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October 1, 2008

File No. 039610-0003

VIA FEDEX

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 08-AFC-9
1516 Ninth Street, MS-4
Sacramento, California 95814-5512

Re: City of Palmdale Hybrid Power Plant Project: Docket No. 08-AFC-9

Dear Sir/Madam:

Pursuant to California Code of Regulations, title 20, sections 1209, 1209.5, and 1210, enclosed herewith for filing please find Applicant's Data Adequacy Supplement, Volume 3.

Please note that the enclosed submittal was filed today via electronic mail to your attention and to all parties on the attached electronic proof of service list.

Very truly yours,

Paul E. Kihm
Senior Paralegal

Enclosure

cc: 08-AFC-9 Proof of Service List (w/encl. via e-mail)
Michael J. Carroll, Esq. (w/encl.)

Palmdale Hybrid Power PROJECT

APPLICATION FOR CERTIFICATION
08-AFC-9

DATA ADEQUACY SUPPLEMENT

Volume 3

Submitted on Behalf of:

PALMDALE
a place to call home

Submitted by:

Inland Energy, Inc.

Submitted to:
California Energy Commission
September 2008

Prepared by:

ENSR | AECOM

Response to CEC Staff Data Adequacy Comments

Technical Area: Project Overview

Following are additional information and/or clarifications in response to the specific issues raised in the CEC staff Data Adequacy review. For each specific area where the questions were raised by CEC staff, the applicable section of the CEC Siting Regulations is identified, followed by the "Information Required to Make AFC Conform with Regulations," followed by the supplemental/clarifying information.

PO-1. Appendix B (b)(2)(C).

TRANSMISSION SYSTEM DESIGN-3 Appendix B(b)(2)(c)

Information Required:

1. Please resubmit Figure 2-10. Show all equipment ratings including generators, transformers, circuit breakers, disconnect switches, and etc. which required for the project.

Please see attached Figures 2-10 and 2-10C.

2. Please provide detail drawings for the take off structures which are required in interconnecting the 230 kV transmission lines from the proposed power plant to the existing Vincent Substation.

Please see attached Figure 2-10A.

3. Provide a one-line diagram for the existing SCE Vincent Substation before the interconnection of the project.

The pre and post conditions are currently being modified by SCE. The pre-substation configuration is undergoing modifications and upgrades, and won't be available until SCE completes their upgrades. This is also being addressed in the Facility Study which the CAISO has indicated will be completed by the end of September, or at the latest in early October.

4. Provide a one-line diagram for the existing SCE Vincent Substation after the addition of the project. Show all equipment ratings including bay arrangement of the breakers, disconnect switches, buses, and etc. which are required for the addition of the project.

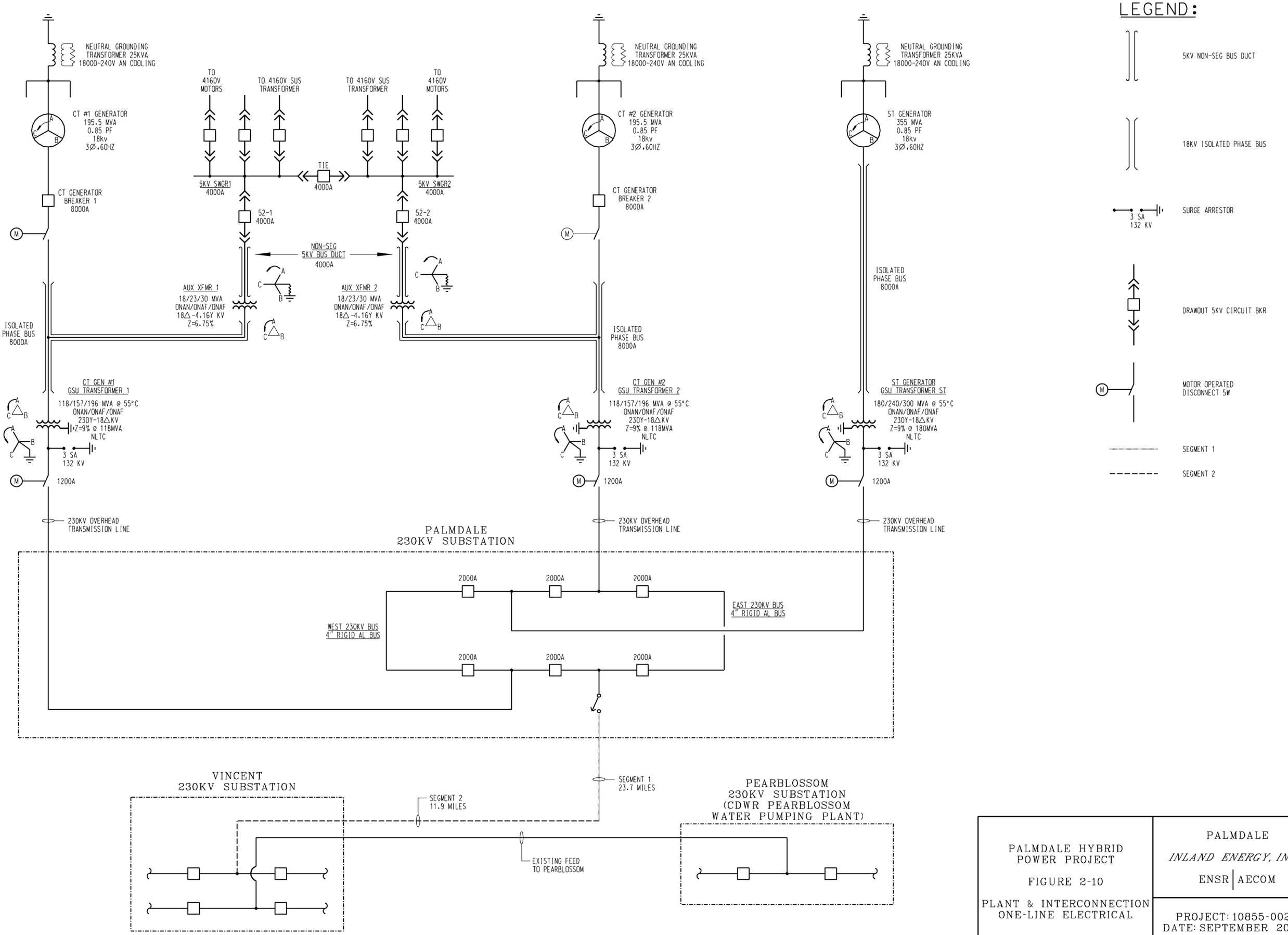
Please see response to 3 above.

5. Please provide transmission pole/tower configurations which would be used to support the generation tie-line from the proposed project to the Vincent Substation.

Please see attached Figure 2-10B.

6. Please clarify the conductor type, current carrying capacity of the conductor, and number of circuits that will be used in Segment 1 (from project site to near the Pearblossom Substation segment) of the generation tie-line.

Please see previous attachments.



PALMDALE HYBRID POWER PROJECT

FIGURE 2-10

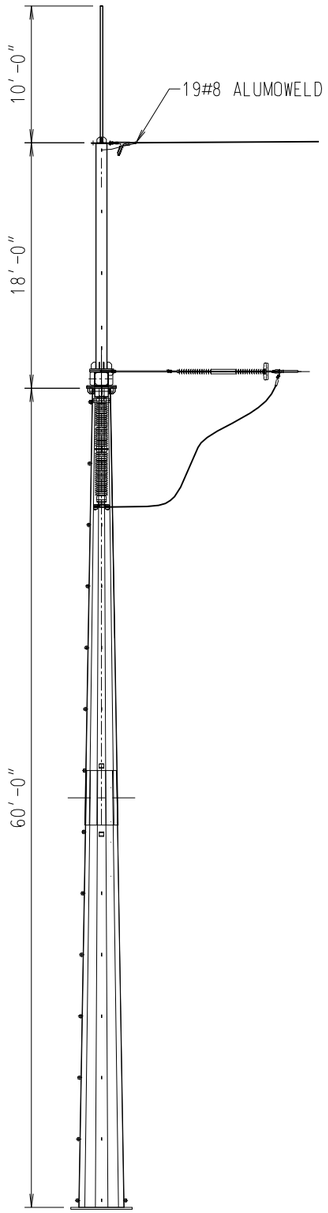
PLANT & INTERCONNECTION ONE-LINE ELECTRICAL

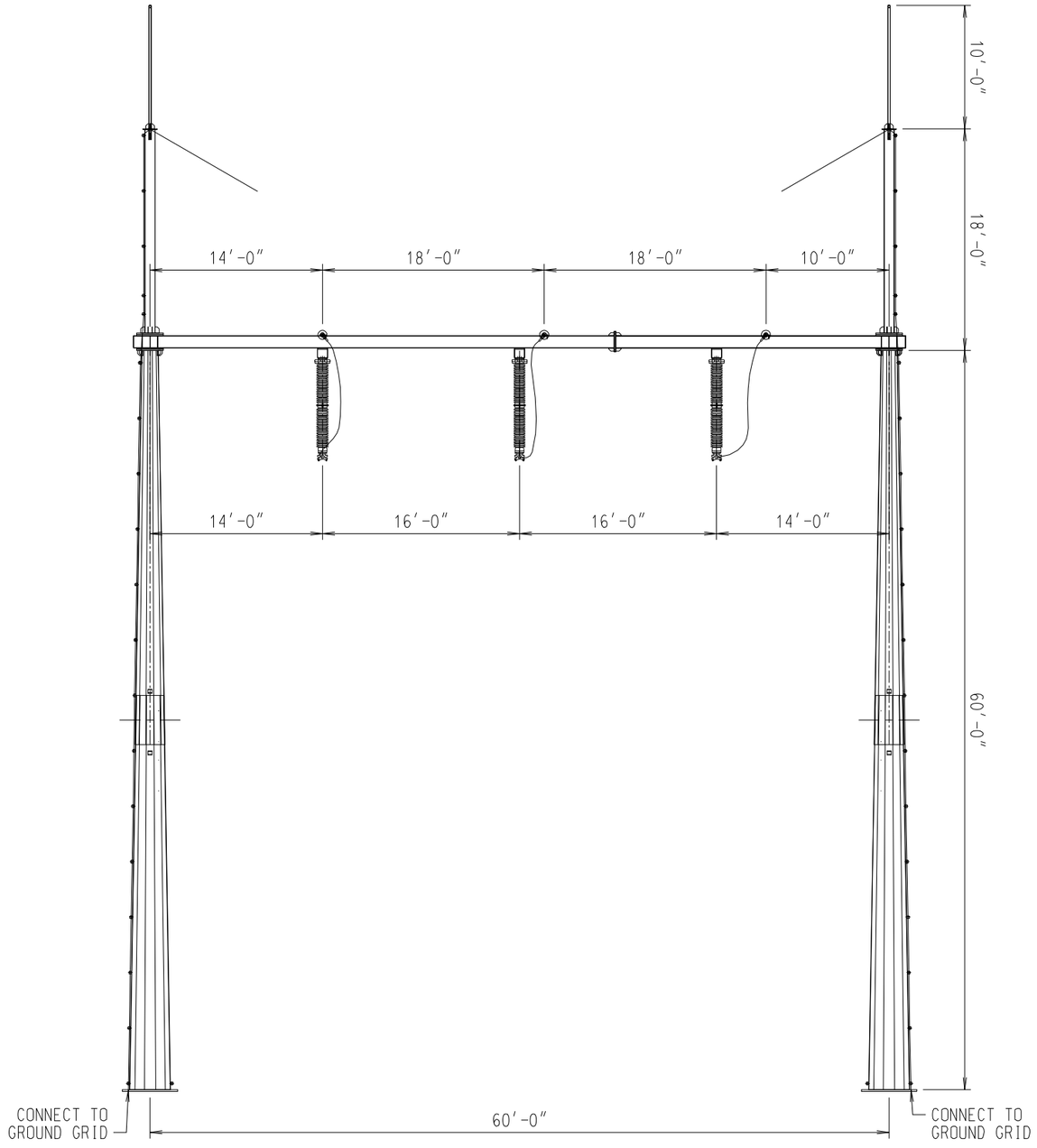
PALMDALE

INLAND ENERGY, INC.

ENSR | AECOM

PROJECT: 10855-002
DATE: SEPTEMBER 2008





SIDE VIEW

230KV TOWER

PALMDALE HYBRID POWER PROJECT

FIGURE 2-10A

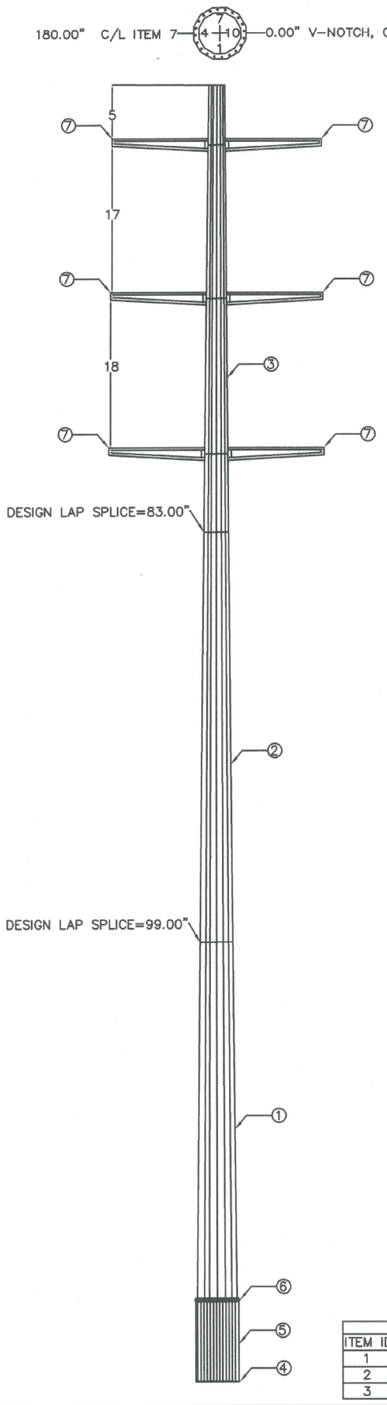
PALMDALE SITE SUBSTATION TAKE-OFF STRUCTURE

PALMDALE

INLAND ENERGY, INC.

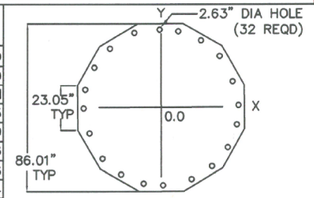
ENSR | AECOM

PROJECT: 10855-002
DATE: SEPTEMBER 2008



ITEM ID	NO REQ'D	FEATURES	WEIGHT (LBS)
1	1	SECTION A	22,704
2	1	SECTION B	15,940
3	1	SECTION C	7,859
	1	ANCHORAGE (SHIPPED ASSEMBLED)	5,928
4	1	BOTTOM CAGE PLATE	
	1	TOP CAGE PLATE (REMOVE BEFOR SETTING POLE)	
5	32	2.25"-4.5 UNC-2A ACHOR BOLT, LENGHT=11.00'	
6	1	BASE PLATE	5,056
7	6	14' COND.	613
		GALVANIZING	806
	198	STEP AND CLIP (VALMONT STANDARD)	1
	72	BOLT 1.25" DIA	
	1	GROUND PLATE	1
	6	VANG	320
	2	VANG	25
	1	POLE CAP	86

HOLE COORDS (INCHES)	
X-COORD	Y-COORD
40.00	7.80
39.24	15.31
36.96	22.23
33.26	28.29
28.29	33.26
22.23	36.96
7.80	39.24
0.00	40.00



NOTES: 1. BASE PLATE THICKNESS=3.500"
2. BASE PLATE ALLOWABLE STRESS (KSI)=60
3. VENT AND DRAIN HOLES PROVIDED
4. MAXIMUM BOLT CIRCLE DIAMETER=80.01"
5. MAXIMUM CAGE TEMPLATE DIAMETER=86.01"

BASE PLATE/ANCHORAGE CHARACTERISTICS

NOTES: 1.POLE SHAFT-GOVERING REACTION
MOMENT = 146.485 IN-KIPS
SHEAR = 96.818 #
VERTICAL = 114.275#
2.V-NOTCH INDICATES CENTERLINE OF THE ARMS

SECTION INFORMATION					
ITEM ID	LENGTH	BASE OD	TOP OD	THK	MATL
1	52'-0.00"	71.00"	57.95"	0.625"	5-22
2	54'-3.00"	61.02"	47.40"	0.500"	5-22
3	53'-11.00"	49.75"	36.23"	0.313"	5-22

PALMDALE HYBRID
POWER PROJECT

FIGURE 2-10B

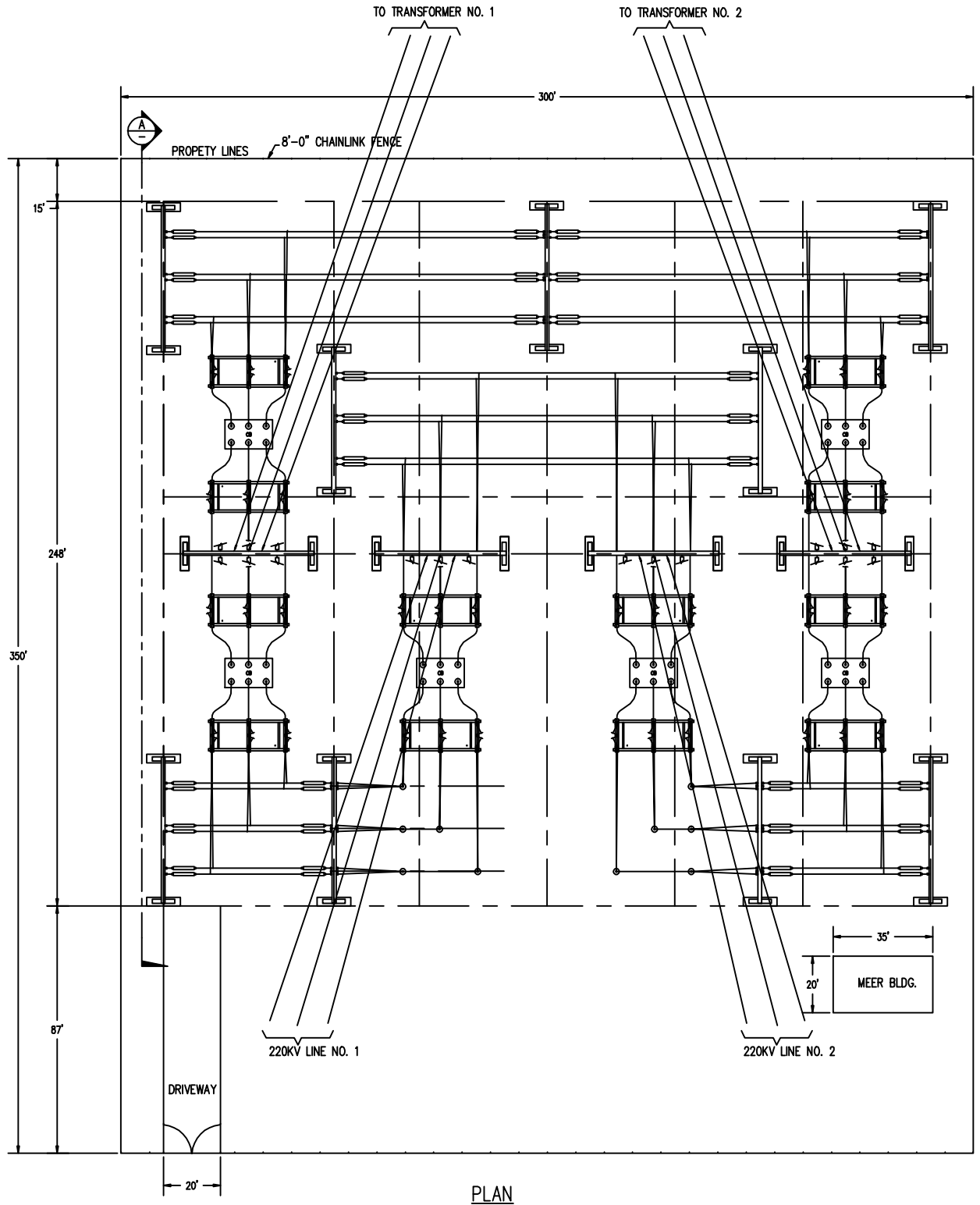
TRANSMISSION LINE TOWER

PALMDALE

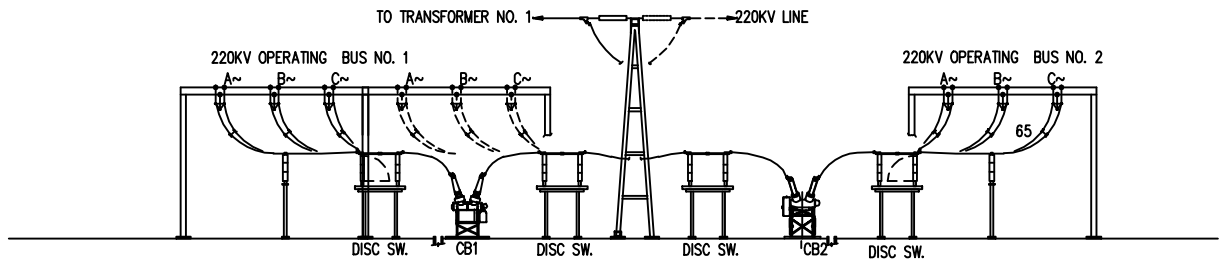
INLAND ENERGY, INC.

ENSR | AECOM

PROJECT: 10855-002
DATE: SEPTEMBER 2008



PLAN



SECTION A
NTS

PALMDALE HYBRID
POWER PROJECT

FIGURE 2-10C
PHPP SWITCHYARD CONCEPT

PALMDALE
INLAND ENERGY, INC.

ENSR | AECOM

PROJECT: 10855-002

DATE: SEPTEMBER 2008

Response to CEC Staff Data Adequacy Comments

Technical Area: Biological Resources

Following are additional information and/or clarifications in response to the specific issues raised in the CEC staff Data Adequacy review. For each specific area where the questions were raised by CEC staff, the applicable section of the CEC Siting Regulations is identified, followed by the "Information Required to Make AFC Conform with Regulations," followed by the supplemental/clarifying information.

BIO-1. Appendix B (g) (13) (A) (iii).

Information Required:

Please identify which species, if any, discussed in the AFC are designated as Fully Protected by updating Table 5.3-5 with this status.

Response:

None of the species in Table 5.3-5 are classified as "Fully Protected" by CDFG.

BIO-2. Appendix B (g) (13) (D).

Information Required:

Please submit results for the protocol burrowing owl surveys reported to be complete by August 15, 2008.

Response:

Please see **Attachment BIO-2**.

BIO-3. Appendix B (g) (13) (D).

Information Required:

Please submit resumes for rare plant/drainage surveyors Green, Rajtaniak, Trumbo, and Rado.

Response:

Please see **Attachment BIO-3**.

BIO-4. Appendix B (g) (13) (D) (i).

Information Required:

Provide survey dates for each sensitive species/resource (e.g., rare plants – specific dates, burrowing owl – specific dates, Mohave ground squirrel – specific dates, general wildlife/vegetation – specific dates, etc.).

Response:

The dates on which the various surveys of the power plant site and all linear facilities were conducted are shown below. These dates also include the surveys that were done in 2006 of the power plant site only.

General Wildlife/Vegetation – Apr 1-26, 2008; May/June 2006 (plant site only)

Desert Tortoise – Apr 1-26, 2008; June 2006 (plant site only)

Burrowing Owl – Apr 1-26, 2008; Aug 11-14, 2008; June 2006 (plant site only)

Mohave Ground Squirrel – Habitat Assessment in July 2008 (Leitner); Trapping (plant site only) in Apr, May, Jul 2006 (conducted by Eremico Biological Services) and in Mar, Apr, May, Jun, Jul 2006 (conducted by CSU Stanislaus).

Special-status Plants – Apr 1-26, 2008; June 2006 (plant site only)

Jurisdictional Delineation – July 2008

BIO-5. Appendix B (g) (13) (D) (iii).

Information Required:

Please submit completed USACE delineation forms with field data for drainages and consult with USACE on any additional data forms required (re: Rapanos decision).

Response:

A delineation report was provided in the AFC with the drainages shown in Figure 5.3-3 and Attachment 3 of Appendix H. Most of the drainages are along the transmission line route, and it is expected that it will be possible to avoid impacts to the drainages when installing the transmission line. Diagrams showing the potential locations of the transmission line poles that would avoid impacts to the washes are shown in **Attachment BIO-5**. When final Project engineering and design is complete, if there could be impacts to jurisdictional waters, an assessment of the type of habitat impacted (e.g., desert wash, wetlands, riparian) will be conducted. This assessment will include impact assessment, mitigation coordination, and completion of permit applications to USACE, CDFG, and RWQCB. A permit schedule, if necessary, is outlined in BIO-10.

BIO-6. Appendix B (g) (13) (D) (iii).

Information Required:

Please submit resumes for drainage surveyors Green, Rajtaniak, Trumbo, and Rado.

Response:

See BIO-3 above (see Attachment BIO-3).

BIO-7. Appendix B (g) (13) (H).

Information Required:

Please provide copies of preliminary agency correspondence (if contact has been made) with CDFG, USFWS, the city, the county, USACE, and RWQCB to discuss potential biological resource concerns, impacts, mitigation, whether separate local, state, or federal permits will be required. Submit detailed records of conversations. Also, include the agency personal conversations cited in the AFC (i.e., Larkin 2008 and Trinh 2008) in the submittal.

Response:

Please see **Attachment BIO-7**.

BIO-8. Appendix B (i) (1) (B).

Information Required:

Add the USACE, RWQCB and the County to Table 5.3-2.

Response:

Revised Table 5.3-2 is provided below.

BIO-9. Appendix B (i) (2).

Information Required:

Include contact information for the appropriate USACE, RWQCB, and County staff in Table 5.3-2.

Response:

See BIO-8 above (see revised Table 5.3-2 below).

Table 5.3-2R Agencies and Agency Contacts

Agency Contact	Phone/E-mail	Permit/Issue
Julie Vance CDFG 1234 East Shaw Avenue Fresno, CA 93710	(559) 243-4017 JVance@dfg.ca.gov	California Endangered Species Act Incidental Take Authorization requirements
Ray Bransfield USFWS 2493 Portola Road, Suite B Ventura, CA 93710	(805) 644-1766, e.317 ray_bransfield@fws.gov	Federal Endangered Species Act Section 7 Consultation
Asoka Herath City of Palmdale Planning Department 38250 Sierra Highway Palmdale, CA 93550	(661) 267-5200 aherath@cityofpalmdale.org	Compliance with City Native Desert Vegetation Ordinance
Phuong Thinh USACE Los Angeles District 915 Wilshire Blvd., Suite 980 Los Angeles, CA 90017	213-452-3372 phuong.h.trinh@usace.army.mil	Jurisdictional status of desert washes and dry lakes in western Mojave Desert near Palmdale and Edwards Air Force Base.
Kirk Larkin RWQCB Colorado River Basin Region 73-720 Fred Waring Drive, Ste 100 Palm Desert, CA 92260	760-776-8964 klarkin@waterboards.ca.gov	Regulates impacts to isolated waters of the State of California under the Porter Cologne Water Quality Control Act. Although water quality issues related to impacts to waterways are normally addressed during 401 Water Quality Certification, waters of the State determined by the Corps not to have Clean Water Act jurisdiction, Porter Cologne would be addressed under a Construction General Permit, State General Waste Discharge Order, or Waste Discharge Requirements depending upon the level of impact and the properties of the waterway.
Bruce McLendon Los Angeles County Department of Regional Planning 1390 Hall of Records 320 West Temple Street Los Angeles 90012	(213) 974-6401 dslavin@planning.lacounty.gov Zoningldcc@planning.lacounty.gov	Land Use and Zoning

BIO-10. Appendix B (i) (3).

Information Required:

Provide approximate month and year for each submittal, particularly the federal Biological Assessment.

Response:

Biological Assessment

An abbreviated Biological Assessment (see Attachment BIO-7 for correspondence with Ray Bransfield, USFWS) needed for the USFWS to make a determination through informal consultation with the U.S. EPA under the PSD permit is expected to be submitted in October 2008.

Jurisdictional Waters (if necessary)

Fill into Waters of the U.S. requires:

- USACE – Nationwide Permit 12 for linear utilities (Section 404 of the Clean Water Act)
- CDFG – Streambed Alteration Agreement (Section 1602 of State Fish and Game Code)
- RWQCB – Water Quality Certification (Section 401 of the Clean Water Act)

Impacts to Waters of the State requires:

- CDFG – Streambed Alteration Agreement
- RWQCB – compliance with Porter Cologne Act through General Construction Permit (requires Stormwater Pollution Prevention Plan) or other means

Schedule:

- Preliminary Designs come in (mid-November).
- Week 1 – AMEC ground truths locations and routes. While in the field, assess potential impacts.
- Week 2 – if impacts would occur, discuss with engineers a re-route/design change.
- Week 3 – if not avoidable, assess impacts and delineate wetlands (if applicable).
- Week 4 – discuss and institute minimization measures and offsite mitigation (if needed). Assemble application materials and submit (Jan 2009).
- 3-6 months for processing permits through agencies.

California Endangered Species Act (CESA)

CEC may include CESA permit requirements in the license, but if not, an application for an Incidental Take Permit (Section 2081) for Mohave ground squirrel, and possibly desert tortoise, will be submitted to CDFG.

Schedule:

- Preliminary Designs come in (mid November).
- Submit Application in January 2009.
- Application approval can take up to 30 days once the application is complete.

City of Palmdale

Permits for the Native Desert Vegetation Ordinance (designed to preserve a number of specimen-quality juniper and Joshua trees, and to encourage the use of native vegetation in new development landscaping) will be obtained.

Schedule:

- Submit a permit request in May 2009 (can occur at any time, timing selected to be near end of AFC process such that removing Joshua trees occurs within a few months of start of contruction).
- Approximately ½ month for the City to review the permit application.
- Approximately 4 months to identify, mark and remove the Joshua trees.

Attachment BIO-2

Attachment BIO-2 provided under separate cover

Attachment BIO-3

John F. Green, B.Sc.

Wildlife Biologist

Professional summary

Mr. Green has a broad background in field biology, including extensive experience with birds, mammals, reptiles, amphibians, insects, and plants. In Southern California, he has experience on sites in Imperial, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Santa Barbara Counties and in Northern California and Nevada as well. Professional experience includes: general biological surveys for wildlife and plants; vegetation mapping; revegetation and revegetation monitoring; seed collecting; focused sensitive, threatened, and endangered wildlife and plant species surveys; monitoring for sensitive, threatened, and endangered species; sensitive species exclusion and relocation; small mammal trapping studies; and the preparation of documents and reports related to those projects.

Professional qualifications

Scientific Collecting Permit #801133-03 California Department of Fish and Game

Independent Investigator for Quino Checkerspot Butterfly on Federal Threatened/ Endangered Species Permit #TE804203-6

Independent Investigator for California Gnatcatcher on Federal Threatened/Endangered Species Permit, #TE785148-7 (surveys and nest monitoring)

Independent Investigator for Least Bell's Vireo on Federal Threatened/Endangered Species Permit, #TE-054011-0 (nest monitoring)

Independent Investigator for Southwestern Willow Flycatcher on Federal Threatened/ Endangered Species Permit, #TE785148-7 (surveys and nest monitoring)

Supervised Investigator for California Red-legged Frog on Federal Threatened/ Endangered Species Permit # TE785148-7

Supervised Investigator for Stephens' Kangaroo Rat on Federal Threatened/Endangered Species Permits #TE804203-5 and TE785148-7

Supervised Investigator on Federal Threatened/Endangered Species Permit for San Bernardino Kangaroo Rat, #TE804203-5

Supervised Investigator for Pacific Pocket Mouse on Federal Threatened/Endangered Species Permit # TE785148-7

Subpermittee on Federal Bird Marking (Bird Banding) and Salvage Permit #23035-D

Field Assistant on Memorandum of Understanding (MOU) from the California Department of Fish and Game for California Gnatcatcher, Palm Springs Pocket Mouse, Stephen's Kangaroo Rat, San Bernardino Kangaroo Rat, and Mojave River Vole.

Wetland Delineation Training Certificate

Desert Tortoise Council Certificate
Western Field Ornithologists Conferences 2002, 2003
The Desert Tortoise Council Surveying, Monitoring, and Handling Techniques Workshop 2002
Identification of California Branchiopod Crustaceans Workshop (Fairy Shrimp and Tadpole Shrimp) 2002
Southern California Botanists Symposium - "Rare Plants in Southern California" 2002
California Native Plants Seed Collecting and Storage, Rancho Santa Ana Botanic Garden, Claremont 2002
Southern Willow Flycatcher Survey Training Workshop 2002
Desert Plants During the Non-Blooming Season, University of California Extension, Riverside 2002
Plant Identification and Ecology, University of California Extension, Riverside, 2002
Rapid Assessment Method Vegetation Training Workshop, California Native Plant Society, San Diego 2002
South Coast Missing Linkages Workshop, University of Redlands, Redlands 2002
Survey of the Major Plant Families of Southern California, Rancho Santa Ana Botanic Garden, Claremont 2002
The Grass Family: Identification and Ecology, Rancho Santa Ana Botanic Garden, Claremont 2002
Vegetation Program Releve Training, California Native Plant Society, San Diego 2002
Introduction to Bird Banding, University of California Extension, Riverside, 2001
Field Study of Birds: Spring, University of California Extension, Riverside, 2001
Field Study of Birds: Winter, University of California Extension, Riverside, 2001
Field Study of Birds: Fall, University of California Extension, Riverside, 2000
Learning California Bird Sounds Workshop, Audubon Society, Orange County 1998
Cuckoos, Woodpeckers, Doves, and Gallinaceous Birds of California-An Intermediate/Advanced Birding Skills Workshop, Audubon Society, Orange County 1998
Birding by Ear-An Intermediate/Advanced Birding Skills Workshop Audubon Society, Orange County 1997
Warbler Identification Workshop, Garrett and Dunn, Los Angeles Audubon Society 1997
Some Families of North American Waterbirds-An Intermediate/Advanced Workshop, Audubon Society, Orange County 1997
Birding by Ear-An Intermediate/Advanced Birding Skills Workshop Audubon Society, Orange County 1996
Sparrows, An Intermediate/Advanced Birding Skills Workshop, Audubon Society, Orange County 1996
Birding With Your Ears Workshop, Audubon Society, Orange County 1996
Gulls of California-An Intermediate/Advanced Workshop 1995
Birding With Your Ears Workshop, Audubon Society, Orange County 1994
Birding Workshop, Audubon Society, Orange County 1993
Shorebirds-An Intermediate/Advanced Workshop, Audubon Society, Orange County 1992
Birding Workshop, Audubon Society, Orange County 1992

Education

University of California Extension, Riverside, CA 2000-present (Certificate in Field Ornithology/Field Botany/Field Ecology Programs)
University of California, Riverside, CA 1991 (BS Entomology)
Fullerton College, Fullerton, CA 1989 (AA Biology)

Memberships

American Birding Association
American Ornithologists' Union
Association of Field Ornithologists
California Native Plant Society
Cooper Ornithological Society
Desert Tortoise Council
Western Field Ornithologists
Wilson Ornithological Society
Xerces Society (invertebrate biodiversity)

Language

English

Summary of core skills

General Biological Surveys

Mr. Green has performed numerous general biological surveys. Such surveys involve research on a project area to identify potential sensitive elements, field surveys on the site to identify all plants and wildlife possible, and preparation of a report on the results of that research and fieldwork. Such reports identify impacts, if any, which the project will cause, and recommends focused surveys and other mitigation measures as needed. Examples of a few such projects that have been prepared by Mr. Green include a survey at an oak woodland/riparian/coastal sage scrub/chaparral interface, including vegetation mapping, for a retention basin project; a survey in degraded coastal sage scrub for a wastewater treatment plant; a survey at the base of the Santa Rosa Mountains in Palm Springs for a golf course being constructed in a desert wash; a survey on sand dunes in La Quinta for a church construction project; a survey on former agricultural land in Indio for a housing development and a multiple species habitat conservation plan compliant series of surveys for a nine mile long power line project.

Desert Tortoise Monitoring and Surveying

Mr. Green has spent hundreds of hours monitoring and surveying for the threatened Desert Tortoise in both the Mojave and Colorado Deserts, including the performance of protocol presence-absence and clearance surveys. He has taken the workshop on Desert Tortoises offered by the Desert Tortoise Council, and gotten their certification. He has encountered and observed the Desert Tortoise in the field many times over the past fifteen years, while on both personal and professional desert visits. He is familiar with Desert Tortoise biology and ecology; with their Federal and State Threatened status; with the protocols for detecting them and their sign, and with the protocols for safely observing them.

Representative Projects

Cabazon Clearance Survey and Monitoring (Coachella Valley)
Canyon Vista Survey (Coachella Valley)
Coachella Canal Presence/Absence Survey – Remains found
Coachella Water District Dike 4 Presence/Absence Survey
Desert Dunes Presence/Absence Survey (Coachella Valley)
Interstate 15 Presence/Absence Survey (Mojave Desert)
Kangaroo Rat Study (East Mojave) – Numerous sightings of Desert Tortoise
Kramer Junction Monitoring (Mojave Desert) – Multiple tortoises observed
Mesquite, Nevada Presence/Absence Survey (abundant tortoise sign detected)
The Crest Tortoise Presence/Absence Survey (Coachella Valley)
Whitewater Hill Monitoring (Coachella Valley) – tortoise observed multiple days
Yucca Valley Presence/Absence Survey (abundant sign and two tortoises detected)

Victorville 2 Power Plant Presence/Absence Survey (sign and tortoises detected)

Mountain Plover Studies
Mr. Green has participated in two statewide surveys for Mountain Plovers and in a 2002 census of the species in the entire Imperial Valley. Mountain Plover is a declining sensitive species that has been considered for federal listing.

Riverside County Breeding Bird Atlas
The Breeding Bird Atlas project was an attempt to create a baseline on the status of breeding birds in Riverside County. During this effort, Mr. Green surveyed an area in Riverside County that included much of the Box Springs Mountains and northern Moreno Valley.

Partners in Flight/Birds in the Balance Avian Monitoring
Partners in Flight is a cooperative effort between dozens of government, industry, and environmental entities united to promote bird conservation. One aspect of this effort is the establishment of several regularly scheduled point counts per year on a multi-year basis in numerous locations. The data collected is providing baseline data on bird populations over time. Mr. Green spent several years conducting point counts in Orange County, California for this effort.

Least Bell's Vireo Monitoring/Southwestern Willow Flycatcher Surveys
Mr. Green spent the 2002-2006 breeding seasons monitoring a population of the threatened Least Bell's Vireo on the Santa Ana River in Riverside County. This study is part of a multi-year monitoring effort, which includes presence/absence surveys for the Southwestern Willow Flycatcher. The data collected has added to the evidence of the vireos' positive response to the recovery efforts that have been made on its behalf, and of the failure of the flycatcher to respond positively to those same efforts.

Kangaroo Rat Study in the East Mojave
This study involved trapping and identifying many species of small mammals in addition to the three species of kangaroo rats involved. Monthly visits were made for four years and data was collected to establish longevity, abundance, health, and activity periods over time.

Revegetation/Restoration Monitoring
Mr. Green has participated in revegetation efforts, including soil preparation, seed collection, seeding, planting, and long term monitoring. Sites where he has worked on this include: Cabazon and Whitewater in the Coachella Valley, following construction of wind farms; at Edwards Air Force Base restoring a burn site; Trona following mining operations; Vandenberg Air Force Base following bridge construction; and at Edwards Air Force Base using seeding, planting, and vertical mulching to close unwanted roads.

Location
Riverside, California, USA

Employment history
Biologist, AMEC Earth and Environmental 2001-present
President, John F. Green, Incorporated 1979-2001
Detection of Tephritid fruit flies, Supervisor, Department of Agriculture 1991-1996
Assistant (Entomology), University of California, 1991

Presentations / publications
North American Birds, Riverside County editor, Fall 2002-present.
Birds of the Season, 1998-2005, published quarterly in the *Western Meadowlark*

Birds and other Vertebrates of the Box Springs Mountains and Vicinity 1998, updated yearly for the Riverside County Parks Department's Box Springs Reserve
Ornithological Considerations for Habitat Connectivity. Presentation at the South Coast Missing Linkages Workshop, University of Redlands, Redlands 2002
Green, John F., David H. Headrick, and Richard D. Goeden 1993. Life History and Description of Immature Stages of *Procecidochares stonei* Blanc & Foote on Viguiera spp. in Southern California (Diptera: Tephritidae). *Pan-Pacific Entomologist* 69(1): 18-32.

Detailed core skills

Mr. Green is experienced in visually and aurally identifying birds. He has spent thousands of hours in the field, both personally and professionally, studying birds in California. He has hundreds more hours of bird observations over most of the United States and in Canada, Costa Rica, Great Britain, Kenya, Madagascar, and Mexico. He has observed, surveyed for, and monitored for, sensitive bird species including Burrowing Owl, California Gnatcatcher, Least Bell's Vireo, and Southwestern Willow Flycatcher. He is the Riverside County editor for the journal *North American Birds*, which reports quarterly on trends in bird populations and occurrences. For over ten years he has participated in several count circles for the National Audubon Society's Christmas Bird Count program. For seven years he was the compiler of the Southeastern California Rare Bird Alert, which included quarterly summaries published in *The Western Meadowlark* newsletter and consultation on avian issues for articles in the *San Bernardino Sun* and the *Riverside Press-Enterprise* newspapers. Mr. Green also leads birding field trips for the Audubon Society. He has conducted personal and historical research to compile and maintain the bird section of a checklist of vertebrates of the Box Springs Mountains in western Riverside County.

Mr. Green has hundreds of hours of field study and identification of mammals as well. He spent four years assisting with a kangaroo rat and small mammal trapping study in the East Mojave. He has monitored in occupied habitat for the endangered Pacific Pocket Mouse on Camp Pendleton and for the endangered Stephens' Kangaroo Rat on the former March Air Force Base. He has assisted with trapping surveys in occupied habitat for sensitive species such as the Palm Springs Pocket Mouse, Northwestern San Diego Pocket Mouse, Los Angeles Pocket Mouse, San Diego Desert Woodrat, and for the endangered San Bernardino Kangaroo Rat, . He was a licensed County Agricultural Inspector Biologist in vertebrates while working for the Department of Agriculture. He has conducted personal and historical research to compile and maintain the mammal section for a checklist of vertebrates of the Box Springs Mountains in western Riverside County.

Mr. Green has independently spent thousands of hours over three decades observing and identifying reptiles and amphibians, both by sight and in the hand, especially in California and the Southwest. He is especially familiar with the reptile and amphibian species in Southern California. His time in the field has included numerous observations of threatened and endangered amphibians and reptiles, including Mountain Yellow-legged Frog, Red-legged Frog, and Desert Tortoise; and sensitive species including Western Spadefoot Toad, Colorado River Toad, Yosemite Toad, Western Pond Turtle, San Diego Horned Lizard, Mojave Fringe-toed Lizard, Belding's Orange-throated Whiptail, Coastal Western Whiptail, Silvery Legless Lizard, Rosy Boa, Ringneck Snake, and Mountain Kingsnake. He has conducted personal and historical research to compile and maintain a reptile and an amphibian section for a checklist of vertebrates of the Box Springs Mountains in western Riverside County.

John F. Green

Mr. Green has spent thousands of hours of work in field entomology beginning over twenty-five years ago. He is skilled at identifying insects. He is permitted for, and has surveyed for and detected the federally listed endangered Quino Checkerspot Butterfly. He created school display and teaching collections for John A. Rowland High School and for Fullerton College. He has published a life history on one species of Tephritid fly. He taught insect information and appreciation workshops for the Fullerton Unified School District and for the City of Fullerton in Orange County. He assisted with an ant survey on the Santa Rosa Plateau in Riverside County, and discovered a previously unknown species there. He spent several years in the field detecting and identifying fruit flies and their hosts in Orange and Los Angeles Counties. He participated in the field on the study that brought the Ash Whitefly under control in Southern California. He also led educational tours at the Newport Back Bay Reserve in Orange County.

Mr. Green has spent hundreds of hours in the field studying California's native plants, surveying for them, landscaping with them, and revegetating with them. The majority of that time has been spent in important Southern California plant communities such as coastal sage scrub, chaparral, and cottonwood/willow/sycamore riparian areas. He identified and reported previously unknown relict populations of Yerba Santa in the Box Springs Mountains near Riverside, and of San Diego Ambrosia and Coastal Cholla in Temecula. Previously only two occurrences of San Diego Ambrosia were known in Riverside County, and Coastal Cholla was believed to have been extirpated in the county. The nearest known population of Yerba Santa was in the San Jacinto Mountains, about 20 miles away.

In addition to those species already mentioned, Mr. Green's time in the field has included many observations of sensitive, threatened, or endangered species and their sign such as the Black-flowered Figwort, Long-spined Spineflower, Nevin's Barberry, Palmer's Grappling Hook, Payson's Jewel-flower, San Diego Tarweed, Small Flowered Morning-glory, Vernal Barley, Coachella Valley Jerusalem Cricket, Yuma Clapper Rail, Snowy Plover, California Least Tern, Burrowing Owl, Loggerhead Shrike, Coastal Cactus Wren, Le Conte's Thrasher, Bighorn Sheep, San Diego Black-tailed Jackrabbit, and many others.

Dave M Kajtaniak

Staff Biologist

Professional Summary

Mr. Kajtaniak has over nine years of professional endeavors with publicly and privately owned organizations. To date, he has conducted professional biological and environmental assessment work throughout San Bernardino, Riverside, Imperial, Humboldt, Del Norte, and Siskiyou counties in California, Storey County, Nevada, as well as counties in northwest and southeast Ohio. Mr. Kajtaniak's work has focused on the research and management of Threaten, Endangered, and Sensitive Species of fish and plants in many different eco-regions. This has incorporated broad computer and mechanical skills to perform analyses and documentation within project-related assignments. His expertise has been derived from a formal education (BS in Field Biology) and extensive domestic field experience.

Professional experience includes playing a key role in the development and implementation of a state-wide, holistic approach for watershed assessments. Mr. Kajtaniak has served as the lead biologist supervising and managing biological compliance monitoring and sensitive species survey efforts for a variety of large-scale projects, conducting focused surveys and monitoring of a variety of endangered, threatened, and/or otherwise sensitive species, and performed wetland delineations in various habitats and regions. In addition to fieldwork, Mr. Kajtaniak authors environmental and biological assessments, wetland delineation reports, watershed assessments, habitat suitability evaluations for sensitive species, mitigation and revegetation plans, instream habitat improvement projects, and comprehensive field inventories of flora and fauna.

Professional Qualifications

California Department of Fish and Game Scientific Collectors Permit #801280-03

Supervised Investigator for California Gnatcatcher on Federal Threatened/Endangered Species Permit, #TE785148-7 (survey activities)

Supervised Investigator for Least Bell's Vireo on Federal Threatened/Endangered Species Permit, #TE-054011-0 (survey activities)

Supervised Investigator for Southwestern Willow Flycatcher on Federal Threatened/ Endangered Species Permit, #TE785148-7 (survey activities)

Supervised Investigator for California Red-legged Frog on Federal Threatened/ Endangered Species Permit # TE785148-7 (survey activities)

Supervised Investigator for Stephens' Kangaroo Rat on Federal Threatened/Endangered Species Permits #TE804203-5 and TE785148-7 (survey activities)

Supervised Investigator on Federal Threatened/Endangered Species Permit for San Bernardino Kangaroo Rat, #TE804203-5 (survey activities)

Supervised Investigator for Pacific Pocket Mouse on Federal Threatened/Endangered Species Permit # TE785148-7 (survey activities)

Wetland Delineation Training Certificate

Desert Tortoise Council Certificate

Education

College of the Redwoods, Eureka, CA
Furthering education, Semester Units 11, January 2002 to April 2003

Ohio University, Athens, OH
B.S. in Field Biology, November 1999

Seminars, Symposia, and Workshops

Large Mammal Tracking Training – California Department of Fish and Game. August 23, 2006, Niland, CA.

Desert Tortoise Council Surveying, Monitoring & Handling Techniques Workshop. October 22 & 23, 2005, Ridgecrest, CA.

Wetland Training Institute, Inc (WTI) Wetland Delineation Course. July 25-29, 2005, San Diego, CA.

Survey of Major Plant Families of Southern California: Advanced Plant Identification Workshop. January, 2005, Rancho Santa Ana Botanic Garden, Claremont, CA.

Big Bear Fireshed Workshop. August, 2004, Fawnskin, CA.

Society of American Foresters: Evaluation of San Bernardino National Forest Conference. May, 2004, Lake Arrowhead, CA.

16th, 17th, 19th, 21st, and 24th annual California Salmonid Restoration Federation Conference: February and March 1998, 1999, 2001, 2003, & 2006 various locations in California.

Memberships

Salmonid Restoration Federation – Alternate Board Member (June 2006 to Present)
Pomona Valley Audubon Society – June 2005 to Present
Friends of the Big Morongo Canyon Preserve 2004 to Present
California Native Plant Society – Humboldt Branch 2001-2003

Languages

English

Detailed Core Skills by Project

Domestic Water Development and Supply

Coachella Canal Lining Project. Currently serving as Lead Field Monitor for the biological monitoring of sensitive biological resources during the bypass canal construction phase. Duties include: development and implementation of large mammal monitoring plan, coordinating and scheduling monitoring activities, and ongoing discussion of biological issues with Coachella Valley Water District and construction engineers and contractors. I also contributed to the development and writing of the Environmental Protection Plan for the Coachella Canal lining project. Participated in revegetation efforts, including surveying and mapping Sonoran thorn woodland and seed collection.

Fern Valley Water District. Surveyed Fern Valley Water District's property to mark dead and dying stands of trees. Determined property boundaries and flagged in project site area. In addition to marking tree stands, area was surveyed for possible archaeological sites.

Electrical Power

Southern California Edison (SCE) DSP Projects. Performed reconnaissance level flora and fauna and focused rare plant surveys along existing SCE powerlines in San Bernardino and Riverside Counties. Upon completion of surveys wrote biological assessment reports addressing any and all biological issues concerning proposed projects.

SCE Bark Beetle Project. Supervised and managed a crew of up to 5 field technicians for an eight month period conducting assessments in residential areas for dead and dying trees. This project, located in the mountain communities of the San Bernardino and San Jacinto mountains, involved recording dead and dying tree species, mapping surveyed areas, and imputing, organizing, and analyzing field data.

Renewable Energy Resources

Victorville 2 Hybrid Power Project, ENSR, Victorville, CA. Conducted focused Desert Tortoise surveys, focused Burrowing Owl surveys, focused surveys for rare plants, focused trapping surveys for Mojave ground Squirrel, vegetation and sensitive species mapping, identification and delineation of jurisdictional water courses, and identifying potential mitigation strategies for a 400+ acre hybrid power plant site and associated transmission lines and pipeline easements. Regulatory agencies involved included California Energy Commission, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, and California Department of Fish and Game.

U.S. Forest Service

Klamath National Forest Road Surveys. Conducted road / upslope watershed sediment delivery assessments following the U.S. Forest Service protocol. Inspected roads and road infrastructure features such as: culverts, water bars, and inboard drainages, in determining sediment delivery to fish bearing streams.

Klamath National Forest Stream Surveys. Performed California Department of Fish and Game in-stream structure evaluations in fish bearing tributaries of the Klamath River. These evaluations included an assessment of current stream conditions, fish habitat improvement structures, and recommendations and designs of future watershed improvement projects.

California Department of Fish and Game (CDFG)

North Coast Watershed Assessment Program. Integral role in a multiple agency effort that performed watershed assessments in Northern California (see employment history below).

AmeriCorps Volunteer. Assisted CDFG with their in-stream restoration program in northern California. Created and implemented watershed and in-stream restoration projects. Performed various Pacific salmon field inventories such as spawner surveys, juvenile snorkelling dives, downstream migrant trapping, and stream habitat surveys (see employment history below).

County Parks and Recreation

Toledo Metroparks Ecosystem Restoration. Performed ecological restoration of different habitats in the Oak Openings region of Northwest Ohio. Through the active restoration and management (controlled burns, eradication of non-native species, seed collection) of sand dunes, prairies, oak woodlands, and oak savannahs populations of endangered flora and fauna were increased as well as overall improvement in genetic diversity.

Private Timberlands

Pacific Lumber's Stream Watershed Analysis. Contributed to the fisheries portion of the Elk River Watershed Analysis in Humboldt County. This project entailed: snorkel dives for presence/absence of fish species, habitat typing all class one watercourses, determining end of anadromy, mapping fish distribution by species, and writing and editing stream reports.

Transportation and Infrastructure

CalTrans State Route 138, Segments 10 & 11, CalTrans District 7, Los Angeles County, CA. Assisted lead field biologist in the coordination of biological monitoring of the widening of two different, approximate 3-mile sections of State Route 138 in the vicinity of Pearblossom, Los Angeles County, CA. Duties included scheduling monitoring activities, conducting focused preconstruction/clearance surveys for rare plants, Desert Tortoise and Mojave Ground Squirrel, monitoring, supervision and inspection of exclusion fence installation. Other duties included meeting, communicating, and coordinating with CalTrans inspectors, and Granite Construction Company personnel.

Cedar Canyon Fire. Coordinated with timber crews of tree removal in Cedar Glen after the Cedar Glen Fire. On site supervision of tree cutting selection and marking of trees in burned residential areas.

Education and Community Outreach

Trinidad Elementary School. Taught science, specifically stream ecology and fisheries, based curriculums in schools from grades first through seventh, including organizing and leading a class field trip to a local fish hatchery.

Community Events. Participated in numerous community events aimed at improving environmental health and promoting public awareness. These included: Klamath River clean-up, Eureka Marsh Clean-up, Humboldt Bay Wildlife tree planting, Trinidad State Park non-native plant eradication, and Eureka food drive.

Employment History

Staff Biologist / Ecologist, AMEC Earth & Environmental, Inc.: August 2004 – present

Prepares environmental assessments (EA), biological assessments (BA), Wetland Delineations, and focused sensitive species' surveys and habitat assessments for both the public and private sectors. Conducts focused presence/absence surveys for rare and endangered flora and fauna including the Coachella Valley Milkvetch, Least Bell's Vireo, Burrowing Owl, Desert Pupfish, Santa Ana Sucker, Mojave Ground Squirrel, San Bernardino Kangaroo Rat, and Desert Tortoise. Serves as Lead Field Monitor for biological compliance monitor for large-scale construction projects.

Forestry Technician, ACRT, Inc.: June 2004 – July 2004

Performed environmental consultation with private landowners and homeowner's association concerning forestry management and fuels modification. This work entails the following: flagging project boundaries, mapping surveyed areas, identifying archeological sites, wildlife habitat, watercourses, and other pertinent landscape features, tree species identification, marking dead and dying tree stands, and organizing data inventory.

Forestry Technician, Mason Bruce and Gerard, Inc.: August 2003 – April 2004

Mr. Kajtaniak led a crew of field technicians surveying bark beetle infested trees throughout the San Bernardino National Forest. Some of my work duties included: cruise checking crew members for quality control, identifying infected trees, organizing and integrating data, and mapping surveyed areas. Mr. Kajtaniak also coordinated with logging crews directing tree removal within residential areas and private timberlands.

Fisheries Biologist, Pacific States Marine Fisheries Commission: August 2001 – April 2003

Mr. Kajtaniak was an integral part of a multi-agency collaborative team conducting watershed assessments on river systems in Northern California. He performed in-field and academic research, analytical analysis of historic and current field data and previous studies, and extensive technical writing and editing watershed assessment reports.

- Developed recommendations for habitat improvement, future monitoring studies, land-use activities, and the overall advancement of salmonid species.

- Participation in frequent multi-agency meetings and conferences conducting technical analysis and development of watershed assessment reports.
- Collected and integrated habitat inventory data, electro-fishing data, and other pertinent fisheries and watershed information.

Fisheries, Botanical, and Forestry Technician – Natural Resources Management Corp.: April 2000 – August 2001

Utilized multidimensional skills to perform field and office duties of these positions. Primarily I lead fisheries and botanical crews on species surveys of private timber and rangelands; completed fish habitat and plant species reports; participation in the development of timber harvest plans. Completion of these tasks included the following:

- Mapped fisheries information (fish distribution by species on Pacific Lumber Corporation basemaps, identified possible mitigation barriers, and access points for further field research).
- Proposed proper mitigation in accordance with state laws for "threatened" species of salmonids under the federal Endangered Species Act.
- Deciphered aerial photos to determine vegetation landscapes.
- Rare plant species field surveys and habitat assessments on timber harvest plans and appurtenant roads.
- Wetland identification.
- Determined slopes, possible methods of timber extraction, and mapped completed surveyed areas.

AmeriCorps Volunteer – Watershed Stewards Project: October 1997 – August 1999

As a member of the Watershed Steward's Project I conducted research and monitoring protocols pertaining to Pacific salmon species, created and implemented restoration projects throughout northern California, and integrated educational programs in various classroom and community settings. Some of my many tasks performed included:

- Wrote and reviewed project and site plans including required federal and state permits.
- Supervised California Conservation Corps crews and Humboldt State student volunteers on habitat restoration projects throughout years of service with AmeriCorps.
- Implemented watershed improvement projects such as riparian re-vegetation, stream bank stabilization using bio-engineering techniques, and cattle exclusion fencing.
- Conducted road / upslope watershed sediment delivery assessments following the U.S. Forest Service protocol.

Land Management Crew Member, Toledo Metroparks: June 1995 - September 1997

Performed ecological restoration of different ecosystems (prairie, oak savannah, oak woodland, and sand dunes) in the Oak Openings region to improve populations of Threatened and Endangered species and promote genetic diversity of native species of flora and fauna. Helped propose habitat management plans and implemented these plans through various projects. Field work included: determining range, distribution, and abundance of Threatened and Endangered species of plants, continuous inventorying

and monitoring of local flora, seed collection, prescribed burns, and non-native species eradication.

Grants and Publications

Fisheries Grants 1998-1999
Acquired over $40,000 in grants funding California Conservation Corps fisheries restoration projects and work tools for California Department of Fish and Game's volunteer fisheries program.

Cannata,S. and **D.M. Kajtaniak (**2006*).* Redwood Creek watershed synthesis report, Assessments of anadromous salmonids and stream habitat conditions of the Redwood Creek Basin. California Resources Agency and California Environmental Protection Agency; Sacramento, California.

TED RADO
BIOLOGICAL CONSULTING

Threatened & Endangered Species Surveys
Section 7 and Section 10(a) Permitting
Habitat Conservation Plans
NEPA/CEQA - CDFG 2081 Permitting
Environmental Education Programs

Environmental Reports
Regulatory Review
Mitigation Planning
Project Planning
Construction Monitoring

3144 Celeste Dr., Riverside, CA 92507 • Office (951) 369-8510

Ted Rado

Date of Birth: January 10, 1952

Current Address: 3144 Celeste Drive
Riverside, California 92507

Telephone Number: 951/369-8510

Education: San Jose State University
B.A. Zoology - December 1974
M.A. Biology - August 1977

EXPERIENCE

1989-2004 Independent consulting biologist. Work has included field surveys, report preparation, and preparation of Habitat Conservation Plans and related documents. Projects have included oilfield actions, prison construction and permitting, wind energy, mining, pipelines, roads, and urban development.

1989-Mar 1990 Wildlife biologist. U.S. Bureau of Land Management, Riverside, California. Preparation of an EIS addressing regional control of ravens, assisting Area Offices with various projects affecting desert tortoises, and development of mitigation measures for the desert tortoise.

1984-1989 Wildlife Biologist. U.S. Fish and Wildlife Service, Endangered Species Office, Sacramento, California. Work included preparation of Section 7(a) biological opinions and development of conservation plans for regional Section 10(a) permit applications.

1981-1984 Wildlife Biologist. U.S. Bureau of Land Management, Barstow, California. Development and implementation of management plans for wildlife and sensitive habitats and review of many projects affecting desert wildlife.

1980-1981 Wildlife Biologist. U.S. Bureau of Land Management, Sacramento, California. Employed as an endangered species specialist for the Resources Division of the State Office. Duties included assisting both District and Field Offices state-wide with compliance with the Endangered Species Act.

1979-1980 Wildlife Biologist. U.S. Bureau of Land Management, Riverside, California. Employed as a member of the Desert Planning Staff developing a comprehensive management plan for 12 million acres of Federal lands in the California Deserts.

1975-1978 Seasonal Park Ranger. Conducted faunal inventories of Hovenweep National Monument (Utah-Colorado) and Fossil Butte National Monument (Wyoming). Work included systematic live-trapping of small mammals.

Professional Organizations:

American Society of Mammalogists
Herpetologist's League
Society for the Study of Amphibians and Reptiles
Desert Tortoise Council

Certifications:

Certified biologist on lists for San Bernardino, Kern, Los Angeles, Orange, Ventura, and Riverside Counties, California
Completed desert tortoise training workshop (1990) Completed Mohave ground squirrel workshop, sponsored by The Wildlife Society
State small mammal livetrapping permit
Authorized to livetrap Mohave ground squirrels
Current State Memorandum of Understanding for handling the desert tortoise

Partial List of Publications:

Rado, T.A. and P.G. Rowlands. 1981. A range extension and low elevational record for the Arizona ridgenose rattlesnake, Crotalus willardi willardi. Herp. Review. 1981:15-16.

Rado, T.A. 1990. Results of the 1989 pilot raven control program. The Desert Tortoise Council: Proceedings of the 1990 Symposium.

Rado, T.A. 1993. An overview of mitigation actions employed for selected endangered species in the San Joaquin Valley. Pp. 199-206. In: D. Williams, S. Bryne and T. Rado (eds.) Endangered and sensitive species of the San Joaquin Valley, California: a conference on their biology, management and conservation. 388 pp.

Laudenslayer, W.F., K.B. Buckingham, and T.A. Rado. 1995. Mammals of the Deserts of California. In: J. Latting and P.G. Rowlands (eds.): The California Desert: An

Introduction to Natural Resource's and Man's Impact. California Native Plant Society. Pp. 373-396.

Partial List of Projects:

2004 **Southern Trails Pipeline Coating Inspection Project, San Bernardino, Riverside and Los Angeles Counties.** Did initial surveys, monitored during inspections, and prepared final report on project where pipeline coating inspections took place over 200 linear miles of line.

2004 **Frontier Homes Construction Project, Victorville.** Provided crew with environmental compliance training, conducted preactivity survey and monitored during land clearing for housing subdivision.

2004 **Hilton Gardens Inn Project, Victorville.** Preactivity survey, crew compliance training, site monitoring for large hotel construction site.

2004 **Bolthouse Farms Project, Los Angeles County.** Site survey and report. Also prepared long-term monitoring plan for wildlife.

2004 **Aster Villas and New Homes Housing Projects, Adelanto.** Assisted in site monitoring for compliance during construction. Burrowing owl and Mohave ground squirrel issue species.

2004 **Suncal McAllister Ranch Burrowing Owl Survey, Kern County.** Project surveys for burrowing owls and nesting sites for large-scale planned housing development southwest of Bakersfield.

2004 **Ajax Services Commercial Development, Adelanto.** Biological resource survey and report for planned commercial development.

2004 **Aquino Commercial development Site, Victorville.** Biological resources survey and report for planned commercial development.

2004 **March Air Force Base Bunker Inspection, Riverside County.** Monitored during soils tests of cleared weapons bunkers at the base. Emphasis on the Stephen's kangaroo rat.

2004 **Forecast Homes State 2081 Permit, San Bernardino County.** Prepared draft State 2081 (Endangered Species Permit) for proposed housing subdivision emphasizing the Mohave ground squirrel.

2004 **Whitewater Rock Mine, Riverside County.** Assisted in surveys of proposed mine expanion,

with emphasis on the desert tortoise and rare plants.

2004 **Moreno Valley Burrowing Owl Survey, Riverside County**. Completed burrowing owl survey of proposed subdivision site and prepared summary report for submittal to County for large consulting company.

2004 **Suncal Properties McAllister Ranch Project, Kern County.** Reviewed prior FEIR and data records for large property being considered for development southwest of Bakersfield. Also assisted in blunt-nosed leopard lizard inventory of this site.

2004 **Terrazas Mine, Riverside County.** Assisted in survey of mine expansion project along the western edge of the desert in central Riverside County. Emphasis on the desert tortoise and rare plants.

2004 **Airway Boulevard Extension Project, Kern County.** Road expansion survey in the western Mojave Desert. Emphasis on the desert tortoise.

2004 **San Joaquin Valley Landbank Project, Kern County.** Reviewed several potential sites in the valley as prospective mitigation "landbanking" sites for a large pipeline company.

2004 **Slate Range Communications Site, Inyo County.** Completed biological survey and prepared report for comm site near Death Valley.

2004 **Southern Nevada Water Authority Surveys, Clark County, Nevada.** Member of a team of biologists conducting surveys for a large company for the desert tortoise and rare plants over proposed water conveyance and stoage system in southern Nevada.

2004 **Mohave Ground Squirrel Livetrapping Survey, 30-Acre Site in Victorville.** Completed systematic livetrapping survey using California Department of Fish and Game protocols.

2004 **Mohave Ground Squirrel Livetrapping Survey, 55-Acre Site in Adelanto.** Completed systematic livetrapping survey using California Department of Fish and Game protocols.

2004 **Mohave Ground Squirrel Livetrapping Survey, 10-Acre Site in Adelanto.** Completed systematic livetrapping survey using California Department of Fish and Game protocols.

2004 **Mohave Ground Squirrel Livetrapping Survey, 30-Acre Site in Lancaster.** Assisted in a systematic livetrapping survey using California Department of Fish and Game protocols.

2004 **Joshua Tree Land Development, San Bernardino County.** Assisted in systematic survey of

90-acre parcel bordering Joshua Tree National Park. Emphasis on the desert tortoise.

2003 **Questar Road Grading Survey, San Bernardino County.**
Conducted desert tortoise survey of 66 linear mile segment of pipeline maintenance road. Submitted summary report to company for agency review.

2003 **Conoco-Phillips Marsh Creek Repair Project, Alameda County.** Conducted survey of pipeline repair project near Mt. Diablo, with emphasis on the red-legged frog, Alameda striped whipsnake, California tiger salamander and western pond turtle. Discussed mitigation with company representative.

2003 **Shea Properties Project, Riverside County.** Conducted desert tortoise surveys of four separate sites in the Coachella Valley.

2003 **Atolia Comm Site Preactivity Survey, Kern County.** Conducted desert tortoise survey of communications site near Randsburg. Gave construction crew environmental compliance training. Assisted in tortoise-proof fence construction.

2003 **Desert Dunes Project, Riverside County.** Member of crew conducting surveys of proposed subdivision in the Coachella Valley. Emphasis on the desert tortoise, rare plants, Coachella Valley fringe-toed lizard, burrowing owl and Coachella round-tailed ground squirrel.

2003 **Metropolitan Water District Colorado River Aqueduct Repairs, San Bernardino County.** Member of team conducting preactivity surveys and monitoring during repairs of segment of the aqueduct in the Mojave Desert. Emphasis on the desert tortoise.

2003 **Tosco Kern Station Tank and Pipeline Demolition, Kern County.** Conducted site surveys and monitored as crew dismantled and removed equipment from facility in the Kern Oilfield. Emphasis on the San Joaquin kit fox and the Bakersfield cactus.

2003 **Coachella Water District Site Survey, Riverside County.** Worked as a member of a team conducting desert tortoise surveys of property near La Quinta, with emphasis on the desert tortoise.

2003 **Whitewater Canyon Alluvial Rock Quarry Site, Riverside County.** Worked as a member of a team conducting surveys of an approximately one-linear mile segment of Whitewater Canyon, with emphasis on the endangered arroyo toad.

2003 **Metropolitan Water District Patrol Road Maintenance, San Bernardino County, California and Clark County, Nevada.** Did preactivity surveys and monitoring during maintenance of existing patrol road segments in the eastern Mojave Desert, with emphasis on the desert tortoise.

2003 **Neuvo Buena Vista to E+M Pipeline Survey, Kern County.**
Worked as a member of a 4-person team conducting surveys of an approximately 15-linear mile pipeline segment in the southern San Joaquin Valley. Emphasis on many species, including the San Joaquin kit fox, blunt-nosed leopard lizard, San Joaquin antelope squirrel, burrowing owl, giant kangaroo rat and Hoover's woolly-star.

2003 **California City Oasis Project, Kern County.** Worked as a member of a team conducting surveys of a proposed camping area on the northern edge of California City, with emphasis on several rare plants, the desert tortoise, Mohave ground squirrel and burrowing owl.

2003 **California City High School Site, Kern County**. Assisted in conducting surveys of a proposed high school site in California City. Prepared summary report. Emphasis on the desert tortoise, Mohave ground squirrel, burrowing owl, and rare plants.

2003 **California City Elementary School Site, Kern County.** Assisted in conducting surveys of a proposed elementary school site in California City. Prepared summary report. Emphasis on the desert tortoise, Mohave ground squirrel, burrowing owl, and rare plants.

2003 **MCAGCC Range 500 Tortoise Survey, San Bernardino County.** Crew supervisor conducting surveys of a variety of facility sites at Range 500 near Twentynine Palms. Data (including GPS coordinates) recorded and provided to primary contractor for the military project. Emphasis on the desert tortoise.

2003 **Hyundai Vehicle Test Site Tortoise Surveys, Kern County.** Team member conducting desert tortoise surveys within an approximately 2,000-acre area in the western Mojave Desert.

2003 **Coachella Canal Line Project Survey, Imperial County.** Crew supervisor conducting desert tortoise surveys along an approximately 33-linear mile segment of the Coachella Canal.

2003 **SCE Devers-West Transmission Line Survey, Orange and Riverside Counties.** Worked as a member of a team conducting general bio surveys along two 80-linear mile segments of existing transmission line right-of-way. Emphasis on a variety of listed and sensitive species.

2002 **Metropolitan Water District - Colorado River Aqueduct Repairs, San Bernardino County.** Member of team conducting preactivity surveys and site monitoring during repairs of sections of the aqueduct in the Mojave Desert.

2002 **Sempre Energy - Line 1080 Repair, Riverside County.** Member of team conducting preactivity surveys and site monitoring for desert tortoises during replacement of a six linear mile segment of natural gas pipeline in the Mojave Desert.

2002 **Questar Pipeline Spread 7 Construction, San Bernardino County.** Conducted preactivity surveys, did site monitoring and post-project compliance report for work over a 35-linear mile segment of pipeline in the eastern Mojave Desert. Emphasis on the desert tortoise.

2002 **BNSF Lateral Pipeline, San Bernardino County.** Conducted surveys, prepared report, did project monitoring and completed post-project monitoring report for pipeline supplying fuel to the BNSF railroad yard in Barstow. Emphasis on a variety of species, including the burrowing owl and the desert tortoise.

2002 **Questar Spread 3B Construction, San Bernardino County.** Conducted preactivity surveys, did site monitoring and post-project compliance report for work over a 35-linear mile segment of pipeline in the eastern Mojave Desert. Emphasis on the desert tortoise.

2002 **Sempre Energy Adelanto-Kramer Pipeline Project, San Bernardino County.** Worked as a member of a team conducting preactivity surveys and monitoring during the construction of a 36-inch trunk natural gas pipeline extending across the central Mojave Desert. Emphasis on the desert tortoise.

2002 **Kinder Morgan Energy Partners Draft Biological Evaluation, California and Nevada.** Reviewed and incorporated editorial comments and suggestions received on preliminary draft also written by myself addressing regional pipeline operations and maintenance and returned to company.

2002 **BNSF Lateral burrowing Owl Survey, San Bernardino County.** Completed a preactivity survey of a pipeline segment, with emphasis on checking a previously noted burrowing owl nesting site for signs of current activity.

2002 **Questar Pipe Line Cabazon Reroute Project, Riverside County.** Completed a preactivity survey of pipeline reroute segment, with emphasis on the desert tortoise and several sensitive species.

2002 **Questar Pipeline Spread 7 Construction, San Bernardino County.** Conducted preactivity surveys, did site monitoring and post-project compliance report for work over a 35-linear mile segment of pipeline in the eastern Mojave Desert. Emphasis on the desert tortoise.

2001 **Level 3 Fiber-optic Line, Victorville to Stateline Project.** Worked as a member of a team

conducting surveys and monitoring during placement of an approximately 200 linear mile segment of fiber-optic line in the Mojave Desert. Sensitive plants, Mohave ground squirrel and the desert tortoise were the principal species of concern.

2001 **Questar Pipe line Company Road Repairs, San Bernardino County.** Conducted surveys and monitored construction crew effecting repairs of pipeline maintenance road in the eastern Mojave Desert.

2001 **Tosco Polonio Pass Project, San Luis Obispo and Kern Counties.** Worked as a subconsultant conducting arroyo toad and California red-legged frog survey.

2001 **U.S. Borax Sensitive Plant Surveys, Kern County.** Worked as a team member conducting spring surveys around active portions of the mine for sensitive plants and the desert tortoise.

2001 **Metropolitan Water District Washout Repairs, Riverside and San Bernardino Counties.** Conducted surveys and monitored as construction crew repaired patrol road washouts from thunderstorm damage.

2001 **Metropolitan Water District Road Surveys, California and Nevada.** Conducted desert tortoise and sensitive species surveys over approximately 300 linear mile segment of the patrol road system in the Mojave Desert.

2001 **Ludlow Quarry Pit, San Bernardino County.** Conducted surveys and prepared report for 60-acre quarry pit for
I-40 repairs, with emphasis on rare plants and the desert tortoise.

2001 **Southern Rubber Boa Survey, San Bernardino Mountains.** Conducted survey to look for and evaluate habitat of the southern rubber boa along a proposed water pipeline corridor.

2001 **Sands Project, San Bernardino County.** Conducted biological survey as a team member of Union Pacific Railroad sites slated for cleanup in the eastern Mojave Desert, with emphasis on the desert tortoise.

2001 **Atolia Communications Site, Kern County.** Conducted biological survey of comm site in the Mojave Desert and prepared summary report text.

2000 **Level 3 San Diego-Yuma Fiber-optic Line, San Diego and Imperial Counties.** Team member to parent engineering firm conducting surveys and monitoring of portions of line, with emphasis on sensitive plants and the endangered arroyo toad.

2000 **Level 3 Las Vegas-Stateline Fiber-optic Line, Clark County, Nevada.** Team member to parent engineering firm conducting surveys and monitoring of portions of line, with emphasis on the threatened desert tortoise.

2000 **Level 3 Fiber-optic Line, Corona Area, Riverside County.** Team member to parent engineering firm monitoring construction, with emphasis on riparian habitats.

2000 **Metropolitan Water District Desert-wide Operations and Maintenance Projects, California and Nevada.** Prepared draft biological evaluation report addressing ongoing operations and maintenance of Colorado River Aqueduct, access roads, transmission lines, pump stations and associated facilities on listed and sensitive species.

2000 **Metropolitan Water District Road Maintenance, Riverside and San Bernardino Counties.** Conducted surveys and prepared summary report addressing road maintenance over about 125 linear miles of facility roads. Environmental compliance training to staff.

2000 **Calnev Pipe Line Company Block Valve Survey, California and Nevada.** Conducted surveys and prepared report addressing maintenance work on four block valve sites in the Mojave Desert, with emphasis on the desert tortoise.

2000 **U.S. Borax Sensitive Plant Surveys, Kern County.** Team member conducting systematic surveys on outer edges of borax mine, with emphasis on several sensitive plants and the desert tortoise.

2000 **Glamis Imperial Project, Imperial County.** Reviewed text of proposed Federal mineral withdrawal surrounding mine and prepared summary text for company.

2000 **Glamis Imperial Project, Imperial County.** Reviewed text of final biological opinion for the mine site, and prepared summary text for the company.

2000 **TXI Quarry Site, San Bernardino County.** Team member conducting tortoise and sensitive plant surveys near Victorville.

2000 **Southern California Gas Company Line 173 Leak Survey, Kern County.** Conducted preactivity surveys of San Joaquin kit foxes, blunt-nosed leopard lizards and other listed and sensitive species.

2000 **Southern California Gas Company Desert Project Surveys, Riverside County and San Bernardino County.** Surveys of over 20 operations and maintenance projects proposed for calendar year 2000, in tortoise habitat areas for parent firm.

2000 **Southern California Gas Company, San Joaquin Valley Operations and Maintenance Project Surveys, Kern County.** Surveys of over 10 project sites in the southern San Joaquin valley slated for year 2000 work, with emphasis on several listed and sensitive plants and wildlife for parent firm.

2000 **Coalinga Cogeneration Project, Fresno County.** Annual check of cogeneration site and associated steam field service area for compliance with Section 10(a) permit prepared in 1990.

2000 **Questar Line 90 Endangered Species Habitat Correlations, California and Western Arizona.** Aerial photoanalysis review and ground-truthing to accurately map locations and extent of endangered species habitat along an approximately 285 linear mile pipeline segment extending through the Mojave Desert for a parent consulting firm.

2000 **ATT San Diego-Blythe Fiber-optic Surveys, Imperial and Riverside Counties.** Subconsultant and field crew supervisor to parent firm conducting systematic surveys of approximately 125 linear miles of fiber-optic line. emphasis on several listed plants in the Algodones Dunes (Pierson's milk-vetch, Algodones Dunes sunflower), flat-tailed horned lizard and the desert tortoise. Preparation of draft summary report for the parent firm.

1999 **Questar Pipe Line Company road Maintenance, San Bernardino County.** Conducted preactivity surveys and monitored during patrol road maintenance over 15-linear mile segment in the eastern Mojave Desert. Emphasis on the desert tortoise.

1999 **Needles Landfill Perimeter Fence Construction, San Bernardino County.** Conducted preactivity surveys and monitored during placement of a tortoise-proof fence around the perimeter of the Needles landfill.

1999 **Arroyo Toad Surveys, Summit Valley Ranch, San Bernardino County.** Lead biologist conducting surveys for the endangered arroyo toad in segments of Little Horsethief Creek and Horsethief Creek. Summary report completed.

1999 **U.S. Borax Desert Tortoise Surveys, Kern County.** Worked as a member of a team conducting systematic surveys of a portion of the mine for the desert tortoise.

1999 **Southern California Gas Company Desert Road Grading Maintenance, Riverside County.** Monitor during road maintenance along an approximately 40-linear mile segment of patrol road, with emphasis on the desert tortoise. For parent firm.

1999 **Southern California Gas Company, Belridge Oilfield Maintenance, Kern County.** Monitoring during pipeline corrosion repair in the San Joaquin Valley, with emphasis on the San Joaquin kit fox, San Joaquin antelope squirrel and the blunt-nosed leopard lizard. For parent firm.

1999 **Southern California Gas Company, Line 8090 Leak Repairs, Kern County.** Monitor during repairs of several pinhole leaks in the valley near Taft. Emphasis on the San Joaquin kit fox, Hoover's woolly-star, blunt-nosed leopard lizard, and San Joaquin antelope squirrel. For parent firm.

1999 **Questar Pipe Line Company, Habitat Mapping of Line 90 in California.** Mapping of habitats using aerial photos and ground-truthing of an approximately 250-linear mile segment of pipeline.

1999 **Questar Southern Trails Pipeline, California and Arizona Interconnects.** Field surveys of Topock Interconnect and Transwestern Interconnect sites, with emphasis on sensitive species and the desert tortoise.

1999 **Tosco PN10 Pipeline Project, Elk Hills, Kern County.** Crew member conducting preactivity surveys and monitoring during construction of a 20-linear mile pipeline at Elk Hills. Emphasis on several listed species, including the San joaquin kit fox, blunt-nosed leopard lizard, giant kangaroo rat, and Hoover's woolly-star.

1999 **Arroyo Toad Surveys, San Bernardino and Cleveland National Forests.** Worked as a member of a team conducting systematic surveys of several drainages for the endangered arroyo toad for the U.S. Forest Service.

1999 **Yellow-legged and Red-legged Frog Surveys, Cleveland and San Bernardino National Forests.** Worked as a member of a team conducting systematic surveys of several drainages for the endangered California red-legged frog and the yellow-legged frog for the U.S. Forest Service.

1999 **Metropolitan Water District Road Maintenance, San Bernardino County.** Surveys of approximately 100 linear miles of roads for desert tortoises and other sensitive species prior to road grading. Preparation of summary report.

1999 **Cima Pump Station, San Bernardino County.** Field surveys and report preparation

addressing construction and operation of a pipeline pump station in the eastern Mojave Desert.

1999 **Questar Line 90 Conversion, California-Western Arizona Segments.** Review of database records, selected field surveys, and preparations of two reports for presentation by a parent consulting firm to the Federal Energy Regulatory Commission for a 600-linear mile pipeline conversion from crude oil to natural gas transport.

1998 **Questar Pipe Project, San Bernardino and Riverside Counties.** Surveys and preparation of a draft report as a subconsultant to a larger firm.

1998 **Southern California Gas Company Road Maintenance, San Bernardino and Riverside Counties.** Monitoring of road grading for tortoises and other sensitive species in the Mojave Desert. Preactivity surveys and environmental compliance training of personnel.

1998 **Summit Valley Ranch Arroyo Toad Survey, San Bernardino County.** Surveys of two drainages for endangered arroyo toads, calculations of estimated papulation size using field-generated data. Summary report.

1998 **R Ranch Sensitive Plant Survey, Riverside County.** Sensitive plant survey of proposed development site in the San Jacinto Mountains.

1998 **Interstate 15 Mohave River Crossing Arroyo Toad Survey, San Bernardino County.** Surveys of river channel and banks at highway overcrossing for the endangered arroyo toad.

1998 **Hi Grade Plant Transects, San Bernardino County.** Survey member establishing baseline at mine site for later site restoration work.

1998 **Calnev Biological Assessment, Southern California-Nevada.** Continued development of project-wide permit allowing for operations and maintenance of interstate pipeline corridor in endangered species habitats.

1998 **Greenleaf II Reservoir Project, Orange County.** San Diego horned lizard habitat evaluation of small proposed reservoir site in Whittier.

1998 **Glamis Imperial Project, Imperial County.** Review of draft biological opinion for large-scale mining operation.

1998 **Aera Wastewater Line, Kern County, California.** Surveys for San Joaquin kit fox, blunt-nosed leopard lizard and other listed and sensitive species west of Bakersfield.

1998 **Valley Waste Project, Kern County.** Surveys for San Joaquin kit fox, blunt-nosed leopard

lizard and other listed and sensitive species west of Bakersfield.

1998 **Calspar Mine, San Bernardino County.** Site surveys and preparation of a summary report for a small-scale mining operation southeast of Barstow.

1998 **Temecula Wash Horned Lizard Monitoring, Riverside County.** Continued surveys and monitoring of release area for San Diego horned lizards.

1998 **Mesquite Mine, Imperial County.** Preactivity surveys of exploratory drilling area for desert tortoises.

1998 **Edwards Air Force Base Water Pipeline, Kern County.** Monitoring during trenching and placement of water pipeline near Phillips Lab area.

1998 **Edwards Air Force Base Homestead Wellsite Closures, Los Angeles and Kern Counties.** Monitoring during groundwater testing and well closure on the base.

1998 **Needles Landfill, San Bernardino County.** Desert tortoise monitoring during construction of perimeter landfill fence. Endangered species compliance training for staff.

1998 **ARCO Orion Project, California.** Surveys, monitoring, and endangered species compliance training during purging and monitoring of a 16-inch crude oil line in the Mojave Desert involving approximately 100 personnel.

1998 **ARCO Pipe Line Maintenance and Operations Projects, San Bernardino County.** Surveys, monitoring and reports for approximately 35 separate projects along a 150-linear mile segment of crude oil pipeline in the Mojave Desert.

1997 **Metropolitan Water District Road Maintenance, Nevada-California.** Surveys of 183 miles of maintenance roads in the Mojave Desert for sensitive species including the desert tortoise. Preparation of summary report for the agencies.

1997 **ARCO Pipe Line Operations and Maintenance Projects, Riverside and San Bernardino Counties.** Surveys, monitoring and report addressing approximately 40 separate projects over the calendar year.

1997 **Interstate Highway 15 Widening, San Bernardino County.** Member of team conducting desert tortoise and other sensitive species surveys along highway corridor between Victorville and Barstow.

1997 **Mountain Falls Survey, Riverside County.** Bio survey of proposed golf course site, including checks of spring area for sensitive amphibians including the red-legged frog.

1997 **Shadow Rock Amphibian Survey, Riverside County.** Combination of red-legged frog and arroyo toad survey of proposed golf course site near Palm Springs.

1997 **Victorville Landfill Survey, San Bernardino County.** Desert tortoise survey of proposed landfill expansion area.

1997 **La Quinta Traditions Golf Course, Riverside County.** Participated in survey of large golf course project site near Palm Springs.

1997 **Sunwest Sensitive Plant Survey, Riverside County.** Participated in surveys for several listed and sensitive plants on a large-scale sand and gravel operation.

1997 **Picacho Peak Exploratory Drilling, Imperial County.** Completed survey and prepared report addressing 15 exploratory drill holes for a proposed mining operation near Picacho Peak.

1997 **Airtouch Comm Sites, San Bernardino County.** Completed surveys and prepared report addressing the installation of six comm sites in the Mojave Desert.

1997 **Elk Hills Sensitive Plant Survey, Kern County.** Participated in a systematic survey over most of NPR-1 for listed and sensitive plants for the U.S. Department of Energy.

1997 **Western Geophysical Seismic Survey, Kern County.** Participated in surveys for T+E species in the Belridge Oilfield.

1997 **Big Morongo Canyon Pipeline Realignment, Riverside County.** Monitor during pipe realignment for the Southern California Gas Company.

1997 **Big Morongo Canyon Plant Survey.** Systematic survey of canyon and tributaries for the endangered triple-ribbed milk-vetch. Summary report for agencies.

1997 **CalWest Spring Floral and Revegetation Survey, riverside County.** Sensitive plant survey of large-scale sand and gravel operation.

1997 **Amboy Quarry Vegetation Transects, San Bernardino County.** Participated in the collection of baseline plant data to be used for later project monitoring and revegetation success.

1997 **Temecula Creek Coast Horned Lizard Relocation Study, Riverside County.** Participated in the capture, marking and release with subsequent monitoring of 10 San Diego horned lizards on to a rehabilitated project site.

1997 **Rand Mining Clearance Survey, Kern County.** Completed desert tortoise survey of approximately 40-acre portion of mine and prepared summary report.

1997 **American Girl Mine Drillsites, Imperial County.** Completed survey of approximately 15 exploratory drilling sites and prepared summary report.

1996 **AirTouch Cellular Comm Sites, Riverside County.** Completed survey of two cell phone comm sites and prepared summary report.

1996 **California City Golf Course, Kern County.** Participated in survey of approximately 1,200 acre area north of Highway 58 for desert tortoises and other listed and sensitive species.

1996 **ARCO Line 90 Rectifiers, San Bernardino County.** Completed initial surveys, monitoring and post-project report for the installation of 10 rectifiers in the Mojave Desert.

1995 **Eagle Mountain Landfill, Riverside County.** Reviewed court decision on landfill as it related to endangered and sensitive species. Prepared summary brief for client.

1995 **American Girl Mine, Imperial County.** Completed survey and report of buildout of ore processing area on mine.

1995 **Coalinga Cogeneration Company, Fresno County.** Completed annual endangered species compliance monitoring of cogeneration project in the Coalinga Oilfield.

1995 **Mendenhall Property Dispute, Washington County, Utah.** Assisted property owner in HCP area in negotiations with the U.S. Fish and Wildlife Service. Settled satisfactorily to both entities.

1995 **Southern California Gas Company, Kern County.** Provided deposition and expert witness testimony in California Superior Court on endangered species and the Endangered Species Act.

1995 **ARCO Pipe Line Monitoring, San Bernardino County.** Completed required reports, conducted preactivity surveys, on-site monitoring during projects, and preparation of year-end agency reports for approximately 60 different operations and maintenance projects.

1995 **Big Morongo Canyon Pipeline Realignment, Riverside County.** Completed initial site surveys and report addressing realignment of about two miles of exposed pipe in a riparian stream,. Also completed draft environmental assessment for the U.S, Bureau of

Land Management. Met with agencies to review endangered species and wetland permitting and protection measures. Developed environmental compliance guide specifically for project crew. Monitored site during project. Completed post-project evaluation and monitoring report.

1995 **Rand Water Pipeline Construction, Kern County.** Completed pre-project survey and project monitoring during construction of about two miles of 10-inch water pipeline across desert tortoise habitat.

1995 **Rand Project Clearance Surveys, Kern County.** Completed clearance of approximately 800 acres for the desert tortoise as a mitigation measure for the project EIS. Captured, marked and released 14 desert tortoises from the project site. Completed post-project monitoring report for agencies.

1995-96 **Calnev Pipeline Company, California-Nevada.** Preparation of draft biological assessment addressing ongoing operations and maintenance of over 250 miles of pipelines in the Mojave Desert. Meetings with agency staffs during preparation.

1994 **Southern California Gas Company Programmatic Permit.** Preparation of biological assessment addressing ongoing operations and maintenance over 1,100 miles of natural gas pipelines in the California Desert. Meetings with agency staffs during preparation.

1994-95 **Southern Nevada Water Authority, Las Vegas.** Preliminary scoping surveys for T+E species along various project alternative routes for the secondary system for the City of Las Vegas. Species included the desert tortoise, bearpaw poppy, sticky buckwheat, relict leopard frog, and arroyo toad.

1994-97 **Chemgold Imperial Project, Imperial County.** Conducted surveys of over 2,000 acre proposed mine site and associated road and transmission line corridors. Prepared biological assessment, assisted in the preparation of the project EIS/EIR. Monitored exploratory drilling of about 300 test holes on the site. Participated in negotiations with agencies on project compensation, incidental take limits and mitigation.

1994 **Line 90 Crude Oil Leak, San Bernardino County.** Monitored cleanup of crude oil leak in the Mojave Desert near Yucca Valley.

1994 **City of Bakersfield Northeast Sewer Trunkline Habitat Conservation Plan, Kern County.** Preparation of a multi-species HCP for buildout on north side of the city. Biological

assessment, draft biological opinion, and draft State 2081 permit for project.

1994 **Rand Mine, Kern County.** Preconstruction surveys, reports and monitoring of two mile pipeline through desert tortoise habitat.

1994-95 **Federal Highway Administration, Ft. Irwin Road Expansion, San Bernardino County.** Linear surveys, biological assessment, and draft biological opinion for desert tortoises and sensitive plants on a 2.8 linear mile climbing lane improvement through Pickhandle Pass. Construction monitoring.

1994 **Briggs Mine Project, Inyo County.** Completed desert tortoise survey of portion of mine site and prepared summary report.

1993 **Crude Oil Pipeline Recoat Project, San Bernardino County.** Completion of pipeline preactivity survey for the desert tortoise and other sensitive species. Preparation of associated report.

1993 **Unocal Endangered Species Compliance Training Course.** Preparation of materials and presentation of an endangered species course with Unocal employees in the San Joaquin Valley. Field review to identify species, sign, and to demonstrate survey methods as well.

1993 **Wheaton and Afton Regenerator Facility Survey, San Bernardino County.** Wildlife and sensitive plant survey and report preparation of two AT&T sites in the Mojave Desert.

1993 **Hectorite Mine Tortoise Clearance Survey, San Bernardino County.** Clearance survey of approximately 150-acre mine site in the central Mojave Desert.

1993 **Crude Oil Pipeline Segment Replacement, San Bernardino County.** Endangered species survey for Four Corners Pipe Line Company and report preparation.

1993 **Morongo Canyon Washout Survey, Riverside County.** Endangered species survey of crude oil pipeline washout in the Big Morongo Canyon Area of Critical Environmental Concern. Associated report preparation and development of site protection measures.

1993 **Rand Mine Project Survey, Kern County.** Systematic inventory of 2,000+ acre large-scale gold mine operation for plants and wildlife, emphasizing the desert tortoise and Mohave ground squirrel. Conducted with a crew of 5 biologists. Preparation of biological

assessment and development of associated draft State 2081 and Federal permits

1993 **Baltic Mine Project Monitoring, Kern County.** Desert tortoise compliance monitoring during site preparation of large-scale open pit gold mining operations. Completion of associated monitoring report.

1993 **Line 90 Road Maintenance Survey, San Bernardino County.** Survey of approximately 45-linear mile road alignment in the central Mojave Desert for desert tortoises and other sensitive species. Associated report preparation.

1993 **Four Corners Pipe Line Company (ARCO) Programmatic Permit, State of California.** Preparation of draft biological assessment addressing ongoing maintenance over 3,800 linear miles of crude oil lines encompassing 40% of California. Meetings with agency staffs. Ongoing project.

1993 **Northeast Bakersfield Sewer Trunkline, Kern County.** Field surveys of 13.9 mile alignment. Preparation of biological assessment and biological resources chapter for EIR.

1993 **Industrial Asphalt Quarry, San Bernardino County.** Desert tortoise surveys and report preparation. Monitoring.

1993 **Piute Tribe Project, Clark County, Nevada.** Participation in systematic desert tortoise surveys.

1993 **Oak Summit Project, San Bernardino County.** Livetrapping emphasizing the Los Angeles pocket mouse.

1993 **M.H. Whittier Lease Survey, Coalinga Oilfield, Fresno County.** Endangered Species survey and report.

1992 **Four Corners Pipe Line Maintenance, San Bernardino County.** Completion of preactivity survey of rewrap line segments for the desert tortoise. Preparation of State 2081 and draft Section 7 opinion. Monitor during project. Preparation of post-monitoring report for agencies.

1992 **Morongo Valley Pump Station, San Bernardino County.** Sensitive plant/wildlife survey. Preparation of summary report for county review.

1992 **Aerial Photoanalysis Monitoring, Fresno County.** Interpretation of pre- and post-construction photos for monitoring program on cogeneration project. Work also included San Joaquin kit fox survey of plant site. Preparation of monitoring report for submittal to agencies by company.

1992 **Gold Mining project, Kern County.** Preparation of biological assessment addressing open pit mine expansion in desert tortoise habitat.

1992 **Raptor Monitoring, SeaWest Windfarm, Kern County.** Periodic monitoring of large wind turbine project near Mojave, using standardized protocols developed by the California Energy Commission.

1992 **Portland Cement Mohave Ground squirrel Habitat Evaluation.** Evaluation of large aggregate mine site near Victorville, using CDFG protocols for habitat evaluation.

1992 **Victorville-Bakersfield Fiber-optic Line.** Assisted as project manager with surveys of 145 linear mile line for listed species with crew of 10 biologists. Meetings with agencies. Future preparation of State 2081 permit and Federal draft Section 7 opinion.

1992 **Adelanto Subdivision, San Bernardino County.** Desert tortoise/Mohave ground squirrel survey of subdivision.

1992 **I-5 Wastewater Treatment Plant, Kern County.** Preparation of state Endangered Species Management Permit.

1992 **Kern County Landfills, Kern County.** Assisted as field supervisor in T+E surveys of 15 major County landfill sites for plants and wildlife. Preparation of reports, meetings with agencies and future development of State 2081 and Federal 10(a) permits.

1992 **Lockwood Valley Subdivision, Ventura County.** Small mammal livetrapping survey, focusing on the Federal candidate Tehachapi pocket mouse.

1992 **Salt River Project, Quemado, New Mexico.** Vegetation transects for mining reclamation project.

1992 **California City Mohave Ground Squirrel Habitat Evaluation**. Evaluation using CDFG protocols for Mohave ground squirrel habitat.

1992 **Line 63 Relocation, Kern County.** Tehachapi slender salamander survey of proposed crude oil pipeline re-route south of Bakersfield.

1992 **Mountain High Water Line, Los Angeles County.** Small mammal livetrapping and plant survey of proposed 8-mile line segment.

1992 **Nipton Road Water Line, San Bernardino County.** Desert tortoise survey and monitor during construction.

1992 **Apple Valley Landfill, San Bernardino County.** Desert tortoise survey.

1992 **Griffin Subdivision, Kern County.** Preparation of draft Section 7 opinion addressing issuance of Section 10(a) permit for project.

1992 **Whitewater-Dillon Road Fiber-optic Line, Riverside County.** Sensitive species survey of 25-linear mile line.

1992 **PacBell Fiber-optic Line, Kern County.** Sensitive species survey of 2.8 linear mile line.

1992 **AT&T Road Maintenance, San Bernardino and Clark Counties.** Survey of 32-linear mile road segment and report preparation.

1992 **Ward Valley Cleanup Site, San Bernardino County.** Desert tortoise/sensitive plant survey, with report and employee training.

1992 **Barron Mine Project, Kern County**. Supplemental desert tortoise/sensitive plant survey.

1991 **Alpine Butte Subdivision, Los Angeles County.** Preparation of biota report for 160-acre subdivision.

1991 **Pipeline 63 Re-route, Kern County.** Biota survey and report for pipeline segment in Grapevine Canyon.

1991 **Four Corners Pipeline CPU Site Surveys, San Bernardino County.** Desert tortoise surveys for about 6-8 sites along a pipeline corridor in the eastern Mojave Desert.

1991 **Delano State Prison, Kern County.** Preparation for a site management and monitoring plan for endangered species.

1991 **Keene Ranch Project, Kern County.** Assistance during development of final EIR for project.

1991 **Yellow Aster Mine, Kern County.** Field surveys for desert tortoise and several expansion projects. Preparation of 2081 state Endangered Species Management Permit and draft biological opinion.

1991 **Mojave River Levee Project, San Bernardino County.** Desert tortoise survey near Barstow.

1991 **Lost Hills Wastewater Treatment Plant, Kern County.** Survey for listed wildlife and plant species.

1991 **Soda Lake Gold Processing, San Bernardino County.** Preparation of draft biological opinion for project.

1991 **Jasmin Development, Kern County.** Sensitive wildlife and plant survey of proposed 1,600-acre housing development near Bakersfield.

1991 **Excel Minerals Millsite, Kern County.** Sensitive wildlife and plant survey southwest of Bakersfield.

1991 **Van and Stowell Subdivision, Kern County.** Sensitive plant and wildlife survey near Frazier Park.

1991 **Coalinga Cogeneration Project, Fresno County.** San Joaquin kit fox survey of staging/laydown area.

1991 **M.H.Whittier Star Lease, Fresno County.** San Joaquin kit fox.sensitive plant survey of oilfield expansion project.

1991 **AT&T Repeater Hut Station, San Bernardino County.** Desert tortoise survey of 19 comm sites in the central Mojave Desert.

1991 **McGinnis Creek Timber Project, Humboldt County.** Survey for sensitive amphibians within 700-acre proposed timber harvest area.

1991 **Jess Ranch, San Bernardino County.** Habitat evaluation for the Mohave ground squirrel.

1991 **Texaco Landfill Cleanup, Kern County.** Endangered species survey of four separate landfill sites in the southwestern San Joaquin Valley.

1991 **SeaWest Wind Farm, Kern County.** Part of team undertaking raptor monitoring study of 300 turbines.

1991 **Kern River Pipeline, San Bernardino County.** Tortoise monitor during major natural gas pipeline construction project.

1991 **Granite Construction Company Quarry Site, Los Angeles County.** Wildlife and plant survey.

1991 **Whittier Station 18, Los Angeles County.** Sensitive plant and wildlife survey for the Southern California Gas Company.

1991 **Mtn High Ski Resort Pipeline, Los Angeles County.** Wildlife and plant survey and report.

1991 **Los Angeles Cellular Phone Comm Site, Riverside County.** Wildlife and plant survey and report.

1991 **Mid-set Cogeneration Pipeline, Kern County.** Survey form the San Joaquin kit fox, giant kangaroo rat and San Joaquin antelope squirrel.

1991 **Zion Lutheran Church Site, San Bernardino County.** Desert tortoise survey and report.

1991 **Open Pit Mine, Kern County.** Desert tortoise survey near Randsburg, with report.

1991 **Mine Ore Processing Site, Kern County.** Desert tortoise survey and relocation near Randsburg, with report.

1991 **PacTel Comm Sites, San Bernardino County.** Wildlife and plant surveys of 13 separate comm sites, with report.

1991 **Adair Engineering Project, Kern County.** San Joaquin kit fox and Tipton kangaroo rat study.

1991 **Mountain Mesa Kissach Property, Kern County.** General wildlife survey.

1991 **Line 90 Pipeline Project, San Bernardino County.** Desert tortoise surveys of two pipeline segments. Preparation of draft biological opinion and State 2081 permit for project.

1991 **Industrial Asphalt Project, San Bernardino County.** Desert tortoise survey.

1991 **South Needles Treatment Ponds, San Bernardino County.** Desert tortoise survey for the Southern California Gas Company.

1991 **Irvine Ranch, Orange County.** Survey of about 50,000 acres for sensitive wildlife species, emphasizing the orange-throated whiptail and San Diego horned lizard.

1991 **Mountain Investment Company Purchase, San Bernardino County.** Desert tortoise survey.

1990 **Fort Cady Mines, San Bernardino County.** Linear surveys for the desert tortoise and rare plants.

1990 **NL Hector Mines, San Bernardino County**. Linear transect surveys for desert tortoises and rare plants.

1990 **City of Barstow Landfill, San Bernardino County.** Linear transects for the desert tortoise.

1990 **Victorville Landfill, San Bernardino County.** Desert tortoise survey.

1990 **City of Lenwood Landfill, San Bernardino County.** Desert tortoise survey

1990 **Sitting Bull Developments, San Bernardino County.** Desert tortoise survey.

1990 **SeaWest Wind Energy Project, Kern County.** Project manager of team of biologists conducting survey of 1,500+ acre wind farm. Included small mammal livetrapping.

1990 **PG&E Line 300 Reinforcement**, Barstow, California
Tortoise survey of pipeline right-of-way

1990 **PG&E Line 300 Reinforcement**, Bakersfield, California
San Joaquin kit fox and blunt-nosed leopard lizard survey of pipeline right-of-way segment

1990 **DaCin Development**, Beaumont, California
Sensitive species survey and mitigation plan for proposed 450-acre land sale.

1990 **Lake Success Reservoir Enhancement**, Tulare County
Survey for San Joaquin kit fox and other listed species at reservoir site and associated Water District lands.

1990 **Lake Kaweah Reservoir Enhancement**, Tulare County
Survey for San Joaquin kit fox, blunt-nosed leopard lizard, and other listed species at reservoir site and associated Water District lands.

1990 **Carl Jones Construction Company**, Apple Valley, CA
Development of a Habitat Conservation Plan for a permit from the U.S. Fish and Wildlife Service to allow development on tortoise habitat.

1990 **Salinas River Cogeneration Project**, Monterey County
Endangered species survey of plant site and adjacent steam field service area.

1990 **Sargent Canyon Cogeneration Project**, Monterey County
Endangered species survey of plant site and adjacent steam field service area.

1990 **SoCal Gas 235 Pipeline Project**, Victorville, California
Mohave ground squirrel records search of proposed pipeline corridor, extending from Newberry to Silver Lakes area.

1990 **Texaco Refinery Sumps Cleanup**, Bakersfield, California
Survey of section of refinery for San Joaquin kit fox and other listed species.

1990 **Rancho Clarita Development**, Ventura County, California
Wildlife survey of proposed development north of Los Angeles

1990 **McMillan Canyon Road Realignment**, San Luis Obispo County
Endangered species survey of proposed highway realignment near the community of Shandon.

1990 **Gartner Subdivision**, Bakersfield, California
Endangered species survey of proposed commercial subdivision in north Bakersfield area.

1990 **Shandon Properties**, San Luis Obispo County, California
Endangered species survey of three parcels proposed for subdivision.

1990 **DeGennaro Development**, Riverside, California
Preparation of Streambed Alteration Agreement for proposed development in Riverside affecting riparian stream.

1990 **Coalinga Cogeneration Project**, Fresno County, California
Endangered species surveys and preparation of both State and Federal permits allowing for future development in endangered species habitat.

1990 **Rubidoux Sports Complex**, Riverside County, California
Wildlife and plant surveys and preparation of Streambed Alteration Agreement for proposed sports development.

1990 **George Dube Subdivision**, Phelan, California
Desert tortoise survey.

1990 **Woodridge Development**, Kern County, California
Wildlife and plant survey of proposed 2,000-unit subdivision.

1990 **Silver Lakes Development**, San Bernardino County
Desert tortoise survey.

1990 **Cushenberry Grade Sand and Gravel Quarry**, Lucerne Valley, California. Desert tortoise survey.

1990 **Excel Mineral Minesite and Millsite**, Kern County, California. Survey for San Joaquin kit foxes and other listed species.

1990 **Unocal Cleanup-Section 32G**, Kern County, California
Endangered species survey, including San Joaquin kit fox, blunt-nosed leopard lizard, and giant kangaroo rat.

1990 **Apple Valley Subdivision**, Apple Valley, California
Desert tortoise survey

1990 **Ridgecrest Golf Course**, Ridgecrest, California
Preparation of a Habitat Conservation Plan and related documents for the City addressing future development in desert tortoise habitat.

1990 **Buttonwillow Race Circuit Course**, Kern County, California
Surveys for Tipton kangaroo rats and other endangered species.

1989 **Chevron Industrial Complex**, Bakersfield, California
San Joaquin kit fox survey.

1989 **China Grade Landfill**, Bakersfield, California
Endangered species survey of proposed expansion of City landfill.

1989 **Triam Development**, Tehachapi, California. Wildlife and plant survey, focusing on sensitive species.

1989 **Salcido Construction Company Subdivision**, Tehachapi, California. Wildlife and plant survey, focusing on sensitive species.

1989 **Unocal Cleanup, NPR-2**, Kern County, California
Endangered species survey for San Joaquin kit fox, blunt-nosed leopard lizard, San Joaquin antelope squirrel, and giant kangaroo rat.

Daryl Trumbo

Wildlife Biologist

Professional summary

Mr. Trumbo has 6 years of experience in environmental management, terrestrial ecology, marine ecology, and conservation biology in southern California, Baja California, and Costa Rica. He has been involved in all aspects of environmental review, ecological investigation of plants and animals, permitting, habitat evaluations, and resource agency coordination. Mr. Trumbo has experience working with a wide range of local laws including National Environmental Policy Act, California Environmental Quality Act, State and Federal Endangered Species Acts, Natural Community Conservation Planning Act, and California Coastal Act. He has been responsible for designing and implementing studies, collecting and analyzing data, and working with clients to achieve compliance goals. Mr. Trumbo has participated in and conducted research in wildlife movement, wildlife home range analysis, large and small scale habitat mapping, endangered/threatened wildlife species surveys, behavioral biology, spatial distribution of wildlife, and marine ecology.

Education

BS, Biology, San Diego State University, San Diego, CA, 2003

Additional training

Vegetation Rapid Assessment Protocol, California Native Plant Society, 2006

Phylogenetic Inference and Systematic Biology, San Diego State University Graduate Lab Course, 2005

Desert Tortoise Surveying, Monitoring, and Handling Techniques Workshop, Desert Tortoise Council, 2005

International Conference on Ecology and Transportation, 2005

California Anostracan and Notostracan (Fairy Shrimp) Identification Class with Mary Schug Belk, 2005

Biology of the Rattlesnakes Symposium, 2005

San Diego County Sensitive Butterfly Workshop, 2004

Basic Wetland Delineation, Wetland Training Institute, 2004

Para-botanist Training, San Diego Natural History Museum, 2004

CEQA Workshop, Association of Environmental Professionals, 2004

Multiple Species Conservation Program Document Review and Preparation, County of San Diego, 2003.

Plants of San Diego County, San Diego Natural History Museum, 2003

Habitat Loss Permits, County of San Diego, 2003

Invasive Plants School, County of San Diego, 2002

Natural Resource Laws and Regulations, UC San Diego Extension, 2002

Memberships
World Wildlife Fund

Sierra Club

Natural Resources Defense Council

Location
San Diego, California

Languages
English (native)

Spanish (professional working proficiency)

Summary of core skills
Mr. Trumbo has been the project manager for various environmental projects involving biological resource impacts, studies, and permits. He is currently a wildlife biologist for AMEC Earth & Environmental where he is primarily involved in sensitive and non-sensitive wildlife species surveys, reserve management, and habitat mapping/evaluations; but he also participates in other biological resource management duties such as restoration site management and monitoring, permitting, and sensitive plant surveys. Mr. Trumbo has also served as staff biologist in an environmental management office where his duties included giving biological guidance to environmental managers, administrators, and engineers; assessing biological impacts for construction projects; managing and participating in ecological studies on biological resources; coordinating with government resource agencies and non-profit organizations; and finding and assessing biological mitigation land. He has experience writing environmental documents consistent with the California Environmental Quality Act, the National Environmental Policy Act, the Federal and State Endangered Species Acts, and the San Diego Multiple Species Conservation Program. He has created presentations and led meetings with scientists, engineers, regulators, public administrators, and the general public.

Mr. Trumbo has also had experience in all aspects of ecological investigations research. He has designed ecological investigations on terrestrial and littoral zone wildlife species; collected many kinds of field data; field mapped and evaluated southern California habitats and plant communities; tracked wildlife by radio transmitter, tracks, and scat; conducted statistical analyses to test ecological hypotheses; written scientific reports detailing the results and implications of his studies; and presented his findings to public and scientific audiences.

Areas of expertise

- Mammalogy
- Herpetology
- Invertebrate biology
- Wetland delineation
- Biological monitoring
- Ornithology
- Preparation of Biological Assessments
- Natural resources management plans
- Botanical surveys
- Geographic Information Systems (GIS)
- Research on natural resources-related topics

Details by project
Proposition 13, Dominguez Channel Hydrodynamic Modeling, Port of Los Angeles, Los Angeles, CA. (2007, $180,400, 4151001010) Part of AMEC team assisting the Port of Los Angeles with management of a State Water Resources Control Board (SWRCB)-funded Proposition 13 project. The Port was awarded $1.2 million to complete a hydrodynamic and water quality study of the Dominguez Channel, an impaired water body on the 303(d) list. The model will be used to describe the transport of stormwater runoff and dry and wet weather waters through the channel and into the Los Angeles Harbor. The model will eventually be used to help develop TMDLs for the Dominguez Watershed and other local surrounding areas. AMEC also supported the Port in writing the QAPP that in turn was reviewed by the Los Angeles Regional Water Quality Control Board (RWQCB) and State

Water Resources Control Board (SWRCB). AMEC is also participating in the water quality data collection, the Scientific Review Board (a select group of experts in the hydrodynamic modeling field who review the proposed study methods and model selection), as well as assisting the Port with all required reports to RWQCB and SWRCB.

Exotic Weed Control Program, Marine Corps Base Camp Pendleton, CA. ($1,200,000, 2007, 32106090A) Biologist. Project objective is to organize all historical exotic weed treatment data collected on the Base since 1996 and creation of a spatially organized geodatabase that organized all data collected on the Base since 1996. Primary target weeds included *Arundo donax* and *Tamarix* spp. Edited annual report outlining and documenting all historical weed treatment data pertaining to many mitigation areas and conservation banks and results of these treatments as they related to regulatory permits obtained from the U.S. Army Corps of Engineers so that MCB could track their permit requirements by acreage treated over extended periods of time.

Habitat Restoration, Petroleum Pipeline Construction Project, Kinder Morgan Energy Partners, L.P., Marine Corps Base Camp Pendleton, CA. (Ongoing, $1,985,510) Biologist for 26-mile pipeline restoration project. Habitats restored include coastal sage scrub, wetland, riparian scrub, riparian woodland, freshwater seep, oak woodland, sycamore grassland, native grassland, and thread-leaved brodiaea transplantation monitoring.

Bullfrog Control Program, Kinder Morgan Energy Partners, L.P., MCB Camp Pendleton, CA. (Ongoing, $33,000) Assisted with development of program and fieldwork for control of bullfrogs in San Mateo Creek at Marine Corps Base Camp Pendleton for mitigation of impacts to the southwestern arroyo toad during construction of a pipeline. Sensitive species located during control program included southwestern arroyo toad, southwestern pond turtle, and California newt.

INS Border Infrastructure Project, Specialty Biological Services, U.S./Mexico Border, CA. (Ongoing, $227,000, 322500006, 322500008) As part of the overall mitigation for project impacts related to proposed fencing, roads, lighting and other infrastructure, AMEC is planning and implementing wetland creation, restoration, and enhancement of over 5 acres of riparian wetlands in Spring Canyon. AMEC developed and successfully obtained agency approval of a detailed wetland mitigation plan for the project. Implementation of the mitigation program will begin in the fall of 2006. AMEC will oversee the landscape contractors during construction and installation of the wetland mitigation areas and is responsible for the 5-year monitoring of the site to ensure success of the mitigation.

Water Quality Monitoring NPDES Permit Monitoring for University of California at San Diego, Scripps Institution of Oceanography, San Diego, CA. ($1,500,000, 01/2006 – 01/2011, 6151000200) Biologist for UCSD/SIO NPDES discharge monitoring program. As part of the AMEC team, Mr. Trumbo periodically collects and analyzes water and sediment samples from various oceanside and underwater locations where return seawater from numerous aquariums and stormwater are discharged. In addition, AMEC scientists are helping SIO conduct special studies to understand any potential impacts to the ecosystem within the ASBS.

Biological Resources Constraints Report for the Proposed Discovery Lake Sediment Dredging Project, Moffat & Nichol, San Marcos, CA. (2006, $36,648) Developed a biological report for the client that involved an overview of local, state, and federal jurisdiction constraints of a proposed dredging project on species and habitats on-site. Additionally, performed a database search for potential sensitive species, gathered and organized relevant information relating to potential impacts and mitigation methods that the client could use to minimize these potential impacts. Aided in the mapping of various habitats on-site, and incorporated information regarding the need for future surveys.

Chappo Post Fire Weed Management Project, MCB Camp Pendleton Environmental Security, Land Management Branch, Camp Pendleton, CA. (2006; $797,176, 321060094) Biologist as part of team responsible for monitoring the species diversity and vegetative cover of plants throughout a weed dominated post-fire landscape (137 acre site), and incorporating this information, directing the contractor to focus various weed management strategies where most appropriate. Other objectives include monitoring native plant recovery and tracking costs to determine efficient management

techniques, qualitatively mapping exotic weed communities, quantitatively monitoring vegetation comeback, adding native seed to a major section of the site, assessing the costs and benefits associated with treatment activities, monthly progress reporting and annual reporting.

Biological and Botanical Resources Assessments, Southern California Edison, Riverside County, CA. (12/2006, $59,000, 6151000801) Biologist for biological and botanical resources assessments for the proposed Valley-Ivyglen Transmission Line and Fogerty Substation. Documented the biological resources associated with construction of a new 115kV transmission line designed to improve reliability and meet projected electrical load requirements. Conducted biological habitat assessment surveys for sensitive plant species within 11 potential land parcels which will provide an overview of existing and potential sensitive plant resources within the project area, evaluate consistency with the MSHCP, and determine what focused sensitive species surveys or wetland/jurisdictional waters delineation may be necessary for further project review.

Frontier Homes Tract 17529 Wetland Permitting, Frontier Homebuilders, Inc., Hesperia, CA. (11/2006, $41,452, 5554000211) Prepared applications to obtain a Section 404 Nationwide Permit from the U.S. Army Corps of Engineers, a Section 401 Water Quality Certification from the Regional Water Quality Control Board, and a Section 1600 Streambed Alteration Agreement from the California Department of Fish and Game. Conducted pre-application meeting with client, project engineer, and resource agencies to discuss potential project impacts and mitigation.

Mountain Vista Biological Studies, Desert Tortoise Surveys, Terra Nova Planning and Research, Yucca Valley, CA. (2005, $21,000) Assisted in U.S. Fish and Wildlife Service protocol surveys for federally threatened desert tortoise on 500 acre site in Yucca Valley. Observed live adult desert tortoise, active desert tortoise burrows, scat, and desert tortoise shell remains.

Before-After-Control-Impact Wildlife Movement Study, Wildcat Canyon Road Enhancement Project, County of San Diego, Dept. of Public Works, CA. (09/2004, $300,000; Construction: 2006 [estimated]) Project manager overseeing implementation of one year of pre-construction surveys for wildlife movement baseline data to determine the optimal locations for wildlife crossings and determine impacts to wildlife movement from a one mile passing lane. Study methodology included gypsum tracking stations, wildlife sign transects, camera stations, road-kill transects, and monthly reports for the Wildlife Agencies (U.S. Fish and Wildlife Service and California Department of Fish and Game). Responsible for all contact and coordination with the agencies.

Vernal Pool and Rare and Endangered Species Surveys, San Diego Air Force Station, San Diego County, CA. (2006, $148,730; Construction: 2006) Wildlife biologist for services including conducting a California gnatcatcher habitat assessment, vernal pool and Quino checkerspot butterfly surveys.

Assessment of Vernal Pools and Vegetation Communities on the McClellan-Palomar Airport Properties, County of San Diego, Carlsbad, California. (2005, $17,000) Surveyed 16 vernal pools for vernal pool indicator plants, mapped all upland and wetland vegetation communities, and recorded incidental wildlife species sightings on preserve lands under the San Diego County Multiple Species Conservation Program.

Biological Technical Report, Proposed San Elijo Lagoon Visitor Center Improvements Project, County of San Diego. (2005, $12,000) Staff wildlife biologist involved in the data collection and preparation of a biological technical report to analyze and assess potential biological impacts for a County of San Diego project within a plant and wildlife preserve under the San Diego County Multiple Species Conservation Program. Key staff member in field mapping the habitats onsite, surveying the site for birds and other wildlife species, researching the applicable regulatory plans and requirements for this multi-jurisdictional area, compiling the data, and writing the report.

Upland and Riparian Vegetation Community Mapping, U.S. Marine Corps Base at Camp Pendleton. (Ongoing, $186,000) One of the primary biologists involved in large-scale field mapping, classification, and change analysis of all upland and riparian vegetation communities on the 250 square mile MCB Camp Pendleton. Duties performed included coordinating with the base resource managers; field mapping of vegetation communities, including photo interpretation; preparation and coordination of data for entry into a GIS database; 5-year vegetation change analysis; and report

preparation. Data from this project will be incorporated as a GIS base layer at Camp Pendleton. Mapping requirements included a minimum mapping unit of one acre for upland areas and one quarter acre for riparian areas, and a mapping accuracy of 95 percent.

Otay Water District Recycled Water Pipeline, Reservoir, and Pump Station Project, Lee & Ro, Inc., Chula Vista, CA. (Ongoing, $30,000,000; Construction: 09/2005) Linear construction project within County of San Diego, City of San Diego, and City of Chula Vista jurisdictions. Natural resource specialist responsible for preparing documentation to obtain a Section 404 Corps' Nationwide Permit, a Section 401 water quality certification, and a Section 1600 streambed alteration agreement for the project. In addition, performed a pre-construction burrowing owl habitat and presence/absence assessment within the project area and adjacent habitat. The burrowing owl assessment consisted of one habitat assessment survey and three presence/absence surveys according to survey protocol proposed by the Santa Cruz Predatory Bird Research Group. Wrote a report detailing the findings of the surveys that was submitted to the wildlife agencies.

San Miguel Habitat Management Area and Otay Interconnect Pipeline, Otay Water District, Chula Vista, CA. (2005, $610,000) Wildlife specialist for services including management of preserve and conducting protocol surveys for Quino checkerspot butterfly, California gnatcatcher, and sensitive plants; monitoring of burrowing owl artificial burrow mitigation program, least Bell's vireo surveys, and invasive nonnative weed control program. Project included the design, implementation, monitoring, and maintenance of a 14-acre native grassland restoration and wetland/riparian restoration. Evaluated success of two restoration projects onsite, including horticultural (qualitative) and botanical (quantitative) monitoring methods.

Assisted in managing all aspects of the San Miguel Habitat Management Area, a dedicated biological reserve acquired by the Otay Water District for use a mitigation bank for impacts associated with proposed District projects. Conducted monthly surveys to assess overall Reserve status. Evaluated success of two restoration projects onsite, including horticultural (qualitative) and botanical (quantitative) monitoring methods. Conducted protocol surveys for federally listed sensitive species Quino checkerspot butterfly, coastal California gnatcatcher, and least Bell's vireo. Conducted presence/absence surveys for burrowing owls within occupied habitat that contains artificial burrowing owl burrows. Made recommendations and coordinate with the landscape contractor to maintain and improve the habitat and artificial burrows for burrowing owl use. Assisted with rare plant surveys. Provided direction for landscape maintenance contractor to control nonnative weeds and improve habitats onsite. Prepared monthly status reports. Prepared annual reports for the Reserve, the burrowing owl habitat, the native grassland restoration area, and the Rickey Pond restoration area. Prepared 45-day reports for submittal to the U.S. Fish and Wildlife Service for Quino checkerspot butterfly, coastal California gnatcatcher, and least Bell's vireo.

Cannon Road Extension Project Wetland Mitigation for Reach 1, City of Carlsbad, CA. (2000, $188,000) Evaluated present conditions of restoration project for temporary impacts associated with the construction of Macario Bridge in the city of Carlsbad. Monitor success of mitigation site, including horticultural (qualitative) and botanical (quantitative) parameters. Provided direction for landscape maintenance contractor. Generate monthly status reports. Generated annual reports.

Cocklebur Vernal Pool Conservation and Restoration Plan, MCB Camp Pendleton, CA. (Ongoing, $160,000) Assisted in the development of a conservation plan for approximately 145 vernal pools associated with the Cocklebur Mesa Sensitive Area. Involved in habitat mapping, assessing vernal pool and upland resources, and developing a management plan that provides direction for short and long-term goals that will increase the value of the vernal pool habitat. Preliminary biological fieldwork included upland and vernal pool habitat mapping and vernal pool sensitive plant survey.

Jurisdictional Waters and Wetland Delineation Report for the Landscape by Hiro, Inc. Site, Southern California Edison, County of Orange, Huntington Beach, CA. (Ongoing, $15,000) Participated in writing the Jurisdictional Waters and Wetland Delineation Report for a jurisdictional wetland delineation. Duties included researching pertinent regulations, historical research for the site, and a WETS analysis to quantitatively determine whether it was a wetter than normal rainy season.

Past professional experience

Before-After-Control-Impact Wildlife Movement Study for the Wildcat Canyon Road Enhancement Project, County of San Diego, Department of Public Works, San Diego, CA. (Ongoing, $210,000; Construction: 2005, $15,000,000) Project manager overseeing implementation of one year of pre-construction surveys for wildlife movement baseline data to determine the optimal locations for wildlife crossings and determine impacts to wildlife movement from a one-mile passing lane. Study methodology included gypsum tracking stations, wildlife sign transects, camera stations, road-kill transects, and monthly reports for the Wildlife Agencies (U.S. Fish and Wildlife Service and California Department of Fish and Game). Responsible for all contact and coordination with the Wildlife Agencies.

Opportunities and Constraints Report for the Sunnyside Equestrian Bridge, County of San Diego, Department of Parks and Recreation, San Diego, CA. (2003, $6,000; Construction: 2003, $60,000) Performed initial study for equestrian bridge over the Sweetwater River and connecting trail, including identification and evaluation of habitats near the bridge site, potential for sensitive plant and wildlife species on-site, and recommendations for location of bridge and construction staging areas. Also recommended type of environmental documentation, permits, and mitigation necessary. Prepared report detailing the results.

Wetland Permits for the Wildcat Canyon Road Enhancement Project, County of San Diego, Department of Public Works, San Diego CA. (2004, $50,000; Construction: 2005, $15,000,000) Compiled all wetland impact information and completed permit applications for a Section 404, Nationwide Permit 14 from the U.S. Army Corps of Engineers, a 1601 Streambed Alteration Agreement from the California Department of Fish and Game, and a Section 401 Water Quality Certification from the Regional Water Quality Control Board. Managed and participated in a wetland mitigation site search and preparing Findings of Conformance with the Multiple Species Conservation Program. Identified and secured suitable wetland mitigation property and successfully negotiated and received all permits form the Resource Agencies. Responsible for all contact and coordination with the Resource Agencies during the permit acquisition process.

Burrowing Owl Habitat Survey on the McClellan-Palomar Airport Property, County of San Diego, Department of Public Works, Carlsbad, CA. (2003, $4,000) Participated in a survey for burrowing owls, including potential burrows and sign, in conjunction with County of San Diego staff working on the San Diego Multiple Species Conservation Program. An approximately 210 acre parcel owned by the County of San Diego was surveyed visually for potential burrowing owl habitat, including focused transects within approximately 20 acres of potential burrowing owl habitat for sign of burrowing owl occupation. Reviewed and commented on letter report to the County of San Diego detailing the results of the survey.

Olive Ridley Sea Turtle (*Lepidochelys olivacea*) Conservation Project, Asociacion Sudcalifornianа de Protecion al Medio Ambiente y a la Tortuga Marina (ASUPMATOMA), Cabo San Lucas, BCS, Mexico. (2002) Served as staff biologist, camp manager, Master's research assistant, and tour guide at a sea turtle research and conservation camp at Rancho Punta San Cristobal, near Cabo San Lucas. Collected and compiled nesting turtle field data for Master's student and Mexican government pursuant to Mexican permits for endangered species research. This data included nesting turtle weight and length, tagging nesting turtles, recording number of eggs, size of eggs, hatch success, and size of hatchlings. Prepared and gave presentations for public and scientific audiences. Responsible for coordination with other Mexican and American biologists.

Past scholastic experience

Behavioral Biology Research Practicum on Leaf-cutter Ants (*Atta cephalotes*), UC San Diego, Costa Rica. (2001) Designed, collected all field data, statistically analyzed data, and reported on a behavioral study on relationship of trail clearing behavior to individual ant size for three colonies of leaf-cutter ants. Presented findings to a scientific audience.

Home Range Analysis of the Red Diamond Rattlesnake (*Crotalus ruber*) within Variably Sized Habitat Patches, in San Diego County, UC San Diego, CA. (2000) Tracked rattlesnakes by radio transmitter, collected spatial GIS data, collected individual measurement data (weight, length),

collected blood samples, entered GIS data, and assisted in surgery to implant radio transmitters. Designed, collected field data, statistically analyzed data, and reported on an independent study on winter den characteristics of red diamond rattlesnake and the implications for conservation.

Investigation of Niche Patterns in a Desert Lizard Community, U.C. San Diego, Anza Borrego Desert State Park, CA. (2000) Performed transect sampling of desert lizard density, identified species, and characterized microhabitats. Analyzed diversity, niche widths, and niche overlaps using descriptive statistics. Used results to examine diversity patterns according to classical competition theory, as well as temporal trends in desert lizard abundance.

Ecological Investigation of Spatial Patterns of Adult California Sea Hares (*Aplysia californica*) within Interconnected Tide Pools near Scripps Research Institute, UC San Diego San Diego, CA. (2000) Designed, collected, and statistically analyzed field data, and reported on an ecological study of a population of sea hares to determine if the adults exhibit any spatial patterns and, if so, the reasons for the patterns (i.e., resource competition, mating behavior, predator avoidance, etc.).

Population Size and Age Distribution Investigation of Blue-clawed Hermit Crabs (*Pagurus samuelis*) using Mark-Release-Recapture Techniques within Interconnected Tide Pools near Scripps Research Institute, UC San Diego San Diego, CA. (2000) Performed stratified random sampling and used three different mark-release-recapture techniques (Lincoln-Petersen index, Schnabel method, and Bailey triple-catch method) to monitor a population of blue-clawed hermit crabs in the rocky intertidal zone. Analyzed population size, age distribution, and estimated survivorship.

Employment history

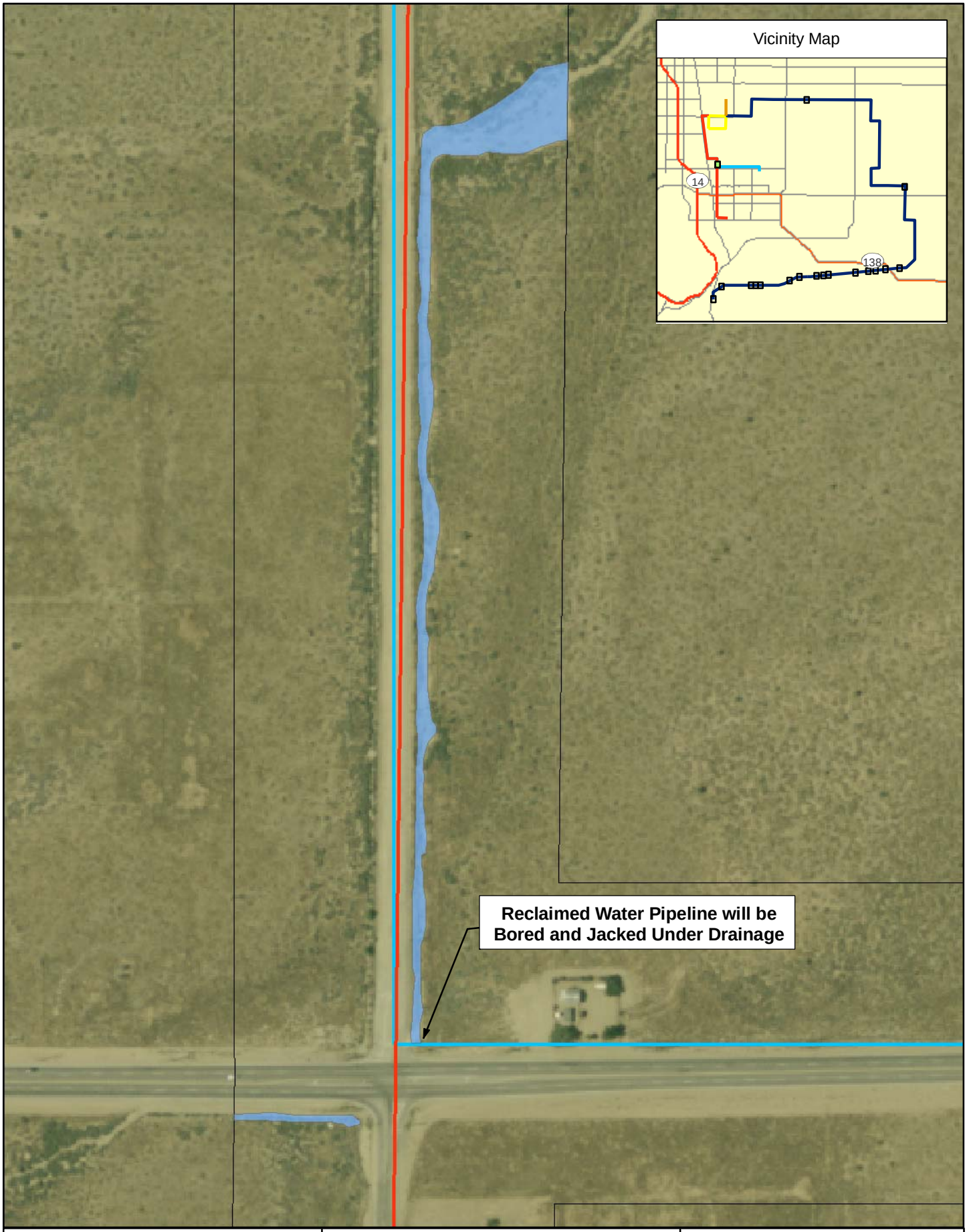
2004 - Present	Wildlife Biologist, AMEC Earth & Environmental, Inc.
2002 - 2004	Environmental Management Specialist/Staff Biologist, County of San Diego, Department of Public Works
2002	Tram Operator/Guide, San Diego Wild Animal Park
2001 - 2002	Staff Biologist, Non-profit Sea Turtle Research & Conservation Organization (ASUPMATOMA, Cabo San Lucas, BCS, Mexico)
2000	Research Assistant, U.C. San Diego, Dr. Ted Case's Laboratory, Jeff Tracey's Master's research on home range analysis of the red diamond rattlesnake (*Crotalus ruber*)

Presentations/publications

Trumbo, D. 2002. Presentation of 2001 Nesting Season Results of the Olive Ridley Sea Turtle (*Lepidochelys olivacea*) on Two Beaches in Cabo San Lucas, BCS, Mexico. Annual Sea Turtle Symposium, Loreto, BCS, Mexico.

Trumbo, D. 2003. Professional Biology Jobs, San Pasqual High School Career Day.

Attachment BIO-5



Legend

- Transmission Line
- Reclaimed Water Pipeline
- Natural Gas Supply Pipeline
- Power Plant Site
- Sanitary Wastewater Pipeline
- ★ Transmission Tower
- Waters of the State of California
- Waters of the State & Waters of the U.S. (California Aqueduct)
- 250 Foot Buffer

Palmdale Hybrid Power Project

Potential Jurisdictional Waters and Approximate Transmission Tower Locations

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Map Notes:
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Date: 09/12/2008

Figure - 1

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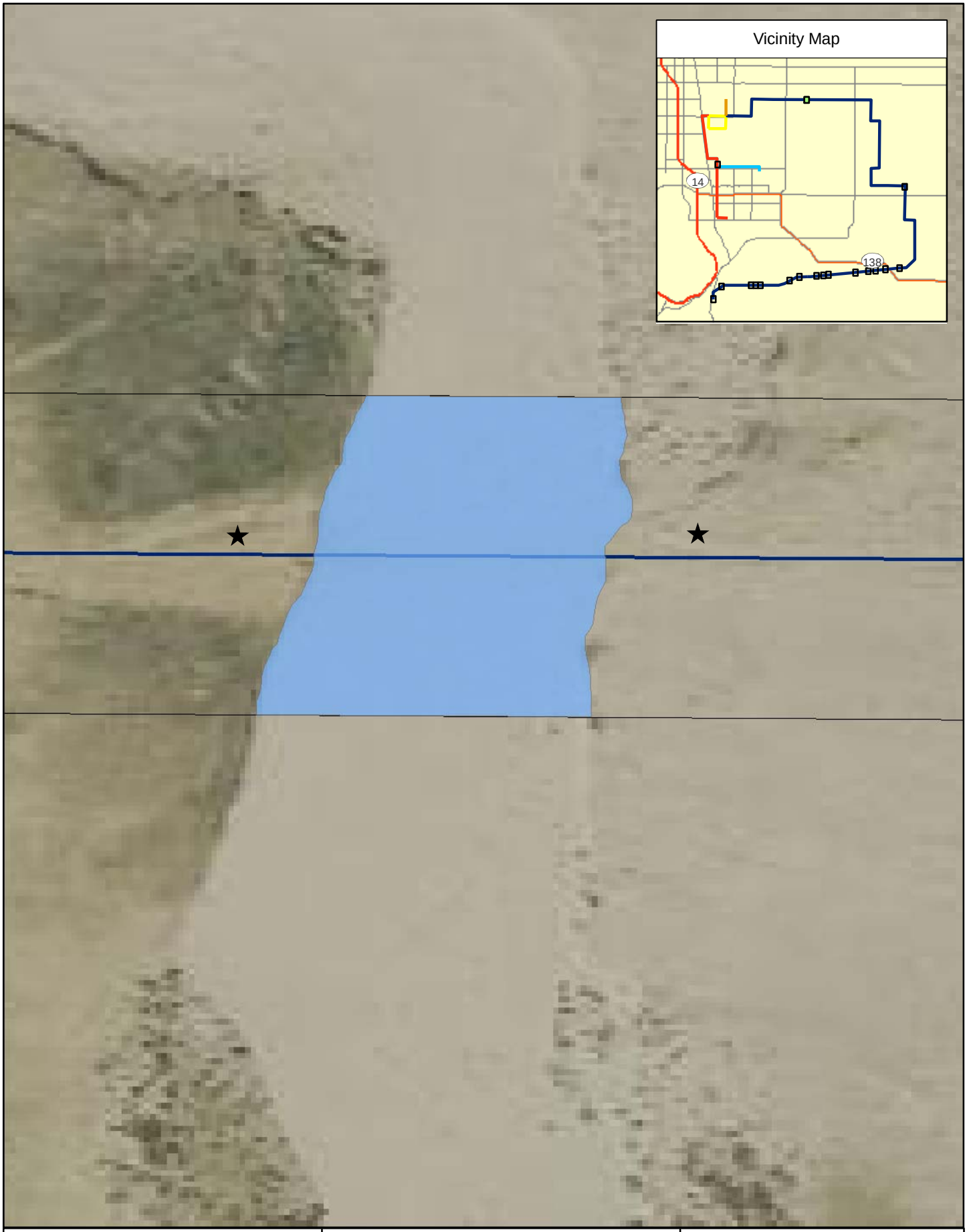

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Figure - 2

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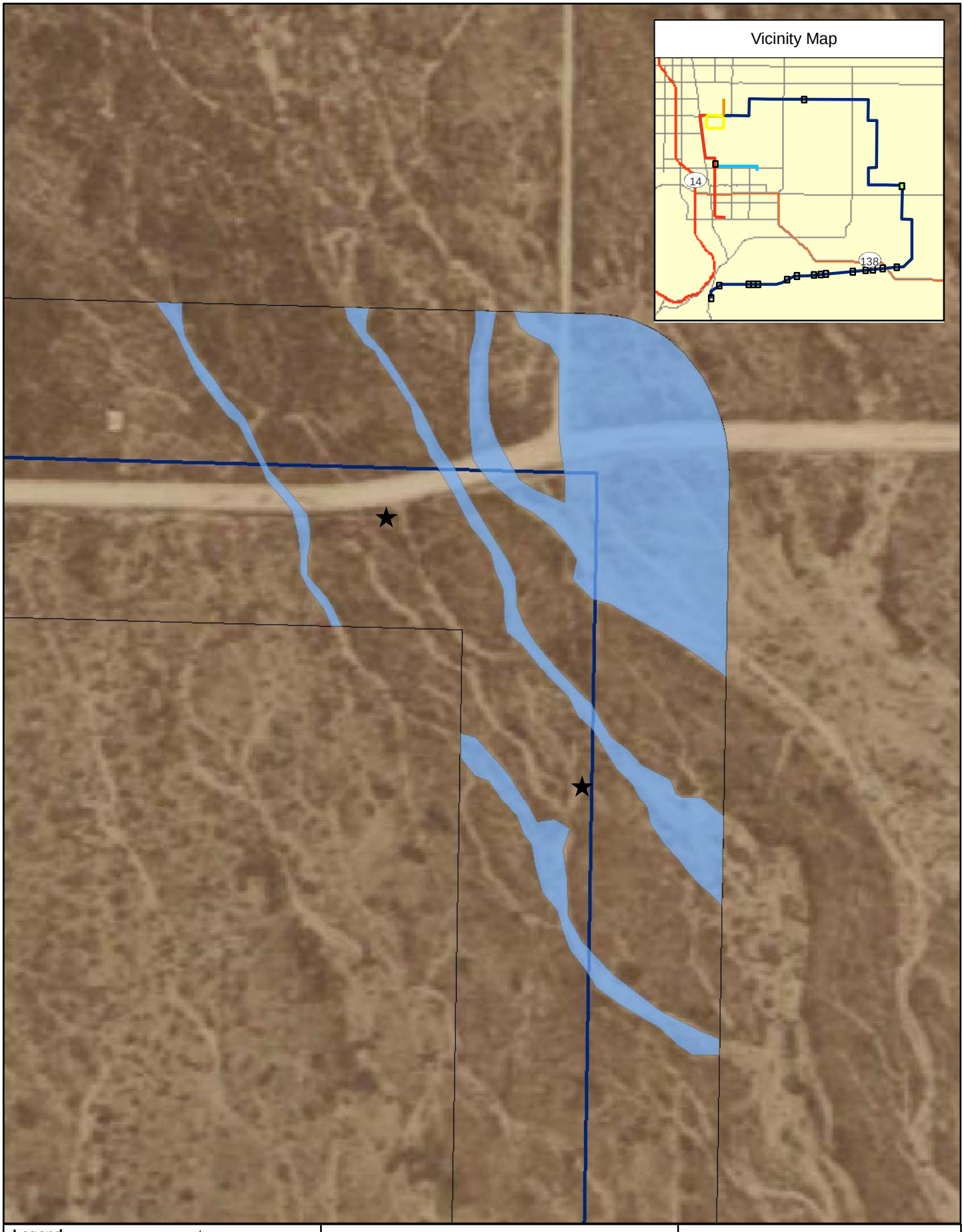

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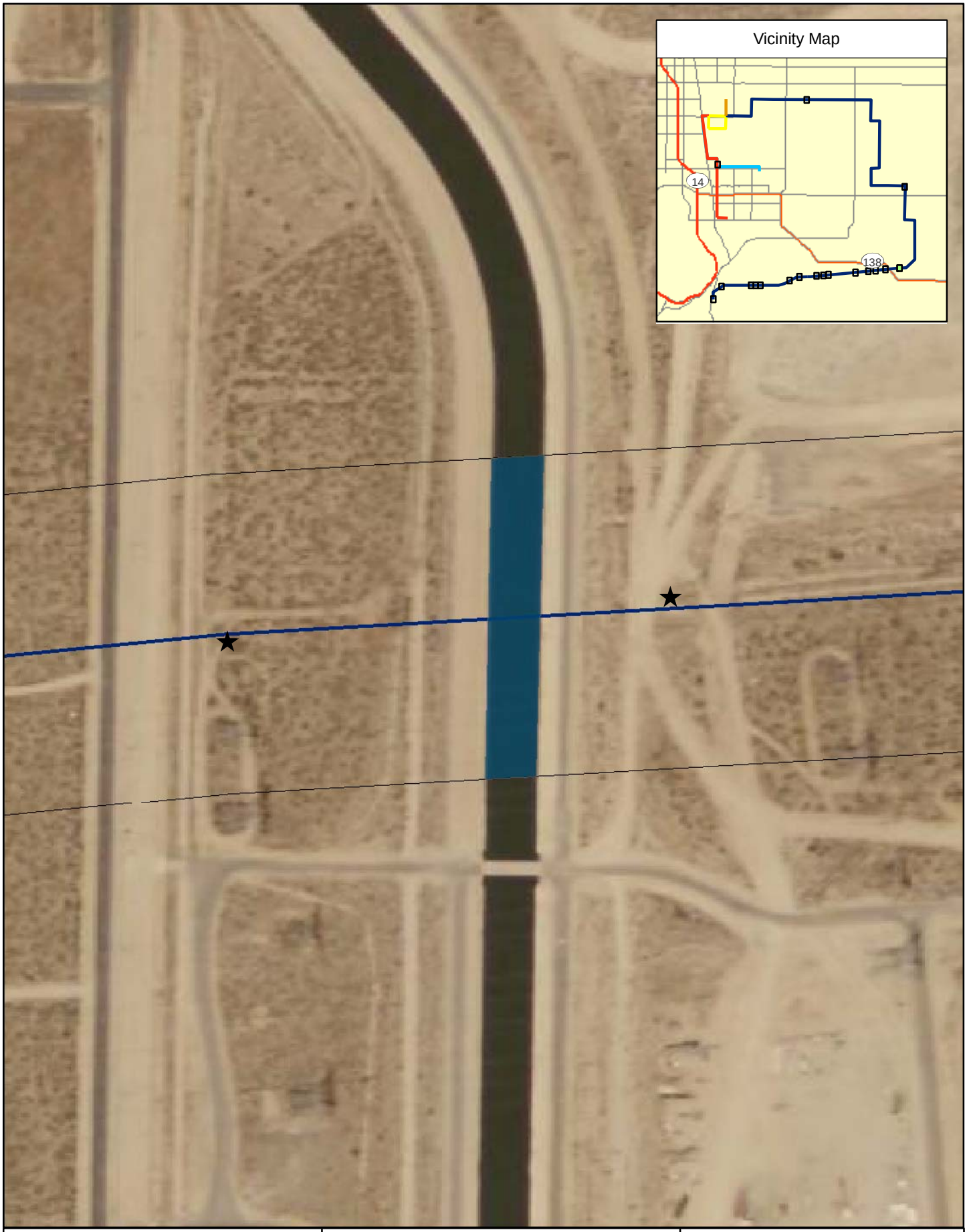

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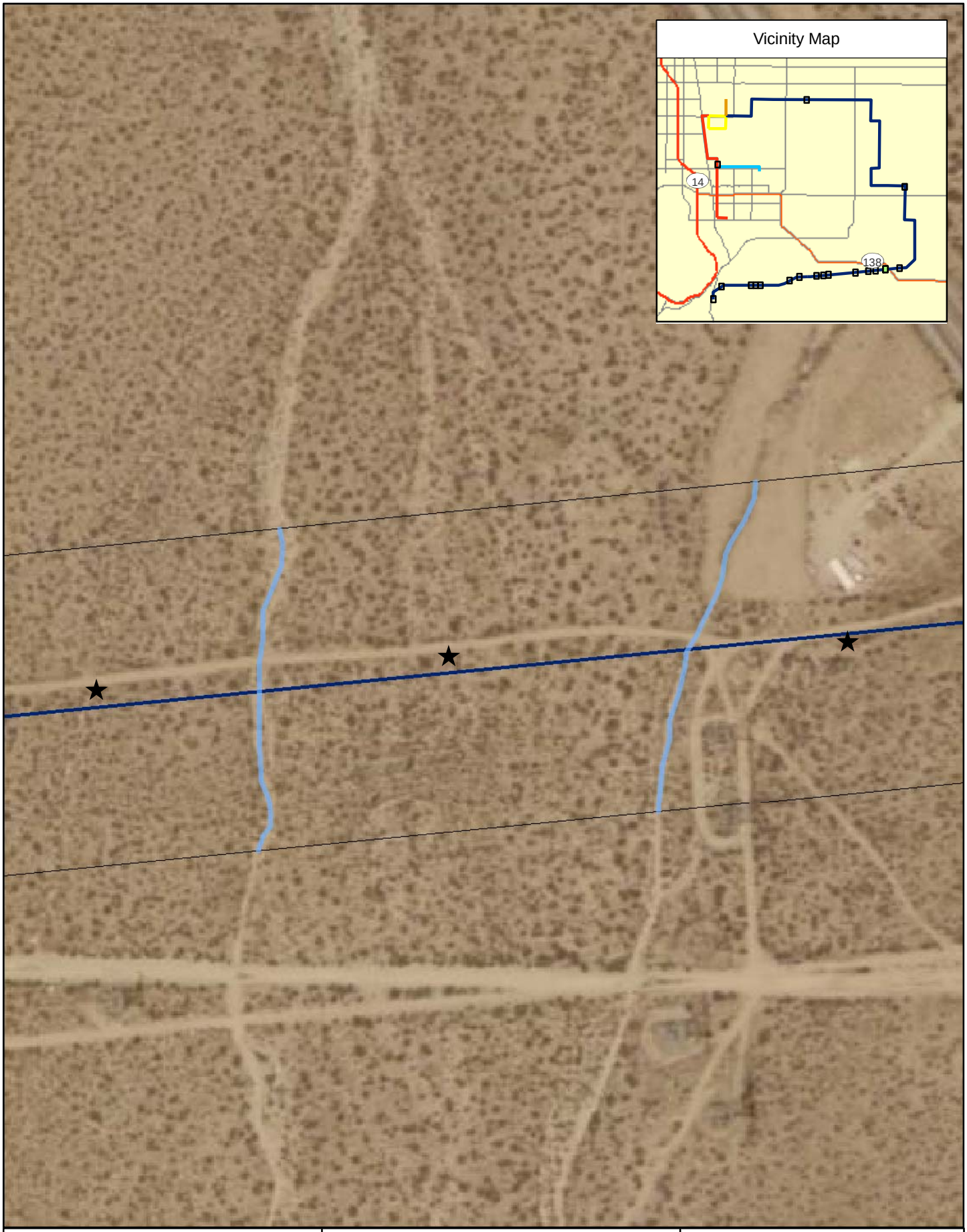

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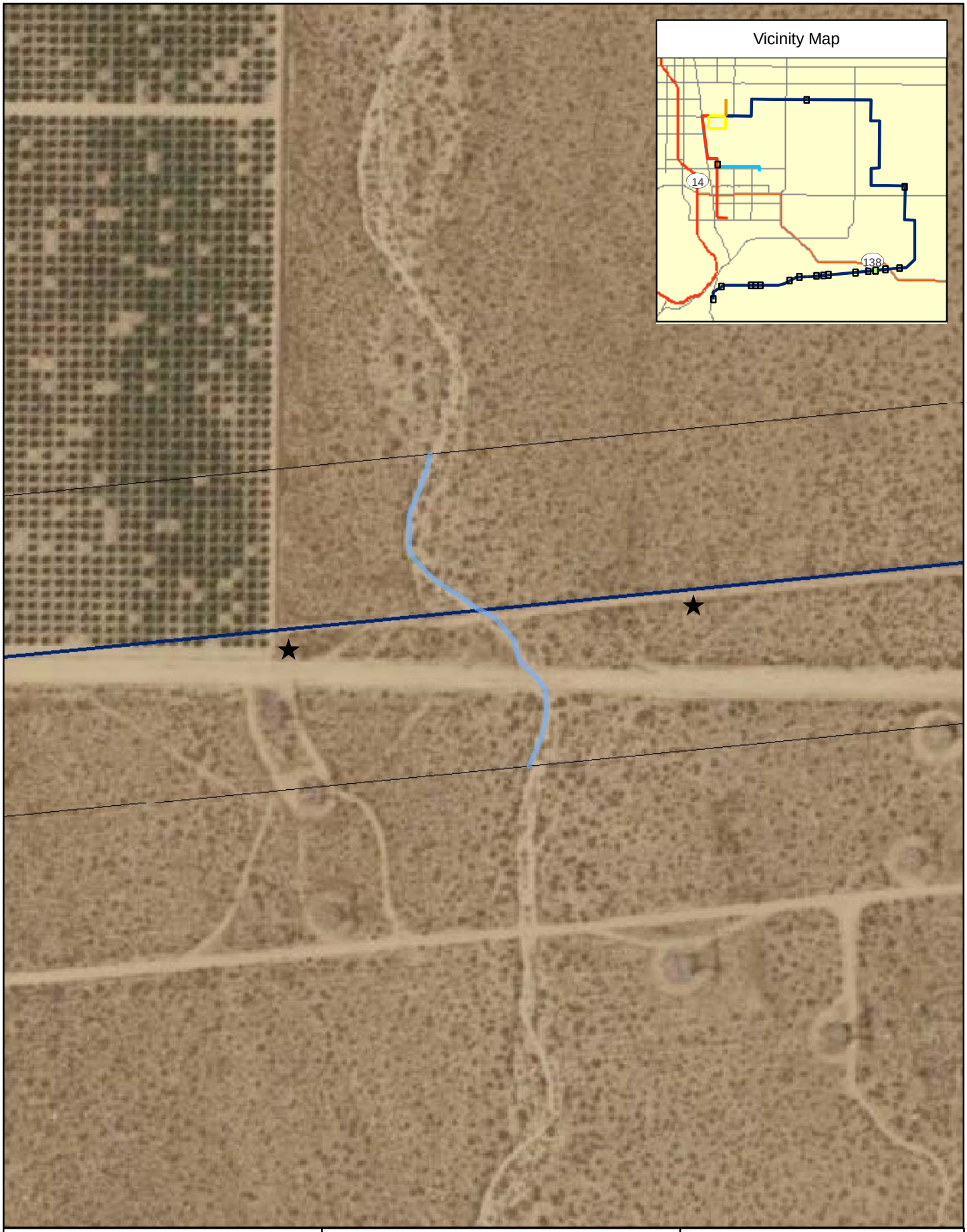

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Figure - 6

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Legend

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Figure - 7

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Legend

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Figure - 8

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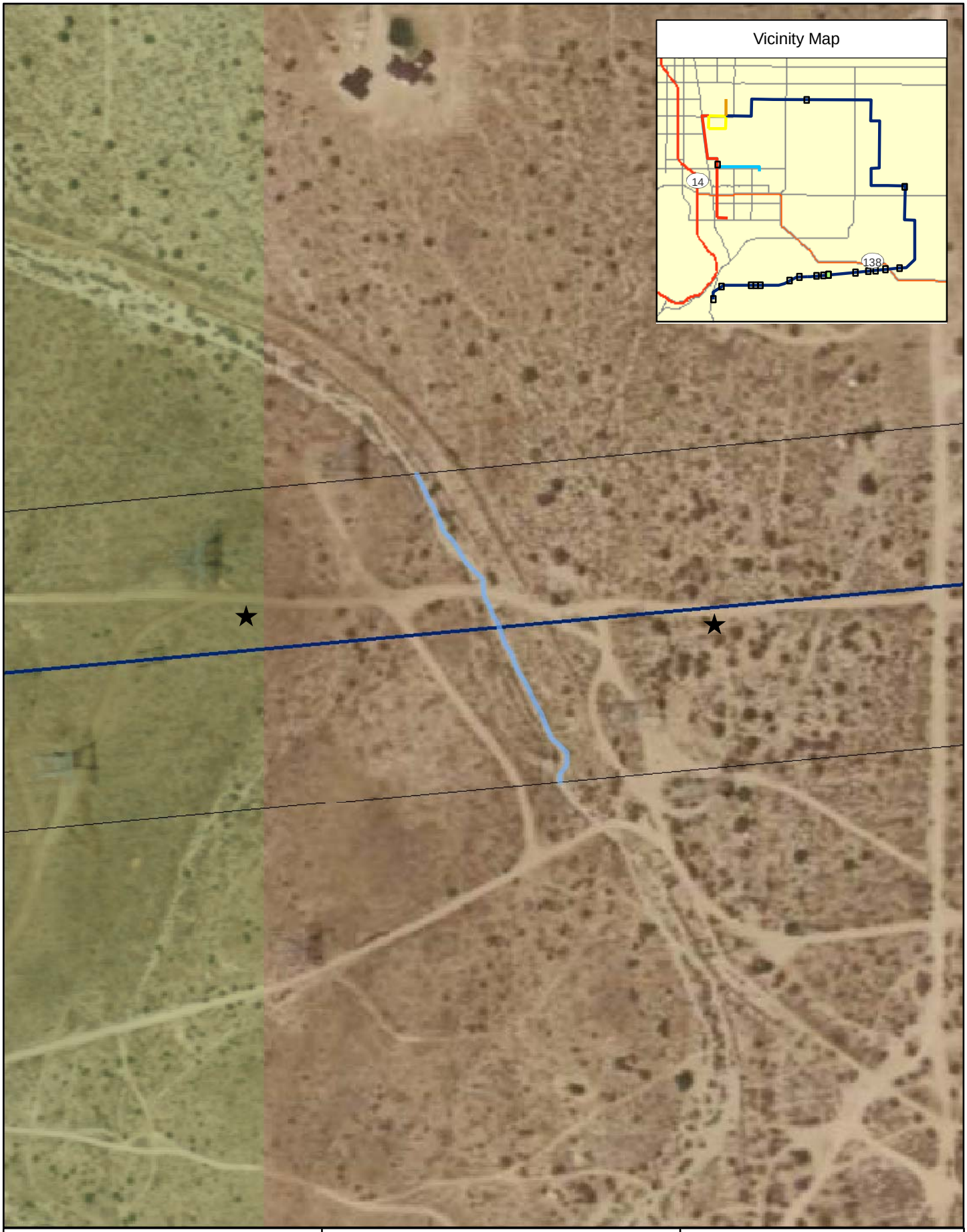

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Figure - 9

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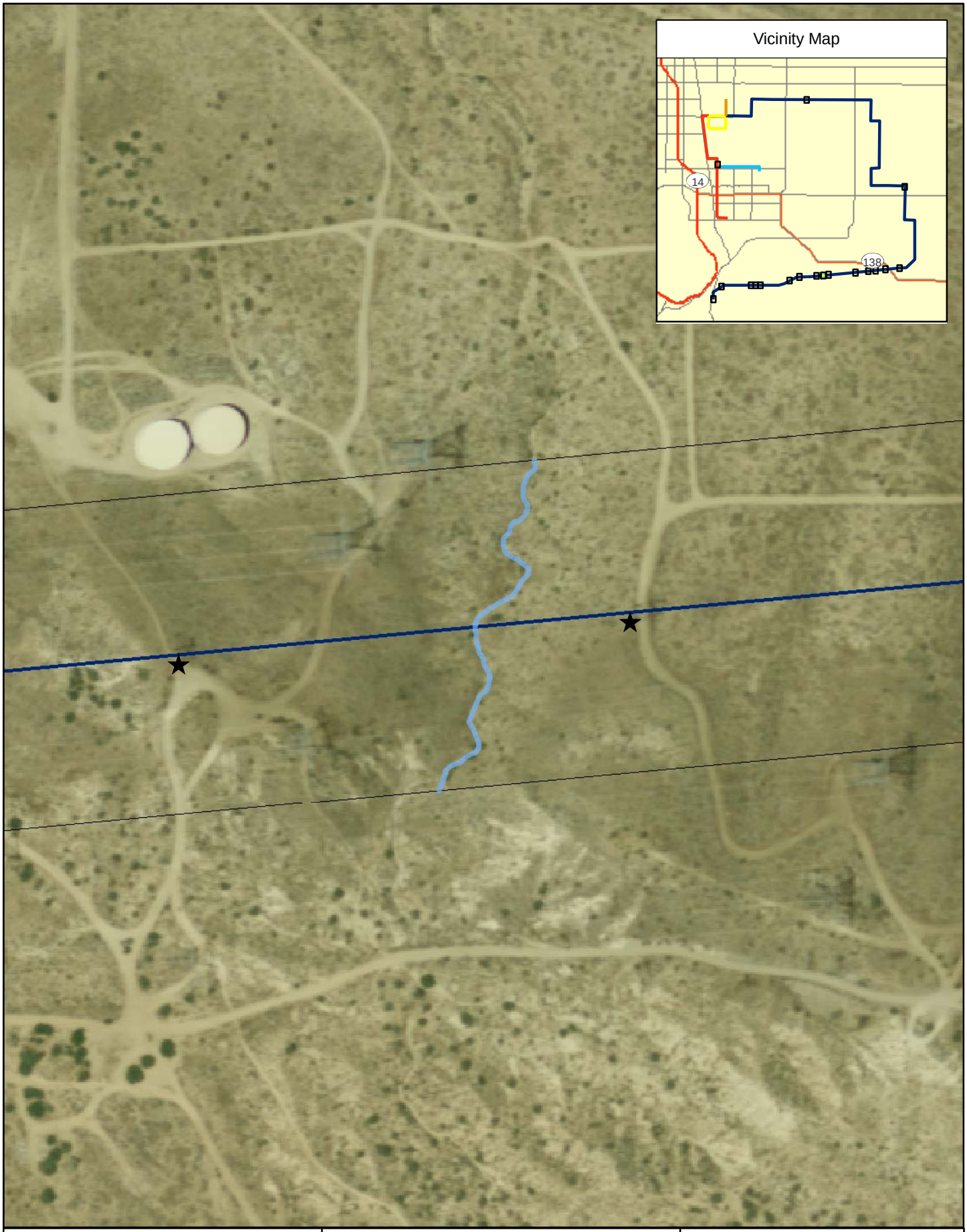

Legend

- Transmission Line
- Reclaimed Water Pipeline
- Natural Gas Supply Pipeline
- Power Plant Site
- Sanitary Wastewater Pipeline
- Transmission Tower
- Waters of the State of California
- Waters of the State & Waters of the U.S. (California Aqueduct)
- 250 Foot Buffer

Palmdale Hybrid Power Project

Potential Jurisdictional Waters and Approximate Transmission Tower Locations

0 100 200 Feet 1:2,400

Map Notes:
Projection: NAD 83, Zone 11
Path:G:\sdo8\bio\Palmdale\mxd\waters_tl_mb
Date: 09/12/2008

Figure -10

amec

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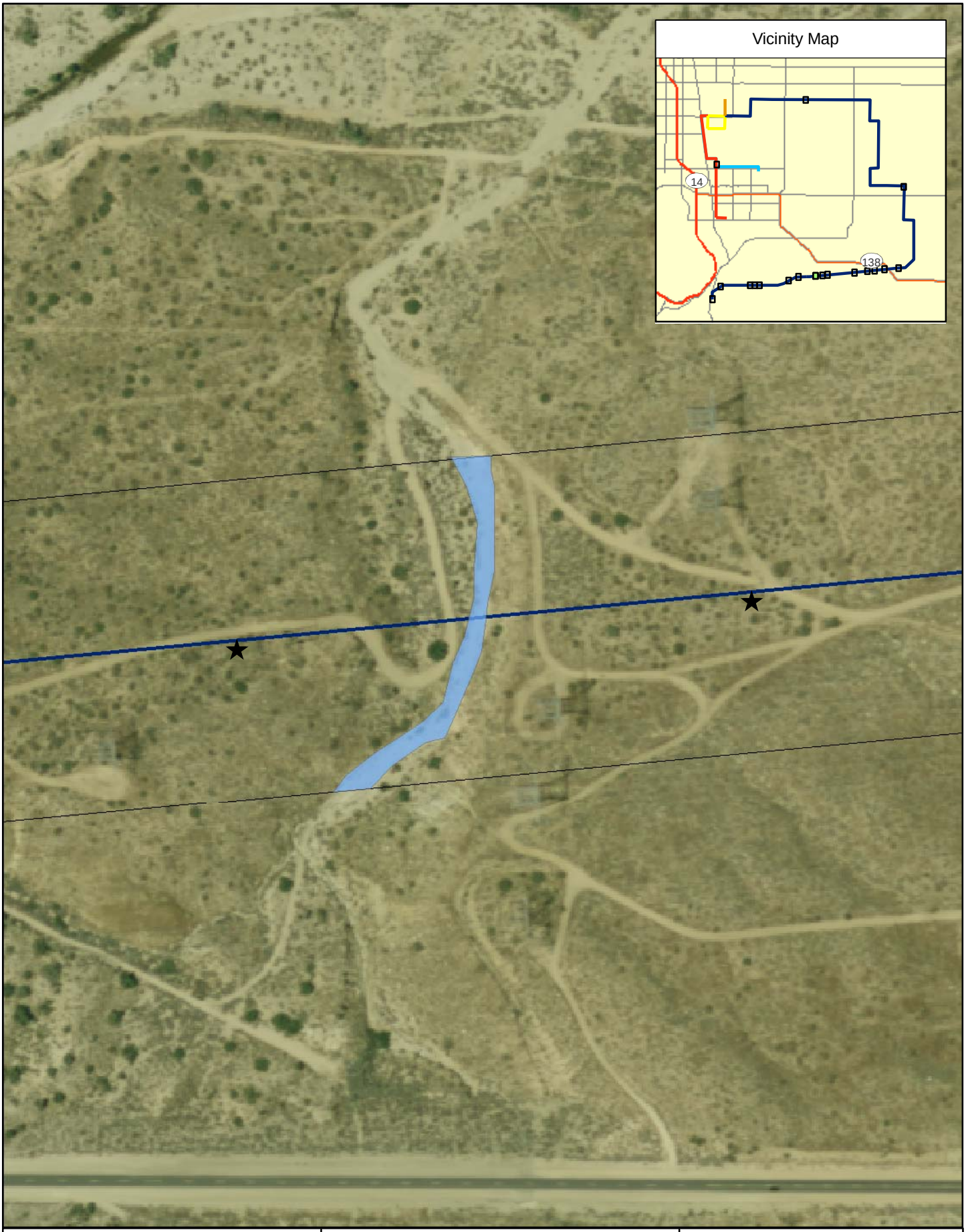

Legend

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Palmdale Hybrid Power Project

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Map Notes:
Projection: NAD 83, Zone 11
Path:G:\sdo8\bio\Palmdale\mxd\waters_tl_mb
Date: 09/12/2008

Figure -11

amec

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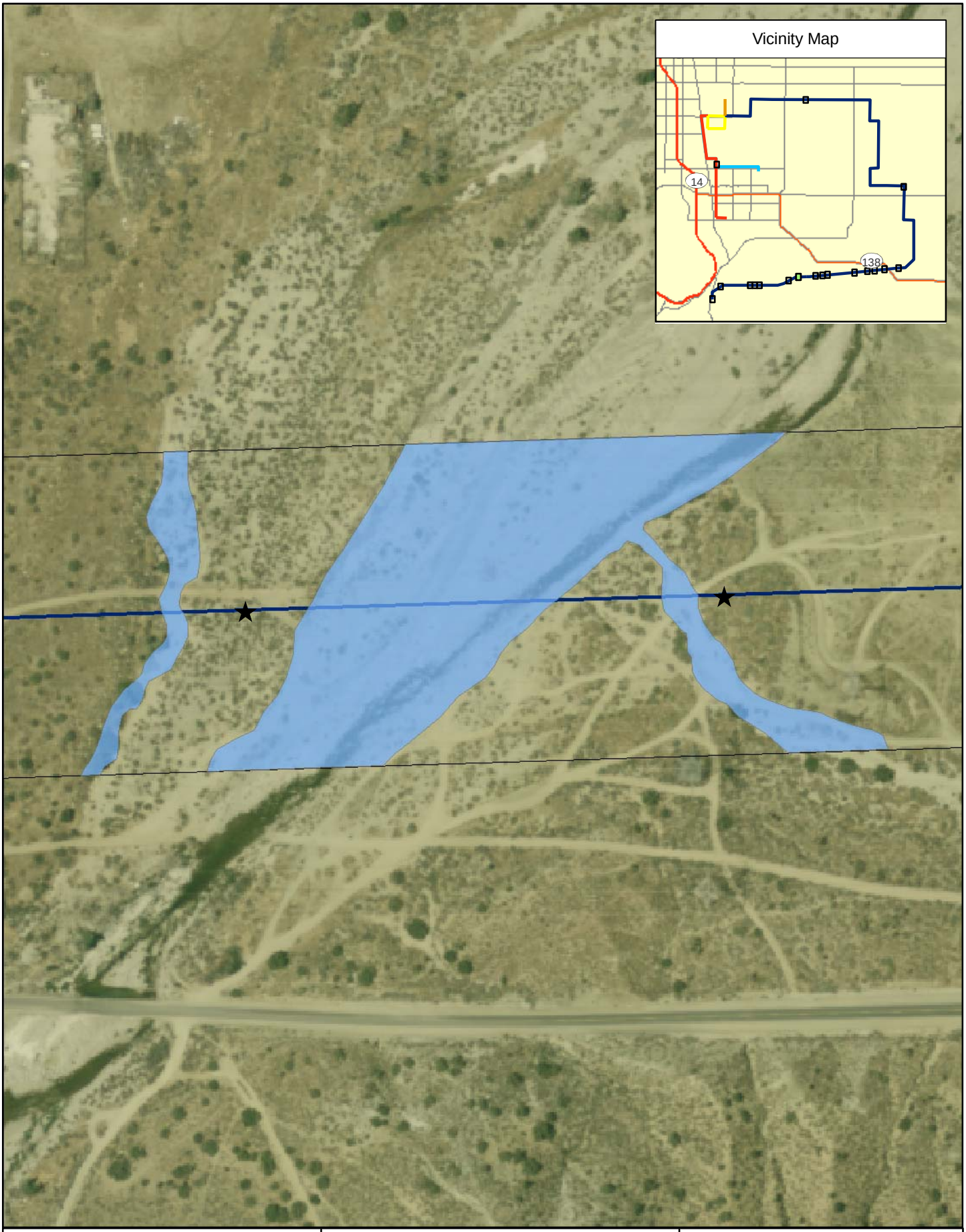

Legend

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Palmdale Hybrid Power Project

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Map Notes:
Projection: NAD 83, Zone 11
Path:G:\sdo8\bio\Palmdale\mxd\waters_tl_mb
Date: 09/12/2008

Figure -12

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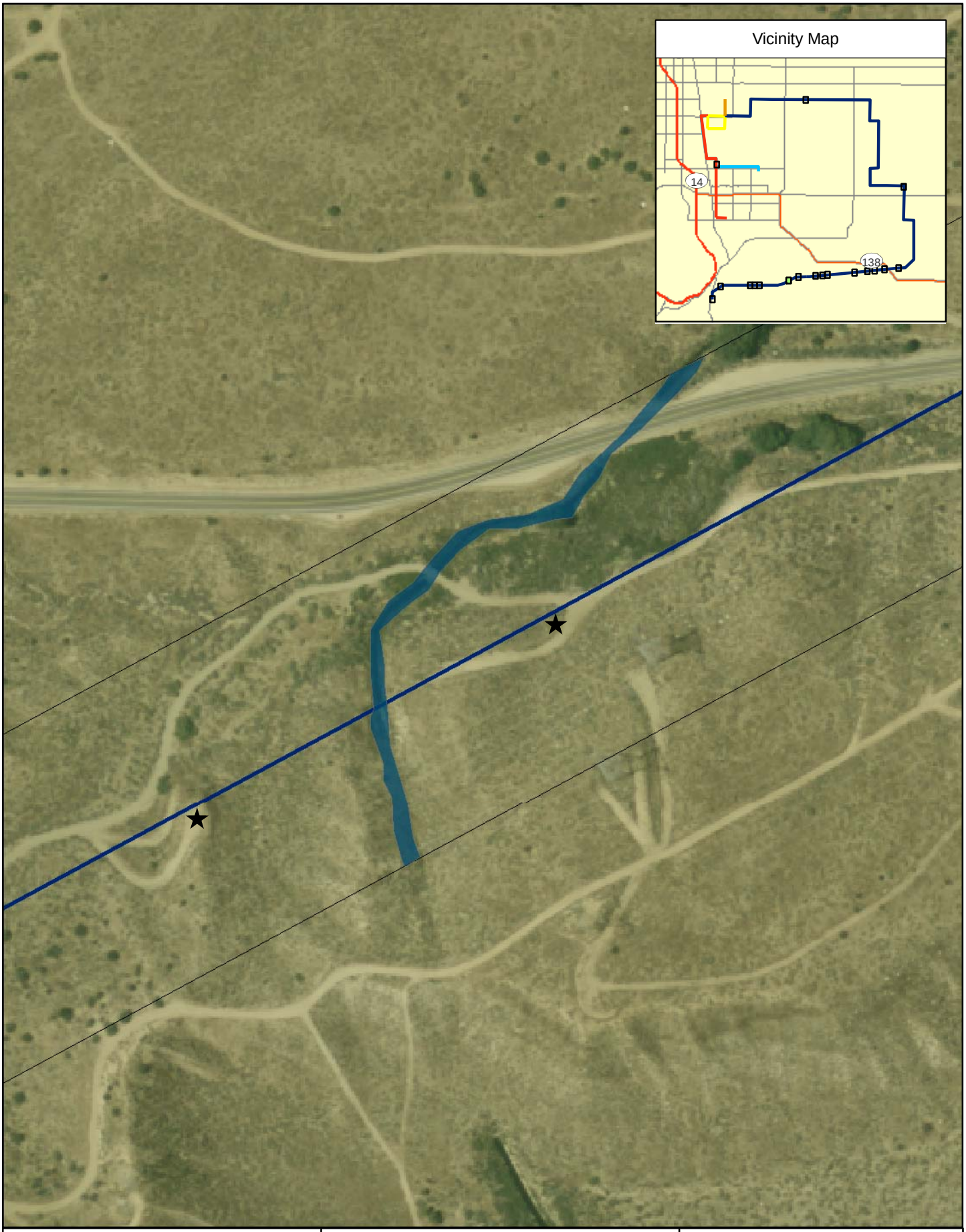

Legend

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Palmdale Hybrid Power Project

Potential Jurisdictional Waters and Approximate Transmission Tower Locations

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Map Notes:
Projection: NAD 83, Zone 11
Path:G:\sdo8\bio\Palmdale\mxd\waters_tl_mb
Date: 09/12/2008

Figure -13

amec

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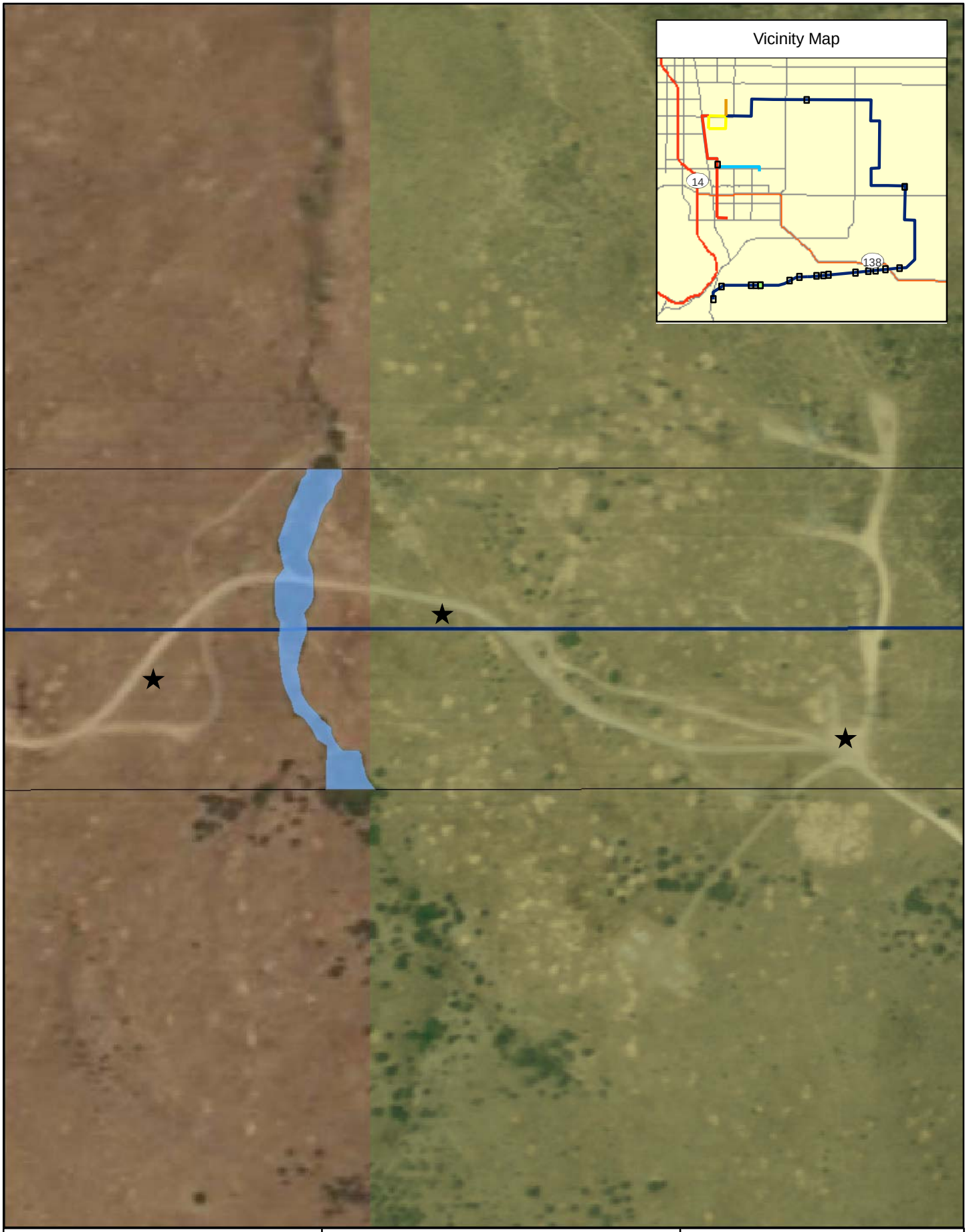

Legend

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Palmdale Hybrid Power Project

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Map Notes:
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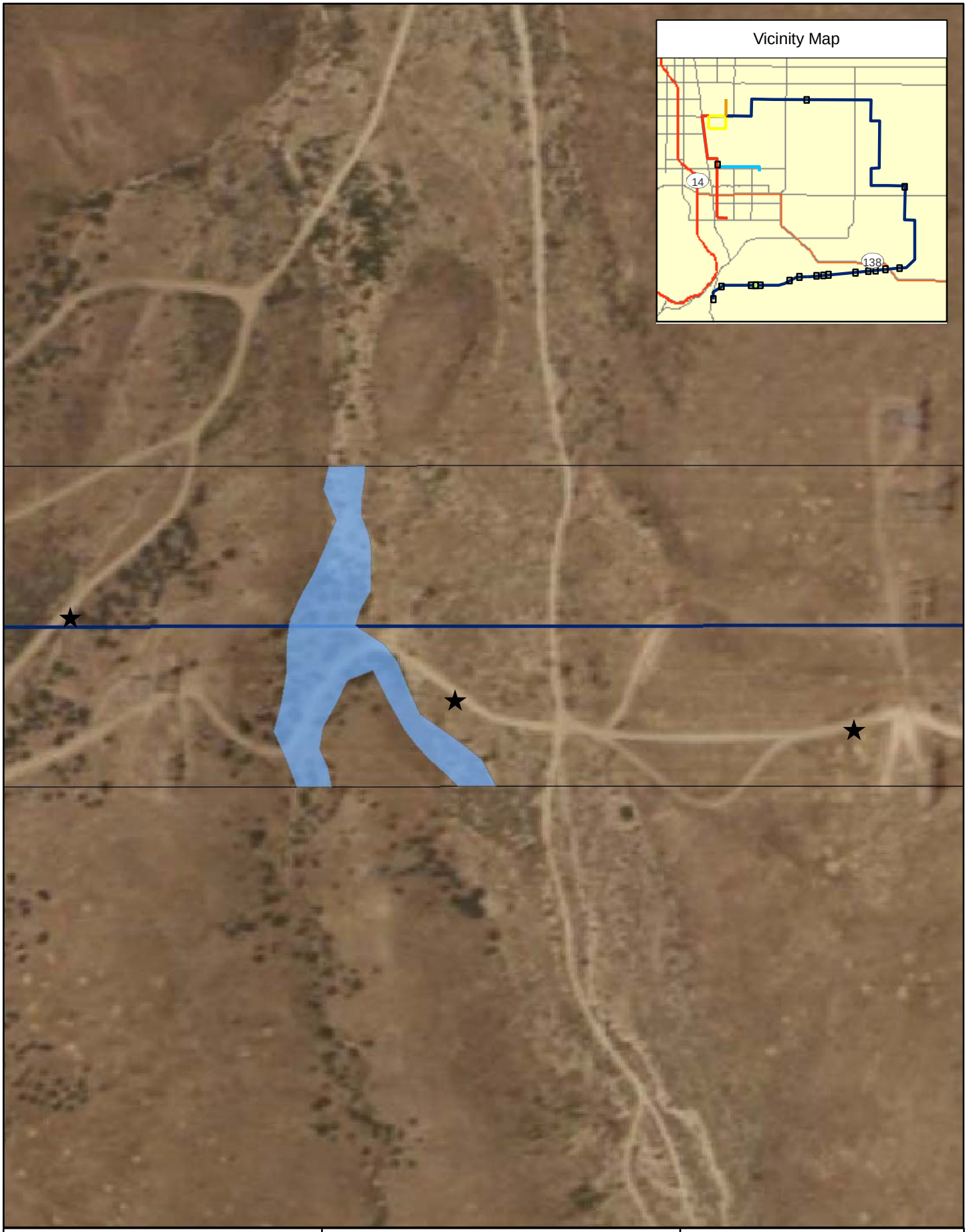
Date: 09/12/2008

Figure -14

amec

N



Legend

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Potential Jurisdictional Waters and Approximate Transmission Tower Locations

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Map Notes:
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Date: 09/12/2008

Figure -15

amec

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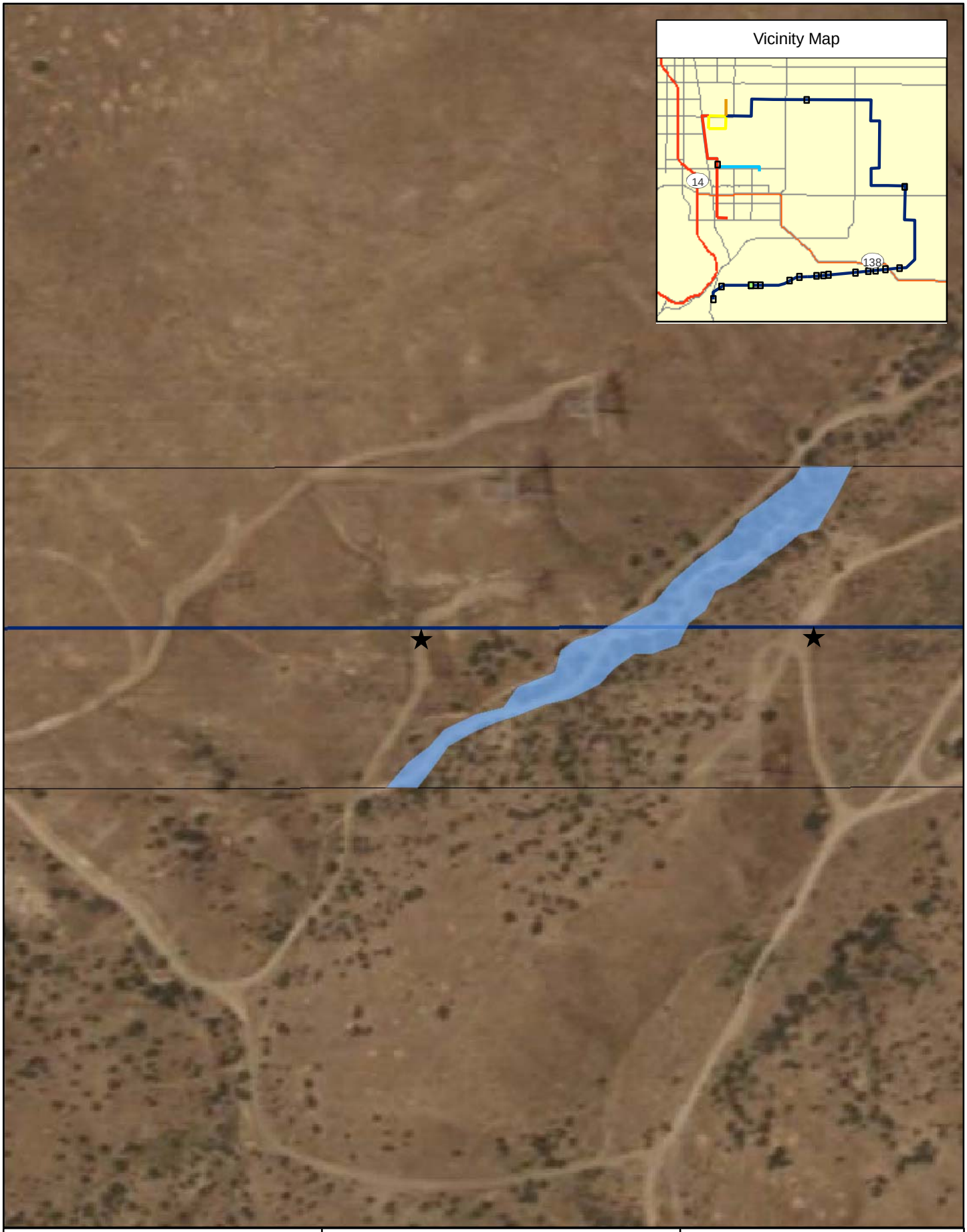

Legend

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Palmdale Hybrid Power Project

Potential Jurisdictional Waters and Approximate Transmission Tower Locations

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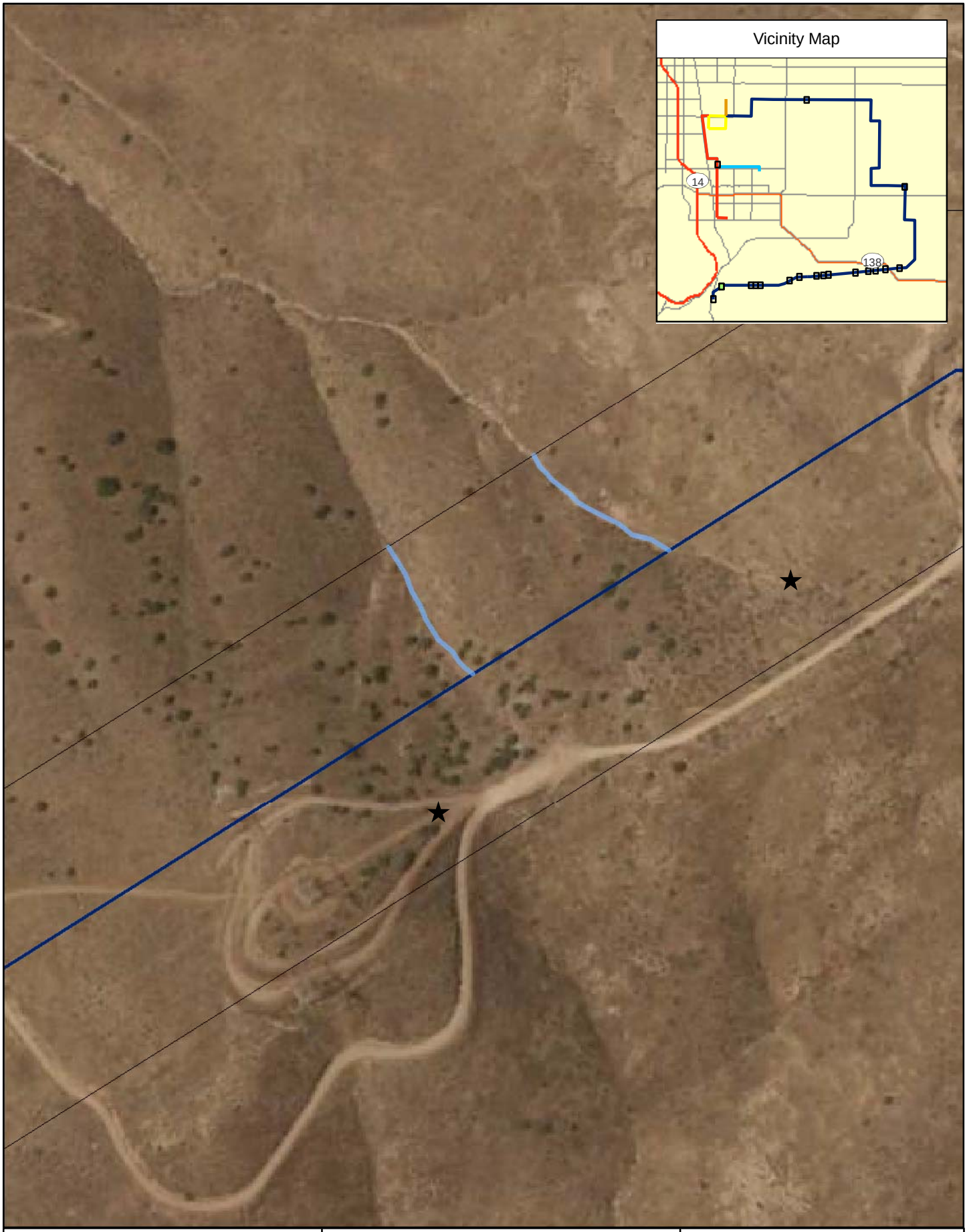
Map Notes:
Projection: NAD 83, Zone 11
Path:G:\sdo8\bio\Palmdale\mxd\waters_tl_mb
Date: 09/12/2008

Figure -16

amec

N



Legend

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Date: 09/12/2008

Figure -17

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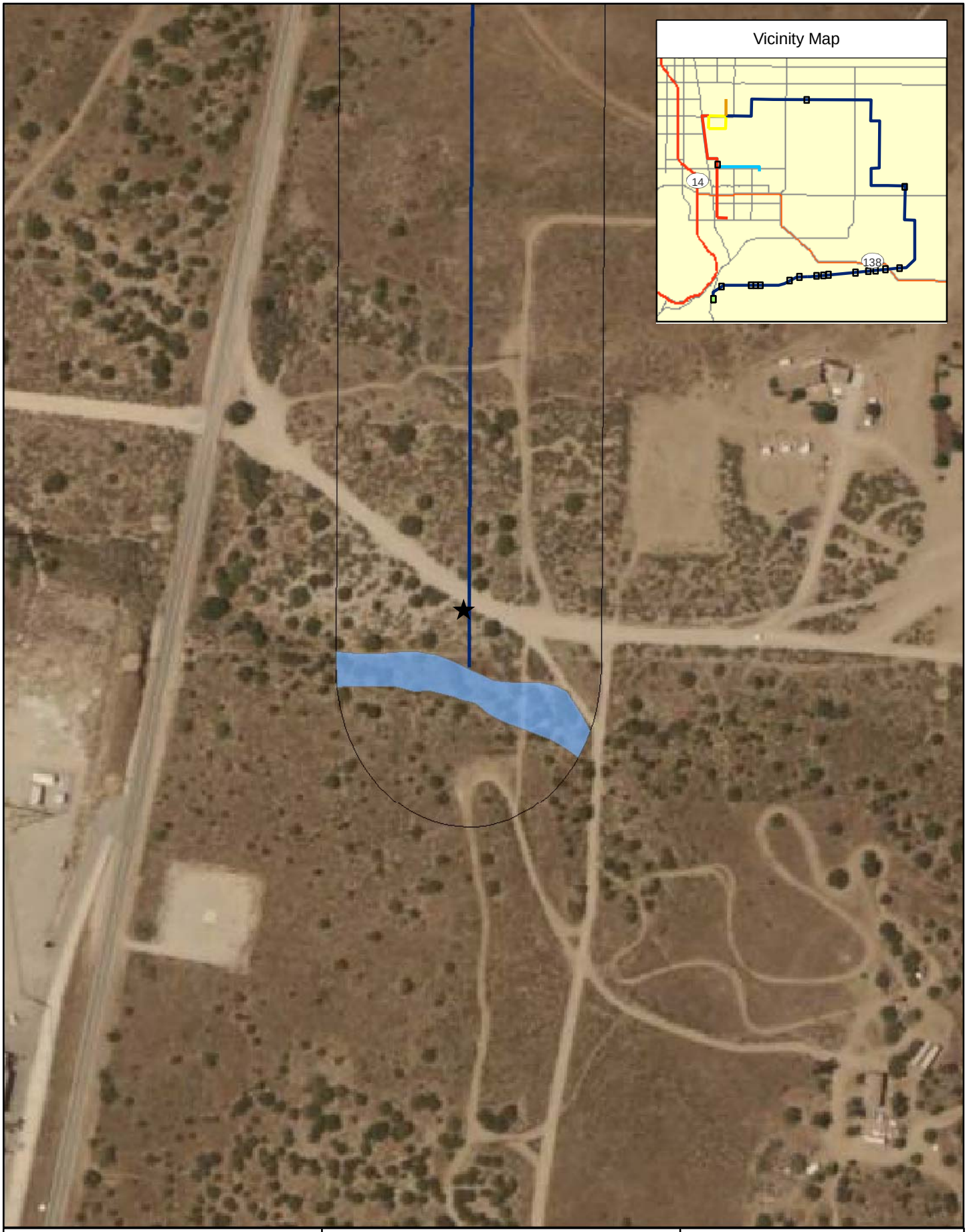

Legend

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Map Notes:
Projection: NAD 83, Zone 11
Path:G:\sdo8\bio\Palmdale\mxd\waters_tl_mb
Date: 09/12/2008

Figure -18

amec

N

Attachment BIO-7

AGENCY CONTACTS

1. Ray Bransfield (June 2006)
   U.S. Fish and Wildlife Service (USFWS)
   Regarding desert tortoise surveys

2. Becky Jones (June 2006)
   California Department of Fish and Game (CDFG)
   Regarding special-status species in area

3. Connie Brown (September 2006)
   City of Palmdale, Division of Public Works
   Regarding Palmdale Native Desert Vegetation Ordinance

4. Rick York (June 2007)
   California Energy Commission (CEC)
   Regarding CEC survey guidelines

5. Dale Edwards (March 2008)
   CEC Environmental Protection Office
   Regarding CEC survey guidelines

6. John Farley (March 2008)
   L.A. County Wildflower and Wildlife Sanctuaries
   Regarding sanctuaries along Project routes

7. Carl Benz (April 2008)
   USFWS
   Regarding desert tortoise surveys

8. Kirk Larkin (July 2008)
   Regional Water Quality Control Board (RWQCB)
   Regarding impacts to isolated waters

9. Phuong Thinh (July 2008)
   U.S. Army Corps of Engineers (USACE)
   Regarding impacts to isolated waters

10. Richard Kite (July 2008)
    City of Palmdale
    Regarding Significant Ecological Areas

11. Soyong Choi (July 2008)
    L.A. County
    Regarding Significant Ecological Areas

12. Shirley Rivera (August 2008)
    U.S. Environmental Protection Agency (USEPA)
    Regarding PSD

13. Ray Bransfield (September 2008)
    USFWS
    Regarding BA

14. Phuong Trinh (September 2008)
    USACE
    Regarding jurisdictional waters permitting

15. Mary Dellavalle (September 2008)
    Lahontan RWQCB, 401 Certification Program
    Regarding jurisdictional waters permitting

16. Jamie Jackson (September 2008)
    CDFG
    Regarding jurisdictional waters of the State

17. Scott Harris (September 2008)
    CDFG
    Regarding biological resources for PHPP

18. Phuong Trinh (September 2008)
    USACE
    Regarding jurisdictional waters permitting

The following provides a description of a discussion between Wes Speake (Business Unit Manager) and Ray Bransfield (US Fish and Wildlife Service) in June 2006.

Ray Bransfield
US Fish and Wildlife Service
805 644-1766
ray_bransfield@r1.fws.gov

Topic: Desert tortoise surveys

Discussion: See attached email.

AMEC Earth & Environmental, Inc.
3120 Chicago Avenue, Suite 110
Riverside, CA 92507
Tel +951-369-8060
Fax +951-369-8035
www.amec.com

Amalong, Matt L

From: Speake, Wes J
Sent: Wednesday, June 07, 2006 2:00 PM
To: Ray_Bransfield@fws.gov
Cc: Green, John F (Riverside); Egan, Tom
Subject: RE: FW: Approvals for performing Desert Tortoise Surveys

Thanks Ray, That helps a lot. We plan on having all of surveys completed in the next two weeks.

Wes
-----Original Message-----
From: Ray_Bransfield@fws.gov [mailto:Ray_Bransfield@fws.gov]
Sent: Wednesday, June 07, 2006 1:55 PM
To: Speake, Wes J
Subject: Re: FW: Approvals for performing Desert Tortoise Surveys

Wes,
I don't have any problem with you conducting the surveys outside of the 'activity period' recommended in our survey protocols. I have a couple of caveats to go along with this agreement:
1. Be sure that surveyors are well qualified and that they know they are looking for sign because they are more likely to see sign than tortoises when tortoises are less active.
2. Given that this was not a particularly good year for tortoise activity, you may want to do the surveys sooner than later; if limited sign is present, you want to see it before it goes away.
3. The report of the surveys should be meticulously prepared, given that you would be surveying when tortoises are more difficult to detect in an area of extremely low density (if any are present). Remember that you are trying to prove a negative.
4. Last but most, please discuss with CDFG. I have copied Becky Jones from CDFG on this email.
Ray

"Speake, Wes J" <wes.speake@amec.com>
06/06/2006 08:37 AM

To: <ray_bransfield@fws.gov>
cc:
Subject: FW: Approvals for performing Desert Tortoise Surveys

I forgot to drop the R1. Thanks Ray

From: Speake, Wes J
Sent: Monday, June 05, 2006 4:36 PM
To: ray_bransfield@r1.fws.gov
Subject: Approvals for performing Desert Tortoise Surveys

Ray,
Thanks for speaking with me last week regarding our project in Palmdale. Attached is a map of the project site, minus any linears (the exact routes haven't been identified to date). Since the project is subject to CEC review they will want us to get a Ok to conduct these surveys outside of the "activity period". Thanks for your help and I look forward to hearing back from you soon.

Wes J. Speake
Business Unit Manager
Riverside Environmental Services

AMEC Earth and Environmental, Inc.
3120 Chicago Avenue, Suite 110
Riverside, California
USA 92507
Tel: (951) 369-8060 Ext 102
Cell (951) 906-8626
Fax:(951) 369-8035

wes.speake@amec.com
http://www.amec.com/earthandenvironmental/

(See attached file: Palmdale Site Survey Area March 15, 2006.pdf)

The following provides a description of a discussion between Tom Egan (AMEC Senior Ecologist) and Becky Jones (CDFG) in June 2006.

Becky Jones
CDFG
661-285-5867
dfgpalm@adelphia.net

Topic: Special-status species for Palmdale Hybrid Power Project

Discussion: Coordinated with Becky Jones regarding surveys for special-status species.

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Riverside, CA 92507
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Fax +951-369-8035
www.amec.com

The following provides a description of a discussion between John Green (AMEC Wildlife Biologist) and Connie Brown (City of Palmdale Landscape Architect) in September 2006.

Connie Brown
City of Palmdale
661-267-5265
cbrown@cityofpalmdale.org

Topic: Palmdale Native Desert Vegetation Ordinance

Discussion: See attached email.

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Riverside, CA 92507
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Fax +951-369-8035
www.amec.com

Amalong, Matt L

From: Connie Brown [cbrown@cityofpalmdale.org]
Sent: Tuesday, September 12, 2006 1:07 PM
To: Green, John F (Riverside)
Subject: RE: Your request

Attachments: Joshua Tree Movers.pdf

Joshua Tree Movers.pdf

Here you go:)c

-----Original Message-----
From: Green, John F (Riverside) [mailto:john.f.green@amec.com]
Sent: Tuesday, September 12, 2006 12:54 PM
To: Connie Brown
Subject: RE: Your request

Connie,

Thanks for the quick reply. Could we also have the list of approved Joshua Tree movers?

Thanks,

John

-----Original Message-----
From: Connie Brown [mailto:cbrown@cityofpalmdale.org]

Sent: Tuesday, September 12, 2006 11:31 AM
To: Green, John F (Riverside)
Subject: Your request

<<Joshua Procedures.pdf>> <<Joshua Tree Evaluators.pdf>>

<<Nativeplantordinance repaired.doc>>

Here is the ordinance, our procedures and the evaluators who are presently on our list. If you are wanting to use someone, else, I need to know their qualifications, and they need to have a City of Palmdale Business license.
Let me know:)c

Connie L. Brown
Sr. Engineering Landscape Technician
Phone: 661-267-5265
FAX: 661-267-5262
38250 N. Sierra Highway
Palmdale, Ca. 93550

Amalong, Matt L

From: Connie Brown [cbrown@cityofpalmdale.org]
Sent: Tuesday, September 12, 2006 11:31 AM
To: Green, John F (Riverside)
Subject: Your request

Attachments: Joshua Procedures.pdf; Joshua Tree Evaluators.pdf; Nativeplantordinance repaired.doc


Joshua Procedures.pdf


Joshua Tree Evaluators.pdf


Nativeplantordinanc e repaired....

<<Joshua Procedures.pdf>> <<Joshua Tree Evaluators.pdf>> <<Nativeplantordinance repaired.doc>>

Here is the ordinance, our procedures and the evaluators who are presently on our list. If you are wanting to use someone, else, I need to know their qualifications, and they need to have a City of Palmdale Business license.
Let me know:)c

Connie L. Brown
Sr. Engineering Landscape Technician
Phone: 661-267-5265
FAX: 661-267-5262
38250 N. Sierra Highway
Palmdale, Ca. 93550

The following provides a description of a discussion between Arrie Bachrach (ENSR) and Rick York (CEC Biologist) in June 2007.

Rick York
CEC
916-654-5139

Topic: Recommended Biological Resources Field Survey Guidelines for Large Solar Projects

Discussion: See attached email.

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3120 Chicago Avenue, Suite 110
Riverside, CA 92507
Tel +951-369-8060
Fax +951-369-8035
www.amec.com

Amalong, Matt L

From: Amalong, Matt L
Sent: Thursday, June 14, 2007 3:16 PM
To: Bachrach, Arrie; Speake, Wes J
Cc: Head, Sara
Subject: RE: CEC Staff Bio survey guidance

This is consistent with what has been done (maybe not exactly, but very close) and what will be done. The proposal, which should be revised when all of the project specs have been identified and confirmed, will be updated to reflect these latest requirements.

Matt

From: Bachrach, Arrie [mailto:ABachrach@ensr.aecom.com]
Sent: Thu 6/14/2007 4:26 PM
To: Speake, Wes J; Amalong, Matt L
Cc: Head, Sara
Subject: CEC Staff Bio survey guidance

Wes/Matt -

FYI. I was in a meeting with the CEC the other day on another project and I received the attached from CEC Biology Staff (Rick York).

This is all in the context of the new land-intensive solar projects, protocol survey requirements for special status species and the new CEC siting regs. Staff feel that some additional guidance is needed beyond the regs, which is what this is intended to provide. Their basic thrust is that they do not want to conflict with established protocols for bio surveys, but CEC requirements go beyond what the protocols require (e.g., the CEC wants information out to one mile from the site boundary and the DT survey protocol's Zones of Influence" do not require transects that far out. They want to be sure that AFC preparers understand what they (CEC Staff) are looking for. This is still "draft", but is still of interest because of the source.

Take a look at this and let us know if you see any issues here for us (i.e., is what we have done/are doing at Palmdale is consistent with what the CEC says here?).

Thanks.

Arrie

The following provides a description of a discussion between Matt Amalong (AMEC Wildlife Biologist) and Dale Edwards (CEC Environmental Protection Office) in March 2008.

Dale Edwards
CEC Environmental Protection Office
916-654-5139
dedwards@energy.state.ca.us

Topic: Recommended Biological Resources Field Survey Guidelines for Large Solar Projects

Discussion: We discussed the DRAFT survey guidelines and how they pertained to the Palmdale Hybrid Power Project. Guidelines were discussed for the power plant site, linear facilities, and all associated buffers.

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www.amec.com

The following provides a description of a discussion between Matt Amalong (AMEC Wildlife Biologist) and John Farley (CEC Environmental Protection Office) in March 2008.

John Farley
Regional Park Superintendent
L.A. County Wildflower and Wildlife Sanctuaries
661-944-6881
jfarley@parks.lacounty.gov

Topic: L.A. County Wildflower and Wildlife Sanctuaries

Discussion: We discussed the locations of Wildflower and Wildlife Sanctuaries in L.A. County that may be crossed by the Project. John Farley sent me maps showing their locations.

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3120 Chicago Avenue, Suite 110
Riverside, CA 92507
Tel +951-369-8060
Fax +951-369-8035
www.amec.com

Amalong, Matt L

From: John Farley [jfarley@parks.lacounty.gov]
Sent: Friday, March 28, 2008 4:27 PM
To: Amalong, Matt L
Subject: Wildlife Sanctuaries
Attachments: Sanctuary Map-sml file.BMP; Alpine Butte & Butte Valley-sml file.BMP; Jackrabbit Flat-sml file.BMP

Matt,
I tried to send these earlier, apparently the files were too large. I'll try again,
Jack

John(Jack)Farley
Regional Park Superintendent
Wildflower and Wildlife Sanctuaries
Office 661-944-6881
Fax 661-944-6924

The following provides a description of a discussion between Matt Amalong (AMEC Wildlife Biologist) and Carl Benz (US Fish and Wildlife Service) in April 2008.

Carl Benz
US Fish and Wildlife Service
805 644-1766
Carl_Benz@fws.gov

Topic: Desert tortoise surveys

Discussion: Discussed the Zone of Influence (ZOI) transects around the power plant site. Resolved to not conduct surveys in heavily built-up/urbanized areas.

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The following provides a description of a discussion between Nick Ricono (AMEC permitting specialist) and Kirk Larkin (Colorado River Basin Regional Water Quality Control Board) on July 23, 2008.

Kirk Larkin
Regional Water Quality Control Board- Colorado River Basin Region
401 Certification Program
760-776-8964
klarkin@waterboards.ca.gov

Topic: RWQCB methods of regulating impacts to isolated waters of the State of California.

Discussion: Kirk Larkin stated that the RWQCB regulates impacts to isolated waters of the State of California under the Porter Cologne Water Quality Control Act. Water quality issues related to impacts to waterways are normally addressed during 401 Water Quality Certification for impacts to jurisdictional waters of the United States requiring Clean Water Act Section 404 permitting. Impacts to waters of the State that are not jurisdictional waters of the United States would be addressed under a Construction General Permit, State General Waste Discharge Order, or Waste Discharge Requirements, depending upon the level of impact and the properties of the waterway.

AMEC Earth & Environmental, Inc.
9210 Sky Park Court, Suite 200
San Diego, CA 92123
Tel +858-300-4300
Fax +858-300-4301
www.amec.com

The following provides a description of a discussion between Nick Ricono (AMEC permitting specialist) and Phuong Trinh (U.S. Army Corps of Engineers-Los Angeles District Regulatory Staff) on July 23, 2008.

Phuong Thinh
U.S. Army Corps of Engineers-Los Angeles District
Project Manager-Los Angeles County
213-452-3372
phuong.h.trinh@usace.army.mil

Topic: The jurisdictional status of desert washes and dry lakes in western Mojave Desert near Palmdale and Edwards Air Force Base.

Discussion: Phuong Trinh stated that desert washes flowing into dry lakebeds such as Rosamond Lake and Buckhorn Lake on Edwards Air Force Base, and other intrastate desert washes that do not connect to a Traditionally Navigable Waterway or do not, themselves, have a connection to interstate or foreign commerce, were removed from federal jurisdiction under the Clean Water Act as a result of the 2001 U.S. Supreme Court decision in the *Solid Waste Agency of Northern Cook County v. Corps (SWANCC).* These waters are "isolated" and not regulated by the U.S. Army Corps of Engineers under the Clean Water Act.

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9210 Sky Park Court, Suite 200
San Diego, CA 92123
Tel +858-300-4300
Fax +858-300-4301
www.amec.com

The following provides a description of a discussion between Stephanie Hsia (ENSR environmental specialist) and Richard Kite (August 1, 2008).

Richard Kite
City of Palmdale Planner
City of Palmdale Planning Department
(661)-267-5293

Topic: Applicability of Significant Ecological Areas (SEA) for transmission lines

Discussion: Richard Kite stated that Project transmission lines, which run through the SEA in the City of Palmdale, would not have to go through the SEA regulatory process because the CEC process would address any biological impacts resulting from the Project.

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www.amec.com

The following provides a description of a discussion between Stephanie Hsia (ENSR environmental specialist) and Soyong Choi (July 31, 2008).

Soyong Choi
Los Angeles County Planner
Los Angeles Department of Regional Planning
(213) 974-6411

Topic: Applicability of Significant Ecological Areas (SEA) for transmission lines

Discussion: The applicability of the SEA review process for the Project's transmission lines that run through SEAs in Los Angeles County was discussed. Soyong Choi stated that if the transmission line is constructed and owned by a public utility, then it does not need to go through the LA Regional Planning permitting process. If it is owned by a public utility, the Project will go through the Public Utilities Commission (PUC) permitting process.

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The following provides a description of a discussion between Sara Head (ENSR) and Shirley Rivera (USEPA) in September 2008.

Shirley Rivera
USEPA, Region 9, Air Permits Office
415-972-3966
Rivera.Shirley@epamail.epa.gov

Topic: Palmdale PSD Application

Discussion: See attached email.

AMEC Earth & Environmental, Inc.
3120 Chicago Avenue, Suite 110
Riverside, CA 92507
Tel +951-369-8060
Fax +951-369-8035
www.amec.com

From: Rivera.Shirley@epamail.epa.gov
Sent: Friday, August 22, 2008 1:48 PM
To: Head, Sara
Cc: Hamel, Richard
Subject: RE: Palmdale (PHPP): PSD Application

Sara,

Thanks for response. Confirming that it will be a stand-alone PSD application (vs. CEC AFC cobbled together).

So to address items you brought up -

a) Victorville format - Because Anita was the lead and I had served in an advisory role after she had already begun the permit/AAQIR development, I am not as familiar with "front matter" (i.e., application) as I am with the "back matter" (i.e., permit, AAQIR). I will check in with Anita over the coming weeks.

b) EPA forms - Correct, we do not have specific forms or the like-kind.

c) ESA & BA - For clarification, it is EPA's responsibility - as the federal agency - to conduct/initiate any consultation with the USFWS. It is not the Applicant's role to conduct the Section 7 related activities; however, it is the information that you all provide to us that allows us to do the requisite review, etc. Also, as an example, I see from the Victorville formal consultation letter that there was a "designated non-Federal representative" made. Whether this occurs for your project would be determined by EPA, discussions with USFWS and you all.

Based on a recent PSD permit action that I had completed a couple of months ago, here is what I understand regarding the submittal of a BA -
1) No effect - EPA will have to provide documentation and basis for a "no effect" conclusion. If in fact this can happen without a BA, there would have still to be something for us to review/consider to arrive at such conclusion. (This is based on a discussion I had with an USFWS office in AZ.)

2) May affect or not sure of affect - A BA would need to be provided. At that time, we would review the BA and initiate whatever consultation (i.e., formal, informal) may be needed with USFWS. Consultation would not be initiated by you all, however, you all would/could be kept in the loop.

As an example - and I am not necessarily saying to submit your information in this manner ... just wanted to give you a recent example ... With regards to a BA, for a project I have where the Applicant chose to use portions of the CEC AFC, the Applicant provided the following CEC sections:

- Project Description
- Biological Resources

(However, for you all, if you chose to go this route, please note that the sections to include would be dependent on how the AFC was pulled together; other sections may contribute to fulfilling the necessary elements of a BA for which we could review and could provide to the USFWS). For this other project I have where we are working with the Sacramento Field Office for a San Joaquin Valley-located proposed project, we did end up submitting to them the above mentioned section for the review/preparation of the USFWS's Biological Opinion.

It appears you all believe that there may be no effect and will be in discussions with the USFWS. Please do make note of the contact person(s) because we will still have to fulfill our Section 7 obligations.

=========

Have a good weekend,

- Shirl

Shirley F. Rivera
T: (415) 972-3966 | F: (415) 947-3579 | Rivera.Shirley@epa.gov
U.S. EPA, Region 9, Air Permits Office (AIR-3) | 75 Hawthorne St., San Francisco, CA 94105

"Head, Sara" <SHead@ensr.aecom.com>

08/22/2008 11:55 AM

To Shirley Rivera/R9/USEPA/US@EPA, "Hamel, Richard" <rhamel@ensr.aecom.com>

cc

Subject RE: Palmdale (PHPP): PSD AQ modeling protocol

Hi Shirley -

We will be submitting a separate stand alone application (like we did for Victorville). We will address PM and PM2.5 from the start rather than needing to follow-up with supplements like we did for Victorville. Otherwise, you can let me know if you have any other format observations about the Victorville application that we should incorporate into Palmdale. It's my understanding that EPA Region 9 doesn't have any specific application forms or anything like that.

At this point we do not impact federal endangered species, so we won't need to do formal Section 7 consultation. We are getting guidance from USFWS on informal consultation, but at this point, we do not expect to need to provide EPA with a Biological Assessment.

Depending on where we stand with USFWS (i.e., confirm that no BA is needed), we may be able to submit the PSD application next week. Otherwise, it will be early Sept.

Thanks for your input.

Sara

From: Rivera.Shirley@epamail.epa.gov [mailto:Rivera.Shirley@epamail.epa.gov]
Sent: Fri 8/22/2008 12:37 PM
To: Hamel, Richard; Head, Sara
Cc: Bohnenkamp.Carol@epamail.epa.gov
Subject: Palmdale (PHPP): PSD

Richard (and Sara),

I left a v/m msg for you yesterday. I have been assigned the PSD permit project for Palmdale Hybrid Power Project.

To date, I have received from my Manager, Gerardo Rios, the Aug 6, 2008 *"Class I and Class II Protocol Submittal for Palmdale Hybrid Power Project"* that includes text and a CD. I will forward this to Carol Bohnenkamp's attention (as well as retain a copy of the text portion of your submittal). Other than this information, I will await the formal PSD permit application submittal.

CEC INFO ... I note that you all have filed with the CEC (08-AFC-9) on August 4.
http://www.energy.ca.gov/sitingcases/palmdale/index.html
I sent an e/m to John Kessler to let him know my contact information (as well as the project name typo on the "Applicant's Documents" link); he has confirmed receipt of the info.

So for the purposes of when you all are going to be submitting the formal PSD application - some items to consider:

a) Project Contacts - Below is my contact information. I will see who else in our Permits Office would be interested in providing additional support. And as you may know, Gerardo Rios is the Chief of our Office. When the PSD portion kicks-off, I'll pull contact info together regarding our folks.

b) September submittal? - When you all know the submittal date (and timeframe), please let me know. As with your circumstances on other project activities and commitments, I (and others in our office) have similar competing project activities.

c) PSD Application format & content - I am interested in knowing if you all plan to submit the PSD application as a:
1) PSD standalone application (that may be comparable to AFC-filed info) **OR**
2) compiled sections of the AFC filing that would be intended to fulfill our PSD application requirements.

Please let me know either way. In particular, if you plan to go for 'option 2', it would be convenient for streamlining of my review to have the following:
- **Cross reference** - Cross reference the AFC sections with those parts of our Pt 52.21 requirements you are fulfilling (e.g., additional impacts analysis for soils and vegetation may be a mix of the air quality section, biological resources, etc.)

- Data adequacy checklist - Given you all have submitted on August 4, depending on when you'll have resolved the data adequacy stage and when the PSD application will be submitted, a copy of the data adequacy checklist would be helpful, e.g,. references to pages, subject matters outlined, etc.

d) Endangered Species Act (ESA), Section 7 - Just a reminder that we should receive the Biological Assessment so that we may initiate our ESA, Section 7 activities.

Look forward to working w/you all, and have a good weekend!

Best regards,

- Shirl

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T: (415) 972-3966 | F: (415) 947-3579 | Rivera.Shirley@epa.gov
U.S. EPA, Region 9, Air Permits Office (AIR-3) | 75 Hawthorne St., San Francisco, CA 94105

The following provides a description of a discussion between Wes Speake (Business Unit Manager) and Ray Bransfield (US Fish and Wildlife Service) on September 8, 2008.

Ray Bransfield
US Fish and Wildlife Service
805 644-1766
ray_bransfield@r1.fws.gov

Topic: Biological Assessment (BA) Requirements for Palmdale Hybrid Power Plant.

Discussion: Ray Bransfield stated that the USFWS would require a BA; however it was USFWS discretion as to the level of detail and contents of the BA. Since the surveys for the desert tortoise were negative he would like to see the following:

- A very short BA that simply had a project description, location of project site and all linears
- Results Section
- Conclusion and Determination of Effect
- Include Attachments of Biological Reports prepared for the AFC

He also indicated that he would attend a coordination/progress meeting with the project proponent, consultants, and the other agencies.

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3120 Chicago Avenue, Suite 110
Riverside, CA 92507
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Fax +951-369-8035
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The following provides a description of a discussion between Nick Ricono (AMEC permitting specialist) and Phuong Trinh (U.S. Army Corps of Engineers-Los Angeles District Regulatory Staff) on September 17, 2008.

Phuong Thinh
U.S. Army Corps of Engineers-Los Angeles District
Project Manager-Los Angeles County
213-452-3372, phuong.h.trinh@usace.army.mil

Topic: Jurisdictional waters permitting.

Discussion:
Nick Ricono stated:

- We are doing preliminary assessments of permitting requirements for the Palmdale Hybrid Power Plant Project.
- Preliminary designs are not available yet, but project proponent has stated that the project would be designed to avoid all waterways.
- Preliminary Jurisdictional Determination (JD) Report was written including each waterway crossing.
- An additional assessment would be conducted based on preliminary design to insure avoidance.
- Asked Phuong if some information could be submitted to show avoidance and provide information that no permits were needed.

Phuong Thinh replied:

- A project proponent can submit for an Approved JD from the USACE based on information provided in the Preliminary JD. This can be done for multiple waters or individual waters as needed or requested by the project proponent.
- Approved JD requests can be made prior to an application, or as part of an application for a permit.
- Approved JDs require Approved Jurisdictional Determination Forms to be filled out completely and attached to the document.
- Waterways that have already been documented as Non-Jurisdictional based on previous assessments (i.e., Little Rock Wash and Rock Creek) would be able to be approved in an abbreviated process.
- The project proponent can always assume a waterway IS jurisdictional and submit for a permit if impacts are to occur. Such permit applications will be processed without an Approved JD.
- As long as the project does not result in the loss of greater than 0.5 acre of waters of the U.S., a 404 Permit could be obtained under Nationwide Permit 12 for utility line activities. Anything larger would require an Individual Permit. Permit Notification would require a project description (including design drawings), purpose and need, information on the impact (volume, type, reason), delineation of wetlands (if wetlands occur), description of other resources (i.e., endangered species, historic resources), minimization or mitigation measures proposed to limit/compensate for unavoidable impacts.

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San Diego, CA 92123
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Fax +858-300-4301
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The following provides a description of a discussion between Nick Ricono (AMEC permitting specialist) and Mary Dellavalle (Lahontan Regional Water Quality Control Board) on September 17, 2008.

Mary Dellavalle
Lahontan Regional Water Quality Control Board
401 Certification Program
14440 Civic Drive, Suite 200
Victorville, CA 92392
760-241-6583

Topic: Jurisdictional waters permitting.

Discussion:
Discussed the permitting process for 401 Certification (required for impacts to waters of the US) and for Waste Discharge Requirements (WDR) (required for impacts to waters of the State). Asked if there is a preliminary process to discuss avoidance of impacts and get approval from RWQCB for a project that avoidance has occurred.

Responses from Ms. Dellavalle included:

- The RWQCB normally comments on preliminary design information during the CEQA process. A project proponent (especially for large projects) may schedule a meeting to discuss proposed project impacts and avoidance of impacts based on preliminary designs.
- If unavoidable impacts will occur to a water of the US or water of the State, an application for 401 Cert. or WDR is required. The same application can be used for multiple waterways, including both waters of the US and State. A table should be included that identifies waterway's jurisdictional status and description of impact for each. Permit fee is based on RWQCB Dredge and Fill Fee Calculator.
- Impact to waters thought to be only waters of the State would require an Approved JD from the USACE, or at least a formal letter from the USACE stating they agree with the proponent's jurisdictional determination, for any waters that would be impacted by the Project.
- Application for 401 Certification (and/or WDR) requires a project description (including design drawings), description of existing waters, delineation of extent of waters of the US and/or waters of the State, dredge and fill information, impact avoidance and minimization measures, compensatory mitigation measures, CEQA compliance, listed species information, and past and future proposals by the applicant.

The following provides a description of a discussion between Nick Ricono (AMEC permitting specialist) and Jamie Jackson (CDFG) on September 17, 2008.

Jamie Jackson
California Department of Fish and Game - Region 5
4949 Viewridge Avenue
San Diego, CA 92123
(626) 296-3430

Topic: Jurisdictional Waters of the State

Discussion:

Discussed the permitting process for Streambed Alteration Agreements related to the Palmdale Hybrid Power Project passing over, and in relatively close proximity to jurisdictional waters of the State.

Ms. Jackson responded with a request that the project proponent submit a Streambed Notification Package that can be reviewed for avoidance and minimization measures, and should include design drawings and site photos along with project description information. CDFG will make a field visit if needed and make a determination as to whether a Streambed Alteration Agreement is needed.

If CDFG is satisfied that no significant alteration of waters of the State will occur, they will provide a letter stating that no Agreement is necessary. If they determine that there is a potential for significant impacts, CDFG will process the Agreement.

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San Diego, CA 92123
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Fax +858-300-4301
www.amec.com

The following provides a description of a discussion between Matt Amalong (AMEC Wildlife Biologist) and Scott Harris (CDFG Biologist) on September 18, 2008.

Scott Harris
CDFG
626-797-3170
spharris@dfg.ca.gov

Topic: Biological Resources for Palmdale Hybrid Power Project

Discussion:

Mr. Harris's comments included:

- Confirmed that AMEC followed survey protocols for burrowing owl (CDFG, CBOC) and desert tortoise (USFWS, CEC).
- Expressed concern regarding the spacing of transects (30 feet) for botanical surveys, stating that some plants can be missed. He will have a CDFG Botanist look at the methods.
- Confirmed that PHPP had a Mohave ground squirrel habitat assessment.
- Expressed concern regarding the City of Palmdale's Native Desert Vegetation Ordinance, stating that it was inadequate.
- Recommended contacting the CDFG Waters specialist (Jamie Jackson: (626) 296-3430) and arranging a site visit with appropriate AMEC personnel (Nick Ricono).
- Recommended a site visit with AMEC.

Mr. Harris will review AMEC's BRTR and provide comments as soon as possible.

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Riverside, CA 92507
Tel +951-369-8060
Fax +951-369-8035
www.amec.com

The following provides a description of a discussion between Nick Ricono (AMEC permitting specialist) and Phuong Trinh (U.S. Army Corps of Engineers-Los Angeles District Regulatory Staff) on September 18, 2008.

Phuong Trinh
U.S. Army Corps of Engineers-Los Angeles District
Project Manager-Los Angeles County
213-452-3372
phuong.h.trinh@usace.army.mil

Topic: Jurisdictional waters permitting.

Discussion:

Called for confirmation of availability for pre-application meeting regarding the PHPP.

Ms. Trinh confirmed that USACE is available for pre-application meetings to discuss Project designs, avoidance measures, and permitting process if avoidance is not possible. Applicant can coordinate meeting to include CDFG, RWQCB, and other interested parties.

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Response to CEC Staff Data Adequacy Comments

Technical Area: Cultural Resources

Following are additional information and/or clarifications in response to the specific issues raised in the CEC staff Data Adequacy review. For each specific area where the questions were raised by CEC staff, the applicable section of the CEC Siting Regulations is identified, followed by the "Information Required to Make AFC Conform with Regulations," followed by the supplemental/clarifying information.

CUL-1. Appendix B (g)(2)(B).

Information Required:

Applicant needs to provide the name(s) and qualifications of person(s) doing the literature search to the AFC, the Archaeology Technical Report, and the Built-Environment Technical Report.

Response:

Staff at the South Central Coastal Information Center (SCCIC) conducted the records search for the Palmdale Hybrid Power Project. William Self Associates (WSA) does not have access to the qualifications or resumes of staff at the SCCIC. Dr. Allen Estes (PhD, RPA) and Ms. Angela Cook conducted literature searches undertaken by WSA. Dr. Estes' and Ms. Cook's qualifications are presented in Attachment 6 of the confidential Cultural Resources Assessment Report (submitted to the CEC on August 22, 2008), and are provided as **Attachment CUL-1** with this response.

CUL-2, Appendix B (g)(2)(C).

Information Required:

Applicant needs to provide, under confidential cover, copies of DPR 523 forms for 71 recorded archaeological resources (App. I, p. 42).

Response:

These forms were provided in Attachment 9 of the confidential Cultural Resources Assessment Report (submitted to the CEC on August 22, 2008).

CUL-3, Appendix B (g)(2)(C).

Information Required:

Applicant also needs to provide, NOT under confidential cover, copies of DPR 523 forms (or the local equivalent) for 44 historic structures recorded at the SCCIC (App. I, p. 46); for 19 historic structures listed in the Los Angels County Historic Property Data File (App. I, p. 49); and 13 historic structures on the Palmdale General Plan list of potential historic structures (App. I, p. 50).

Response:

Copies of the DPR 523 forms for the 44 historic structures were provided in Attachment 9 of the confidential Cultural Resources Assessment Report (submitted to the CEC on August 22, 2008). WSA has a signed confidentiality agreement with the SCCIC that prohibits distribution of this information to the general public. WSA consulted with the SCCIC in this regard and was informed that, although some of the DPR 523 are marked "unrestricted," all the forms include owners' names and addresses. Consequently, the SCCIC recommends that these forms not be included in a non-confidential submittal.

The relevant pages of the Los Angeles County Historic Property Data File, and the relevant pages of the Palmdale General Plan, are provided in **Attachment CUL-3** with this response).

CUL-4, Appendix B (g)(2)(C).

Information Required:

Applicant needs to provide a copy of USGS 7.5' quadrangle map(s) of the literature search area legibly delineating the coverage of past cultural resources surveys, labeled with the corresponding CHRIS survey report numbers.

Response:

These maps are provided in Attachment 8 of the confidential Cultural Resources Assessment Report (provided to the CEC on August 22, 2008) and as **Attachment CUL-4** with this response.

CUL-5, Appendix B (g)(2)(C).

Information Required:

Applicant needs to provide, under confidential cover, copies of 32 technical reports obtained from the CHRIS, whose survey coverage is wholly or partly within 0.25 mile of the area newly surveyed for the project (App. I, Table 3) and which produced positive results, or which report on any archaeological excavations or built-environment surveys within the one-mile radius literature search area. Required CHRIS report copies include: Nos. LA 0017, LA 0249, LA 0410, LA 0703, LA 1422, LA 1511, LA 1627, LA 1732, LA 1792, LA 1799, LA 1857, LA 1909, LA 1938, LA 1959, LA 2088, LA 2172, LA 2837, LA 3017, LA 3537, LA 3987, LA 4008, LA 4069, LA 4141, LA 4329, LA 4464, LA 6671, LA 6706, LA 7177, LA 7200, LA 7991, LA 8427, LA 8957.

Response:

These reports are provided in Attachment 10 of the confidential Cultural Resources Assessment Report (submitted to the CEC on August 22, 2008). Attachment 10 of the confidential submittal also includes copies of LA 162; 553; 680; 1222; 1479; 1547; 1585; 1806; 1853; 1933; 1949; 1976; 1983; 2023; 2125; 2352; 2476; 2485; 2811; 2869; 3062; 4070; 4393; 4727; 5152; 5227; 5228; 7160; 7198; 7510; 8138; 8179; 8368; 8903; 9011, which are also wholly or partly within 0.25 mile of the project area.

CUL-6, Appendix B (g)(2)(C).

Information Required:

Applicant needs to provide the name(s) and qualifications of person(s) conducting the project-sponsored archaeological survey.

Response:

The archaeological survey was undertaken by Dr. Allen Estes (PhD, RPA), Mr. Drew Bailey and Mr. David Buckley. The qualifications of Dr. Estes, Mr. Bailey and Mr. Buckley are provided in Attachment 6 of the confidential Cultural Resources Assessment Report (submitted to the CEC on August 22, 2008), and Attachment CUL-1 with this response.

CUL-7, Appendix B (g)(2)(C).

Information Required:

Applicant needs to provide the name(s) and qualifications of person(s) conducting the project-sponsored built-environment survey. If an architectural historian meeting the Secretary of the Interior's Professional Standards did not conduct the built-environment survey discussed in the AFC and the cultural resources technical report, the applicant needs to have a qualified architectural historian survey the project site and the project linear facilities, plus an area 0.5 mile out from the proposed project site and from the proposed transmission-line route for structures, districts, and cultural landscapes that appear older than 45 years and record any such on DPR 523 Primary and Building, Structure, and Object forms.

Response:

The built-environment survey was undertaken by Dr. Allen Estes, Mr. Drew Bailey and Mr. David Buckley under the direct supervision of WSA historian /architectural historian Ms. Aimee Arrigoni, M.A. Ms. Arrigoni had direct involvement in planning and directing the work and her resume is contained in Attachment CUL-1 with this response.

CUL-8, Appendix B (g)(2)(C).

Information Required:

Applicant needed to conduct built-environment survey 0.5 miles to either side of the transmission-line route in rural areas. Table 5.4-3 indicates the survey coverage was limited to 0.25 miles to either side of the proposed transmission line, in whole or in part. Applicant needs to have a qualified architectural historian survey 0.5 miles to either side of the proposed transmission line route in rural areas for built-environment resources 45 years of age or older whose integrity of setting and feeling could be impacted by the proposed project.

Response:

The 0.25 mile coverage indicated in the table was a typographical error. The survey coverage along the portion of the transmission line route located within rural areas for built-environment resources was 0.5 miles to either side of the transmission line.

CUL-9, Appendix B (g)(2)(C).

Information Required:

Applicant needs to provide, NOT under confidential cover, a Built-Environment Technical Report by a qualified architectural historian on the methods and results of the project-sponsored built-environment survey.

Response:

A description of the built-environment survey methods and results was provided in Sections 7.1 and 7.3 of the Cultural Resources Technical Report provided as AFC Appendix I and AFC Section 5.4.2.5. This information is now provided as a separate report in **Attachment CUL-9** with this response.

CUL-10, Appendix B (g)(2)(C).

Information Required:

Applicant needs to provide a revised Section 5.4 of the AFC, to include the report of a qualified architectural historian, with the methods and findings from the project-sponsored built-environment survey.

Response:

As noted above, a qualified architectural historian directed the work of the project-sponsored built environment survey that is provided in Attachment CUL-9. The findings of this study are summarized in Section 5.4, pages 5.4-30 through 5.4-32 of the AFC.

CUL-11, Appendix B (g)(2)(C)(ii).

Information Required:

Applicant needs to provide a detailed description of the built-environment survey procedures and methodology in the Built-Environment Technical Report.

Response:

A detailed description of the built-environment survey procedures and methodology is provided in the Built-Environment Technical Report provided as Attachment CUL-9.

CUL-12, Appendix B (g)(2)(C)(iii).

Information Required:

Applicant needs to provide, under confidential cover, DPR 523 series forms that reflect the results of the project-sponsored archaeological survey, including DPR form 523A for all archaeological sites that could be impacted by the project.

Response:

These DPR 523 forms are provided in Attachment 5 of the confidential Cultural Resources Assessment Report (submitted to the CEC on August 22, 2008).

CUL-13, Appendix B (g)(2)(C)(iii).

Information Required:

Applicant needs to provide, NOT under confidential cover, DPR 523 series forms that reflect the results of the project-sponsored built-environment survey, including DPR Primary and Building, Structure, and Object forms, for all built-environment resources that could be impacted by the project.

Response:

DPR 523 forms for the structures found during the recent surveys are contained in the updated Built-Environment Technical Report provided as **Attachment CUL-9**.

CUL-14, Appendix B (g)(2)(C)(iv).

Information Required:

Applicant needs to provide a copy of USGS 7.5' quadrangle map(s) of the literature search area, under confidential cover, legibly depicting the locations of all known archaeological and built-environment resources identified in the literature search and all cultural resources identified in the project-sponsored archaeological and built-environment surveys.

Response:

These maps are provided in Attachment 7 of the confidential Cultural Resources Assessment Report (submitted to the CEC on August 22, 2008).

CUL-15, Appendix B (g)(2)(C)(v).

Information Required:

Applicant needs to add to the Archaeology Technical Report the name(s) and qualifications of person(s) conducting the literature search and the archaeological survey, and preparing the Archaeology Technical Report.

Response:

The names of WSA staff who conducted the archaeological literature search and survey for the Palmdale Hybrid Power Project were provided on the title page of the Cultural Resources Technical Report provided as AFC Appendix I. The title page of this Technical Report has been revised to indicate who undertook each activity and the revised title page is provided as **Attachment CUL-15** with this response. Dr. Allen Estes (PhD, RPA) and Ms. Angela Cook conducted literature searches undertaken by William Self Associates. The archaeological survey was undertaken by Dr. Estes, Mr. Drew Bailey and Mr. David Buckley. The report was prepared by Dr. Estes, Ms. Cook, Mr. Bailey, Mr. Buckley and Mr. Nazih Fino. The archaeological study was overseen by Dr. James Allan. The qualifications of Dr. Allan, Dr. Estes, Ms. Cook, Mr. Bailey, Mr. Buckley and Mr. Fino were provided in Attachment 6 of the confidential Cultural Resources Assessment Report (submitted to the CEC on August 22, 2008) and are provided in Attachment CUL-1 of this response. Staff at the South Central Coastal Information Center (SCCIC) conducted the records search for the Palmdale Hybrid Power Project. William Self Associates (WSA) does not have access to the qualifications or resumes of staff at the SCCIC.

CUL-16, Appendix B (g)(2)(C)(v).

Information Required:

Applicant needs to add to the Built-Environment Technical Report the name(s) and qualifications of person(s) conducting the project-sponsored built-environment survey and preparing the Built-Environment Technical Report.

Response:

The names of the persons conducting the built-environment survey are provided on the title page of the report provided as **Attachment CUL-9**. The methods and results sections of the Built-Environment Technical Report and AFC were prepared by Dr. Estes, under the supervision of Ms. Arrigoni. Dr. Estes' and Ms. Arrigoni's qualifications are provided in **Attachment CUL-1**.

Attachment CUL-1

WSA

James M. Allan, Ph.D., RPA — Principal

EDUCATION

2002 Ph.D. Anthropology, University of California, Berkeley.
1990 MA. Anthropology, University of California, Berkeley.
1989 MA. Maritime History and Underwater Archaeology, East Carolina University.
1970 BS. Business Administration, St. Mary's College, Moraga, California.

EXPERIENCE:

1993 - Present: *Vice President/Principal Investigator, William Self Associates.*

As Principal Investigator, responsibilities include supervision of 30 technical staff in cultural resource management studies including: prehistoric, historic, and maritime archeological field survey, archival research, testing and data recovery, artifact cataloging and lab analysis, architectural history and architectural documentation, and state and federal historic preservation consultation. Recent Principal Investigator experience includes:

- Victorville-2 Hybrid Power Project. Responsible for development of budgets, scopes of work, project management and oversight of field surveys, resource documentation, technical report preparation and client and agency coordination for the construction of a new hybrid 570MW power plant, along with associated transmission lines, a natural gas supply pipeline, a water supply pipeline, and a sanitary wastewater pipeline.

- Tucson Pipeline Replacement Project, involving coordination with numerous state agencies and tribes. Pipe project crossed several significant archaeological sites, including Tumamoc Hill, a National Historic Landmark site and Native American Traditional Cultural Property. Coordinated survey, site recoding and assessment, data recovery, and reporting.

- Kern River Gas Transmission Company High Desert Power Plant Project. Prepared archaeological research design, monitoring and data recovery plan for the construction of a 32-mile natural gas pipeline to fuel the High Desert Power Plant's electrical generation facility in San Bernardino County. Directed associated construction monitoring effort and oversaw preparation of project's archaeological monitoring report.

- City of Oakley Cypress Corridor Project. Responsible for budget preparation and management, staffing, agency and client coordination, direction of technical studies, and report preparation for City of Oakley's annexation of approximately 2,600 acres.

- Kinder Morgan Energy Partners Bay District Archaeological Survey and Sensitivity Project. Responsible for designing and implementing archaeological survey and analysis of sensitivity of 300 mile gas pipeline system.

- Calpine Aidlin Pipeline Survey Project; Wildhorse State 71 Drill Pad Project. Responsible for development of budgets, scopes of work, project management and oversight of field surveys, resource documentation, technical report preparation and client and agency coordination for the construction of new pipeline and development of new drill pads and access roads in the vicinity of Squaw and Big Sulphur creeks in Sonoma County, California.

- 300 Spear Street Project, San Francisco, CA. Responsible for budget preparation and management, staffing, SFERO and client coordination, direction of technical studies, data recovery (including the recovery of a 19th century whaling ship) and report preparation.

- Carquinez Straits Bridge Replacement and Seismic Retrofit Project. Responsible for design and implementation of maritime archaeological research associated with replacement and seismic retrofit of the Carquinez and Benicia bridges. Project included archival research, remote sensing (side scan sonar, sub-bottom profile, remote ground-truthing), underwater ground truthing and data recovery, and interpretation.

- San Rafael Bridge Seismic Retrofit Project. Responsible for design and implementation of maritime archaeological research associated with seismic retrofit of the San Rafael Bridge. Project included archival research, remote sensing (side scan sonar, sub-bottom profile, remote ground-truthing), underwater ground truthing and data recovery, and interpretation.

- San Francisco-Oakland Bay Bridge East Span Replacement Project. Responsible for design and implementation of maritime archaeological research associated with SFOBB replacement project. Project included archival research, remote sensing (side scan sonar, sub-bottom profile, remote ground-truthing), underwater ground truthing and data recovery, and interpretation.

- Muni Metro Turnback Project. Responsible for technical direction and administration on multi-year, $250M construction project in San Francisco requiring archeological monitoring, artifact retrieval and data recovery through 19th Century historic fill and maritime (vessel) remains. Directed activities of multiple archeological monitors, responsible for artifact analysis and reporting, agency consultation.

- San Francisco Muni Railway Mid-Embarcadero Roadway/F-Line Extension Project. Responsible for archaeological testing, construction monitoring, data recovery for renovation and realignment of Embarcadero roadway from Folsom Street to Broadway, San Francisco.

- One Embarcadero South Project. Responsible for excavation, documentation, and interpretation of structural remains of Tichenor's Ways, earliest marine railway in California.

- 1045 Mission Street. Responsible for archaeological testing, construction monitoring, and data recovery for multi-story residential complex in South of Market area, San Francisco, California.

1999 - Present: *Research Fellow, Archaeological Research Facility, University of California, Berkeley*

1997 – Present: *Adjunct Professor, Department of Anthropology and Sociology, Saint Mary's College of California.*

1990 – Present: *Director, Institute for Western Maritime Archaeology, Archaeological Research Facility, University of California, Berkeley.*

2005 – 2009: *Member, National Park Service Historical Landmarks Committee*

SELECTED PUBLICATIONS

- Principal Author: Preliminary Report of the Maritime Archaeology Study for the San Francisco Bay Rocks Removal Project. Prepared for Sea Surveyor, Inc., Benicia, CA.

- Principal author: Archaeological Testing and Monitoring Program. Mid-Embarcadero Surface Roadway and F-Line Extension Project. Final Report. Prepared for Don Todd Associates, San Francisco, California.

- Principal author: Carquinez Replacement Bridge Project. Report of Potential Construction Impediments Observed in the Maritime Archaeology Remote Sensing Survey and Ground Truthing Operations. Prepared for the California Department of Transportation District 4, Oakland, California.

- Principal author; 1045 Mission Street Apartment Project, Archaeological Testing, Monitoring, and Data Recovery Report. Prepared for Emerald Fund, San Francisco, California.

  Principal author; Historic Archaeology of Tichenor's Ways, A Mid-19th Century Marine Railway and Drydock. Prepared for U.S. Department of Housing and Urban Development.

- Principal author; Archaeological Monitoring and Data Recovery Report. One Embarcadero South Project. Prepared for Urban West Associates, San Diego, California.

- Principal author; Archaeological Remote Sensing Survey and Ground Truthing Assessment. San Francisco-Oakland Bay Bridge East Span Seismic Safety Project. Pile Installation Demonstration Project Area of Potential Effect. Prepared for Parsons Brinckerhoff, San Francisco, California.

- Principal author; Yerba Buena Tower Project: Archaeological Testing, Data Recovery, and Monitoring Report. Prepared for Millennium Partners, San Francisco, California.

SELECTED PRESENTED PAPERS AND LECTURES

- *"…so many ghastly piles of marine debris"*: Discovery of the whaling ship *Candace* in downtown San Francisco. Paper presented at 40th Annual Meeting of the Society for California Archaeology, Ventura, CA. 2006

- Systematic Surveying in Piecemeal Fashion: Tales of Research in San Francisco Bay.
  Paper presented at the 36th Conference on Historical and Underwater Archaeology, Kingston, Rhode Island, 2003.

- The Elusive *Il'men* -- Searching for one of California's Earliest Known Shipwrecks. Paper presented at the 26th annual conference of the North American Society for Oceanic History, Honolulu Hawaii, 2002.

- Archaeology as Prologue. Paper presented at the 34th Conference on Historical and Underwater Archaeology, Long Beach, CA; 2001.

- Tichenor's Ways: A 19th Century Shipyard in Downtown San Francisco. Paper presented at the 32rd Conference on Historical and Underwater Archaeology, Quebec, Canada 2000.

WSA

Aimee L. Arrigoni

Project Director/ Historian/Architectural Historian

EDUCATION:

- 2004, M.A. History, California State University, East Bay
- Summer 1997, Universita degli Studi di Pisa, Viareggio, Italy. Studied Italian language and culture.
- 1995, B.A. History, Northeastern University, Boston, MA
- Winter 1993, University of London, London, UK. Studied abroad through the American Institute for Foreign Study.

EXPERIENCE:

2002 – Present: *Project Director/Historian/Architectural Historian, William Self Associates, Inc.*

As a project director, responsibilities include preparation of in-depth historic contexts based on original research, evaluation of historic built resources as well as buried deposits, historic artifact analysis, precise historic map analysis, preparation of reports in a variety of formats, as well as project coordination.

Recent Projects:

- Built Environment Technical Report Palmdale Hybrid Power Project, Palmdale, California.
  Planned survey of hybrid power plant site and associated transmission/supply lines and directed survey and evaluation of built resources
- Cultural Resources Assessment Report, City of Ceres Downtown Development Specific Plan, Ceres, Stanislaus County, California.
  Assessment of architectural integrity for structures within 26-block downtown district
- Cultural Resources Assessment of 2211 N. Main Street, Walnut Creek, Contra Costa County, California.
  Assessment of architectural integrity for Commercial Vernacular style structure (ca. 1924) with modifications
- Historical Resources Evaluation Report, Deer Valley Road Shoulder Widening Project, Contra Costa County, California (in progress).
  Evaluation of early 20th century agricultural property that included a 19th century residence moved onto the property from a nearby mining district
- Archaeological Survey and Cultural Resources Assessment for the Montecito Estates Project (924 and 938 Danville Blvd.), Alamo, Contra Costa County, California.
  Evaluation of twelve structures (ca. 1910-1960s) in a formerly agricultural (now residential) setting
- Archaeological Assessment of a 6.16-Acre Parcel (APN 159-230-002), Located at 4755 Pacheco Blvd., Martinez, Contra Costa County, California.
  Evaluation of a residential structure (ca. 1960) and associated outbuildings
- Historic Resources Evaluation Report, Seismic Retrofit of BART Aerial Structures and Stations along the Concord, Richmond, Daly City and Fremont Lines.
  Preparation of historic context as well as detailed historic map research to provide basis for Section 106 technical studies

2000 – 2002:

- **USS Hornet Museum,** Alameda, CA. March 2001– August 2002. Archival management; docent coordination; interpretation and presentation of historic material.
- **Contra Costa County Historical Society,** Martinez, CA. Spring 2000. Internship. Provided research assistance for patrons; cataloged manuscript collection.

Allen L. Estes

Project Director

Education:

Ph.D. Near Eastern Studies (History and Archaeology); UC Berkeley; 1998

Professional Experience:

Dates	*Position*	*Organization*
1995-present	Senior Archaeologist and Project Director	William Self Associates, Orinda, CA
1997-present	Assistant Director and Field Supervisor	U. C. Berkeley Tel Dor Excavations, Tel Dor, Israel
1996	Area Supervisor	U. C. Berkeley Tel Dor Excavations, Tel Dor, Israel
1990	Area Supervisor	U. C. Berkeley Nineveh Excavations, Iraq
1989	Area Supervisor	U. C. Berkeley Tel Dor Excavations, Tel Dor, Israel
1986-1987	Unit Supervisor	U. C. Berkeley Tel Dor Excavations, Tel Dor, Israel

Professional Experience:

1995 – Present: WSA Senior Archaeologist/Project Director

Bellevue Ranch, Modesto, CA. Conducted archeological survey, architectural documentation and assessment for historic structures, including historic irrigation canals, prepared technical report for the planned residential development of the 1,300 acre Bellevue Ranch property.

Tishman-Speyer 300 Spear Street Project (San Francisco). Field supervisor for data recovery, technical report. Assisted with supervision of archaeological monitoring, excavation and recording of features, field drawing, and contributed to final report.

East Line Project, Maricopa and Pinal Counties, AZ.; Field Director, Conducted linear survey and site recording. Contributed to the technical report of the findings of the survey.

Modesto Wastewater Project, Modesto, CA. Conducted all cultural background research for the ±34,000-acre Modesto Wastewater Study Area and conducted the archaeological survey and assessment of the 327-acre 'Ho' Property within the Study Area. Prepared Cultural Resources Assessment Report (letter report).

Tucson Pipeline Replacement Project; Field Director, Conducted Data Recovery in numerous sites, excavating pithouses, canals, hearths, and other features. Conducted site survey;

recorded hundreds of dry-land agriculture (Hohokam) rock features and alignments at Tumamoc Hill. Prepared technical report of findings on work.

Canyon Oaks Project; Supervisor, involved in excavation of 475 prehistoric burials, pithouses, and dozens of historic and prehistoric features.

URS High Desert Power Project, Mojave Desert (western Great Basin). Field supervisor for surveys, surface collection and test unit excavations, technical report.

Bay Street, Emeryville, field supervision, burial excavation, archaeological monitoring at Emeryville Shellmound.

URS Kern River Lateral Pipeline Project, San Bernardino County (southern Great Basin). Field supervisor for surveys, monitoring, technical report.

Southern California Gas Company's Kramer Expansion Project, Mojave Desert (southern Great Basin). Surface mapping and test excavations at sites P-1582-2 and CA-SBR-7202. Data recovery at sites CA-SBR-2257/H and CA-SBR-7282. Direction of field excavations, artifact analysis, and preparation of 2-volume technical report.

Catellus Residential Project, Hercules, Ca. Prepared survey grid, served as field supervisor during excavation of 120 prehistoric burials, supervised 2-volume report preparation, managed archaeological monitoring.

SF Towers Project, 3rd and Mission Streets, San Francisco, archaeological monitor, field supervisor, involved in artifact analysis and technical report preparation.

First and Howard Project, San Francisco, archaeological monitoring, test excavations, artifact analysis, and report preparation.

Greenbriar Homes Bernal Project, Pleasanton, Ca. Conducted and supervised survey, archaeological testing, data recovery and burial excavation.

560 Mission Street, San Francisco. Field supervisor, archaeological monitor, site recording of midden component, test and human burial excavations, artifact analysis, and report preparation.

360 Networks, 3rd party archaeological monitor on behalf of California Public Utilities Commission on fiber installation project from Oregon border south to Sacramento (400 miles).

Moffett Park Project, Santa Clara, Ca. Supervision of archaeological monitoring and testing at site SCL-11, a National Register listed midden property.

530 Chestnut Street Project, San Francisco. Supervised archaeological monitoring, site recording, artifact analysis, and report preparation.

Four Seasons Hotel Project, San Francisco. Supervised archaeological monitoring and excavation of 19th century cultural deposit of house foundations, cellars and privies. Artifact analysis and technical report preparation.

Level 3 Fiber Optic Project. Assisted with supervision of archaeological monitoring in both the San Francisco and Los Angeles metropolitan areas during fiber optic cable installation.

KMEP's Concord to Colton Project. Assisted with survey and site recording (western Great Basin).

1986 – Present

Served as Unit Supervisor, Area Supervisor, Field Supervisor, and currently Assistant Director for UC Berkeley's on-going investigations at Tel-Dor (Phoenician/1100 BC to Roman/A.D. 300) site in Israel. Currently working on technical report preparation for the project.

Publications:

Principal author: *Final Monitoring Report, SFPP, L.P. Concord to Sacramento Pipeline Project, Contra Costa, Solano, and Yolo Counties, California*. Prepared for SFPP, L. P.

Co-author: *Class III Cultural Resources Survey, Kinder Morgan Energy Partners, L.P., East Line Expansion, Arizona Portion*. Prepared for Kinder Morgan Energy Partners, L.P., Orange, CA.

Principal author: *Final Data Recovery and Monitoring Report, KMEP Tucson Pipeline Replacement Project, Phases III and IV, Pima County, Arizona*. Prepared for Kinder Morgan Energy Partners, L.P., Orange, CA.

Principal author: *Cultural Resources Survey and Assessment Report, KMEP Tucson Pipeline Replacement Project, Pima County Arizona*. Prepared for Kinder Morgan Energy Partners, L.P., Orange, CA.

Principal author: *Archaeological Testing and Monitoring Program: Bauer-Schweitzer Historic Building Project, 530 Chestnut Street, San Francisco, CA.* Prepared for Emerald Fund, San Francisco, CA. February 2001.

Principal author: *Archaeological Monitoring, Testing, and Data Recovery Program, 560 Mission Street Project, San Francisco, California*. Prepared for Hines Interests, San Francisco, CA. June 2001.

WSA

Angela Cook — Staff Archaeologist

EDUCATION:

- Postgraduate Bachelor of Arts (Honours), 2000, University of Queensland, St Lucia, Australia. Field of Research: Contact Archaeology.
- Bachelor of Arts (Anthropology), 1997, University of Queensland, St Lucia, Australia.

EXPERIENCE:

2005-Present: *Staff Archaeologist, William Self Associates, Inc.*

Recent Projects:

- Cultural Resources Assessment Report and EIR Section, Roddy Ranch Project, Antioch (in progress)
  Included field survey and reevaluation of historic sites previously recommended potentially eligible.
- Historic Property Survey Report with Archaeological Survey Report, Alhambra Valley Road Shoulder Widening Project (in progress)
  Intensive field survey and report preparation for submittal to Caltrans.
- EIR Section, Aviano Adult Community, Antioch (in progress)
  Reevaluation of historic site previously recommended potentially eligible and preparation of EIR section.
- Final Archaeological Resources Report, California Academy of Sciences Rebuilding Project, San Francisco, California.
  Excavation and documentation of historic features from the 1894 Midwinter Expo, Golden Gate Park.
- Letter Report, Montecito Estates Project, Alamo
  Included field survey and evaluation of historic structures for eligibility for CRHR.
- Final Archaeological Resources Report, 300 Spear Street Project, San Francisco, California
  Excavation and documentation of 19th century privies, foundations, ship breaking yard, and ship.
- Final Archaeological Resources Report, 400 Howard Street Project, San Francisco, California
  Excavation and documentation of City of San Francisco's earliest coal gasification plant.

2005: *Far Western Anthropological Research Group, Archaeological Field Technician.*

2004: *Pacific Legacy, Inc., Archaeologist.*
Anthropological Studies Center, Sonoma State University, Archaeological Field Technician.
Archeo-Tec, Inc., Archaeologist.

2003-2004: *McCardle Cultural Heritage Pty Ltd (Aust.), Archaeologist.*

2003: *Bonhomme, Craib & Associates (Aust.), Assistant Archaeologist.*
Environmental Resources Management Australia Pty Ltd, Archaeologist.

2002: *Environmental Resources Management Australia Pty Ltd, Assistant Archaeologist.*
Archaeo Cultural Heritage Services (Aust.), Archaeologist.

2001-2002: *Bonhomme Craib & Associates (Aust.), Assistant Archaeologist.*

WSA

Nazih Fino GIS Specialist/Staff Archaeologist

Education

2005 M.A. Urban Planning, San Jose State University, San Jose, CA
2002 M.A. Archeology, Jordan University, Amman, Jordan
1992 B.A. Archeology, Sana'a University, Sana'a, Yemen

Software

- GIS Arc View 9.1, GIS MapInfo
- MS Word, Excel, PowerPoint, AutoCAD, Corel Draw, Adobe Photoshop, Surveying instruments: GPS, Total Station Excel, Filemaker Pro 6, Adobe Photoshop 7, Adobe Illustrator 10, VBA, UML, Microsoft Visio, Terrain Navigator Pro

Experience

2005-Present: Archaeologist, GIS/GPS Specialist, William Self Associates, Inc., Orinda, CA

- Archaeological Resources Area of Potential Effect (APE) Maps, East line and El Paso to Phoenix Expansion pipeline projects.
- Architectural History Resources Area of Potential Effect (APE) Maps, BART Earthquake Safety Program, San Francisco/Bay Area
- GIS mapping and database design/management for various projects.
- GPS data management and collection for various projects.

4/2004-5/2005: GIS Specialist, Parks and Recreation Neighborhood Services Department, San Jose City Government, San Jose, CA

- Created GIS- based Asset Map for the 2004-2005 budget reduction proposal.

4/2002-12/2002: Assistant Planner, San Jose State University, San Jose, CA

- Team member of the Market-Almaden Neighborhood Improvement Plan and Strong Neighborhood (SNI) Planning Project.
- Provided technnical assistance, collected data and prepared site plans as well as presentation maps.

11/2001-4/2004: GIS Specialist /Intern, Data Management Division/Planning Department, San Jose City Government, San Jose, CA

- Provided technical assistance using GIS by creating assessment and analytical maps to facilitate decision-making and quality customer service.

5/1999-8/2000: Intern, International Council on Monuments and Sites (ICOMOS) and National Park Service, Washington, DC

- Prepared condition assessment and conservation reports for several historic sites.

1995-1999: Chief Field Archeologist, Various Companies

- American Center of Oriental Research (ACOR), Amman, Jordan
- Department of Antiquities, Jordan Government, Amman, Jordan

WSA

Drew M. Bailey — Staff Archaeologist

EDUCATION

- Bachelor of Arts (Anthropology), 2006 University of Massachusetts, Boston.

EXPERIENCE

- **William Self Associates, Inc,** Orinda, CA. July 2006-Present. Staff Archaeologist. Archaeological excavation and monitoring of historic and prehistoric sites. Management of Small Projects. Report preparation and laboratory analysis.

Projects (selected)

- **Palmdale Hybrid Power Project**
  Palmdale CA, 2008. Participated in extensive survey, and recording of historic sites within proposed project area.
- **Evelyn Glen Townhomes Project**
  Sunnyvale, CA, 2008. Participated in the excavation, recording and reburial of a Native burial and associated artifacts.
- **Moraga Road Pipeline Project**
  Moraga California, 2007. Surveyed and tested the proposed route of the Moraga Road Water Pipeline.
- **Moffett Towers Project**
  Sunnyvale, CA, 2007-2008. Participated in the removal of 38 prehistoric Native burials and associated features discovered during construction. Performed analysis of features for reporting phase of project.
- **Transbay Terminal Replacement Project**
  San Francisco, CA, 2007-2008. Historical research and analysis of areas to be affected by construction of the new Transbay Terminal building and associated structures.
- **Los Vaqueros Reservoir Expansion Project**
  Contra Costa County, CA, 2007. Historical background for Los Vaqueros Reservoir Expansion project.
- **Shea Homes Project**
  Oakley, CA, 2007. Participated in the removal and field analysis of 96 Native burials and associated features from a site due to be impacted by construction.
- **Academy of Sciences Project**
  San Francisco, CA, 2007. Testing and excavation of sheet refuse from 1894 Winter Exposition in Golden Gate Park, discovered during construction of new Academy of Sciences building.
- **St. James Properties Project**
  Petaluma, CA, 2007. Excavation and mitigation of historic habitation, lumber yard and hatchery on lot being graded for development.
- **UNEV Pipeline Project**
  Utah and Nevada, 2006-2008. Participated in extensive survey covering historic and prehistoric archaeological sites along proposed route of the UNEV oil pipeline.

FURTHER STUDIES

- Field Archaeologist, UMASS Boston Hassanamessitt Woods Field School, Grafton, MA, 2006.
- Volunteer Lab Technician, UMASS Boston Eastern Pequot Reservation Field School, 2005-2006
- Field Archaeologist, Adirondack Community College Fort Edward Field School, Fort Edward, NY, 2005
- Volunteer Field Archaeologist, Wayland Archaeological Research Group Sudbury River Paleo-Indian Hunting Camp, Wayland, MA, 2004.

MEMBERSHIPS

- Society for Historical Archaeology, 2007-present.

WSA

David Buckley — Staff Archaeologist

EDUCATION:
B.A., 2005, History and Geology, University of the Pacific, Stockton, California

EXPERIENCE:
Aug 2005 - Present: Staff Archaeologist, *William Self Associates, Inc.*

- Conducted archaeological data recovery, construction monitoring, and technical reporting for the Tishman Speyer Properties 300 Spear Street Project, San Francisco, CA.
- Conducted archaeological testing for the Hanson Consulting RD-108 Poundstone Project, Colusa County, CA.
- Conducted archaeological construction monitoring and data recovery/burial removal for the Kinder Morgan Energy Partners, LP East Line Project in association with the Gila River Indian Community, Chandler, AZ.
- Conducted archaeological survey and technical reporting for the Contra Costa Public Works Department Byron Highway Project, Byron, CA.
- Conducted archaeological survey for the Golden Gate University 40 Jessie Street Project, San Francisco, CA.
- Conducted archaeological construction monitoring for the KB Home South Bay, Inc. Elmwood Project, Milpitas, CA.
- Conducted archaeological construction monitoring for the Greenbriar Homes Communities Valley Avenue Project, Pleasanton, CA.
- Conducted archaeological survey and technical reporting for the RMC Water and Environment Pittsburg Irrigation Pipeline II, and Antioch Recycled Water Projects in Pittsburg and Antioch, CA.
- Conducted archaeological testing and technical reporting for the KB Home Elmwood Project, Milpitas, CA.
- Conducted archaeological survey and technical reporting for the Loving and Campos Architects 4769 Pacheco Blvd. Project, Martinez, CA.
- Conducted archaeological construction monitoring, data recovery and technical reporting for the California Academy of Sciences Project, San Francisco, CA.
- Conducted technical reporting for the CirclePoint John Muir Medical Center Project, Concord, CA.
- Conducted archaeological survey for the Carter and Burgess BART Retrofit Project, Alameda and Contra Costa Counties, CA.

Other Field Experience:
- Archival research and artifact analysis - Lorenzo De' Medici School, Florence, Italy study abroad program through the University of the Pacific, Stockton, CA. In association with the University of Florence, Italy – Fall 2004.

Attachment CUL-3

PALMDALE

GENERAL PLAN

Adopted by City Council
Resolution 93-10
January 25, 1993

CITY OF PALMDALE

GENERAL PLAN

Administration Offices
38300 Sierra Highway
Palmdale, CA 93550
(805) 267-5100

Planning Department
38306-9th Street East
Palmdale, CA 93550
(805) 267-5200

Adopted by City Council
Resolution 93-10
January 25, 1993

City of Palmdale

City Council

James C. Ledford, Jr., Mayor
James A. Root, Mayor Pro Tem
Joseph P. “Joe” Davies, Councilmember
Terry Judge, Councilmember
David J. Myers, Councilmember

Planning Commission

John Mayfield, Chairman
Addison Thompson, Vice Chairman
Sandy Corrales, Commissioner
Jeanette Glozer, Commissioner
Steve Hofbauer, Commissioner

City Staff

City Manager: Robert W. Toone, Jr.
Assistant City Manager: Ron Creagh

General Plan Team
January 1993

Molly Bogh	Planning Director
Bill Emlen	Principal Planner
Asoka Herath	Principal Planner
John Doughty	Assistant Planner
David Koontz	Associate Planner
Laurie Lile	Associate Planner
Becky Smith	Junior Planner
Mike Behen	Junior Planner
Sue Thompson	Deputy City Clerk
Lynn O'Brien	Secretary

Contributing Consultants

MBA	Environmental Impact Report, General Plan
DKS	Traffic Model/Circulation Element
Karin Palley & Associates	Housing Element

Participants in the Citizens Advisory Committee – 1987 through 1989

Tracey Bibb, Chairman
Pat Baal
Charles Battey
Dr. Larry Bosma
Richard Burriss
Carolyn Cotton
Joe Davies
Michael Graziano
Rebecca Hamill
Leroy Harrington
Patrick Hunt
Edward Kamper
Billie Kelly
Kirk Lazaruk
Jim Ledford
Christine Mann
Ton Mastin
Grace Murlock
Pete Peterson
Trudie Satterfield
Elaine Schneider
Jeff Storm
Fred Strasburg
Norm Titcher
Fred Trueblood
Jeanne Tucker
Fred Walter
Phil Wood
Callyn Yorke

affect habitat quality. Past development patterns have created habitat “islands”, isolating populations of species, thereby reducing their local long-term viability.

The landscaping style prevalent in the United States is based on British tastes and climate--a cool region with plentiful rainfall. In order to maintain the green lawns and shrubbery, irrigation is necessary. Excessive watering literally drowns native plants. However, alternative landscape styles from drier climates are not common in the United States--even in drier regions--and as a result may be more expensive to install and less attractive to buyers. Public education and design assistance about drought tolerant and native landscaping is needed.

State and federal environmental protection laws require the review of individual projects to mitigate their potential impacts on existing biological resources. Two approaches are typically chosen:

- Attempt to preserve significant natural features and incorporate them in the proposed development. (This approach usually fails because of the different cultural requirements of the native as opposed to the introduced species.)

- Preservation of significant resources in "open space area" where development is restricted. (This approach results in islands of "undisturbed" areas that are not connected in a natural system as they were previously, and are frequently subject to vandalism or intrusion of urban activities, such as off-road vehicle use.)

These approaches can only succeed when there is an overall approach to development that emphasizes native, drought-tolerant landscaping and the establishment and protection of a system of natural open space areas in the City.

Cultural Resources

Cultural resources in Palmdale are derived from the rich and colorful history of the Antelope Valley. Evidence from the Barrel Springs site dates human occupation of the Palmdale area back 5,000 years before present (Love 1989:15). Cultural groups known to have occupied the area in and around the Antelope Valley in late prehistoric and early historic times include the Kitanemuk, Kawaiisu, Tatavium and Serrano/Vanyume.

The amount of existing cultural resources directly determines the extent of conservation that can be realized. While a number of archaeological, historical, and paleontological sites have been identified, the Planning Area is largely undeveloped and, for the most part, has not been surveyed for cultural resources. Resources are most often discovered during the environmental assessment of a proposed development project. In the last few years, rapid urbanization has resulted in an increased number of site

surveys for these resources and a substantial number of newly identified cultural resources.

Existing state laws dealing with the preservation of archaeological, historical, and paleontological resources can ensure that identified cultural resources are preserved or investigated and mitigated through prudent and acceptable means. Public awareness and involvement often act as catalysts for aggressive resource preservation as historical and archaeological organizations become vanguards of the community's cultural resources.

The conservation of the area's cultural resources must be promoted by increasing the appreciation of residents for the valley's history. Public awareness programs and conservation ordinances will help bring about community pride and identity.

Historical Resources

A listing of potential historic structures has been compiled by the Antelope Valley Historical Society. Table ER-1 provides the listing and Exhibit ER-6 shows their general location. The list is based solely on the structure's existence for at least 50 years. Historical significance should not be inferred from this listing until such time as these (and perhaps other) structures are evaluated to determine their importance. In addition to age, the following factors should be considered when evaluating a structure's significance:

1. Architectural features unique to the region, such as:

    a. Outstanding example within the region of an architectural style or of a particular architect's work.

    b. Use of construction techniques or materials unique to the region.

2. Importance of the structure in the history of Palmdale.

3. Existing or restorable condition of the structure.

4. Physical and economic feasibility of possible relocation.

5. Physical and economic feasibility of possible restoration.

6. Potential reuse for the structure following restoration/relocation.

TABLE ER-1

POTENTIAL HISTORIC STRUCTURES

Structure	Age	Comments
Single-Family House (Wolf House) 536 E. Palmdale Blvd.	Early 1930	Now: Antelope Valley Mobile Home Sales
Single-Family Houses Ave. Q between 5th Pl. and 6th St. E	1920s to 1930s	
Ice Storage South of Ave. R between 6th St. E. and railroad	1918	Ice Storage for fruit and ice; now Bekins Storage
Two-Story Barn-Like Structure 37352 N. Sierra Highway	1920s	Now: Church of the Open Bible
Metal Building 38126 N. Sierra Highway	1920s	Part of L.A. County Maintenance Yard
Concrete Block House 932 E. Ave. R	1918	Imitation rock face probably made by Sadler Block Company (1915)
Six Woodframe Houses Southwest corner of 9th St. E and Ave. Q-10	1920s	"Edison Company House" for company employees
Single-Family House 816 Ave. Q-9	1910s	
Single-Family House 911 Ave. Q-9	1935	
Concrete Block House 927 Ave. Q-9	1920s	Imitation rock face probably made by Sadler Block Company (1915)
Single-Family House 942 Ave. Q-9	1920s	
Single-Family Houses, South side of Ave. Q-10 between 10th St. E and 9th St. E	1913 to 1930's	
Single-Family Houses 38211, 38147, and 38107 10th St. E	1930s	
Old Palmdale Cemetery Southeast corner of 20th St. E and Ave. R-12	1880s	
Ranch House in alfalfa fields 1818 E. Palmdale Blvd.	1920s	Now: Spanky's
Old Schoolhouse in McAdam Park 30th St. E and Ave. R	1900	
Single-Family House 38457 9th St. E	1920s	
Moore's Hall 38414 8th St. E	1918	Now: Ace Swimming Supply
Bank of Italy Northeast corner of 8th St. E and E. Palmdale Blvd.	pre-1918	First bank in Palmdale
Safeway Store, Sierra Highway	1930s	Now: Apollo Tire
Craig Wilson Chicken Ranch Northeast corner of 12th St. E and Ave. Q		Now: Mountain Muffler
Old Leona Schoolhouse 8367 Elizabeth Lake Rd.	1914	
Store Building Southwest corner of Elizabeth Lake Rd. and 90th St. W	1920s	

Source: Antelope Valley Historical Society 1989; Palmdale Planning Department 1992.

ROPERTY-NUMBER	PRIMARY-#	STREET.ADDRESS.....	NAMES.....	CITY.NAME.....	OWN	YR-C	OHP-PROG..	PRG-REFERENCE-NUMBER	STAT-DAT	NRS	CRI
162411		9801 HADDON AVE		PACOIMA		1952	PROJ.REVW.	HUD060501M	06/01/06	6U	
154042		11176 HERRICK AVE		PACOIMA		1950	PROJ.REVW.	HUD040202L	02/02/04	6U	
150068		11324 HERRICK AVE		PACOIMA		1950	HIST.RES.	DOE-19-04-0183-0000	09/30/04	6Y	
							PROJ.REVW.	HUD041006D	09/30/04	6Y	
153029		13100 HOYT ST		PACOIMA		1940	PROJ.REVW.	HUD050404N	04/19/05	6U	
154058		13106 JUDD ST		PACOIMA		1955	PROJ.REVW.	HUD040202L	02/02/04	6U	
074434		12843 KELOWNA ST		PACOIMA	U	1910	PROJ.REVW.	HUD920203B	02/28/92	6Y	
153033		10071 LAUREL CANYON BLVD		PACOIMA		1939	PROJ.REVW.	HUD050404N	04/19/05	6U	
125097		13200 LOUVRE ST		PACOIMA	Y	1928	HIST.RES.	DOE-19-98-0288-0000	02/02/98	6Y	
							PROJ.REVW.	HUD980202K	02/02/98	6Y	
150080		10094 NORRIS AVE		PACOIMA		1924	HIST.RES.	DOE-19-04-0194-0000	09/30/04	6U	
							PROJ.REVW.	HUD041006D	09/30/04	6U	
150079		11090 NORRIS AVE		PACOIMA		1924	HIST.RES.	DOE-19-04-0193-0000	09/30/04	6U	
							PROJ.REVW.	HUD041006D	09/30/04	6U	
098134	19-175513	13555 PINNEY ST		PACOIMA	M		HIST.RES.	DOE-19-94-0573-0000	09/30/94	6Y	
							PROJ.REVW.	HRG940202Z	09/30/94	6Y	
026562	19-172549	13633 PINNEY ST		PACOIMA	P	1915	HIST.SURV.	0053-3890-0000		7N	
125106		13526 REMINGTON ST		PACOIMA	Y		HIST.RES.	DOE-19-98-0298-0000	02/02/98	6Y	
							PROJ.REVW.	HUD980202K	02/02/98	6Y	
080677		10580 TAMARACH AVE		PACOIMA	U	1923	PROJ.REVW.	HUD930219I	03/17/93	6Y	
150088		12601 WINGO ST		PACOIMA		1945	HIST.RES.	DOE-19-04-0203-0000	09/30/04	6U	
							PROJ.REVW.	HUD041006D	09/30/04	6U	
113394			AIR FORCE PLANT #42 / BUILDING #15	PALMDALE	F	1958	HIST.RES.	DOE-19-97-0055-0000	12/23/97	2S2	A
113395			AIR FORCE PLANT #42 / BUILDING #21	PALMDALE	F	1954	HIST.RES.	DOE-19-97-0056-0000	12/23/97	2S2	A
116016			JR-50 - ROAD	PALMDALE	P	1937	CHRIS	19-150035	01/01/92	7	
116018			JR-49 - DIRT ROAD	PALMDALE	P	1937	CHRIS	19-150036	08/28/96	7	
116015			JR-1 - U.S. COAST & GEODETIC SURVE	PALMDALE	FP	1938	CHRIS	19-150034	08/28/96	7	
135584		39302 10TH ST E		PALMDALE	P	1954	HIST.RES.	DOE-19-02-1095-0000	08/29/02	6Y	
							PROJ.REVW.	FHWA000324A	08/29/02	6Y	
148187		41051 12TH ST		PALMDALE	P	1950	HIST.RES.	DOE-19-04-0107-0000	04/16/04	6Y	
							PROJ.REVW.	FCC040407B	04/16/04	6Y	
135595		39005 8TH ST E		PALMDALE	P		HIST.RES.	DOE-19-02-1106-0000	08/29/02	6Y	
							PROJ.REVW.	FHWA000324A	08/29/02	6Y	
135597		39021 8TH ST E		PALMDALE	P	1955	HIST.RES.	DOE-19-02-1108-0000	08/29/02	6Y	
							PROJ.REVW.	FHWA000324A	08/29/02	6Y	
135596		39025 8TH ST E		PALMDALE	P	1956	HIST.RES.	DOE-19-02-1107-0000	08/29/02	6Y	
							PROJ.REVW.	FHWA000324A	08/29/02	6Y	
135598		39029 8TH ST E		PALMDALE	P	1947	HIST.RES.	DOE-19-02-1109-0000	08/29/02	6Y	
							PROJ.REVW.	FHWA000324A	08/29/02	6Y	
135599		39149 8TH ST E		PALMDALE	P	1943	HIST.RES.	DOE-19-02-1110-0000	08/29/02	6Y	
							PROJ.REVW.	FHWA000324A	08/29/02	6Y	
113396		ADMINISTRATION RD	AIR FORCE PLANT #42/BUILDING #531/	PALMDALE	F	1944	NAT.REG.	19-0410	08/12/02	7W	
							HIST.RES.	DOE-19-97-0057-0000	12/23/97	2S2	A
135585		1014 AVE P-5		PALMDALE	P	1954	HIST.RES.	DOE-19-02-1096-0000	08/29/02	6Y	
							PROJ.REVW.	FHWA000324A	08/29/02	6Y	
135586		1018 AVE P-5		PALMDALE	P	1954	HIST.RES.	DOE-19-02-1097-0000	08/29/02	6Y	
							PROJ.REVW.	FHWA000324A	08/29/02	6Y	
135587		1024 AVE P-5		PALMDALE	P	1954	HIST.RES.	DOE-19-02-1098-0000	08/29/02	6Y	
							PROJ.REVW.	FHWA000324A	08/29/02	6Y	
135588		1028 AVE P-5		PALMDALE	P	1954	HIST.RES.	DOE-19-02-1099-0000	08/29/02	6Y	
							PROJ.REVW.	FHWA000324A	08/29/02	6Y	
135589		1034 AVE P-5		PALMDALE	P	1954	HIST.RES.	DOE-19-02-1100-0000	08/29/02	6Y	
							PROJ.REVW.	FHWA000324A	08/29/02	6Y	
135590		1038 AVE P-5		PALMDALE	P	1954	HIST.RES.	DOE-19-02-1101-0000	08/29/02	6Y	

ROPERTY-NUMBER	PRIMARY-#	STREET.ADDRESS.....	NAMES.....	CITY.NAME.....	OWN	YR-C	OHP-PROG..	PRG-REFERENCE-NUMBER	STAT-DAT	NRS	CRI
135591		1044 AVE P-5		PALMDALE	P	1954	PROJ.REVW.	FHWA000324A	08/29/02	6Y	
							HIST.RES.	DOE-19-02-1102-0000	08/29/02	6Y	
135592		1048 AVE P-5		PALMDALE	P	1954	PROJ.REVW.	FHWA000324A	08/29/02	6Y	
							HIST.RES.	DOE-19-02-1103-0000	08/29/02	6Y	
135593		1054 AVE P-5		PALMDALE	P	1954	PROJ.REVW.	FHWA000324A	08/29/02	6Y	
							HIST.RES.	DOE-19-02-1104-0000	08/29/02	6Y	
135594		1161 AVE P-8		PALMDALE	P	1941	PROJ.REVW.	FHWA000324A	08/29/02	6Y	
							HIST.RES.	DOE-19-02-1105-0000	08/29/02	6Y	
068303		1020 AVENUE Q	PALMDALE SENIOR CENTER	PALMDALE	U		PROJ.REVW.	FHWA000324A	08/29/02	6Y	
066070		3217 EAST AVE M	AVENUE M (R-AD-68[1]	PALMDALE	U		PROJ.REVW.	HUD890620D	07/17/89	6Y	
066071		3347 EAST AVE M	AVENUE M WIDEN (R-AD-68[1])	PALMDALE	U		PROJ.REVW.	FHWA890703A	08/29/89	6Y	
066073		4207 EAST AVE M	AVENUE M WIDEN	PALMDALE	U		PROJ.REVW.	FHWA890703A	08/29/89	6Y	
066074		4503 EAST AVE M	AVENUE M WIDEN	PALMDALE	U		PROJ.REVW.	FHWA890703A	08/29/89	6Y	
066072		42007 N 40TH ST E	AVENUE M WIDEN	PALMDALE	U		PROJ.REVW.	FHWA890703A	08/29/89	6Y	
116108		PEARBLOSSOM HWY	HISTORIC PORCH FOUNDATION	PALMDALE	S	1917	CHRIS	19-120020	07/17/96	7	
144521		100 VIA ALAMEDA		PALOS VERDES ESTA	P	1954	HIST.RES.	DOE-19-03-0281-0000	10/16/03	6Y	
							PROJ.REVW.	FCCC031007A	10/16/03	6Y	
091829		2400 VIA CAMPESINA	PALOS VERDES PUBLIC LIBRARY ART GA	PALOS VERDES ESTA	P	1930	NAT.REG.	19-0213	04/16/96	3S	AC
							HIST.RES.	NPS-96000393-9999	04/16/96	1S	AC
							HIST.RES.	NPS-95000388-9999	04/07/95	1S	AC
							NAT.REG.	19-0198	04/07/95	3S	AC
095824		2400 VIA CAMPESINA	PALOS VERDES STONE WALLS	PALOS VERDES ESTA	D	1928	HIST.RES.	NPS-96000393-0002	04/16/96	1D	AC
							HIST.RES.	NPS-95000388-0002	04/07/95	1D	AC
095823		2400 VIA CAMPESINA	PALOS VERDES PUBLIC LIBRARY AND AR	PALOS VERDES ESTA	D	1930	HIST.RES.	NPS-96000393-0001	04/16/96	1D	AC
							HIST.RES.	NPS-95000388-0001	04/07/95	1D	AC
103131		2400 VIA CAMPESINA	FARNHAM MARTIN'S PARK	PALOS VERDES ESTA	D	1928	HIST.RES.	NPS-96000393-0003	04/16/96	1D	AC
103132		2400 VIA CAMPESINA	FOUNTAIN	PALOS VERDES ESTA	D	1928	HIST.RES.	NPS-96000393-0004	04/16/96	1D	AC
072956		796 VIA DEL MONTE	LA VENTA INN	PALOS VERDES ESTA	P	1923	HIST.RES.	SPHI-LAN-051	09/15/90	7L	
							ST.PT.INT.	19-0025	05/26/89	7L	
144522		2805 VIA LA SELVA		PALOS VERDES ESTA	P	1951	HIST.RES.	DOE-19-03-0282-0000	10/16/03	6Y	
							PROJ.REVW.	FCC031007A	10/16/03	6Y	
144523		2809 VIA LA SELVA		PALOS VERDES ESTA	P	1956	HIST.RES.	DOE-19-03-0283-0000	10/16/03	6Y	
							PROJ.REVW.	FCC031007A	10/16/03	6Y	
144524		2815 VIA LA SELVA		PALOS VERDES ESTA	P	1940	HIST.RES.	DOE-19-03-0284-0000	10/16/03	6Y	
							PROJ.REVW.	FCC031007A	10/16/03	6Y	
162400		13736 COMMUNITY ST		PANORAMA CITY		1950	PROJ.REVW.	HUD060501M	06/01/06	6U	
162402		9006 COSTELLO AVE		PANORAMA CITY		1950	PROJ.REVW.	HUD060501M	06/01/06	6U	
162429		8011 NOBLE AVE		PANORAMA CITY		1940	PROJ.REVW.	HUD060501M	06/01/06	6U	
140342		8125 144TH ST		PARAMOUNT	P	1938	HIST.RES.	DOE-19-04-0078-0000	04/20/04	6Y	
							PROJ.REVW.	HUD040322E	04/20/04	6Y	
							HIST.RES.	DOE-19-02-1197-0000	10/16/02	6Y	
							PROJ.REVW.	HUD021007A	10/16/02	6Y	
147242		8302 2ND ST		PARAMOUNT	P	1939	HIST.RES.	DOE-19-04-0087-0000	04/22/04	6Y	
							PROJ.REVW.	HUD040405K	04/22/04	6Y	
154345		8305 3RD ST		PARAMOUNT	P	1955	PROJ.REVW.	HUD050516R	05/16/05	6Y	
085003		8230 ACKLEY ST		PARAMOUNT	P	1940	PROJ.REVW.	HUD931101L	12/14/93	6Y	
095176		8301 ACKLEY ST		PARAMOUNT		1930	PROJ.REVW.	HUD940119F	09/19/94	6Y	
164782		8326 ACKLEY ST		PARAMOUNT	P	1957	PROJ.REVW.	HUD070122U	01/26/07	6Y	
081603		8055 ALHAMBRA AVE		PARAMOUNT	U	1923	PROJ.REVW.	HUD871027C	08/29/89	6Y	
143750		6731 ALONDRA BLVD		PARAMOUNT	P	1958	HIST.RES.	DOE-19-03-0257-0000	10/03/03	6Y	
							PROJ.REVW.	HUD030908O	10/03/03	6Y	
155435		7812 ALONDRA BLVD	HYNES DES HALL	PARAMOUNT	P	1940	PROJ.REVW.	HUD050825Q	09/21/05	6Y	

Attachment CUL-4

Attachment CUL-4 provided under separate cover

Attachment CUL-9

Attachment CUL-9 provided under separate cover

Attachment CUL-15

CULTURAL RESOURCES TECHNICAL REPORT
PALMDALE HYBRID POWER PROJECT
PALMDALE, CALIFORNIA

Prepared for:

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July 2008

Response to CEC Staff Data Adequacy Comments

Technical Area: Socioeconomics

Following are additional information and/or clarifications in response to the specific issues raised in the CEC staff Data Adequacy review. For each specific area where the questions were raised by CEC staff, the applicable section of the CEC Siting Regulations is identified, followed by the "Information Required to Make AFC Conform with Regulations," followed by the supplemental/clarifying information.

SOCIO-1. Appendix B (g)(7)(B)(vii).

Information Required:

Please provide separate estimates of the total operation payroll for permanent and short-term (contract) operations employees.

Response:

Power Plant Operator Payroll -

0-1 year:	$20.21
1-4 years:	$22.58
4-9 years:	$25.93
9-19 years:	$25.47
20 plus years:	$27.84

The average hourly wage in California is $26.65.

Based upon these figures, the estimated total permanent operation payroll for the plant will be approximately $2 million per year.

With regard to short term contract labor rates, these are provided below:

Position	Number	Hourly Cost	Duration
Shift Supervisor	1	$30.00	6 months
DCS Support	1	$35.00	9 months
Water Treatment Tech	1	$20.00	6 months
Laborer	1	$15.00	9 months

Based on these rates, hourly costs, and durations, the short-term contract annual payroll will be $159,000.

SOCIO-2. Appendix B (i)(2).

Information Required:

Please provide the name, title, phone number, address (required), and email address (if known), of an official within each agency, and also provide the name of the official who will serve as a contact person for commission staff.

Response:

See new Table 5.11-18 below.

Table 5.11-18 Agencies and Agency Contacts

Contact	Phone/E-mail	Permit/Issue
Karen Johnston, Budget Officer, City of Palmdale Finance Department: 38300 Sierra Highway, Suite D, Palmdale, California 93550	(661) 267-5440	Local finance and tax questions
William Fujioka, Chief Executive Officer, County of Los Angeles: 713 Kenneth Hahn Hall of Administration, 500 West Temple Street, Los Angeles, California 90012	(213) 974-1404	Los Angeles County budget questions
Wendy Watanabe, Acting Auditor-Controller, County of Los Angeles: 525 Kenneth Hahn Hall of Administration, 500 West Temple Street, Los Angeles, California 90012	(213) 974-0729	Tax rate information
Cindy Thompson, Facilities Technician, Maintenance Division, Antelope Valley Union High School District: 44811 Sierra Highway Lancaster, California, 93534	(661) 948-7666 Ext. 264	School fee information

Response to CEC Staff Data Adequacy Comments

Technical Area: Soils

Following are additional information and/or clarifications in response to the specific issues raised in the CEC staff Data Adequacy review. For each specific area where the questions were raised by CEC staff, the applicable section of the CEC Siting Regulations is identified, followed by the "Information Required to Make AFC Conform with Regulations," followed by the supplemental/clarifying information.

SOILS-1. Appendix B (g)(15)(B)(i).

Information Required:

The volume of soil loss due to accelerated wind and water erosion must be numerically quantified using the *Revised Universal Soil Loss Equation (RUSLE2 model)* and the *Wind Erosion Prediction System (WEPS model)* or similarly accepted methods. The soil loss should be estimated, in tons, when using Best Management Practices (BMPs) and without BMPs. Each project feature, such as the power block, solar field, and linear facilities, should be evaluated separately.

Response:

Soil loss due to accelerated wind and water erosion without BMPs (Pre-Development Condition, Source: USDA Natural Resources Conservation Services):

Solar Field Site		Sheet & Rill Erosion by Water		Erosion by Wind	
Soil Name	Approx. percent of project area	Erosion Factor, K	Erosion Factor, T (tons per acre per year)	Wind Erodibility Group	Wind Erodibility Rating (tons per acre per year)
Adelanto coarse sandy loam, 2 to 5 percent slopes (AcA)	1.6	0.37	5	3	86
Cajon loamy sand, 0 to 2 percent slopes (CaA)	85.7	0.28	5	2	134
Cajon loamy sand, 2 to 9 percent slopes, (CaC)	12.7	0.28	5	2	134

Power Block Site		Sheet & Rill Erosion by Water		Erosion by Wind	
Soil Name	Approx. percent of PB area	Erosion Factor, K	Erosion Factor, T (tons per acre per year)	Wind Erodibility Group	Wind Erodibility Rating (tons per acre per year)
Cajon loamy sand, 0 to 2 percent slopes (CaA)	66.2%	0.28	5	2	134
Cajon loamy sand, 2 to 9 percent slopes, (CaC)	33.8%	0.28	5	2	134

Offsite Linear Facility Route		Sheet & Rill Erosion by Water		Erosion by Wind	
Soil Name	Approx. percent of area	Erosion Factor, K	Erosion Factor, T (tons per acre per year)	Wind Erodibility Group	Wind Erodibility Rating (tons per acre per year)
Adelanto coarse sandy loam, 2 to 5 percent slopes (AcA)	17.0%	.28	5	3	86
Cajon loamy sand, 0 to 2 percent slopes (CaA)	25.9%	.24	5	2	134
Cajon loamy sand, 2 to 9 percent slopes (CaC)	0.6%	.24	5	2	134
Cajon loamy sand, loamy substratum, 0 to 2 percent slopes (CbA)	3.9%	.24	5	2	134

Cajon loamy fine sand, 0 to 2 percent slopes, hummocky (CcA2)	5.3%	.24	5	2	134
Gaviota rocky sandy loam, 15 to 30 percent slopes, eroded (GaE2)	0.5%	.24	1	3	86
Hanford coarse sandy loam, 0 to 2 percent slopes (HbA)	0.1%	.28	5	3	86
Hesperia fine sandy loam, 0 to 2 percent slopes (HkA)	12.6%	.32	5	3	86
Ramona coarse sandy loam, 2 to 5 percent slopes (RcB)	14.8%	.28	5	3	86
Rosamond loam (Rp)	4.0%	.37	5	5	56
Sorrento loam, 2 to 5 percent slopes (SsB)	0.4%	.55	5	5	56

Soil loss due to accelerated wind and water erosion with BMPs (Post-Development Condition):

Solar Field Site

Based on concept plan, 84% of existing ground (257 acre of 307 acre, approx.) for Solar Field and adjacent area, including roadway, slopes, infiltration ponds, will be covered (by Soil-Sement or equivalent product) and will not be exposed to erosion by wind and water. So, it can be predicted that the soil loss due to accelerated wind and water will be reduced by at least 84% after BMPs are installed (i.e. post development condition). Application of Soil-Sement or equivalent product has been included in proposed BMP in DESCP. Proposed plan also utilizes infiltration basins, which will act as sedimentation basins, thus reducing/eliminating soil loss by storm water from proposed site.

Power Block Site

Based on concept plan, approximately 75% of existing ground for Power Block and adjacent area, including roadway, slopes, infiltration ponds, will be covered (by building foot prints, equipment foundation slab, roadway pavements, gravel and Soil-Sement or equivalent product) and will not be exposed to erosion by wind and water. So, it can be predicted that the soil loss due to accelerated wind and water will be reduced by at least 75% after BMPs are installed (i.e. post development condition). Application of rock/gravel cover and Soil-Sement or equivalent product has been included in proposed BMP in DESCP. Proposed plan also utilizes infiltration basins, which will act as sedimentation basins, thus reducing/eliminating soil loss by storm water from proposed site.

Offsite Linear Facility Route

Offsite linear facilities shall be installed underground and the existing surface cover shall be restored. Therefore, the soil loss due to accelerated wind and water erosion will not be increased during post development condition.

Response to CEC Staff Data Adequacy Comments

Technical Area: Traffic and Transportation

Following are additional information and/or clarifications in response to the specific issues raised in the CEC staff Data Adequacy review. For each specific area where the questions were raised by CEC staff, the applicable section of the CEC Siting Regulations is identified, followed by the "Information Required to Make AFC Conform with Regulations," followed by the supplemental/clarifying information.

TRANS-1. Appendix B (g)(5)(A).

Information Required:

Please provide a regional transportation setting, on topographic maps (scale of 1:250,000), identifying the project location and major transportation facilities.

Response:

Please see revised (re-scaled) Figure 5.13-1.

TRANS-2. Appendix B (g)(5)(C).

Information Required:

Please provide an identification, on topographic maps at a scale of 1:24,000, and a description of existing and planned roads, rail lines, (including light rail), bike trails, airports, bus routes serving the project vicinity, pipelines, and canals in the project area affected by or serving the proposed facility.

Response:

Please see revised AFC Figure 5.13-2 (re-scaled and with added information including bike lanes and bus transit routes). A description of existing roadways is provided in AFC Sections 5.13.2.1 and 5.13.2.2. There is one planned roadway improvement in the area. The City of Palmdale is planning to grade-separate Avenue P (Monte Vista) at Sierra Highway and the Union Pacific tracks. (Personal conversation between John Wilson, Wilson Engineering and Gordon Phair, City of Palmdale, September 11, 2008) Section 5.13.2.4 of the AFC includes a description of bus transit routes and rail service in the Project area. There is no light rail in the Project area. The attached revised Figure 5.13-2 includes both bus transit routes and railroad service in the Project area. The Antelope Valley Transit Authority (AVTA) provides local bus service with fixed routes through the Palmdale area. Regional transit service is also provided by Kern Regional Transit with the East Kern Express and the Mojave-Ridgecrest Routes. Santa Clarita Transit also operates daily commuter bus service with Route 795 daily between Santa Clarita and Lancaster/Palmdale. Railroad service in the area is provided by the Union Pacific Railroad. The railroad spurs that come off the main line and enter the Air Force Plant 42 property are owned and maintained by the

Department of Defense and the Air Force. There are no major regional pipelines or canals in the area.

TRANS-3. Appendix B (g)(5)(C)(ii).

Information Required:

Please provide peak traffic counts.

Response:

Please see Figure 5.13-3 in the AFC for existing peak hour traffic counts on roadways in the project vicinity. AFC Table 5.13-6 provided the daily traffic information in the area. These data have been converted to hourly traffic data in Table 5.13-6b below by assuming that the peak hourly data would be about ten percent of the daily values, which is a typical traffic engineering assumption when no hourly data are available. Table 5.13-6b summarizes estimates of existing and Baseline 2011 two-way peak hour traffic volumes for select roadways in the Project area.

Table 5.13-6b Existing and 2011 Baseline Peak Hour Roadway Traffic Volumes, Approximate Design Capacities, and Truck Volumes

Roadway/ Segment	Existing Conditions[1]				Year 2011 Conditions[2]			
	Travel Lanes	Volume	Approx Capacity[3]	Truck Volumes	Travel Lanes	Volume	Approx Capacity[3]	Truck Volumes
SR-14 North of Avenue L	6	7,900	13,200	9.2%	6	10,110	13,200	9.2%
SR-14 South of Avenue M	6	9,900	13,200	9.2%	6	12,670	13,200	9.2%
Avenue L East of SR-14	6	3,200	5,400		6	3,740	5,400	
Avenue M East of SR-14	4	2,180	3,600		6	2,790	3,600	
Avenue M Sierra to Challenger	4	2,075	3,600		4	2,650	3,600	
Avenue M Challenger to 20th St E	4	1,400	3,600		4	1,795	3,600	

[1] Based on Caltrans, 2007, City of Palmdale 2007, assumes peak hourly traffic is 10% of daily values

[2] Existing Traffic Volumes expanded to Year 2011 (Estimated)
Construction Completion) at historical rates of 5.59%/year (SR-14 2000 to 2006)

[3] Two way Capacity in vehicles per hour, City of Palmdale, 1993

TRANS-4. Appendix B (g)(5)(C)(iv).

Information Required:

Please provide weight and load limitations.

Response:

The key weight and load restrictions in the State of California is the maximum overall gross weight is limited to 80,000 pounds, and the gross weight of each set of tandem axles is limited to 34,000 pounds. Special permits are required to move loads in excess of 80,000 lbs from the appropriate agency having jurisdiction over the facility as indicated in the AFC. Additionally, weight restrictions for vehicles traveling on freeways and highways include limits on single-axle loads of 20,000 pounds. The load on any one wheel, or wheels supporting one end of an axle, is limited to 10,500 pounds. The front steering axle load is limited to 12,500 pounds.

TRANS-5. Appendix B (g)(5)(C)(v).

Information Required:

Please provide an estimated percentage of current traffic flows for passenger vehicles and trucks for local streets identified in Table 5.13-6.

Response:

Estimated truck percentages for surface streets in the project area included in the traffic analysis are 7 to 10 percent trucks on Avenue M and 3 to 5 percent on Avenue L between SR-14 and Challenger. East of Challenger, truck traffic on Avenue L is estimated to be virtually zero. (Personal conversation between John Wilson, Wilson Engineering and Jason Finch, City of Palmdale, September 5, 2008)

TRANS-6. Appendix B (g)(5)(E).

Information Required:

Please provide a discussion of project-related hazardous materials to be transported to or from the project during construction of the project, including the types, estimated quantities, estimated number of trips, anticipated routes, means of transportation, and any transportation hazards associated with such transport.

Response:

During project construction there will be the typical use of paints, solvents, oils, gas, diesel fuel, grease and other cleaners; the majority of which will be brought to the site in limited quantities from local sources. Fuel, solvents, grease, oil, etc. will all most likely be brought to the site from Palmdale, following either Sierra Highway or SR-14 to Avenue M and then Avenue M east to the

site. Fuel trucks typically will come to the site each evening to service equipment. The delivery of solvents and other cleaners is generally a little more sporadic and will be scheduled dependent upon need.

TRANS-7. Appendix B (i)(2).

Information Required:

Please provide the name, title, phone number, and email address (if known), of an official who was contacted within each agency, and also provide the name of the official who will serve as a contact person for Commission staff.

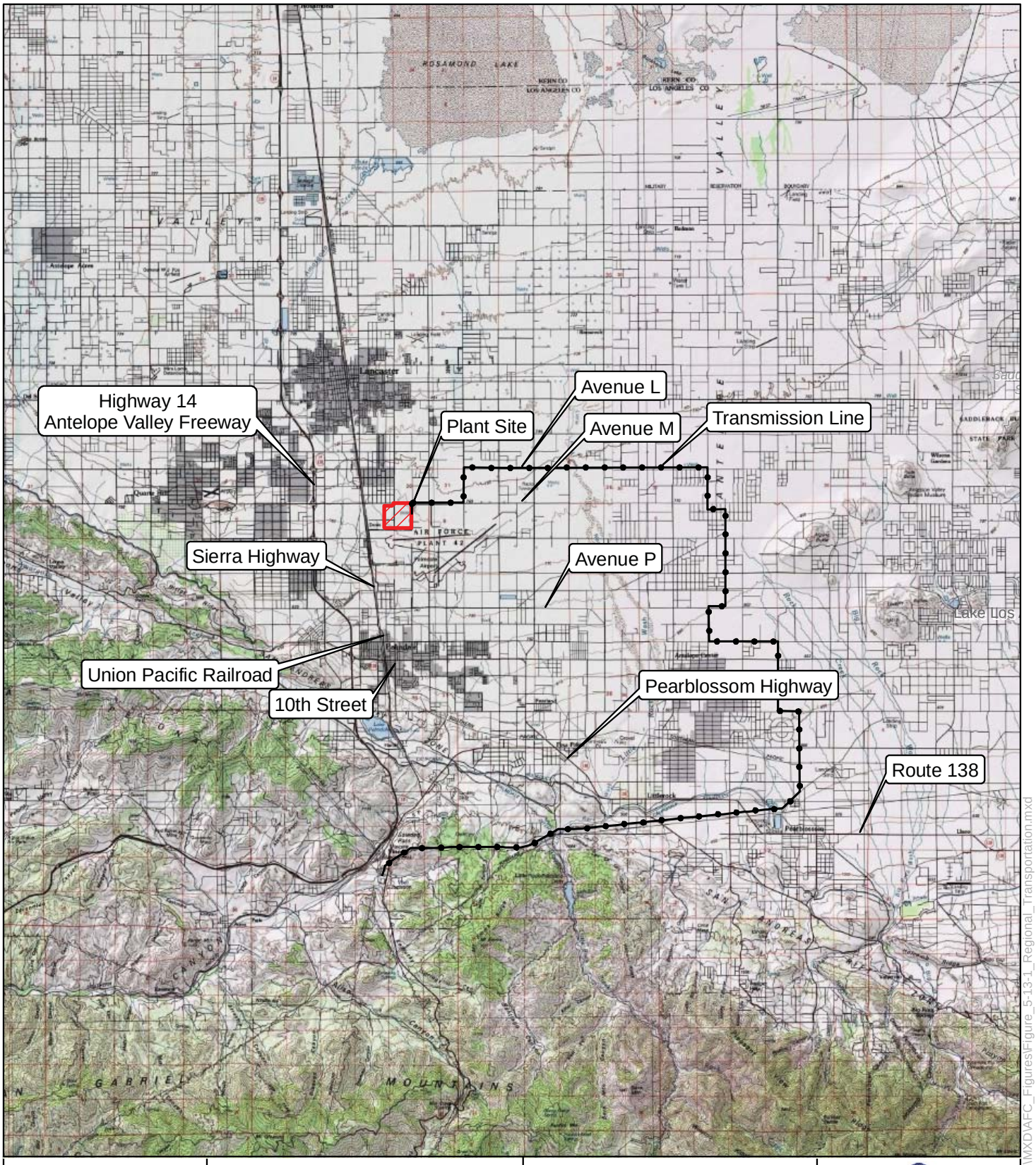
Response:

AFC Table 5.13-2 has been revised to include the additional information.

Table 5.13-2R
Agencies and Agency Contacts

Agency	Contact	Permit/Issue
City of Palmdale	Allie Mawrey City of Palmdale 38250 Sierra Highway Palmdale, CA 93550 adininger@City of Palmdale (661)267-5272	Encroachment Permit for work in the City Right of Way
County of Los Angeles	Department of Public Works, Palmdale Permit Office Gary Johnson 38126 Sierra Highway Palmdale, CA 93550 Tel: (661) 947-4151	Encroachment Permit for work in the County Right of Way
CALTRANS, District 7	Michael Sarieh Caltrans District 7 100 S. Main Street, Los Angeles, CA 90012 Tel: (213) 897-6943	Encroachment Permit for work in Caltrans' Right of Way; Permits for Oversize Loads on State Highways
County of Los Angeles	Department of Public Works, Tony Moran 900 Fremont Street Allhambra, CA 91803 Tel: (626) 458-3126	Permits for Oversize Loads on County Roadways
California DMV	Ron # 14 2260-D, East Palmdale Street Palmdale, CA 93550 Tel: (800) 777-0133	Licenses for Transport of Hazardous Materials and Wastes
CHP, Motor Carrier Unit Southern Division	2041 West Avenue Lancaster, CA 93536 Laurie Tilox Tel: 323-644-9557 www.chp.ca.gov/publications/index.html	Approved Routes for Transport of Hazardous Materials and Wastes

Air Force Plant 42	Mr. Dave Dickson Supervising Engineer ASC/ENV 1801 10th Street Wright-Patterson AFB, OH 45433-7626 937-255-3170	Ownership and maintenance of the railroad spur lines onto Air Force Plant 42 property



Map Location

Legend

Transmission Line

Project Site

NGS USA Topographic Maps

N
W E
S

Palmdale Hybrid Power Project

Figure 5.13-1
Regional Transportation Access

1:250,000

0 2 4 6 Miles

PALMDALE
a place to call home

Inland Energy, Inc.

ENSR | AECOM

Project: 10855-002
Date: September 2008

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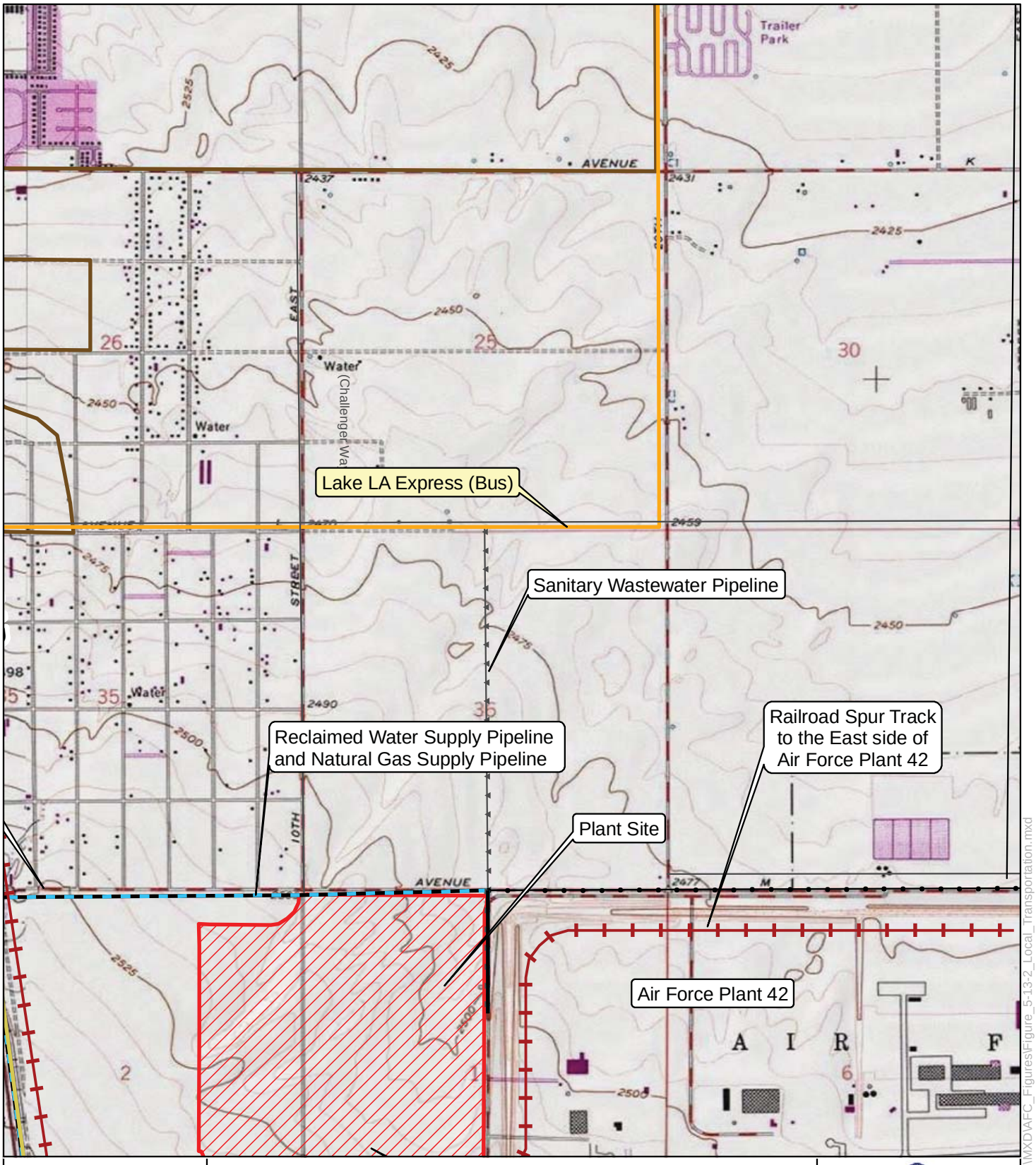

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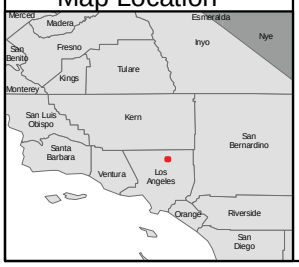

Palmdale Hybrid Power Project

Figure 5.13-2
Local Transportation Access

Bus Route	5	Natural Gas Supply Pipeline	Plant Site
1	7	Reclaimed Water Supply Pipeline	Railroad
11	Lake LA Express (Bus)	Sanitary Wastewater Pipeline	
4	Bike Path	Transmission Line	

Mapsheet 1 of 4 1:24,000 0 2,000 4,000 Feet

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Project: 10855-002
Date: September 2008

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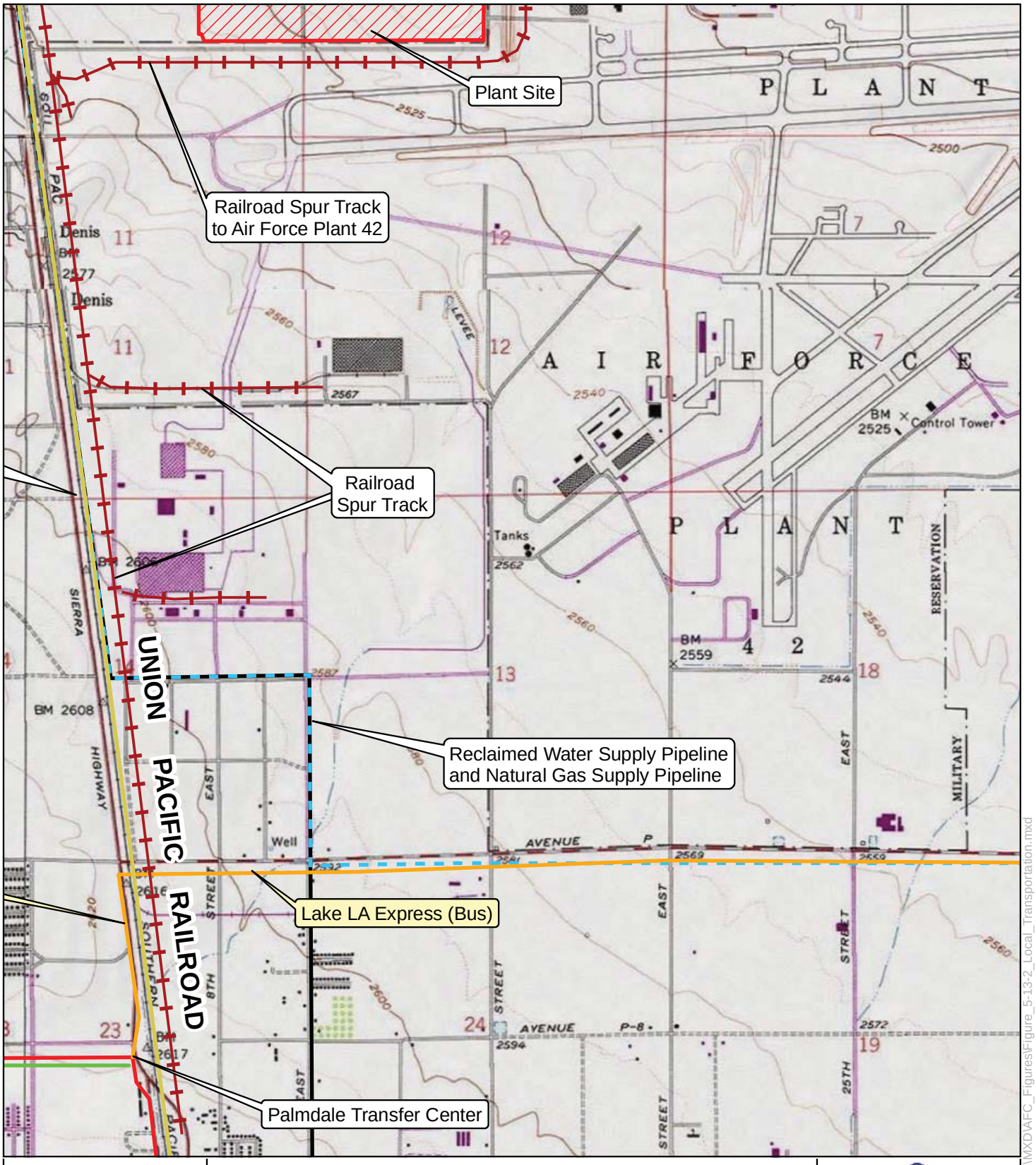

Map Location

Palmdale Hybrid Power Project

Figure 5.13-2
Local Transportation Access

Bus Route	5	Natural Gas Supply Pipeline	Plant Site
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4	Bike Path	Transmission Line	

Mapsheet 2 of 4 1:24,000 0 2,000 4,000 Feet

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ENSR | AECOM

Project: 10855-002
Date: September 2008

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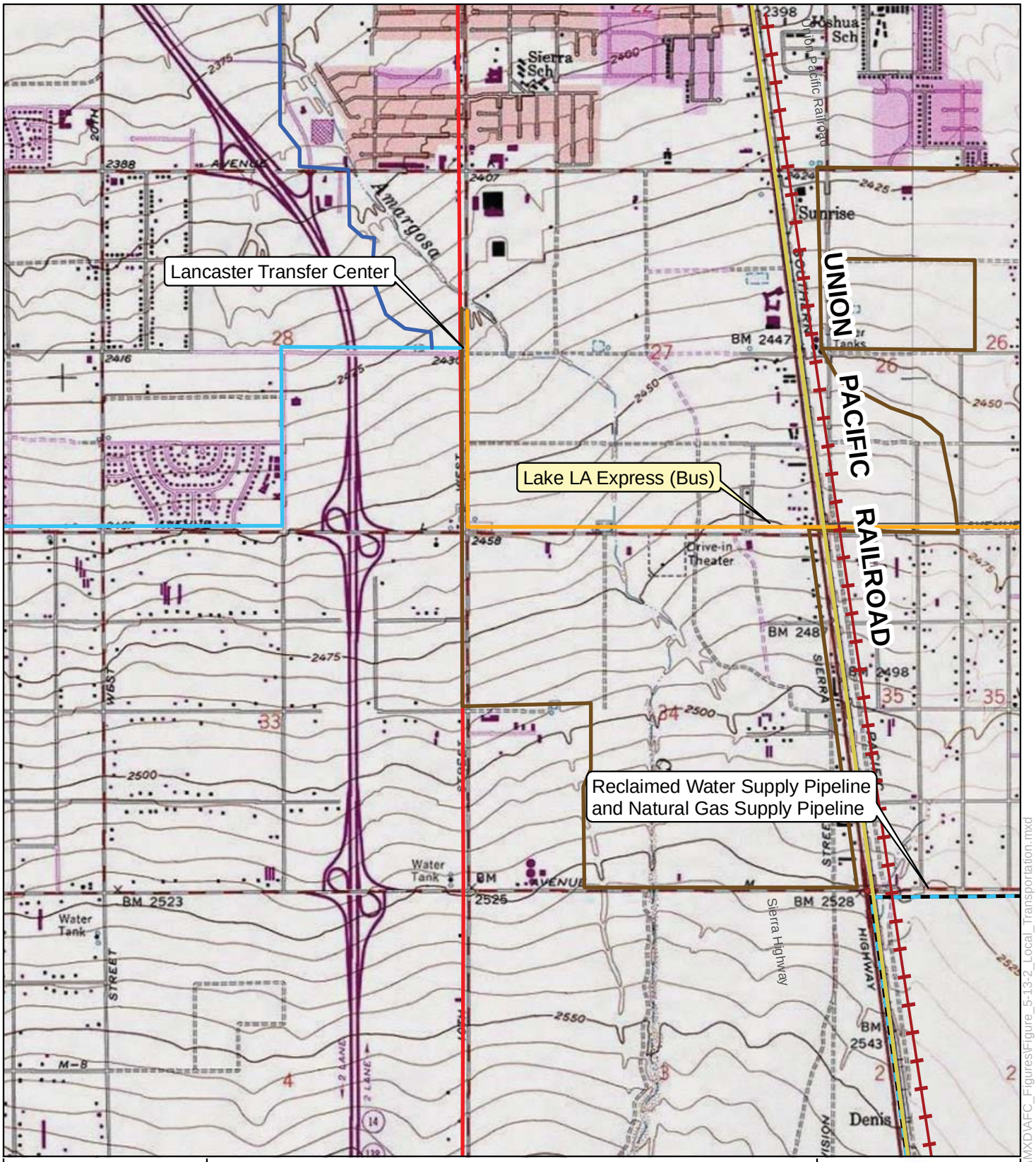

Map Location

Palmdale Hybrid Power Project

Figure 5.13-2
Local Transportation Access

Bus Route	5	Natural Gas Supply Pipeline	Plant Site
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11	Lake LA Express (Bus)	Sanitary Wastewater Pipeline	
4	Bike Path	Transmission Line	

Mapsheet 3 of 4 1:24,000 0 2,000 4,000 Feet

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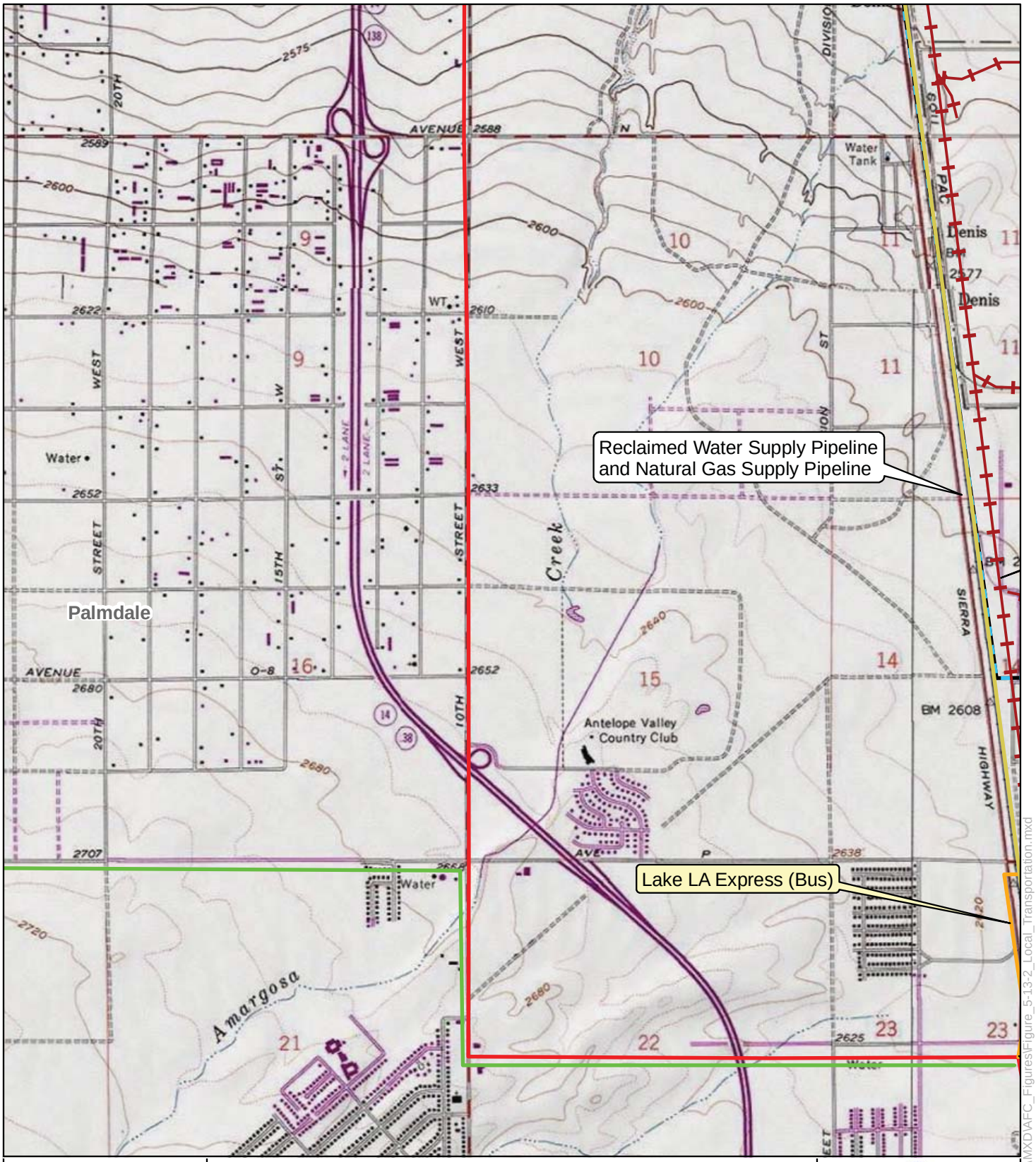

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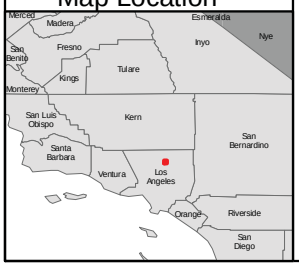

Palmdale Hybrid Power Project

Figure 5.13-2
Local Transportation Access

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Mapsheet 4 of 4 1:24,000 0 2,000 4,000 Feet

PALMDALE
a place to call home
Inland Energy, Inc.
ENSR | AECOM

Project: 10855-002
Date: September 2008

Y:\Projects\InlandEnergy\Palmdale\MXD\AFC_Figures\Figure_5-13-2_Local_Transportation.mxd

Response to CEC Staff Data Adequacy Comments

Technical Area: TRANSMISSION SYSTEM DESIGN

Following are additional information and/or clarifications in response to the specific issues raised in the CEC staff Data Adequacy review. For each specific area where the questions were raised by CEC staff, the applicable section of the CEC Siting Regulations is identified, followed by the "Information Required to Make AFC Conform with Regulations," followed by the supplemental/clarifying information.

TSD-1. Appendix B (i)(3).

Information Required:

Provide a CAISO Preliminary Approval Letter for interconnection of the proposed project to the CAISO control grid or the schedule for when the Preliminary Approval would be granted.

Response:

James D. Pratt at the CAISO has indicated in an email, which is copied below, that the CAISO does not issue Preliminary Approval Letters, rather the Facility Study acts as the CAISO interconnection designation. He has also indicated our Facility Study will be completed by the end of September or the beginning of October at the latest.

Allen,

Unfortunately we do not issue letters to that extent because in the past items have been used out of context. I can tell you that in the past the CAISO would issue an interconnection letter upon review of PTO related studies. Now the CAISO handles the study process therefore that letter designation is no longer needed. You actual Facilities Study is used as your CAISO interconnection designation. I hope to have the draft Facilities Study to you very soon. Once you receive the draft Facilities Study we will have a results meeting and you will then get 30 days to provide comments/concerns to the study. Once we have received your comments we will issue the final Facilities Study to you. I suppose the language in the draft Facilities Study would suffice for what you are looking for. Again that Facilities Study draft should be issued very soon.

Thanks for your patience,

James (J.D.) Pratt
Project Manager
California ISO
916-608-5732 office
916-293-1513 mobile
jpratt@caiso.com

Response to CEC Staff Data Adequacy Comments

Technical Area: Visual

Following are additional information and/or clarifications in response to the specific issues raised in the CEC staff Data Adequacy review. For each specific area where the questions were raised by CEC staff, the applicable section of the CEC Siting Regulations is identified, followed by the "Information Required to Make AFC Conform with Regulations," followed by the supplemental/clarifying information.

VISUAL-1. Appendix B (g)(6)(A)(ii)

Information Required:

Please provide a description of any modifications to the landscape as a result of human activities.

Response:

The landscape of the power plant site will be modified by clearing of vegetation and leveling of terrain. Joshua Trees will be transplanted at the plant site to the extent practicable along Avenue M, along the entry road, and at the administration building.

VISUAL-2. Appendix B (g)(6)(A)(ii)

Information Required:

Please provide a description of the existing visual properties of above ground electrical transmission.

Response:

There are existing above-ground electrical transmission lines for a relatively short distance along East Avenue M and for approximately one third of the length of the proposed electrical line from the Pearblossom Highway to the southern terminus. There is one existing electrical line constructed of steel poles along E Ave M and five existing steel lattice lines on one wooden H-frame line in the corridor from just east of Pearblossom Highway to the substation at the southern terminus. The wooden H-frame line would be replaced by the Project's single pole structures. A photograph of the existing transmission lines along E Ave M is provided in AFC Figure 5.15-5a and a photograph of one of the existing H-frame towers is shown in AFC Figure 2.13a.

VISUAL-3. Appendix B (g)(6)(A)(ii)

Information Required:

Please provide a description of the existing visual properties of the nighttime lighting levels in the project viewshed.

Response:

The project viewshed is influenced by a moderate level of nighttime lighting from roadways and from the industrial and airport facilities to the east and south of the power plant site.

VISUAL-4. Appendix B (g)(6)(C).

Information Required:

Please identify: i) any designated scenic roadways or scenic corridors and any visually sensitive areas that would be affected by the proposed project, including recreational and residential areas; and ii) the locations of the key observation points indicating the approximate number of people using each of these sensitive areas and the estimated number of residences with views of the project. Also identify any major public roadways and trails of local importance that would be visually impacted by the project and indicate the types of travelers (e.g., local residents, recreationists, workers, commuters, etc.) and the approximate number of vehicles, bicyclists, and/or hikers per day.

Response:

The Pearblossom Highway is a designated scenic roadway, initiated as such by the Antelope Valley General Plan, County of Los Angeles. There are no associated permits or specific design or construction guidelines associated with this designation.

The locations of the key observation points (KOPs) are shown on AFC Figure 5.15-3, and KOP 6 is located near the Pearblossom Highway. There are approximately ten residences associated with KOP 3 (on Palermo Dr.) that have views of the main plant site; approximately 25 – 50 average daily users of the Sierra Highway bike and walking trail; approximately 17,000 average daily vehicles on the Sierra Highway; approximately 9,000 average daily vehicles on Avenue M; approximately 1,000 to 4,000 daily users at the Lancaster National Soccer Complex; approximately 18,000 average daily vehicles on the Pearblossom Highway; and approximately 203 residences with views (within a half-mile) of the proposed electrical transmission line.

VISUAL-5. Appendix B (g)(6)(D).

Information Required:

Please provide a table providing the proposed color(s), materials, finishes, patterns, and other proposed design characteristics of each major component visible from off the project site, including any project-related electrical transmission line and/or offsite above ground pipelines and metering stations.

Response:

Table 5.15-5 provides the requested inputs for the major power plant components. In addition, the pole heights for the proposed electrical transmission line range from 105’ – 135’; pole base diameters range from 60.48” – 86”; and the color and material for the poles will be a standard galvanized steel tube.

Table 5.15-5. Significant Structures Coating/Finishing Color List for Plant Site Components

						9/10/08
Description	Height, FT.	Length(East-West), FT.	Depth (North-South), FT.	Diameter, FT.(if applicable)	Finish Color	Equipment Material
Combustion Turbine 1 Enclosure	35	55	25		Desert Tan	Metal siding
Combustion Turbine 1 Inlet Air Filter	70	60	45		Desert Tan	Metal siding
CT 1 MCC Module	20	36	12		Desert Tan	Metal siding
CT 1 Lube Oil Module	15	30	11		Desert Tan	Metal siding
Combustion Turbine 2 Enclosure	34	54	24		Desert Tan	Metal siding
Combustion Turbine 2 Inlet Air Filter	69	62	44		Desert Tan	Metal siding
CT 2 MCC Module	20	36	12		Desert Tan	Metal siding
CT 2 Lube Oil Module	15	30	11		Desert Tan	Metal siding
HRSG 1(Top of Silencers)	119	140	45		Desert Tan	Metal panel
HRSG 2(Top of Silencers)	119	140	45		Desert Tan	Metal panel
HRSG 1 Stack	145			19	Desert Tan	Metal panel
HRSG 2 Stack	145			19	Desert Tan	Metal panel
Wet Cooling Tower (No Plume Abatement)	50	240	96		Desert Tan	Reinforced fiberglass or concrete
Steam turbine Generator/Condenser and associated structure/equipment	70	120	40		Desert Tan	Metal panel
ST MCC Module	20	20	50		Desert Tan	Metal siding
CTG 1 GSU Transformer	26	35	25		ANSI 70 Light Gray	Metal panel
CTG 2 GSU Transformer	26	35	25		ANSI 70 Light Gray	Metal panel
STG GSU Transformer	28	35	25		ANSI 70 Light Gray	Metal panel

Water Treatment Building	25	140	105		Desert Tan	Metal siding
Clarifier Tank 1	25			44	Desert Tan	Metal panel
Clarified Water Storage Tank	35			37	Desert Tan	Metal panel
Filtered Water Storage Tank	30			30	Desert Tan	Metal panel
Demineralized Water Tank	30			30	Desert Tan	Metal panel
Pretreatment Filter Press and Shelter	20	15	30		Desert Tan	Metal siding
Sludge Thickener	20	70	25	20	Desert Tan	Metal panel
Fire Pump Module	15	15	25		Desert Tan	Metal siding
Brine Storage Tank	35			35	Desert Tan	Metal panel
Crystallizer	55			9	Desert Tan	Metal panel
Ammonia Storage Tank (Horizontal)	20		40	10	Desert Tan	Metal panel
Fuel Gas metering Yard	15	75	45		Desert Tan	Metal
Administration / Warehouse	20	210	40		Desert Tan	Metal siding
230 KV Switchyard	20	290	440		Desert Tan/ ANSI 70 Light Gray	Metal
Switchgear Module	20	30	55		Desert Tan	Metal siding
Maximum Dimensions of Significant Structures (Not Including Solar). Dimensions are above ground and do not include foundations. Dimensions are slightly larger than the structures themselves to allow for catwalks, structure significant piping etc. Steps, handrails, grating, etc., if galvanized, will not be finished painted.						

VISUAL-6. Appendix B (i)(2).

Information Required:

Please provide contact information for County of Los Angeles Agency responsible for Scenic Corridors.

Response:

Gina Natoli, Supervising Regional Planner
Department of Regional Planning
County of Los Angeles
Hall of Records (13th Floor)
320 West Temple Street
Los Angeles, CA 90012
Telephone: (213) 974-6411

VISUAL-7. Appendix B (i)(3).

Information Required:

Please provide schedule indicating permits outside the authority of the commission to be obtained and steps the applicant has taken or plans to obtain such permits.

Response:

As noted in AFC Section 5.15.1.5, there are no permits required that are related specifically to visual resources, especially not any federal permits which would be the only type of permit that is outside the authority of the Commission. However, as also noted in this AFC Section 5.15.1.5, a City of Palmdale Native Desert Vegetation Removal Permit will be needed to the extent that the Joshua Trees cannot be transplanted elsewhere on the site (as shown in the Conceptual Landscaping Plan, Figure 5.15-10, attached).

The schedule of this Removal Permit is that it would typically be obtained as part of the Project's final pre-construction activities, along with the other Building, Excavation, etc. permits issued by the City of Palmdale, who is also the Applicant of this Project. The Desert Vegetation Preservation Plan related to this permit will be developed concurrently with plans for Visual screening and the biological resource protection measures of the project.

Response to CEC Staff Data Adequacy Comments

Technical Area: Water Resources

Following are additional information and/or clarifications in response to the specific issues raised in the CEC staff Data Adequacy review. For each specific area where the questions were raised by CEC staff, the applicable section of the CEC Siting Regulations is identified, followed by the "Information Required to Make AFC Conform with Regulations," followed by the supplemental/clarifying information.

WATER-1. Appendix B (g)(14)(C)(ii).

Information Required:

Please provide the expected physical and chemical characteristics of the proposed recycled water that would be used during plant construction and operation. Also, please provide copies of background material used to create this description.

Response:

Chemical and physical characteristics of the recycled water from the PWRP (primary source) and LWRP (backup source) are provided in the following table. The background document used to create the table (Kennedy/Jenks Consultants, 2006) has been included as **Attachment WATER-1**.

Table 5.17-4 Effluent Mineral Characteristics for Project Reclaimed Water Supply

Parameter (Annual Mean Values[1])	PWRP[2]	LWRP[2]
Total Dissolved Solids	520	548
Ammonia-N	22	15.7
Calcium	31.1	44
Magnesium	11.3	12.3
Arsenic	< 0.001	< 0.0022
Barium	NA	0.014
Aluminum	NA	< 0.09
Cadmium	< 0.0004	< 0.0004
Total Chromium	< 0.010	< 0.010
Hexavalent Chromium	NA	< 0.0001

Cobalt	NA	< 0.010
Iron	NA	0.275
Lead	< 0.002	< 0.002
Manganese	NA	0.019
Mercury	< 0.00004	< 0.00004
Nickel	< 0.020	< 0.020
Potassium	14.1	17
Silver	< 0.00033	< 0.00036
Antimony	< 0.0005	< 0.0005
Beryllium	< 0.0005	< 0.0007
Molybdenum	NA	< 0.04
Thallium	< 0.001	< 0.001
Vanadium	NA	< 0.020
Sulfate	69	80
Chloride	113	141
Total Hardness (as C_2CO_3)	NA	127
MBAS	0.2	0.1
Copper	NA	< 0.010
Selenium	NA	< 0.001
Sodium	125	167
Zinc	NA	0.067

Source: Modified from Table 11 in Kennedy/Jenks Consultants, 2006

[1]All values in mg/l

[2]Values derived from 2004 Annual Reports

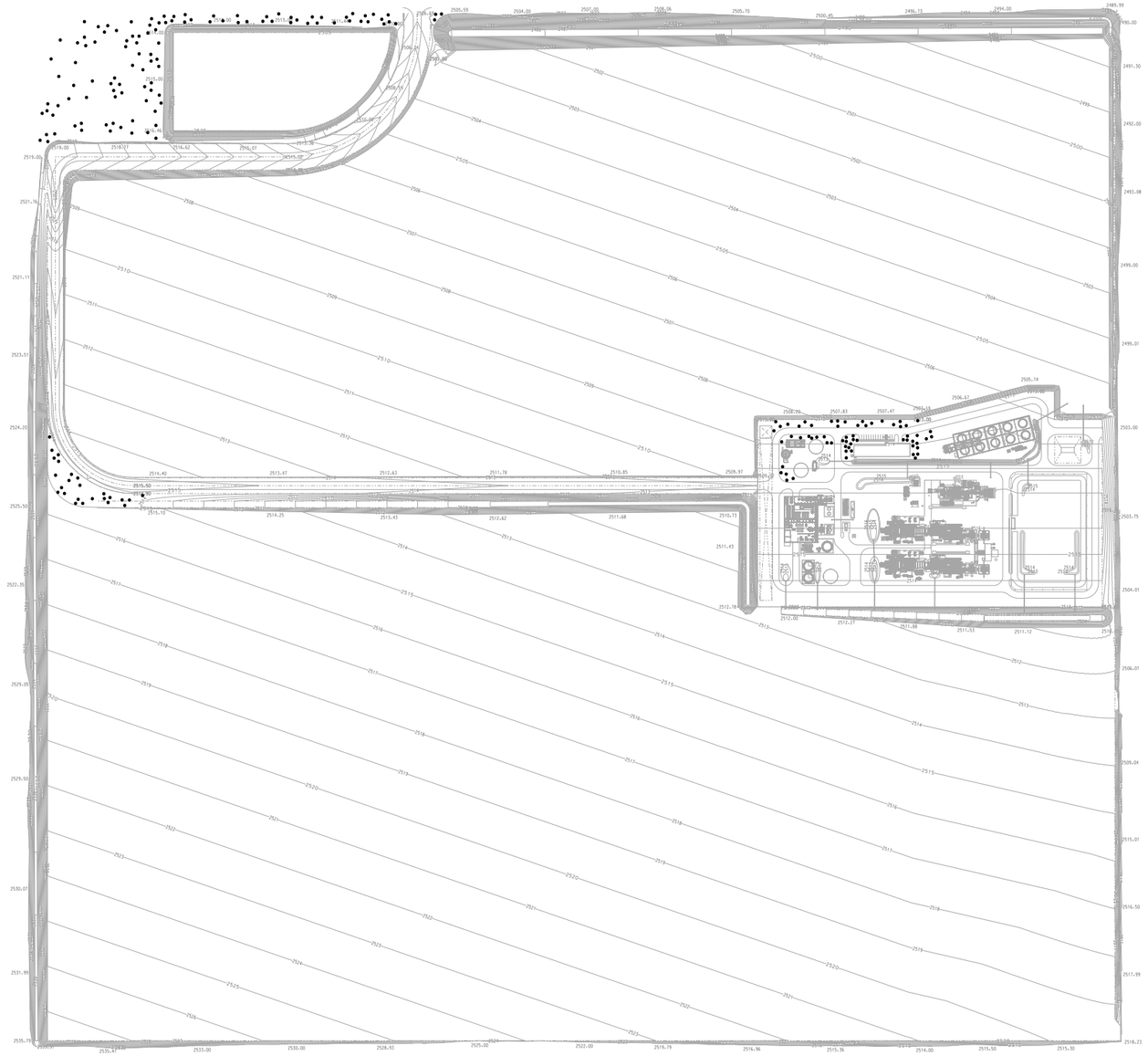
NA: Not Available

Reference:

Kennedy/Jenks Consultants, 2006. Final Facilities Planning Report, Antelope Valley Recycled Water Project. Prepared for Los Angeles County Waterworks District No. 40. August 8.

Attachment WATER-1

Attachment WATER-1 provided under separate cover



200 0 200 400
SCALE IN FEET
SCALE: 1" = 200'-0"

N

- PRELIMINARY -
NOT FOR CONSTRUCTION

CONFIDENTIAL

REV.	DESCRIPTION	DWN	CHK	APP	DATE
A	ISSUED FOR CEC APPLICATION	DAD		PAP	06-26-08

Legend
- Indicates Joshua Tree of varied size and spacing.

INLAND ENERGY

PALMDALE COMBINED CYCLE POWER PROJECT

Kiewit
Kiewit Power
8455 Lenexa Drive
Lenexa, Kansas 66214

Conceptual Landscape Plan

	by	date
DESIGNED		
DRAWN		
CHECKED		
APPROVED		

DRAWING NUMBER

07-27-2008: 001

Attachment BIO-2

PALMDALE HYBRID POWER PROJECT

FINAL

BURROWING OWL HABITAT ASSESSMENT AND FOCUSED SURVEY LOS ANGELES COUNTY, CALIFORNIA

Prepared for:
ENSR Corporation
1220 Avenida Acaso
Camarillo, California 93012-8738
Office: (805) 388-3775
Fax: (805) 388-3577

Contact: Mr. Carl Linder
clinder@ensr.aecom.com

Prepared by:
AMEC Earth & Environmental, Inc.
3120 Chicago Avenue, Suite 110
Riverside, California 92507
Office: (951) 369-8060
Fax: (951) 369-8035

Principal Investigator:
Matt Amalong, Wildlife Biologist
matt.amalong@amec.com

September 2008
AMEC Project No. 6554000247

TABLE OF CONTENTS

LIST OF TABLES

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LIST OF APPENDICES

1.0 INTRODUCTION

1.1 Purpose and Need

AMEC Earth & Environmental, Inc. (AMEC) was contracted by ENSR Corporation (ENSR) to prepare a Biological Resources Technical Report (BRTR) for the development of the proposed Palmdale Hybrid Power Project (PHPP or Project), a nominal 570-megawatt (MW) hybrid combined-cycle/solar thermal electrical generation facility. As part of the BRTR, AMEC conducted a habitat assessment and focused survey for burrowing owl (*Athene cunicularia*).

The California Burrowing Owl Consortium (CBOC 1993) and California Department of Fish and Game (CDFG 1995) developed Survey Protocol and Mitigation Guidelines to meet the need for uniform standards when surveying burrowing owl populations and evaluating impacts from development projects. The guidelines are intended to provide a decision-making process that should be implemented wherever there is potential for an action or project to adversely affect burrowing owls or the resources that support them. The process begins with a four-step survey protocol to document the presence of burrowing owl habitat, and evaluate burrowing owl use of the Project site and a surrounding buffer zone. When surveys confirm occupied habitat, the mitigation measures are followed to minimize impacts to burrowing owls, their burrows, and foraging habitat on the Project site. The guidelines emphasize maintaining burrowing owls and their resources in place rather than minimizing impacts through displacement of owls to an alternate site.

1.2 Project and Property Description

The Project is located in the City of Palmdale (City) and unincorporated areas of Los Angeles County, California (the power plant site and most linear facilities are within the City of Palmdale; portions of the transmission line route are within unincorporated areas), and includes a 377-acre power plant site, 50-acre construction laydown area, 35.6-mile transmission line, 7.4-mile reclaimed water pipeline, 8.7-mile natural gas supply pipeline, and 1-mile sanitary wastewater pipeline (Figure 1). The Project also includes a 1-mile potable water pipeline that will be installed along the same alignment as the last portion of the reclaimed water pipeline. Throughout this report, the term “Project site” refers to all Project elements in the aggregate (power plant site and all linear facilities); “linear facilities” refers to the various Project pipelines and the transmission line in the aggregate; all other references are to the specific Project component being addressed (“power plant site” or “plant site,” “transmission line,” “reclaimed water pipeline,” “natural gas supply pipeline,” and “sanitary wastewater pipeline”).

The Project consists of five components (with quadrangle and Township Range Section (TRS) data below):

1. Power Plant Site and Construction Laydown Area:
   - USGS 7.5' Quadrangle: Lancaster East
   - T6N, R12W, S 1-2
   - T7N, R12W, S 35-36

2. Transmission Line
   - USGS 7.5' Quadrangles: Lancaster East, Alpine Butte, Littlerock, Palmdale, Pacifico Mountain
   - T5N, R10W; R11W, S 19-24; R12W, S 23-24, 26-27;
   - T6N, R10W, S 4-5, 8-9, 16-17, 20-22, 26-28, 34-35; R11W, S 6; R12W, S 1;
   - T7N, R10W, S 29-33; R11W, S 25-29, 31-36; R12W, S 36

3. Reclaimed Water Line
   - USGS 7.5' Quadrangles: Lancaster West, Lancaster East, Palmdale
   - T6N, R11W, S 17-20; R12W, S 2, 11, 13-14, 24
   - T7N, R12W, S 35

4. Natural Gas Supply Pipeline
   - USGS 7.5' Quadrangles: Lancaster West, Lancaster East, Palmdale
   - T5N, R12W, S 2
   - T6N, R12W, S 2, 11, 13-14, 23-26, 35-36

5. Sanitary Wastewater Pipeline
   - USGS 7.5' Quadrangle: Lancaster East
   - T7N, R12W, S 36

1.2.1 Power Plant Site and Construction Laydown Area

The Project power plant consists of a hybrid of natural gas-fired combined-cycle generating equipment integrated with solar thermal generating equipment to be developed on an approximately 377-acre site in the northern portions of the City. The combined-cycle equipment utilizes two natural gas-fired combustion turbine generators (CTG), two heat recovery steam generators (HRSG), and one steam turbine generator (STG). The solar thermal equipment utilizes arrays of parabolic collectors to heat a high-temperature working fluid. The hot working fluid is used to boil water to generate steam. The combined-cycle equipment is integrated thermally with the solar equipment at the HRSG and both utilize the single STG that is part of the Project. All of this 377-acre power plant site area would be subject to permanent impacts.

The construction laydown area would occupy a footprint of 50 acres located west of the power plant site. This area would be used for storing Project-related equipment; parking, staging, and maintenance of construction heavy equipment and personnel vehicles; and assembling power plant components. All of this 50-acre area would be subject to permanent impacts.

1.2.2 Transmission Line

The proposed interconnection point for the Project with the Southern California Edison (SCE) electrical transmission system is at SCE's existing Vincent Substation, approximately 11 miles south-southwest of the proposed power plant site. To accommodate the needs of Palmdale's aviation community (Air Force Plant 42 and Los Angeles (LA) World Airports), a transmission line route approximately 35.6 miles long is planned that extends north and east from the power plant site, then south and back to the west. The Project's transmission system will be constructed in two segments, as briefly summarized below.

Transmission line segment 1 involves the construction of approximately 23.7 miles of 230-kilovolt (kV) transmission line in new and existing right-of-ways (ROWs) between the power plant site and SCE's Pearblossom Substation. The route extends northward and eastward from the power plant site, then southward and finally back to the southwest. Transmission line segment 2 is a system reliability upgrade that includes increasing transmission capacity and expansion of the existing Vincent Substation. A new single-circuit 230 kV line will be installed on new 230 kV towers parallel to existing lines in an existing 11.9-mile transmission ROW extending westward from the Pearblossom Substation to the Vincent Substation.

Permanent disturbance areas for the transmission line include pole footprints, access roads, and laydown areas.

1.2.3 Reclaimed Water Pipeline

Reclaimed water for the Project cooling tower makeup and other industrial uses will be supplied from the City Water Reclamation Plant (PWRP). The City will design and construct an approximately 7.4-mile 14-inch pipeline from the PWRP to the power plant site in existing City street ROWs. No new disturbance is anticipated.

1.2.4 Natural Gas Supply Pipeline

The Project will be fueled with natural gas delivered via a new 20-inch natural gas pipeline. The Southern California Gas Company (SCG) will design and construct the approximately 8.7-mile pipeline in existing City street ROWs. The pipeline will originate at the SCG facility on East Avenue S and terminate at the power plant site. No new disturbance is anticipated.

1.2.5 Sanitary Wastewater Pipeline

Sanitary wastewater will be disposed through an existing Los Angeles County Sanitation Districts 12-inch sanitary wastewater pipeline. The Project will connect to the existing line at an existing manhole just north of Avenue L along Challenger Way approximately one mile from the power plant site. The sanitary wastewater pipeline will be approximately 1 mile long and will be constructed in existing City street ROWs. No new disturbance is anticipated.

1.3 Burrowing Owl Background

Burrowing owls, a California Special Concern Species (CSC), use a variety of natural and modified habitats for breeding, wintering, foraging, and/or migration stopovers that are typically characterized by low growing vegetation. Burrowing owl habitat includes, but is not limited to, native and non-native grassland, interstitial grassland within shrub lands, shrub lands with low density shrub cover, golf-courses, drainage ditches, earthen berms, unpaved airfields, pastureland, dairies, fallow fields, and agricultural use areas.

Burrowing owls typically use burrows made by fossorial (adapted for burrowing or digging) mammals, such as California ground squirrels (*Spermophilus beecheyi*) or badgers (*Taxidea taxus*). They often utilize manmade structures, such as earthen berms; cement culverts; cement, asphalt, rock, or wood debris piles; or openings beneath cement or asphalt pavement. Owls can be affected by disturbance and habitat loss, even though there may be no direct impacts to the birds themselves or their burrows.

Occupancy of suitable burrowing owl habitat can be verified at a site by detecting a burrowing owl, its molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance. Burrowing owls exhibit high site fidelity, reusing burrows year after year. A site should be assumed occupied if at least one burrowing owl has been observed occupying a burrow there within the last three years (Rich 1984).

2.0 METHODS

AMEC biologists and sub-consultants knowledgeable in burrowing owl habitat, ecology, and field identification of the species and burrowing owl sign conducted surveys on the dates shown in Table 1 (see Appendix 1 for surveyor qualifications). The weather conditions during these surveys were conducive to observing owls outside their burrows and detecting burrowing owl sign. Survey methodology adhered to the *Burrowing Owl Survey Protocol and Mitigation Guidelines* (CBOC 1993) and the *Staff Report on Burrowing Owl Mitigation* (CDFG 1995). Data were collected by numerous techniques including the use of a hand-held Global Positioning System (GPS), standardized data forms, photographs, and aerial field maps.

One segment of the transmission line route (along 105th Street from Avenue M-4 to Avenue P) was changed after field surveys were conducted; therefore, 3.75 miles of ROW were not surveyed. However, a cursory field survey identified the habitat communities along this revised route to be very similar to surveyed areas, so species composition is expected to be similar.

Table 1. Burrowing Owl Survey Details

Date (2008)	Surveyors[1]	Time	Area/Location Surveyed[2]	Percent Cloud Cover	Wind (mph)	Temp. (˚F)
Habitat Assessment and Focused Burrow Survey						
Apr 01	MA, SF, NMo, NMu	07:00-16:00	Plant	0-15	0-15	45-70
Apr 02	MA, SF, NMo, NMu	07:00-16:00	Plant	15-90	1-15	52-66
Apr 03	MA, SF, NMo, NMu	07:00-15:00	Plant	0-5	1-10	47-72
Apr 04	MA, SF, NMo, NMu	06:30-12:00	Plant	0-60	0-3	38-76
Apr 07	MA, JB, SF, AH, NMu	07:00-17:00	Plant & Buffer	5-40	2-15	48-70
Apr 09	MA, JB, SF, AH	07:00-16:00	Water ROW & Buffer	0-20	5-20	47-68
Apr 10	MA, JB, SF, AH	09:00-16:00	Water ROW & Buffer	0	0-5	65-79
Apr 11	MA, JB, SF, AH	07:00-12:00	Gas ROW & Buffer	0	0-10	46-72
Apr 14	MA, JB, SF, AH, NMu	07:00-17:00	T-Line ROW & Buffer	0	0-20	60-88
Apr 15	MA, JB, SF, AH, NMu	07:00-16:00	T-Line ROW & Buffer	0-10	5-22	46-68
Apr 16	JB, SF, AH, NMu	07:30-16:00	T-Line ROW & Buffer	0	0-8	45-75
Apr 17	MA, JB, SF, AH, NMu	07:00-16:30	T-Line ROW & Buffer	0	0-12	48-80
Apr 18	MA, JB, SF, AH, NMu	07:30-14:00	T-Line ROW & Buffer	0-40	0-10	64-86
Apr 21	MA, JB, AH, NMu, HR, DS	08:30-15:00	T-Line Buffer	0	0-8	58-82
Apr 22	MA, JB, AH, NMu, HR, DS	08:00-17:00	T-Line ROW & Buffer	0	1-18	58-79
Apr 23	MA, JB, AH, NMu, HR, DS	07:30-15:00	T-Line ROW	0-5	1-25	52-62
Apr 24	JB, AH, NMu, HR, DS	07:00-16:00	T-Line ROW & Buffer	0	1-15	45-76
Apr 25	MA, JB, AH, NMu, HR, DS	07:30-17:00	T-Line ROW & Buffer	0	0-8	60-85
Apr 26	JB, AH	06:45-15:00	T-Line Buffer	0	0-5	55-85
Focused Burrowing Owl Survey						
Aug 11	TM	05:15-10:45	Suitable Habitat	50-75	5-10	61-77
Aug 12	TM	05:00-10:00	Suitable Habitat	40-80	5-10	65-79
Aug 13	TM	05:20-09:20	Suitable Habitat	20-50	5-10	61-78
Aug 14	TM	05:05-09:30	Suitable Habitat	10-40	5-10	59-79

1 Surveyor Initials:
- MA = Matt Amalong, Wildlife Biologist, AMEC
- JB = Jim Boone, Botanist/Ecologist, Desert Wildlife Consultants, LLC
- SF = Steve Ferrand, Wildlife Biologist, Nevada Biological Consulting, LLC
- AH = Alex Heindl, Herpetologist, Desert Walkabouts, Inc.
- TM = Tsegaye Mengistu, Wildlife Biologist, AMEC
- NMo = Nathan Moorhatch, Wildlife Biologist, AMEC
- NMu = Nathan Mudry, Wildlife Biologist, eGIS Services, LLC
- HR = Heather Rothbard, Botanist, AMEC
- DS = Dennis Strong, Herpetologist, Nevada Biological Consulting, LLC

2 Area/Location:
- Plant = Power Plant Site
- T-Line = Transmission Line
- Water = Reclaimed Water Pipeline
- Gas = Natural Gas Supply Pipeline
- ROW = Right-of-Way
- Buffer = 100, 200, 300, 400, & 500-foot Transects

2.1 Records Search

Prior to the field surveys, a records search was conducted to identify the historical occurrences of burrowing owls in the Project vicinity. The CDFG California Natural Diversity Data Base (CNDDB) was queried: USGS Lancaster West, Lancaster East, Alpine Butte, Hi Vista, Ritter Ridge, Palmdale, Littlerock, Lovejoy Buttes, Acton, Pacifico Mountain, Juniper Hills, and Valyermo 7.5-minute series topographic quadrangles (CDFG 2008).

2.2 Habitat Assessment

The Project site and a 500-foot buffer (where possible and appropriate based on habitat) were surveyed to assess the presence of special-status species and habitats. Pedestrian survey transects were spaced to allow 100 percent visual coverage of the ground surface. The distance between transect center lines was no more than 100 feet and was reduced to account for differences in terrain, vegetation density, and ground surface visibility.

2.3 Focused Burrow Survey

A focused burrow survey to detect natural burrows or suitable man-made structures was conducted concurrently with the habitat assessment. The biologists walked areas of suitable habitat (the Project site and, where appropriate, the 500-foot buffer zone) while searching for burrowing owls, potential and active burrows, and owl sign such as feathers, pellets, and prey items. The 500-foot buffer zone was surveyed to identify burrows and owls outside of the Project site which may be impacted by factors such as noise and vibration created by heavy equipment during Project construction. Pedestrian survey transects were spaced to allow 100 percent visual coverage of the ground surface. The distance between transect center lines was no more than 100 feet and was reduced to account for differences in terrain, vegetation density, and ground surface visibility. The locations of all suitable burrowing owl habitat, potential owl burrows, burrowing owl sign, and any owls observed were recorded and mapped.

2.4 Focused Burrowing Owl Survey

Focused nesting season burrowing owl surveys were conducted on four separate days. Surveys were conducted in the morning one hour before sunrise to two hours after sunrise (see Table 1 for times). Binoculars were used to scan all suitable habitat, locations of mapped burrows, and potential perch locations. Surveys were conducted from fixed points and provided 100 percent visual coverage of the suitable habitat areas within the Project site. Surveys were conducted during weather conducive to observing owls outside their burrows.

3.0 RESULTS

3.1 Records Search

CNDDB records did not indicate the historical presence of burrowing owls and burrows within the Project site or buffer zone, but they have been observed in the Project vicinity. Known occurrences (12 records from 1999 to 2006) range from 2 to 6 miles from the Project site (CDFG 2008).

3.2 Habitat Assessment and Focused Burrow Survey

Evidence of burrowing owls (*i.e.* suitable habitat with potential burrows present, discussions with landowners, etc.) was apparent throughout various areas of the Project site footprint and 500-foot buffer zone (Figure 2). One live individual was observed along the desert tortoise 1,200-foot zone of influence (ZOI) transect for the transmission line (outside the proposed disturbance footprint and the 500-foot buffer zone). Additionally, numerous areas of suitable habitat containing small mammal burrows (primarily California ground squirrels) were observed across much of the Project site and within the buffer zone. These burrows provide ample nesting opportunities for this species.

3.3 Focused Burrowing Owl Survey

No burrowing owls or burrowing owl sign were detected on the Project site or buffer zone.

4.0 CONCLUSIONS

The habitat assessment and focused burrow survey resulted in the detection of suitable habitat for potential future burrowing owl use. One live individual was observed along the 1,200-foot ZOI transect. The focused burrowing owl survey resulted in the absence of burrowing owls within the area of concern (Project site and 500-foot buffer zone).

Because of the potential for burrowing owls to be present in areas containing suitable habitat, a focused burrowing owl survey for winter residents will be conducted between December 1 and January 31, as well as a pre-construction survey no more than 30 days prior to ground disturbing activity. If live burrowing owls are found within the area of concern, impact avoidance, minimization, and/or mitigation will be required. See the Project's BRTR (AMEC 2008) for impact minimization and mitigation recommendations for burrowing owl and other nesting migratory birds.

5.0 REFERENCES

AMEC. 2008. Palmdale Hybrid Power Project: Biological Resources Technical Report. Unpublished report dated July 2008 and submitted to the California Energy Commission as part of an Application for Certification.

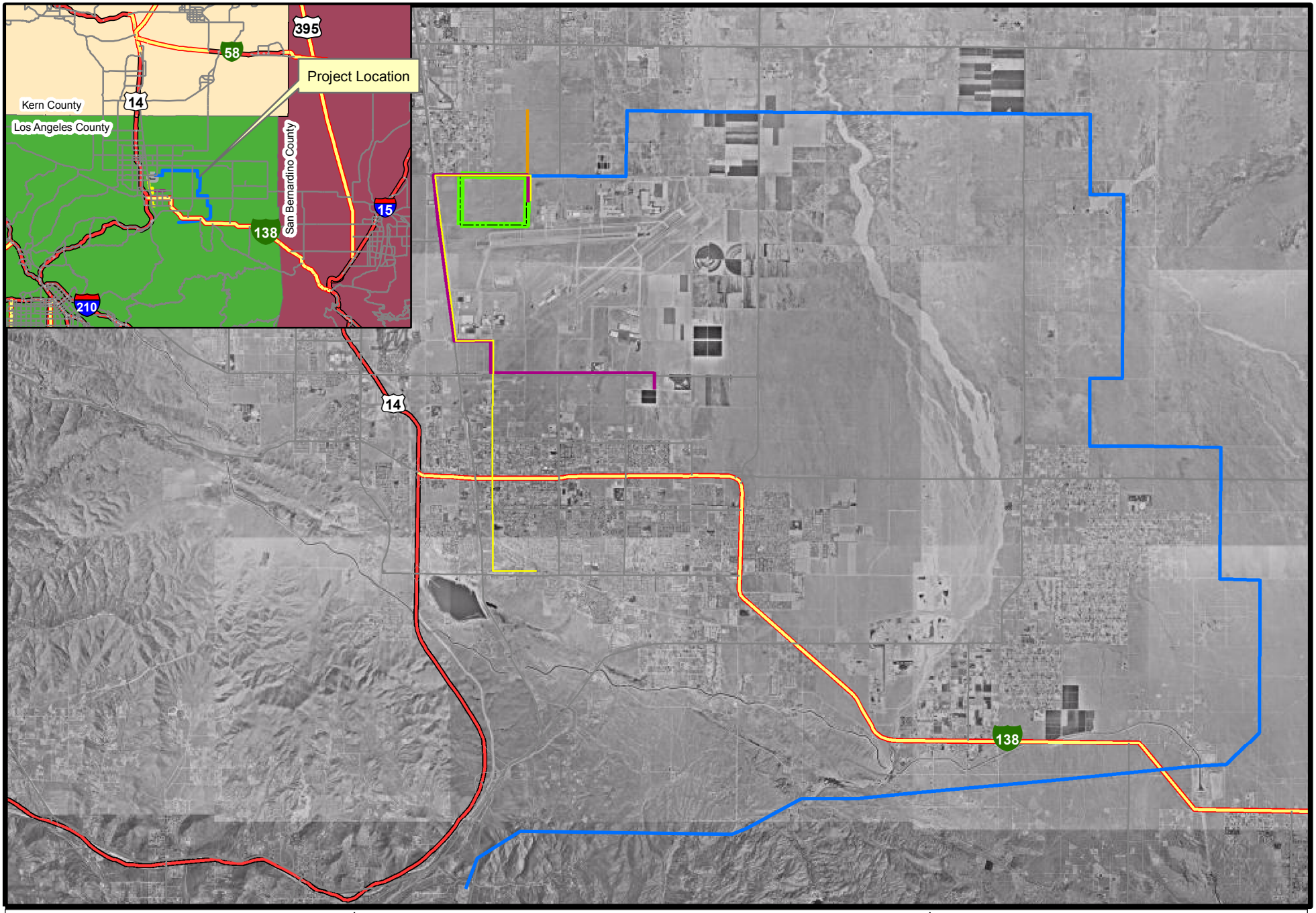
California Burrowing Owl Consortium (CBOC). 1993. Burrowing Owl Survey Protocol and Mitigation Guidelines.

California Department of Fish and Game (CDFG). 2008. California Natural Diversity Data Base, Rarefind 3, Version 3.1.0.

CDFG. 1995. Staff Report on Burrowing Owl Mitigation.

Rich, T. 1984. Monitoring Burrowing Owl populations: Implications of burrow re-use. Wildlife Society Bulletin 12: 178-180.

FIGURES



Legend

- Power Plant Site
- Transmission Line
- Sanitary Wastewater Pipeline
- Natural Gas Pipeline
- Reclaimed Water Pipeline

Palmdale Hybrid Power Project

Figure 1

Vicinity & Location

0 1 2 3 4 Miles

1:125,000

Map Notes:

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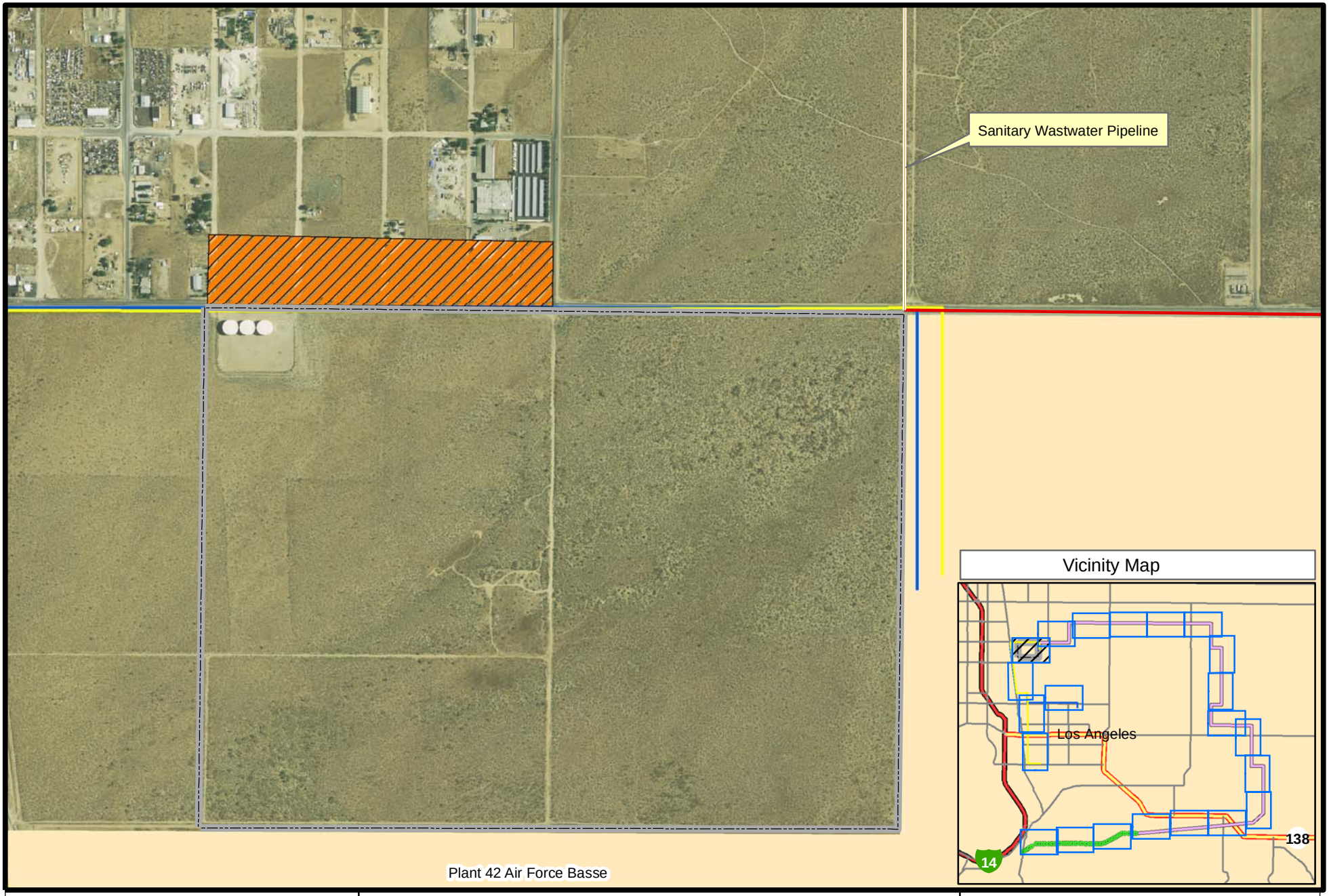

Legend

- Potential Burrowing Owl Habitat
- Transmission Line Route
- Reclaimed Water Pipeline
- Natural Gas Supply Pipeline

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl
Figure 2-A

0 0.05 0.1 0.2 0.3 0.4 Miles

1:12,000

Map Notes:

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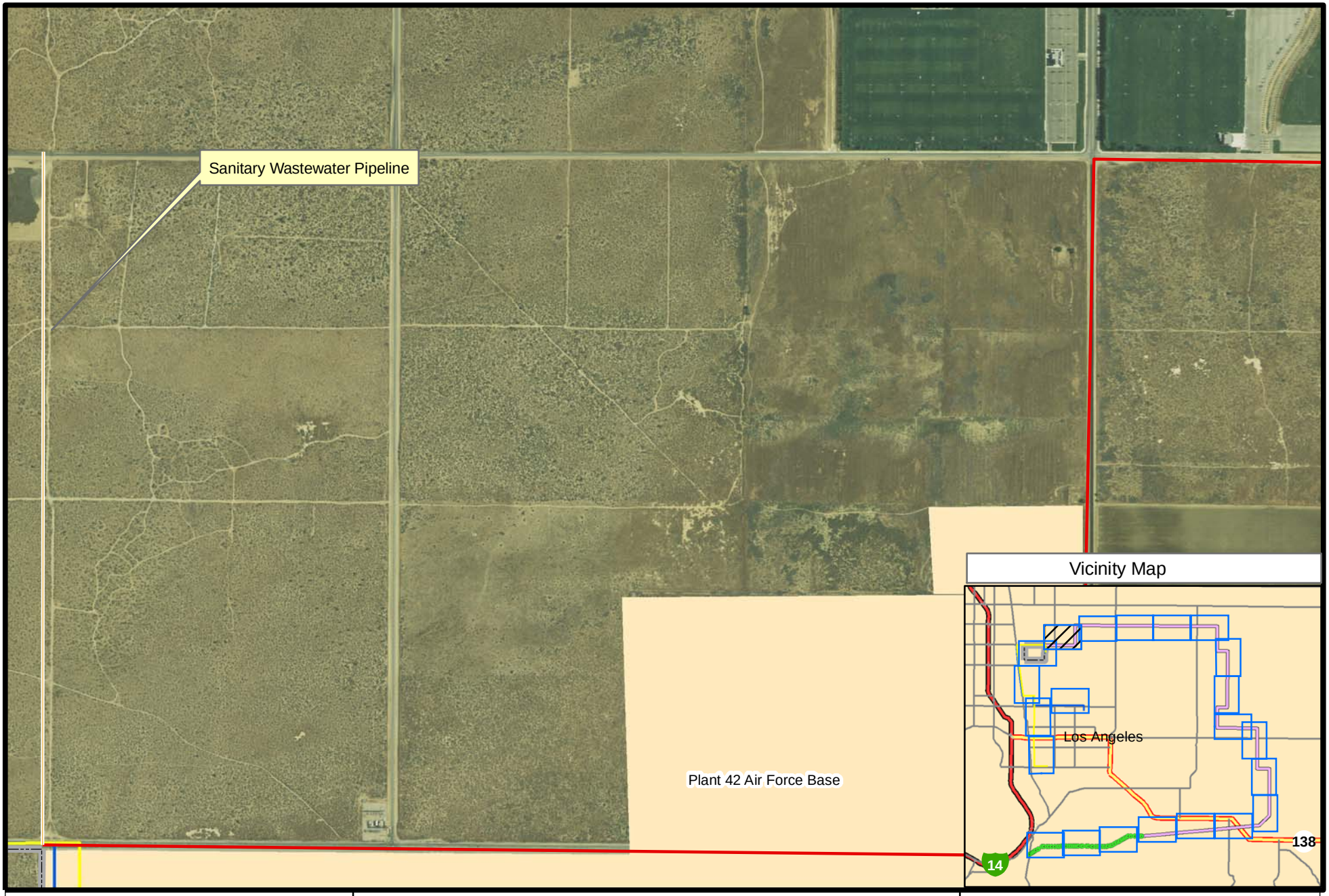

Legend

Transmission Line Route

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl
Figure 2-B

0 0.1 0.2 0.3 0.4 Miles

1:12,000

Map Notes:

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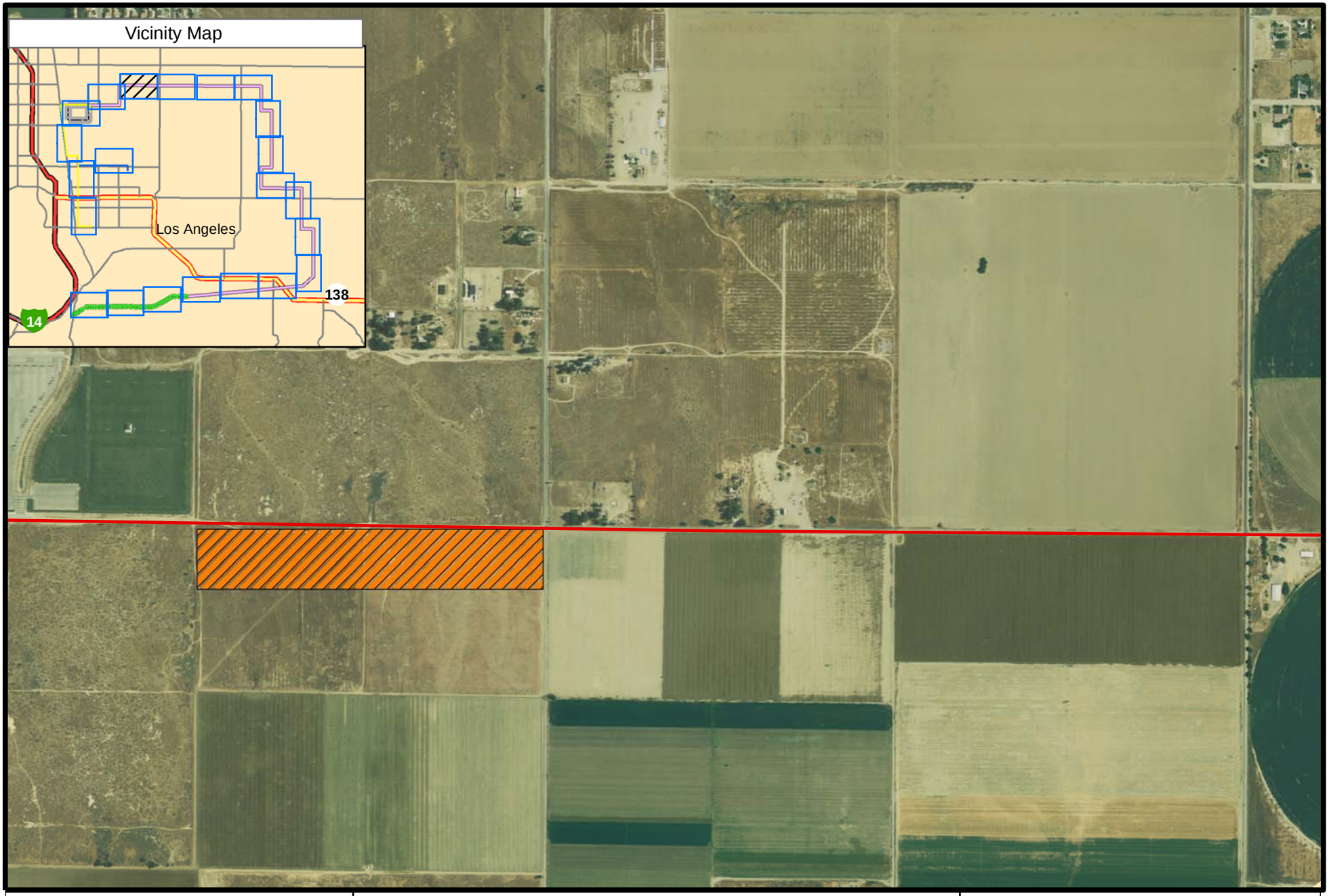

Legend

Transmission Line Route

Burrowing Owl Habitat

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl
Figure 2-C

0 0.1 0.2 0.3 0.4 Miles

1:12,000

Map Notes:

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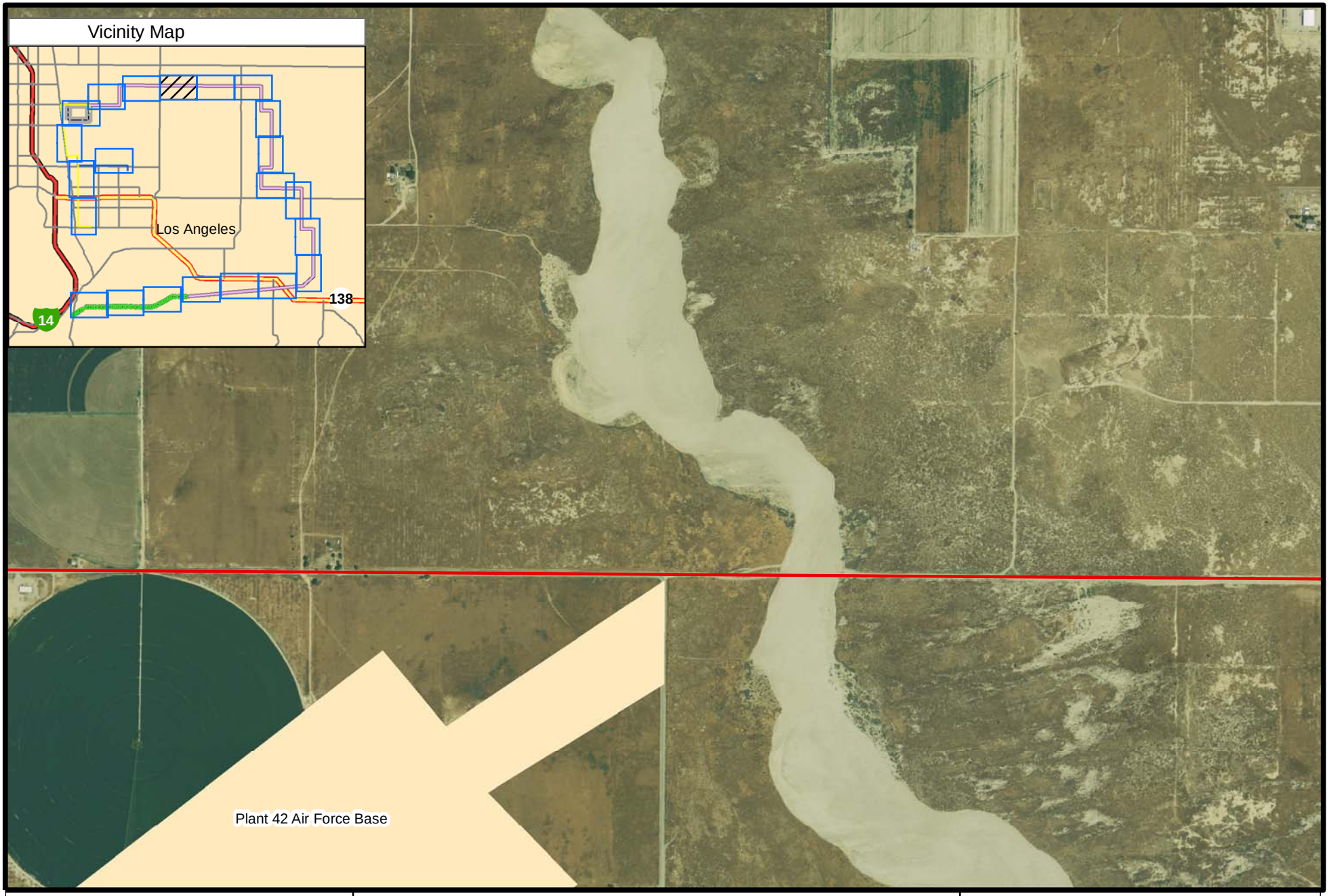

Legend

Transmission Line Route

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl
Figure 2-D

0 0.1 0.2 0.3 0.4 Miles

1:12,000

Map Notes:

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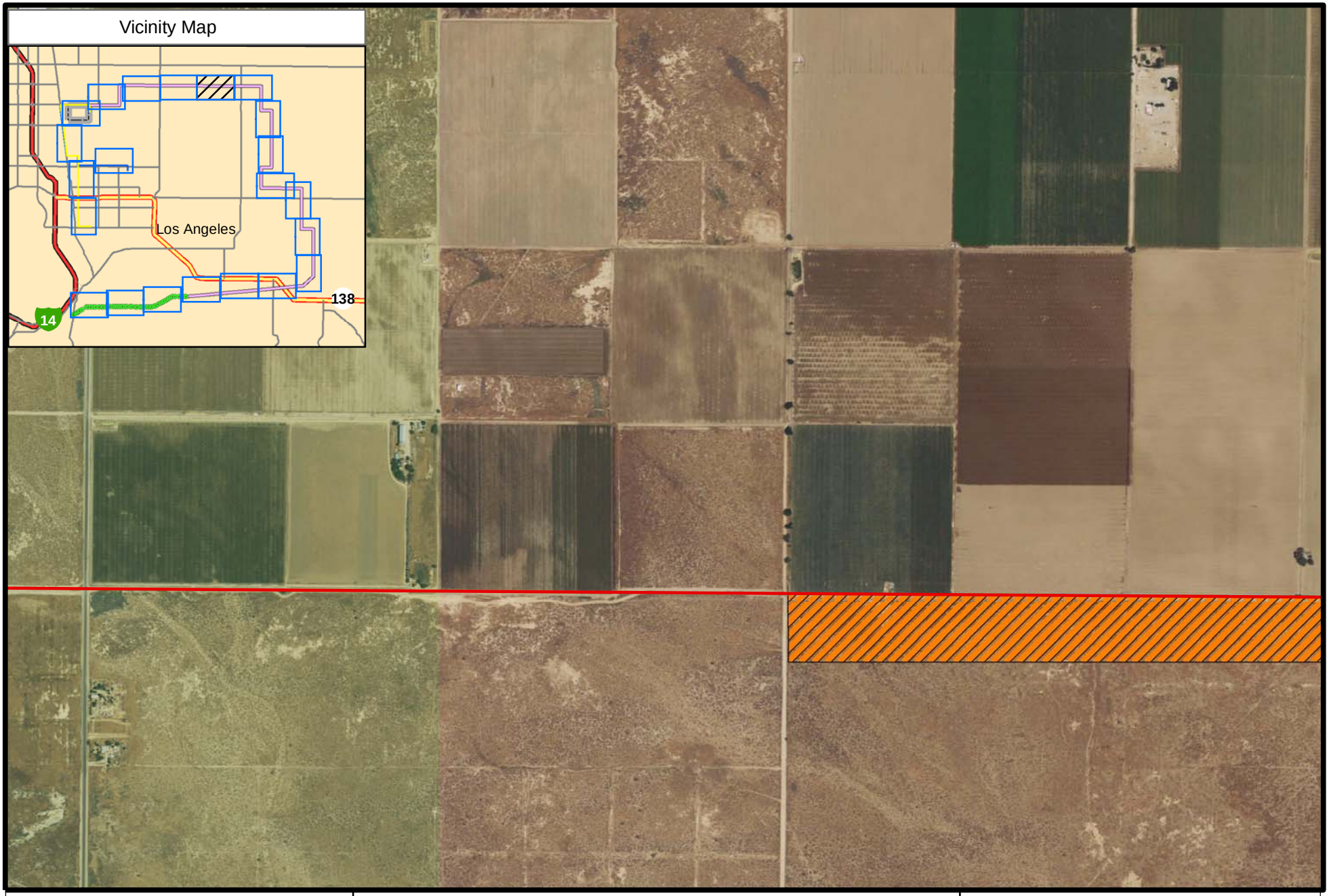

Legend

- Transmission Line Route
- Burrowing Owl Habitat

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl
Figure 2-E

0 0.1 0.2 0.3 0.4 Miles

1:12,000

Map Notes:

Projection: NAD 83, Zone 11
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Date: 08/26/08

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Legend

- Transmission Line Route
- Burrowing Owl Habitat

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl
Figure 2-F

0 0.1 0.2 0.3 0.4 Miles

1:12,000

Map Notes:

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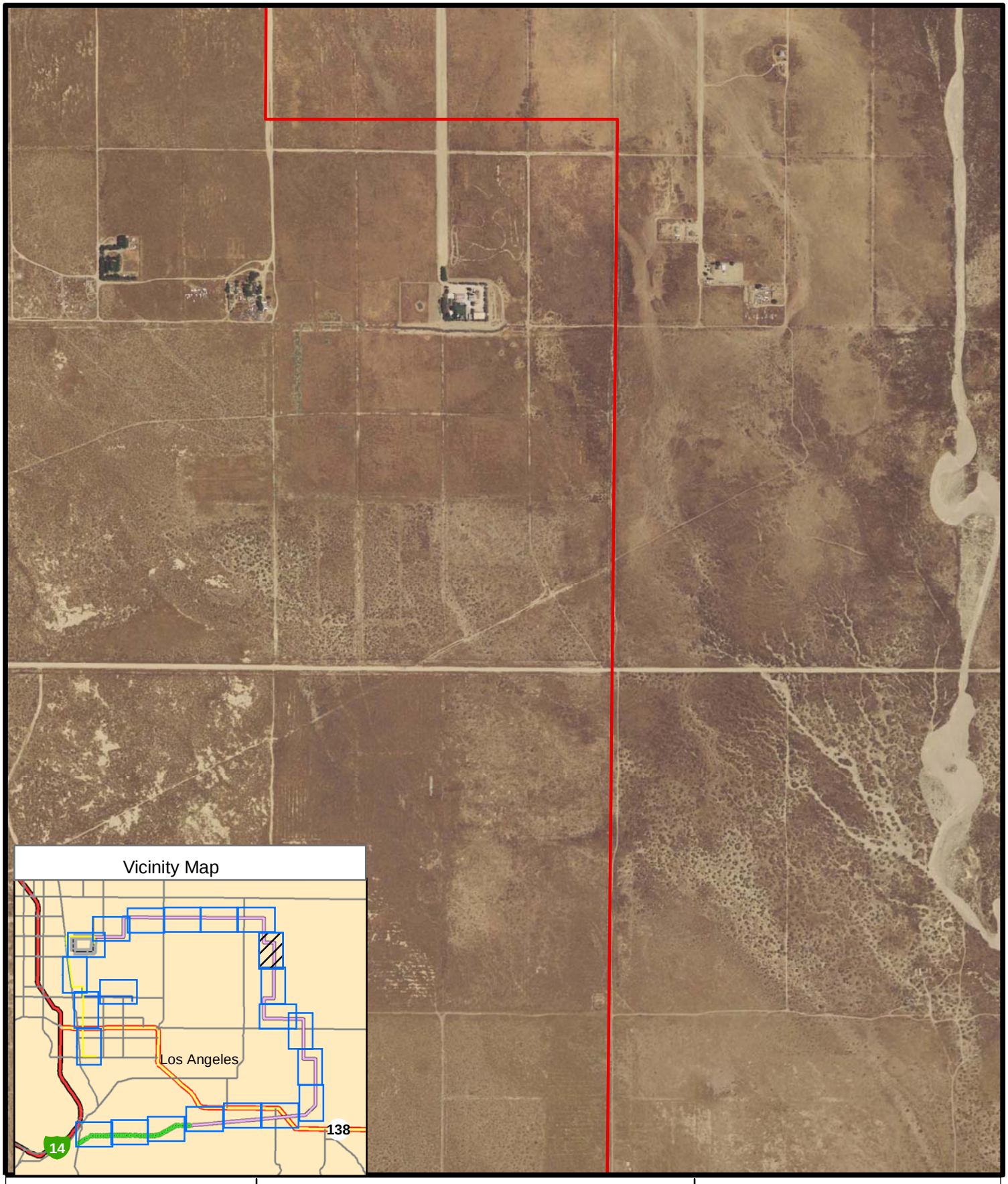

Legend

Transmission Line Route

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl
Figure 2-G

0 0.08 0.16 0.24 0.32 Miles
1:12,000

Map Notes:

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Date: 08/26/08

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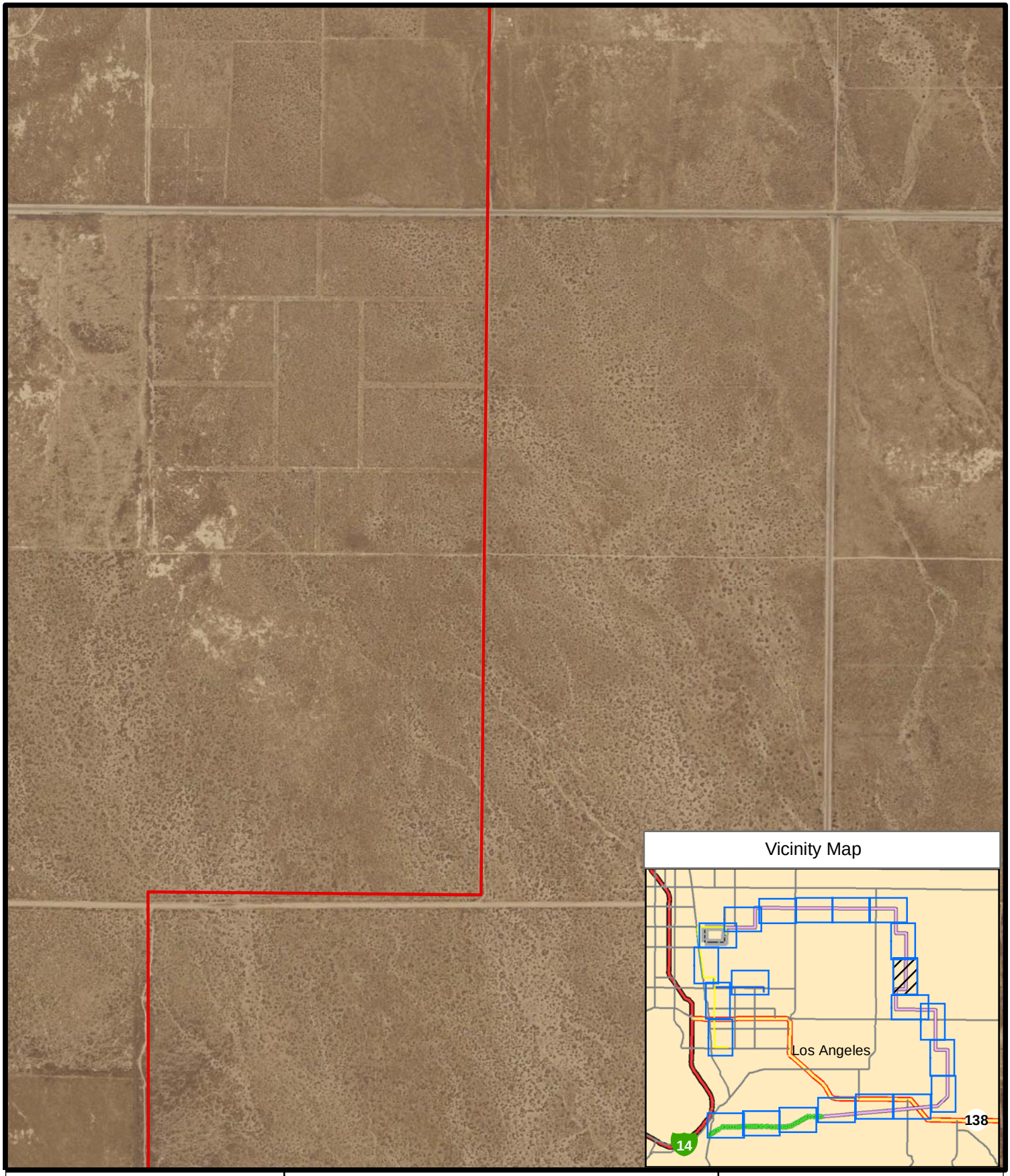

Legend

Transmission Line Route

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl
Figure 2-H

0 0.08 0.16 0.24 0.32 Miles

1:12,000

Map Notes:

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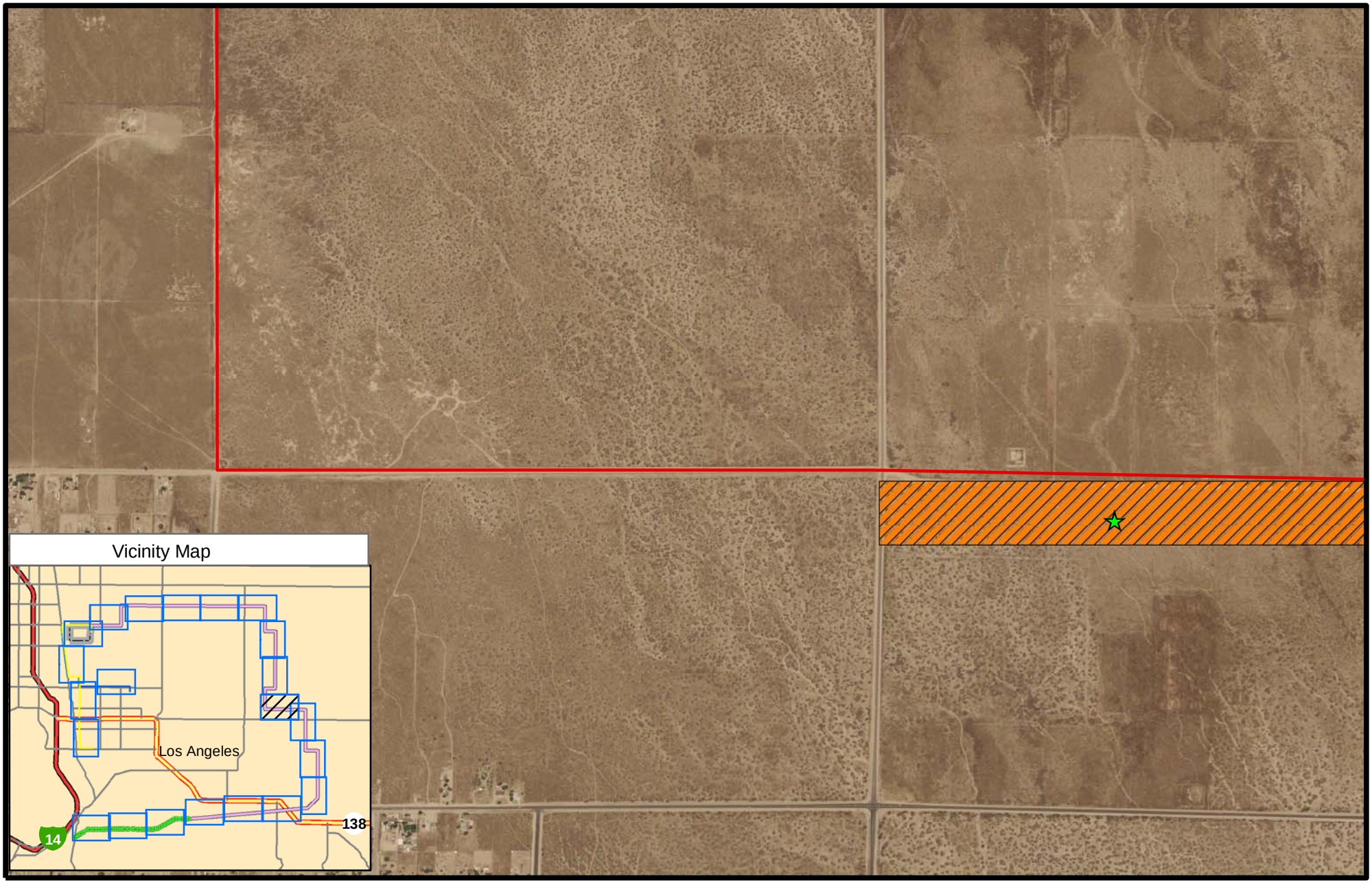

Legend

- Transmission Line Route
- Burrowing Owl Burrows
- Burrowing Owl Habitat

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl

Figure 2-I

0 0.08 0.16 0.24 0.32 Miles

1:12,542

Map Notes:

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Date: 08/26/08

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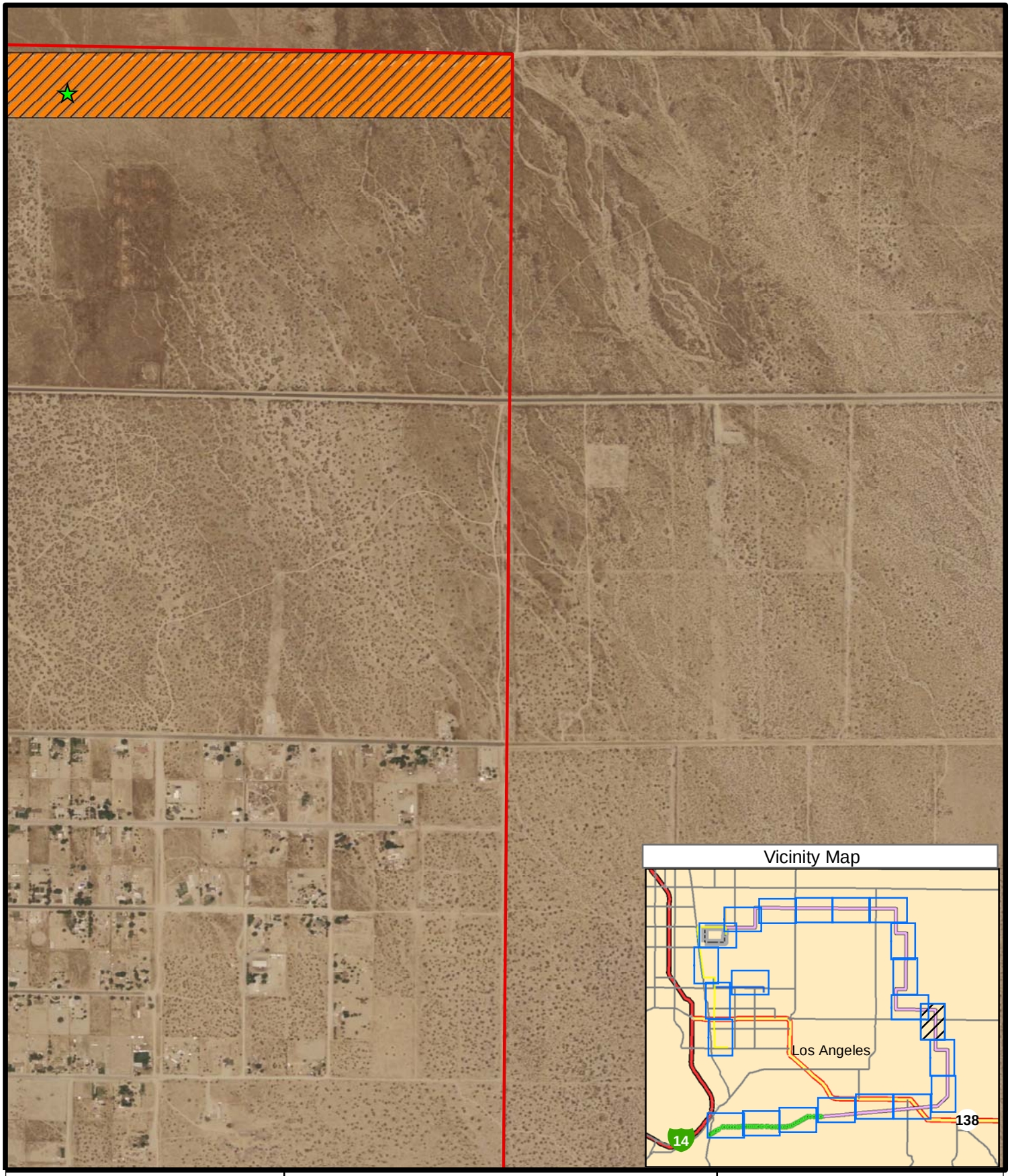

Legend

- Transmission Line Route
- Burrowing Owl Burrows
- Burrowing Owl Habitat

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl
Figure 2-J

0 0.08 0.16 0.24 0.32 Miles

1:12,000

Map Notes:

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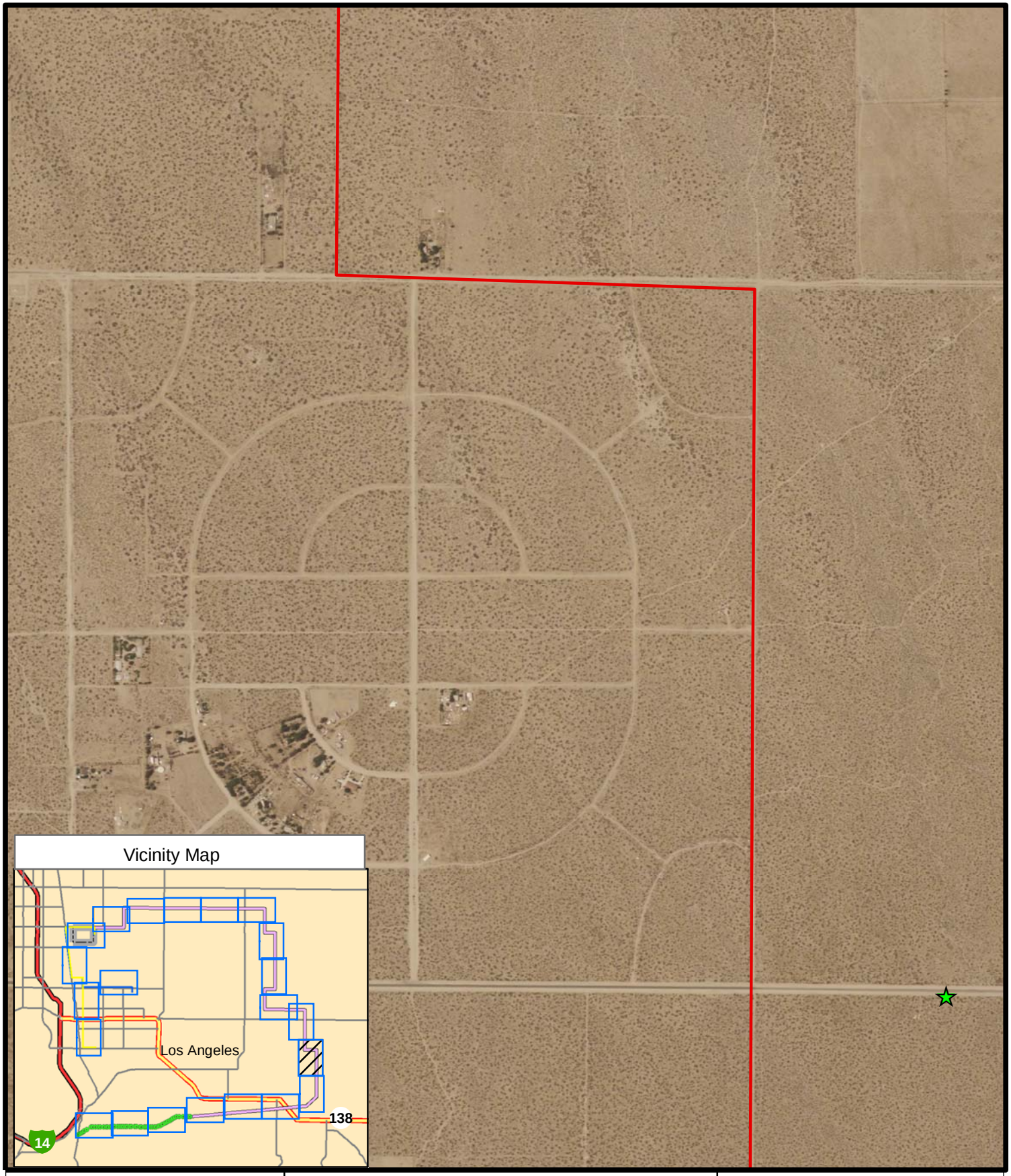

Legend

- Transmission Line Route
- Burrowing Owl Burrows

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl
Figure 2-K

0 0.08 0.16 0.24 0.32 Miles

1:12,000

Map Notes:

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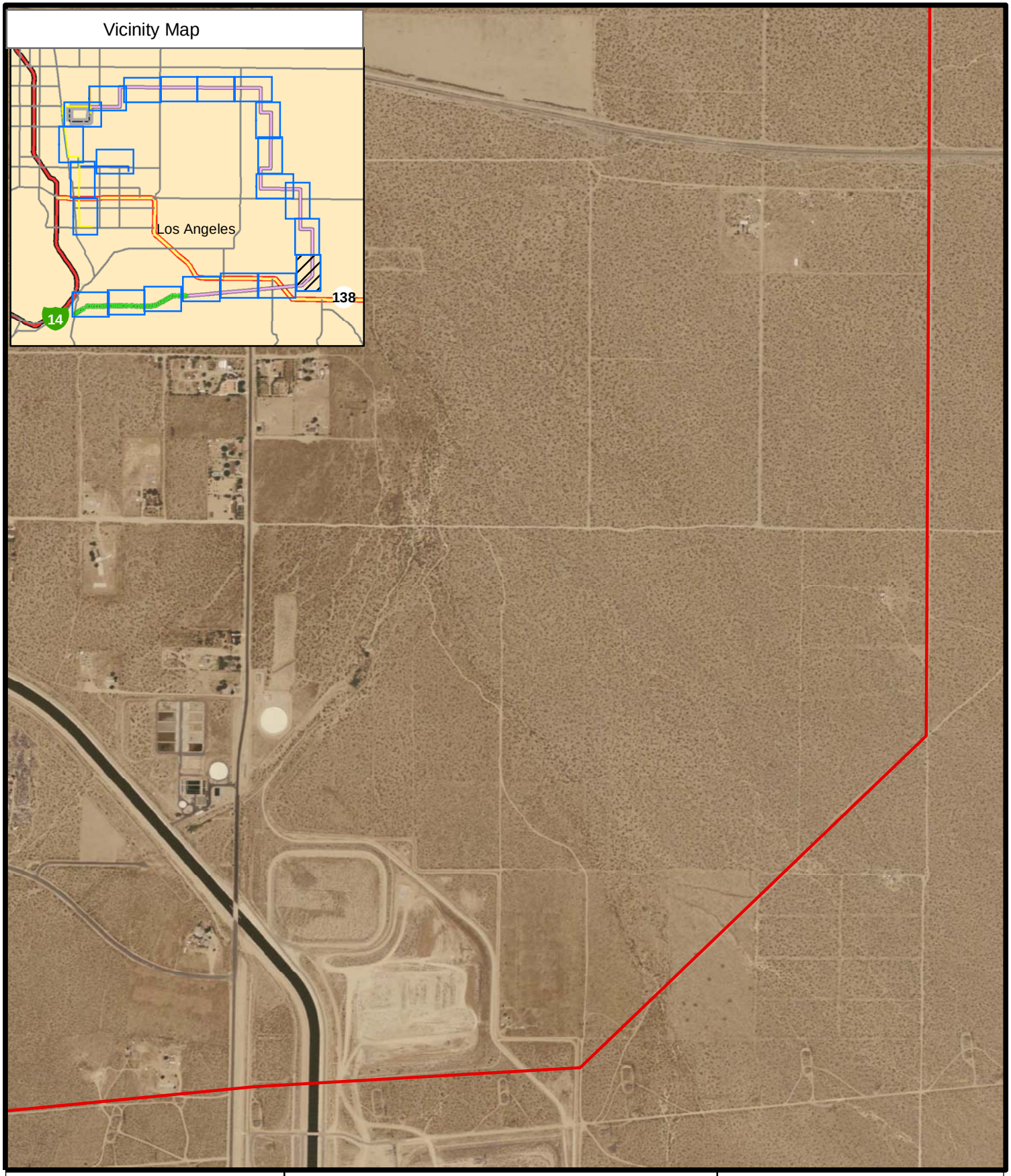

Legend

Transmission Line Route

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl
Figure 2-L

0 0.08 0.16 0.24 0.32 Miles

1:12,000

Map Notes:

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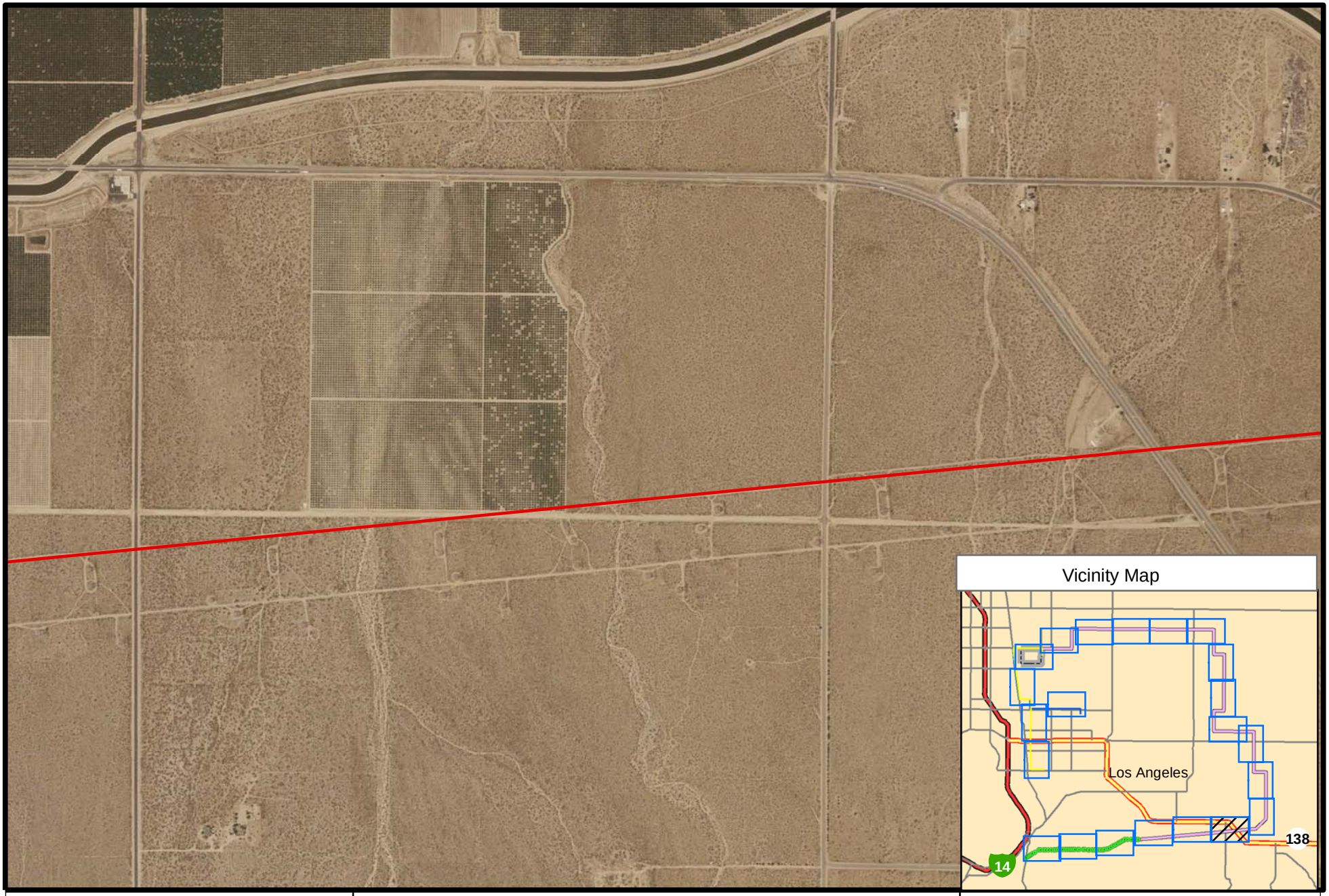

Legend

Transmission Line Route

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl

Figure 2-M

0 0.09 0.18 0.27 0.36 Miles

1:12,000

Map Notes:

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Date: 08/26/08

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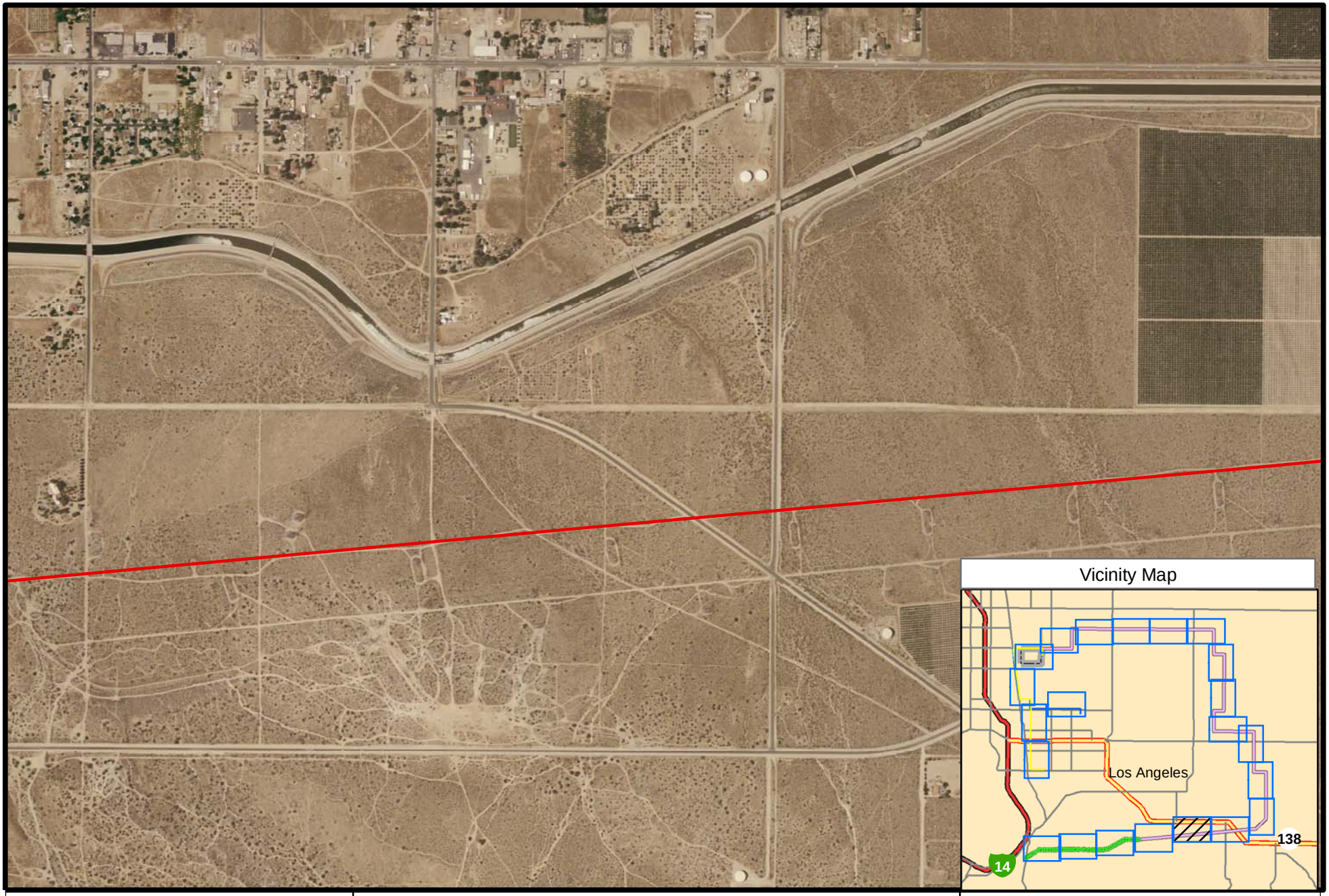

Legend

Transmission Line Route

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl
Figure 2-N

0 0.09 0.18 0.27 0.36 Miles

1:12,000

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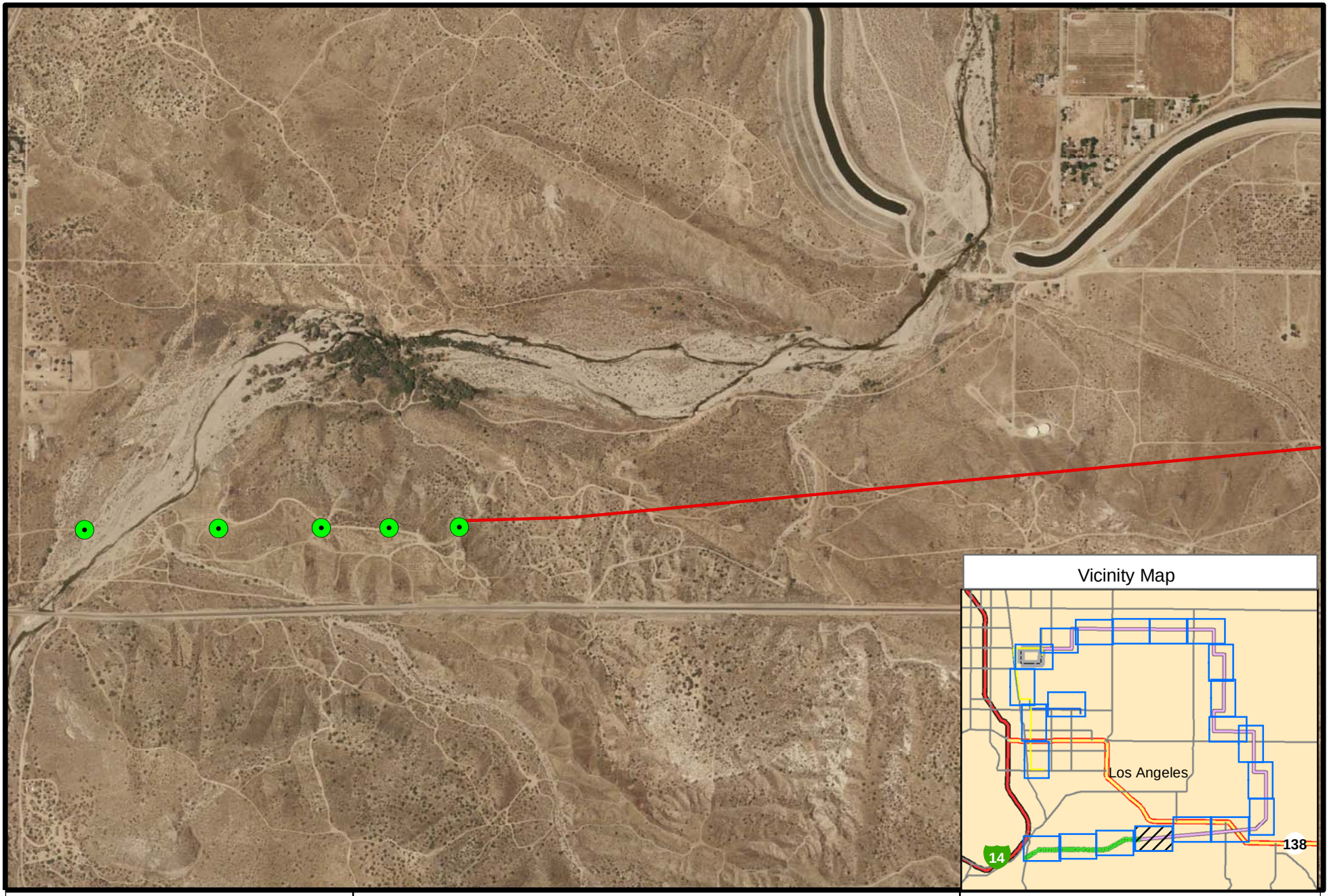

Legend

Towers

Transmission Line Route

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl

Figure 2-O

0 0.09 0.18 0.27 0.36 Miles

1:12,000

Map Notes:

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Date: 08/26/08

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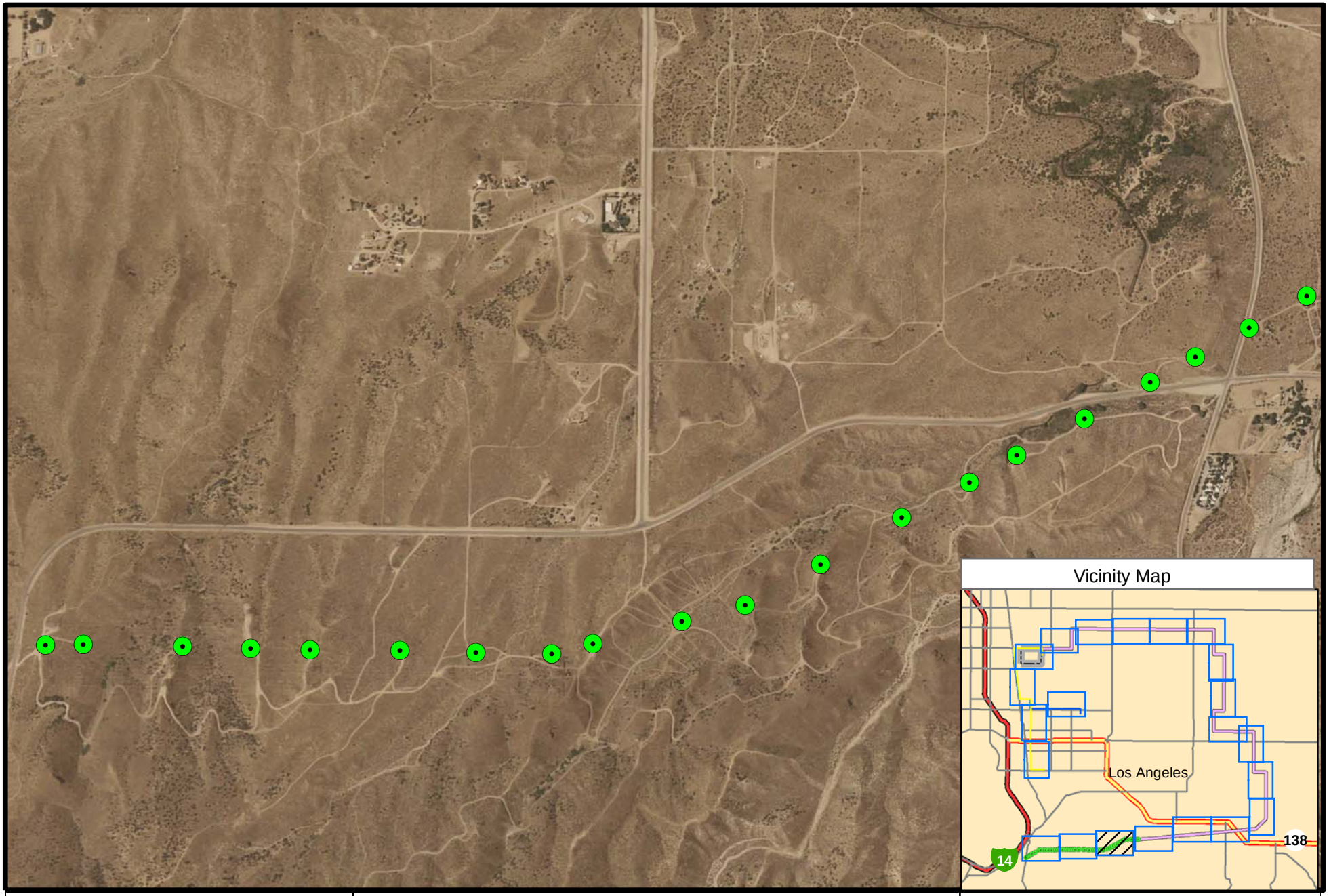

Legend

Towers

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl
Figure 2-P

0 0.09 0.18 0.27 0.36 Miles

1:12,000

Map Notes:

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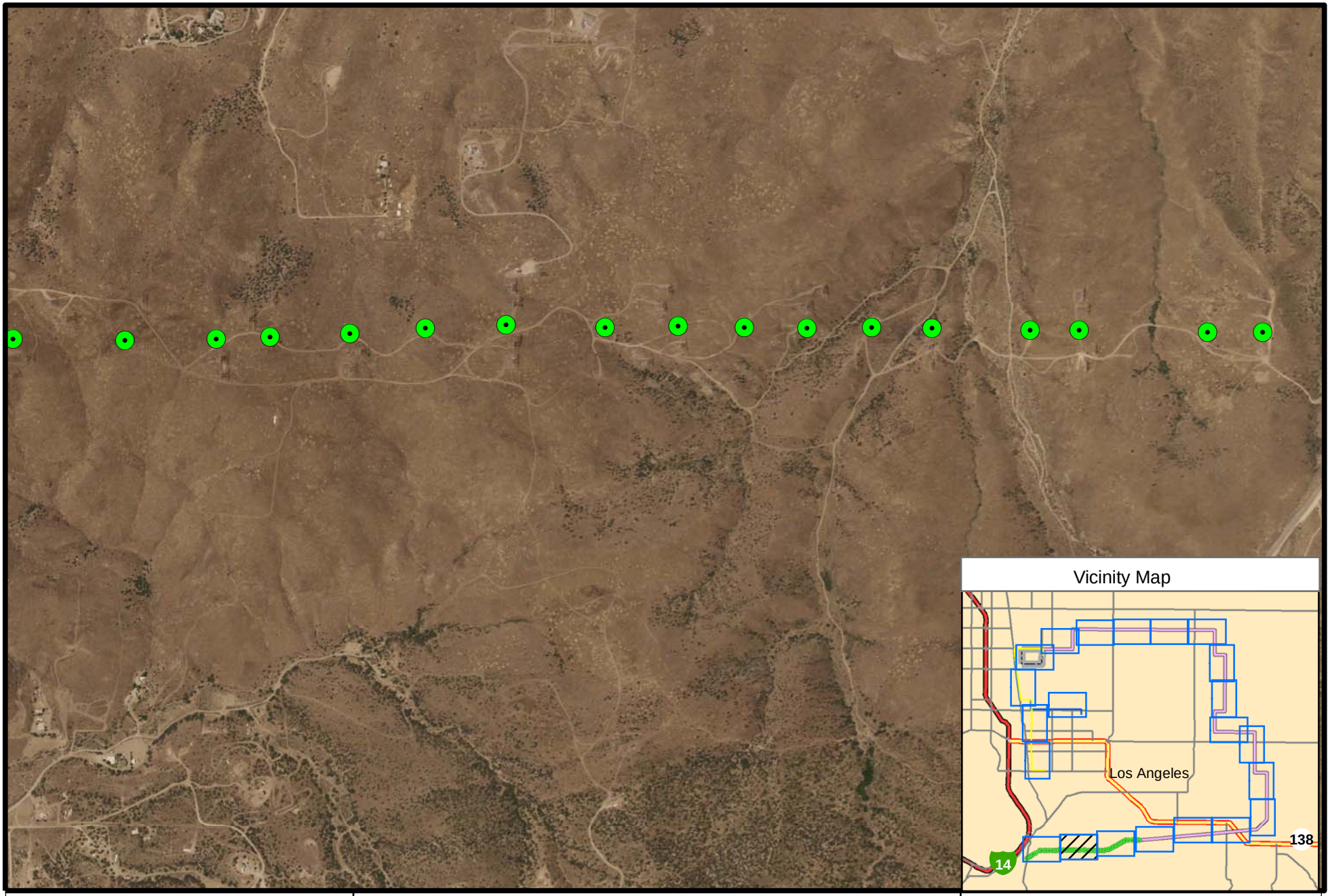

Legend

Towers

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl

Figure 2-Q

0 0.09 0.18 0.27 0.36 Miles

1:12,000

Map Notes:

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Path:S:\active projects\Palmdale Power Plant Bio 6554000247\graphics\mxd

Date: 08/26/08

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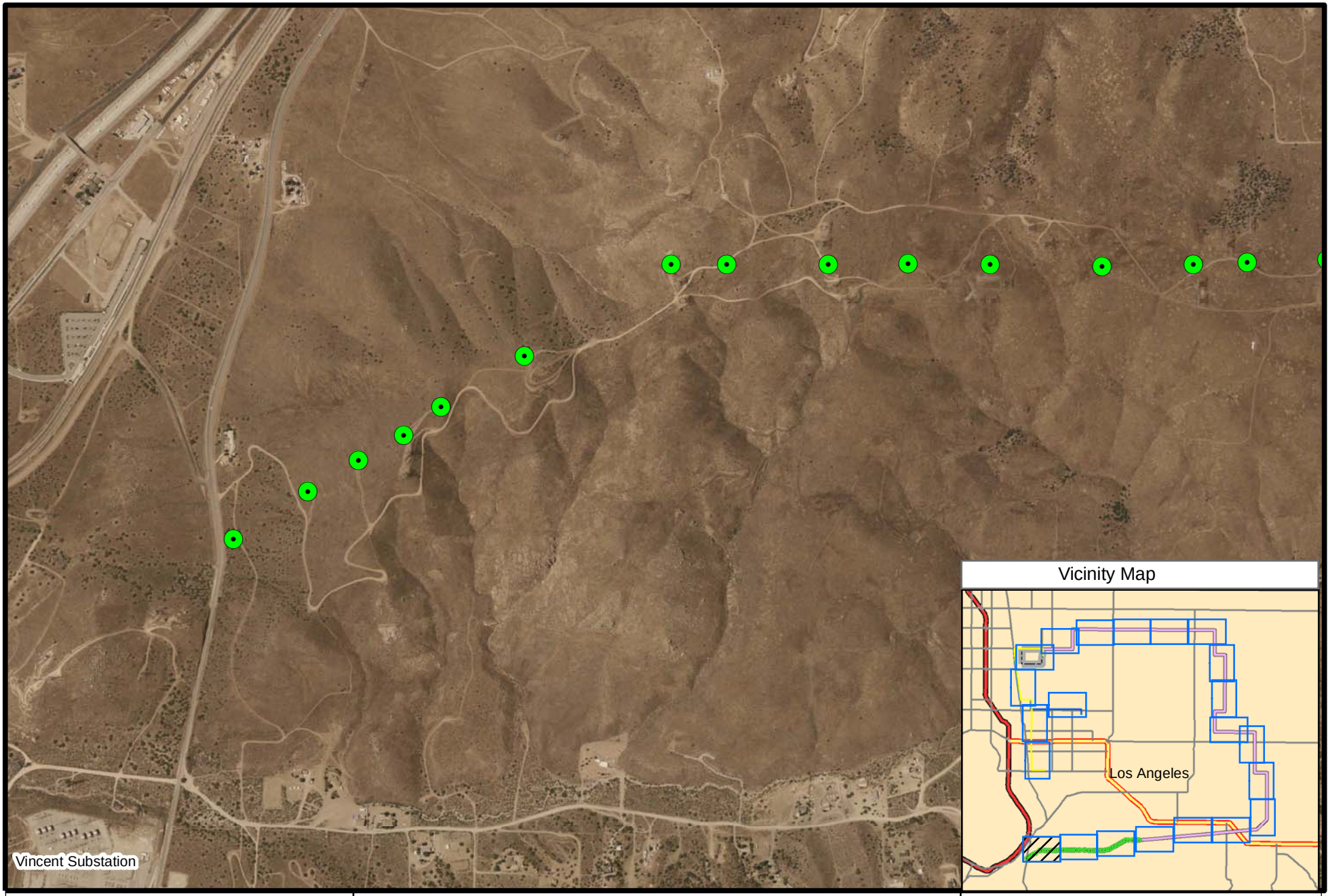

Legend

Towers

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl

Figure 2-R

0 0.09 0.18 0.27 0.36 Miles

1:12,000

Map Notes:

Projection: NAD 83, Zone 11

Path:S:\active projects\Palmdale Power Plant Bio 6554000247\graphics\mxd

Date: 08/26/08

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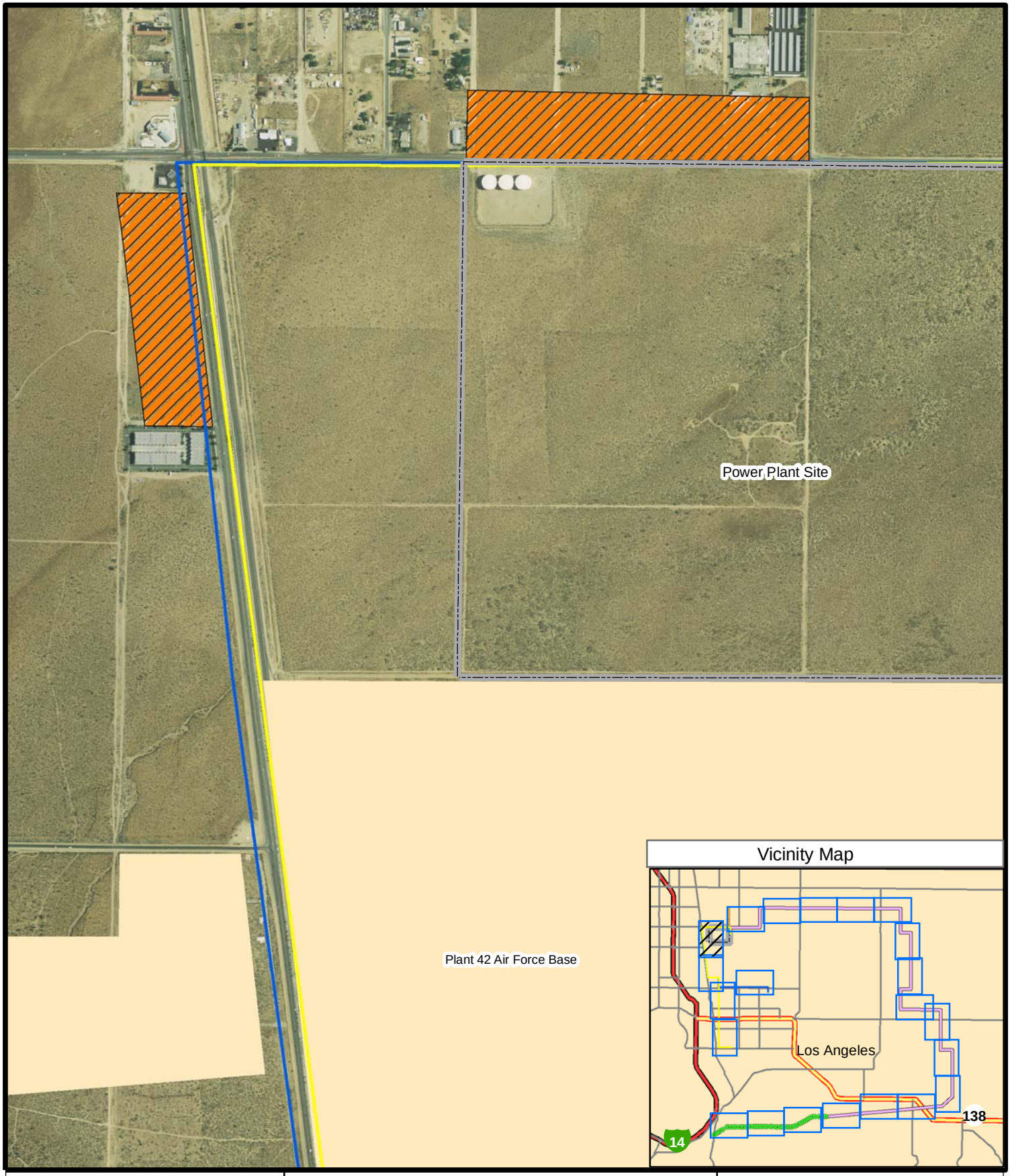

Legend

- Natural Gas Supply Pipeline
- Reclaimed Water Pipeline
- Burrowing Owl Habitat

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl
Figure 2-S

0 0.1 0.2 0.3 0.4 Miles

1:12,000

Map Notes:

Projection: NAD 83, Zone 11
Path:S:\active projects\Palmdale Power Plant Bio 6554000247\graphics\mxd
Date: 08/26/08

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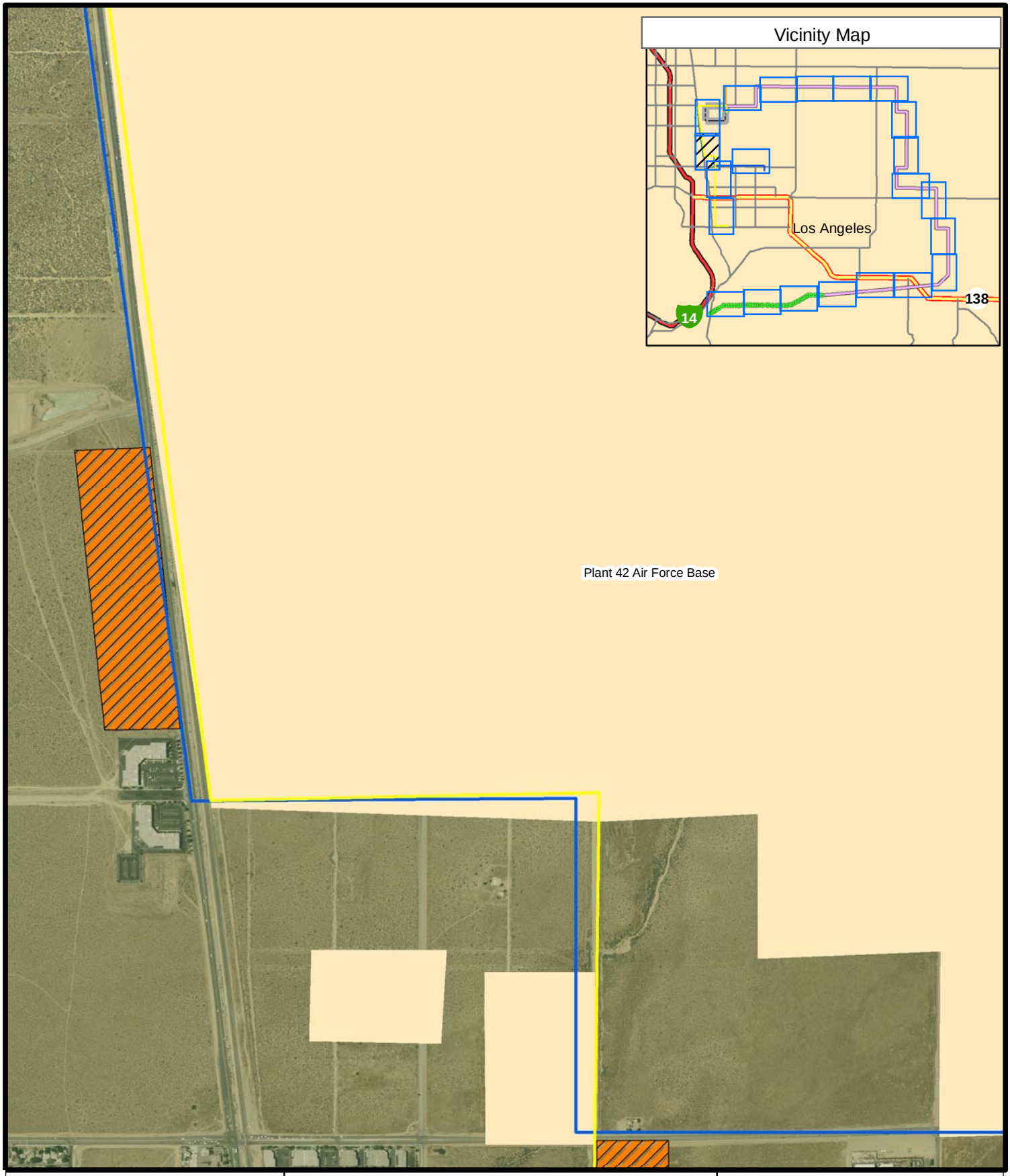


Legend

- Natural Gas Supply Pipeline
- Reclaimed Water Pipeline
- Burrowing Owl Habitat

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl
Figure 2-T

0 0.1 0.2 0.3 0.4 Miles

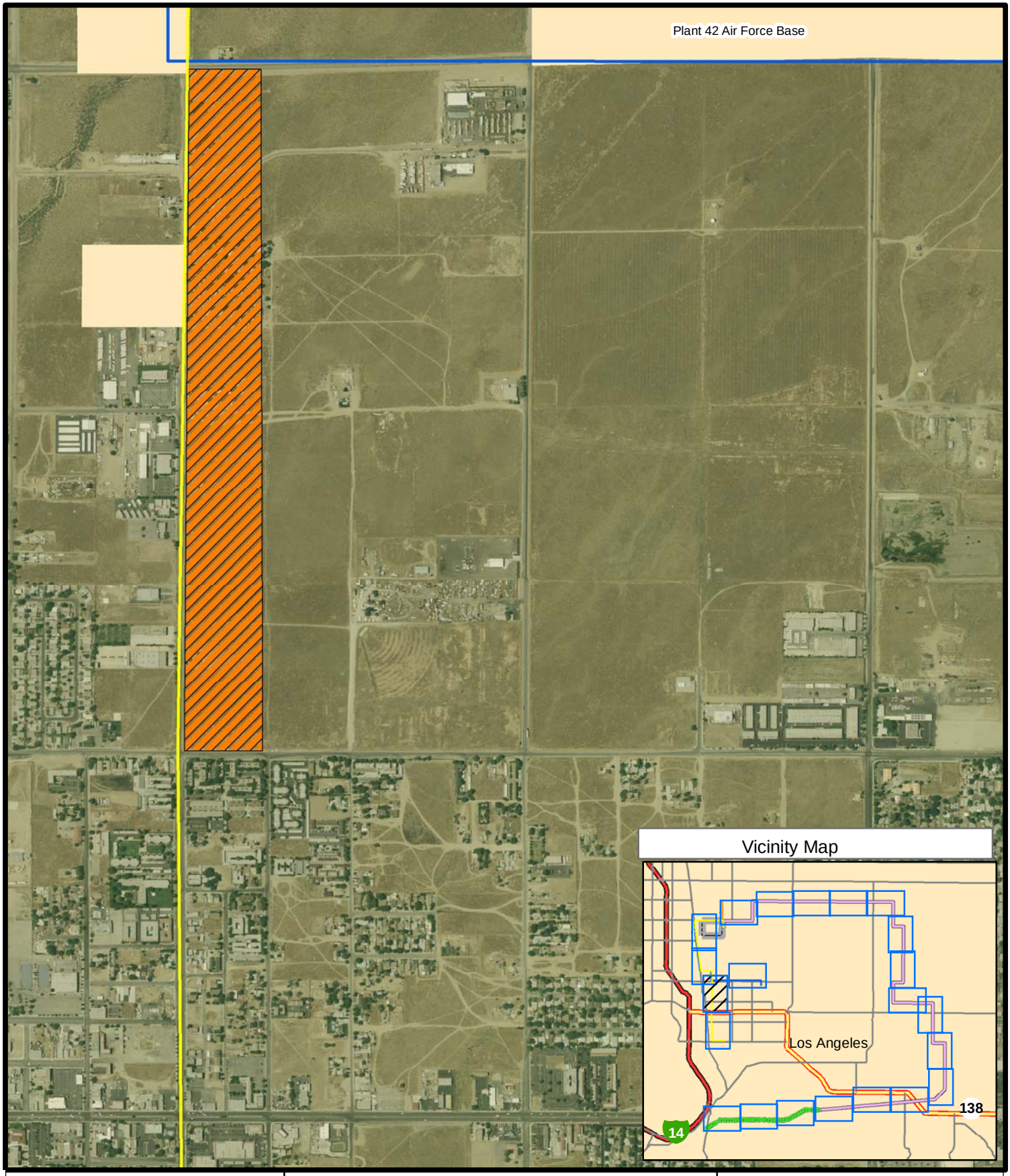
1:12,000

Map Notes:

Projection: NAD 83, Zone 11
Path:S:\active projects\Palmdale Power Plant Bio 6554000247\graphics\mxd
Date: 08/26/08

N

amec



Legend

- Natural Gas Supply Pipeline
- Reclaimed Water Pipeline
- Burrowing Owl Habitat

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl

Figure 2-U

0 0.1 0.2 0.3 0.4 Miles

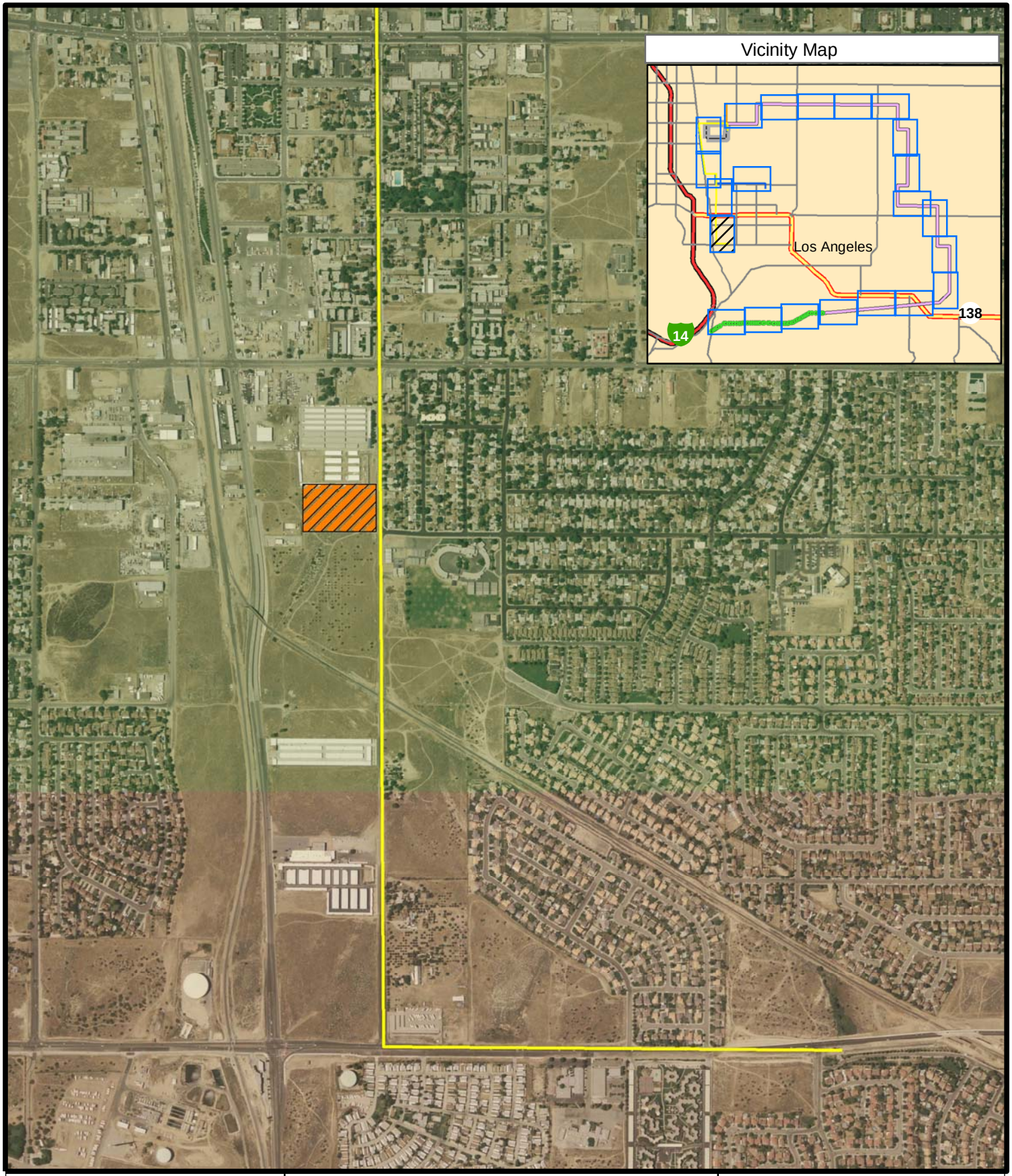
1:12,000

Map Notes:

Projection: NAD 83, Zone 11
Path:S:\active projects\Palmdale Power Plant Bio 6554000247\graphics\mxd
Date: 08/26/08

N

amec



Legend

- Natural Gas Supply Pipeline
- Burrowing Owl Habitat

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl
Figure 2-V

0 0.1 0.2 0.3 0.4 Miles

1:12,000

Map Notes:

Projection: NAD 83, Zone 11
Path:S:\active projects\Palmdale Power Plant Bio 6554000247\graphics\mxd
Date: 08/26/08

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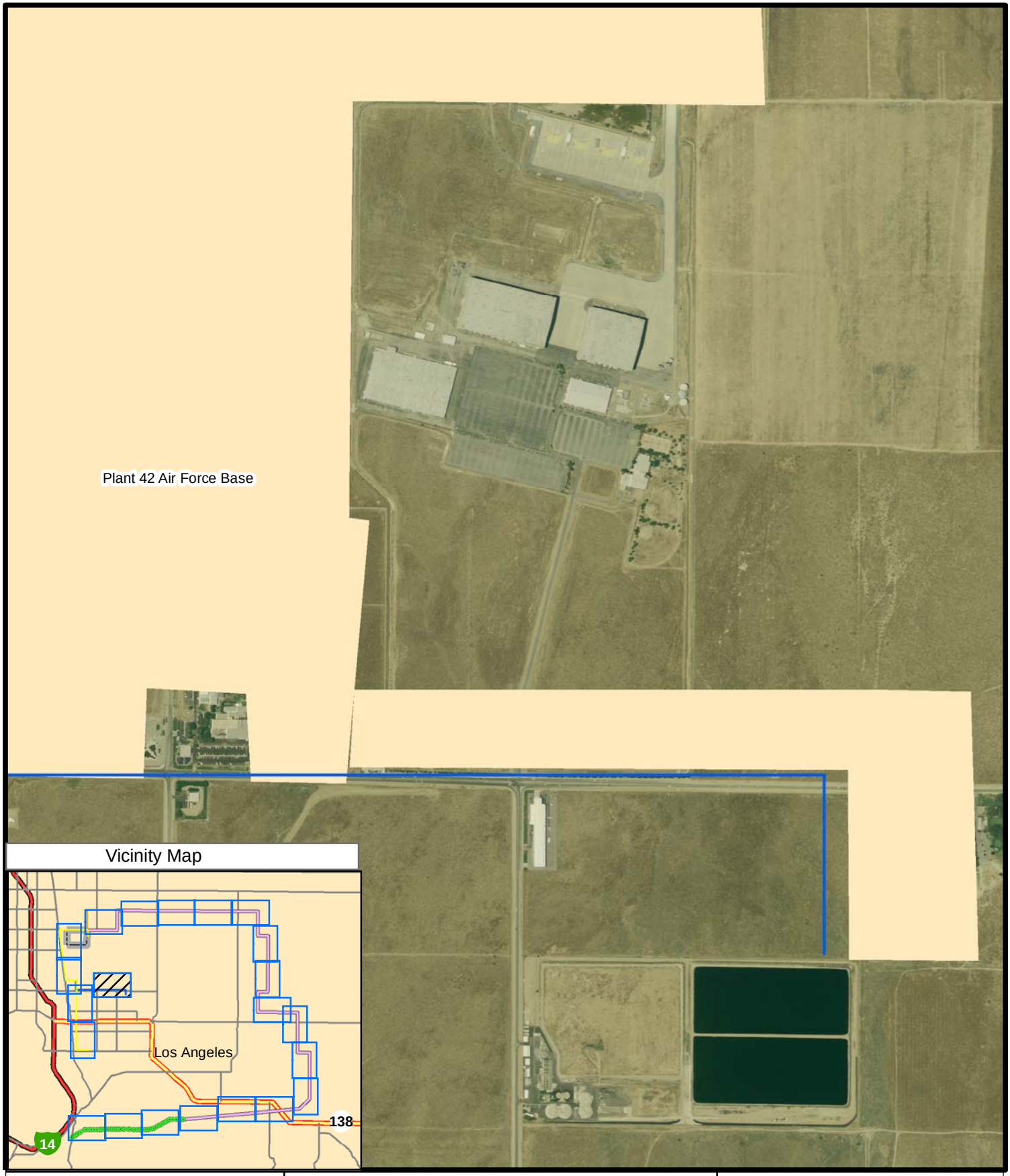

Legend

Reclaimed Water Pipeline

Palmdale Hybrid Power Project

Habitat Suitability for Burrowing Owl
Figure 2-W

0 0.1 0.2 0.3 0.4 Miles

1:12,000

Map Notes:

Projection: NAD 83, Zone 11
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Date: 08/26/08

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APPENDIX 1
QUALIFICATIONS OF INDIVIDUALS CONDUCTING STUDIES

Matt Amalong

Wildlife Biologist

Professional summary
Eight years experience as an environmental consultant/biologist. Responsibilities have included: project management; preparation of FERC, BRAR, BRTR, EA, EIR, CIA, AFC and CEQA Biological Resource Reports; preparation of scopes, schedules, and budgets; desktop surveys (CNDDB, internet, literature search, etc.); technical editing and report writing; proposed wind energy facilities surveys (avian, wildlife, plant); monitoring of endangered species (California least tern & western snowy plover); wetland delineation projects; restoration projects; wind energy projects; superfund site projects; coordinating and conducting field surveys (avian, herpetological, mammalian, vegetation); and construction monitoring.

Professional qualifications
Basic Wetland Delineation, Wetland Training Institute, Aug 2007

Desert Tortoise Surveying, Monitoring, and Handling Techniques Workshop, Nov 2006

Avian/Bat Fatality Survey Training, Searcher Efficiency, and Carcass Removal Trials at Wind Farms, Aug 2006

Flat-tailed Horned Lizard Survey Certification, Jun 2006

Successful CEQA Compliance Workshop, Feb 2006

40-Hour HAZWOPER Training, Dec 2005

8-Hour HAZWOPER Refresher, Nov 2006

CDFG Scientific Collecting Permit

Education
Graduate School, Biology/Ornithology, California State University, Long Beach, 2000-2003

B.S., Biology, Stetson University, 1999

Memberships
The Wildlife Society, Western Section

National Wind Coordinating Collaborative

The Desert Tortoise Council

Languages
English

Summary of core skills
As Project Manager, responsible for scope, schedule, budget, and level of quality for a variety of projects.

Detailed core skills or details by project

Oak Creek Energy Systems Inc., Wind Assessment Projects, southern CA and southern NV. Coordinated cultural and biological field surveys for three-year renewable wind prospecting BLM right-of-way grants for the installation of meteorological towers at five project sites in southern CA (San Bernardino and Kern Counties) and southern NV (Clark County). Prepared Biological Resource Assessment Reports to support EA documents.

Energy Unlimited Inc., Revised Commercial WECS 20 Permit Project, Riverside County, CA. Provided biological support and prepared DEIR Response to Comments for a Repower Project in Desert Hot Springs, CA. The proposed Project will install eight new GE 1.5 MW wind turbine generators, remove sixteen existing smaller Bonus 65 kW wind turbine generators, construct a single-story storage building, and expand an existing outdoor storage area within the existing WECS 20 Wind Park.

RES Energy, Granite Mountain Wind Project, San Bernardino County, CA. Prepared biological study plan. Coordinated and conducted bi-weekly avian point-count surveys for proposed 46 MW Granite Mountain Wind Project in San Bernardino County. Analyzed avian point-count data and prepared mean use report providing results of those surveys. Identified species at risk by visual and aural observations. RES proposes to develop a new wind energy generation facility. This facility will include access roads, underground electrical lines, underground communication lines, concrete wind turbine foundations, tubular steel towers, 2.3-megawatt wind turbines, transformers, a communications system, and undisturbed open space. Project work required for preparation of an EIR for submission to the Bureau of Land Management (Barstow Field Office).

Dillon Wind, LLC, Field Surveys and EIR, Riverside County, CA. Coordinated and conducted field surveys for special-status species, including desert tortoise, flat-tailed horned lizard, and burrowing owl. Wrote General Biological Assessment for County of Riverside and Biological Resources Technical Appendix for EIR. Dillon Wind, LLC is proposing to construct and operate an approximately 45 megawatt (MW) wind energy conversion system (WECS) project in the San Gorgonio Pass area of Riverside County. The Project will involve the installation of supporting facilities including on-site access roads, pad mount transformers, underground electrical transmission, and communication lines.

Edwards Air Force Base, Common Raven Study, Lancaster, CA. Developed and implemented a monitoring program to provide information on the population and behavior of ravens and their interaction with desert tortoise within the Desert Tortoise Critical Habitat Area (DTCHA) on Edwards Air Force Base (EAFB). Factors investigated included raven population densities, movement patterns, and diet characteristics. These three primary factors were evaluated both inside and outside the boundaries of the DTCHA and EAFB. Additional information collected included raven nesting locations and staging areas. The study was also intended to establish point count locations where long-term comparative data can be collected to measure the status and impact of raven populations within and adjacent to the DTCHA. Wrote biological report for Army Corps of Engineers.

PPM Energy, Tule Wind Project, San Diego County, CA. Prepared biological study plan. Coordinated and conducted bi-weekly avian point-count surveys, surveys for rare plant species, and surveys for refining vegetation community maps for proposed 177 MW Tule Wind Project in eastern San Diego County. Identified species at risk by visual and aural observations. The primary components of the proposed project are approximately 118 1.5-MW capacity wind turbines with a hub height of approximately 80 meters, a rotor diameter of 77 meters, and a total height of approximately 118 meters. Electrical power generated by the wind turbines would be

collected on-site by underground 34.5kV transmission lines and ultimately delivered to an existing substation in Boulevard, approximately 3 mi. south of the project site via an overhead 230kV transmission line. Project work is required for preparation of an EIR.

FPL Energy, LLC, Beverly and DeKalb & Lee Wind Resource Areas, IL. Wrote Environmental Critical Issues Analysis (CIA) Report for two proposed wind energy conversion facilities in Beverly and DeKalb & Lee Counties, Illinois. These reports evaluated current environmental conditions and potential impacts on sensitive biological and cultural resources within the Wind Resource Areas (WRA). It also evaluated applicable land uses, zoning, and identified the types of permits, plans, and approvals that would likely be required for project development. Current plans for the Beverly WRA include the installation of 126 tubular-steel, 80 meter tall, 1.5 megawatt (MW) GE turbines (approximately 190 MW). Current plans for the DeKalb & Lee WRA include the installation of 129 tubular-steel, 80 meter tall, 1.5 megawatt (MW) GE turbines (approximately 194 MW). Infrastructure to be constructed or installed in conjunction with the turbine arrays and associated substations include access routes and both buried and overhead transmission lines.

Salton Sea Authority, New & Alamo River Wetland Restoration Plan, Imperial County, CA. Coordinated and implemented reconnaissance-level habitat and biota surveys along the New and Alamo Rivers in Imperial County, CA. The primary goal of the proposed surveys were to identify those flora and fauna that are currently present at the undeveloped sites and to help predict those species that may be present in any future wetlands scenario. Wrote biological report for Tetra Tech Divisions to be incorporated as a chapter in the Master Plan for New and Alamo Rivers.

UPC Wind Energy, LLC, Mile High Ranch Wind Project, Hudspeth County, TX. Analyzed avian point-count data and prepared mean use report providing results of those surveys for proposed wind energy conversion facility on an approximately 44.5 km^2 (11,000 acre) area of west-central Texas, approximately 50 km east of El Paso near the El Paso/Hudspeth County line. The proposed design includes GE 1.5 MW turbines, which have an 80-meter hub height and a rotor diameter of 77 meters, resulting in a rotor swept area (RSA) between 41.5 and 118.5 meters above ground level. Infrastructure to be constructed or installed in conjunction with the turbine array and associated substation includes access routes and transmission lines. The protocol for this analysis was similar to protocols used at the Condon, Maiden, Stateline, and Vansycle wind projects in Oregon and Washington, the Buffalo Ridge wind project in southwest Minnesota, and the Foote Creek Rim wind project in Wyoming.

Luke Air Force Base, Barry Goldwater Tactical Range, Nevada. Coordinated and conducted biological surveys for Sonoran pronghorn antelope. Utilized video camera surveillance to monitor wildlife activity at watering/revegetation plots. Included installation of cameras and DVR equipment.

All-American Canal Lining Project, Imperial County, CA. Prepared training and safety materials, including Worker's Environmental Education Program (WEEP) manual, special-status species identification cards, environmental signs, training documentation database, and stickers. The purpose of the AAC Lining Project is to conserve seepage lost from the unlined AAC. The conserved water is needed in the southern California coastal area to offset a projected water shortage of 1.2 million acre-feet that is expected by the year 2010. The proposed project has the potential to conserve about 67,700 acre-feet per year.

North Baja Expansion Project, Imperial and Riverside County, CA. Prepared FERC Resource Report: Vegetation and Wildlife. The purpose of this report was to describe the

existing fish, wildlife, and vegetation resources that would be affected directly and indirectly by the proposed North Baja Expansion (NBX) Project and to assess the potential impacts to these resources resulting from construction and operation of the proposed project. The report also identifies the mitigation measures that are proposed to reduce the impact to these resources. The proposed project consists of the following two components: the B-line, which is comprised of the North Baja Loop, the Blythe Lateral, and the SoCal Gas Lateral; and, the IID Lateral.

Sempra Energy Resources, Imperial Valley Desert Restoration Project. Compiled and edited the "As-built" baseline surveys and initial execution of Sempra's restoration plan, including tamarisk, a non-native invasive shrub/small tree, removal and off-site mitigation for impacts.

North Baja Pipeline Extension, Avian Surveys, AZ and CA. Compiled and edited focused avian survey reports for southwestern willow flycatcher and clapper rail.

South Coast Water District, Laguna Sur Sanitary Easement Natural Resources Evaluation, Orange County, CA. Compiled and edited an assessment intended to determine potential environmental regulatory and compliance issues associated with regular and emergency maintenance activities needed to maintain operation of SCWD facilities within the Laguna Sur Sanitary Easement.

South Coast Water District, Casden Properties, LLC, Los Angeles County, CA. Compiled and edited focused avian survey reports for California gnatcatcher and burrowing owl. Complied with California Environmental Quality Act (CEQA), state and federal Endangered Species Acts (ESA), Clean Water Act (CWA), California Department of Fish and Game (CDFG) Code Sections, and Migratory Bird Treaty Act (MBTA) associated with emergency maintenance activity requisite to maintain use and operation of SCWD facilities.

Department of the Navy, Superfund Site, Hunters Point, CA. Monitored biological resources on former Hunters Point Naval Shipyard superfund cleanup site. Maintained buffer zones to protect biological resources; prepared and filed daily field monitoring reports; interacted with construction staff to ensure compliance with established environmental protection measures.

Rialto Municipal Airport, Phase I Environmental Site Assessments, Rialto, CA. Compiled and edited Phase I Environmental Site Assessments for four properties in and around the Rialto Municipal Airport.

Pacific Gas and Electric, North Baja Natural Gas Pipeline, California and Arizona. Field compliance with NEPA, CEQA, FERC, and federal and state Endangered Species Acts for an 80-mile natural gas line extending from Ehrenberg, La Paz County, Arizona, through Riverside and Imperial Counties, California to an interconnection with Sempra International's proposed Gasoducto Bajanorte pipeline at the U.S./Mexico border west of Yuma, Arizona. Implemented field compliance with terms and conditions of formal consultation with the USFWS pursuant to Section 7 of the Endangered Species Act of 1973 (as amended) and CDFG 2081 Take Permit. Field executed desert restoration plan, field survey protocols, field survey schedules, and mitigation packages in accordance with local and federal agency standards. Assisted with threatened and endangered species surveys for rare plants, desert tortoise, flat-tailed horned lizard, burrowing owl, Gila wood pecker, southwestern willow flycatcher, and nesting bird surveys in accordance with the MBTA. Additional responsibilities included instructing, implementing, and maintaining compliance with various mitigation measures outlined in numerous project approvals and permits.

Port of Los Angeles, Pier 400 California Least Tern Nesting Site, Los Angeles County, CA. Maintained compliance with various mitigation measures outlined in numerous project approvals and permits. Field compliance included field survey protocols, field survey schedules, and mitigation packages in accordance with local and federal agency standards. Monitored breeding biology of California least tern. Observed and monitored other sensitive species such as western snowy plover, burrowing owl, black skimmer, Caspian tern. Assisted with predator management (trapping and relocating) of peregrine falcon, American kestrel, burrowing owl, feral cats, corvids, gulls. Conducted banding studies on least, Caspian, and elegant terns. Compiled and analyzed data into annual reports.

City of Murrieta/USFWS, Southern California. Maintained compliance with various mitigation measures outlined in numerous project approvals and permits. Field compliance included field survey protocols, field survey schedules, and mitigation packages in accordance with local and federal agency standards. Monitored construction during Clinton Keith Roadway Ramp Interim Improvement Project in habitats containing the endangered California gnatcatcher. Interacted with construction crews to ensure environmental compliance.

Army Corps of Engineers, Southern California. Maintained compliance with various mitigation measures outlined in numerous project approvals and permits. Field compliance included field survey protocols, field survey schedules, and mitigation packages in accordance with local and federal agency standards. Conducted California least tern foraging surveys at the Port of Los Angeles and Camp Pendleton. Monitored snowy plover activity adjacent to CLT nesting sites. Compiled and analyzed data in an annual foraging report.

Upper Newport Bay, Orange County, CA. Maintained compliance with various mitigation measures outlined in numerous project approvals and permits. Field compliance included field survey protocols, field survey schedules, and mitigation packages in accordance with local and federal agency standards. Conducted avian surveys at Big Canyon and West Bay. Monitored endangered California gnatcatcher. Compiled avian, mammalian, herpetological, and entomological species lists.

Myra Frank, Southern California. Maintained compliance with various mitigation measures outlined in numerous project approvals and permits. Field compliance included field survey protocols, field survey schedules, and mitigation packages in accordance with local and federal agency standards. Monitored construction during I-5 highway construction in habitats containing endangered species (Willow Flycatcher, Least Bell's Vireo, Unarmored 3-spined Stickleback). Interacted with CalTrans and construction crews to ensure environmental compliance.

Alameda Corridor, Los Angeles County, CA. Maintained compliance with various mitigation measures outlined in numerous project approvals and permits. Field compliance included field survey protocols, field survey schedules, and mitigation packages in accordance with local and federal agency standards. Located and marked nests, monitored breeding biology, interacted with construction crews during railroad construction to minimize disturbance to nests. Prepared annual breeding report.

Cajalco Creek Dam and Detention Basin, Riverside County, CA. Maintained compliance with various mitigation measures outlined in numerous project approvals and permits. Field compliance included field survey protocols, field survey schedules, and mitigation packages in accordance with local and federal agency standards. Monitored construction in habitats containing endangered species (California gnatcatcher, Stephens' kangaroo rat). Ensured construction crews were in compliance with environmental permits. Prepared annual report.

Batiquitos Lagoon, Carlsbad, CA. Managed four endangered California least tern and western snowy plover nesting sites. Coordinated and communicated with predator management, CDFG, and others to optimize reproductive success. Prepared annual breeding report.

Employment history

Apr 2007 – present Wildlife Biologist, AMEC Earth & Environmental, Inc., Anaheim, CA

Aug 2005 – Apr 2007 Associate Biologist, Tetra Tech EC, Inc., Santa Ana, CA. Project Manager responsible for preparing and executing biological study plans.

Apr 2000 – Aug 2006 Project Biologist, Keane Biological Consulting, Long Beach, CA. Project Manager responsible for coordinating biological surveys and maintaining compliance with mitigation measures.

Jan 2005 – Aug 2005 Assistant Biologist, LSA Associates, Inc., Irvine, CA. Conducted biological monitoring in habitats containing endangered, threatened, and/or species of special concern.

Apr 2004 – Nov 2004 Biological Monitor, CA Department of Fish and Game, Carlsbad, CA. Managed four California least tern and western snowy plover nesting sites.

James L. Boone
Desert Wildlife Consultants, LLC
3112 Ivory Coast Drive, Las Vegas, NV 89117-2346
(702) 286-6477; email: jlboone@aol.com

WORK SUMMARY

I have been involved in basic and applied environmental research since 1975, and in 1995 I earned a Ph.D. in ecology. My experience includes planning and conducting plant and wildlife field surveys, designing experiments, collecting data, performing advanced statistical and computational procedures using a variety of computer programs and platforms, database management, and preparing technical reports and scientific publications. More recently, I made a living as a technical writer in science and engineering. During that time, I remained active in studying the flora, fauna, and geology of the Mojave Desert, and I maintain a website (birdandhike.com) about the Mojave Desert. I also started an environmental consulting firm focused on monitoring desert tortoise activity on construction sites. In the old days, I worked in wildland fire fighting, law enforcement, search and rescue, and emergency medicine.

EDUCATION

Ph.D., ECOLOGY, 1995. University of Georgia, Athens.
Population genetics, systematics, conservation, ecology, applied mathematics.
Dissertation: *Patterns of Temporal and Geographic Variation in the Genetics and Morphology of Cotton Mice (*Peromyscus gossypinus*)*.

M.S., FOREST RESOURCES, 1990. University of Georgia, Athens.
Population genetics, conservation, wildlife management, land use planning.
Thesis: *Reassessment of the Taxonomic Status of the Cotton Mouse (*Peromyscus gossypinus anastasae*) on Cumberland Island, Georgia, and the Implications of this Information for Conservation*.

B.S., WILDLIFE MANAGEMENT, 1986. Humboldt State University, Arcata, CA.
Wildlife management, biostatistics, botany, computers. Graduated summa cum laude.
Senior Thesis: *Morphological Differences between Populations of Deer Mice (*Peromyscus maniculatus rubidus*) in Sand Dune and Upland Habitats*.

PRIMARY RESEARCH PROJECTS

* Response of Mojave Desert vegetation to wildfire.
* Modeling the movement of radioactive materials on a subsistence farm.
* Ecology of mammals and reptiles at Yucca Mountain.
* Impacts of human activities on mammals and reptiles at Yucca Mountain.
* Small-scale genetic change (geographic and temporal) in populations.
* Subspecific taxonomy of *Peromyscus gossypinus*.
* Vertebrate community ecology in the southern Appalachian Mountains.
* Distribution of Lyme disease in the southeastern U.S.
* Wading birds at Cumberland Island National Seashore.
* Control of invasive salt marsh plants without herbicides.
* Effects of fire on small mammal populations.
* Foraging behavior of White-headed Woodpeckers.
* Black bear research and management.

SELECTED PUBLICATIONS

Boone, J.L. 2006. Birding, Hiking, and Naturalizing Around Las Vegas. www.birdandhike.com

Rautenstrauch, K. R., D. L. Rakestraw, G. A. Brown, J. L. Boone, and P. E. Lederle. 2002. Patterns of Burrow Use by Desert Tortoises (*Gopherus agassizii*) in Southcentral Nevada. Chelonian Conservation and Biology, 4(2):398-405.

Walters, J.P., and J.L. Boone. 2002. Effects of Salinity and Sodicity on Vegetation Used for Strip Mine Reclamation in Webb County, Texas. Farco Mining, Laredo, Texas, 33 pp. plus Appendices.

Boone, J. L., and E. A. Holt. 2001. Field Sexing Young Free-ranging Desert Tortoises (*Gopherus agassizii*) Using External Morphology. Chelonian Conservation and Biology, 4(1):28-33.

Boone, J. L., J. Laerm, and M. H. Smith. 1999. Allozyme Variation in the Cotton Mouse (*Peromyscus gossypinus*). Journal of Mammalogy, 80:833-844.

Boone, J. L. 1998. Indirect Impacts of Site Characterization Activities on Small Mammal Populations in the Larrea-Lycium-Grayia Vegetation Association at Yucca Mountain, Nevada: 1991-1997. CRWMS M&O, B00000000-01717-5705-00102.

Lederle, P. E., M. C. Nelson, and J. L. Boone. 1997. A simple, Inexpensive, and Versatile Research Blind. North American Bird Bander, 22:18-21.

Laerm, J., W. M. Ford, M. A. Menzel, T. S. McKay, J. L. Boone, and T. Pig. 1996. Symposium on Appalachian Biodiversity: Soricid Communities in the Southern Appalachians. Virginia Museum of Natural History, Blackburg.

Laerm, J., and J. L. Boone. 1995. Corrections of Records of Occurrence of *Peromyscus polionotus* (Wagner) and *P. gossypinus* (LeConte) (Rodentia: Muridae) in the Blue Ridge Province of Georgia. Brimleyana, 22:9-14.

Boone, J. L., and R. G. Wiegert. 1994. Modeling Deer Herd Management: Sterilization is a Viable Option. Ecological Modeling, 72:175-186.

Boone, J. L., J. Laerm, and M. H. Smith. 1993. Taxonomic Status of the Anastasia Island Cotton Mouse (*Peromyscus gossypinus anastasae*). Journal of Mammalogy, 74: 363-375.

Weed, J., and J. L. Boone. 1992. A Macintosh Computer System for Collecting and Analyzing Rodent Sexual Behavior. Physiology and Behavior, 52: 183-184.

Magnarelli, L. A., J. H. Oliver, H. J. Hutcheson, J. L. Boone, and J. F. Anderson. 1992. Antibodies to *Borrelia burgdorferi* in Rodents in the Eastern and Southern United States. Journal of Clinical Microbiology, 30: 1449-1452.

Boone, J. L., E. Furbish, K. Turner, and S. P. Bratton. 1988. Clear Plastic. A Non-Chemical Herbicide. Restoration and Management Notes, 6:94-95.

WORK EXPERIENCE

Desert Ecologist
Desert Wildlife Consultants, LLC; Las Vegas, Nevada (2000 to present)

Operated my own business doing consulting work for the county government, state government, mining companies, and individuals, focusing mainly on technical publications. During September 2006 to March 2007, I worked as a Tortoise Biologist as an independent contractor. I attended the Desert Tortoise Council Training Workshop in 2007.

I also developed a website (birdandhike.com) about the ecology of the Mojave Desert (flora, fauna, and geology) by providing information on things to do and places to go in the desert around Las Vegas (e.g., hiking, birding, four-wheeling, and other outdoor activities). During this time, I became proficient in GPS and mapping, drove four-wheel drive vehicles to remote locations, and lived and worked under extreme environmental conditions alone and with small groups for extended periods of time. I collected data, organized information, and published results. My formal education focused on vertebrate ecology and wildlife management, but during this time I studied botany and geology to expand the breadth of my understanding of the Mojave Desert ecosystem.

Temporary Field Botanist (4/2006 to 5/2006)
USGS, Western Ecological Research Center, Henderson, Nevada

Set up study plots and measured vegetation in middle-elevation Mojave Desert habitats as part of a study evaluating the response of plants to fire. Responsible for identifying annual and perennial plants to species, counting plants in quadrats, and measuring plant heights along transect lines. Worked with small crews and lived in field camps.

Technical Writer II (1999 to present)
SAIC (4/1999 to 2/2001)
Bechtel-SAIC, Las Vegas, Nevada (2/2001 to present)

Responsible for writing, editing, compiling, and assisting in the production of scientific technical reports (mostly hydrology and geology), engineering reports (e.g., system description documents, facility description documents, and specifications) for the Yucca Mountain Project. Rewrote technical material to levels appropriate for intended audiences (e.g., rewriting technical jargon and conceptually challenging material using words and writing styles that made the resulting text understandable by the general public). Compiled information from original sources and numerous project authors, developed reference lists and data tracking databases, and produced graphics. Worked with authors and reviewers to resolve technical issues and clarify material. Ensured consistency and professional quality. Worked independently and in groups while leveraging knowledge of computer systems to speed the work while reducing the workload and the cost of doing business. Note: In 2001, management of the Yucca Mountain Project changed from SAIC to Bechtel-SAIC.

Animal Ecologist (Senior Scientist) (1995 to 1999)
EG&G/Energy Measurements (4/1995 to 9/1995)
SAIC, Las Vegas, Nevada (9/1995 to 4/1999)

Responsible for conducting long-term impact assessment and ecological research for the Yucca Mountain Project. Engaged in mark-recapture studies of rodent and reptile community dynamics. Curated faunal collections. Supervised scientists in the field and office. Reviewed and edited technical and other documents. Managed data. Manipulated databases including

GPS and GIS data (ArcView). Performed statistical analyses. Authored technical reports and peer-reviewed journal articles. Worked on teams composed of people from a variety of scientific, technical, and non-technical backgrounds in contributing to environmental impact statements. Lead efforts of the ecology team to model the movement of radioactive materials through a desert agroecosystem. My last year in this position was spent analyzing data and writing reports for other environmental scientists, primarily those in the environmental restoration and botanical research groups. By early 1999, all of the environmental research staff had been laid off, and I transferred to a technical writing position. Note: In 1995, management of environmental research on the Yucca Mountain Project changed from EG&G to SAIC.

Manager of Mammal Collections (Research Associate)
Nevada State Museum, Las Vegas, Nevada (1997 to 2001)

Responsible for curating the mammal collection: organized, updated, and maintained the collection of more than 8,000 specimens. Maintained and updated and the computerized collection catalog. Cleaned and prepared specimens. Reviewed, investigated, and updated historical collection records. Provided reports on holdings.

Graduate Student (Teaching Assistant)
University of Georgia, Institute of Ecology and Museum of Natural History, Athens, GA (1990-1995)

Taught labs for Comparative Anatomy, Mammalogy, Vertebrate Natural History, Ecology, and non-majors Biology. Prepared and delivered lectures in classroom and laboratory settings, made and gave exams, and maintained grade lists. Presented guest and substitute lectures in several classes. Organized and trained new teaching assistants. During this time, I conducted my independent dissertation research on the population genetics and morphology of Cotton Mice (Peromyscus gossypinus). I also helped other graduate students characterize vegetation in the north Georgia and North Carolina mountains (count and measure trees, record data on understory plants, coarse woody debris, and physical conditions), study of the distribution of Lyme disease in the Southeast, inventory amphibians and bats in north Georgia, and inventory shrews in North Carolina.

Macintosh Computer Consultant
MacRescue, Athens, GA (1988-1995)

Operated my own computer consulting business. Assisted individuals and institutions in developing Macintosh computer skills and making purchasing decisions. Performed hardware and software maintenance. Taught non-credit courses through the university continuing education program.

Graduate Student (Research Assistant)
University of Georgia, School of Forest Resources, Athens, GA (1987-1989)

Conducted and published independent and directed research projects mostly dealing with small mammals. Analyzed the data and published reports from the floral and faunal studies that I collected in the Georgia and North Carolina coastal marshes during 1987.

Biological Technician
University of Georgia Institute of Ecology, and National Park Service. 1987.

Designed and implemented field studies concerning small mammals, migrant birds, prescribed fire, and invasive plants in coastal barrier-island marsh communities. In Georgia, studies focused on the effects of disturbance and potential beach erosion on ducks and wading birds along an intercoastal waterway (Cumberland Island). In North Carolina, studies focused on small mammals, birds, and invasive plant species in barrier-island sand dune and salt marsh communities (Cape Hatteras). Evaluated several methods to control invasive plants, including fire, mechanical removal (chainsaws), hand removal (hand tools), and covering with clear plastic. We also studied the effects of disturbance in several habitat types on the island. I participated in all of these studies, but for some, I set up, conducted studies, supervised others, collected data, analyzed data, and published the results. I reactivated my Fire Boss card and participated in experimental burns.

Park Ranger
National Park Service. Joshua Tree National Park, Sequoia and Kings Canyon NP, Grand Canyon NP, Lake Mead National Recreation Area (1978-1986; 12 seasons).

Primarily responsible for emergency response and conflict resolution in law enforcement, emergency medicine, search and rescue, technical rock rescue, structural and wildland fire suppression, ambulance, campground operations, visitor programs (campfire programs and nature walks), backcountry patrol, other technical and non-technical aspects of park management. Supervised employees under technically difficult, life threatening, and stressful situations. Documented activities in written form. Participated in resource management activities such as bear research and management, bird studies, bubonic plague surveys, fire management, and vegetation studies. Details available on request.

Forestry Aid
U.S. Forest Service, Clearwater National Forest, Idaho (1975-1976; 2 seasons)

Worked on timber stand improvement, tree planting, timber cruising, controlled burns, and firefighting crews. Timber cruising involved working in teams of two to inventory timber, identify understory plants, take soil samples, inventory coarse woody debris, and identify forest pathogens. The focus of this work was timber inventory (number, height, DBH, condition, disease) using variable radius plots, but we also collected ecological data for forest fire planning and soils data for soil mapping. Used maps, compasses, and chains to navigate the mountains and locate plots. Lived in remote field camps (drive-in and fly-in) for 10 days at a time. Did seedling survival surveys in replanted clearcuts using fixed radius plots. Worked on a timber stand improvement crew using chainsaws to thin trees in regenerating clearcuts. Selected trees to keep based on species, size, and condition, and cut down the others. Participated in controlled burn to remove debris from clearcuts and fought wild fires. Details available on request.

Details available on request.

S T E V E N C . F E R R A N D

OBJECTIVE

THIS RESUME IS SUBMITTED FOR CONSIDERATION OF OBTAINING A POSITION AS A BIOLOGICAL MONITOR .

EXPERIENCE

FOSTER WHEELER ENVIRONMENTAL CORPORATION

August 2001 – Present

Approved monitor / handler for flat-tailed horned lizard, burrowing owl, Arroyo toad, and desert tortoises.

CONSTRUCTION MONITORING ASSIGNMENTS

- Monitoring of directional drilling under roads, water ways, and riparian areas in burrowing owl habitat in Blythe and Brawley CA.
- Monitoring of conventional plow installation of ducting in burrowing owl habitat in Blythe and Brawley CA.
- Conducted desert tortoise survey, presence / absence along Hwy 78 for a proposed construction corridor change.

TRAINING THROUGH FOSTER WHEELER

1. Cultural & Environmental Training

BIORESOURCE CONSULTANTS, Carl G. Thelander

September, 2001

- Participated in a raptor survey involving recording raptor usage of non APLIC compliant power poles to determine raptor electrocution frequency.

HDR ENGINEERING **O**ctober 2000 – August 2001

CONSTRUCTION MONITORING ASSIGNMENTS

LEVEL 3 (Lines 04 AND 08)

- Directional drilling 100' – 5000' long bores of washes, streams, culverts, roads, Cal Trans off ramps, the New River, Alamo River, and under cultural sites.
- Paving of finished trenching from Santee CA to Alpine CA

- Spider plow installation of ducting west of El Centro CA & from Hesperia CA to Primm NV
- Conventional plow installation of ducting from El Centro CA through the

Algodones Dunes west of Yuma Az.

- Pot holing for utilities throughout El Centro CA
- Trenching for ducting installation with track and back hoes from Santee CA to Yuma AZ & from Hesperia CA to Primm NV
- Rock saw trenching for ducting installation from Santee through Pine Valley CA
- Fiber installation (blowing) east of El Centro CA and from Barstow CA to Baker CA
- Fiber splicing from Barstow CA ILA to Cima Road (between Primm NV & Baker CA)
- Fiber testing from Barstow CA ILA to Cima Road
- Preconstruction sweeps for destert tortoise presence / absence survey from Ogilby Road and I-8 along the construction line to Yuma AZ
- Taught burrowing owl, flat-tailed horned lizard and desert tortoise worker awareness classes on the Level 3 O4 line, Santee CA to Yuma Az. Taught desert tortoise worker awareness classes on the O8 line, Hesperia CA to Primm NV.
- Selected as one of six biologists to conduct preconstruction sensitive plant surveys and flagging from Hesperia CA to Primm NV. This provided information that was used to modify the construction corridor and reduce the impact to native vegetation.
- Field trained biologists that were qualified as tortoise monitors so they could be considered for qualification to be tortoise handlers – 60 hours training each

TRAINING THROUGH HDR ENGINEERING:

1. Biological monitor training
2. Burrowing owl training
3. Flat-tailed horned Lizard training
4. Desert tortoise training
5. Arroyo toad training
6. Union Pacific Railroad training 2000 & 2001
7. Kiewit environmental, cultural & safety training
8. Sexual harassment training

SELF EMPLOYED 1991–September 2000 NEVADA

- Actively involved in Clark County Nevada's Multiple Species Habitat Conservation Plan as a member of the Implementation and Monitoring Committee representing the Searchlight Nevada Town Advisory Board.
- Tortoise monitoring for the University of Nevada at Las Vegas.
- Taught workshop classes for public school educators for Project Wild developed by the Nevada Division of Wildlife.
- Licensed by the Nevada Division of Wildlife to collect selected scientific specimens for the Barrick Museum at University of Nevada at Las Vegas.
- Licensed by the Nevada Division of Wildlife to commercially collect reptiles in

Nevada.

- Wildlife presentations to Nevada public schools (elementary through high school).
- Research assistant for university projects to study the desert tortoise and western chuckwalla.

1975–1990

Employed in the structural steel industry in varying capacities:

- Operations Manager, responsible for company operations, estimating, sales and fabrication of structural steel and reinforcing bar
- Engineering Manager, managed engineering, estimating and detailing departments for structural steel fabrication
- Chief Estimator, managed estimating departments from 3 – 9 estimators
- Estimator, estimated structural steel and pressure vessel projects
- Planner, wrote construction sequence planning for ASME section 8 and nuclear fabricated assemblies
- Steel fabricator working on the shop floor fabricating parts

EDUCATION

1965–1968 Arizona Western College Yuma, AZ

- A.A Applied Sciences1968-1969

1968-1969 Northern Arizona University Flagstaff, AZ

- Major in Zoology, emphasis in Herpetology

INTERESTS

Biological research in herpetology, ecology and conservation biology

REFERENCES

- Alex Heindl, Curator of Reptiles, Barrick Museum, University of Nevada, Las Vegas (702) 895-1401 (office)
- Richard Montanucci, Ph. D., Professor, Department of Biological Sciences, Clemson

University, South Carolina (864) 656-3625 (office)

- Dave Sanger, Biologist, Nevada Division of Wildlife, Reno, NV (administered Project Wild) (775) 688-1500 (office)
- John Wear, Biologist, Biological Resource Specialists, Yucaipa, CA. (909) 797-5740 (office)
- Jim Boone, Ph.D., Ecologist, Las Vegas, NV. (702) 228-4603 (home)

Email: steve@chuckwallas.com

Searchlight, NV 89046 Phone: (702) 296-1616

RÉSUMÉ

Alex L. Heindl

Desert WalkAbouts, Inc.
426 W. Viewmont Dr.
Henderson, Nevada 89015

Res.: *(702) 566-4297* Cell: (702) 370-1309

E-mail: Desertwalkabouts@gmail.com

Education:

B.S. Wildlife Science, Oregon State University, Corvallis, 1972.

M.A. Biology major/Geology minor, University of Nevada, Las Vegas, 1999.
Thesis title: *Preliminary investigations into distribution of the Western Diamondback Rattlesnake,* Crotalus atrox, *in Nevada and discussion of some factors possibly contributing to the species' present Nevada distribution pattern.*

Additional (1.5 years) graduate level study toward PhD in geoscience, University of Nevada, Las Vegas, 2000 – 2002.

Summary of Professional Work Experience:

Thirty-six years terrestrial and marine field experience as wildlife and fisheries biologist/ecologist for state, federal and tribal agencies and academic institutions. Self-employed environmental consultant since 2006. Strong background in all aspects of desert ecology, (particularly herpetology), terrestrial and marine mammalogy, ichthyology and geology. Good background in ornithology, particularly waterfowl and pelagic sea birds. Experienced in archaeological survey and field techniques. Author of numerous staff and technical reports and NEPA documents.

Specific Experience:

ENVIRONMENTAL CONSULTANT - Desert WalkAbouts, Inc., Henderson, Nevada – 2006 to present. Conduct biological and ecological field surveys; prepare project reports and NEPA documents.

CURATOR OF HERPETOLOGY - Marjorie Barrick Museum of Natural History, University of Nevada, Las Vegas - 1993 to 2006. Conduct biological and ecological field studies and surveys; maintain and expand UNLV herpetological collection; write and edit staff reports and NEPA documents. Conduct Museum-sponsored educational outreach program re: local herpetology.

RESEARCH ASSISTANT - Marjorie Barrick Museum of Natural History, University of Nevada, Las Vegas - 1992 to 1993. Duties similar to those in previously described position.

ENVIRONMENTAL ANALYST - Nevada Department of Transportation - 1989 to 1991. Conduct environmental studies and secure federal and state permits necessary to permit maintenance and expansion of state highway system. Write correspondence and project reports; compose and present department testimony before various private and governmental bodies.

FISHERY BIOLOGIST - Columbia River Inter-Tribal Fish Commission, Portland, Oregon - 1979 to 1989. Staff representative of four tribes with treaty fishing rights on Columbia/Snake River system. Conduct field studies; write correspondence and staff reports; write and present testimony to state and congressional bodies; appear as expert witness in court cases involving Indian fishing issues.

FISHERY BIOLOGIST/MARINE MAMMALOGIST - Fisheries Research Institute, University of Washington, Seattle - 1978 and 1981. Foreign Fishery Observer of Japanese salmon gillnet fishery in North Pacific Ocean. Compile harvest records; collect marine mammal sighting and behavior data; conduct field necropsies on incidentally captured marine mammals and write project reports.

WILDLIFE BIOLOGIST - Oregon Department of Fish and Wildlife - 1973 to 1979. Conduct research and management of large and small mammal, bird, and resident and anadromous fish populations in western and central Oregon. Census mammal, bird and fish populations; trap and relocate elk; trap and band waterfowl; plan and direct habitat rehabilitation projects; enforce hunting and fishing regulations; handle animal damage complaints; serve as agency's Public Information Officer.

Pertinent and Related Skills:

> Proficient writer and editor.

> Experienced public speaker, including experience before state and federal congressional bodies.

> Mine Safety and Health Administration (MSHA – US Dept. Labor) certified in underground mine safety (underground biological surveys)

> Experienced in negotiation and dispute resolution.

> Experienced in archaeological field techniques.

> Graduate of Dale Carnegie Course: "Effective Speaking and Human Relations".

> Experienced horseman and outdoorsman.

> Licensed private pilot (license not current).

References:

Dr. Donald Baepler, Director Emeritus
Marjorie Barrick Museum of Natural History
Harry Reid Center for Environmental Studies
University of Nevada, Las Vegas
4505 Maryland Parkway
Las Vegas, Nevada 89154-4009 (702) 895-3381

Ms. Diane Winslow, Director
Cultural Resources Division
Harry Reid Center for Environmental Studies
University of Nevada, Las Vegas
4505 Maryland Parkway
Las Vegas, Nevada 89154-4009 (702) 895-2687

Dr. Will Pratt, Curator of Invertebrates
Marjorie Barrick Museum of Natural History
Harry Reid Center for Environmental Studies
University of Nevada, Las Vegas
4505 Maryland Parkway
Las Vegas, Nevada 89154-4009 (702) 895-1403

Mr. Jeff Wedding, Historic Archaeologist
Cultural Resources Division
Harry Reid Center for Environmental Studies
University of Nevada, Las Vegas
4505 Maryland Parkway
Las Vegas, Nevada 89154-4009 (702) 895-1480

Publications list supplied on request.

Tsegaye Mengistu

Staff Biologist

Professional Summary

Mr. Mengistu has over eight years of professional experience with public and private organizations. To date, he has conducted professional biological and environmental assessment work Minnesota, Oregon, Washington, Nevada and California as well as research in Kenya. He has performed surveys for Desert Tortoise and many other sensitive species in the Coachella Valley. Mr. Mengistu's has worked for the Bureau of Land Management in Medford Oregon, and Las Vegas Nevada under a contract with Environmental Careers Organization performing biological and botanical surveys using GIS/GPS technology. This has incorporated broad computer and mechanical skills to perform analyses and documentation within project-related assignments. Over the past year Mr. Mengistu has served at the lead biological monitor for the Coachella Canal Lining Project and has lead teams doing seed collection and clearance surveys. His expertise has been derived from a formal education and extensive domestic field experience.

Professional Qualifications

Desert Tortoise Council Tortoise Survey Workshop, 2006

Education

B.A. Environmental Science, Hamline University, St. Paul, Minnesota 1999

Employment History

Staff Biologist / Lead Biological Monitor, AMEC Earth & Environmental, Inc.: January 2005 – present

Conducts focused presence/absence surveys for rare and endangered flora and fauna including the Coachella Valley milkvetch, burrowing owl, desert tortoise and many desert Plants. Serves as Lead Field Monitor for biological compliance monitor for large-scale construction projects.

Natural Resource Specialist, Oregon Department of Environmental Quality.: June 2004 – October 2004

- Stream survey involving electro fishing and fish survey.
- Macro invertebrate and Periphyton sampling.

- Stream habitat assessment, and water quality measurements.
- Water sampling and analysis, benthic fauna sampling and fish collecting.
- General water quality and effluent sampling and analysis.

Botanist, Charis Corporation.: April 2004 – May 2004
Performed sensitive plant survey for *Cymopterus deserticola* in the Mojave Desert region. Survey included:

- Establishing transects and performing navigation for survey crew.
- Entering and recording GPS data for input into ArcView GIS.
- Navigation by topographical maps.
- All work performed as a member of a survey team.

Hydrologic Technician and GIS/ Hydrographer, Environmental Careers Organization, placed as an Associate at the Bureau of Land Management (BLM), Medford, Oregon: December 2002 – December 2003

- Organization, collection, and maintenance of BLM hydrography spatial and attribute databases.
- Assess, review, and verify the quality and accuracy of map.
- Performed digitization and map editing techniques with ArcView 3.3 and ArcInfo.
- Served as production assistant for the analysis and creation of spatial display products.
- Performed soil, ground water and surface water sampling.

Hydrologic Technician and GIS/ Hydrographer, Environmental Careers Organization, placed as an Associate at the Bureau of Land Management (BLM), Medford, Oregon: June 2002 – December 2002

- Surveyed stream reaches as defined by the Northwest Forest plan by using topographic maps, compass, clinometer, altimeter, and aerial photos.
- Identified unmapped stream reaches and modified base maps.
- Identified riparian and upland area vegetation.
- Conducted measurements of stream flow along with conductivity and turbidity sampling.
- Utilized Rosgen Classification and Wolman Pebble count methodology for interpreting stream channel characteristics.

Botanist, California Native Plant Society: Spring 2002

- Identify and map endangered plant species using GPS.
- Identify and record Sonoran desert flora.
- Survey Algodones Dunes in CA, for *Helianthus niveus*, *Palafoxia arida*, *Astragalus magdalenae* and *Pholisma sonarae*.

Restoration Ecologist and GIS/ Hydrographer, Environmental Careers Organization, placed as an Associate at the Bureau of Land Management (BLM), Las Vegas, Neveda: November 2001 – May 2002

- Seed collection, harvest and clean seeds from species identified for harvesting.
- Plant restoration, Identify disturbed areas needing restoration.
- Restored roads, trails, corrals, old livestock concentration areas, and abandoned mine sites.

Surveying Technician

- Stream and spring survey.
- Sampling and sorting insects by using deep net and kick net for thirty second trap.
- Identify and keyed aquatic and terrestrial insects for further water quality assessment.
- Used Min Sound 4a Hydrolab for stream and spring survey.
- Utilization survey to determine grazing impacts.
- Identify use patterns and collected data on vegetation and soil conditions.

Botanist /Field Technician (April 2001-September 2001)
Charis Corporation (Environmental Consulting Group), Barstow, CA

- Identify and map all federally listed endangered plant species using GPS.
- Utilize GPS and compass to run transect lines by applying the mid-intensive and reconnaissance survey method.
- Identify and record Mojave Desert flora.
- Survey land in Barstow, CA, for Lane Mountain Milk vetch (*Astragalus Jaegerianus*).
- Administer advanced techniques for determining individual plant species and their precise locations.

Botany/Restoration Technician (June 2000-April 2001)
Employed by Environmental Careers Organization placed as an Associate at the Bureau of Land Management, Las Vegas, Nevada.

- Seed collection.
- Plant restoration.
- Arid land restoration and rehabilitation.
- Identify noxious weeds and GPS area of habitat.
- Identified and inventoried threatened native plant species and GPS perimeters.

Research (1996-1999 Hamline University, St. Paul, MN, and 1999 Kenya, East Africa)

- Examined forest community structure and the diversity between the riverbank and Interior Forest of the Mississippi River.
- Analyzed extinction risks of endangered animals by conducting a population viability analysis under varying environmental conditions.
- Identified and classified plant species in Nairobi National Park for the Kenya Wildlife Service.
- Assessed the effect of feedlots on water, soil, and air.
- Examined the impact of game cropping as a viable land option in Machakos District, Kenya.
- Developed strategies to reduce conflict between the elephants and the Massai people living around Amboseli National Park Kenya.
- Identified ways to reverse rangeland degradation on Nyokie Massai group ranch in Kenya.
- Identified wildlife signs, animal's tracks and dung as well as identified birds and their environment.
- Assessed the roles of the stakeholders and the management structure of Nairobi National Park.
- Examined several different environmental threats to frogs both locally and globally.

Community Involvement (1992-2000)

- Tutored adults with limited English skills in mathematics and citizenship at the YMCA while working for AmeriCorps in Minneapolis, MN.
- Coached youth soccer team for Hopkins School District as well as the YMCA in Minneapolis, MN.
- Assisted with Habitat for Humanity projects in Minneapolis, MN.
- Supervised neighborhood revitalization and clean-up programs for AmeriCorps in Minneapolis, MN.
- Assisted with GPS, GIS and coordinating volunteers for Red Rock Canyon National Conservation Area, Las Vegas, NV.
- Coordinated and Supervised Ameri Corps and Friends of Red Rock Canyon members for Soil and Plant Restoration.

Memberships

California Native Plant Society

Languages

English

Nathan T. Moorhatch

Wildlife Biologist/Herpetologist

Professional summary

Mr. Moorhatch has over 11 years consulting experience performing a wide variety of biological surveys throughout California, spanning from the Sacramento Valley to the International Border. He has had a life-long interest in general biology, and obtained a degree in Zoology from the California State Polytechnic University at Pomona under Dr. Glen Stewart in 1991. Mr. Moorhatch has conducted biological and environmental assessments at project sites in Solano, Monterey, Tulare, Fresno, Inyo, Kern, Ventura, Los Angeles, San Bernardino, Orange, Riverside, San Diego, and Imperial counties in California, as well as in Nevada. He has conducted the following types of assessments: rare plant species surveys; plant species inventory and vegetation mapping; revegetation plan preparation and implementation; general wildlife species surveys; focused sensitive wildlife species surveys and habitat quality assessments; sensitive wildlife species monitoring and relocations; small mammal trapping studies; Corps Section 404 waters/wetlands delineation and jurisdictional determination; CDFG 1601-3 stream and riparian habitat assessments and jurisdictional determinations; and preparation of biological assessment reports and sections of EIS and EIR documents for federal, state, and/or county agency CEQA and NEPA environmental review.

Mr. Moorhatch has extensive experience conducting herpetological studies including focused surveys and monitoring of endangered species. Mr. Moorhatch has performed surveys for a wide variety of sensitive amphibians and reptiles including: California Tiger Salamander, Tehachapi Slender Salamander, Large-blotched Ensatina, Arroyo Toad, California Red-legged Frog, Mountain Yellow-legged Frog, Western Spadefoot, Southwestern Pond Turtle, Desert Tortoise, Switak's Barefoot Gecko, Blunt-nosed Leopard Lizard, San Diego Horned Lizard, Coachella Valley Fringe-toed Lizard, Flat-tailed Horned Lizard, Orange-throated Whiptail, Southern Rubber Boa, and Two-striped Garter Snake. He has a deep personal interest in general Herpetology, and has undertaken numerous forays in the field in search of both common and rare amphibian and reptile species in California, Nevada, Arizona, Utah, Texas, Kansas, Maryland, Virginia, Florida, Hawaii and Costa Rica.

He also is an avid birder, and has assisted in conducting surveys for California Gnatcatcher, Least Bell's Vireo, Burrowing Owl, Le Conte's Thrasher, Snowy Plover, Least Tern, and various nesting raptor species in Riverside, Orange, Los Angeles, Kern, San Diego, and San Bernardino counties. Mr. Moorhatch has conducted Bird Air Strike Hazard (BASH) studies on the Edwards Air Force Base Main Base Flightline during 1998 and 1999, and is currently participating in a base-wide bird survey utilizing point counts to determine distribution and abundance of bird species on EAFB. He has also conducted bird use surveys of several landfill sites in San Bernardino and Tulare Counties in support of BASH studies related to local airports. Mr. Moorhatch is a member of the American Birding Association and the Audubon Society. His personal interest in birds has led him on numerous field searches in California, Arizona, Utah, Texas, Kansas, Florida, Hawaii, Baja California, and Costa Rica.

Mr. Moorhatch has conducted focused surveys for Delhi Sands Flower-loving Fly and Quino Checkerspot Butterfly; and has a Federal Endangered Species Permit [10(a)(1)(A)] for both of these insects. Mr. Moorhatch has also participated in "Fourth of July Butterfly Counts" sponsored by the North American Butterfly Association. He has a personal interest in Entomology and is a member of the Friends of the University of California, Riverside, Entomological Research Museum (FERM).

Mr. Moorhatch has assisted in trapping surveys for several sensitive small mammals including: San Bernardino Kangaroo Rat, Los Angeles Pocket Mouse, Tehachapi Pocket Mouse, and Short-nosed Kangaroo Rat. He has also participated in focused surveys for San Joaquin Kit Fox, San Joaquin Antelope Ground Squirrel, Mojave Ground Squirrel, and Peninsular Bighorn Sheep.

In addition to his experience with sensitive wildlife species, Mr. Moorhatch has conducted numerous surveys for sensitive plant species throughout California. He has conducted surveys for over 35 sensitive plant species, including limestone endemics, Big Bear Valley endemics, vernal pool species, and a wide variety of sensitive species in the San Joaquin Valley, Mojave and Colorado Deserts, and various coastal and inland valley habitats. Mr. Moorhatch has also assisted in the preparation of revegetation plans, and has conducted restoration/revegetation activities including site preparation, seeding/transplanting, and monitoring.on Edwards Air Force Base. Additionally, he conducts general inventories of flora and fauna; and authors biological assessments and mitigation plans. Mr. Moorhatch also has a current California Department of Fish and Game Scientific Collector's Permit.

Professional qualifications

California Department of Fish and Game Scientific Collectors Permit #801166-04

Federal Endangered Species Permit ("10a") for Quino Checkerspot Butterfly, #TE029414-0

Federal Endangered Species Permit ("10a") for Delhi Sands Flower-loving Fly, #TE029414-0

Authorized Individual for studies regarding the Desert Tortoise (Authorized to monitor, handle, and relocate desert tortoises when necessary for specific project implementation).

Education

B.S. Zoology (cum laude), California State Polytechnic University, Pomona, 1991

University of California, Riverside – Extension Course Work: Ornithology – A Field Study of Birds

Victor Valley Community College: Ecology of Costa Rica, 2001

Location

Riverside, California

Seminars, Workshops, and Symposia

Desert Tortoise Council Symposium, 1992 - 1999

Desert Tortoise Council Field Techniques Workshop, 1992, 1994

Mojave Ground Squirrel "CHIEF" Workshop. 1992

Declining Amphibians in California I, San Diego Natural History Museum, 3/97.

Declining Amphibians in California II, San Diego Natural History Museum, 3/98.

Workshop on Year 2000 Draft Quino Checkerspot Butterfly Survey Protocol, Carlsbad, California, 1999.

Planning for Biodiversity: Bringing Research and Management Together. 2/29-3/2/00; Pomona, California.

Arroyo Toad Symposium (*Bufo californicus*): Natural History and Management Practices. 10/05/00; Marine Corps Air Station, Camp Pendleton, California.

Current Research on Herpetofauna of the Sonoran Desert II. 4/5-7/02; Tucson, Arizona.

Memberships

American Birding Association

Friends of the University of California, Riverside, Entomological Research Museum

Desert Tortoise Council

National Audubon Society

Southwestern Herpetologist's Society

Detailed Core Skills by Project

Domestic Water Development and Supply

Cadiz Land Company Inc. Exploratory Drilling and Proposed Water Line Surveys and Monitoring. Conducted presence/absence surveys and monitoring for Desert Tortoise and sensitive plants during exploratory drilling and surveys for proposed water line system right-of-ways, Danby and Cadiz, Fenner Valley, San Bernardino County, California.

Oil and Gas Development and Supply

Kramer Junction Line 6905 Expansion Project. Acted as an assistant Lead Biologist supervising a team of 30+ biologists and biological monitors for the installation and development of a 33-mile natural gas pipeline project in the Mojave Desert. Conducted general and focused (for Desert Tortoise, Burrowing Owl, and sensitive plant species) biological surveys; Desert Tortoise burrow excavation, artificial burrow construction, processing, and relocation; Burrowing Owl burrow excavation, artificial burrow construction, and passive relocation; mitigation monitoring; personnel awareness training, yucca and cacti transplantation, and vertical mulching; San Bernardino County; Southern California Gas Company.

All American Pipeline Project. Conducted general and focused biological surveys and mitigation monitoring for the Desert Tortoise for exploratory geotechnical drilling activities in support of the All American Pipeline Project; San Bernardino County; All American Pipeline Company.

Four Corners Pipeline Company (ARCO). Conducted Desert Tortoise Monitoring for two oil line leak repairs at Danby and Sheephole Pass, San Bernardino County, California.

Four Corners Pipeline Company (ARCO). Conducted Desert Tortoise Monitoring for anode bed installation, San Bernardino County, California.

Renewable Energy Resources

Whitewater Wind Energy Conversion Systems. Acted as a Lead Biologist for the development, installation, and implementation of a wind energy park located in the San Gorgonio Pass area, on the northwestern outskirts of the Coachella Valley. Conducted general and focused (for Desert Tortoise, Burrowing Owl, and sensitive plant species) biological surveys; Desert Tortoise burrow excavation,

artificial burrow construction, processing, and relocation; Burrowing Owl burrow excavation, artificial burrow construction, and passive relocation; mitigation monitoring; personnel awareness training for the life of the project; Shell Oil Corporation; Riverside County.

Cabazon Wind Energy Conversion Systems. Lead Biological manager for the development, installation, and implementation of a wind energy park located in the San Gorgonio Pass area. Conducted general and focused biological surveys (for Desert Tortoise, Burrowing Owl, and Coachella Valley Fringe-toed Lizard), mitigation monitoring, and personnel awareness training for the life of the project; Cannon Power; Riverside County.

Electrical Power

Otay Mesa Generating Plant. Conducted habitat assessments and focused surveys for the Quino Checkerspot Butterfly the proposed generation plant site and throughout the associated transmission line easements on Otay Mesa from the U.S./Mexican border north to Chula Vista; San Diego Gas and Electric Company; San Diego County.

Valley to Auld Electrical Substation and Transmission Line Upgrade Project. Conducted mitigation monitoring for the Valley to Auld transmission line and electrical substation upgrade project. Significant biological issues included the California Gnatcatcher, Burrowing Owl, Stephens' Kangaroo Rat, Quino Checkerspot Butterfly, Belding's Orange-throated Whiptail, San Diego Coast Horned Lizard, and Southwestern Pond Turtle; Southern California Edison Company; Riverside County.

U.S. Forest Service

Arroyo Toad Surveys. Conducted habitat assessments and focused surveys for the Arroyo Toad throughout drainage systems containing potentially suitable and historically occupied habitat within the San Bernardino National Forest (including San Jacinto Range).

Mountain Yellow-legged Frog Surveys. Conducted habitat assessments and focused surveys for the Mountain Yellow-legged Frog throughout drainage systems in historically occupied habitat within the San Bernardino National Forest.

Transportation and Infrastructure

State Highway 138. Conducted habitat assessments and focused protocol surveys for the Arroyo Toad for the proposed realignment of SR 138 between Interstate 15 and State Highway 18; San Bernardino County; Caltrans.

Interstate 215 Seismic Retrofit Project. Conducted habitat assessments and focused protocol surveys for the Arroyo Toad for the proposed Interstate 215 seismic retrofit project in the City of Riverside; Riverside County; Caltrans.

Interstate 15 Bridge Widening Project. Conducted habitat assessments and focused protocol surveys for the Arroyo Toad for the proposed Interstate 15 Bridge Widening Project over the Mojave River in the City of Victorville; San Bernardino County; Caltrans.

State Highway 18 Seismic Retrofit Project. Conducted habitat assessments and focused protocol surveys for the Arroyo Toad for the proposed seismic retrofitting of SR 18 at the crossing of the Mojave River in the town of Apple Valley; San Bernardino County; Caltrans.

State Highway 79/371 Interchange Realignment Project. Conducted habitat assessments and focused protocol surveys for the Quino Checkerspot Butterfly for the proposed SR 79/371 Interchange Realignment Project in the community of Aguanga; Riverside County; Caltrans.

Big Bear Dam/State Highway 18 Improvement Project. Conducted habitat assessments and focused protocol surveys for the Mountain Yellow-legged Frog for the proposed improvements of SR 18 at the

crossing of the dam at the southwest end of Big Bear Lake in the San Bernardino Mountains; San Bernardino County; Caltrans.

Opah Ditch Mining Reclamation Project. Conducted focused protocol surveys for the Desert Tortoise for the proposed Opah Ditch Mining Reclamation Project located south of Baker; San Bernardino County; Caltrans.

Department of Defense.

Edwards AFB Main Base Flightline BASH study. Conducted Bird Air Strike Hazard (BASH) studies on the EAFB Main Base Flightline during 1998 and 1999. Responsibilities included seasonal field inventories of bird species diversity and population size, coordination and management of experimental use of falconry as method to deter bird use, and preparation of documentation summarizing the effectiveness of bird control measures.

Edwards AFB Base-wide Bird Inventory. Base-wide surveys utilizing point counts to determine distribution and abundance of bird species on EAFB, 2000 to present (ongoing).

Edwards AFB Desert Tortoise Monitoring. Conducted Desert Tortoise presence/absence surveys and monitoring throughout EAFB for a variety of projects including: Historic Homestead Well destruction, Monitoring Well Drilling, site restoration, and Joshua Tree transplantation.

Edwards Air Force Base Revegetation Efforts. Has participated in revegetation/habitat rehabilitation on over 270 acres of desert scrub on Edwards AFB. These largely successful efforts have incorporated a wide-variety of seeding methodologies including imprinting and hand seeding. Efforts have also included planting of nursery stock, transplanting of numerous desert shrub species, Joshua tree transplanting, and long-term viability monitoring.

Nellis AFB Desert Tortoise and Rare Plant Survey. Conducted presence/absence surveys for Desert Tortoise and rare plants for proposed road construction and residential expansion projects.

Travis AFB Vernal Pool and Rare Plant Inventory. Conducted field surveys to inventory vernal pools and rare plant species on Travis AFB. Responsibilities included identification and mapping of vernal pools and rare plants (including the federal Endangered Contra Costa Goldfields *Lasthenia conjugens*).

Employment history

Wildlife Biologist/Herpetologist, AMEC Earth and Environmental, Inc. November 2000-present. Conducts field inventories of fauna and flora, performs literature reviews, prepares biological assessment reports emphasizing impact analysis, mitigation measures, and mitigation monitoring. Specializes in herpetological and entomological field studies, and also conducts ornithological field studies. Authorized by U.S. Fish and Wildlife Service to conduct focused surveys for the following Endangered or Threatened species: Quino Checkerspot Butterfly and Delhi Sands Flower-loving Fly.

Wildlife Biologist/Herpetologist, Ogden Environmental and Energy Services, March 2000-November 2000.

Wildlife Biologist/Herpetologist, Tierra Madre Consultants, Inc., August 1999-March 2000.

Wildlife Biologist/Herpetologist, Earth Tech, August 1997 – August 1999

Nathan T. Moorhatch

Assistant-Associate Biologist, Lilburn Corporation, November 1991 - August 1997

Languages
Spanish - Fair

Nathan Mudry
Biologist/ GIS Specialist

EXPERIENCE SUMMARY

Nine years of experience as a environmental consultant/biologist. Responsibilities have included monitoring of nesting grounds for endangered species (California Least Tern & Western Snowy Plover), preparation of field reports, GIS mapping of GPS data (species locations) including vegetation/habitat maps, general avian surveys, construction monitoring, wetland delineation projects, restoration projects, as well as GIS support for a variety of wind and solar energy development projects.

EDUCATION

BS, Biology, 2000, California State University Long Beach

TRAINING

40-Hour OSHA Hazardous Waste Health and Safety Training – 2004
Willow Flycatcher Training May 2004
Wetlands Delineation Training-Jan 2005
Remote/Automatic Camera Monitoring for Wildlife - May 2006
Avian Mortality at Wind Sites- August 2006
Desert Tortoise Surveying, Monitoring, and Handling – November 2006

PROJECT EXPERIENCE

Desert Tortoise/ Raven Interaction Studies, Edwards Air Force Base, Kern County, CA.
Project Biologist responsible for development and supervision of field surveys of populations, movements, and feeding habits of common raven within desert tortoise critical habitat on Edwards Air Force Base. Participated in field surveys for multi-year field program and statistical analyses of field data. Responsible for preparation of GIS-based maps illustrating survey sites and raven distribution and movements within the study area.

PPM Energy, Dillon Wind Project EIR, Riverside County, CA.
Biologist and GIS specialist responsible for coordination and supervision of biological field surveys and preparation of maps and other graphics of an Environmental Impact Report (EIR) prepared for a proposed 45MW wind energy facility near Palm Springs in Riverside County, CA. Participated in field programs to collect information on biological resources and wetlands. Conducted avian point-count surveys, surveys for rare plant species, desert tortoise surveys, and surveys for refining vegetation community maps.

Calpine Corporation, Inland Empire Energy Center Application for Certification, Calpine IEEC, Romoland, CA
Served as Designated Biologist during construction of the 670 MW combined-cycle power plant facilities located in southwest Riverside County, CA. Monitored clearing, grading, and construction activities for potential impacts to biological resources. Prepared daily field reports and incident reports including photographs and maps in cooperation with other staff conducting cultural and paleontological monitoring. Supervised activities of other biological monitors.

North Baja Expansion Project, Imperial and Riverside County, CA
Conducted field surveys on vegetation plots to determine success of plant recruitment along the right-of-way. Conducted protocol level surveys for Desert Tortoise and other special status species. Responsible for coordination of data recording by biological field staff and for production of detailed GIS-based route maps for biological resources.

Blythe Energy Transmission Project, Blythe, CA
Prepared GIS maps for 67.4 mile transmission route in Riverside County proposed by Blythe Energy for submission to the California Energy Commission. Imported engineering data for integration with GIS data to prepare maps for all resources including: cultural resources, water resources, transportation, geology, visual, and biological resources. Conducted bed and bank field surveys for delineation of microphyll woodland habitat to support preparation of CDFG Stream Bed Alteration Agreement. Prepared draft Storm Water Pollution Prevention Plan for construction phase of the project.

Participated in protocol level surveys for Desert Tortoise and other special status species for 67.4 mile primary route and several alternative transmission line routes and alternate substation locations. Responsible for coordination of data recording for approximately 13 biological field staff using standard data sheet resulting in several thousand data points for special stats species observations. Responsible for production of GIS-based route maps for biological resources.

Department of the Navy, Superfund Clean-up Site, Hunters Point, CA
Conducted California Clapper Rail and Burrowing Owl surveys in wetland areas where radiological surveys were being conducted. Conducted biological compliance monitoring during construction activities related to development of replacement wetlands areas. Produced daily reports and summary reports. Prepared a biological assessment for the Department of the Navy for the Shipyard.

Department of the Navy, Superfund Clean-up Site, Alameda Point, CA
Conducted avian surveys in wetland areas where radiological surveys were being conducted. Produced daily reports and summary reports. Prepared a biological assessment for the Department of the Navy for the Shipyard. Produced maps depicting natural resources found on site.

Orange County and Riverside County, CA (Harmsworth Associates)
Conducted site visits at various locations within Orange County and Riverside County to monitor construction related activities in accordance with issued permits. Performed surveys for waterfowl, raptor, burrowing owl, least bell's vireo, yellow breasted chat, and other passerines. Monitored influence of earth moving activities on adjacent biological resources.

Alameda Corridor Project, Alameda, CA (Keane Biological Consultants)
Monitoring of Killdeer nesting area. Conducted weekly monitoring of Killdeer nesting areas adjacent to active construction zones protected by Migratory Bird Treaty Act. Tasks included: bird counts, nest marking, monitoring, and chick and fledgling censuses; Monitoring for presence and activity of predatory birds (such as Kestrel, Red Tailed Hawk, Coopers Hawk and

Peregrine Falcon) and feral cats; Provided advice on biological mitigation measures to both construction workers and engineers regarding precautions that should be taken to ensure nesting success; Preparation of daily field reports.

PPM Energy, Tule Wind Project, San Diego County, CA
Organized and conducted bi-weekly avian point-count surveys for proposed 125 MW Tule Wind Project in southeast San Diego County. Project work is required for preparation of an environmental assessment for submission to the Bureau of Land Management (El Centro office). Prepared GIS maps to identify environmental constraints applicable to the 17,000 acre project area. Utilized California Natural Diversity Data Base (CNDDB) to identify potential habitat for threatened and endangered species.

UPC Energy Wind Projects, San Bernardino and Riverside County, CA
Prepared GIS-based maps for several potential wind energy sites in California with emphasis on biological and cultural resources. Conducted field biology surveys for ten selected sites and prepared biology sections for inclusion in an Environmental Assessment needed to support right-of-way applications for wind testing on lands managed by Bureau of Land Management (BLM).

FPL Energy Wind and Solar Prospecting, CA, NV, AZ, NM
Prepared GIS maps for several wind and solar energy projects in four southwestern states using NREL wind and solar data and GIS database information for topography, land use, land ownership, and environmental constraints (parks, wilderness, areas of critical environmental concern, etc.). Participated in surveys to ground-truth selected sites.

Casden Properties, Los Angeles County, CA
Produced GIS maps for constraints analysis of the entire property. Maps were prepared for resources including wetlands, habitats, and general topography.

Port of Los Angeles, San Pedro, CA (Keane Biological Consultants)
Monitoring of California Least Tern nesting and adjacent feeding areas on Terminal Island in the Port of Los Angeles. The Terminal Island area has three Least Tern nesting areas: Pier 300, Pier 400 and transportation corridor area (known as TC-2). During the 1997 season, Pier 400 was an island under construction in San Pedro Bay. Other species regularly observed during surveys included: Western Grebe, Elegant Tern, Caspian Tern and Black Skimmer. Protection and habitat enhancement for this federally listed Endangered Species at this site has been established under the California Least Tern Recovery Plan. Tasks included: Bird counts, banding, nest marking, monitoring, and chick and fledgling censuses; Monitoring for presence and activity of predatory birds (such as Kestrel and Peregrine Falcon) and feral cats; Recording disturbance to the nesting sites by vehicles, boaters, and aircraft; Preparation of daily field reports.

Batiquitos Lagoon, San Diego County, CA (California Department of Fish and Game)
Monitoring of California Least Tern nesting and adjacent feeding areas in Batiquitos Lagoon, San Diego County, CA. Conducted weekly monitoring of Least tern and Western Snowy Plover nesting areas. The Batiquitos Lagoon area includes five nesting sites for the Least Tern and three for the Snowy Plover. Other species regularly observed during surveys included: Black Skimmer, American Avocet, Black Necked Stilt, and Forester's Tern. Protection and habitat enhancement for this federally listed Endangered Species at this site has been established under

the California Least Tern Recovery Plan. Tasks included: bird counts, nest marking, monitoring, and chick and fledgling censuses; monitoring for presence and activity of predatory birds (such as Kestrel, Red Tailed Hawk, Coopers Hawk and Peregrine Falcon) and feral cats; recording disturbance to the nesting sites by vehicles, boaters, and aircraft.

Venice Beach, Los Angeles County, CA (California Department of Fish and Game)
Monitoring of California Least Tern nesting site. Conducted weekly monitoring of Least Tern (endangered species). Tasks included: Bird counts, nest marking, monitoring, and chick and fledgling censuses; Monitoring for presence and activity of predatory birds (such as Kestrel, Red Tailed Hawk, Coopers Hawk and Peregrine Falcon) and feral cats; Recording disturbance to the nesting sites by vehicles, boaters, and aircraft; Preparation of daily field reports.

Long Beach, CA; Teaching Assistant, (California State University at Long Beach)
Provided instruction for human physiology labs (Bio 207L – 2 semesters) and general biology (Bio 200 – 4 semesters). Topics included: enzymes and energy, nervous system, natural selection, cell biology, general chemistry, plant anatomy, etc.

Veteran Affairs Memorial Hospital Long Beach, CA; Research Assistant.
Assisted with sensitive experimental procedures focusing on techniques used in protein receptor studies and cell culture. Performed electrophoresis and general lab techniques on a daily basis. Study area involving estrogen signaling and its relationship to cancer. Techniques Used: SDS gel electrophoresis, affinity chromatography.

RESEARCH EXPERIENCE

California State University at Long Beach, Long Beach, CA; Masters Thesis Research: Movements and Behavior of Pre-Breeding Island Scrub-Jays.
Movements of 1st year individuals were investigated for dispersal patterns, amount of habitat utilized, and behaviors exhibited during the post-breeding season. Movements were monitored using radio–telemetry techniques and analyzed using Arcmap® (GIS) to establish Kernel Home Ranges (Animal Movements Extension). Home ranges of 1st year Island Scrub-Jays were compared to adult breeding territory sizes to investigate any significant differences. Findings of this study will form recommendations for management / conservation of Island Scrub-Jays during planned island restoration activities.

PUBLICATIONS & PRESENTATIONS

Mudry, N.W. 2003. Movements and behavior of pre-breeding island scrub-jays on Santa Cruz Island. Sixth California Islands Symposium. Ventura Beach, CA.

Mudry, N.W., M. L. Amalong, and K. Keane. 2004. Foraging Patterns of Least Terns in Los Angeles Harbor. The Western Section of the Wildlife Society. Rohnert Park, CA.

Heather Rothbard

Environmental Scientist/Botanist/Planner

Professional summary

Ms. Rothbard has 5 years experience in botanical survey and environmental regulatory compliance. Her experience includes rare and sensitive plant surveys, noxious weed surveys, rangeland studies including flora identification, biomass and species diversity data collection, National Environmental Policy Act (NEPA) documentation, environmental site assessments, Section 404 delineation and permitting, Phase I Environmental Site Assessments, and biological reviews. Ms. Rothbard has managed and performed numerous plant surveys for a major utility in Arizona, managed a biological and soil salinity study on a major oilseed crop for the USDA-ARS, and held responsibility for arthropod collection and identification, identification of native and non-indigenous plants, soil and plant root collection for mycorrhizal fungi detection, and vegetation sampling and monitoring at sites in the Phoenix metro and surrounding area for the Central Arizona Phoenix Long-Term Ecological Research Project (CAP-LTER).

Professional qualifications

40-hour HAZWOPER Training, 2008

Desert Tortoise Survey and Handling Workshop, 2007

Chiricahua Leopard Frog Survey Training, 2007

Southwestern Willow Flycatcher Survey Training, 2007

Integrated Weed Management Workshop, Montana State University, 2007

USFWS Biological Assessment Workshop, 2006

Southwest Noxious Weed Short Course, 2006, 2007

Red Brome (*Bromus rubens*) Grass Symposium, ASU, 2006

Arizona Wildfire Academy, 2006

Sahara Mustard (*Brassica tournefortii*) Workshop, August 2005

Education

Bachelor of Science, Botany: emphasis in Environmental Science and Ecology, Arizona State University, Tempe, Arizona, 2003

Memberships

Arizona-Nevada Academy of Sciences (ANAS), 2003-present

Arizona Riparian Council (ARC), 2005-present

Arizona Native Plant Society (AzNPS), 2005-present

Botanical Society of America (BSA), 2005-present

Central Arizona Weed Management Area (CAWMA), 2005-present

Western Yavapai Weed Management Area (WYWMA), 2005-present

Southwest Vegetation Management Association (SWVMA), 2005-present

Western Society of Weed Science (WSWS) 2006-present

National Association of Environmental Professionals, Arizona Chapter (AZAEP) 2006-present

Desert Tortoise Council – 2007-present

California Invasive Plant Council (CAL-IPC) – 2007 – present

California Native Plant Society – 2007-present

Arizona Field Ornithologists – 2007-present

Location

Tempe, Arizona

Summary of core skills

Clean Water Act Section 404 Delineation and Permitting

Ms. Rothbard has prepared Section 404 jurisdictional delineations for waters of the U.S., including ephemeral washes, intermittent and perennial steams, and freshwater, tree-dominated wetlands. She has also prepared nationwide and individual permit applications. Her Section 404 work includes projects in Arizona, Oklahoma, and South Carolina.

National Environmental Policy Act

Ms. Rothbard has prepared National Environmental Policy Act (NEPA) environmental assessments (EAs) and technical studies for environmental impact statement (EISs) for water distribution and collection, utility, development, aviation, and transportation projects in Arizona, Oklahoma, Nevada, Mexico, and California. Clients include municipalities, transportation departments, United States Air Force Bases, National Guard Training Facilities, and private developers.

Botanical Surveys

Ms. Rothbard has conducted numerous botanical surveys including noxious weed, rare plant, and rangeland diversity surveys in Arizona, California, Oklahoma, and New Mexico. Vegetative areas include low and high desert, chaparral, juniper/pinyon pine, coniferous forest, grasslands, and rangelands. Clients include utilities and federal land management departments.

Environmental Site Assessments

Ms. Rothbard has conducted Phase I Environmental Site Assessments (ESAs) of undeveloped, industrial, residential, and commercial facilities in Arizona. Clients included municipalities, commercial developers, and residential developers.

Employment history

2006 - Present: Environmental Scientist/Planner, AMEC Earth & Environmental, Inc., Tempe, Arizona

2005 - 2006: Botanist/Forestry Planner, Arizona Public Service, Cottonwood, Arizona

2004 - 2005: Field Research Technician, International Institute for Sustainability, Arizona State University, Tempe, Arizona

2002 – 2004: Research Technician, USDA-ARS Water Conservation Lab., Phoenix, Arizona.

Detailed core skills or details by project
National Environmental Policy Act

EA of New Facilities at Yuma International Airport, Yuma, Arizona, Merrick & Company/TEPA/Department of Homeland Security Customs and Border Protection (ongoing, $75,502.44, 7114003050): AMEC is preparing an Environmental Assessment to address Custom and Border Protection Air and Marine Section's construction of new facilities and operations at the Yuma International Airport. The proposed action includes construction of facilities needed to fly and maintain helicopters and fixed wing aircraft and the operation of that aircraft for border security activities. Ms. Rothbard is the environmental scientist for this effort.

Environmental Information Document, Wastewater System Expansion Program Conventional Gravity Sewer Collection System (2008–2012), Lake Havasu City Arizona (ongoing, $43,671, 7114003032): AMEC is preparing an Environmental Information Document (EID) update for the second five-year period of Lake Havasu City's Wastewater System Expansion Program. AMEC is preparing the EID in accordance with the Arizona Water Infrastructure Finance Authority's guidelines. Since the program is receiving federal funds through the Clean Water State Revolving Fund, the EID must be NEPA compliance. Ms. Rothbard is the environmental scientist for this effort.

Winter Storm Management/Operations Plan and EA, Arizona – Statewide, Arizona Department of Transportation (ongoing, $307,000, 7115005004): AMEC was recently awarded the development of a Winter Storm Management/Operations Plan and EA for the implementation of that plan. Ms. Rothbard is preparing the NEPA portion for this project. Preparation of the EA for this project will consist of collecting, reviewing, and evaluating data to define environmental thresholds related to such factors as air quality, socioeconomic factors, water quality, and biological resources. In concert with the evaluation of environmental issues, AMEC's winter storm management specialists will be reviewing winter storm management alternatives regarding cost, including long-term costs such as impacts to pavement, and effectiveness. Ms. Rothbard is the environmental scientist for this effort.

Three EAs for Consolidated Wing Headquarters, New Control Tower, and Realignment of Air Depot Boulevard, Tinker Air Force Base, Oklahoma. (ongoing, $118,895, 376060107, Task Order 0107): Ms. Rothbard is the environmental scientist for preparation of EAs for three projects at Tinker Air Force Base. The projects include construction of a consolidated wing headquarters, construction of a new control tower, and realignment of Air Depot Boulevard. The project is being performed under the requirements of the Air Force Center for Environmental Excellence.

EA Revision for Construction of Consolidated Fuel Overhaul and Repair Facility, Tinker Air Force Base, Oklahoma. (ongoing, $24,852, 376060106, Task Order 0106): Ms. Rothbard is the environmental scientist for revision of an EA for construction of a consolidated fuel overhaul and repair facility. This project is being performed under the requirements of the Air Force Center for Environmental Excellence. The project will impact a wetland; therefore, AMEC's scope of work includes preparation of a Finding of No Practicable Alternative (FONPA) and inclusion of wetland mitigation in the EA.

Integrated Natural Resources Management Plans, Arizona Department of Emergency and Military Affairs, Camp Navajo and Florence Military Reservation, Arizona (ongoing, $77,000, 6114003063): Ms. Rothbard is serving as the primary environmental scientist for completion of Integrated Natural Resources Management Plans (INRMPs) for Camp Navajo, near Bellemont Arizona, and Florence Military Reservation, near Florence, Arizona. The INRMPs document natural resources within the installations and serve as a tool for the Arizona Army National Guard to manage those

resources. In addition to the INRMPs, Ms. Rothbard is also preparing the National Environmental Policy Act (NEPA) compliant Environmental Assessments (EAs) for implementation of the INRMPs.

EA for BRAC Actions, Luke Air Force Base, Arizona. ($74,896.00, 376065DO5): Ms. Rothbard is the environmental scientist assisting in the preparation of an EA for Base Realignment and Closure (BRAC) actions at Luke Air Force Base (AFB) affecting aircraft inventory, aircraft flight operations, and associated mission realignment.

507th KC-135 Transfer EA, Tinker Air Force Base, Oklahoma. (ongoing, $53,546.00, 376060088, Task Order 88): Ms. Rothbard is the environmental scientist assisting in the preparation of an EA for the proposed expansion of the airfield/apron fuel hydrant system; construction of Air Force Reserve Command and Air National Guard squadron operations, operations support squadron, life support storage, and life support work area; construction of a new hangar; and building renovation under the requirements of the Air Force Center for Environmental Excellence.

Diamond Valley Speed Racing, Marathon Racing, LLC, Diamond Valley, Nevada. Ms. Rothbard prepared numerous resource sections of an EA for BLM land in Diamond Valley, Nevada. The project area was within the jurisdiction of BLM's Battle Mountain Field Office.

51st Avenue Intersection Improvements, City of Glendale, Glendale, Arizona (ongoing, $75,240.00, 6114003014)**:** Ms. Rothbard is the environmental scientist/botanist for environmental work, including native plant surveys, related to projects involving intersection improvements at 51st Avenue and Northern Avenue and 51st Avenue and Camelback. The project sponsor, the City of Glendale, is applying for federal funds for these projects; therefore review through the Arizona Department of Transportation's Local Government Program is necessary.

Transboundary Environmental Site Assessment for Construction of a Water Distribution and Wastewater Collection System in Tecate, Border Environment Cooperation Commission, Tecate, Baja California (ongoing, $38,876.00, 6551000503): Ms. Rothbard is preparing a NEPA compliant environmental assessment (EA) to address the impacts of construction of a water distribution and wastewater collection system within colonias of Tecate, Baja California. This project is receiving funding from the Border Environment Cooperation Commission (BECC). BECC receives federal funds from the U.S. and Mexico for projects that improve environmental conditions within the U.S.-Mexico border region.

Clean Water Act Section 404 Delineation and Permitting

Arkoma Connector Pipeline Environmental Field Surveys, MarkWest Energy Partners, L.P. - Atoka, Bryan, and Coal Counties, Oklahoma, AMEC Paragon. (December 2007 – February 2008) Role: Botanist/Environmental Scientist. The Arkoma Connector Pipeline will provide transportation for natural gas from the Woodford field in southeastern Oklahoma to major interstate pipeline systems and will consist of one 24-inch diameter pipeline, approximately 50 miles in length, one compressor station of approximately 10,000 horsepower, and associated pipeline support facilities, including a pig launcher and receiver, and metering equipment. Environmental components of the survey program include land use, wetlands delineation, and threatened and endangered species habitat delineation in accordance with the US Army Corp of Engineers, US Fish and Wildlife Service, and FERC regulations. The surveys were conducted in areas along the proposed pipeline 300 ft ROW.

Section 404 Jurisdictional Delineation, Arizona State Lands Department, 303 Peoria East, Maricopa County, Arizona: Ms. Rothbard is serving as field reconnaissance leader to identify and establish boundaries of Section 404 jurisdictional areas on the 4,600 acre project site. Jurisdictional areas are identified and delineated in accordance with the USACE's 1987 Wetland Delineation Manual, the USACE's 2001 guidelines for conducting JDs in the arid southwest, USACE's 2006 Interim

Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region, and USACE's June 2007 Rapano's Guidance Memorandum. Ms. Rothbard prepared the results of the JD in a technical report. The technical report includes a description of the project area drainage features including width, depth, substrate, vegetation characteristics, hydrology, and connectivity to the Agua Fria and New Rivers.

Maricopa County Department of Transportation, Power Road and Guadalupe Road Bridge Expansion. (ongoing, 012007025): Ms. Rothbard is monitoring construction activities for compliance with conditions of Clean Water Act Section 404 Nationwide Permit Numbers 12 and 14 and general conditions of Section 401 Water Quality Certification. Construction activities include widening the bridges that cross the floodway that flows underneath Power Road and Guadalupe Road. Ms. Rothbard's participation includes tri-weekly site visits and weekly reporting of site conditions.

McEntire Joint National Guard Base, Base-wide Wetland Delineation, National Guard Bureau, Columbia, South Carolina. ($305,618, 276220102)**:** Ms. Rothbard has conducted wetland delineation surveys of wetlands and other waters of the U.S. within the Common Installation Footprint per the methods described in the 1987 U.S. Army Corps of Engineers (USACE) Wetland Delineation Manual at McEntire Joint National Guard Station in South Carolina. Her participation in these surveys included identifying plant species, determining soil color and texture, completing wetland data report forms, and reviewing the wetland delineation report.

Section 404 Jurisdictional Delineation Shadow Ridge Subdivision, Millennia Investment Corporation, Mohave County, Arizona ($11,200, 7114003026): Ms. Rothbard is the environmental scientist/botanist for a Section 404 Jurisdictional Delineation for waters of the United States associated with the development of a 105 acre subdivision in the unincorporated town of Scenic, Arizona. AMEC was selected to assist the client in resolving Clean Water Act Section 404 violations that occurred when portions of the site were graded prior to issuance of a Section 404 permit. AMEC's services include field reconnaissance to identify and establish boundaries of Section 404 jurisdictional areas on the project site and identification of biological resources.

Section 404 Permitting WACOG Air Industrial Park, AMEC Infrastructure/Lake Havasu City ($59,400, 6114003056)**:** Ms. Rothbard is the environmental scientist/botanist for Clean Water Act Section 404 permitting services related to the development of an industrial park near the Lake Havasu City airport. AMEC's environmental services for this project include review of previous environmental documents for the project area, review of grant funding pathways to determine if NEPA documentation is necessary, and preparation of a Section 404 individual permit application. The Section 404 documentation will include verification of previously delineated limits of waters of the United States, an environmental assessment (EA) prepared in accordance with U.S. Army Corps of Engineers guidelines, and a compensatory mitigation and monitoring plan.

Section 404 Jurisdictional Delineation, Florence Military Reservation, Pinal County, Arizona: Ms. Rothbard completed a Section 404 Jurisdictional Delineation for waters of the United States, at 20 utility road crossings at Florence Military Reservation, using the U.S. Army Corps of Engineers guidelines for determining waters of the United States in arid regions.

Section 404 Jurisdictional Delineation and Permitting, Prospectors Road, Pinal County, Arizona: Ms. Rothbard served as environmental scientist/botanist for a Section 404 Jurisdictional Delineation and permit application associated with improvements to Prospectors Road in Apache Junction, Arizona. Ms. Rothbard's responsibilities included the field reconnaissance for the jurisdictional delineation, botanical survey, and production of a Section 404 Jurisdictional Delineation report and permit application.

Botanical/Biological Surveys

Palmdale Power Plant Biological Surveys, Palmdale, California. (April 2008): Ms. Rothbard performed biological surveys in the right of way of a high voltage power line. These surveys included rare and sensitive plants, desert tortoise (*Gopherus agassizii*), and burrowing owl (*Athene cunicularia*) surveys.

Noxious Weed Survey for Palo Verde-North Gila 500kV Conductor Maintenance Project, Arizona Public Service and BLM Yuma Field Office, Yuma to Gila Bend, Arizona (May 2006): Ms. Rothbard managed and performed a noxious weed survey in the right of way of a high voltage power line. All plant identification, vegetative habitat determination, and technical writing was performed by Ms. Rothbard. The project received funding through Arizona Public Service however all data collection was performed on state and federal lands including BLM and the Yuma Proving Grounds.

Rare Plant Survey of 6 Mow Areas for the Prescott 500kV Transmission Line Maintenance Project, Chino Valley Ranger District, Prescott National Forest, Arizona. (Spring 2006): Ms. Rothbard managed and performed a plant survey for rare and sensitive plant species in the right of way of a high voltage power line. All plant identification, vegetative habitat determination, and technical writing was performed by Ms. Rothbard. The project received funding through Arizona Public Service however all data collection was performed on the Prescott National Forest.

Rangeland Survey of the Roswell Grazing Allotment, BLM Roswell Field Office, New Mexico. (Oct 2005): Ms. Rothbard performed plant identification, biomass determination, and species richness and diversity classification on grazing allotments in the Roswell, New Mexico area. Funding was provided by the BLM Roswell Field Office however the project was managed by Southwest Botanical Research, Chino Valley, Arizona.

Arizona State University Central Arizona Project – Long-Term Ecological Research, Phoenix, Arizona. (2004-2005): Ms. Rothbard performed arthropod collections and identification, native and non-indigenous plant identification, vegetation sampling and monitoring at over 32 sites in the Phoenix Metro Area. Funding was provided by the National Science Foundation however all work was managed and performed by the International Institute for Sustainability at Arizona State University.

Environmental Site Assessments

City of Phoenix On-Call Environmental Site Assessments and Biological Surveys (2006, multiple projects)**:** Ms. Rothbard is assisting in numerous Phase I Environmental Site Assessments for the City of Phoenix. For these projects, the City of Phoenix has asked that AMEC include requirements of the All Appropriate Inquiry Rule into the assessments. This contract involves properties associated with Light Rail Transit, the Community Noise Reduction Program, and Tres Rios. The properties include right-of-way in urban areas, undeveloped parcels, residential parcels, and agricultural land.

Publications

Dierig, D.A., Tomasi, P.R., Dahlquist, G.H., **Dawson, H.K***. Measurements of *Lesquerella* Interspecific Hybrids and Parents. Abstract 2003.

Dierig, D.A., Rodriguez, D., Foster, M.A., Grieves, C.M., **Dawson, H.K***., Rodriguez, R. Effects of Salinity on *Lesquerella* at Three Locations. Agronomy Abstracts. 2003.

*Dawson was Ms. Rothbard's married name at the time of publication.

DESERT TORTOISE MONITOR AND BIOLOGIST
RESPONSIBILITIES AND QUALIFICATIONS

DESERT TORTOISE MONITOR -- Approved by the Fish and Wildlife Service to monitor project activities within desert tortoise habitat, ensure proper implementation of protective measures, and record and report desert tortoise and sign observations in accordance with approved protocol, report incidents of noncompliance in accordance with a biological opinion or permit, move desert tortoises from harm's way when desert tortoises enter project sites and place these animals in relocation areas preselected by authorized biologists or maintain the desert tortoises in their immediate possession until an Authorized Biologist assumes care of the animal. Monitors assist qualified biologists during surveys and often serve as "apprentices" under the biologist to acquire experience. Monitors are not authorized to conduct presence/absence or clearance surveys unless directly supervised by an authorized biologist; "directly supervised" means the authorized biologist is direct voice and sight contact with the monitor. A desert tortoise monitor must have thorough knowledge of desert tortoise behavior, natural history, and ecology, and demonstrated substantial field experience and training to successfully:

- handle desert tortoises
- relocate desert tortoises

AUTHORIZED BIOLOGIST – Approved by the Fish and Wildlife Service to conduct all activities described in the previous section for desert tortoise monitors, and to locate desert tortoises and their sign (i.e., conduct presence/absence and clearance surveys) and ensuring that the effects of the project on the desert tortoise and its habitat are minimized in accordance with a biological opinion or permit. An authorized biologist must have thorough knowledge of desert tortoise behavior, natural history, and ecology, and demonstrated substantial field experience and training to successfully:

- handle desert tortoises
- excavate burrows to locate desert tortoise or eggs
- relocate desert tortoises
- reconstruct desert tortoise burrows
- unearth and relocate desert tortoise eggs
- locate, identify, and record all forms of desert tortoise sign

GENERAL DESERT TORTOISE BIOLOGIST/MONITOR QUALIFICATIONS STATEMENT

This form should be used to provide your qualifications to handle desert tortoises during construction or other projects authorized under Sections 7 or 10 (HCPs) of the Endangered Species Act. If you seek approval to attach/remove/insert any devices or equipment to/into tortoises, withdraw blood, or conduct other procedures on desert tortoises, a recovery permit or similar authorization may be required. Application for a recovery permit requires completion of Form 3-200. Supplemental information for the recovery permit application should be provided with the form, *Statement of Skills and Experience with Specialized Desert Tortoise Procedures* which is available from a U.S. Fish and Wildlife Service Field Office.

1. Contact Information:

Name	**Dennis Strong**
Address	**23143 Canyon Estates Drive**
City, State, Zip Code	**Corona, Ca. 92883**
Phone Number(s)	**(951) 316-9279**
Email Address	**Getulus20@aol.com**

2. Date of Statement: 1/23/06

3. States in which authorization is requested (check all that apply):

☐ California X Nevada ☐ Utah ☐ Arizona

4. if authorization is sought for desert tortoise work under a Biological Opinion (BO) or Habitat Conservation Plan (HCP), provide the following:

USFWS BO or HCP Number		**Date:**
Project Name		
Federal Agency		
Proponent or Contractor		

5. Specify project and/or activities anticipated that require authorization (e.g. capture/release, weigh, measure, attach and remove telemetry devices and other hardware, etc.). Specifically reference the relevant document and page numbers with authorizing statements (e.g., BO, page 19, terms and conditions 6, 7, and 8):

6. If you hold, or have held, any relevant state or federal wildlife permits, provide the following:

Dates	
Species	
State (specify) or Federal Permit Number	
Authorized Activities	

7. Education (provide up to three):

Institution	Dates attended	Major/Minor	Degree received
1. California State University, Fullerton	1996	Biology	Master of Arts
2. California State University, Fullerton	1989	Biology	Batchelor's of Arts
3.			

8. Desert Tortoise Training:

Name/Type of Training	Dates (From/To)	Location	Instructor/Sponsor
1. Attended class on the proper way to process and pit tag desert tortoises.	**1995**	**Fort Irwin Army Base**	**Chambers Group Environmental Consultants**
2. Attended the Desert Tortoise Council Workshop and observed a U.S. Fish and Wildlife Service approved demonstration of the appropriate way to trans-locate tortoise eggs out of harms way. Also observed a U.S. Fish and Wildlife Service approved demonstration of the appropriate way to construct artificial tortoise burrows.	**1995 & 2003**	**Ridgecrest, Ca.**	**Desert Tortoise Council**
3.			
4.			

9. Experience – Complete for each position held, attach additional sheets as necessary. Include only those positions relevant to the requested work with desert tortoises. Distinguish between Mojave Desert tortoise and other experience. Include only your experience, not information for the project you worked on (e.g. if 100 tortoises were handled on a project and you handled 5 of those tortoises, include only those 5). Add more lines, as necessary.

General Field Experience:

Project Name & Job Title	Dates (From/To)	Job Duties & Responsibilities/ Skills Used or Acquired
1. **P.F. Net, Fiber Optic Environmental Compliance, 2473, AT&T Nexgen /Core, Los Angeles to San Diego To Blythe, CA Environmental Inspector and Resource Specialist - 2003** .	**Oct. 2003**	Responsibilities include inspection for environmental mitigation measure compliance, identification, delineation and monitoring of biological resources (including Desert Tortoise), wetlands and water crossings along a fiber optic right-of-way in Southern California.

Project Name & Job Title	Dates (From/To)	Job Duties & Responsibilities/ Skills Used or Acquired
2. **Larson Lane Gravel Pit Desert Tortoise Clearance, Las Vegas NV; Tortoise Handler – 2003**	**July 2003**	Helped survey the 640-acre gravel pit for desert tortoises and the subsequent removal and relocation. Helped supervise the team's salvage of over twenty desert tortoises
3. **Kern River Pipeline, Barstow CA; Field Crew Leader for Spread 9 – 2002, 2003**	**Oct. 2002 – May 2003**	Responsible for overseeing 45 tortoise biologists and monitors over an 80-mile gas pipeline installation and was also a certified tortoise handler (USFW & CDFG) for this spread. The following is a list of personal contributions to helping protect the desert tortoise on this project.• Personally helped construct four (4) . Tortoise pens. • Personally removed 35 tortoise pens. • Personally monitored 40 tortoises . . Pens. • Personally walked two (2) tortoises . From their pens. • Personally excavated and relocated one (1) tortoise from its burrow on the right of way to a new burrow safely off the right of way. Also monitored this tortoise for several days afterward as per biological opinion. • Personally moved seven (7) tortoises on an emergency basis. • Lead pre-construction surveys and personally found 15 tortoises, 403 burrows, 33 scats, and six (6) bones. • Personally salvaged one (1) starving and blind tortoise from the right of way. Helped rehabilitate and then return to the wild (as per direction of USFW, CDFG, BLM & Project Biologist).

Project Name & Job Title	Dates (From/To)	Job Duties & Responsibilities/ Skills Used or Acquired
4. *Fort Irwin Army Base, San Bernadino, Ca; Tortoise Handler*	**1995**	**-** In 1995 while working with the Chambers Group at Fort Irwin, Ca. I received Desert tortoise training from Mr. Scott Rolands of the Chambers Group and personnel from Fort Irwin's Natural resources department. The training covered proper handling of Desert tortoise so as not to spread disease between humans and tortoises, and between tortoise populations. Other techniques learned included: total processing of Desert tortoises (i.e. capturing without inducing urination, measuring, weighing, sexing, checking general health, pit tagging, and re-releasing animals after processing). The Natural Resource Department at Fort Irwin also showed us a tortoise with Upper Respiratory Disease (URD) so we could learn first hand how to tell if a tortoise has active URD's. I saw and processed dozens of tortoises on this job. This project was commissioned by Fort Irwin in order to construct a habitat quality index based on several years of recapture data. We walk 100 % coverage surveys on the south end of the base and I personally walked over 100 miles of transects. The transects were walked in the spring and consisted of approximately 4 to 10 miles a day depending on how many tortoises had to be processed.

Total Field Experience:

a. Number of hours or 8-hour days (specify) conducting desert tortoise-related activities (referenced above): Thousands of hours over the past twenty years.

b. Number of miles/kilometers walked conducting survey transects: Thousands of miles over the past twenty years.

c. Number of wild, free-ranging desert tortoises you encountered; <100 mm carapace length: > 50

>100 mm carapace length: > 1000

d. Number of wild, free-ranging desert tortoises you personally handled (circle one for each size category);

<100 mm carapace length:

Zero <10 <u>10-50</u> 50-100 100-200 >200

>100 mm carapace length:

Zero <10 10-50 50-100 100-200 <u>>200</u>

e. Number of captive-held tortoises you personally handled (circle one for each size category);

<100 mm carapace length:

Zero <10 <u>10-50</u> 50-100 100-200 >200

>100 mm carapace length:

Zero <10 <u>10-50</u> 50-100 100-200 >200

f. Number of telemetry devices you personally attached to wild, free-ranging desert tortoises (circle one for each size category);

<100 mm carapace length:

<u>Zero</u> <10 10-50 50-100 100-200 >200

>100 mm carapace length:

<u>Zero</u> <10 10-50 50-100 100-200 >200

g. Number of telemetry devices you personally attached to captive-held desert tortoises (circle one for each category);

<100 mm carapace length:

<u>Zero</u> <10 10-50 50-100 100-200 >200

>100 mm carapace length:

<u>Zero</u> <10 10-50 50-100 100-200 >200

Total Field Experience Continued:

h. Number of telemetry devices you personally removed from wild, free-ranging desert tortoises (circle one for each size category);

<100 mm carapace length:

Zero **<10** **10-50** **50-100** **100-200** **>200**

>100 mm carapace length:

Zero **<10** **10-50** **50-100** **100-200** **>200**

i. Number of telemetry devices you personally removed from captive-held desert tortoises (circle one for each category);

<100 mm carapace length:

Zero **<10** **10-50** **50-100** **100-200** **>200**

>100 mm carapace length:

Zero **<10** **10-50** **50-100** **100-200** **>200**

j. Number of blood-withdrawal events that you personally conducted on wild, free ranging desert tortoises (circle one for each size category);

<100 mm carapace length:

Zero **<10** **10-50** **50-100** **100-200** **>200**

>100 mm carapace length:

Zero **<10** **10-50** **50-100** **100-200** **>200**

k. Number of blood-withdrawal events that you personally conducted on captive-held desert tortoises (circle one for each size category);

<100 mm carapace length:

Zero **<10** **10-50** **50-100** **100-200** **>200**

>100 mm carapace length:

Zero **<10** **10-50** **50-100** **100-200** **>200**

l. Experience conducting other procedures on wild, free-ranging desert tortoises;
Specify type of procedure: Weight, measure, sex, inspect health, relocate and pit tag.

<100 mm carapace length:

Zero **<10** **10-50** **50-100** **100-200** **>200**

>100 mm carapace length:

Zero **<10** **10-50** **50-100** **100-200** **>200**

Total Field Experience Continued:

m. Experience conducting other procedures on captive-held desert tortoises;
Specify type of procedure:

<100 mm carapace length:

Zero	<10	10-50	50-100	100-200	>200

>100 mm carapace length:

Zero	<10	10-50	50-100	100-200	>200

n. Prior authorizations for desert tortoise under Biological Opinions or Habitat Conservation Plans (specify number, date, project name and location). Do not reiterate "general field experience" information:

10. List 3 references that can verify your field qualifications and skills:

Name	Employer/Position	Address/Location	Phone Number	Email
1. Rick Goette	Applied Bio	4012 S Rainbow Blvd K192 Las Vegas, Nv. 89103	(702) 596-4346	Appliedbio@aol.com
2. Steve Ferrand	Nevada biological Consultants	P.O. Box 3 Searchlight, Nv. 89046	(702) 296-1616	Lizards@powernet.net
3. Jon Martin	Blue Zoo	Vancouver, Wa.	(360) 607-2843	

I certify that the information submitted in this form is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to the criminal penalties of 18 U.S.C. Ch.47, Sec. 1001.

Signed: _____

Date: January 23, 2006

Form Revised December 2005 ALS

Attachment WATER-1

Kennedy/Jenks Consultants

16855 W. Bernardo Dr.
Suite 360
San Diego, CA 92127
(858) 676-3620
(858) 676-3625 (Fax)

Final Facilities Planning Report, Antelope Valley Recycled Water Project

8 August 2006

Prepared for

Los Angeles County Waterworks District No. 40
900 South Fremont Avenue
Alhambra, CA 91803-1331

K/J Project No. 0589030

Table of Contents

List of Tables

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List of Abbreviations

AACE - American Association of Cost Engineers

AAD – Average Annual Demand

ADD – Average daily demand

Acre-feet – AF

AFY – AF per year

AMD – average monthly demand

APN – Assessors Parcel Number

ASR – Aquifer Storage and Recovery

AVEK – Antelope Valley-East Kern Water Agency

AVFPR – Antelope Valley Facilities Planning Report

AVTTP – Antelope Valley Tertiary Treatment Plant

BMP – Best management practices

BOD – Biochemical Oxygen Demand

CalTrans Right-of-Way – California Department of Transportation Right-of-Way

CAO – Cleanup And Abatement Order

CAS – conventional activated sludge

CDO – Cleanup and Desist Order

CEQA – California Environmental Quality Act

cfs – cubic feet per second

CIMIS – California Irrigation Management Information System

CIP – capital improvement program

CSDLAS – County Sanitation Districts of Los Angeles County

CUWCC – California Urban Water Conservation Council

DFG – California Department of Fish and Game

DHS – California Department of Health Services

District No. 14 – Los Angeles County Sanitation District No. 14

District No. 20 – Los Angeles County Sanitation District No. 20

DWR – State Department of Water Resources

EAFB – Edwards Air Force Base

EDU – Equivalent Dwelling Unit

ENR – Engineering News-Record

EPA – Environmental Protection Agency

GIS – Geographic Information System

GPM – Gallons per minute

GWMP – Groundwater Management Plan

HCF – Hundred Cubic Feet

HDPE – High Density Polyethylene

HGL – hydraulic grade line

HOA – Homeowners Association

IS/MND – Initial Study/Mitigated Negative Declaration

LACWW40 – Los Angeles County Waterworks District No. 40

LAWA – Los Angeles World Airports

LCID – Littlerock Creek Irrigation District

LLUP Map – Local Land Use Planning Map

LWRP – Lancaster Water Reclamation Plant

MG – Million gallons

mgd – Million gallons per day

mg/l – Milligrams per liter

MOU – Memorandum of Understanding

MPN – Maximum probable number

NPDES – National Pollutant Discharge Elimination Systems

O&M – Operational and Maintenance

PDD – Peak Day Demand

PHD – Peak Hour Demand

PID – Palmdale Irrigation District

PWD – Palmdale Water District

PWRP – Palmdale Water Reclamation Plant

ppm – Parts per million

Purple Book – Excerpts from The Heath and Safety Code, Water Code, and Titles 22 and 17 of the California Code of Regulations

QHWD – Quartz Hill Water District

RCSD – Rosamond Community Services District

RW – Recycled Water

RWQCB-LR – Regional Water Quality Control Board, Lahontan Region

RWWTP – Rosamond Wastewater Treatment Plant

RWQCB – Regional Water Quality Control Board

SCAG – Southern California Association of Governments

SWP – State Water Project

SWRCB – State Water Resources Control Board

SWTR – Surface Water Treatment Rule

TDS – Total Dissolved Solids

TSS – Total Suspended Solids

Units – hundred cubic feet (HCF)

USBR – U.S. Bureau of Reclamation

USGS – U.S. Geological Survey

UV – Ultraviolet

UWMP – Urban Water Management Plan

WDR – Waste Discharge Permit

WQO – Water Quality Objectives

WRF – Water Reclamation Facility

WSA – Water Supply Assessment

WTP – Water Treatment Plant

WWMP – Wastewater Master Plan

WWTP – Wastewater Treatment Plant

Section 1: Executive Summary

1.1 Overview

Los Angeles County Waterworks District No. 40 (LACWW40) prepared this Antelope Valley Facilities Planning Report (AVFPR) to apply for financial assistance from the State Water Resources Control Board (SWRCB) Proposition 50 Recycled Water Construction Grants program. This report is written in accordance with the SWRCB Recycled Water Funding Guidelines (Guidelines).

As described in the Guidelines, the AVFPR gives background information of the study area (Section 2), water supply (Section 3), and wastewater supply (Section 4); provides requirements for treatment (Section 5); provides a market assessment of potential recycled water users (Section 6); develops and evaluates alternatives for delivering recycled water (Section 7); recommends an alternative and gives reasoning for the preferred alternative (Section 8); and presents a construction financing plan and revenue program (Section 9).

1.2 Benefits of the Recycled Water Facilities Plan

If implemented, this project will generate many benefits, which include:

- Saving a significant amount of potable water currently provided either by local groundwater, local surface water or from imported State Water Project (SWP);
- Potential to provide water for recharging the Antelope Valley's groundwater basin;
- Saving money that is currently being spent for potable water;
- Providing a valuable alternative for effluent management; and
- Promoting the State's policies of beneficial reuse of recycled water to replace potable water where possible.

1.3 Facility Planning Considerations

Costs, convenience (location, ability to join the system), and technical elements (peak flows, pressure) were given consideration for the planning of facilities. By taking a range of different considerations into account, alternative systems with the ability to deliver the desired amount of recycled water were developed.

1.4 Recommended Project

The recommended project described in Table 1 was developed through hydraulic modeling analysis and is the most convenient and has the lowest cost. On a phase-by-phase basis, the table describes area served, estimated annual volume delivered, facilities for conveyance, treatment, and storage, and construction capital costs for the alternative. Capital costs include construction, construction management, and engineering. Operation

and Maintenance (O&M) costs include labor, chemicals, energy and equipment replacement, if necessary. The phased facilities are shown on Figure 1 and Figure 2. Please note that only Phases 1A-4 is included in this Facilities Planning Report.

1.5 Estimated Cost per Acre-foot Recycled Water Delivered

The value of each phase of this proposed system is also represented in terms of the quantity of demand served. The capital and O&M costs applied over 20 years are used to generate a life-cycle cost for the project per year. This life-cycle cost is then divided by the total acre-feet of recycled water that is being delivered per phase to arrive at $/AFY. The $/AFY for each phase is shown below in Table 1.

1.6 Summaries of Existing Antelope Valley Reports Relevant to Recycled Water

In this section, brief discussions of existing Antelope Valley reports relevant to recycled water are presented. Detailed summaries are included in Appendix A.

Antelope Valley Water Resources Study, Kennedy/Jenks Consultants, November 1995

The primary objective of the Antelope Valley Water Group's water resource study was to develop consensus on a water resource management plan that addresses the need of the municipal and industrial purveyors to reliably provide the quantity and quality of water necessary to serve the growth projected by the planning agencies while concurrently addressing the need of agricultural users to have adequate supplies of reasonable cost irrigation water. Recycled water was one of several water supply alternatives discussed in this study.

Reclamation Concept and Feasibility Study (Draft Report), Metcalf & Eddy, July 1997

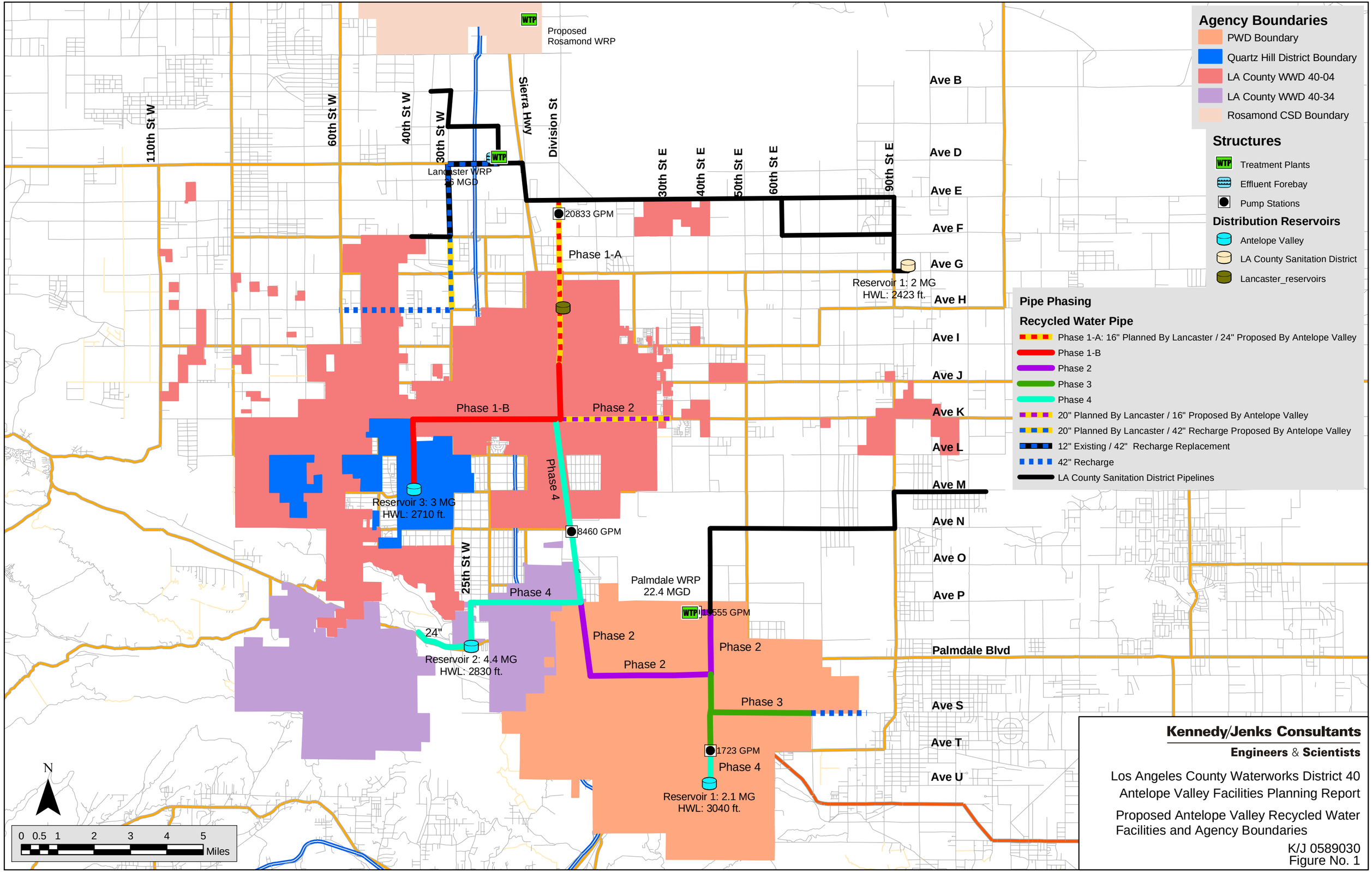
The purpose of this report was to develop a conceptual reclamation program and to evaluate the feasibility of its implementation. An analysis of recycled water use was included as part of a regional water supply study (*Antelope Valley Water Resource Study*, 1995) and this feasibility study was focused on a refinement of the previous analysis with an emphasis on providing recycled water to proposed projects being considered by the City of Palmdale, in addition to providing recycled water to existing parks, schools and golf courses.

Palmdale Water Reclamation Concept Study, Kennedy/Jenks Consultants, June 2000

The purpose of the Water Reclamation Concept Study was to evaluate three potential conceptual uses of recycled water produced by the Palmdale Water Reclamation Plant, owned and operated by County Sanitation Districts of Los Angeles County, District No. 20. The concepts considered included the following:

1. Discharge of effluent into existing sand and gravel pits located in the eastern portion of the City of Palmdale to create a recreational facility.

2. Recharge of local groundwater basins with highly treated effluent.



Agency Boundaries

- PWD Boundary
- Quartz Hill District Boundary
- LA County WWD 40-04
- LA County WWD 40-34
- Rosamond CSD Boundary

Structures

- Treatment Plants
- Effluent Forebay
- Pump Stations

Distribution Reservoirs

- Antelope Valley
- LA County Sanitation District
- Lancaster_reservoirs

Pipe Phasing

Recycled Water Pipe

- Phase 1-A: 16" Planned By Lancaster / 24" Proposed By Antelope Valley
- Phase 1-B
- Phase 2
- Phase 3
- Phase 4
- 20" Planned By Lancaster / 16" Proposed By Antelope Valley
- 20" Planned By Lancaster / 42" Recharge Proposed By Antelope Valley
- 12" Existing / 42" Recharge Replacement
- 42" Recharge
- LA County Sanitation District Pipelines

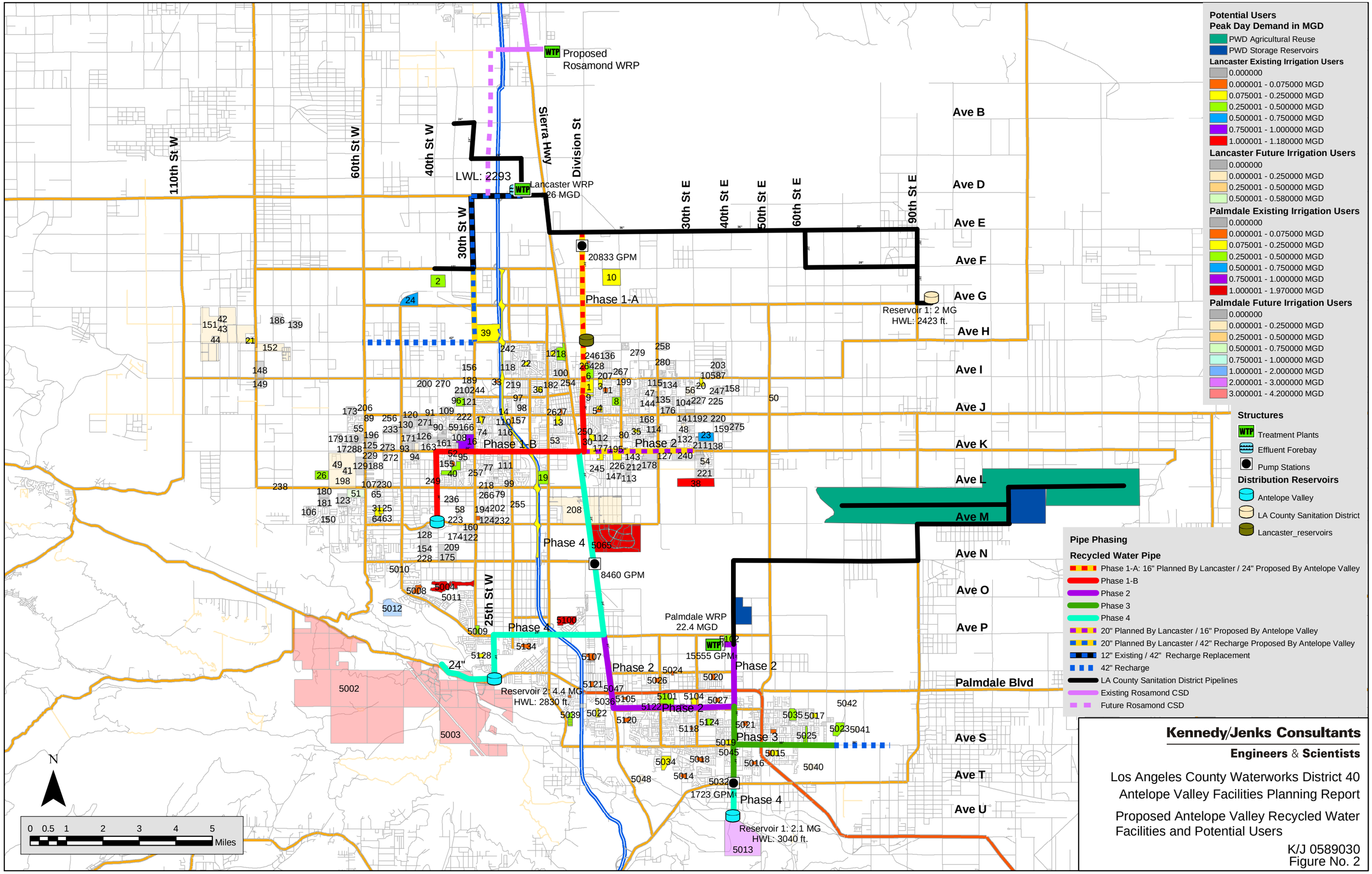
Kennedy/Jenks Consultants

Engineers & Scientists

Los Angeles County Waterworks District 40
Antelope Valley Facilities Planning Report

Proposed Antelope Valley Recycled Water Facilities and Agency Boundaries

K/J 0589030
Figure No. 1



Kennedy/Jenks Consultants

Engineers & **Scientists**

Los Angeles County Waterworks District 40
Antelope Valley Facilities Planning Report

Proposed Antelope Valley Recycled Water Facilities and Potential Users

K/J 0589030
Figure No. 2

- Option 1 - Excludes total dissolved solids (TDS) reduction (includes TOC reduction with granular activated carbon)

- Option 2 – Includes TDS reduction with reverse osmosis

3. Discharge of highly treated effluent into Lake Palmdale, which serves as the forebay for the Palmdale Water District Water Treatment Plant.

Each of these alternatives was evaluated at the conceptual level in an effort to identify feasibility and preliminary costs.

The findings of the Study indicated that utilizing effluent for recreational purposes within gravel pits would not result in the utilization of a significant quantity of effluent. With this finding, such use was found not to be feasible unless combined with another alternative.

The introduction of highly treated effluent into Lake Palmdale was not considered feasible; as such discharge would not comply with the preliminary requirements established by the California Department of Health Services for a similar proposal developed by the City of San Diego.

The third alternative, discharge of highly treated effluent into local groundwater basins, was been found to be technically feasible and would have costs similar to alternative water supplies available within the Antelope Valley region.

Implementing a groundwater recharge program would require resolution of a number of key regulatory issues, the outcome of which could greatly impact the cost of the program.

Lancaster Water Reclamation Plant (LWRP) 2020 Facilities Plan, Environmental Science Associates, May 2004

The objectives of the LWRP 2020 Plan are as follows:

1. Provide wastewater treatment and effluent management capacity adequate to meet the needs of District No. 14 through the year 2020 in an environmentally sound and cost-effective manner;
2. Eliminate unauthorized effluent-induced overflows from Piute Ponds to Rosamond Dry Lake in the most expeditious manner possible and in consideration of the Regional Water Quality Control Board – Lahontan Region (RWQCB-LR), in order to avoid any threatened nuisance condition as determined by Edwards Air Force Base (EAFB);
3. Ensure recycled water of sufficient quality and quantity is available to satisfy emerging municipal reuse needs; and
4. Comply with the requirements to maintain Piute Ponds.

The LWRP 2020 Plan recommended project, *26* million gallons per day (mgd) Conventional Activated Sludge (CAS)/Tertiary Treatment, Agricultural Reuse, and Storage Reservoirs, addresses the objectives listed above.

Palmdale Water Reclamation Plant (PWRP) 2025 Facilities Plan and Environmental Impact Report, Environmental Science Associates, October 2005

The overall goal of the PWRP 2025 Plan is to identify a project that meets the wastewater treatment and effluent management needs of District No. 20 through year 2025 in a cost-effective and environmentally sound manner. To meet the above-listed needs, the objectives of the PWRP 2025 Plan are as follows:

- Provide wastewater treatment capacity adequate to meet the needs of District No. 20 through the year 2025;
- Provide effluent management capacity adequate to meet the needs of District No. 20 through the year 2025;
- Provide a long-term solution for meeting water quality requirements set forth by regulatory agencies; and
- Provide a wastewater treatment and effluent management program that accommodates emerging recycled water reuse opportunities.

The major components of the recommended project are wastewater treatment facilities, effluent management facilities, and municipal reuse. Some processes of the wastewater treatment and effluent management facilities will be constructed to upgrade the treatment and effluent management level currently provided at the PWRP. For other processes, facilities will be expanded from 15.0 mgd to 22.4 mgd. These changes will be performed in stages.

Table 1: Summary of Recommended Alternative

Phase	Area Served	Annual Volume RW Delivered (AFY & MG/yr)		Conveyance, Treatment, Storage Facilities	Capital Costs	Annual O&M Costs	Total Capital and O&M Cost Per Year[1]	Total Cost Per Year Per AF RW Delivered
Phase 1A	Backbone from LWRP	786	256	24,200 LF of 24-inch diameter pipeline (increased Lancaster pipeline sizing from 16-inch)	$4,027,000	N/A [2]	N/A	N/A
Phase 1B	Western Lancaster	2,161	704	39,000 LF of 24-inch diameter pipelines, 3.0 MG reservoir and 1 LWRP PS @ 20,833 gpm	$27,958,000	$485,600 [3]	$2,639,000	$895
Phase 2	Eastern Lancaster and first phase backbone from PWRP	2,076	676	56,000 LF of 16-inch to 36-inch diameter pipelines, 1 PWRP PS @ 15,555 gpm	$33,316,000	$853,500	$3,093,000	$1,490
Phase 3	Existing and Future Palmdale	1,295	422	26,000 LF of 14- inch to 36-inch diameter pipelines,	$17,168,000	$294,400	$1,448,400	$1,119
Phase 4	Existing and Future Palmdale and Connecting backbones of LWRP and PWRP	7,013	2,285	57,000 LF of 14-inch to 24-inch diameter pipeline, 1 booster PS @ 1,725 gpm, 1 booster PS @ 8,460 gpm, 1 storage tank @ 2.1 MG 1 storage tank @ 4.4 MG	$36,715,000	$1,819,600	$4,287,600	$611

[1] *Capital costs annualized over 20 years at 2.7 % interest.*
[2] *First phase of City of Lancaster recycled water use program.*
[3] *Includes Phase 1A & 1B operating costs.*

Section 2: Study Area Characteristics

2.1 Project Setting

The Antelope Valley encompasses approximately 2,400 square miles in northern Los Angeles County, southern Kern County and western San Bernardino County. The area is bordered on the southwest by the San Gabriel Mountains, on the northwest by the Tehachapi Mountains, and on the east by a series of hills and buttes that generally follow the San Bernardino county line. There are three playa (dry) lakes located in the center of the valley on EAFB: Rosamond Dry Lake, Rogers Dry Lake and Buckhorn Dry Lake. Major communities within the valley include Boron, EAFB, Lancaster, Mojave, Palmdale and Rosamond. The vicinity map is provided on Figure 3.

2.1.1 Topography

The topography of the Antelope Valley includes a relatively flat valley with a few occasional buttes and/or rock outcroppings. The valley is surrounded by the San Gabriel Mountains to the southwest, the Tehachapi Mountains to the northwest, and various hills and buttes along the eastern boundary that generally follow the San Bernardino County line. Figure 4 displays the topographical features of the area.

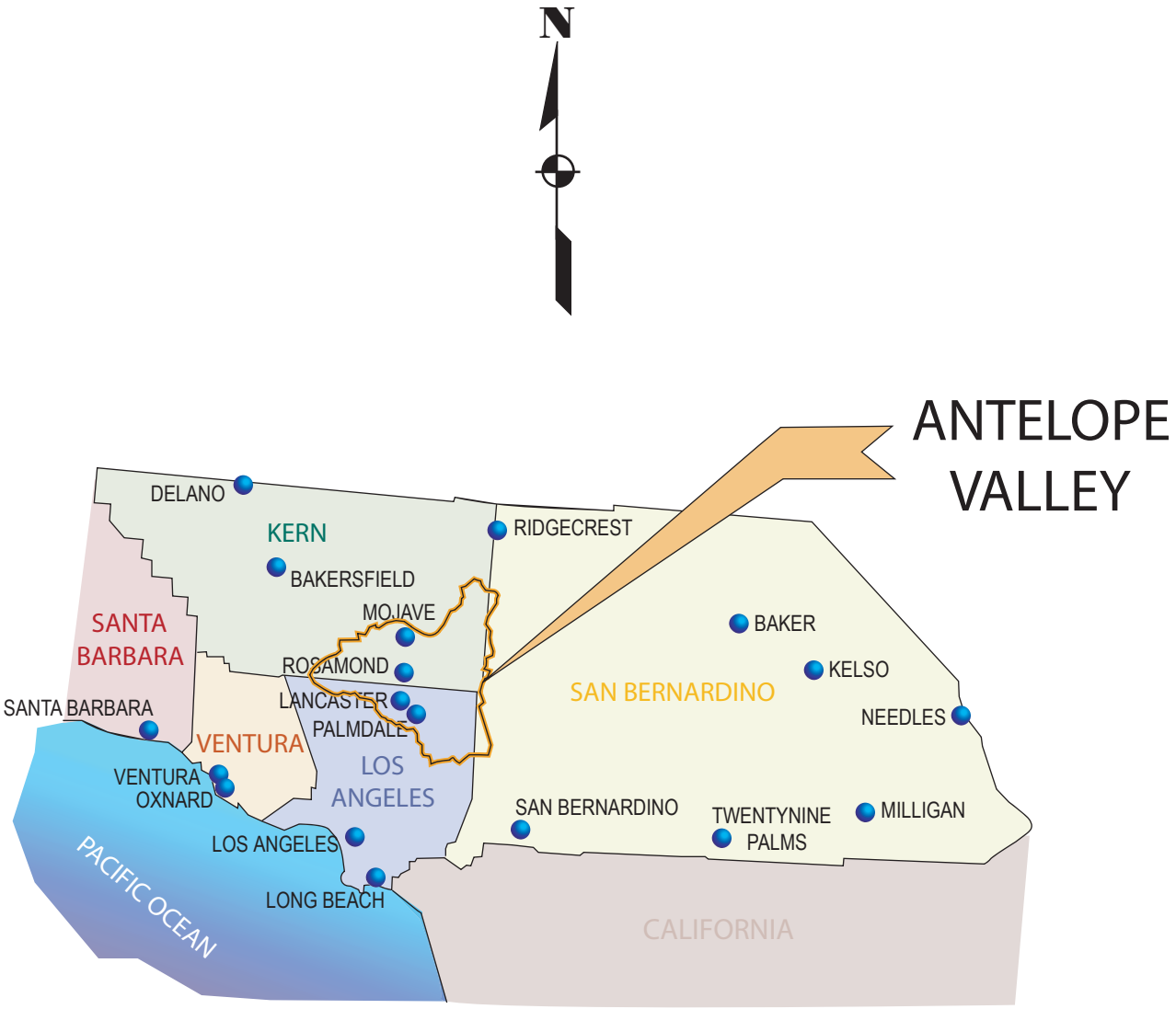
2.1.2 Existing Recycled Water Facilities

Lancaster Water Reclamation Plant (LWRP), Palmdale Water Reclamation Plant (PWRP) and Rosamond Wastewater Treatment Plant (RWWTP) are the three wastewater treatment plants in the Antelope Valley considered for this report. The LWRP is owned and operated by the Los Angeles County Sanitation District No. 14 (District No. 14). The PWRP is owned and operated by the Los Angeles County Sanitation District No. 20 (District No. 20). The RWWTP is owned and operated by the City of Rosamond.

Currently, these three plants primarily provide secondary treated effluent. The only existing recycled water facility that is treated to a tertiary level is a small percentage of the wastewater at the LWRP through additional onsite facilities (0.6 mgd capacity) known as the Antelope Valley Tertiary Treatment Plant (AVTTP). This recycled water is conveyed to Apollo Lakes Regional County Park. LWRP, PWRP and RWWTP will all provide tertiary treated effluent with future upgrades. Additional discussion regarding these facilities is found in Section 4.

2.1.3 Study Area Boundaries

The study area for the recycled water project includes the City of Palmdale, City of Lancaster, Los Angeles County Waterworks District No. 40 (LACWW40), Palmdale Water District (PWD), Rosamond Community Services District (RCSD), Quartz Hill Water District (QHWD) and Littlerock Creek Irrigation District (LCID). The study area boundaries are indicated on Figure 5.



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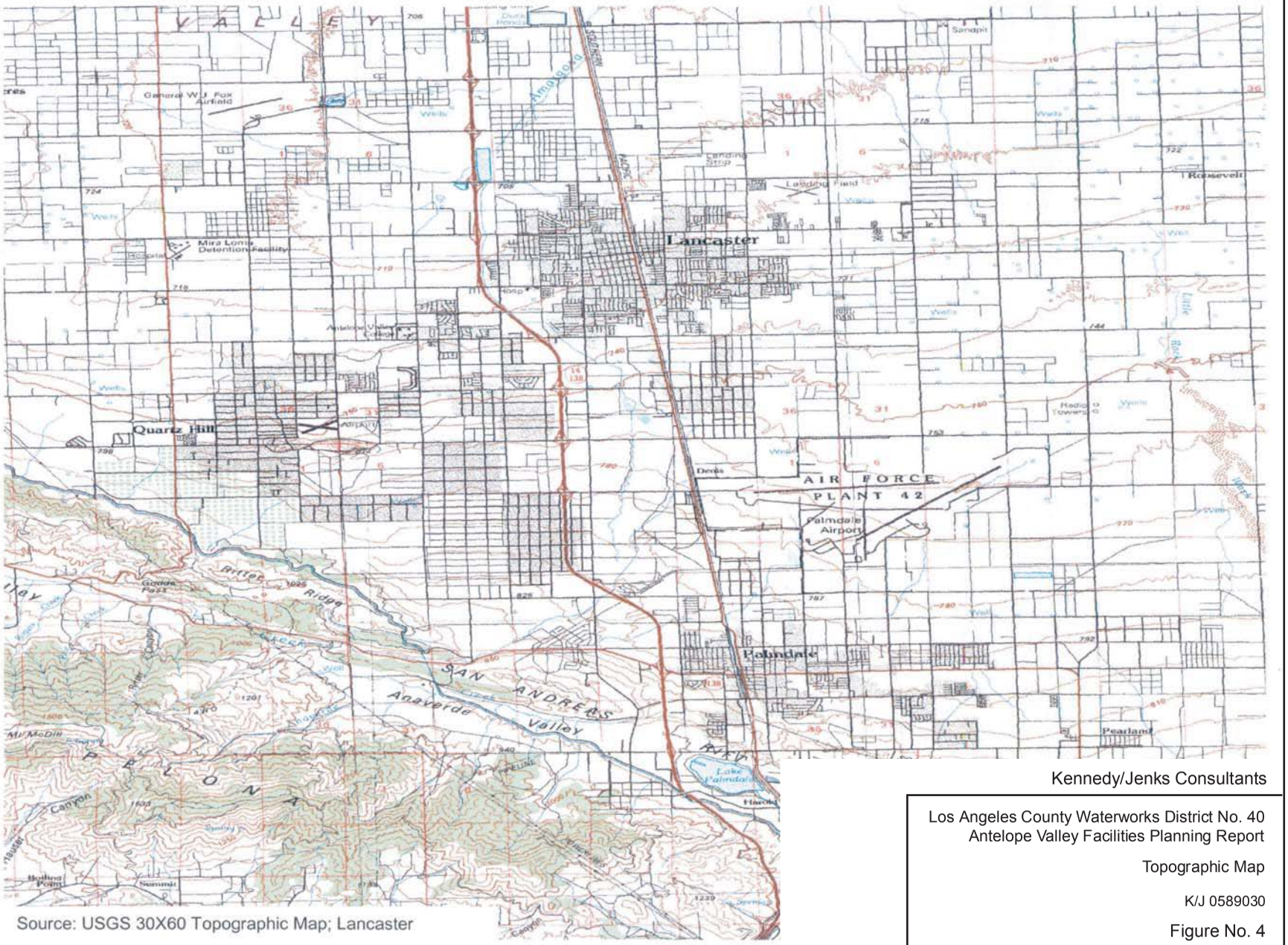
Los Angeles County Waterworks District No. 40
Antelope Valley Facilities Planning Report

Antelope Valley Vicinity Map

K/J 0589030

Figure No. 3

Source: Antelope Valley Water Resource Study
(Kennedy/Jenks Consultants, 1995)



Source: USGS 30X60 Topographic Map; Lancaster

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Los Angeles County Waterworks District No. 40
Antelope Valley Facilities Planning Report

Topographic Map

K/J 0589030

Figure No. 4

Rosamond WWTP

Lancaster WRP

Palmdale WRP

KERN COUNTY

COUNTY

SAN BERNARDINO

NOT TO SCALE

LEGEND

- Laco wwd 40-04, LANCASTER
- Laco wwd 40-24, PEARBLOSSOM
- Laco wwd 40-27, LITTLEROCK
- Laco wwd 40-33, SUN VILLAGE
- Laco wwd 40-34, DESERT VIEW HIGHLANDS
- Laco wwd 40-35, NORTHEAST LA COUNTY
- Laco wwd 40-38, LAKE LOS ANGELES
- Laco wwd 40-39, ROCK CREEK
- QUARTZ HILL WATER DISTRICT
- LITTLEROCK CREEK IRRIGATION DISTRICT
- ROSAMOND BOUNDARY
- LACO BOUNDARY LINE
- CITY OF PALMDALE
- CITY OF LANCASTER
- STUDY AREA BOUNDARY
- PWD BOUNDARY

LACO Sanitation Districts

- District # 14
- District # 20
- WRP/WWTP

Kennedy/Jenks Consultants

Los Angeles County Waterworks District No. 40
Antelope Valley Facilities Planning Report

Study Area Boundary Map

K/J 0589030

Figure No. 5

2.2 Hydrologic Features

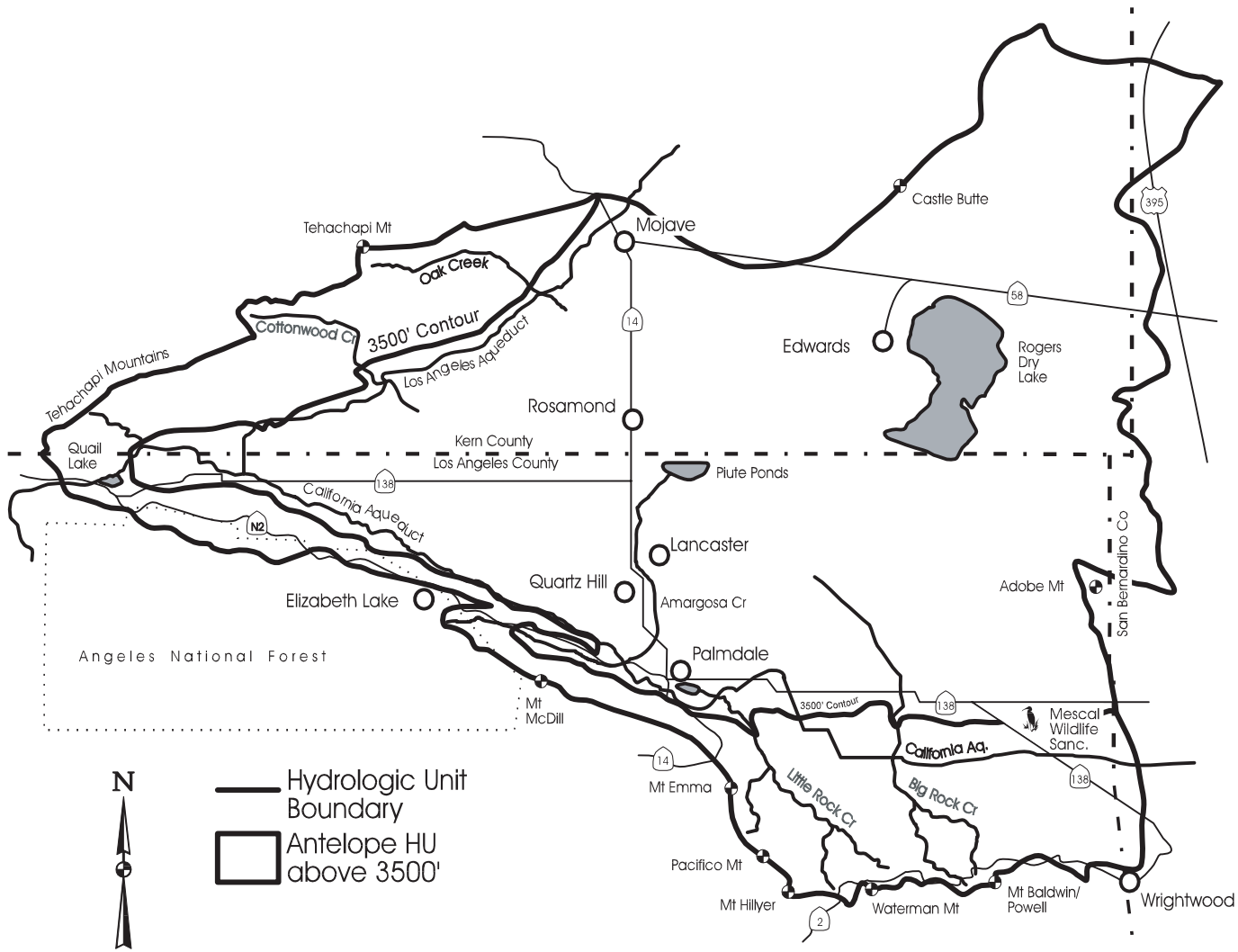
The Antelope Valley is a closed basin. Surface water from the surrounding hills and from the valley floor flow primarily toward three dry lakes on Edwards AFB: Rosamond Lake, Buckhorn Lake and Rogers Lake. Surface water flows are carried by ephemeral streams. The most hydrologically significant streams begin in the San Gabriel Mountains in the southwestern edge of the Valley and include, from east to west, Big Rock Creek, Little Rock Creek and Amargosa Creek. Amargosa Creek runs north/south and is between the Antelope Valley Freeway (14) and Sierra Highway. Except during the largest rainfall events of a season, surface water flows toward the Antelope Valley from the surrounding mountains and quickly percolates into the stream bed and recharges the groundwater basin. Surface water flows that reach the dry lakes are generally lost to evaporation. It appears that little percolation occurs in the Antelope Valley other than near the base of the surrounding mountains due to impermeable layers of clay overlying the groundwater basin. The U.S. Geological Survey (USGS) estimates that nearly 1.4 million acre-feet (AF) of surface water in the Antelope Valley is lost to evapotranspiration each year (USGS, 1987). The hydrologic features are shown on Figures 6 and 7.

Little Rock Creek is the only developed surface water supply in the Antelope Valley. The Little Rock Reservoir, jointly owned by PWD and LCID, collects runoff from the San Gabriel Mountains. The reservoir currently has a useable storage capacity of 3,500 AF of water (PWD Final Water System Master Plan Update {FWSMPU} 2001). Historically, water stored in the Little Rock Reservoir has been used directly for agricultural uses within LCID's service area and for municipal and industrial uses within PWD's service area following treatment at PWD's water purification plant.

2.3 Groundwater Basins

There are two primary aquifers: 1) the principal aquifer and 2) the deep aquifer. The principal aquifer is an unconfined aquifer. Separated from the principal aquifer by clay layers, the deep aquifer is generally considered to be confined. In general, the principal aquifer is thickest in the southern portion of the Valley near the San Gabriel Mountains, while the deep aquifer is thickest in the vicinity of the dry lakes on Edwards Air Force Base. The Antelope Valley Groundwater Basin is divided into twelve subunits, as shown on Figure 7. The subunits are Finger Buttes, West Antelope, Neenach, Willow Springs, Chaffee, Oak Creek, Pearland, Buttes, Lancaster, North Muroc, and Peerless. The groundwater basin is principally recharged by deep percolation of precipitation and runoff from the surrounding mountains and hills.

According to the 1980 DWR report, there is an estimated 68 million AF of total storage capacity and 20 million AF of useable storage in the groundwater basin. According to the USGS, the Antelope Valley groundwater pumping has exceeded recharge every year since the early 1920s (LWRP 2020 Plan).



Source: Lahontan Regional Water Quality Control Board Basin Plan (1995), Figure 4.1-22.

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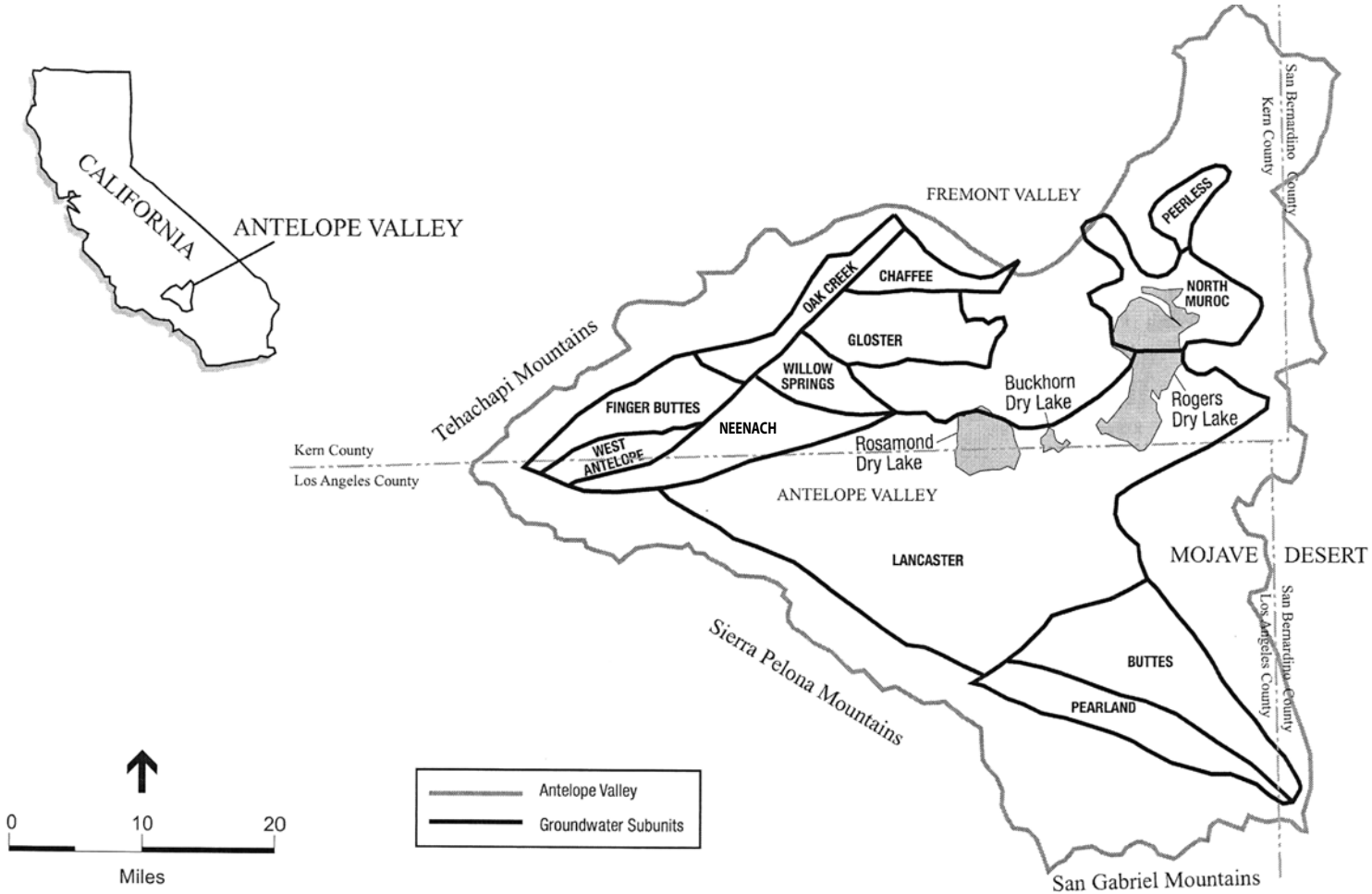
Los Angeles County Waterworks District No. 40
Antelope Valley Facilities Planning Report

Hydrologic Features

K/J 0589030

Figure No. 6



Source: Draft Palmdale Water Reclamation Plant 2025 Facilities Plan and Environmental Impact Report April 2005, Figure 14-3.

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Los Angeles County Waterworks District No. 40
Antelope Valley Facilities Planning Report

Antelope Valley Groundwater Basin

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Figure No. 7

Natural recharge of the groundwater basin is due to infiltration of surface water in the alluvial fan areas at the southern, upstream reaches of Amargosa and Anaverde Creeks and Little Rock and Big Rock Washes at the base of the San Gabriel Mountains. The northern, downstream reaches of the above-mentioned creeks and washes tend to be impervious and any water reaching them evaporates (Final PWRP 2025 Plan and EIR).

In the Lancaster basin, the groundwater generally moves northeasterly from the San Gabriel and Sierra Pelona Mountains to Rosamond and Rogers Dry Lakes. Heavy pumping has caused large groundwater depressions that disrupt this movement. (Final PWRP 2025 Plan and EIR)

A groundwater management plan currently does not exist for the basin as a whole, but one has been developed for the RCSD service area. Although the groundwater basin is not currently adjudicated, an adjudication process has begun and is in the early stages. Since the basin is not adjudicated and has not been deemed in overdraft by DWR, there are no existing restrictions on pumping. However, water rights will be assigned as part of the adjudication process.

2.4 Water Quality

2.4.1 Groundwater Water Quality

Groundwater quality is excellent within the principal aquifer but degrades toward the northern portion of the dry lakes areas. Considered to be generally suitable for domestic, agricultural, and industrial uses, the water in the principal aquifer has a total dissolved solids (TDS) concentration ranging from 200 to 800 milligrams per liter (mg/L). The deep aquifer typically has a higher TDS level. Hardness ranges from 50 to 200 mg/L and high fluoride, boron, and nitrates are a problem in some areas of the basin. The groundwater in the basin is used for agricultural, municipal and industrial uses.

An emerging contaminant of concern is arsenic. In California, there are 763 sources in 404 water systems in 45 counties that show arsenic levels greater than the new federal drinking water standard. (California Department of Health Services, May 2005). Arsenic is a naturally occurring inorganic contaminant often found in groundwater, occasionally found in surface water. Anthropogenic sources of arsenic include agricultural, industrial and mining activities. Arsenic can be toxic in high concentrations. Arsenic is considered a carcinogen when accounting for lifetime exposures.

There has been a drinking water regulation for arsenic since 1975, which included an MCL of 0.05 mg/L (50 ppb). In 2001, US EPA revised the drinking water regulation for arsenic to include an MCL of 0.010 mg/L (10 ppb), effective nationwide (including California) 23 January 2006. The State of California is in the process of developing its own regulation for arsenic in drinking water, which could include a revised, lowered MCL. While by statute, the regulation should have been proposed by 30 June 2004, it is not expected out until the end of 2005. The compliance date for this revised state regulation is the same as the federal rule, 23 January 2006.

Arsenic has been observed in the groundwater for LACWW40, QHWD and RCSD. This is discussed further in Section 3.7.

2.4.2 Surface Water Quality

Littlerock Reservoir is the only developed surface water source in the Antelope Valley. This reservoir collects runoff from the San Gabriel Mountains. The storage capacity of the reservoir is 3,500 AF (PWD FWSMPU 2001). PWD and LCID jointly own Littlerock Reservoir. The reservoir discharges to Lake Palmdale and the water is ultimately treated by PWD's water treatment plant.

Section 3.3.2 discusses the surface water quality in more detail.

2.5 Land Use and Land Use Trends

Historically, land uses within the Antelope Valley have focused primarily on agriculture; however, the area is in transition as the predominant land use shifts from agricultural uses to residential and industrial uses. Agricultural land use has decreased from 73,000 acres in the early 1950s to 12,854 acres in 1993 (USGS 1994). DWR predicts that agricultural land use will continue to decrease to approximately 900 acres in 2020 (USGS 1994). It should be noted that DWR did not take into account approximately 5,500 acres for carrot production that was developed in the Antelope Valley between 1995 and 2000. In addition, the Los Angeles County Sanitation Districts' proposed farming operations in Lancaster and Palmdale are expected to utilize 4,650 and 5,140 acres, respectively, by the year 2020.

Historically, crops grown in the Antelope Valley have included alfalfa, wheat, barley and other livestock feed crops. In recent years, onions, turf and orchards have become more prominent. Broken down by the various types of crops, acreages in 1993 were 6,124 acres for alfalfa, 955 acres for pasture and turf, 835 acres for grain, 32 acres for field crops, 2,645 acres for truck crops and 2,263 acres for deciduous trees.

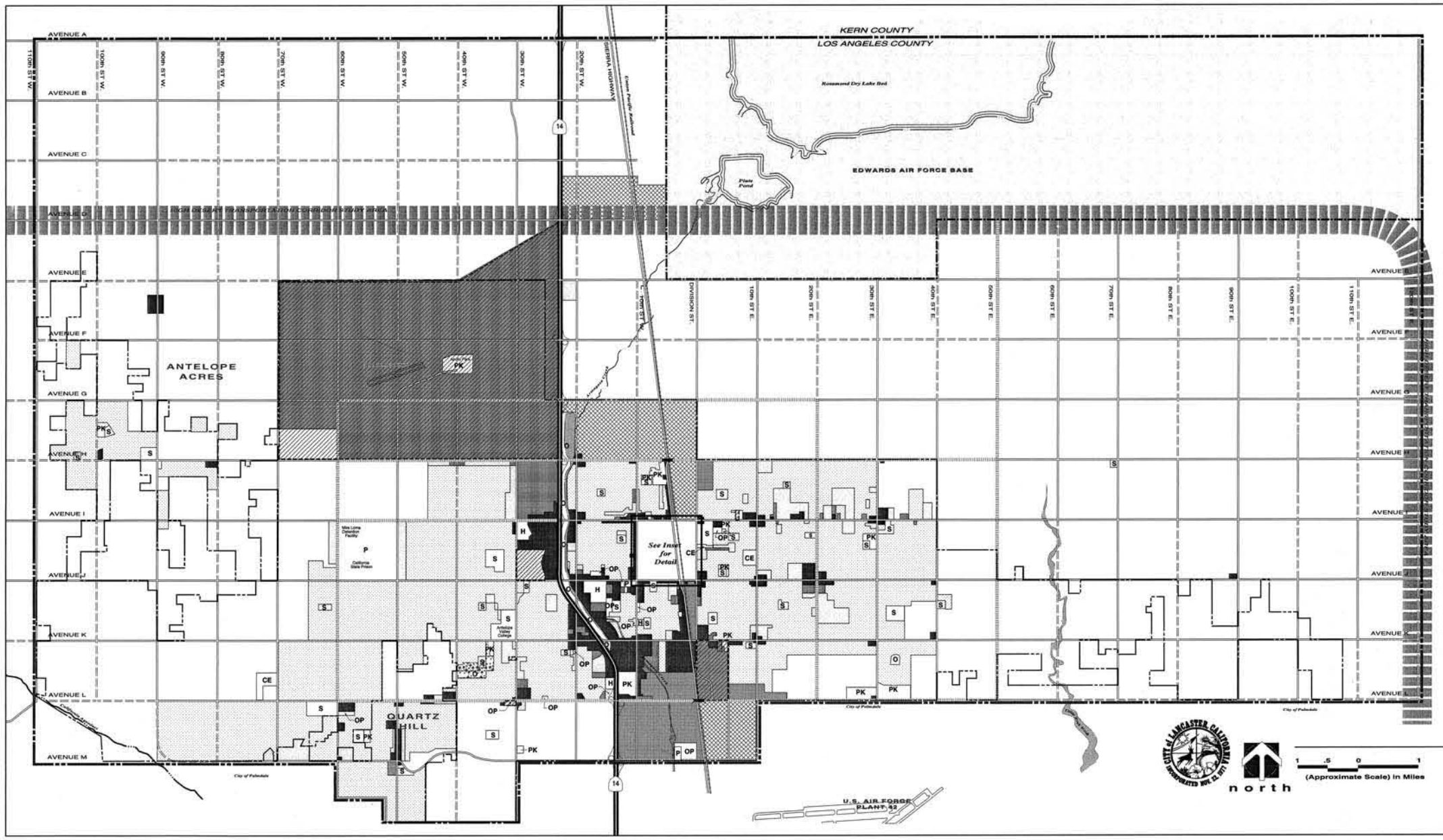
The increase in residential land use is evident from the population growth in the Antelope Valley, which is discussed in the next section. With significantly lower home prices than in Southern Los Angeles County, the Antelope Valley housing market has seen an increase as people chose to commute to the Los Angeles area.

Industrial land use in the Antelope Valley consists primarily of manufacturing for the aerospace industry and mining. EAFB and the U.S. Air Force Flight Production Center (Plant 42) provide a strong aviation and military presence. Mining of borate in the northern areas and salt extract, rock, gravel and sand in the southern areas contribute to the Antelope Valley's industrial land uses.

Figures 8 and 9 show the land uses for the Lancaster and Palmdale areas, respectively.

2.6 Population Projections of Study Area

Population growth in the Antelope Valley proceeded at a slow pace until 1985 because agriculture was the primary focus. However, between 1985 and 1990, the growth rate



LEGEND

Non Urban Residential
- NU (0.4-2.0 DU/AC)

Urban Residential
- UR (2.1-6.5 DU/AC)

Multi-Residential
- MR1 (6.6-15.0 DU/AC)
- MR2 (15.1-30 DU/AC)

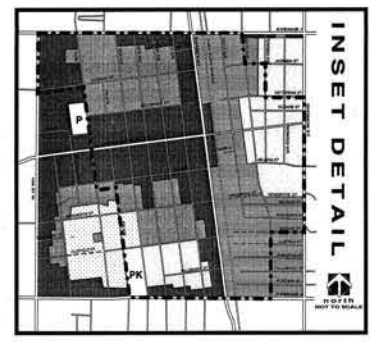
Commercial
- Commercial
- OP — Office/Professional

Employment
- Light Industry
- Heavy Industry

Specific Plan
- Specific Plan

Facilities
- P — Public Use
- S — Public School
- PK — Park
- H — Health Care
- CE — Cemetary
- O — Open Space

- Sphere of Influence
- City Boundary
- Proposed Regional Arterial
- Paved Roads
- Unpaved Roads
- Edwards Air Force Base
- Union Pacific Rail Road
- Land Use Boundary
- Transit Village Boundary
- Prime Desert Woodland
- High Desert Transportation Corridor Study Area



LANCASTER GENERAL PLAN

Adopted October 28, 1997 by Resolution 97-102

REVISED
Resolution No. 98-150 Resolution No. 00-317 Resolution No. 03-113
Resolution No. 99-89 Resolution No. 01-306 Resolution No. 03-468
Resolution No. 99-193 Resolution No. 01-307 Resolution No. 04-355
Resolution No. 00-190 Resolution No. 02-125 Resolution No. 04-457
Resolution No. 00-191 Resolution No. 02-280
Resolution No. 00-193 Resolution No. 03-311

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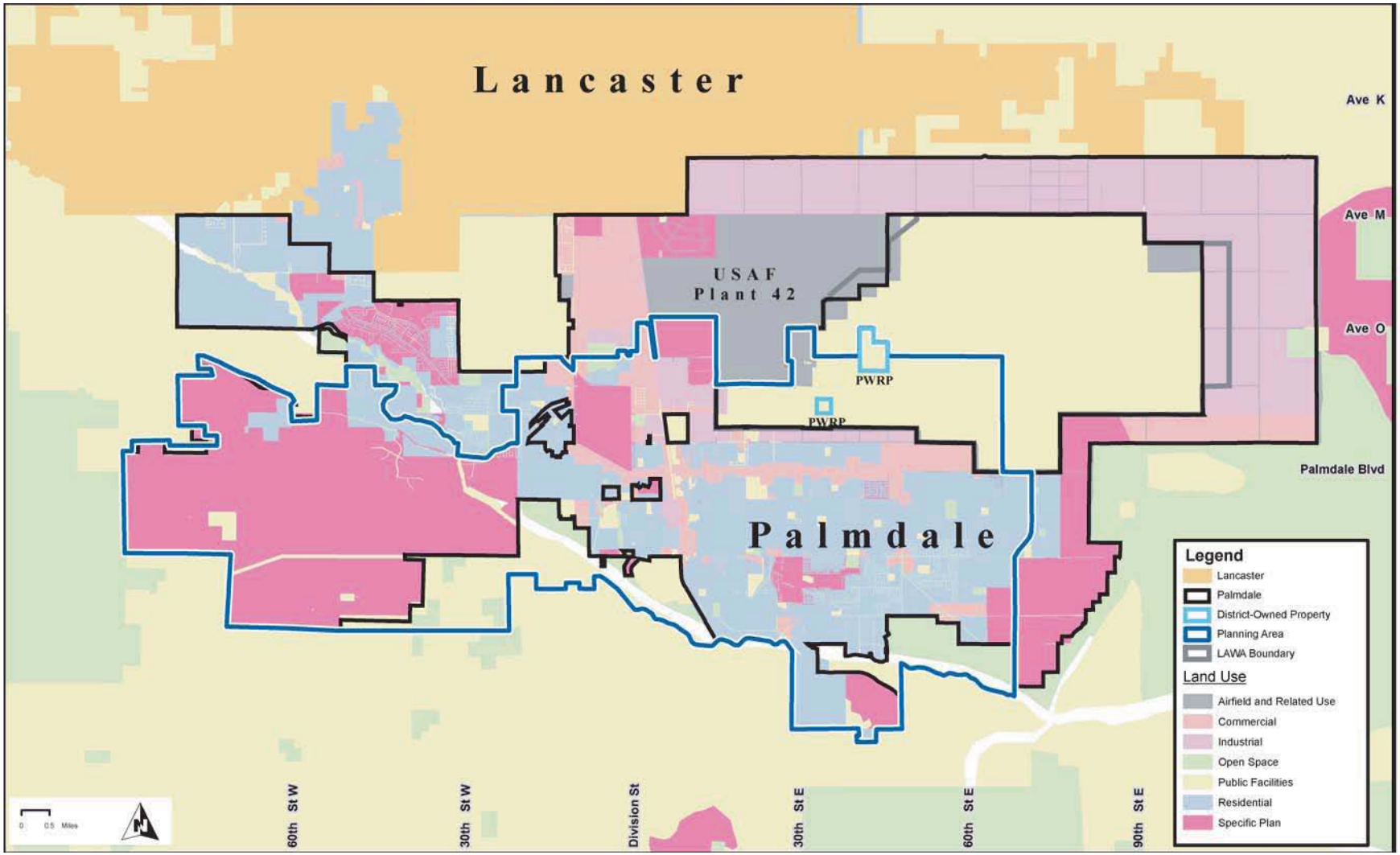
Los Angeles County Waterworks District No. 40
Antelope Valley Facilities Planning Report

Lancaster Land Use Map

K/J 0589030

Figure No. 8



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Los Angeles County Waterworks District No. 40
Antelope Valley Facilities Planning Report

Palmdale Area Land Use Map

K/J 0589030

Figure No. 9

Source: Draft Palmdale Water Reclamation Plant 2025 Facilities Plan and Environmental Impact Report, April 2005, Figure 2-9.

increased approximately 1,000 percent from the average growth rate between the years 1956 to 1985 as land uses shifted from agricultural to residential and industrial. Historical and projected population for the Antelope Valley is shown in Table 2. Southern California Association of Governments (SCAG) projections indicate that approximately 1,013,000 people will reside in the Antelope Valley by the year 2030. This represents an increase of approximately 187 percent from the 2000 population.

Table 2: Population Projections

	2004	2010	2015	2020	2025	2030
LACWW40[1]	144,357	176,666	204,206	231,746	259,286	286,826
RCSD[1]	15,510	24,901	36,944	54,812	81,322	120,656
QHWD[1]	15,500	17,980	20,857	24,194	28,065	32,555
PWD[2]	105,755[3]	130,570	146,019[4]	161,467	176,916[4]	192,364[4]
LCID[5]	2,900	2,900	2,900	2,900	2,900	2,900
Study Area	**284,022**	**353,017**	**410,926**	**475,119**	**548,489**	**635,301**

[1]Obtained from Draft 2005 Integrated Urban Water Management Plan for the Antelope Valley, Source: LACWW40 – SCAG Projections, Local Area Formation Commission (LAFCO) Projections, and Agency projections based upon additional 1800 connections per year at 3.06 persons per connection. Rosamond – Water Master Plan dated August 2004. QHWD – LAFCO Projections.

[2]Obtained from PWD 2001 FWSMPU, Table 2-3.

[3]2004 PWD population projections calculated using straight line projection between known 2000 population of 89,212 and 2010 population projection.

[4]2015, 2025 and 2030 PWD populations calculated using interpolation of 2010 and 2020 population projections.

[5]Obtained from discussions with LCID 2005.

2.7 Beneficial Uses of Receiving Waters

The Antelope Valley is located in Region 6 (Lahontan) of the nine Regional Water Quality Control Board regions.

The Water Quality Control Plan (Basin Plan) for the Lahontan Region identifies the beneficial uses of waters of the Antelope Valley. The Lahontan Basin Plan describes beneficial uses and water quality objectives for surface water and groundwater within the study area. Effluent limitations and discharge prohibitions are also included in the Lahontan Basin Plan. The most recent update of the entire Lahontan Basin Plan was adopted by the Regional Board on March 21, 1995. Amendments have been added since this date.

The beneficial uses for the Antelope Valley's surface waters are: municipal and domestic water supply, agricultural water supply, industrial service supply, groundwater recharge, freshwater replenishment, water contact recreation, non-contact water recreation, commercial and sportfishing, wildlife habitat, warm fresh water habitat, cold freshwater habitat, inland saline water, spawning, reproduction and development, water quality enhancement and flood peak attenuation/flood water storage.

Existing and potential beneficial uses applicable to groundwater in the region include municipal and domestic water supply, agricultural water supply, industrial service supply and fresh water replenishment.

Specific water quality objectives are described further in Section 5.3.

Section 3: Water Supply Characteristics and Facilities

3.1 Wholesale and Retail Entities

Antelope Valley-East Kern Water Agency (AVEK), PWD, LACWW40, RCSD, QHWD and LCID provide water to the Antelope Valley. Figure 5 in Section 2 shows the wholesale and retail entities.

3.1.1 Wholesale Entities

AVEK, PWD and LCID are the imported water wholesalers in the Antelope Valley. AVEK was established in 1956 to coordinate distribution of raw water provided by the California Department of Water Resources via the California Aqueduct. AVEK has a current annual contractual Table A amount for 141,400 AF of State Water Project (SWP) water that is for both municipal/industrial and agricultural uses. AVEK is also a retailer of untreated agricultural water.

PWD is a wholesaler and retailer of potable water. PWD's contractual Table A amount is 21,300 AFY from the California Aqueduct. The water is stored in Palmdale Lake until treatment and distribution. LCID's contractual Table A amount is 2,300 AFY of raw water from SWP (Antelope Valley Water Resources Study 1995).

3.1.2 Retail Entities

LACWW40, PWD, RCSD, QHWD and LCID are the water retailers in the Antelope Valley. LACWW40, RCSD and QHWD receive imported water from AVEK. As discussed above, PWD and LCID receive imported water directly from SWP.

3.2 Water Agencies of Antelope Valley

As discussed above, the water agencies of the Antelope Valley include AVEK, LACWW40, PWD, RCSD, QHWD and LCID.

3.2.1 AVEK

AVEK supplies SWP water to LACWW40, RCSD and QHWD. AVEK does not have production groundwater wells and does not provide recycled water. AVEK does provide a small amount of SWP to areas outside of the Antelope Valley.

3.2.2 LACWW40

LACWW40 is a retailer of potable water. LACWW40 receives water from AVEK and groundwater wells. LACWW40 was formed in accordance with Division 16 sections 55000-55991 of the State Water Code to supply water for urban use throughout the Antelope Valley. It is governed by the Los Angeles County Board of Supervisors with the Waterworks and Sewer Maintenance Division of the County Department of Public Works providing

administration, operation and maintenance of LACWW40's facilities. LACWW40 is comprised of eight regions serving customers in the communities of Lancaster and Palmdale (Regions 4 and 34), Pearblossom (Region 24), Littlerock (Region 27), Sun Village (Region 38), and Rock Creek (Region 39). Regions 4 and 34 are integrated and are operated as one system. Similarly, Regions 24, 27, and 33 are also integrated and operated as one system.

In general, LACWW40 serves all of the City of Lancaster and the western half of the City of Palmdale.

3.2.3 PWD

PWD is a wholesaler and retailer of potable water. PWD was established in 1973 as it evolved from the Palmdale Irrigation District (PID), which was formed in 1918. PWD has three sources for water: imported water from SWP, surface water (Littlerock Reservoir, which is jointly owned by LCID) and groundwater. Littlerock Reservoir has a storage capacity of 3,500 AF of water. Palmdale Lake stores the imported water and any Littlerock Reservoir discharges until treatment and distribution. Groundwater wells produce approximately 40% of PWD's water supply.

In general, PWD serves the eastern half of the City of Palmdale.

3.2.4 RCSD

RCSD is a retailer of imported water from AVEK and local groundwater. RCSD was formed in 1966 under the Community Services District Law, Division 3, Section 61000 of Title 6 of the Government code of the State of California. It provides water, sewer, lighting service, and public park maintenance services to residential, commercial, industrial, and agricultural customers, and for environmental and fire protection uses. RCSD's service area boundary encompasses approximately 31 square miles of unincorporated residential, industrial, and undeveloped land. The majority of the land located within the RCSD's service area is undeveloped. The developed property focuses around central Rosamond, with the exception of the Tropico Hills.

3.2.5 QHWD

QHWD is a retailer of imported water from AVEK and local groundwater. QHWD is located in the southwest end of the Antelope Valley at the north end of Los Angeles County. It is 65 miles northwest of Los Angeles on the Antelope Valley State Route 14 and west of both Palmdale and Lancaster. QHWD occupies an area of about 4.5 square miles. Incorporation of QHWD occurred in 1955 and water service is provided to all residential, commercial, industrial, and agricultural customers, and for environmental and fire protection uses.

3.2.6 LCID

LCID receives raw water from SWP, surface water from Littlerock Creek Reservoir and pumps groundwater. LCID's SWP contractual Table A amount is 2,300 AF. The surface

water is from surface runoff collected in Littlerock Creek Reservoir. Littlerock Creek Reservoir, which is co-owned with PWD, is fed by the runoff from the San Gabriel Mountains and has a useable storage capacity of 3,500 AF of water. PWD and LCID jointly have long-standing water rights to 5,500 AFY from Littlerock Creek flows (PWD FWSMPU 2001). LCID has an agreement with PWD to treat LCID's SWP and Littlerock Creek water when it is needed for potable use. LCID has one groundwater well for agriculture, four groundwater wells producing potable water and five one-million gallon (MG) tanks to store potable water for residential use (Discussions with LCID 2005).

3.3 Sources of Water for Study Area

Available water resources in the Antelope Valley consist of local groundwater, surface water from Littlerock Creek reservoir, imported water from SWP, recycled water, and water conservation/demand reduction.

3.3.1 Groundwater

The Antelope Valley groundwater basin is a naturally stable, long-term, but finite, source of water (LWRP 2020 Plan). The groundwater basin under most of the Antelope Valley is the Lancaster subbasin. The Lancaster subunit is within the Lancaster subbasin and serves as the source of the majority of the groundwater pumped in the valley (PWRP 2025 Plan and EIR).

In addition to the Lancaster subunit, the Pearland and Buttes subunits and the San Andreas Rift Zone are available to PWD for groundwater pumping. Currently, PWD only pumps from Lancaster and Pearland subunits and the San Andreas Rift Zone.

The Lancaster subbasin was the source of groundwater for approximately 73,000 acres of farmland in the 1950s. A substantial amount of groundwater pumping was required to support this farming effort. State Water Resources Control Board (SWRCB) records report that water use peaked in 1956 at 270,000 AF. A 1955 electrical energy consumption study by J. H. Snyder indicated that groundwater use exceeded 400,000 AF per year (AFY) in the early 1950s. By 1972, with the completion of initial SWP facilities, imported water was delivered and groundwater pumping decreased to approximately 100, 000 AFY. Approximately 140,000 AFY of water was used in the Antelope Valley in 1998 (LWRP 2020 Plan). Groundwater pumping for LACWW40, PWD, RCSD, QHWD and LCID from 2000 – 2004 is provided in Table 3.

Table 3: Historic Pumping (AF)

	2000	2001	2002	2003	2004
LACWW40[1]	17,419	21,736	21,195	16,837[4]	21,357
RCSD[1]	1,464	2,169	2,364	1,773	1,760[4]
QHWD[1]	1,421	3,041	2,802	1,555	1,348
PWD[2]	9,765	11,302	8,298	10,608	11,046
LCID[3]	1,755	1,799	2,022	1,922	2,160
Study Area	**31,824**	**40,047**	**36,681**	**32,695**	**37,671**

[1]Obtained from Draft 2005 Integrated Urban Water Management Plan (IUWMP) for the Antelope Valley (AV).

[2]Obtained from discussions with PWD, 2005.

[3]Obtained from discussions with LCID, 2005.

[4] An exact breakdown of 2004 water use by source was not available at this time. Groundwater use was estimated as 60 percent of 2,933 AFY for 2004, since this is RCSD's target ratio. Exact numbers will be provided in Final 2005 IUWMP report for AV.

The capacity of the wells for each water agency is discussed in Section 3.4.1.

3.3.2 Surface Water

The surface water is from surface runoff collected in Littlerock Creek Reservoir. Littlerock Creek Reservoir, which is co-owned with PWD and LCID, has a useable storage capacity of 3,500 AF of water. PWD and LCID jointly have long-standing water rights to 5,500 AFY from Littlerock Creek flows.

LCID is currently able to purchase 1,000 AFY, or 25 percent yield from the reservoir from PWD, whichever is less (PWD FWSMPU 2001). This amount exists until the 1992 reservoir rehabilitation agreement between PWD and LCID ends in 2042. When the 50-year term of the agreement expires, LCID regains its water rights according to the 1922 agreement between PWD and LCID. The 1922 agreement states that LCID has the exclusive right to the first 13 cubic feet per second (cfs) measured at the point of inflow to the reservoir. Flows greater than 13 cfs will be shared by PWD and LCID, with 75 percent to PWD and 25 percent to LCID. In addition, each district is allotted 50 percent of reservoir storage capacity (PWD FWSMPU 2001).

3.3.3 Imported Water

LACWW40, RCSD and QHWD all receive imported water from SWP through AVEK. AVEK operates four water treatment plants to treat the raw SWP water. The main plant is the Quartz Hill Water Treatment Plant (WTP), which is capable of producing 65 mgd and serving 280,000 customers. Eastside WTP, Rosamond WTP and Acton WTP are designed to provide 10 mgd, 14 mgd and 4 mgd, respectively, and, jointly, can supply water to 121,000 consumers. (AVEK 2005)

PWD and LCID obtain their water directly from SWP. Table 4 provides a summary of the historic and current imported water volumes for the study area.

Table 4: Historic Imported Water Supply

	2000	2001	2002	2003	2004
LACWW40[1]	34,655	30,965	33,442	37,442	36,231
RCSD[1]	1,641	981	938	1,229	1,173[4]
QHWD[1]	3,353	1,830	2,630	3,706	4,099
PWD[2]	8,974	10,365	18,480	11,421	12,076
LCID[3]	0	0	0	0	0
Study Area	**48,623**	**44,141**	**55,490**	**53,798**	**53,579**

[1]Obtained from Draft 2005 Integrated Urban Water Management Plan for the Antelope Valley.

[2]Obtained from discussions with PWD, 2005.

[3]Obtained from discussions with LCID, 2005.

[4]Estimated as 40 percent of total 2,933 AFY for 2004.

3.3.4 Recycled Water

Currently, the only recycled water in the Study Area that is treated to a tertiary level is a small percentage of the wastewater at the LWRP through additional onsite facilities of the AVTTP. In the future, recycled water will be available from three primary sources: Lancaster, Palmdale, and Rosamond Water Reclamation Plants. Table 5 provides a summary of the availability of the recycled water to the Antelope Valley through 2030.

Table 5: Recycled Water Flow Projections 2005 - 2030

	2005	2010	2015	2020	2025	2030
Lancaster WRP [(a)] (mgd)	12[(b)]	14.8[(c)]	19[(c,h)]	23[(c)]	27.1[(c,d)]	31.2[(c,d)]
Palmdale WRP [(e)] (mgd)	10.9[(f)]	13.2[(c)]	16.4[(c)]	19.5[(c)]	22.4[(c)]	25.5[(c,d)]
Rosamond WWTP [(g)] (mgd)	0[(i)]	0.5[(c)]	1.0[(c)]	1.0[(c)]	1.0[(c)]	1.0[(c)]
Total Study Area (mgd)	**22.9**	**28.5**	**36.4**	**43.5**	**50.5**	**57.7**

[(a)] Obtained from the *Lancaster Water Reclamation Plant 2020 Facilities Plan*, prepared by the Sanitation Districts of Los Angeles County, May 2004, less the 3.03 mgd already committed.

[(b)] Total flow projection for 2005 is 15 mgd per Figure 7-3 in the *Lancaster Water Reclamation Plant 2020 Facilities Plan* (with 0.5 mgd (peak) treated to tertiary level per discussions with Sanitation Districts of Los Angeles County).

[(c)] All flow is tertiary treated.

[(d)] Flows are calculated using straight-line projections from the 2020 flows consistent with population increase estimates.

[(e)] Obtained from the *Final Palmdale Water Reclamation Plant 2025 Facilities Plan and Environmental Impact Report*, prepared by the Sanitation Districts of Los Angeles County, October 2005.

[(f)] All flow is secondary treated.

[(g)] Obtained from discussions with RCSD.

[(h)] Flow is calculated using straight-line projections between 2010 and 2020 flows consistent with population increase estimates.

[(i)] Existing WWTP (15-pond system that provides treatment, storage and disposal) is not designed to discharge any effluent for offsite reuse.

The previous table excludes quantities of recycled water accounted for in any existing contracts for recycled water that any of the WRPs or WWTP already have in place. These are discussed below:

3.3.4.1 Lancaster WRP Existing Contracts for Recycled Water

There are three existing commitments for recycled water form the LWRP as follows:

1. The LWRD 2020 Facilities Plan FEIR commits District No. 14 to maintain Piute Ponds (specifically at a rate sufficient to maintain a minimum of 400 wetted acres of habitat). District No. 14 staff calculates this to be an average of 2.62 mgd excluding any overflows.

2. Los Angeles County Parks and Recreation Department have an existing contract with the District No. 14 to deliver tertiary water to Apollo Park where it is used to for recreational uses. The park's usage averages approximately 0.15 mgd, and peaks to 0.5 mgd during summer months.

3. There is a Memorandum of Agreement (MOA) between District No. 14 and EAFB for discharge to a series of shallow impoundments south of Piute Ponds for recreational duck hunting. The effluent is discharged between November 1 and April 15 and averages approximately 0.26 mgd.

Items 1 through 3 above total 3.03 mgd of recycled water that is contracted out already to users for Lancaster WRP from 2005 - 2030.

3.3.4.2 Palmdale WRP Existing Contracts for Recycled Water:

There are 2 existing commitments for recycled water from the PWRP as follows:

1. District No. 20 entered into a 20-year lease agreement with the Los Angeles World Airports (LAWA) in 2002 for a 2,680 acre effluent management site on the WRP property. As part of the lease agreement, the LAWA has first right of refusal for any tertiary treated water that comes from the WRP.

2. There is one existing contract with Harrington Farms, a pistachio grower that expires in 2008, which is for secondary effluent. This contract expires before tertiary effluent is available in 2009. The contract with Harrington Farms for secondary effluent states that the farmer is NOT guaranteed the water if another user comes and wants to buy the tertiary water. Therefore, this contract is not included for future commitments of recycled water from PWRP.

3.3.5 Water Billing Rates

As LACWW40 is expected to be the major recycled water retailer in the Antelope Valley, the water billing rates for LACWW40 are the only rates discussed in this section. The water billing rates for LACWW40 are based on a tiered or block rate program to promote conservation among rate payers. The water usage tiers or blocks vary in summer and

winter months. All water is billed in units of a hundred cubic feet (HCF), which is equal to 748 gallons.

1. "**Conservation" Tier:** The range of 5 - 20 HCF of water used in the summer (5 - 15 HCF in winter).

2. **"Normal" Tier:** The next 21 - 65 HCF of water used in the summer (16 - 30 HCF in winter).

3. **"Excessive" Tier:** The next 66+ HCF of water used in the summer (31+ HCF in winter).

Every property served by LAWWC40 is also charged a fixed meter charge. A summary of LACWW40's water billing rates is included in Tables 6 and 7.

Table 6: LACWW40 Summer Water Billing Rates

Rate Schedule/ Area	Monthly Service Charge (3/4-inch meter)	Water Usage Tier	Range (units) (HCF)	Quantity Charge (per unit)
0427 Lancaster	$13.65	Conservation	5 - 20	$0.69
		Normal	21 - 65	$0.81
		Excessive	> 65	$1.16
0428 Lancaster	$13.65	Conservation	5 - 20	$0.69
		Normal	21 - 65	$0.81
		Excessive	> 65	$1.16
0429 Lancaster	$13.65	Conservation	5 - 20	$0.69
		Normal	21 - 65	$0.81
		Excessive	> 65	$1.16
0430 Lancaster/Palmdale	$13.65	Conservation	5 - 20	$0.77
		Normal	21 - 65	$0.90
		Excessive	> 65	$1.29
0431 Lancaster/Palmdale	$13.65	Conservation	5 - 20	$0.77
		Normal	21 - 65	$0.90
		Excessive	> 65	$1.29
0433 Palmdale	$15.24	Conservation	5 - 20	$0.94
		Normal	21 - 65	$1.10
		Excessive	> 65	$1.58
0434 Lancaster	$15.24	Conservation	5 - 20	$0.94
		Normal	21 - 65	$1.10
		Excessive	> 65	$1.58
2405 Pearblossom	$14.80	Conservation	5 - 20	$0.76
		Normal	21 - 95	$0.88
		Excessive	> 95	$1.26
2705 Littlerock	$16.25	Conservation	5 - 20	$0.76
		Normal	21 - 95	$0.88
		Excessive	> 95	$1.26
3303 Sun Village	$16.25	Conservation	5 - 20	$0.76
		Normal	21 - 90	$0.88
		Excessive	> 90	$1.26
3405 Palmdale	$15.78	Conservation	5 - 20	$1.23
		Normal	21 - 65	$1.44
		Excessive	> 65	$2.06

Table 7: LACWW40 Winter Water Billing Rates

Rate Schedule/ Area	Monthly Service Charge (3/4-inch meter)	Water Usage Tier	Range (units) (HCF)	Quantity Charge (per unit)
0427 Lancaster	$13.65	Conservation	5 - 15	$0.69
		Normal	16 - 30	$0.81
		Excessive	> 30	$1.16
0428 Lancaster	$13.65	Conservation	5 - 15	$0.69
		Normal	16 - 30	$0.81
		Excessive	> 30	$1.16
0429 Lancaster	$13.65	Conservation	5 - 15	$0.69
		Normal	16 - 30	$0.81
		Excessive	> 30	$1.16
0430 Lancaster/Palmdale	$13.65	Conservation	5 - 15	$0.77
		Normal	16 - 30	$0.90
		Excessive	> 30	$1.29
0431 Lancaster/Palmdale	$13.65	Conservation	5 - 15	$0.77
		Normal	16 - 30	$0.90
		Excessive	> 30	$1.29
0433 Palmdale	$15.24	Conservation	5 - 15	$0.94
		Normal	16 - 30	$1.10
		Excessive	> 30	$1.58
0434 Lancaster	$15.24	Conservation	5 - 15	$0.94
		Normal	16 - 30	$1.10
		Excessive	> 30	$1.58
2405 Pearblossom	$14.80	Conservation	5 - 15	$0.76
		Normal	16 - 35	$0.88
		Excessive	> 35	$1.26
2705 Littlerock	$16.25	Conservation	5 - 15	$0.76
		Normal	16 - 35	$0.88
		Excessive	> 35	$1.26
3303 Sun Village	$16.25	Conservation	5 - 15	$0.76
		Normal	16 - 35	$0.88
		Excessive	> 35	$1.26
3405 Palmdale	$15.78	Conservation	5 - 15	$1.23
		Normal	16 - 30	$1.44
		Excessive	> 30	$2.06

3.4 Capacities of Present Facilities

3.4.1 Groundwater Wells

LACWW40 has 42 wells with a combined maximum pumping capacity of approximately 55.5 mgd. Groundwater is used to provide approximately 40% of LACWW40's water supply. (Draft 1999 LACWW40 MP)

PWD has 26 equipped groundwater wells and 4 additional drilled, unequipped wells throughout the Lancaster and Pearland groundwater subunits and the San Andreas Rift Zone. The total capacity for all PWD wells operating is 31,321 AFY, which includes the capacity for unequipped wells. As listed in Table 3 in Section 3.3.1, the total groundwater pumping in 2004 was 11,046 AFY. One of the San Andreas Rift Zone wells was taken out of production due to elevated nitrate concentrations. PWD received 42% of its water from groundwater sources in 1999 (PWD FWSMPU 2001)

RCSD pumps about 1,800 to 2,000 AFY from five wells. Typically, groundwater provides 60% of RCSD's water supply. (RCSD 2000 UWMP)

QHWD currently operates seven wells for a total maximum pumping capacity of 6,831 AFY. Two new wells with 500 gpm capacity each have been drilled and are expected to be on-line by the end of 2005 for a future maximum pumping capacity of 8,448 AFY. Until 2001, QHWD pumped approximately 1,450 AFY until 2001 when a shortage in SWP water required the District to increase pumping to 3,050 AFY. (QHWD 2002 UWMP)

LCID has 5 groundwater wells that supplied approximately 2,160 AFY of water in 2004. Four of the wells provide potable water and one well is strictly for agricultural use.

3.4.2 Surface Water

Available surface water from Littlerock Creek and Santiago Creek is collected and stored in Littlerock Creek Reservoir. The storage capacity in Littlerock Creek Reservoir is 3,500 AF. The average annual yield from the reservoir is estimated to be approximately 7,000 AF, as 1949-1999 hydrology data shows annual diversions between 1,178 and 15,900 AFY (PWD 2001 FWSMPU).

3.4.3 Imported Water

AVEK has a contractual Table A amount of 141,400 AFY of SWP water. Currently, the four AVEK WTPs are capable of treating approximately 104,260 AFY of imported water. Quartz Hill WTP is rated for 65 mgd (72,870 AFY). The 1988 expansion of Eastside WTP provided a treatment capacity of 10 mgd (11,210 AFY). Rosamond WTP is a 14 mgd (15,695 AFY) capacity treatment plant. The fourth AVEK plant, Acton WTP, has a capacity of 4 mgd (4,484 AFY).

SWP deliveries within the Valley ranged from 19% to 29% of the total contractual Table A amounts from 1976 to 1982, but dropped to 9% - 69% between 1983 and 1995 (LACWW40 Draft Water System Master Plan {WSMP} 1999). Typically, imported water is used to meet 60% of LACWW40's demand.

PWD is contracted to take 21,300 AF of SWP water per year from the California Aqueduct. PWD's water treatment plant capacity is 30 mgd (33,632 AFY), but it is limited to treating 28 mgd (31,390 AFY) in accordance with the California Department of Health Services (DHS) requirements to keep one filter offline as a reserve. (2001 PWD FWSMPU).

RCSD has a contract with AVEK for 4,000 AFY of imported water. AVEK serves RCSD from its Rosamond WTP. RCSD's imported water needs should be met with the current contractual Table A amount as the projected imported water use in 2025 is 2,250 AFY (RCSD 2000 UWMP).

QHWD submits its request for water to AVEK every October for the following year, but it is not certain whether QHWD will receive the requested amount. If additional water is available, QHWD can receive more than the original requested quantity. QHWD relied on imported water to meet the majority of its demand until 2001, when the availability of SWP water decreased and QHWD was forced to increase its well production to meet its demands. (QHWD 2002 UWMP)

LCID's SWP contractual Table A amount is 2,300 AFY, but LCID did not use any SWP water during the years of 2000 through 2004.

3.4.4 Storage Facilities

The storage facilities in the Antelope Valley include Littlerock Creek Reservoir and Lake Palmdale. Littlerock Creek Reservoir has a useable storage capacity of 3,500 AF of water.

Littlerock Creek Reservoir discharges into Lake Palmdale, which has a capacity of approximately 4,129 AF (PWD 2001 FWSMPU). Lake Palmdale stores both surface water runoff and SWP imported water until the water is conveyed from the lake through a 42-inch pipeline to PWD's water treatment plant.

3.4.5 Limitations of Existing Facilities

The Antelope Valley water agencies have typically relied on imported water and/or groundwater for their water supply needs. Currently, these water supplies are limited by SWP supply fluctuations, groundwater basin overdraft and the need for facility improvements. The water agencies are pursuing different alternatives, such as recycled water and recharge, to decrease their reliance on imported water and groundwater sources.

SWP water reliability is a function of hydrologic conditions, state and federal water quality standards, protection of endangered species and water delivery requirements. Though contracts are signed, there is no guarantee how much imported water will be delivered each year.

Water agencies in the Antelope Valley cannot entirely rely on groundwater pumping either because excessive pumping for many years has over drafted the basin. According to the USGS, the Antelope Valley groundwater pumping has exceeded the recharge rate every year since the early 1920s (LWRP 2020 Plan). This approach to groundwater pumping will change in the future, as the adjudication process for establishing the groundwater rights in the Antelope Valley has begun.

AVEK's Quartz Hill WTP will require an expansion to approximately 97mgd to treat LACWW40's projected demands (LACWW40 Draft 1999 WSMP).

LACWW40's facilities improvements will include new wells, reservoirs and pipelines throughout its system to meet current and projected water supply requirements. Additional connections with AVEK will be needed to maximize use of available imported water. As evidenced by this report, LACWW40 is pursuing the use of recycled water as an alternative source of water for irrigation and recharge purposes. LACWW40 also has the Lancaster Aquifer Storage and Recovery Project underway in an effort to recharge treated SWP water for extraction at a later time. Section 3.8 discusses this project further. (LACWW40 Draft 1999 WSMP)

To meet future water needs, PWD will require new groundwater wells, storage reservoirs and water pipelines. PWD will also investigate enhancing yield from Littlerock Creek Reservoir. There may be a need to purchase additional SWP water in order to extend the yield of the Littlerock Creek reservoir. The use of recycled water from PWRP for irrigation and recharge will be pursued. (PWD 2001 FWSMPU)

RCSD will need new wells, a reservoir and additional transmission mains to meet projected demands. (RCSD 2004 MP)

QHWD plans to enlarge existing wells or drill new wells to meet additional demands. There are no plans for QHWD to invest in recycled water in the near future because tertiary treatment and recycled water pipelines are too costly. QHWD does intend to recharge local aquifers when excess surface water is available and is currently equipping new wells with appropriate piping. (QHWD 2002 UWMP)

3.5 Groundwater Management

The Antelope Valley groundwater basin is in overdraft since pumping has exceeded the recharge rate every year since the early 1920s (LWRP 2020 Plan). A groundwater management plan currently does not exist for the basin as a whole, but the Antelope Valley pumpers were making an effort to create a basin management plan. This effort ended in 1999 when a farming company filed two lawsuits against water agencies (PWD 2001 FWMPU). A groundwater management plan has been developed specific for the RCSD service area only. Since the Antelope Valley basin is not yet adjudicated and has not been officially deemed in overdraft by DWR, there are no existing restrictions on pumping. However, water rights will be assigned as part of the adjudication process.

3.6 Water Use Trends

Population projections are often used to determine future demand by utilizing an average water demand (typically based on historic water use). LACWW40 water use per person averages about 333 gallons per day (gpd). RCSD average water use per person is about 170 gpd, and QHWD average water use per person is about 315 gpd. The average water use per capita for PWD is 240 gpd from 1999 to 2010, and 248 gpd from 2011 to 2020 (2001 PWD FWSMPU). It was assumed that 248 gpd/ capita is appropriate for 2025 and 2030. Using these values and the population projections from Table 2 in Section 2.6, the estimated future water usage is as presented in Table 8. These values could be reduced in the future with the implementation of stricter demand management measures, which could reduce the average use per person.

Table 8: Per Capita Water Use Projections (AF)

	2005	**2010**	**2015**	**2020**	**2025**	**2030**
LACWW40[1]	53,850	65,902	76,176	86,449	96,722	106,996
QHWD[1]	5,469	6,345	7,360	8,537	9,903	11,488
RCSD[1]	2,954	4,742	7,036	10,438	15,487	22,977
PWD[2]	28,454	35,131	40,597	44,892	49,187	53,482
Study Area	**90,727**	**112,120**	**131,169**	**150,316**	**171,299**	**194,943**

[1]Obtained from Draft 2005 Integrated Urban Water Management Plan for the Antelope Valley.

[2] Calculated using 2001 PWD FWSMPU per capita production numbers.

Recycled water use will benefit the users because it will be offered at a lower cost than potable water. The current costs of potable water for LACWW40 customers are presented in Section 3.3.5.

3.7 Quality of Water Supplies

3.7.1 Groundwater Water Quality

Groundwater quality is excellent within the principal aquifer but degrades toward the northern portion of the dry lakes areas. Considered to be generally suitable for domestic, agricultural, and industrial uses, the water in the principal aquifer has a TDS concentration ranging from 200 to 800 mg/L. The deep aquifer typically has a higher TDS level. Hardness ranges from 50 to 200 mg/L and high fluoride, boron, and nitrates area a problem in some areas of the basin. The groundwater in the basin is used for agricultural, municipal and industrial uses.

As discussed in Section 2.4.1, arsenic has been observed in the groundwater for LACWW40, QHWD and RCSD. Arsenic levels above the MCL have been observed in approximately 18 wells for LACWW40, for which 6 wells have been placed in an inactive status. The remaining active wells with high arsenic levels are undergoing a partial abandonment process that will allow pumping only in arsenic free zones. Similarly, RCSD has observed levels of arsenic in the range of 11 to 14 ppb in some of its wells. RCSD is utilizing methods similar to LACWW40's methods to manage arsenic levels. It is not

anticipated that the existing arsenic problem will lead to future loss of groundwater as a supply for the Antelope Valley.

The groundwater quality of PWD well water in Lancaster and Pearland subbasins and the San Andreas Rift Zone meets the current drinking water standards of US EPA and DHS as of the PWD 2001 FWSMPU. The 1998 – 2000 water quality data for arsenic in the PWD 2001 FWSMPU is below the 2001 US EPA revised arsenic MCL of 0.010 mg/l.

3.7.2 Surface Water Quality

As discussed in Section 2.4.2, Littlerock Reservoir is the only developed surface water source in the Antelope Valley. Littlerock Creek water quality data from a January 2000 sample is provided in Table 9 (PWD 2001 FWSMPU). According to PWD 2001 FWSMPU, there are no objectionable water quality characteristics. The single sample does not relate water quality during peak runoff periods, but it provides an indication of the water quality after settling occurs in Lake Palmdale.

Table 9: Littlerock Creek Water Quality (Single Sample in Jan 2000)[1]

Constituent	mg/l	Constituent	mg/l
Chemical Parameters			
Cations		Anions	
Calcium	32.7	Sulfate	**24.2**
Magnesium	14.2	Chloride	**7.4**
Sodium	22.4	Nitrate	**<2.0**
Potassium	2.5	Perchlorate	**ND**
Manganese	0.08		
Fluoride	ND		
Iron	ND		
Physical Parameters			
Total Hardness as $CaCO_3$	147	Specific Conductance	**360 µmho/cm**
Total Alkalinity as $CaCO_3$	148	Odor	**2 TON**
Total Dissolved Solids	192	Color	**10 Units**
pH	8.3 units	Turbidity	**1.8 NTU**
Radioactivity			
Gross Alpha	2.2 pCi/l		

[1]PWD 2001 FWSMPU, Table 4-2

3.8 Sources for Additional Water

3.8.1 Groundwater Recharge via Spreading Basins

Groundwater recharge via spreading basins was determined to be a feasible use for the tertiary treated recycled water from PWRP in the 2000 Palmdale Water Reclamation Concept Study (PWRCS) prepared by Kennedy/Jenks Consultants. The groundwater recharge concept includes recharging the Pearland and Buttes subbasins with tertiary effluent via spreading basins.

Groundwater recharge into the Antelope Valley basins would require compliance with the California Administrative Code Title 22 Division 4 Environmental Health (Wastewater Reclamation criteria) regulations and the Water Quality Control Plan for the Lahontan Region Basin Plan. RWQCB, in consultation with DHS, would establish discharge requirements.

Discharge requirements will likely involve the following issues: 1) The level of treatment must comply with DHS groundwater recharge regulations (draft form in 2000), which specify levels of treatment that are a function of the percentage of effluent combined with naturally occurring groundwater extracted for domestic water supply. 2) RWQCB could require demineralization within the treatment process if the antidegradation policy adopted by the State of California is strictly enforced. 3) The reduction of total organic carbon (TOC) and TDS are treatment issues that may have significant impacts on potential costs of a groundwater recharge project.

Other issues may arise in the future that will need to be considered.

3.8.2 Aquifer Storage and Recovery (ASR) Demonstration Project via Injection

LACWW40, in conjunction with USGS and AVEK, performed an ASR demonstration project in the City of Lancaster from 1994 to 1999. The goal of the project was to test the feasibility of injecting excess treated surface water supplies into the Lancaster subbasin and recovering groundwater supplies during high demand and/or drought. USGS conducted the majority of the investigation and produced the reports, while LACWW40 monitored water levels and water quality of the injected and extracted waters and prepared the monthly, quarterly and annual reports required by the waste discharge requirements (WDRs) issued by the RWQCB.

The project findings included that the shallow aquifer of the test area accepted water via injection much better than the deep aquifer and older wells may not be acceptable for injection. No significant chemical reactions were experienced that would clog the screen or gravel pack of the well. The main water quality issue was the temporary formation of trihalomethanes (THMs). (Discussions with LACWW40, 2005)

The ASR Demonstration Project concluded that a full-scale project will increase the Lancaster region's available water supply in a technically, economically and institutionally feasible way. The RWQCB adopted a Conditional Waiver of Waste Discharge

Requirements for the County of Los Angeles Department of Public Works Lancaster Sub-basin Full-scale Aquifer Storage and Recovery Project on October 13, 2004. The project will involve annual injection of up to 6,843 AF of AVEK's SWP water and extraction of 13,282 AF from the upper aquifer of the groundwater of the Lancaster subbasin. In an effort to further reduce formation of disinfection byproducts such as THMs, AVEK proposed to modify treatment facilities by June 2006. A five-year review of the effectiveness or failure of the project will start on October 13, 2009 until the project is terminated. (RWQCB Waiver No. R6V-2004-(PROPOSED))

Section 4: Wastewater Characteristics and Facilities

4.1 Wastewater Entities

LWRP, PWRP and RWWTP are the three wastewater treatment plants in the Antelope Valley study area. Figure 5 in Section 2 provides the WRP and WWTP locations. Currently, these three plants primarily provide secondary treated effluent. The only recycled water that is treated to a tertiary level is a small percentage of the wastewater at the LWRP through additional onsite facilities known as AVTTP. Effluent management is challenging in the Antelope Valley because the area is a closed basin with no river or other outlet to the Pacific Ocean. Effluent management options are restricted to methods such as reuse, evaporation and percolation. LWRP, PWRP and RWWTP will all provide tertiary treated effluent with future upgrades.

4.2 Major Facilities

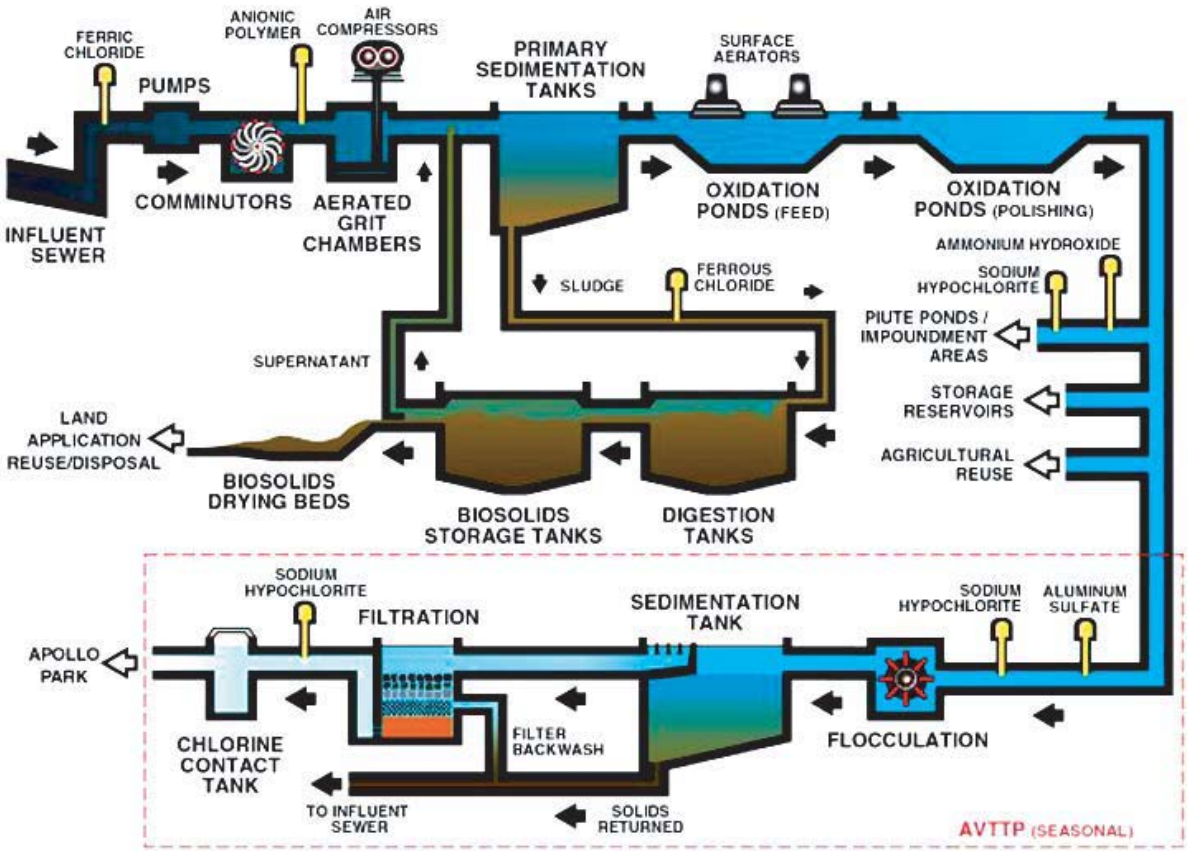
4.2.1 Lancaster Water Reclamation Facility

LWRP was built in 1959 and is located north of the City of Lancaster. County Sanitation District No. 14 of Los Angeles County owns, operates and maintains LWRP. The plant provides primary (via sedimentation) and secondary (via biological stabilization in oxidation ponds) treatment to all incoming wastewater. A portion of the effluent at LWRP is treated to a tertiary level, through additional onsite facilities, known as the Antelope Valley Tertiary Treatment Plant (AVTTP), to a small side-stream of secondary effluent by means of coagulation, dual-media gravity filtration, phosphorus removal, and chlorination. LWRP, which has a permitted capacity of 16.0 mgd, treated an average flow of 12.8 mgd in 2002. Figure 10 presents a schematic of LWRP's existing treatment facilities. Secondary treated recycled water produced at the LWRP is either:

- retained in storage reservoirs,
- conveyed to Nebeker Ranch for the irrigation of fodder crops,
- conveyed to Piute Ponds to maintain a minimum of 200 wetted acres of habitat and/or the adjacent Impoundment Areas to create a suitable environment for recreational duck hunting.

Tertiary treated effluent from the 0.6-mgd-capacity AVTTP is conveyed to Apollo Lakes Regional County Park (Apollo Park), as shown on Figure 11. The LWRP and AVTTP are currently regulated by the RWQCB-LR under Waste Discharge Requirements listed as Board Order R6V-2002-053 adopted in September 2002.

As described in the LWRP 2020 Facilities Plan (May 2004), LWRP will be upgraded and expanded to increase the primary, secondary and tertiary wastewater treatment, biosolids handling capacity and effluent management capacity to 21 mgd by 2008 and 26 mgd by 2014. (The improvements from 21 mgd to 26 mgd will be reevaluated in 2010-11 to respond to any changes in wastewater flow projections or other factors, i.e. increase in municipal recycled water reuse demands.) Primary treatment upgrades include an influent pump



Source: LWRP 2020 Facilities Plan, May 2004, Figure ES-3.

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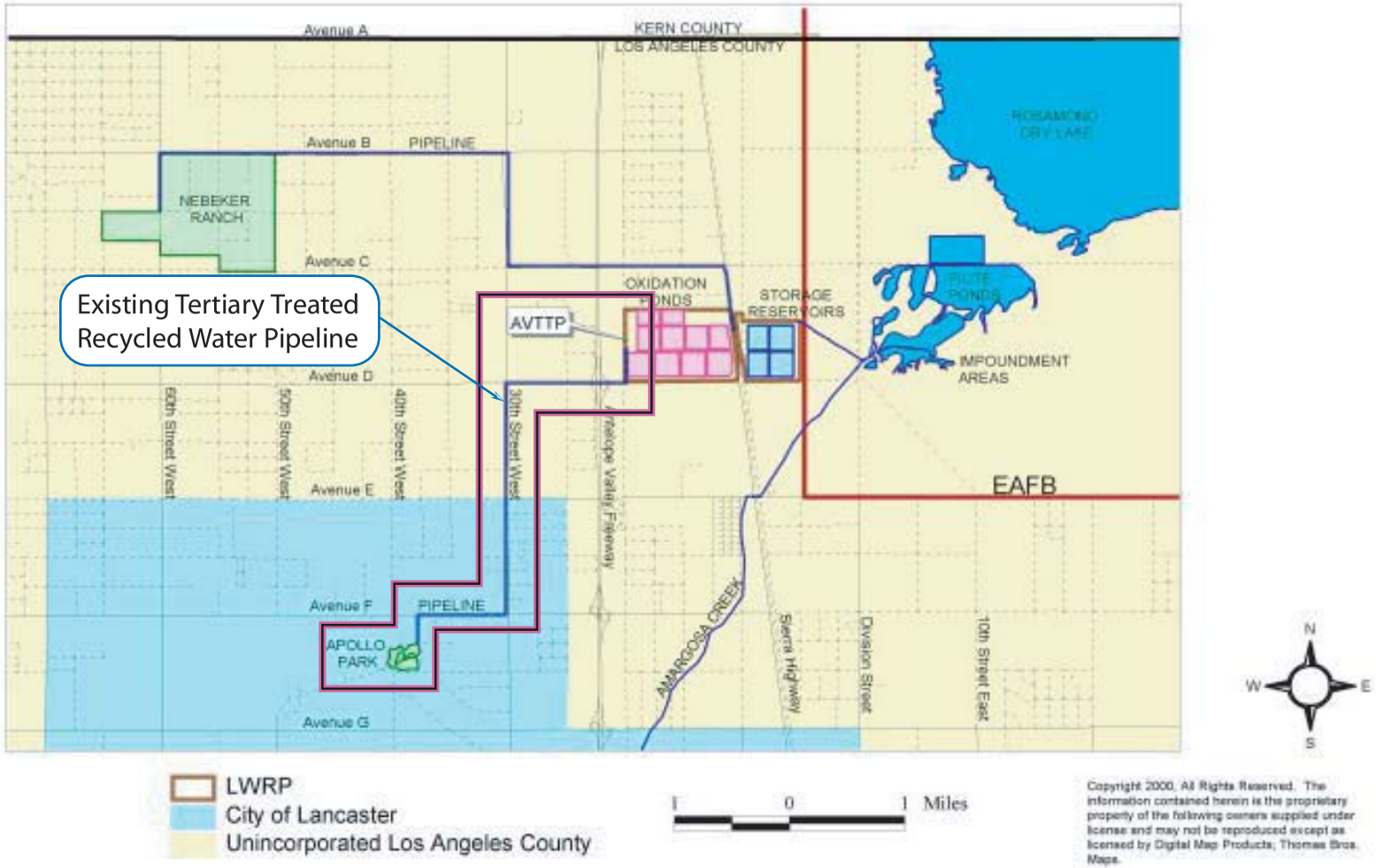
LWRP Existing Treatment Schematic

K/J 0589030

Figure No. 10



Source: LWRP 2020 Facilities Plan, May 2004, Figure ES-2.

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Existing Tertiary Treated Recycled Water Pipeline from AVTTP to Apollo Park

K/J 0589030

Figure No. 11

station, aerated grit channels, primary sedimentation tanks, digestion tanks and drying beds. The existing 16 mgd oxidation pond secondary treatment facilities will be replaced by a 26 mgd CAS secondary and tertiary treatment facility. Portions of AVTTP will be partially replaced with more modern tertiary treatment technology. A dechlorination station will be constructed to improve the quality of effluent discharge to Piute Ponds.

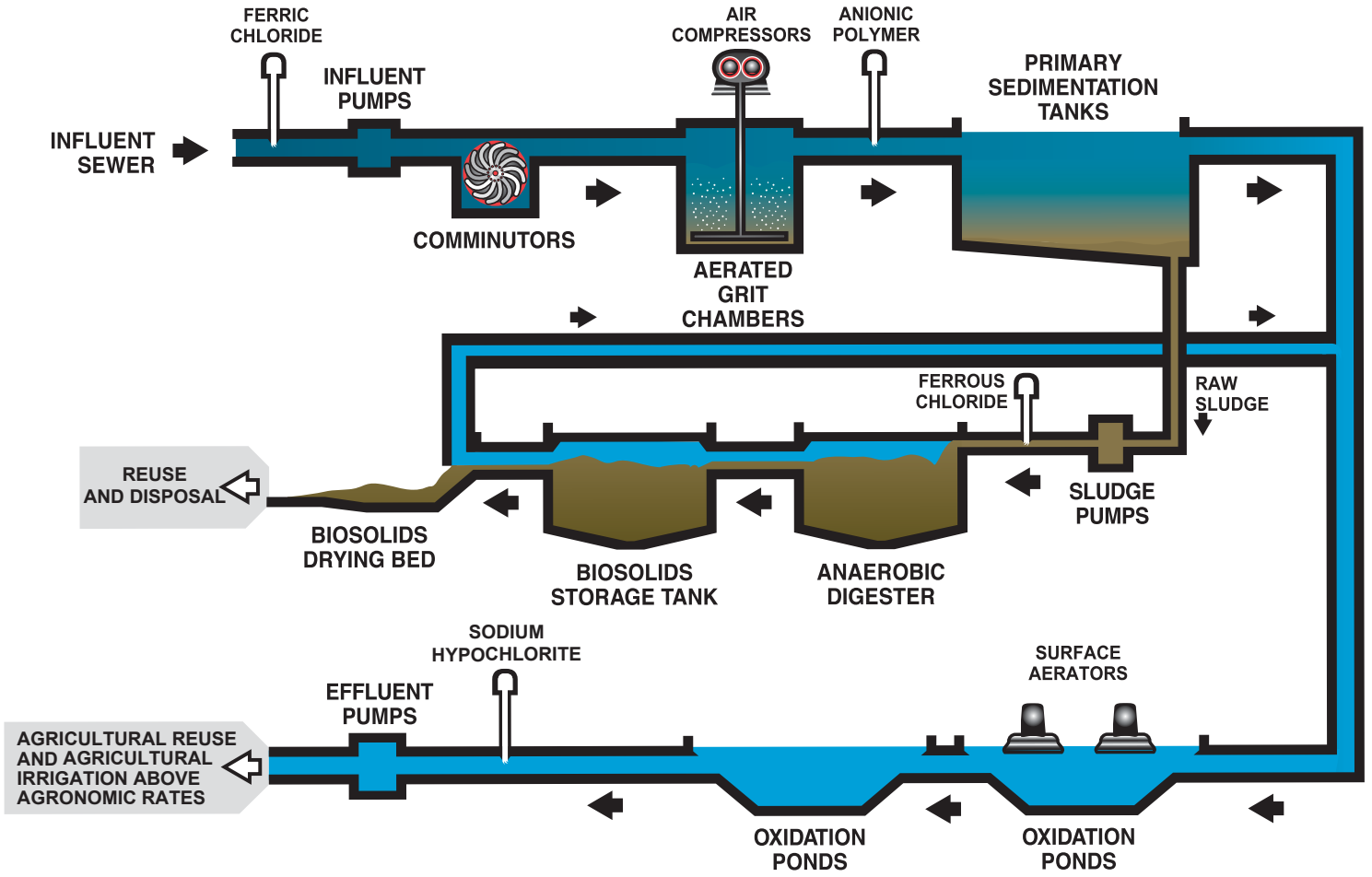
The effluent from the upgraded LWRP will be used for municipal reuse and discharged to Piute Ponds, Impoundment Areas, Apollo Park, storage reservoirs and agricultural reuse operations. Land will be acquired to provide the space for storage reservoirs and agricultural reuse. In addition, the City of Lancaster aims to implement a recycled water project to distribute 1.5 mgd of LWRP's tertiary treated recycled water to municipal users. The recycled water facilities described in this report would accommodate uses over a much larger area.

4.2.2 Palmdale Water Reclamation Facility

PWRP was built in 1953 with an original capacity of 0.75 mgd. The current permitted capacity for PWRP is 15.0 mgd. PWRP is located on two sites in an unincorporated County area, adjacent to the City of Palmdale. County Sanitation District No. 20 of Los Angeles County owns, operates and maintains PWRP. All wastewater receives primary treatment (via sedimentation) and secondary treatment (via biological stabilization in oxidation ponds). Chlorination is also provided by a temporary facility. PWRP treated an average flow of 9.4 mgd in 2004. The secondary treated effluent produced at the plant is either land applied or used to irrigate trees and fodder crops on land leased from Los Angeles World Airports (LAWA). Figure 12 is the existing treatment schematic for PWRP.

The RWQCB-LR revised the WDRs for PWRP in 2000, ordering District No. 20 to take action on suspected groundwater nitrate contamination due to historical land application practices. Furthermore, RWQCB-LR adopted Cleanup and Abatement Order No. R6V-2003-056 (CAO) and Cease and Desist Order No. R6V-2004-039 (CDO) in November 2003 and October 2004, respectively. The CAO requires District No. 20 and LAWA to clean up and abate the elevated nitrate levels identified in the groundwater beneath the land application sites. The CDO requires District No. 20 to eliminate land application of treated effluent by October 15, 2008, and complete construction of the new wastewater treatment and effluent management facilities necessary to prevent the discharge of nitrogenous compounds to the groundwater at levels that create a condition of pollution or violate the 1994 Water Quality Control Plan for the Lahontan Region (1994 Basin Plan) water quality objectives, by October 31, 2009.

The Final PWRP 2025 Facilities Plan and Environmental Impact Report (October 2005) proposes the recommended project to eliminate land application of treated effluent and to construct new wastewater treatment and effluent management facilities to address the CDO. The recommendations include increasing PWRP's capacity from 15.0 mgd to 22.4 mgd by 2013. Existing primary treatment facilities will be expanded, secondary treatment facilities of oxidation ponds would be replaced with CAS w/ nitrification-denitrification, and tertiary treatment facilities (filters), permanent disinfection facilities and solids management facility improvements would be included. Land will be purchased to accommodate the new storage reservoir construction and agricultural reuse pipeline facilities that should be completed by



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PWRP Existing Treatment Schematic

K/J 0589030

Figure No. 12

Source: Final Palmdale Water Reclamation Plant 2005 Facilities Plan and Environmental Impact Report, September 2005, Figure ES-3.

2008 and 2009, respectively. Tertiary wastewater will be produced by 2009 and municipal use of the tertiary treated recycled water is planned with LACWW40 and PWD.

4.2.3 Rosamond Wastewater Treatment Facility

The existing wastewater facilities at RWWTP include the headworks (grinder and influent pumps) and 15 ponds, which provide treatment (aeration), storage and disposal (evaporation). Upgrades to RWWTP in 1995 provided the capacity to provide undisinfected secondary treatment for the wastewater. The current average daily flow at RWWTP is 1.1 mgd, with a capacity of 1.3 mgd. There is no discharge from RWWTP, but treated wastewater can be used to irrigate non-food bearing trees onsite.

Projected wastewater flows for RWWTP are 1.8 mgd in 2010, and 2.34 mgd in 2018. To achieve the 1.8 mgd capacity needed in 2010, the proposed upgrades to RWWTP will increase the primary treatment (grit removal) capacity to 1.8 mgd, continue the operation of the existing 1.3 mgd secondary treatment pond plant, and add 0.5 mgd of new secondary and tertiary treatment facilities. The new 0.5 mgd tertiary treatment plant will be constructed in a manner that the plant can be expanded to handle a total of 1.0 mgd to meet flow projections of 2.34 mgd in 2018. Proposed plant improvements will provide grit removal, flow splitting, tie-in to the existing system, an extended aeration reactor basin, one (1) secondary clarifier, return and waste activated sludge pumping station, chemical feed facility, filters, ultraviolet disinfection, sludge drying beds, a control building, an effluent pump station and distribution system improvements.

The proposed treatment plant improvements design is complete and approved by the State of California; construction will begin when the funding is received. The recycled water will be of sufficient quality that it meets unrestricted use requirements and may be used for irrigating the landscapes of freeways, parks, schools, senior complexes and new home developments.

4.3 Water Quality of Effluent

The water quality of AVTTP effluent is provided in Table 10. Monitoring results and WDR limits, where applicable, are shown also.

Table 10: AVTTP Routine Disinfected Tertiary Effluent Monitoring Results for 2002

Constituent	Range	Average	Permit Limit
Total Coliform, Daily Grab (MPN/100 mL)	< 1a - < 1	< 1	23 (maximum)b
Total Coliform, 7-Day Median (MPN/100 mL)	< 1 - < 1	< 1	2.2 (maximum)b
Turbidity, 24-Hour Composite (NTU)	0.7 - 1.4	1.0	N/A
Turbidity, 30-Day Mean (NTU)	0.7 - 1.6	1.1	2.0 (maximum)
Turbidity, Time > 5 NTU (minutes)	0 - 0	0	72 (maximum)
MBAS (mg/L)	0.10 - 0.10	0.10	2 (maximum)
Soluble BOD (mg/L)	< 2 - 5	< 3	30 (average); 45 (maximum)
Soluble COD (mg/L)	22 - 41	26	N/A
Nitrate Nitrogen (mg/L-N)	0.80 - 8.16	3.50	N/A
Ammonia Nitrogen (mg/L-N)	< 0.01 - 1.8	< 0.3	N/A
Kjeldahl Nitrogen (mg/L-N)	0.2 - 3.1	< 0.7	N/A

(a) "<x" indicates constituent was not detected, with the detection limit being x.
(b) The number of coliforms must not exceed the permit limit per 100 mL in more than one sample during any 30-day period.

The effluent mineral characteristics at LWRP, PWRP and RWWTP for 2004 are provided in Table 11.

Table 11: Effluent Mineral Characteristics for LWRP, PWRP and RWWTP

Parameter (Annual Mean Values)	Unit	LWRP[1]	PWRP[1]	RWWTP[2]
Total Dissolved Solids	mg/l	548	520	590
Ammonia-N	mg/l	15.7	22	32
Calcium	mg/l	44	31.1	NA
Magnesium	mg/l	12.3	11.3	NA
Arsenic	mg/l	< 0.0022	< 0.001	0.007
Barium	mg/l	0.014	NA	NA
Aluminum	mg/l	< 0.09	NA	NA
Cadmium	mg/l	< 0.0004	< 0.0004	ND
Total Chromium	mg/l	< 0.010	< 0.010	ND
Hexavalent Chromium	mg/l	< 0.0001	NA	NA
Cobalt	mg/l	< 0.010	NA	NA
Iron	mg/l	0.275	NA	NA
Lead	mg/l	< 0.002	< 0.002	0.006
Manganese	mg/l	0.019	NA	NA
Mercury	mg/l	< 0.00004	< 0.00004	ND
Nickel	mg/l	< 0.020	< 0.020	ND
Potassium	mg/l	17	14.1	NA
Silver	mg/l	< 0.00036	< 0.00033	ND
Antimony	mg/l	< 0.0005	< 0.0005	ND
Beryllium	mg/l	< 0.0007	< 0.0005	ND
Molybdenum	mg/l	< 0.04	NA	NA
Thallium	mg/l	< 0.001	< 0.001	ND
Vanadium	mg/l	< 0.020	NA	NA
Sulfate	mg/l	80	69	NA
Chloride	mg/l	141	113	98
Total Hardness (as C_2CO_3)	mg/l	127	NA	NA
MBAS	mg/l	0.1	0.2	7.8
Copper	mg/l	< 0.010	NA	0.043
Selenium	mg/l	< 0.001	NA	ND
Sodium	mg/l	167	125	NA
Zinc	mg/l	0.067	NA	0.440

NA: not available
ND: None detected at DLR.
[1]2004 Annual Reports.
[2]BSK Analytical Laboratories Certificate of Analysis, Sample Date 07/20/04 of influent sewer.

4.4 Additional Facilities Needed to Comply with Waste Discharge Requirements

When LWRP, PWRP and RWWTP are upgraded to provide tertiary treated effluent, no additional treatment facilities will be required to comply with the waste discharge requirements.

4.5 Sources of Industrial or Other Problem Constituents

Industrial sources of pollutants will be controlled by implementing an industrial pretreatment program.

4.6 Existing Recycling Activities

As discussed in Section 3.3.4, there is only one current user of tertiary treated recycled water. A small percentage of the wastewater at the LWRP receives tertiary treatment through additional onsite facilities known as AVTTP. Tertiary treated effluent from the 0.6-mgd-capacity AVTTP is conveyed to Apollo Park, where it fills a series of recreational impoundments that are available to the public. Since the recreational demand exists primarily between April and October, AVTTP operates only about half of the year.

4.7 Existing Rights to Use of Treated Effluent after Discharge

LACWW40 is currently in negotiation with County Sanitation Districts of Los Angeles County (CSDLAC) to purchase the tertiary treated effluent from LWRP and PWRP and receive the rights for the reuse of the recycled water.

RCSD has the existing rights to use RWWTP's tertiary treated effluent after discharge since RCSD owns and operates RWWTP.

4.8 Wastewater flow variations

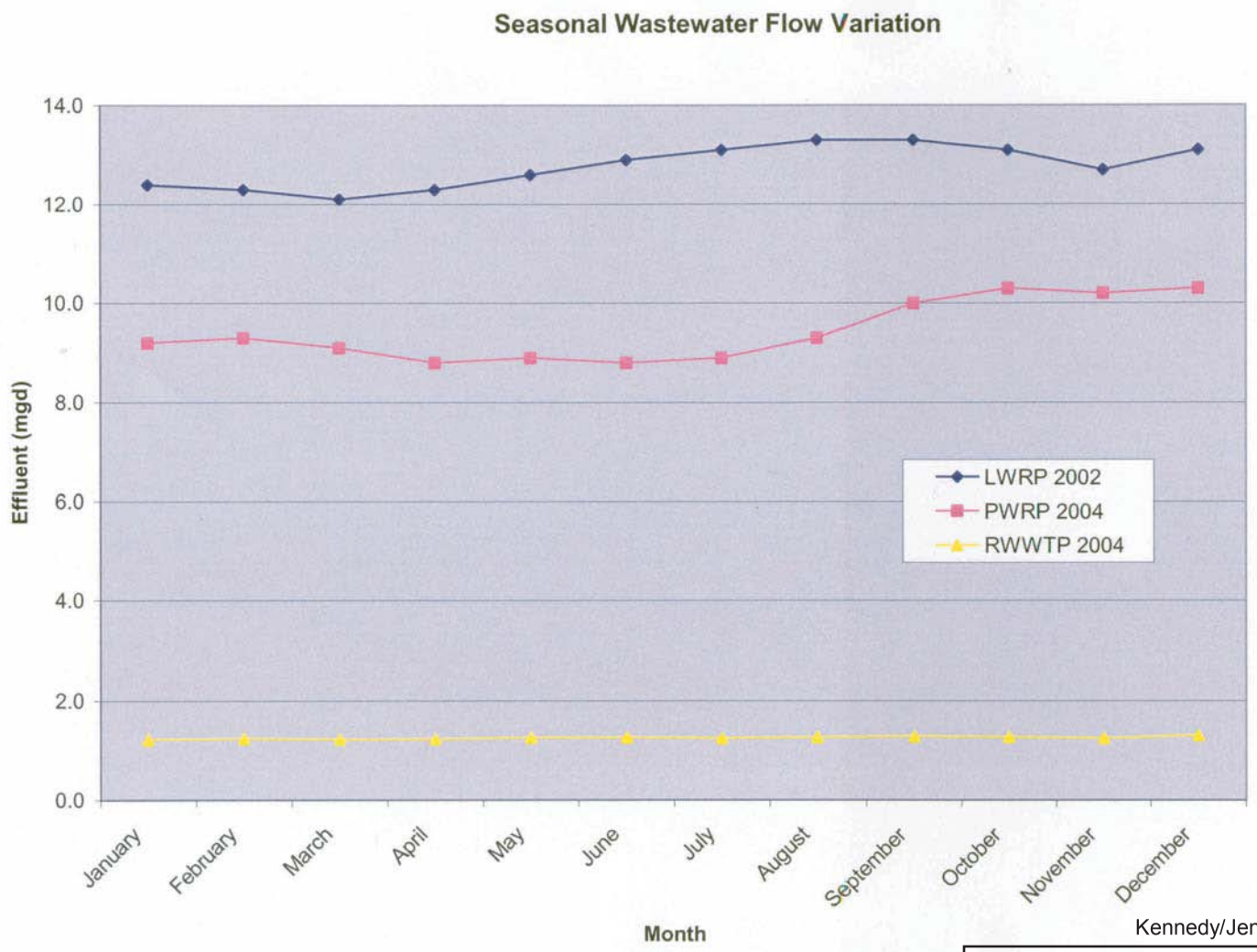
4.8.1 Seasonal Flow Variation

For 2002 at LWRP, the monthly flow averaged over the winter months (October – March) was about 0.3 MGD lower than the monthly flow averaged for the summer months (April – September), despite the majority of the storms occurring in the winter. Figure 13 shows the monthly flows from January 2002 – December 2002. During the winter months of this year (January 2002 – March 2002 and October 2002 – December 2002), Lancaster received 2.27 inches of rainfall and during the summer months (April 2002 – September 2002), they received only 0.03 inches.

For 2004 at PWRP, the monthly flow averaged over the winter months (October – March) was about 0.6 MGD higher than the monthly flow averaged for the summer months (April – September). Figure 13 shows the monthly flows from January 2004 – December 2004.

During the winter months of this year (January 2004 – March 2004 and October 2004 – December 2004), Palmdale received over 9 inches of rainfall and during the summer months (April 2004 – September 2004), the rainfall was 0.04 inches.

For 2004 for RWWTP, the wastewater flows were fairly constant throughout the entire year. The monthly flow averaged over the winter months (October – March) was 0.01 MGD less than the monthly flow average over the summer months (April – September). Assuming the 2004 rainfall data presented above for PWRP is applicable to RWWTP, the significantly higher rainfall in the winter appeared to have little effect on RWWTP's wastewater flows.



Kennedy/Jenks Consultants

Los Angeles County Waterworks District No. 40
Antelope Valley Facilities Planning Report

Seasonal Wastewater Flow Variation

K/J 0589030

Figure No. 13

Section 5: Treatment Requirements for Discharge and Reuse

5.1 Water Quality Requirements for Potential Uses

Disinfected tertiary recycled water will be required for the planned irrigation areas in the Antelope Valley study area as described in the California Health Laws Related to Recycled Water (Purple Book). The Purple Book provides a single source of guidelines and requirements for recycled water usage in California. It is meant to be an aid to staff of the Drinking Water Program within the Department of Heath Services Division of Drinking Water and Environmental Management.

5.1.1 Disinfected Tertiary Recycled Water

Disinfected tertiary recycled water is to be used for:

- Parks and playgrounds
- School yards
- Residential landscaping
- Golf courses
- Cemeteries
- Freeway landscaping
- Ornamental nursery stock and sod farms where access by general public is not restricted.

Disinfected tertiary recycled water is defined in Section 60301.230 of the Title 22 Code of Regulations, Division 4. Environmental Health, Chapter 3 Water Recycling Criteria (and also contained in the Purple Book) as follows:

> "The filtered wastewater has been disinfected by either:
>
> - A chlorine disinfection process following filtration that provides a CT (the product of total chlorine residual and modal contact time measured at the same point) value of not less than 450 milligram-minutes per liter at all times with a modal contact time of at least 90 minutes, based on peak dry weather design flow; or
> - A disinfection process that, when combined with the filtration process, has been demonstrated to inactivate and/or remove 99.999 percent of the plaque forming units of F-specific bacteriophage MS2, or polio virus in the wastewater. A virus that is at least as resistant to disinfection as polio virus may be used for purposes of the demonstration.

> The median concentration of total coliform bacteria measured in the disinfected effluent does not exceed a Maximum Probable Number (MPN) of 2.2 per 100 milliliters utilizing the bacteriological results of the last seven days for which analyses have been completed and the number of total coliform bacteria does not exceed an MPN of 23 per 100 milliliters in more than one sample in any 30 day period. No sample shall exceed an MPN of 240 total coliform bacteria per 100 milliliters."

In the Antelope Valley service area, all the planned irrigation areas fall in this category for Phases 1A - 4.

5.2 Health-related Water Quality or Treatment Requirements

Currently all areas considered for irrigation with recycled water are being irrigated with or have potable water pipes tied into their irrigation systems. The Purple Book describes the different backflow preventers that are required to avoid cross-contamination of potable water with recycled water.

In addition, to keep pipes that convey recycled water distinct, the Purple Book references the requirements of the Health and Safety Code, Division 104. Environmental Health Services, Part 12. Drinking Water, Chapter 5. Water Equipment and Control, Article 2. Cross Connection Control by Water Users, Section 116815:

> "All pipes installed above or below the ground, on and after June 1, 1993, that are designed to carry recycled water, shall be colored purple or distinctively wrapped with purple tape."

Since the regulations compiled in the Purple Book are intended to protect public health, compliance with these regulations should result in public health protection.

5.3 Wastewater Discharge Requirements

As discussed previously in Section 2.7, the Antelope Valley study area is in Water Quality Control Board Region No. 6 (Lahontan). RWQCB has not issued updated WDRs for LWRP, PWRP and RWWTP to address the future tertiary treatment upgrades. WDR Nos. for the three plants are discussed below.

Discharges of treated wastewater from the LWRP are regulated by the RWQCB-LR under WDRs listed as Board Order R6V-2002-053 adopted in September 2002.

Discharges of treated wastewater from the PWRP are regulated by the RWQCB-LR under amended WDRs listed as Board Order 6-00-57, and amendments 6-00-57-A01, 6-00-57-A02 and 6-00-57-A03. Accompanying Monitoring Report Plans (MRPs) listed as Board Order 6-00-57-A01, and amendments 6-00-57-A02, 6-00-57-A03, and 6-00-57-A04 provide the monitoring and reporting requirements.

Significant WDR revisions for PWRP occurred in 2000 when RWQCB ordered CSDLAC District No. 20 (CSDLAC20) to take action on suspected groundwater nitrate contamination

due to historical land application practices. RWQCB also adopted Cleanup and Abatement Order No. R6V-2003-056 (CAO) and Cease and Desist Order No. R6V-2004-039 (CDO) in November 2003 and October 2004, respectively. The CAO requires CSDLAC20 and LAWA to clean up and abate the elevated nitrate levels identified in the groundwater beneath the land application sites. The CDO requires CSDLAC20 to eliminate land application of treated effluent by October 15, 2008, and complete construction of the new wastewater treatment and effluent management facilities necessary to prevent the discharge of nitrogenous compounds to the groundwater at levels that create a condition of pollution or violate the 1994 Water Quality Control Plan for the Lahontan Region (1994 Basin Plan) water quality objectives, by October 31, 2009. (Final PWRP 2025 Plan EIR)

Rosamond WWTP is regulated by WDRs 6-95-107 and 6-96-107A1.

5.3.1 Water Quality Objectives (WQOs) and Effluent Limits

The updated WQOs and effluent limits for LWRP, PWRP and RWWTP with tertiary treatment upgrades are not available because the RWQCB has not issued revised WDRs. The anticipated effluent limits for recycled water at LWRP, PWRP and RWWTP are listed in Table 12. The preliminary design criteria for RWWTP's upgrade to tertiary treatment discussed only three tertiary effluent parameters: suspended solids, total BOD and turbidity. Concerns over nitrate levels in the area may require effluent limits for nitrates and other nitrogen species. All of the parameters and their corresponding levels apply to LWRP and PWRP.

5.4 Water Quality-related Requirements of the RWQCB

The water quality-related requirements of the RWQCB are documented in the Basin Plan and will be designated in the future WDRs. These water quality requirements serve to protect surface or ground water from problems resulting from recycled water use.

Table 12: Anticipated Tertiary Effluent Levels for LWRP, PWRP and RWWTP[1]

PARAMETER	UNIT	Level
Suspended Solids[1]	mg/l	5
Total Dissolved Solids	mg/l	550
Total BOD[1]	mg-N/l	5
Turbidity[1]	NTU	2
Ammonia	mg-N/l	1
Total Kjeldahl Nitrogen	mg-N/l	2
Nitrate+Nitrite	mg-N/l	8
Total Cyanides	µg/l	< 5
Total Phenols	µg/l	< 10
Total Trihalomethanes (THM)	µg/l	< 30
Calcium	mg/l	45
Magnesium	mg/l	12
Arsenic	mg/l	< 0.001
Barium	mg/l	0.01
Aluminum	mg/l	< 0.1
Cadmium	mg/l	< 0.0004
Total Chromium	mg/l	< 0.01
Hexavalent Chromium	mg/l	< 0.0001
Cobalt	mg/l	< 0.01
Iron	mg/l	< 0.3
Lead	mg/l	< 0.002
Manganese	mg/l	0.02
Mercury	mg/l	< 0.00004
Nickel	mg/l	< 0.020
Potassium	mg/l	17
Silver	mg/l	< 0.0005
Antimony	mg/l	< 0.0005
Beryllium	mg/l	< 0.0007
Molybdenum	mg/l	< 0.04
Thallium	mg/l	< 0.001
Vanadium	mg/l	< 0.02
Sulfate	mg/l	80
Chloride	mg/l	150
Total Hardness (as $CaCO_3$)	mg/l	130
MBAS	mg/l	0.1
Copper	mg/l	< 0.01
Selenium	mg/l	< 0.001
Sodium	mg/l	170
Zinc	mg/l	0.07
Boron	mg/l	1

[1]Suspended Solids, Total BOD and Turbidity are only tertiary effluent parameters described in RWWTP's preliminary design criteria for tertiary treatment upgrade.

Section 6: Recycled Water Market

6.1 Market Assessment Procedures

The Market Assessment approach is based on information received in discussions with the City of Palmdale, Palmdale Water District, City of Lancaster and Rosamond Community Services District.

The recycled water market assessment for the City of Palmdale is based on information in the 1995 Antelope Valley Water Resource Study by Kennedy/Jenks Consultants and the 1997 Metcalf & Eddy Draft Reclamation Concept and Feasibility Study. The 1997 report provided updated potential users and acreage, and used a unit application rate of 4.2 feet per year to determine the annual demand. In discussions with the City, an update to the 1997 Feasibility Study was completed. The peak day demands are calculated with a 2.2 peaking factor and 2.0 was used for the peak hour factor.

Palmdale Water District provided the recycled water user information, updated annual demands and estimates of usage for future schools and parks. Peaking factors of 2.2 and 2.0 were used to obtain peak day and peak hour demands from the annual demand information, respectively.

The recycled water market assessment for the City of Lancaster was performed by RMC Water and Environment. The information provided in the Draft Technical Memorandum (Draft TM) on the identification and evaluation of probable recycled water users by RMC Water and Environment (August 2005) is used for the City of Lancaster analysis. The Draft TM used a peak day factor of 2.0 and a peak hour factor of 3.0 for most users. Depending on the type of users, other various peaking factors were also used.

Rosamond Community Services District has not conducted any studies to identify any recycled water users at this time.

6.2 All Users or Categories of Potential Users

The potential recycled water users, annual demands, peak month, peak day and peak hour demands for City of Lancaster, City of Palmdale and the Palmdale Water District are presented below. Each potential user is identified with a site identification number. Potential users plan on using the tertiary treated water for landscape irrigation.

6.2.1 Antelope Valley

The overall estimated recycled water demand at buildout for the Antelope Valley is 17,491 AFY annually. This estimate incorporates recycled water demands for City of Palmdale, Palmdale Water District and City of Lancaster. Table 13 presents the breakdown of annual demands, peak month demands and peak day demands per agency.

It is estimated that the recycled water demand for Antelope Valley will vary seasonally according to the rainfall cycle associated with the region. During the winter months (October – March) when more rainfall is occurring, there will be less demand for recycled water for irrigation. During the summer months (April – September), the demand for recycled water will be high due to the higher temperatures and no rainfall.

Table 13: Antelope Valley Estimated Recycled Water Demand

Site/Project	Annual Demand at Buildout (AFY)	Annual Demand at Buildout (mgd)	Peak Month Demand (AF/mo)	Peak Day Demand (AF/day)	Peak Day Demand (mgd)	Peak Hour (mgd)	Comments
City of Palmdale	6,978	6.23	1,279	42.65	13.90	27.80	Used peak day factor of 2.2 and peak hour factor of 2.0.
Palmdale Water District	3,873	3.46	710	23.67	7.71	15.43	Used peak day factor of 2.2 and peak hour factor of 2.0.
City of Lancaster	6,640	5.93	1,094	36.47	11.88	35.53	Used Lancaster TM peak day factor of 2.0 and peak hour factor of 3.0.
Total Annual Demand	**17,491**	**15.6**	**3,083**	**103**	**33.5**	**78.8**	

6.2.2 City of Palmdale

The recycled water users for the City of Palmdale include mostly parks, schools, and golf courses. In addition, two future developments, Ritter Ranch and Anaverde, could potentially have a large recycled water demand. Table 14 shows the projected annual demand at buildout, peak day and peak hour demands of the potential major recycled water users. The total annual demand is projected to be 6,978 AFY.

Table 14: City of Palmdale Estimated Recycled Water Demand at Buildout

Site ID	Site/Project	Size (ac)	Unit Application Rate (ft/yr)	Annual Demand at Buildout (AFY)	Peak Month Demand (AF/mo)	Peak Day Demand* (AF/day)	(mgd)	Peak Hour (mgd)
5065	Palmdale Business Park							
	Golf Course	236	4.20	991	181.72	6.06	1.97	3.95
5100	Antelope Valley Country Club	125	4.20	525	96.25	3.21	1.05	2.09
5002	Ritter Ranch (Future)							
	Parks	122	4.20	512	93.94	3.13	1.02	2.04
	Schools	121	4.20	508	93.17	3.11	1.01	2.02
	Golf Course	184	4.20	773	141.68	4.72	1.54	3.08
	Green Belts	75	4.20	315	57.75	1.93	0.63	1.25
5003	Anaverde (Future)							
	Golf Course	216	4.20	907	166.32	5.54	1.81	3.61
	Parks	160	4.20	672	123.20	4.11	1.34	2.68
	Schools	36	4.20	151	27.72	0.92	0.30	0.60
5004	Rancho Vista							
	Golf Course	135	4.20	567	103.95	3.47	1.13	2.26
	Parks	5	4.20	21	3.85	0.13	0.04	0.08
	Schools - Existing							
5128	Highlands High School	27	4.20	113	20.79	0.69	0.23	0.45
5134	Summerwind Elementary	7	4.20	29	5.39	0.18	0.06	0.12
5008	Rancho Vista Elementary	7	4.20	29	5.39	0.18	0.06	0.12
	Parks - Existing							
5009	Marie Kerr	60	4.20	252	46.20	1.54	0.50	1.00
	Parks - Future							
5010	Hillside	10	4.20	42	7.70	0.26	0.08	0.17
5005	Rancho Vista	4	4.20	17	3.08	0.10	0.03	0.07
5012	Warnack	132	4.20	552	101.26	3.38	1.10	2.20
	Subtotal Existing Annual Demand	602		2,528	464	15.45	5.04	10.07
	Subtotal Future Annual Demand	1,060		4,450	816	27.19	8.86	17.72
	Total Annual Demand	**1,662**		**6,978**	**1,279**	**42.7**	**13.9**	**27.8**

* Used a peak factor of 2.2

6.2.3 Palmdale Water District

Palmdale Water District provided the recycled water user information, updated annual demands at buildout and estimates of usage for future schools and parks. Table 15 displays the estimated recycled water demands for Palmdale Water District. As can be seen from the table, the projected annual demand for PWD is 3,873 AFY.

Table 15: PWD Estimated Recycled Water Demand at Buildout

Site ID	Site/Project	Size (ac)	Annual Demand (MG/yr)	Unit Application Rate (ft/yr)	Annual Demand at Buildout (AFY)	Peak Month Demand (AF/mo)	Peak Day Demand[1] (AF/day)	Peak Day Demand[1] (mgd)	Peak Hour (mgd)
5013	College Park (Future)								
	Golf Course	184		4.20	773	141.68	4.72	1.54	3.08
	Parks	13		4.20	55	10.01	0.33	0.11	0.22
	School	100		4.20	420	77.00	2.57	0.84	1.67
5102	Desert Aire Golf Course (Existing)	40		4.20	168	30.80	1.03	0.33	0.67
	Schools - Existing								
5014	Barrel Springs		10.17		31	5.72	0.19	0.06	0.12
5015	Buena Vista		21.05		65	11.84	0.39	0.13	0.26
5122	Cactus K-8	10	10.26		31	5.77	0.19	0.06	0.13
5052	Chaparral Elementary	7	5.82		18	3.27	0.11	0.04	0.07
5016	Cimmaron		9.71		30	5.46	0.18	0.06	0.12
5118	Desert Rose Elementary	7	9.67		30	5.44	0.18	0.06	0.12
5017	Golden Poppy		14.16		43	7.97	0.27	0.09	0.17
5018	Joshua Hills		9.17		28	5.16	0.17	0.06	0.11
5019	Los Amigos		14.08		43	7.92	0.26	0.09	0.17
5020	Manzanita Elementary	7	7.77		24	4.37	0.15	0.05	0.09
5124	Mesa Intermediate	14	17.84		55	10.04	0.33	0.11	0.22
5021	Mesquite Elementary	7	9.28		28	5.22	0.17	0.06	0.11
5101	Palmdale High School	37	44.97		138	25.30	0.84	0.27	0.55
5022	Palmtree		13.61		42	7.66	0.26	0.08	0.17
5023	Pete Knight High School		72.33		222	40.69	1.36	0.44	0.88
5024	Phoenix High School		1.80		6	1.01	0.03	0.01	0.02

Site ID	Site/Project	Size (ac)	Annual Demand (MG/yr)	Unit Application Rate (ft/yr)	Annual Demand at Buildout (AFY)	Peak Month Demand (AF/mo)	Peak Day Demand[1] (AF/day)	(mgd)	Peak Hour (mgd)
5024	Phoenix High School		1.80		6	1.01	0.03	0.01	0.02
5025	Shadow Hills		53.54		164	30.12	1.00	0.33	0.65
5026	Tamarisk		7.03		22	3.96	0.13	0.04	0.09
5120	Tumbleweed Elementary	7	12.00		37	6.75	0.23	0.07	0.15
5027	Wildflower		9.92		30	5.58	0.19	0.06	0.12
5028	Yellen/Silpa		8.53		26	4.80	0.16	0.05	0.10
5121	Yucca Elementary	6	8.14		25	4.58	0.15	0.05	0.10
	Schools - Future								
5030	Ana Verde[2]		12.00		37	6.75	0.23	0.07	0.15
5031	Granite Hills[3]		14.16		43	7.97	0.27	0.09	0.17
5032	Ponderosa[4]		10.17		31	5.72	0.19	0.06	0.12
	Parks - Existing								
5105	Courson	8	9.13		28	5.14	0.17	0.06	0.11
5034	Desert Lawn Memorial	38	18.38		56	10.34	0.34	0.11	0.22
5107	Desert Sands	20	27.66		85	15.56	0.52	0.17	0.34
5035	Domenic Massari	40	58.26		179	32.78	1.09	0.36	0.71
5036	Dr. Robert C. St. Clair Parkway	4	6.68		21	3.76	0.13	0.04	0.08
5037	Joshua Hills	4	8.21		25	4.62	0.15	0.05	0.10
5038	Manzanita	5		4.20	21	3.85	0.13	0.04	0.08
5104	McAdam	20	28.84		89	16.23	0.54	0.18	0.35
5039	Pelona Vista Park	73	44.28		136	24.91	0.83	0.27	0.54
	Parks - Future								
5040	60th Street East/Avenue S-8	20		4.20	84	15.40	0.51	0.17	0.33
5041	72nd Street East/Avenue R-8	10		4.20	42	7.70	0.26	0.08	0.17
5042	70th Street East/Avenue R	10		4.20	42	7.70	0.26	0.08	0.17
5043	Desert Sands Expansion	7		4.20	29	5.39	0.18	0.06	0.12
5118	Palmdale	3		4.20	11	1.93	0.06	0.02	0.04
5045	Palmdale Oasis[5]	33	33.73		104	18.98	0.63	0.21	0.41
5046	Sam Yellen	25		4.20	105	19.25	0.64	0.21	0.42

Site ID	Site/Project	Size (ac)	Annual Demand (MG/yr)	Unit Application Rate (ft/yr)	Annual Demand at Buildout (AFY)	Peak Month Demand (AF/mo)	Peak Day Demand[1] (AF/day)	(mgd)	Peak Hour (mgd)
5047	Sierra Hwy Green Belt	4		4.20	16	2.85	0.09	0.03	0.06
5048	Tejon	19		4.20	78	14.33	0.48	0.16	0.31
	Other - Existing								
5049	American Indian Little League	5		4.20	21	3.85	0.13	0.04	0.08
5101	Palmdale Pony League	7		4.20	29	5.39	0.18	0.06	0.12
5051	Ponciltan Square	2		4.20	8	1.54	0.05	0.02	0.03
	Subtotal Exist Annual Demand				2,004	367	12.25	3.99	7.98
	Subtotal Future Annual Demand				1,869	343	11.42	3.72	7.44
	Total Annual Demand				**3,873**	**710**	**23.7**	**7.7**	**15.4**

[1]Used a peak factor of 2.2.
[2]Used Tumbleweed annual demand.
[3]Used Golden Poppy annual demand.
[4]Used Barrel Springs annual demand.
[5]Estimated annual demand.

6.2.4 City of Lancaster

The recycled water market assessment for the City of Lancaster is provided in the Draft TM on the identification and evaluation of probable recycled water users by RMC Water and Environment (August 2005). The results from the market assessment are listed in detail in Appendix B. Table 16 summarizes the results of the market assessment. In the TM, it was assumed that peak month demand is equal to peak day demand. As can be seen from Table 16, the projected annual demand at buildout for the City of Lancaster is 6,640 AFY.

Table 16: City of Lancaster's Estimated Recycled Water Demand at Buildout

Site ID	Site/Project	Size (ac)	Annual Demand at Buildout (AFY)	Peak Day Demand (mgd)	Peak Hour (mgd)
	Existing Facilities Recycled Water Use				
1	Antelope Valley High School	58.6	67.21	0.1200	0.36
2	Apollo Park	89.8	179.20	0.3200	0.96

Site ID	Site/Project	Size (ac)	Annual Demand at Buildout (AFY)	Peak Day Demand (mgd)	Peak Hour (mgd)
3	Eastside Park	18.5	78.41	0.1400	0.42
4	El Dorado Park	13.4	68.00	0.1200	0.36
5	El Dorado School	6.3	11.20	0.0200	0.06
6	Fairgrounds Development	57.8	145.60	0.2600	0.78
7	Jane Reynolds Park	6.8	33.60	0.0600	0.18
8	Joshua Memorial Park	38.2	156.80	0.2800	0.84
9	Lancaster Cemetery	14.4	56.01	0.1000	0.30
10	Landfill	146.5	33.60	0.0900	0.27
11	Linda Verde School, E	10.0	22.40	0.0400	0.12
12	Mariposa Park	11.7	56.01	0.1000	0.30
13	Park View, E, M	19.8	56.01	0.1000	0.30
14	HWY 14	367.2	77.97	0.1392	0.42
15	Phoenix High School	4.0	11.20	0.0200	0.06
16	Antelope Valley College	113.8	483.40	0.8632	2.59
17	Armagosa School, M	14.3	60.74	0.1084	0.33
18	Carter Park	63.5	268.80	0.4800	1.44
19	City Park	69.4	163.00	0.3000	0.90
20	Cole Middle School	19.6	83.36	0.1488	0.45
21	Del Sur School, E, M	18.2	77.28	0.1380	0.41
22	Desert View, E	10.3	43.82	0.0782	0.23
23	Eastside HS (proposed)	68.6	291.20	0.5200	1.56
24	Fox Field Development*	87.5	371.70	0.6637	1.99
25	George Lane Park	13.7	58.30	0.1041	0.31
26	Good Shepard Cemetery	58.5	248.50	0.4437	1.33
27	Hull Park	9.7	41.09	0.0734	0.22
28	Proposed School 5	16.4	44.81	0.0800	0.24
29	Jack Northrop E, M	31.0	131.80	0.2353	0.71
30	Joshua School	17.3	73.46	0.1312	0.39
31	Joe Walker School, E	22.3	94.52	0.1688	0.51
32	Lancaster Golf Center	19.6	83.21	0.1486	0.45
33	Lancaster Municipal Stadium	5.2	22.09	0.0394	0.12
34	Lancaster School, H	37.0	157.20	0.2808	0.84
35	Lincoln School, E	10.7	45.54	0.0813	0.24

Site ID	Site/Project	Size (ac)	Annual Demand at Buildout (AFY)	Peak Day Demand (mgd)	Peak Hour (mgd)
36	Monte Vista, E	14.6	62.04	0.1108	0.33
37	Nancy Cory School, E	7.3	31.05	0.0554	0.17
38	National Soccer Center	155.7	661.10	1.1804	3.54
39	New Fairgrounds*	219.4	57.00	0.1000	0.30
40	Prime Desert Woodlands	64.3	272.90	0.4873	1.46
130A	City Maintenance	-	35.00	0.0554	0.06
130B	Street Cleaning	-	4.00	0.0061	0.01
	Existing Users Subtotal:		5020	8.99	26.85
	Future Developments Recycled Water Use				
41	Proposed Park 1	18.6	79.14	0.1413	0.42
42	Proposed Park 2	14.9	63.08	0.1126	0.34
43	Proposed School 1	13.9	58.94	0.1052	0.32
44	Proposed School 2	21.9	93.20	0.1664	0.50
45	Proposed School 3	18.0	76.46	0.1365	0.41
46	Proposed School 4	14.2	60.39	0.1078	0.32
47	Proposed School 6	15.3	64.94	0.1159	0.35
48	Proposed School 7	10.0	42.67	0.0762	0.23
49	Proposed School 8	18.4	78.28	0.1398	0.42
50	Proposed School 9	18.7	79.28	0.1416	0.42
51	Quartz Hill High School	76.3	323.90	0.5784	1.74
52	Rawely Duntely Park	18.2	77.29	0.1380	0.41
53	Sierra School, E	9.0	38.33	0.0684	0.21
54	Skytower Park	13.0	55.01	0.0982	0.29
55	Sun Down School, E	8.9	37.77	0.0674	0.20
56	Tierra Bonita Park	28.7	121.80	0.2174	0.65
57	Tierra Bonita School	9.6	40.93	0.0731	0.22
58	Valley View School	14.3	60.54	0.1081	0.32
59	West Wind School, E	9.7	41.10	0.0734	0.22
60-283	Future Sites	6505	127	0.23	0.68
	Future Users Subtotal:	6856	1620	2.89	8.68
	Existing and Future Total		**6640**	**11.9**	**35.5**

6.3 Other Topics from Guidelines

As described in the guidelines, some of the other issues associated with recycled water delivery which are discussed in greater detail below include:

- estimated internal capital investment required (on-site conversion costs),
- needed water cost savings,
- desire to use recycled water,
- date of possible initial use of recycled water,
- present and future source of water and quantity of use,
- quality and reliability needs.

6.3.1 Estimated Internal Capital Investment Required (On-site Conversion Costs)

Estimated internal capital investment required to convert existing irrigation facilities for recycled water use will be determined at a later date when more information is available.

6.3.2 Needed Water Cost Savings

The users proposed for the Antelope Valley Recycled Water Project will benefit from the use of recycled water because recycled water will be at a lower cost than potable water. Since the proposed users would benefit from a reduction in their water costs by using recycled water, none of the proposed users are likely to reject the opportunity to use recycled water. All users are using or have planned to use a certain quantity of water, therefore the users have already accepted the cost of water into their operations and are not likely to make decisions regarding water use based on the necessity to save money. So any savings from recycled water would only benefit the users, therefore this topic is not applicable.

6.3.3 Desire to Use Recycled Water

The City of Palmdale, Palmdale Water District, City of Lancaster and Rosamond Community Services District are interested in recycled water for municipal reuse and have expressed interest through the conduct of this feasibility study as well as earlier studies.

6.3.4 Date of Possible Initial Use of Recycled Water

The date of initial use of recycled water is a function of when the recycled water distribution facilities are available since recycled water treatment facilities to produce Title 22 unrestricted use recycled water are already in the planning/design phase. If grant funding is obtained, it is estimated that the completion of each phase of the recycled water project construction is as follows:

- Phase 1A – June 2006
- Phase 1B - January 2010

- Phase 2 - April 2011
- Phase 3 - July 2012
- Phase 4 - October 2013

6.3.5 Present and Future Source of Water and Quantity of Use

Many of the future recycled water users are current water users relying on current sources of water, which include local groundwater, local surface water, and imported water from the SWP. As discussed in Section 3, LACWW40 is continuing to seek alternative water supplies through conservation, development of aquifer storage and recovery, and importing additional water to meet current and future needs reliably.

6.3.6 Quality and Reliability Needs

All of the potential users are irrigation customers who require water quality and quantity sufficient to meet the needs of landscaping. The recycled water, treated to a tertiary level and provided by LWRP, PWRP and RWWTP, is sufficient to the potential users' needs.

Recycled water is a highly reliable source of water because wastewater is being continually produced. It is expected that the recycled water facilities will be sufficiently reliable to meet the needs of landscaping. Landscape is expected to be able to tolerate short duration outages with limited impact.

6.3.7 Wastewater Disposal Methods

The wastewater disposal methods are similar at LWRP, PWRP and RWWTP with some variations. The planned upgrades at LWRP will allow for the tertiary treated effluent to be delivered for municipal reuse or to be discharged to Piute Ponds, Impoundment Areas, Apollo Park, storage reservoirs and agricultural reuse operations. The tertiary level of effluent of PWRP will be available as recycled water for delivery to municipal users or to be discharged to storage reservoirs and agricultural reuse operations. RWWTP will be able to produce secondary and tertiary treated effluent. The secondary treated effluent will be discharged to evaporation ponds, while the tertiary level effluent will be delivered for municipal reuse.

6.4 Logical Service Area

The logical service area for recycled water will be developed in four phases. Figure 14 (folded at the end of this document) displays the planned recycled water system by phase. The initial phase will construct the backbone pipeline from LWRP in the direction of the majority of the existing potential recycled water users. This area was chosen for Phases 1A and 1B to coordinate with recycling water plans that the City of Lancaster is completing in the near future. Also, the backbone pipeline for the recycled water distribution system will need to begin at the WRP. Phase 2 will construct the backbone pipeline from PWRP and provide reservoir storage and include distribution pipelines extending out from the backbone to additional large potential users. The recycled water pipeline routes in Phases 3 and 4 are designed to distribute to large potential recycled water users in areas not yet served in the

service areas. The Phase 4 service area connects the Phase 1 backbone pipelines from the LWRP to the PWRP to provide for redundancy for recycled water delivery.

Section 7: Project Alternative Analysis

7.1 Planning and Design Assumptions

7.1.1 Phasing

Phasing of the recycled water infrastructure was performed using information developed in the Market Assessment, consideration of the topography in the project service area, and GIS files to locate proposed facilities, potential recycled water customers and the development of a logical installation of distribution facilities. This data assisted in defining a phased infrastructure that considers:

- Locations of existing or proposed effluent conveying pipelines for potential recycled water use or connection.
- System topography and hydraulic constraints.
- Existing potable water system pressure zones.
- Recycled water demand (Average Day demand).
- Potential clustering of recycled water users within a specific geographical area.

Phase 1A: Backbone Pipeline from LWRP

1. Serving users within approximately 1 mile of the Phase 1A pipelines.
2. Clusters exist where multiple recycled water customers can be served with minimal additional infrastructure due to close proximity of recycled water customers.

Phase 1B: Reservoir Storage and Extension to Large Users in Lancaster

1. Serving users within approximately 1 mile of the Phase 1 pipelines.
2. Clusters exist where multiple recycled water customers can be served with minimal additional infrastructure due to close proximity of recycled water customers.

Phase 2: Backbone Pipeline from PWRP and Reservoir Storage and Extension to Large Users

1. Serving users within approximately 1 mile of the Phase 2 pipelines.
2. Aggregate (with “clustering”) recycled water to maximize use near the proposed pipelines.
3. Adding storage as soon as possible to facilitate operation of the distribution system.

Phase 3: Reservoir Storage and Extension to Large Users in Palmdale

1. Serving users within approximately 1 mile of the Phase 3 pipelines.
2. Aggregate (with “clustering”) recycled water to maximize use near the pipelines.
3. Adding storage as soon as possible to facilitate operations.

Phase 4: LWRP and PWRP Interconnection

1. Complete the backbone system.
2. Connect the Lancaster and Palmdale systems.

7.1.2 Pipeline Sizing Criteria

The following criteria were developed in coordination with the LACWW40, the City of Lancaster, the City of Palmdale and the Palmdale Water District, the Market Assessment, and specific input from the individual water agencies as to what peaking factors should be used to determine the pipeline sizing.

1. Average day demands were used to load the base model as defined in the Market Assessment.

2. An average day with a peaking factor of 2.2 is applied to simulate Peak Day demands for the City of Palmdale and PWD. A peaking factor of 2.0 is used to calculate the City of Lancaster's Peak Day demands, in most cases.

3. Peak Hour is calculated from Peak Day with a factor of 2.0 applied for the City of Palmdale and PWD. For the City of Lancaster, a peaking factor of 3.0 was used to calculate the Peak Hour from the Peak Day, in most cases.

4. Average Day, Peak Day and Peak Hour demands are used to size pipelines using a hydraulic computer model.

5. Steady state analysis is used to target the above pipeline criteria.

6. Due to the large diameter pipeline required, internal pipeline diameter and friction coefficient for ductile iron pipe are used to model the system. A Hazen-Williams Coefficient of 130 is used in the model.

7. Minimum pressure (Pmin) in the recycled water system of 55 psi is desired for nodes under Average Day, Peak Day and Peak Hour demand conditions.

8. Fluctuations in maximum pressure (Pmax) in the recycled water system allow for maximum pressures of 185 psi with 55 to 150 psi being the optimum delivery pressure range.

9. Maximum Velocities under Peak Day demand conditions are 6 ft/sec.

10. For the potential recharge areas, adequate pipe capacity is provided to allow full WRP flow to the recharge areas.

7.1.3 Storage Sizing Criteria

The storage capacity is set equal to 30 percent of the Peak Day demand for the system.

NOTE: Storage volume for emergency (fire) conditions is assumed to be accounted for in the potable water system.

7.1.4 Pump Sizing Criteria

Pumping capacity will be based on flow requirements at Peak Day demand and necessary HGL, as determined by results of the hydraulic analysis.

7.1.5 Cost Basis: Estimates of Probable Capital Costs

A preliminary estimate of probable capital costs for each of the phases is developed based upon unit cost factors used in the 1995 Antelope Valley Water Resource Study (multiplied by a factor of 1.27 to account for price increases from 1995 to 2005), costing models developed for other similar projects, and minimum construction costs for a pump or storage facility as determined by Kennedy/Jenks project experience. Estimates of probable capital costs provided represent Order of Magnitude level costs as established by the American Association of Cost Engineers (AACE) and represent an accuracy of +50% to -30. Criteria and assumptions that were used to develop the estimates of probable costs include:

- Costs for "new pipe" alternative distribution are based on recent bid results and reflect a dramatic increase in pipeline cost in the current construction bidding climate. Raw costs are based on $13.00 per inch diameter and include allowance for all pipeline facilities (including valves, blow-offs, tunneling under railroads and major road crossings, etc.). With contractor overhead and profit and contingencies, the unit costs are $16.25 per inch diameter.

    - 14" pipelines - $182 per LF
    - 16" pipelines - $208 per LF
    - 24" pipelines - $312 per LF
    - 27" pipelines - $351 per LF
    - 36" pipelines - $468 per LF
    - 42" pipelines - $546 per LF

- Capital cost for the main pump stations is estimated using costs based on Kennedy/Jenks experience from similar facilities.

- Capital cost for the booster pump stations is estimated using a cost curve generated from data provided in the 1995 Antelope Valley Water Resources Study.

- Unit cost for reservoirs is from the 1995 Antelope Valley Water Resource Study at ($0.50/gal) and increased by a factor of 1.27 for 2005 to $0.64/gal, which included tanks, foundations, appurtenances, excavation, paving, fencing, landscaping and telemetry.

- Contingency costs of 10%, Engineering & Administration costs of 35%, and Contractor's Overhead & Profit costs of 15% the total construction costs are added to each proposed facility cost.

Actual construction costs will vary and are dependent on labor and material costs, competitive market conditions and the implementation schedule that exist at the time of construction.

7.2 Water Recycling Alternatives Evaluated

7.2.1 Treatment Alternatives

There are no specific treatment alternatives needed for recycled water since the recycled water entering the pipeline from the LWRP and the PWRP will already be at tertiary quality.

7.2.2 Pipeline Route Alternatives

The pipeline routes were selected primarily to minimize the distance from the LWRP and PWRP recycled water source and the recycled water use sites. The pipeline routes in the City of Lancaster optimized the use of existing recycled water pipes and routes to minimize costs and coordinate appropriately with the existing and planned recycled water system. During the design phase of this project, some refinements to the pipeline alignments may occur when more information becomes available.

Phasing, as detailed in Table 17, assumes users within 1 mile of either side of the recycled water pipelines, installed in each phase, are connected to the distribution system.

Table 17: Infrastructure Phasing

Project Component	Phase 1A	Phase 1B	Phase 2	Phase 3	Phase 4	Total
Pipeline	24,200 LF of 24 inch diameter pipeline	39,000 LF of 24-inch diameter pipeline	56,000 LF of 16-inch to 36-inch diameter pipeline	26,000 LF of 14- inch to 36-inch diameter pipeline	57,000 LF of 14-inch to 24-inch diameter pipeline	202,000 LF of 14-inch to 36-inch diameter pipeline
Main Pump Stations		1 @ 20,833 gpm	1 @ 15,555 gpm	None	None	1 @ 15,555 gpm 1 @ 20,833 gpm
Booster Pump Stations	None	None	None	None	1 @ 1,725 gpm 1@ 8,460 gpm	1 @ 1,725 gpm 1@ 8,460 gpm
Storage	None	1 @ 3.0 MG	None	None	1 @ 2.1 MG 1 @ 4.4 MG	9.5 MG
Annual AFY delivered	786	2,161	2,076	1,295	7,013	13,331

7.2.3 Alternative Markets

The alternative markets that were evaluated in the market assessment include agriculture, industry, construction irrigation, street cleaning, medians for highways, parks, schools, residential common areas, golf courses, sports complexes and cemeteries. The potential alternative recycled water use markets are discussed in Section 6.

7.2.4 Alternative Storage Locations

The recycled water storage locations were selected based on elevations. During the design phase of the project, alternative sites at the required elevations may be evaluated at each proposed reservoir location, if required.

7.2.5 Sub-alternatives of Selected Alternative

There are no sub-alternatives to the alternatives listed in Sections 7.2.1-7.2.4.

7.3 Non-recycled Water Alternatives

7.3.1 Other Potentially Viable New Sources of Water

Include groundwater and aquifer storage and recovery and are discussed in greater detail in Section 3.8.

7.3.2 Economic Costs of New Sources of Water

Alternative sources of water are limited to expanded use of imported water. The proposed project is intended to maximize use of local resources and the cost of imported water is not included in this analysis.

7.4 Water Conservation/Reduction

7.4.1 Analysis

To address future demand, the 2005 Integrated Urban Water Management Plan (IUWMP) for the Antelope Valley focuses on conservation measures, which will project demand reduction when all demand recommendations are implemented. The Final 2005 IUWMP will identify the projected demand reduction percentage. In the 2005 IUWMP, a supply deficit has been projected.

Water conservation measures that are part of the 2005 IUWMP are:

- Water survey programs for single-family residential and multifamily residential customers.
- Residential plumbing retrofit.

- System water audits, lead detection, and repair.
- Metering with commodity rates for all new connections and retrofit of existing connections.
- Large landscape conservation programs and incentives.
- High-efficiency washing machine rebate programs.
- Public information programs.
- School education programs.
- Conservation programs for commercial, industrial, and institutional accounts.
- Wholesale agency programs.
- Conservation pricing.
- Water conservation coordinator.
- Water waste prohibition.
- Residential ultra-low-flush toilet replacement programs

Through the implementation of the existing demand management measures (DMM), an estimated overall water savings can be achieved for the Antelope Valley. However, it is difficult to determine actual water savings since most conservation measures are voluntary. Typically when a shortage occurs, water customers increase their awareness of water usage and voluntarily reduce water demand even more to avoid water rationing. Since most of the DMM implemented for the Antelope Valley are still in the early stages, there is still a high potential to achieve further reduction if and when it is needed, like during a water shortage.

LACWW40 is a signatory to the California Urban Water Conservation Council (CUWCC) Memorandum of Understanding (CUWCC MOU) for water conservation. As a signatory, LACWW40 is committing to implementation of best management practices demand management measures (DMM) to reduce potable water demands. Although use of recycled water is not a DMM, it will be significant with regard to reduction of potable water use.

7.4.2 Impact of Water Conservation/Reduction on Recycling

While conservation measures may help reduce the supply deficit, the measures will unlikely eliminate the deficit. Most likely, both water conservation and recycling will need to be encouraged and promoted to even come close to eliminating the deficit.

7.4.3 Recommendation

The City of Lancaster, the City of Palmdale and LACWW40 should continue with their water conservation efforts to achieve their goal of demand reduction in water supply to ensure additional water supplies will not be required. Concurrently, any water recycling should also be investigated due to the large water supply deficit that occurs, particularly in future years.

7.4.4 Implementation

The water conservation implementation is outlined in the 2005 Integrated UWMP for the Antelope Valley.

7.5 Pollution Control Alternatives (if applicable)

As described in Section 7.2.1 above, there is no additional treatment required for the use of recycled water. Treatment for pollution control is not an alternative in this project.

7.6 No Project Alternative

Without the implementation of the recycled water to the users in the Antelope Valley service area, they would continue to use potable water when needed, with the understanding that they are already over-pumping their groundwater basin and eventually this source will not be available. The LACWW40 and partner agencies understand the imperative to implement recycled water projects in order to meet future water demands therefore the no project alternative is not feasible.

7.7 Summary of Alternatives

Table 18 summarizes the two alternatives for this project; one is the proposed project and the other is the No Project Alternative.

Table 18: Summary of Alternatives

	Alternative #	Treatment	Conveyance	Pump Stations	Storage
Proposed Project	1	none	202,000 LF of 14-inch to 36-inch diameter pipeline	1 @ 1,725 gpm 1 @ 8,460 gpm 1 @ 15,555 gpm 1 @ 20,833 gpm	9.5 MG
No Project	2	none	none	none	none

7.7.1 Cost Tables for Each Alternative

Summary estimates of capital and operations and maintenance (O & M) for the alternatives listed above are shown in Table 19. The capital costs include materials and installation, taxes, contractor overhead and profit, as well as engineering design. The O & M costs include annual expenditures for manpower, equipment & materials, water, chlorination, miscellaneous, electrical power and maintenance of pipelines, tanks and pump stations.

Electrical power costs are calculated using typical power costs within California. Power consumption is calculated using the estimated flows and total dynamic heads (TDHs) for each pump station. The flows are assumed to be the annual average demand. The TDHs are estimated as the sum of the maximum static head for each cumulative phase plus 10% to account for minor and friction losses. It is assumed that pumps operate 6 hours per day (annual average).

Annual chlorination costs for the tertiary effluent at LWRP and PWRP are calculated assuming chlorine gas costs $450 per ton, is dosed at 25 mg/l and the effluent pump stations operate 6 hours per day.

The 8,460 gpm booster pump station planned for Phase 4 is proposed to provide the distribution system operators the flexibility to move water from the Lancaster system into the Palmdale system. No allowance for operating the facility is included in this operating cost in this report. The anticipated demand in both service areas can be accommodated by the recycled water produced at each WRP and the transfer of water would not normally be required.

Table 19: Estimated Capital and O&M Costs

Phase	Volume RW Delivered (AFY)	Capital Costs	Annual O&M Costs
Phase 1A	786	$4,027,000	N/A
Phase 1B	2,161	$27,958,000	$485,600
Phase 2	2,076	$33,316,000	$853,500
Phase 3	1,295	$17,168,000	$294,400
Phase 4	7,013	$36,715,000	$1,819,600
Total	**13,331**	**$119,184,000**	**$3,453,100**

* Costs are based on ENR CCI of 8290 (July 2005).

Detailed cost estimates for the facilities in each phase are provided in Appendix C.

7.7.2 Lists of Potential Users

The Antelope Valley recycled water project is intended to deliver recycled water 13,331 AFY to 202 use sites that includes schools, residential open spaces, parks, golf courses, cemeteries and sports complexes. These recycled water users are provided in Appendix D.

7.7.3 Economic Analysis for Each Alternative

A cost per acre-foot is calculated for each alternative by dividing the total annual cost (capital and O&M) of each alternative by the total volume of recycled water expected to be delivered. These values are shown in Table 20. More detailed planning-level cost estimating spreadsheets are found in Appendix E.

Table 20: Estimated Costs and Costs Per Acre-Foot

Phase	Volume RW Delivered (AFY)	Annual Capital Costs[1]	Annual O&M Costs	Total Annual Cost	Annual Cost/AF RW Delivered
Phase 1A	786	$270,700	N/A	N/A	N/A
Phase 1B	2,161	$1,879,300	$485,600	$2,639,000	$895
Phase 2	2,076	$2,239500	$853,500	$3,093,000	$1,490
Phase 3	1,295	$1,154,000	$294,400	$1,448,400	$1,119
Phase 4	7,013	$2,468,000	$1,819,600	$4,287,600	$611
Total	**13,331**	**$8,011,500**	**$3,453,100**	**$11,468,000**	**$860**

(1) Based on 20 years at 2.7%

7.7.4 Energy Analysis for Each Alternative

The energy associated with each alternative was incorporated into the capital and O&M costs. Annual energy was based on pumping costs. Construction energy is not expected to be a significant component of cost and was not considered.

7.7.5 Water Quality Impacts of Each Alternative

It is expected that the Antelope Valley recycled water project as proposed will improve receiving water quality by reducing the quantity of effluent being discharged to land disposal. Groundwater impacts are expected to be negligible since recycled water will be applied at agronomic rates. Nutrients are expected to be taken up by vegetation reducing the need for fertilizer applications.

7.8 Comparison of Alternatives and Recommended Alternative

The alternatives to be compared are the project as proposed and the non-recycled water alternative. Since the recycled water is coming from existing tertiary plants, there are no treatment alternatives. Because some of the effluent pipeline is already constructed from the LWRP and there are limited alternative routes between the LWRP and PWRP, there are no significant pipeline route alternatives. Regardless of whether the recycled water project is to proceed, the Antelope Valley will continue with ongoing water conservation programs.

The Antelope Valley Recycled Water Project as proposed is the recommended alternative because:

1. It reduces potable demands in an area of rapid growth.

2. It promotes the State's policies of beneficial reuse of recycled water to replace potable water where possible.

3. It helps to eliminate discharges to land disposal.

Section 8: Recommended Plan

8.1 All Proposed Facilities and Basis for Selection

The proposed facilities are selected based on an analysis of the service area demands, topography and desired operating pressures. The proposed system distributes recycled water throughout the service area and provides a backbone system that could accommodate minimum and maximum demands and allow significant deliveries of recycled water to recharge areas.

8.2 Preliminary Design Criteria and Refined Pipeline Routes

The preliminary design criteria for the recycled water supply system are provided in Table 21. The sizes of pipelines, pump stations, and storage depend on the peak demands of potential users for Phases 1A - 4. These demands are presented in Section 6. All pipelines will follow the most convenient and lowest cost routes which have been described above.

Table 21: Summary of Recycled Water System Criteria

System Components	Criteria
Recycled Water Supply	● **Assume project plant production for year 2025.**
Main Pump Stations	● **Pumps will operate 24 hours during peak day demands.** ● **Size for peak day demands.**
Booster Pump Stations	● **To serve high zones, size for peak day demands.** ● **To serve users from reservoirs, size for peak hour demands.**
Storage Reservoirs	● **Provide storage for 30% of peak day demand.** ● **Reservoir elevations should be adequate to provide optimum delivery pressures to most users.** ● **Provide surface storage adequate to meet peak season demands.**
Distribution System	● **Size to meet average day, peak day and peak hour demands.** ● **Maximum design velocity is 6 feet per second.** ● **Maximum system pressure: 185 psi.** ● **Optimum delivery pressure range: 55 to 150 psi.**

8.3 Cost Estimate Based on Time of Construction

The cost estimate based on the anticipated year of construction for RW delivery as described in Section 6.3.4 is presented in Table 22.

Table 22: Costs at Time of Construction

	Estimated 2005 Costs	Estimated Year Construction Begins	Estimated Costs at Time of Construction*
Phase 1A	$4,027,000	2005	$4,027,000
Phase 1B	$27,958,000	2007	$30,239,000
Phase 2	$33,316,000	2008	$37,476,000
Phase 3	$17,168,000	2010	$20,887,000
Phase 4	$36,715,000	2011	$46,456,000

***Escalated at 4%**

8.4 All Potential Users

The same quantity and peak demand for the potential users described in Sections 6.2 and 7.7 are being used for design purposes. Most of the potential users are in the City of Lancaster and City of Palmdale. Commitments and agreements between the water reclamation plants, the water districts and municipal users are under discussion.

8.5 Reliability of Facilities as Compared to User Requirements

All facilities for the recycled water project will meet user requirements. The recycled water facilities for this project will be new and built to meet user requirements. When the new facilities are implemented into the project, they will be done so in a way to provide reliable facilities. Because the facilities are for irrigation, the level of reliability required is not as high as if for potable water at vital facilities such as hospitals or schools.

8.6 Implementation Plan

8.6.1 Coordination with Water/Recycled Water Suppliers

As discussed in Section 4.7, LACWW40 is in discussions with CSDLAC to purchase the tertiary treated effluent from LWRP and PWRP and receive the rights for the reuse of the recycled water. The City of Lancaster is also conducting discussions with CSDLAC for the purchase of recycled water.

Design of the recycled water pipeline, pump stations (including alarms and shut-off control systems), and other appurtenant equipment shall be closely coordinated with CSDLAC District No. 14 staff.

A coordination protocol will need to be established to communicate between the water reclamation plants and LACWW40 as water quality, water quantity and operation & maintenance issues arise.

8.6.2 Ability and Timing of Users to Join System

LACWW40 intends and is likely to adopt a mandatory use ordinance for recycled water, which will be forwarded to the State Board after adoption. Existing potential recycled water users are expected to join the recycled water system as soon as the facilities construction and user connections are complete and in operation.

LACWW40 and the surrounding water supply agencies will be considering the need to provide financial assistance to onsite retrofit costs.

8.6.3 Tentative Water Recycling Requirements of RWQCB

The RW treatment facilities are regulated by waste discharge requirements as discussed in Section 5.1. The use of RW will likely be regulated by a combination of WDR for the treatment facilities in combination with other WDRs for the RW users. Currently there are efforts in progress to establish state-wide general RW requirements.

8.6.4 Commitments from Potential Users

Commitments and agreements between the water reclamation plants, the water districts and potential users will be developed as the program is implemented. The other water agencies associated with the Antelope Valley have indicated their interest in the recycled water project with the letters found in Appendix F.

8.6.5 Water Rights Impact

As discussed in Section 4.7, LACWW40 is in discussions to purchase the tertiary treated effluent from LWRP and PWRP and receive the rights for the reuse of the recycled water.

8.6.6 Permits, Right-of-Way, Design, and Construction

Pipeline construction will require encroachment permits from the City of Lancaster, the City of Palmdale and the County of Los Angeles. Also, land for the proposed reservoirs and pump stations will have to be purchased either from the Cities or negotiated through potential developers. LACWW40 is seeking financial assistance from the State Water Resources Control Board in the form of grants for constructing Phases 1A - 4.

Encroachment permits for all work within the public rights-of-way will be needed from each involved agency prior to commencement of any construction. All traffic control requirements will be complied with as well.

The DHS Title 22 review and inspection will be completed, as necessary. LACWW40 will need to prepare the Recycled Water Rules and Regulations in accordance with Title 22 regulations, which could be adopted at the same time as the mandatory use ordinance.

8.6.7 Detailed schedule

A detailed schedule has been prepared and is attached as Figure 15.

8.7 Operational Plan

8.7.1 Responsible People

LACWW40 will establish a knowledgeable staff for their recycled water operations. The existing and new staff will be given appropriate training and responsibility for recycled water system operations & maintenance. An appropriate staff member will be assigned as a backflow prevention technician.

8.7.2 Necessary Equipment

Any necessary equipment will be purchased for proper operation & maintenance of the recycled water system.

8.7.3 Monitoring

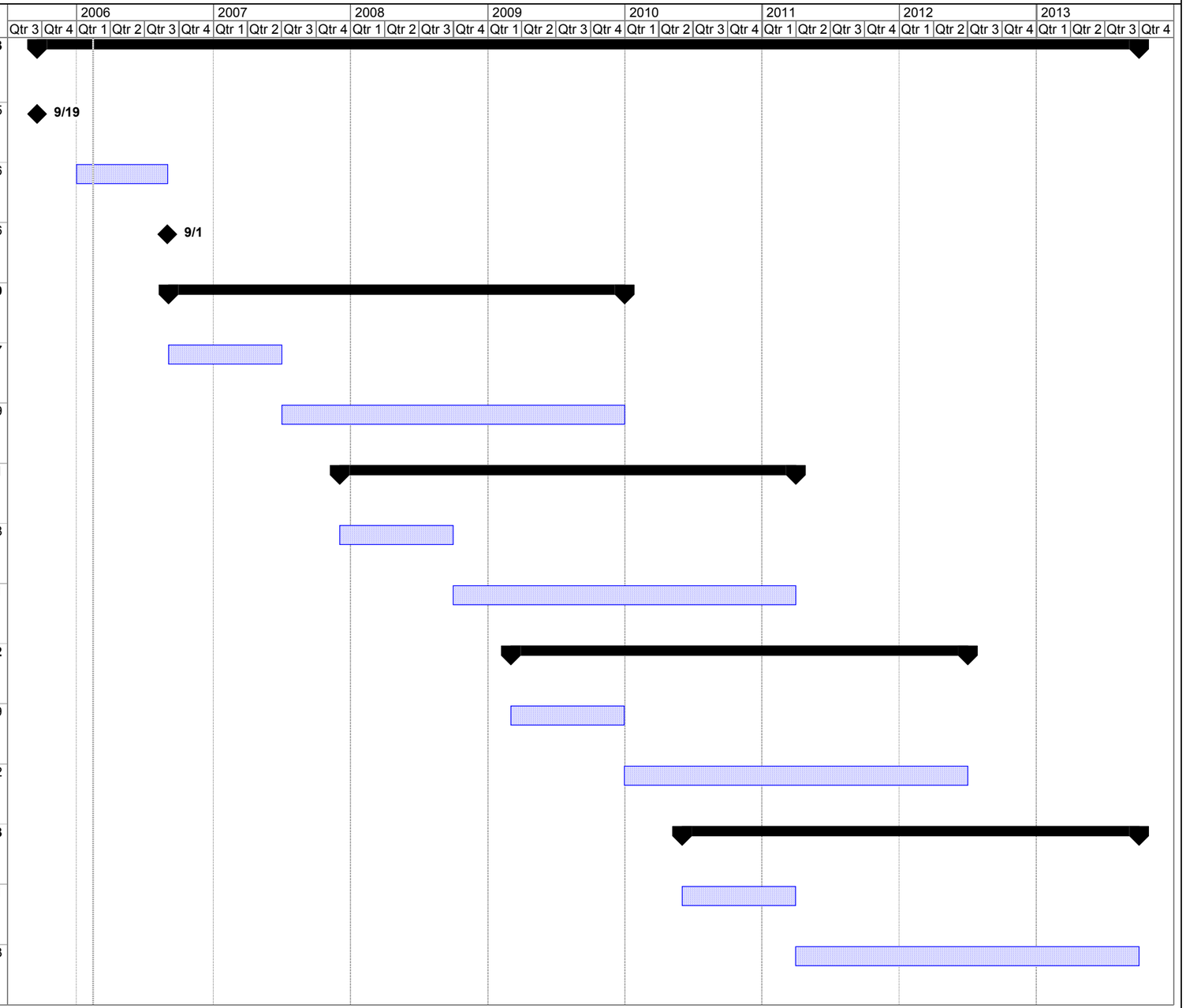
RWCQB requires that wastewater treatment plants (Producers) develop and implement a water reuse monitoring program as part of their General Water Reuse Requirements. When the User(s) is other than the Producer, delegation of responsibilities must be clearly spelled out and included in the Producer's Water Use Permits. The proposed reuse monitoring program requirements for LWPR, PWRP and RWWTP's recycled water have not been established by the RWCQB-LH at this time.

8.7.4 Irrigation Scheduling

For all potential users, irrigation scheduling should not change from the way they currently operate. The majority of the users will be irrigated at night to minimize interference with recreation, reduce evapotranspiration, improve irrigation efficiency and decrease waste. During periods of high temperatures, additional irrigation may occur outside this nighttime window to allow for longer irrigation to compensate for higher evapotranspiration.

Figure 15
Los Angeles County Waterworks District No. 40
Antelope Valley Recycled Water Project Schedule

ID	Task Name	Duration	Start	Finish
1	**Schedule Design and Construction**	**2097 days**	**Mon 9/19/05**	**Tue 10/1/13**
2	Facilities Planning Report	0 days	Mon 9/19/05	Mon 9/19/05
3	Prepare CEQA Document	175 days	Mon 1/2/06	Fri 9/1/06
4	Certify CEQA Document	0 days	Fri 9/1/06	Fri 9/1/06
5	**Phase 1B Project**	**869 days**	**Mon 9/4/06**	**Thu 12/31/09**
6	Design	216 days	Mon 9/4/06	Mon 7/2/07
7	Construction	653 days	Tue 7/3/07	Thu 12/31/09
8	**Phase 2 Project**	**869 days**	**Tue 12/4/07**	**Fri 4/1/11**
9	Design	216 days	Tue 12/4/07	Tue 9/30/08
10	Construction	653 days	Wed 10/1/08	Fri 4/1/11
11	**Phase 3 Project**	**869 days**	**Wed 3/4/09**	**Mon 7/2/12**
12	Design	216 days	Wed 3/4/09	Wed 12/30/09
13	Construction	653 days	Thu 12/31/09	Mon 7/2/12
14	**Phase 4 Project**	**869 days**	**Thu 6/3/10**	**Tue 10/1/13**
15	Design	216 days	Thu 6/3/10	Thu 3/31/11
16	Construction	653 days	Fri 4/1/11	Tue 10/1/13



Project: Project1-rev1
Date: Mon 2/13/06

Task | Progress | Summary | External Tasks | External Milestone
Split | Milestone | Project Summary | External Milestone | Deadline

Section 9: Construction Financing Plan and Revenue Program

9.1 Sources and Timing of Funds for Design and Construction

The Phase 1-4 Recycled Water Projects for the Antelope Valley are significant projects for the LACWW40 in meeting its water needs. The District hopes to be placed on the statewide priority list for construction grants for recycled water for these four phases of the project. The source of grant money would likely be the State of California as administered by the State Water Resources Control Board. The District has also established a recycled water capital reserve from connection fees collected from new development. The capital reserve, in addition to grant funding and SRF loans are critical for design and construction of these projects.

A draft annual revenue program for Phases 1A-4 is discussed below

9.1.1 Overview of Revenue Program and Construction Financing Plan

The Antelope Valley Recycling Project will provide recycled water for irrigation at the facilities listed in Table 17 from Section 7.2.2. Since LACWW40 is still currently evaluating whether there is a more cost-effective means of serving the Ultimate phase from another source, the Ultimate phase is not proceeding until the evaluation is complete.

9.1.1.1 Draft Revenue Program for Antelope Valley Recycled Water Project

As indicated earlier, LACWW40 is submitting a Financial Assistance Application to obtain 25% funding from the State Water Resources Control Board for the Antelope Valley Recycled Water Project. LACWW40 anticipates funding its 75% portion of Phases 1A-4 of the Antelope Recycled Water project through a combination of cash reserves specifically earmarked for recycled water projects and additional income from connection fees and interest. Table 23 identifies the preliminary cash and debt funded portions of the project.

9.1.1.2 Draft Construction Financing Plan

Table 24 provides a monthly cash flow that forecasts expenses during design and construction for Phases 1B through 4. All the sources of funds to meet those expenses for Phases 1B-4 of the project are not fully known at this time but are anticipated to include the cash reserves, connection fees, and interest described above.

Table 23: Draft Revenue Program for Antelope Valley Recycled Water Project

Year	2005	2006	2007	2008	2009	2010	2011	2012
Number of EDU's	1,800	5,400	9,000	12,600	16,200	19,800	23,400	27,000
Budgeted Growth	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Connection Fee	$1,200	$1,248	$1,298	$1,350	$1,404	$1,460	$1,518	$1,579
Connection Fee Revenue	$2,160,000	$2,246,400	$2,336,256	$2,429,706	$2,526,894	$2,627,970	$2,733,089	$2,842,413
Accumulated Revenue	$2,160,000	$4,406,400	$6,742,656	$9,172,362	$11,699,257	$14,327,227	$17,060,316	$19,902,729

Escalation Rate = 4%

Table 24: Monthly Cash Flow Analysis

Phase	Total Cost	Begin Construction	End Construction	Duration (mo)	Ave. Cost per mo.	Ave. 3 mo. Cost
1B	$27,958,000	3-Jul-2007	31-Dec-2009	30	$931,933	$2,795,800
2	$33,316,000	1-Oct-2008	1-Apr-2011	30	$1,110,533	$3,331,600
3	$17,168,000	31-Dec-2009	2-Jul-2012	30	$572,267	$1,716,800
4	$36,715,000	1-Apr-2011	1-Oct-2013	30	$1,223,833	$3,671,500

	Phase 1B	Phase 2	Phase 3	Phase 4	Total/Year
Jul-07	$2,795,800				
Oct-07	$2, 795,800				$5,591,600
Jan-08	$2, 795,800				
Apr-08	$2, 795,800				$5,591,600
Jul-08	$2, 795,800				
Oct-08	$2, 795,800	$3,331,600			$8,923,200
Jan-09	$2, 795,800	$3,331,600			
Apr-09	$2, 795,800	$3,331,600			$12,254,800
Jul-09	$2, 795,800	$3,331,600			
Oct-09	$2, 795,800	$3,331,600			$12,254,800
Jan-10		$3,331,600	$1,716,800		
Apr-10		$3,331,600	$1,716,800		$10,096,800
Jul-10		$3,331,600	$1,716,800		
Oct-10		$3,331,600	$1,716,800		$10,096,800
Jan-11		$3,331,600	$1,716,800		
Apr-11			$1,716,800	$3,671,500	$10,436,700
Jul-11			$1,716,800	$3,671,500	
Oct-11			$1,716,800	$3,671,500	$10,776,600
Jan-12			$1,716,800	$3,671,500	
Apr-12			$1,716,800	$3,671,500	$10,776,600
Jul-12				$3,671,500	
Oct-12				$3,671,500	$7,343,000
Jan-13				$3,671,500	
Apr-13				$3,671,500	$7,343,000
Jul-13				$3,671,500	
					$3,671,500
Totals	**$27,958,000**	$33,316,000	$17,168,000	$36,715,000	**$115,157,000**

9.2 Pricing Policy for Recycled Water

The price that LACWW40 will charge the potential users is not known at this time, but it will be discounted slightly from the price of potable water to encourage users to take advantage of the recycled water.

9.3 Water Pollution Control Costs

The cost of recycled water is estimated to be $100 per acre foot. Actual costs will be determined when agreements are in place with the County Sanitation Districts of Los Angeles County.

9.4 Annual Projections

9.4.1 Fresh Water Prices

LACWW40's water pricing details are discussed in Section 3.3.5.

9.4.2 Recycled Water Used

In Section 8.6.7, the estimated dates for the construction completion for each phase are shown. This schedule assumes that funding to complete all phases of the project is available. With construction phases being completed over the course of seven years, from 2007 to 2013, the recycled water use will increase over those years. The recycled water use for each year is shown in Table 25.

Table 25: Recycled Water Annual Use

	Recycled Water Use		Cumulative Recycled Water Use	
Date	**AFY**	**MG/yr**	**AFY**	**MG/yr**
2005 – 2009 [1]	786	256	786	256
2010	2,161	704	2,947	960
2011	2,076	676	5,023	1,636
2012	1,295	422	6,318	2,058
2014	7,013	2,284	13,331	4,343

[1] Phase 1A projected to be operating in 2006.

9.4.3 Annual Costs of Recycling Project

For approximately the first twenty years, the users will likely be paying the initial capital costs for the construction of the recycled water facilities, as well as the O&M costs. Thereafter, the annual costs of the recycled water project will be the O&M costs only. These costs are described in Section 7.7.1.

9.4.4 Allocation of Costs to Users

The costs of both capital and O&M for delivery of recycled water will be included in the price that potential users will pay for a unit of water. As stated in Section 9.2, this price has not yet been confirmed but is anticipated to be less than potable water even when capital costs are included with the O&M costs. In addition, new users to the system may be charged a connection fee.

9.4.5 Unit Costs to Serve Users

The main category of users is irrigation, which includes several types of irrigation users such as parks, schools, roadways. Some dust control and other uses may also occur. Section 7.7.3 describes the annual cost per acre-foot of recycled water necessary to recover capital and O&M costs. The unit costs for recycled water to serve users will be such that capital recovery and O&M are funded to the greatest extent possible.

9.4.6 Unit Price of Recycled Water

The unit price of recycled water can be expected to rise over the years as costs of operations and maintenance increases. In addition, it is likely that if the potable rate increases, the same percentage increase would be applied to the recycled water prices.

9.4.7 Sensitivity Analysis to Underutilization of Recycled Water

The earlier phases of this project are not particularly sensitive to the underutilization of water because most of the users identified are existing users that are already using potable water. If the users do not use recycled water, they will still have to use potable water. In the later phases, there are some planned future users that will have to have their demands re-evaluated as the construction schedule gets closer. Because the Antelope Valley is such a high-growth area and the potable water is a limited resource, the underutilization of recycled water is not likely. However, alternative users may have to be found to use any excess recycled water.

9.5 Sunk Costs and Indebtedness

LACWW40 has established funding for this project through the connection fee program. Funding to recover capital will also likely occur from commodity charges for recycled water, which have yet to be set. There are no sunk costs currently associated with the project, which is the recycled water distribution and storage. The costs associated with treatment improvements to tertiary will not be directly born by LACWW40 but will be born by the sanitation agencies and are necessary to meet regulatory requirements and would not be characterized as a sunk cost.

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Appendix A

Existing Antelope Valley Recycled Water Report Summaries

Antelope Valley Water Resource Study

Kennedy/Jenks Consultants

November 1995

The primary objective of the Antelope Valley Water Group's water resource study was to develop consensus on a water resource management plan that addresses the need of the municipal and industrial purveyors to reliably provide the quantity and quality of water necessary to serve the growth projected by the planning agencies while concurrently addressing the need of agricultural users to have adequate supplies of reasonable cost irrigation water.

Water Conservation

Based on projections presented in this study, the water supply reliability of the Antelope Valley was below MWD's objectives. Without exceeding groundwater extractions of 59,100 acre-feet per year, the probability of meeting the estimated 1993 water demand was approximately 73 percent. Without a conservation program, by the year 1998 (projected population of 451,000), 100 percent of the water demand was estimated to be met only 50 percent of the time without overdrafting the groundwater basin. Similarly, by the year 2000 (projected population of 499,000), 100 percent of the potential water supplies would be required to meet the projected water demands without overdrafting the groundwater basin.

With a conservation program, by the year 2000, 100 percent of the water demand is estimated to be met only 50 percent of the time and by the year 2002 (projected population of 547,000), 100 percent of the potential water supplies would be required to meet the water demand.

The measures recommended for inclusion in the water conservation plan for the Antelope Valley are listed in Table ES-3 of this report. Because agricultural water use is expected to decline significantly during the planning period (1994-2020), the plan consists primarily of urban conservation programs developed for the City of Palmdale, City of Lancaster and Community of Rosamond. Evaluation of urban water conservation measures was performed utilizing the Department of Water Resources' (DWR) Water Plan computer software. Benefit to cost (B/C) analyses were performed for each recommended urban water conservation measure to determine cost effectiveness. The overall B/C ratios for the City of Palmdale, City of Lancaster, and Community of Rosamond were calculated to be 4.7, 3.0, and 4.5 respectively.

The Agricultural Water Suppliers Efficient Water Management Practices (EWMP) Act requires the Department of Water Resources (DWR) to establish an advisory committee to evaluate EWMPs aimed at agricultural water suppliers concerning conservation of irrigation water. Because the evaluation of the EWMPs will require detailed planning by each water agency and will include analysis of technical feasibility, social and district economic criteria and legal feasibility of each practice, an assessment of the impact of implementation of EWMPs (i.e., costs and water savings) is not currently available through the DWR. Therefore, until DWR's assessment of the EWMPs is complete,

analyses of potential agricultural conservation measures for the Valley cannot be provided. However, based on the available case studies, an agricultural water conservation program can be recommended on a preliminary basis. It is recommended that a Mobile Agricultural Water Conservation Laboratory (Mobile Lab) program be established to serve agricultural areas in the Antelope Valley. The Mobile Lab operates under the leadership of the local Resource Conservation District, with technical and management assistance from the local Soil Conservation Services (SCS) Field Office. The Mobile Lab provides agricultural growers with individual, site-specific performance evaluations of their irrigation systems by measuring efficiency of the systems. Data are collected for the specific site for calculations on distribution uniformity and application efficiency. Based on an analysis of the results, recommendations or suggestions are made by the Mobile Lab team on management or physical changes to improve water use efficiency of the irrigation system.

Implementation of the urban conservation measures was assumed to begin in 1994 and continue through the year 2020. (Note that although conservation programs currently exist in the Antelope Valley, for purposes of estimating water savings using DWR's Water Plan software, the year 1994 was assumed to be the beginning of the planning period.) Estimated water savings from the urban measures range from 0.67 to 87,356 acre-feet for the City of Palmdale, 0.34 to 43,775 acre-feet for the City of Lancaster, and 0.34 to 7,821 acre-feet for the Community of Rosamond. The estimated water savings is shown as the total amount of water saved over the entire implementation period (1994 to 2020). Implementation of the agricultural conservation measure is assumed to begin in 1995 and continue through the year 2020. Estimated water savings for the agricultural measure is 68,800 acre-feet over the entire implementation period (1995 to 2020).

Use of Reclaimed Water

The Palmdale WRP, Lancaster WRP, Rosamond WRP, and Edwards AFB WRP have the greatest potential for expansion, as well as the highest projected flows in the year 2020. Therefore, discussion of reclaimed water use focuses on these four plants. Edwards AFB WRP is discussed to a lesser extent than the other three plants, because design of water reclamation facilities were already underway.

The Palmdale WRP is an undisinfected secondary treatment facility with a capacity of 8.0 mgd. The Lancaster WRP was the only facility in Antelope Valley supplying tertiary treated water (0.6 mgd design capacity). A majority of the plant's flow is treated to a secondary treatment level. Total capacity of the plant is 10.0 mgd (1994). The Rosamond WRP is a 2.0 mgd primary treatment facility (1994). RCSD was planning to convert the existing system to a 2.0 mgd tertiary treatment facility in 1996. The Edwards AFB WRP is a 1.5 mgd primary treatment facility (1994). Edwards AFB was designing a 2.5 mgd tertiary treatment facility that was scheduled to be constructed in 1995.

The average daily wastewater flow in the year 2020 is estimated to be 37.2 mgd for the Palmdale WRP and 29.8 mgd for the Lancaster WRP. The average daily wastewater flow in the year 2020 for the Rosamond WRP and the Edwards AFB WRP is estimated to be 3.0 and 2.5 mgd, respectively.

The total annual reclaimed water demand was approximately 35,600 acre-feet per year. Total peak month demand was estimated to be approximately 6,300 acre-feet, and total peak day demand was estimated to be 74 million gallons or 216 acre-feet.

The recommended conceptual plan was divided into 4 main reclaimed water systems:

- Palmdale and Lancaster Tertiary System (Tertiary System)
- Palmdale and Lancaster Secondary System (Secondary System)
- Rosamond System
- Edwards AFB System

The tertiary system would serve tertiary treated reclaimed water to approximately 34 users in three service zones. The secondary system would serve secondary treated reclaimed water to approximately 23 users in one service zone. The Rosamond system would serve tertiary treated water to approximately 20 users in one service zone. Main pump stations would be located at the reclaimed water supply. Each of the service zones would contain storage reservoirs, distribution system piping, and booster pump stations.

The estimated construction cost of the treatment facilities for the tertiary and the Rosamond systems are $24,417,000 and $7,731,000 respectively. The distribution facilities for the tertiary, secondary and Rosamond systems are $36,456,000, $67,486,000, and $8,296,000 respectively. The total cost for construction of the entire regional system was approximately $144,386,000 (1994 dollars).

Edwards AFB was currently (1994) designing a 2.5-mgd tertiary wastewater treatment plant. The following is a list of facilities for the planned reclaimed water distribution system:

- A 3,125 gallon per minute (gpm) main pump station at the wastewater treatment plant.
- A 3,125 gpm booster pump station.
- A 2.2 mg storage reservoir.
- Approximately 31,740 feet of polyvinyl chloride (PVC) pipe ranging from 4 to 18 inches in diameter.

The estimated capital cost of the planned distribution facilities is $6,300,000. Operation and Maintenance (O&M) costs were estimated to be $140,000 per year.

The unit costs for the reclaimed water distribution facilities for the tertiary, secondary and Rosamond systems are $858, $359 and $1,218 per acre-foot respectively (includes annualized capital). The unit costs for the treatment facilities for the tertiary and Rosamond systems are $999 and $1,649 per acre-foot respectively (includes annualized capital). Total unit costs (distribution and treatment) for the tertiary, secondary and Rosamond systems are $1,857, $359 and $2,867 per acre-foot, respectively.

Without exceeding groundwater extractions of 59,100 acre-feet per year, the probability of meeting the estimated 1993 water demand was approximately 73 percent. Without a conservation program and including the reclaimed water system identified in this report, by the year 1999 (projected population of 475,000), 100 percent of the water demand was estimated to be met only 50 percent of the time and by the year 2001 (projected population of 523,000), 100 percent of the potential water supplies would be required to meet the water demand. With a conservation program and including the reclaimed water system, by the year 2002 (projected population of 547,000),100 percent of the water demand is estimated to be met only 50 percent of the time and by the year 2004 (projected population of 595,000), 100 percent of the potential water supplies would be required to meet the water demand.

Aquifer Storage and Recovery

Aquifer Storage and Recovery (ASR) include the following methods of storing and recovering water from the groundwater basin:

- Spreading/Infiltration - use of surface spreading basins to allow infiltration of water into the aquifer.
- Injection - use of new or existing wells for direct injection of water into the aquifer.
- In-lieu Use - use of an alternative source of water, other than groundwater, when available, and use of groundwater when the alternative source is unavailable.

The entire groundwater basin of the Antelope Valley is estimated to have 68 million acre-feet of storage, of which 13 million acre-feet was currently available (DWR, 1980). Approximately 55 million acre-feet of groundwater was estimated to remain in storage as of 1975. This stored water, however, may not be entirely accessible due to 1) uneconomical pumping depths, 2) distance between the groundwater basin and current users and 3) the potential for causing land subsidence.

At present, the principal source of recharge of the groundwater in the Antelope Valley is runoff, principally recharged in the foothills of the mountains. Numerous studies have been conducted to estimate natural recharge since 1924, some based on little data. The most recent studies estimate natural recharge at 31,200 to 59,100 acre-feet per year (USGS, 1993).

There are a variety of source waters that could be available for recharge into the groundwater of the Antelope Valley. They include:

- SWP
  - Treated potable water
  - Untreated water directly from the California Aqueduct
- Reclaimed Water (for spreading only)
  - Secondary treatment
  - Tertiary treatment

- Surface Water
  - Little Rock Creek and Little Rock Reservoir
  - Big Rock Creek
  - Amargosa Creek

The highest groundwater TDS level within the wells for which data were evaluated was 1,840 milligrams per liter (mg/L) in a well located on Edwards AFB where perched water tables and the accompanying high salts occur. The low groundwater TDS of 125 mg/L occurred in a well in the LACWW wellfield near Lancaster. The average TDS value was estimated at about 300 mg/L based on the wells for which water quality was evaluated.

Potential infiltration and injection sites should be assessed relative to the location of the existing facilities in order to minimize capital costs. In certain instances where it is necessary to control the ultimate storage location of the infiltrated or injected groundwater, fault and bedrock control of the groundwater impound may be a necessary characteristic that will need to be investigated further. In addition, it is important that the potential recharge site has good quality groundwater that will not compromise the quality of the water to be infiltrated or injected.

Based on the characteristics favorable to a good surface infiltration site and previous work that has been conducted in assessing infiltration sites, the following areas were focused on for more detailed analysis:

- Little Rock Creek
- Big Rock Creek
- Amargosa Creek
- West Antelope Subunit
- Groundwater recharge zones described in the Los Angeles County Department of Public Works (LACDPW) "Final Report on the Antelope Valley Comprehensive Plan of Flood Control and Water Conservation," dated June 1987.

Infiltration as a mechanism to recharge groundwater appears to be technically feasible. The sites with the highest potential for recharge by spreading appear to be:

- Amargosa Creek south of Avenue "N" between 10th Street West and Division Street (LACDPW Site).
- Little Rock Creek near Avenue "N" between 60th Street and 70th Street East, Department of Airport (DCA) Property.
- Amargosa Creek near Elizabeth Lake Road and 25th Street West.

Potential injection areas include the municipal wellfields within the existing LACWW and PWD municipal well fields. Specific areas within the well fields that have been assessed include:

- Potential LACDPW wells at Avenue K-8 and Division Street.
- Wells in USGS/LACWW/AVEK Injection Study.

Injection has not been extensively studied in the Valley; however, groundwater recharge by injection appears to be technically feasible. The existing wellfields could provide both the injection and extraction facilities necessary to conduct such a program. The specific areas that should be explored further because of their proximity to the distribution system and potential treated SWP water are:

- LACWW wells located:
  - South of A venue" K" between 10th Street West and Division Street (where USGS is conducting its injection study).
  - South of Avenue "L" between 10th Street West and Division Street (adjacent to the area above).
- PWD wells south of Avenue "P" between 20th Street East and 40th Street East.

It appears that treated SWP water should be generally acceptable for injection from a water quality perspective. However, more detailed water quality analyses will have to be conducted at the potential injection sites to gather current information on the condition of the aquifer water quality in these specific locations.

Depending on the results of the USGS's injection study, significant additional work will be required and should include, at a minimum, the following:

- Estimation of the actual volumes that could be injected at each site.
- Evaluation of aquifer behavior during injection and extraction and a determination of aquifer characteristics at specific sites.
- Evaluation of potential ground surface effects during injection and extraction.
- Determination of upgrades that may be required at each well and pump station.
- Evaluation of the operation of the injection/extraction system based on the availability of treated SWP water.
- Evaluation of the potential changes to water treatment plant operations that may be required to continue injection and extraction over the long-term.

Effects of Changes in Groundwater Levels

According to the USGS, groundwater levels in the Lancaster area have declined by as much as 200 feet from 1915 to 1988 (USGS, 1994). Conversely, well hydrographs maintained by AVEK and in cooperation with the USGS, indicate groundwater levels in portions of the Valley have risen in recent years. Declining groundwater levels over a long period of time generally indicate over-extraction from a groundwater basin; conversely, increasing groundwater levels over a long period of time may indicate under-extraction from a basin (or recovery from over-extraction).

Declining groundwater levels potentially result in two primary damages: 1) land subsidence and 2) increased pumping costs. Land subsidence is defined by USGS as the vertical lowering of the land surface over an area of many square miles (USGS, 1991) and may be the result of a variety of causes. In general, damages will be most pronounced when subsidence gradients (change in subsidence levels over a given distance) are high. Subsidence levels of up to 7 feet have occurred in some areas of Antelope Valley. USGS (1992) reported that as much as 2 feet of land subsidence had affected Antelope Valley by 1967 and was causing surface deformations at Edwards AFB. Fissures, cracks and depressions on Rogers Lakebed were affecting the use of the lakebed as a runway for airplanes and space shuttles. A study done by Geolabs - Westlake Village (1991) studied a 10 square mile area in Lancaster identified to have fissures and sinklike depressions. The report identified fissures ranging in width from one inch to slightly over one foot. The lengths of the fissures ranged mainly between 50-200 feet, with the longest continuous fissures in the 600- 700 foot range. Sinkholes ranged mainly between one to five feet deep and less than four feet in diameter. One sinkhole measured 20 feet long and 1 5 feet wide.

Increased pumping costs result directly from declining groundwater levels. As the pumping lift increases, so does the power cost to lift the water. As groundwater declines, additional pump bowls and larger motors may be necessary.

Potential damages attributable to increasing groundwater levels include waterlogging and water quality degradation. Waterlogging is defined as saturation of soil with water. The effects of waterlogging are dependent not only upon the elevation of the groundwater table but also on the soil type. Generally, the effects of waterlogging will be most noticeable in granular soils. Water quality degradation can result from nitrates being drawn down into the aquifers by rising groundwater levels and then being spread by depressions caused from over-pumping. Nitrates are the end product of aerobic stabilization of organic nitrogen and, as such, occur in polluted waters that have undergone self-purification. Nitrate in groundwater can come from fertilizer, poultry manure, or domestic wastewater. Nitrates can cause blue baby syndrome which can be fatal for infants.

Increasing groundwater levels have occurred in portions of the Valley. For most of these areas, no damage related to these increases has been identified, due to the fact the groundwater level is still significantly below the ground surface. However, for the Leona Valley area in the southern portion of the Valley, damages potentially attributable to increasing groundwater levels were identified in April 1993. The apparent damages appear to be typical and include waterlogging and water quality degradation.

Reclamation Concept and Feasibility Study (Draft Report)

Metcalf & Eddy

July 31, 1997

The purpose of this report was to develop a conceptual reclamation program and to evaluate the feasibility of its implementation. An analysis of reclaimed water use was included as part of a regional water supply study (*Antelope Valley Water Resource Study*, 1995) and this feasibility study was focused on a refinement of the previous analysis with an emphasis on providing reclaimed water to proposed projects being considered by the City, in addition to providing reclaimed water to existing parks, schools and golf courses.

The required facilities would include treatment upgrades at the existing CSDLAC treatment facility and a reclaimed water distribution system. The treatment upgrades include the addition of tertiary treatment facilities. The facilities would be located at the existing aerated and oxidation lagoon site and would require appropriate support facilities to accommodate operators and maintenance access. The following facilities were proposed to provide full tertiary treatment:

- Flocculation/clarification
- Sludge pump station and force main
- Filter pump station
- Gravity filters
- Extended chlorination

The system capacity used for this study was equal to the maximum day demand of 13.3 million gallons per day (mgd), providing operational storage to accommodate peak hour demands (26.5 mgd).

The conceptual distribution system was developed with the goal of limiting the number of zones, thereby reducing the number of booster pump stations required to deliver reclaimed water throughout the community. Three zones were proposed. The main zone, referred to as the Plant Zone, would serve the entire central portion of Palmdale and a portion of the new developed areas located to the south and west. Two additional zones would be created (South and West Zones), which would require booster pump stations to serve development located at higher elevations. The operational storage would be provided by a single reservoir within the Plant Pressure Zone. Sufficient capacity in the operating reservoir would be provided to enable peak hour demands to be met by a combination of water pumped from the treatment plant site and water delivered from the storage reservoir. The two pressure zones (West and South) would be served by booster pump stations designed to accommodate peak hour demands within those areas.

This distribution system would be a backbone system, which has been laid out to connect with all large users and to locate the transmission mains within reasonable proximity of all smaller users.

The total estimated capital cost (July 1997) for treatment, distribution, storage and pumping facilities is shown in **Table 1**.

Table 1

Palmdale Reclamation System
Estimated Capital Costs

Facilities	Estimated Cost
Treatment	$15,818,400
Distribution	$23,554,800
Pumping/Storage	$6,739,200
Total Estimated Cost	$46,112,400

The estimated annual operating costs (July 1997) are summarized in **Table 2**.

Table 2

Palmdale Reclamation System
Estimated Annual Operating Costs

Item	Estimated Cost
Labor	$327,600
Power	$823,300
Equipment	$125,000
Chemical/Materials	$298,900
Total Estimated Cost	$1,574,800

Palmdale Water Reclamation Concept Study

Kennedy/Jenks Consultants

June 2000

The purpose of the Water Reclamation Concept Study was to evaluate three potential conceptual uses of reclaimed water produced by the Palmdale Water Reclamation Facility Plant, owned and operated by County Sanitation Districts of Los Angeles County, District No. 20. The concepts considered included the following:

1. Discharge of effluent into existing sand and gravel pits located in the eastern portion of the City of Palmdale to create a recreational facility.

2. Recharge of local groundwater basins with highly treated effluent.

    - Option 1 – Excludes total dissolved solids (TDS) reduction (includes TOC reduction with granular activated carbon)

    - Option 2 – Includes TDS reduction with reverse osmosis

3. Discharge of highly treated effluent into Lake Palmdale, which serves as the forebay for the Palmdale Water District Water Treatment Plant.

Each of these alternatives was evaluated at the conceptual level in an effort to identify feasibility and preliminary costs.

The findings of the Study indicated that utilizing effluent for recreational purposes within gravel pits would not result in the utilization of a significant quantity of effluent. With this finding, such use was found not to be feasible unless combined with another alternative.

The introduction of highly treated effluent into Lake Palmdale was not considered feasible, as such discharge would not comply with the preliminary requirements established by the California Department of Health Services for a similar proposal developed by the City of San Diego.

The third alternative, discharge of highly treated effluent into local groundwater basins, was been found to be technically feasible and would have costs similar to alternative water supplies available within the Antelope Valley region.

Implementing a groundwater recharge program would require resolution of a number of key regulatory issues, the outcome of which could greatly impact the cost of the program.

These issues include:

- The level of treatment must comply with California Department of Health Services draft groundwater recharge regulations. Regulations specify levels of treatment that are a function of the percentage of effluent combined with naturally occurring groundwater extracted for domestic water supply.

- The Regional Water Quality Control Board in consultation with the Department of Health Services would establish discharge requirements for a proposed groundwater recharge program. The Regional Board could require demineralization within the treatment process if the antidegradation policy adopted by the State of California is strictly enforced.

The two significant treatment elements which have the greatest impact on potential costs include reduction of total organic carbon and total dissolved solids in treated effluent prior to groundwater recharge. It was recommended that these requirements be the focus of future studies as communities within the Antelope Valley move forward with a planned groundwater recharge program.

Capital costs for the groundwater recharge Options 1 and 2 are summarized in ***Table 1***. The total capital cost was estimated to range from $33 million to $45 million (June 2000), depending upon the need for the reduction of TDS.

Estimated operating costs (June 2000) for the groundwater recharge options are summarized in ***Table 2***. Estimated costs include labor, power and chemical and materials associated with each alternative.

Table 1

Groundwater Recharge Alternatives
Estimated Capital Costs

Option No.	Alternative and Improvements	Estimated Cost
1	Excludes TDS Reduction (includes TOC Reduction with Granular Activated Carbon)	
	Treatment (10 mgd)	$22,505,000
	Conveyance	8,650,000
	Recharge Sites	1,828,500
	Total Estimated Cost	**$32,983,500**
2	Includes TDS Reduction (with Reverse Osmosis)	
	Treatment (10.0 mgd)	$32,438,000
	Conveyance	8,650,000
	Recharge Sites	1,828,500
	Total Estimated Cost	**$42,916,500**

Table 2

Groundwater Recharge Alternatives
Estimated Annual Operating Costs

Option No.	Alternative and Expenses	Estimated Cost
1	Excludes TDS Reduction (includes TOC Reduction with Granular Activated Carbon)	
	Labor	$ 600,000
	Power	1,214,000
	Chemical/Materials	433,000
	Total Estimated Cost	**$2,063,000**
2	Includes TDS Reduction (with Reverse Osmosis)	
	Labor	$ 600,000
	Power	1,501,000
	Chemical/Materials	650,000
	Total Estimated Cost	**$2,751,000**

The objectives of the LWRP 2020 Plan are as follows:

- Provide wastewater treatment and effluent management capacity adequate to meet the needs of District No. 14 through the year 2020 in an environmentally sound and cost-effective manner;
- Eliminate unauthorized effluent-induced overflows from Piute Ponds to Rosamond Dry Lake in the most expeditious manner possible and in consideration of the RWQCB-LR, in order to avoid any threatened nuisance condition as determined by EAFB;
- Ensure recycled water of sufficient quality and quantity is available to satisfy emerging municipal reuse needs; and
- Comply with the requirements to maintain Piute Ponds.

The major components of the LWRP 2020 Plan recommended project, *26 mgd CAS/Tertiary Treatment, Agricultural Reuse, and Storage Reservoirs*, are:

- Wastewater Treatment Facilities;
- Effluent Management Facilities;
- Municipal Reuse; and
- Maintenance of Piute Ponds.

Wastewater Treatment Facilities

The existing methods of primary treatment and biosolids handling at the LWRP will be expanded to a capacity of 26 mgd by constructing the following major components of the recommended project: an influent pump station, aerated grit channels, primary sedimentation tanks, digestion tanks, and drying beds.

A 26-mgd CAS secondary and tertiary treatment facility will be constructed in phases to replace the existing 16-mgd-capacity oxidation pond secondary treatment facilities. The CAS process will be operated in “nitrification-denitrification” mode to increase nitrogen removal from the wastewater. Tertiary treated effluent for municipal reuse projects, such as that of the City of Lancaster, will be provided from the new 26-mgd tertiary facility. The AVTTP, which currently provides tertiary-treated effluent to Apollo Park by treating up to 0.6-mgd of effluent from the oxidation ponds, will be partially decommissioned and replaced with more current tertiary treatment technology. A dechlorination station will be constructed in order to improve the quality of effluent that will be discharged to Piute Ponds. Nitrogen removal facilities may be constructed, and/or process modifications

may be implemented, to further improve the quality of oxidation pond effluent during the interim period until CAS secondary treatment is online.

Construction of these facilities will require acquisition of additional land, since the current plant area is not large enough to accommodate the proposed facilities. Approximately 15 acres of land, some to the north and some to the west of the LWRP, will be acquired.

Effluent Management Facilities

Aside from the delivery of recycled water for municipal reuse, which is described in the following subsection, effluent from the LWRP will be managed via discharge to (1) Piute Ponds, (2) the Impoundment Areas, (3) Apollo Park, (4) storage reservoirs, and (5) agricultural reuse operations. Effluent delivery to Piute Ponds, the Impoundment Areas, and Apollo Park will remain relatively constant throughout the planning period since only the volume adequate to compensate for evaporative losses will be discharged to these locations. As influent to the LWRP increases throughout the planning period, the resultant increase in effluent flow will be managed by expanding agricultural and/or municipal reuse operations and constructing additional storage reservoirs, as discussed below:

- *Storage Reservoirs*

  Approximately 750 acres of land will be acquired for construction of effluent storage reservoirs. The storage reservoirs will have a total capacity of approximately 2,300 million gallons (7,059 acre-feet), a water depth of approximately 20 feet, and a freeboard of three feet. The top of the reservoir berms will be approximately 20 feet above grade. Native soils with a low permeability will be excavated and recompacted to construct the floors of the storage reservoirs in order to minimize tertiary-treated effluent infiltration. The decommissioned oxidation ponds, which will be emptied, cleaned, and repaired as necessary, will provide an effluent storage capacity of approximately 470 million gallons (1,442 acre-feet). The new storage reservoirs and converted oxidation ponds together will help increase the effluent management capacity of the LWRP to 26 mgd.

- *Agricultural Reuse Operations*

  Approximately 4,650 acres of land will be acquired by District No. 14 for the development of agricultural reuse operations. This will help increase the effluent management capacity of the LWRP to 26 mgd. A recycled water pipeline and a pump station will be constructed to convey recycled water to the agricultural sites. In an effort to ensure continuation of its existing agricultural reuse operations, District No. 14 is negotiating to acquire Nebeker Ranch. If District No. 14 succeeds in purchasing this 680-acre farm, then only 3,970 acres will need to be acquired for agricultural reuse operations.

Purchase of land for agricultural operations, rather than leasing, ensures that District No. 14 can meet its legal obligations under the WDRs for appropriate effluent management at all times. The proposed agricultural operations will be located within the agricultural site east of the LWRP. The precise locations of the agricultural operations will be determined during the land acquisition process. District No. 14 will develop agricultural reuse operations on land it acquires by entering into agreements with responsible and experienced farming entities. The methods of irrigation used will be ones that are permitted under Title 22 and are protective of the groundwater. District No. 14 will prepare an engineering report for DHS approval and obtain a recycled water reuse permit from the RWQCB-LR.

Municipal Reuse

District No. 14 will provide a sufficient quantity and quality of tertiary-treated effluent to the City of Lancaster, and any other entities, to meet municipal recycled water reuse demand. The City of Lancaster's goal is to implement a project to distribute up to 1.5 mgd (4.6 acre-feet per day) of recycled water to municipal users.

In addition to the City of Lancaster's recycled water reuse project, the development of a new municipal reuse project of a comparable size will ensure that the proposed agricultural reuse acreage will be adequate for managing the expected year 2020 flow rate of 26 mgd. If neither the City of Lancaster's nor any additional municipal reuse demand materializes, then District No. 14 may have to acquire approximately 800 additional acres of land in order to manage the surplus recycled water via agricultural reuse operations.

Maintenance of Piute Ponds

Piute Ponds will be preserved by (1) delivering a sufficient quantity of recycled water to the ponds to maintain the current habitat and (2) providing for periodic flushing of the ponds to ensure a healthy habitat. A detailed discussion on the maintenance of Piute Ponds, as well as preservation of the Amargosa Creek delta and the adjoining mud flats, is provided in the Final LWRP 2020 Plan EIR.

Project Implementation and Schedule

The recommended project will be implemented in two phases, which will be known as the Stage V and Stage VI expansions.

Stage V Expansion

Stage V will involve land acquisition and construction of facilities by 2008 that will increase the primary, secondary, and tertiary wastewater treatment and biosolids handling capacity of the LWRP to 21 mgd. Stage V will also involve land acquisition and construction of facilities by early 2007 that will increase the effluent management capacity of the LWRP to 21 mgd. The major effluent management facilities that will be constructed as part of Stage V include storage reservoirs, a recycled water pipeline, a

pump station, and agricultural reuse operations. The 21-mgd capacity of the LWRP following completion of the Stage V expansion will be adequate through the year 2014.

Although all reasonable efforts are being made to have facilities in place to meet the RWQCB-LR deadline, all Stage V effluent management facilities will not be completed in time. District No. 14 will manage effluent from the LWRP by delivering recycled water to the existing effluent management sites (Piute Ponds, Impoundment Areas, Apollo Park, Nebeker Ranch, and existing storage reservoirs) and applying recycled water at defined irrigation rates on the Stage V agricultural reuse sites as they are established. During the winter months, District No. 14 will continue its present practice of controlled effluent discharge to Piute Ponds in a manner that does not create a threatened nuisance condition for EAFB. As the necessary facilities become operational, effluent-induced overflows onto Rosamond Dry Lake will be greatly reduced. All effluent overflows onto Rosamond Dry Lake will be eliminated after April 2009. District No. 14 is working with the RWQCB-LR and EAFB to ensure that continuation of controlled effluent overflows during this period does not create a threatened nuisance condition.

Stage VI Expansion

Stage VI will involve construction of facilities by 2014 that will increase the primary, secondary, and tertiary wastewater treatment, biosolids handling, and effluent management capacity of the LWRP from 21 mgd to 26 mgd.

The proposed facilities and timing of the Stage VI expansion will be reevaluated in 2010-11 to respond to any changes in wastewater flow projections or other factors affecting the recommended project. As municipal recycled water reuse projects that require tertiary-treated effluent increase, the agricultural reuse component of the recommended project will be adjusted accordingly.

Project Cost

The cost of the recommended project is presented as both the total capital cost and as an equivalent annual cost. Table ES-9 shows the capital cost breakdown of the recommended project for the Stage V expansion, Stage VI expansion, and the total project. Table ES-10 shows the equivalent annual project cost, which is comprised of the annualized capital cost and the anticipated annual O&M cost at 26 mgd, for the Stage V expansion, the Stage VI expansion, and the total project. Although the project costs will be incurred in future years, all amounts contained in the following tables are in 2003 dollars.

Table ES-9
Capital Cost Breakdown of the Recommended Project[a,b]

Project Component	LWRP		
	Stage V	Stage VI	Total
Preliminary - Influent Pump Station	$3,953,000	—	$3,953,000
Preliminary - Odor Control Stations	$779,000	—	$779,000
Preliminary - Ferrous Chloride Stations	$194,000	—	$194,000
Primary - Comminutors, Aerated Grit Channels	$277,000	$277,000	$554,000
Primary - Sedimentation Tanks	$2,737,000	$2,736,000	$5,473,000
Secondary (CAS) - Aeration Tanks, Return Activated Sludge	$13,348,000	$3,178,000	$16,526,000
Secondary (CAS) - Sedimentation Tanks, Waste Activated Sludge	$6,216,000	$1,480,000	$7,696,000
Secondary (CAS) - DAF Units	$782,000	$186,000	$968,000
Secondary (CAS) - Chemical Stations	$984,000	$234,000	$1,218,000
Secondary (CAS) - Piping	$3,950,000	$941,000	$4,891,000
Tertiary - Filters, Pumps, Backwash Recovery	$12,875,000	$3,066,000	$15,941,000
Tertiary - Piping	$1,317,000	$313,000	$1,630,000
Tertiary (Disinfection) - Chlorine Contact Tanks	$2,982,000	$710,000	$3,692,000
Tertiary (Disinfection) - Chlorination	$620,000	$148,000	$768,000
Biosolids Handling - Digestion Tanks	$7,528,000	$4,517,000	$12,045,000
Biosolids Handling - Drying Beds	$1,443,000	$444,000	$1,887,000
Effluent Management - Storage Reservoirs	$16,013,000	$8,006,000	$24,019,000
Effluent Management - Agricultural Operations	$9,758,000	—	$9,758,000
Effluent Management - Piping, Pump Station	$25,000,000	—	$25,000,000
Miscellaneous - Oxidation Pond Effluent N-Removal, Dechlorination	$2,130,000	—	$2,130,000
Miscellaneous - Roads, Fences, Culverts	$2,015,000	$1,008,000	$3,023,000
Miscellaneous - Plant Monitoring Wells	$853,000	—	$853,000
Miscellaneous - Laboratory Building	$2,147,000	—	$2,147,000
Land - Wastewater Treatment, Biosolids Handling	$75,000	—	$75,000[c]
Land - Storage Reservoirs	$3,750,000	—	$3,750,000[d]
Land - Agricultural Operations	$29,109,000	—	$29,109,000[e]
Land Acquisition Services	$5,075,000	—	$5,075,000
Relocation Expenses	$5,361,000	—	$5,361,000
Contingency for Mitigation	$11,399,000	—	$11,399,000
TOTAL CAPITAL COST	**$172,670,000**	**$27,244,000**	**$199,914,000**

(a) 2003 dollars.
(b) All costs, except land, land acquisition services, relocation expenses, and contingency for mitigation, include 10% for design.
(c) 15 acres @ $5,000 per acre.
(d) 750 acres @ $5,000 per acre.
(e) 4,650 acres @ $6,260 per acre.

Table ES-10
Equivalent Annual Cost of the Recommended Project[a]

Project Component	LWRP		
	Stage V	Stage VI	Total
Design	$10,718,000	$2,477,000	$13,195,000
Construction	$107,183,000	$24,767,000	$131,950,000
Land	$32,934,000	—	$32,934,000
Land Acquisition Services	$5,075,000	—	$5,075,000
Relocation Expenses	$5,361,000	—	$5,361,000
Contingency for Mitigation	$11,399,000	—	$11,399,000
Total Capital Cost	$172,670,000	$27,244,000	$199,914,000
Annualized Capital Cost[b]	$15,827,000	$2,497,000	$18,324,000
Annual O&M Cost[c]	$7,454,000	$1,636,000	$9,090,000
EQUIVALENT ANNUAL COST	**$23,281,000**	**$4,133,000**	**$27,414,000**

(a) 2003 dollars.
(b) Amortized at 6.625% annual interest rate for 20 years.
(c) Based on 21 mgd for Stage V facilities, 5 mgd for Stage VI facilities, and 26 mgd for Total facilities.

Revenue Program

A revenue program allocates costs and supplemental revenue as needed from the users of the system to ensure sufficient revenues for construction and subsequent operation of facilities.

The financial program of District No. 14 is based on maximum utilization of the existing sources of revenue, supplemented by revenues from two additional programs: (1) the Service Charge Program, which is applicable to existing users, and (2) the Connection Fee Program, which applies to new users and existing users who significantly increase their discharge flow and/or strength.

In order to prevent a large fluctuation in the service charge rates from year to year, District No. 14 utilizes outside financing to the extent possible to distribute the capital costs of projects over an extended period of time. The primary mechanism that District No. 14 uses is the SRF loan program. If the recommended project had to be funded in a single year, the cost per single -family home would probably be prohibitive for many homeowners. However, the time needed to complete Stage V of the recommended project, will be approximately five years. This will allow the project cost to be spread over this time period. Additionally, District No. 14 will distribute this cost over an even greater number of years by utilizing the SRF loan program as well as any available bond proceeds.

Projected Service Charge and Connection Fee Rates

It is projected that the service charge rate will have to increase from the current $67 per year per single-family home to approximately $220 per year per single-family home by fiscal year 2008-09. This translates to an increase of approximately $31 per year per single -family home for each year over the next five years. Additionally, it is projected that the connection fee rate will have to increase, in phased increments, from its current rate of $1,780 per single-family home to approximately $3,900 per single-family home

over a five-year period that parallels the Stage V construction time frame. The current service charge rate of $67 per year per single-family home has been in effect for 11 years, since fiscal year 1993-94. Although a significant increase in the present rate is projected as a result of the cost to construct and operate the recommended project, the projected future rate of $220 per year per single -family home is within the range that other communities in California currently pay for wastewater treatment. The projected future rate of $220 per year is equal to the median rate charged in 2002 by all communities in California.

Final Palmdale Water Reclamation Plant 2025 Facilities Plan and Environmental Impact Report

Sanitation Districts of Los Angeles County

October 2005

The overall goal of the PWRP 2025 Plan is to identify a project that meets the wastewater treatment and effluent management needs of District No. 20 through year 2025 in a cost effective and environmentally sound manner. In order to meet the above-listed needs, the objectives of the PWRP 2025 Plan are as follows:

- Provide wastewater treatment capacity adequate to meet the needs of District No. 20 through the year 2025;
- Provide effluent management capacity adequate to meet the needs of District No. 20 through the year 2025;
- Provide a long-term solution for meeting water quality requirements set forth by regulatory agencies; and
- Provide a wastewater treatment and effluent management program that accommodates emerging recycled water reuse opportunities.

The major components of the recommended project are wastewater treatment facilities, effluent management facilities, and municipal reuse. Some processes of the wastewater treatment and effluent management facilities will be constructed to upgrade the treatment and effluent management level currently provided at the PWRP. For other processes, facilities will be expanded from 15.0 mgd to 22.4 mgd. These changes will be performed in stages, as described below.

Stage V

Stage V involves upgrading the existing wastewater treatment facilities by decommissioning the existing oxidation ponds and installing CAS with NDN and tertiary treatment filters. The agricultural reuse capacity of the PWRP would be expanded to 15.0 mgd by obtaining 840 acres of land for agricultural reuse operations and constructing storage reservoirs. District No. 20 will continue to seek municipal, industrial, and other public reuse opportunities for recycled water throughout the Stage V upgrade and expansion period, which would lessen the extent of agricultural reuse operations.

Wastewater Treatment Facilities

The proposed Stage V upgrade includes construction of facilities to upgrade the treatment capability of secondary treatment utilizing oxidation ponds with the installation of CAS aeration tanks, sedimentation tanks, and dissolved air flotation (DAF) units. Additional upgrades will be accomplished by: (1) installing tertiary treatment facilities consisting of tertiary filters and chemical treatment facilities, (2) expanding solids processing facilities by adding drying and/or mechanical solids thickening facilities, and

(3) constructing related facilities, such as an emergency generator, control and laboratory buildings, and associated piping and appurtenant structures. The existing PWRP headworks and primary treatment facilities will remain in service, as will the existing solids processing equipment. As noted previously, the existing 15.0 mgd-capacity oxidation ponds will be decommissioned.

The CAS process will be operated in NDN mode to increase nitrogen removal from the wastewater. Following the Stage V upgrades, the PWRP will produce treated effluent that will meet all the prescribed DHS standards for the beneficial reuse of tertiary treated recycled water.

The existing PWRP site has land available for all of the proposed treatment facilities. The new facilities for Stage V will be positioned next to the existing primary facilities on the southwest portion of the PWRP property at 30th Street East and Avenue P-8.

Agricultural Reuse Operations

Stage V will include the secured use of approximately 840 acres of additional land that will be needed to accommodate the 15.0 mgd flow projected by the year 2013. A new plant effluent force main (approximately 36 inches in diameter), a plant effluent pump station, an agricultural recycled water pump station, an agricultural recycled water force main, and an agricultural recycled water storage tank will be constructed to convey recycled water to the proposed storage reservoirs and agricultural reuse sites. The new agricultural reuse areas will require irrigation systems (e.g., center pivots), booster pumps, electrical sources, ancillary piping and conduit, and appurtenant structures.

As plant flow rates increase and exceed the capacity of the existing EMS with storage reservoirs on-line, additional agricultural reuse land will be developed. District No. 20 or contracted farming entities will be responsible for preparing the land, installing distribution lines and irrigation systems, and cultivating and harvesting crops in conformance with Title 22 of the California Code of Regulations (CCR). Agronomic irrigation rates will be used to protect groundwater quality. District No. 20 will prepare a recycled water reuse engineering report and obtain a recycled water reuse permit for the agricultural operations from the RWQCB-LR.

District No. 20 may also elect to enter into recycled water reuse contracts with farming entities on privately owned land. However, reliance on these types of contracts does not provide the assurance that adequate and cost-effective effluent management capacity will be available at all times. Secured use of land by District No. 20 for agricultural operations and ongoing support of municipal, industrial, and other public reuse opportunities are the best ways to ensure that District No. 20 can meet its legal obligations under the WDRs.

Storage Reservoirs

Approximately 700 acres are needed to construct six reservoirs. In Stage V, District No. 20 will acquire the land necessary for all six reservoirs though only four will actually be constructed during this stage. The new storage reservoirs will be rectangular and/or

trapezoidal modules, each having a capacity of approximately 385 million gallons (MG). They will have a water depth of approximately 18 feet with approximately three feet of freeboard. The top of the reservoir berms will be as much as 25 feet above grade. The storage reservoirs will be constructed with a low-permeability synthetic liner to minimize infiltration.

Stage VI

Stage VI involves expanding both wastewater treatment and effluent management facilities to accommodate the projected increase in wastewater flow from 15.0 mgd to 22.4 mgd. District No. 20 will continue to seek municipal, industrial, and other reuse opportunities for recycled water throughout the Stage VI expansion period.

Wastewater Treatment Facilities

Construction of the Stage VI wastewater treatment components will not require acquisition of additional land. The current PWRP site located at 30th Street East and Avenue P-8 is large enough to accommodate the proposed wastewater treatment facilities.

The major wastewater treatment facilities planned for construction by 2013 as part of the Stage VI expansion from 15.0 mgd to 22.4 mgd include: (1) primary facilities consisting of influent pumps, comminutors, aerated grit channels, a grit channel blower, primary sedimentation tanks, primary sludge pumps, and a primary sludge grinder, (2) secondary facilities consisting of CAS aeration tanks, sedimentation tanks, and return and waste-activated sludge pump stations, and associated piping and appurtenant structures, (3) tertiary facilities consisting of tertiary filters and chemical pretreatment; (4) appropriate disinfection facilities, and (5) solids processing facilities consisting of an anaerobic digestion tank, a digested solids transfer pump, a ferrous chloride station, and appropriate dewatering facilities.

Effluent Management Facilities

As plant flows increase throughout the planning period, additional agricultural reuse operations will be developed to manage the increased volume of recycled water produced. Two additional storage reservoirs will be constructed as part of Stage VI. These reservoirs will be similar to those constructed in Stage V. Since District No. 20's lease agreement with LAWA expires in 2022, approximately 4,300 acres of additional agricultural land may be required in Stage VI to accommodate the projected 22.4 mgd of PWRP flow by 2025.

Municipal Reuse

The Los Angeles County Waterworks District No. 40 and PWD have expressed interest in implementing recycled water reuse projects for landscape irrigation and industrial purposes within their jurisdictions. District No. 20 has committed to provide a sufficient quantity of tertiary-treated recycled water to meet the demands of these municipal reuse projects.

Building the infrastructure (pipelines, pump stations, distribution systems, etc.) necessary to deliver recycled water from the PWRP to various end users, identifying and securing reuse sites, and preparing environmental documentation would be the responsibility of the Los Angeles County Waterworks District No. 40 and/or PWD. As demand for recycled water increases in the future, the Los Angeles County Waterworks District No. 40 and/or PWD would need to construct additional facilities to meet the increased demand. District No. 20, on its part, will assure the availability of tertiary-treated recycled water to meet emerging municipal reuse needs by diverting water from agricultural reuse when other beneficial uses become available.

Project Implementation and Schedule

As described above, the recommended project will be implemented in two stages. The Stage V storage reservoirs are scheduled for completion in October 2008 and the Stage V wastewater treatment upgrade and effluent reuse expansion are scheduled for completion in October 2009. The Stage VI wastewater treatment and effluent management expansions are both scheduled to be completed by the year 2013 based on the SCAG 2004 population projections.

Phased construction will allow District No. 20 to re-evaluate the planned facilities and other options for effluent management at an interim point between the two stages and determine whether any adjustments should be made. Adjustments may be needed to respond to any changes in wastewater flow projections or to new municipal, industrial, and other public recycled water reuse applications that emerge. If the projected wastewater flow rate during the planning period does not materialize as anticipated, the construction of the Stage VI facilities will be delayed accordingly. Alternatively, if the population in the planning area increases more rapidly than projected, the construction of the Stage VI facilities will likewise be accelerated. This approach will allow District No. 20 to integrate future recycled water reuse opportunities that may become feasible in subsequent phases of the project.

Project Cost

The total estimated capital cost in 2005 dollars is $271, 570,000. The estimated annual operating cost is $8,135,120.

Revenue Program

The Revenue Program provides for the equitable distribution of the costs associated with providing wastewater services to both existing and future users of the wastewater system. The Revenue Program is used to determine what revenue is required to provide sufficient funds for construction and subsequent O&M of facilities.

The Revenue Program of District No. 20 is based on maximum utilization of the existing sources of revenue, supplemented by revenues from (1) the Service Charge Program, which is applicable to existing users, and (2) the Connection Fee Program, which applies to new users and existing users who significantly increase their discharge flow and/or strength.

In order to prevent a large fluctuation in the service charge rates from year to year, District No. 20 plans to utilize outside financing to the maximum extent possible to distribute the capital costs of projects over an extended period of time. It is anticipated that financing will be composed of both SRF loans, to the maximum extent available, and revenue bonds. If the recommended project was to be funded on a pay as-you-go basis, the cost would have to be borne by the existing users and would be cost prohibitive for many homeowners. However, with the use of outside financing, District No. 20 will be able to distribute the project cost over 20 to 30 years, significantly reducing the immediate impact on system users.

Appendix B

Detailed Market Assessment Results for the City of Lancaster

Table B-1: City of Lancaster's Estimated Recycled Water Demand at Buildout

Site ID	Site/Project	Size	Annual Demand at Buildout		Peak Day Demand	Peak Hour
		(ac)	(MG/yr)	(AFY)	(mgd)	(mgd)
1	Antelope Valley High School	58.6	0.0600	67.21	0.1200	0.36
2	Apollo Park	89.8	0.1600	179.20	0.3200	0.96
3	Eastside Park	18.5	0.0700	78.41	0.1400	0.42
4	El Dorado Park	13.4	0.0600	68.00	0.1200	0.36
5	El Dorado School	6.3	0.0100	11.20	0.0200	0.06
6	Fairgrounds Development	57.8	0.1300	145.60	0.2600	0.78
7	Jane Reynolds Park	6.8	0.0300	33.60	0.0600	0.18
8	Joshua Memorial Park	38.2	0.1400	156.80	0.2800	0.84
9	Lancaster Cemetery	14.4	0.0500	56.01	0.1000	0.30
10	Landfill	146.5	0.0300	33.60	0.0900	0.27
11	Linda Verde School, E	10.0	0.0200	22.40	0.0400	0.12
12	Mariposa Park	11.7	0.0500	56.01	0.1000	0.30
13	Park View, E, M	19.8	0.0500	56.01	0.1000	0.30
14	HWY 14	367.2	0.0696	77.97	0.1392	0.42
15	Phoenix High School	4.0	0.0100	11.20	0.0200	0.06
16	Antelope Valley College	113.8	0.4316	483.40	0.8632	2.59
17	Armagosa School, M	14.3	0.0542	60.74	0.1084	0.33
18	Carter Park	63.5	0.2400	268.80	0.4800	1.44
19	City Park	69.4	0.1500	163.00	0.3000	0.90
20	Cole Middle School	19.6	0.0744	83.36	0.1488	0.45
21	Del Sur School, E, M	18.2	0.0690	77.28	0.1380	0.41
22	Desert View, E	10.3	0.0391	43.82	0.0782	0.23
23	Eastside HS (proposed)	68.6	0.2600	291.20	0.5200	1.56
24	Fox Field Development*	87.5	0.3319	371.70	0.6637	1.99
25	George Lane Park	13.7	0.0520	58.30	0.1041	0.31
26	Good Shepard Cemetery	58.5	0.2218	248.50	0.4437	1.33
27	Hull Park	9.7	0.0367	41.09	0.0734	0.22
28	Proposed School 5	16.4	0.0400	44.81	0.0800	0.24
29	Jack Northrop E, M	31.0	0.1176	131.80	0.2353	0.71
30	Joshua School	17.3	0.0656	73.46	0.1312	0.39
31	Joe Walker School, E	22.3	0.0844	94.52	0.1688	0.51
32	Lancaster Golf Center	19.6	0.0743	83.21	0.1486	0.45
33	Lancaster Municipal Stadium	5.2	0.0197	22.09	0.0394	0.12
34	Lancaster School, H	37.0	0.1404	157.20	0.2808	0.84
35	Lincoln School, E	10.7	0.0407	45.54	0.0813	0.24

Site ID	Site/Project	Size	Annual Demand at Buildout		Peak Day Demand	Peak Hour
		(ac)	(MG/yr)	(AFY)	(mgd)	(mgd)
36	Monte Vista, E	14.6	0.0554	62.04	0.1108	0.33
37	Nancy Cory School, E	7.3	0.0277	31.05	0.0554	0.17
38	National Soccer Center	155.7	0.5902	661.10	1.1804	3.54
39	New Fairgrounds*	219.4	0.0500	57.00	0.1000	0.30
40	Prime Desert Woodlands	64.3	0.2436	272.90	0.4873	1.46
41	Proposed Park 1	18.6	0.0707	79.14	0.1413	0.42
42	Proposed Park 2	14.9	0.0563	63.08	0.1126	0.34
43	Proposed School 1	13.9	0.0526	58.94	0.1052	0.32
44	Proposed School 2	21.9	0.0832	93.20	0.1664	0.50
45	Proposed School 3	18.0	0.0683	76.46	0.1365	0.41
46	Proposed School 4	14.2	0.0539	60.39	0.1078	0.32
47	Proposed School 6	15.3	0.0580	64.94	0.1159	0.35
48	Proposed School 7	10.0	0.0381	42.67	0.0762	0.23
49	Proposed School 8	18.4	0.0699	78.28	0.1398	0.42
50	Proposed School 9	18.7	0.0708	79.28	0.1416	0.42
51	Quartz Hill High School	76.3	0.2892	323.90	0.5784	1.74
52	Rawely Duntely Park	18.2	0.0690	77.29	0.1380	0.41
53	Sierra School, E	9.0	0.0342	38.33	0.0684	0.21
54	Skytower Park	13.0	0.0491	55.01	0.0982	0.29
55	Sun Down School, E	8.9	0.0337	37.77	0.0674	0.20
56	Tierra Bonita Park	28.7	0.1087	121.80	0.2174	0.65
57	Tierra Bonita School	9.6	0.0365	40.93	0.0731	0.22
58	Valley View School	14.3	0.0540	60.54	0.1081	0.32
59	West Wind School, E	9.7	0.0367	41.10	0.0734	0.22
60		0.1	0.0000	0.00	0.0000	0.00
61		0.9	0.0000	0.02	0.0000	0.00
62		1.3	0.0000	0.03	0.0000	0.00
63		9.2	0.0002	0.18	0.0003	0.00
64		10.1	0.0002	0.20	0.0004	0.00
65		6.0	0.0001	0.12	0.0002	0.00
66		8.8	0.0002	0.17	0.0003	0.00
67		5.0	0.0001	0.10	0.0002	0.00
68		9.9	0.0002	0.19	0.0003	0.00
69		9.5	0.0002	0.19	0.0003	0.00
70		9.6	0.0002	0.19	0.0003	0.00
71		7.9	0.0001	0.15	0.0003	0.00
72		7.2	0.0001	0.14	0.0003	0.00
73		4.9	0.0001	0.10	0.0002	0.00

Site ID	Site/Project	Size	Annual Demand at Buildout		Peak Day Demand	Peak Hour
		(ac)	(MG/yr)	(AFY)	(mgd)	(mgd)
74		4.5	0.0001	0.09	0.0002	0.00
75		10.3	0.0002	0.20	0.0004	0.00
76		9.9	0.0002	0.19	0.0003	0.00
77		10.9	0.0002	0.21	0.0004	0.00
78		4.7	0.0001	0.09	0.0002	0.00
79		4.7	0.0001	0.09	0.0002	0.00
80		4.4	0.0001	0.09	0.0002	0.00
81		7.5	0.0001	0.15	0.0003	0.00
82		9.1	0.0002	0.18	0.0003	0.00
83		5.3	0.0001	0.10	0.0002	0.00
84		4.8	0.0001	0.09	0.0002	0.00
85		8.6	0.0001	0.17	0.0003	0.00
86		8.9	0.0002	0.17	0.0003	0.00
87		9.5	0.0002	0.19	0.0003	0.00
88		14.8	0.0003	0.29	0.0005	0.00
89		18.2	0.0003	0.36	0.0006	0.00
90		14.7	0.0003	0.29	0.0005	0.00
91		19.7	0.0003	0.39	0.0007	0.00
92		14.6	0.0003	0.29	0.0005	0.00
93		19.3	0.0003	0.38	0.0007	0.00
94		19.3	0.0003	0.38	0.0007	0.00
95		19.3	0.0003	0.38	0.0007	0.00
96		19.2	0.0003	0.38	0.0007	0.00
97		13.4	0.0002	0.26	0.0005	0.00
98		14.1	0.0002	0.28	0.0005	0.00
99		17.6	0.0003	0.34	0.0006	0.00
100		19.7	0.0003	0.39	0.0007	0.00
101		17.9	0.0003	0.35	0.0006	0.00
102		17.0	0.0003	0.32	0.0006	0.00
103		16.3	0.0003	0.39	0.0007	0.00
104		19.9	0.0002	0.26	0.0005	0.00
105		13.5	0.0004	0.40	0.0007	0.00
106		20.2	0.0004	0.45	0.0008	0.00
107		23.1	0.0004	0.43	0.0008	0.00
108		21.8	0.0004	0.40	0.0007	0.00
109		20.2	0.0004	0.50	0.0009	0.00
110		25.4	0.0004	0.48	0.0009	0.00
111		24.4	0.0004	0.49	0.0009	0.00

Site ID	Site/Project	Size	Annual Demand at Buildout		Peak Day Demand	Peak Hour
		(ac)	(MG/yr)	(AFY)	(mgd)	(mgd)
112		25.1	0.0004	0.42	0.0007	0.00
113		21.3	0.0005	0.53	0.0009	0.00
114		27.0	0.0004	0.50	0.0009	0.00
115		25.3	0.0006	0.63	0.0011	0.00
116		32.1	0.0005	0.58	0.0010	0.00
117		29.7	0.0006	0.67	0.0012	0.00
118		34.4	0.0007	0.76	0.0014	0.00
119		38.9	0.0007	0.76	0.0013	0.00
120		38.6	0.0007	0.74	0.0013	0.00
121		37.9	0.0008	0.87	0.0015	0.00
122		44.1	0.0010	1.13	0.0020	0.01
123		57.7	0.0010	1.13	0.0020	0.01
124		57.7	0.0011	1.23	0.0022	0.01
125		62.6	0.0011	1.18	0.0021	0.01
126		60.0	0.0012	1.31	0.0023	0.01
127		67.0	0.0013	1.41	0.0025	0.01
128		71.8	0.0014	1.54	0.0027	0.01
129		78.6	0.0013	1.50	0.0027	0.01
130		76.5	0.0003	0.33	0.0006	0.00
131		2.5	0.0000	0.05	0.0001	0.00
132		9.4	0.0002	0.18	0.0003	0.00
133		4.7	0.0001	0.09	0.0002	0.00
134		17.4	0.0003	0.34	0.0006	0.00
135		22.7	0.0004	0.44	0.0008	0.00
136		41.8	0.0007	0.82	0.0015	0.00
137		9.6	0.0002	0.19	0.0003	0.00
138		40.4	0.0007	0.79	0.0014	0.00
139		39.2	0.0007	0.77	0.0014	0.00
140		17.0	0.0003	0.33	0.0006	0.00
141		29.7	0.0005	0.58	0.0010	0.00
142		8.5	0.0001	0.17	0.0003	0.00
143		4.8	0.0001	0.09	0.0002	0.00
144		20.2	0.0004	0.40	0.0007	0.00
145		11.5	0.0002	0.23	0.0004	0.00
146		18.0	0.0003	0.35	0.0006	0.00
147		8.6	0.0001	0.17	0.0003	0.00
148		77.2	0.0014	1.51	0.0027	0.01
149		38.3	0.0007	0.75	0.0013	0.00

Site ID	Site/Project	Size	Annual Demand at Buildout		Peak Day Demand	Peak Hour
		(ac)	(MG/yr)	(AFY)	(mgd)	(mgd)
150		7.5	0.0001	0.15	0.0003	0.00
151		861.5	0.0151	16.89	0.0302	0.09
152		169.2	0.0030	3.32	0.0059	0.02
153		2.0	0.0000	0.04	0.0001	0.00
154		37.7	0.0007	0.74	0.0013	0.00
155		30.6	0.0005	0.60	0.0011	0.00
156		19.5	0.0003	0.38	0.0007	0.00
157		19.4	0.0003	0.38	0.0007	0.00
158		25.1	0.0004	0.49	0.0009	0.00
159		20.1	0.0004	0.39	0.0007	0.00
160		29.1	0.0005	0.57	0.0010	0.00
161		21.7	0.0004	0.43	0.0008	0.00
162		2.6	0.0000	0.05	0.0001	0.00
163		19.5	0.0003	0.38	0.0007	0.00
164		3.0	0.0001	0.06	0.0001	0.00
165		9.7	0.0002	0.19	0.0003	0.00
166		4.9	0.0001	0.10	0.0002	0.00
167		9.7	0.0002	0.19	0.0003	0.00
168		18.9	0.0003	0.37	0.0007	0.00
169		5.0	0.0001	0.10	0.0002	0.00
170		4.7	0.0001	0.09	0.0002	0.00
171		43.0	0.0008	0.84	0.0015	0.00
172		19.5	0.0003	0.38	0.0007	0.00
173		29.4	0.0005	0.58	0.0010	0.00
174		10.5	0.0002	0.21	0.0004	0.00
175		79.3	0.0014	1.56	0.0028	0.01
176		28.2	0.0005	0.55	0.0010	0.00
177		5.1	0.0001	0.10	0.0002	0.00
178		78.1	0.0014	1.53	0.0027	0.01
179		20.1	0.0004	0.39	0.0007	0.00
180		17.9	0.0003	0.35	0.0006	0.00
181		57.2	0.0010	1.12	0.0020	0.01
182		7.1	0.0001	0.14	0.0002	0.00
183		0.9	0.0000	0.02	0.0000	0.00
184		2.3	0.0000	0.05	0.0001	0.00
185		9.6	0.0002	0.19	0.0003	0.00
186		39.8	0.0007	0.78	0.0014	0.00
187		15.0	0.0003	0.29	0.0005	0.00

Site ID	Site/Project	Size	Annual Demand at Buildout		Peak Day Demand	Peak Hour
		(ac)	(MG/yr)	(AFY)	(mgd)	(mgd)
188		38.5	0.0007	0.75	0.0013	0.00
189		19.4	0.0003	0.38	0.0007	0.00
191		9.9	0.0007	0.19	0.0014	0.00
192		38.8	0.0002	0.20	0.0003	0.00
193		10.0	0.0002	0.19	0.0004	0.00
194		9.9	0.0002	0.15	0.0003	0.00
195		7.7	0.0001	0.56	0.0003	0.00
196		28.6	0.0005	0.05	0.0010	0.00
197		2.5	0.0000	9.18	0.0001	0.00
198		468.3	0.0082	0.15	0.0164	0.05
199		7.5	0.0001	0.57	0.0003	0.00
200		29.2	0.0005	0.20	0.0010	0.00
201		10.1	0.0002	0.16	0.0004	0.00
202		8.0	0.0001	1.09	0.0003	0.00
203		55.7	0.0010	0.17	0.0019	0.01
204		8.8	0.0002	0.08	0.0003	0.00
205		4.1	0.0001	0.19	0.0001	0.00
206		9.6	0.0002	0.22	0.0003	0.00
207		11.4	0.0002	16.14	0.0004	0.00
208		823.5	0.0144	0.78	0.0288	0.09
209		39.8	0.0007	0.60	0.0014	0.00
210		30.4	0.0005	0.87	0.0011	0.00
211		44.2	0.0008	0.35	0.0015	0.00
212		17.7	0.0003	0.00	0.0006	0.00
213		0.1	0.0000	0.14	0.0000	0.00
214		7.3	0.0001	0.19	0.0003	0.00
215		9.7	0.0002	0.17	0.0003	0.00
216		8.9	0.0002	0.19	0.0003	0.00
217		9.7	0.0002	0.18	0.0003	0.00
218		9.3	0.0002	0.21	0.0003	0.00
219		10.5	0.0002	0.78	0.0004	0.00
220		39.6	0.0007	1.48	0.0014	0.00
221		75.3	0.0013	0.05	0.0026	0.01
222		2.4	0.0000	0.20	0.0001	0.00
223		10.0	0.0002	0.28	0.0004	0.00
224		14.4	0.0003	0.40	0.0005	0.00
225		20.2	0.0004	0.08	0.0007	0.00
226		4.1	0.0001	0.56	0.0001	0.00

Site ID	Site/Project	Size	Annual Demand at Buildout		Peak Day Demand	Peak Hour
		(ac)	(MG/yr)	(AFY)	(mgd)	(mgd)
227		28.5	0.0005	0.20	0.0010	0.00
228		10.2	0.0002	0.38	0.0004	0.00
229		19.3	0.0003	0.30	0.0007	0.00
230		15.3	0.0003	0.02	0.0005	0.00
231		0.8	0.0000	0.33	0.0000	0.00
232		16.7	0.0003	0.76	0.0006	0.00
233		38.9	0.0007	0.05	0.0014	0.00
234		2.6	0.0000	0.01	0.0001	0.00
235		0.4	0.0000	0.39	0.0000	0.00
236		20.0	0.0003	0.06	0.0007	0.00
237		3.1	0.0001	0.09	0.0001	0.00
238		4.8	0.0001	0.23	0.0002	0.00
239		11.6	0.0002	0.58	0.0004	0.00
240		29.8	0.0005	0.44	0.0010	0.00
241		22.3	0.0004	0.22	0.0008	0.00
242		11.4	0.0002	0.08	0.0004	0.00
243		4.0	0.0001	0.28	0.0001	0.00
244		14.4	0.0003	0.03	0.0005	0.00
245		1.3	0.0000	0.30	0.0000	0.00
246		15.3	0.0003	0.58	0.0005	0.00
247		29.6	0.0005	0.35	0.0010	0.00
248		17.8	0.0003	0.19	0.0006	0.00
249		9.7	0.0002	0.01	0.0003	0.00
250		0.6	0.0000	0.09	0.0000	0.00
251		4.4	0.0001	0.19	0.0002	0.00
252		9.9	0.0002	0.29	0.0003	0.00
253		14.7	0.0003	0.05	0.0005	0.00
254		2.7	0.0000	0.10	0.0001	0.00
255		4.9	0.0001	0.19	0.0002	0.00
256		9.6	0.0002	0.07	0.0003	0.00
257		3.6	0.0001	0.76	0.0001	0.00
258		38.9	0.0007	0.15	0.0014	0.00
259		7.5	0.0001	0.39	0.0003	0.00
260		20.1	0.0004	0.41	0.0007	0.00
261		20.7	0.0004	0.06	0.0007	0.00
262		3.1	0.0001	0.10	0.0001	0.00
263		5.0	0.0001	0.22	0.0002	0.00
264		11.1	0.0002	0.39	0.0004	0.00

Site ID	Site/Project	Size	Annual Demand at Buildout		Peak Day Demand	Peak Hour
		(ac)	(MG/yr)	(AFY)	(mgd)	(mgd)
265		20.1	0.0004	0.20	0.0007	0.00
266		10.2	0.0002	0.17	0.0004	0.00
267		8.7	0.0002	0.19	0.0003	0.00
268		9.6	0.0002	0.07	0.0003	0.00
269		3.8	0.0001	0.20	0.0001	0.00
270		10.1	0.0002	1.09	0.0004	0.00
271		55.6	0.0010	0.39	0.0019	0.01
272		19.9	0.0003	0.76	0.0007	0.00
273		39.0	0.0007	0.75	0.0014	0.00
274		38.3	0.0007	0.80	0.0013	0.00
275		41.0	0.0007	0.27	0.0014	0.00
276		13.8	0.0002	0.06	0.0005	0.00
277		3.2	0.0001	0.18	0.0001	0.00
278		9.1	0.0002	0.20	0.0003	0.00
279		10.0	0.0002	0.39	0.0004	0.00
280		20.1	0.0004	0.30	0.0007	0.00
281		15.1	0.0003	0.07	0.0005	0.00
282		3.8	0.0001	0.09	0.0001	0.00
283		4.8	0.0001	0.09	0.0002	0.00
	City Maintenance	-	0.0300	35.00	0.0554	0.0554
	Street Cleaning	-	0.0033	4.00	0.0061	0.0061
	Totals:	**8887**	**5.9**	**6640**	**11.88**	**35.53**

Appendix C

Detailed Cost Estimates

Total System Estimated Cost

TOTAL Distribution Facilities	Quantity	Unit	2005 Dollars
1. Main Pump Stations			
Palmdale	15,555	gpm	$2,353,000
Lancaster	20,833	gpm	$2,804,000
Subtotals	**36,388**	**gpm**	**$5,157,000**
2. Booster Pump Stations			
No. 1	1,725	gpm	$372,000
No. 2	8,460	gpm	$1,076,000
Subtotals	**10,185**	**gpm**	**$1,448,000**
3. Reservoirs			
No. 1	3.0	MG	$1,905,000
No. 2	4.4	MG	$2,794,000
No. 3	2.1	MG	$1,334,000
Subtotals	**9.5**	**MG**	**$6,033,000**
4. Distribution Pipelines			
42-inch DI	29,200	LF	$15,943,200
36-inch DI	31,100	LF	$14,554,800
27-inch DI	28,700	LF	$10,073,700
24-inch DI	92,400	LF	$28,828,800
16-inch DI	16,400	LF	$3,411,200
14-inch DI	10,500	LF	$1,911,000
16-24 inch increase	24,200	LF	$2,516,800
Subtotals	**232,500**	**LF**	**$77,239,500**
5. System Flushing & Testing	1	LS	$295,275
6. Chlorination of Tertiary Effluent	1	LS	$641,096
SUBTOTAL			**$90,813,871**
Contractor's OH & Profit (15%)			$13,622,081
Engineering/Admin (35%)			$31,784,855
Contingency (10%)			$9,081,387
TOTAL			**$145,302,194**

Total System Estimated Cost
Facilities Included in Grant Application

TOTAL Distribution Facilities	Quantity	Unit	1995 Dollars	2005 Dollars
1. Main Pump Stations				
Palmdale	15,555	gpm	$1,853,000	$2,353,000
Lancaster	20,833	gpm	$2,208,000	$2,804,000
Subtotals	**36,388**	**gpm**	**$4,061,000**	**$5,157,000**
2. Booster Pump Stations				
No. 1	1,725	gpm	$293,000	$372,000
No. 2	8,460	gpm	$847,000	$1,076,000
Subtotals	**10,185**	**gpm**	**$1,140,000**	**$1,448,000**
3. Reservoirs				
No. 1	3.0	MG	$1,500,000	$1,905,000
No. 2	4.4	MG	$2,200,000	$2,794,000
No. 3	2.1	MG	$1,050,000	$1,334,000
Subtotals	**9.5**	**MG**	**$4,750,000**	**$6,033,000**
4. Distribution Pipelines				
42-inch	0	LF	$0	$0
36-inch	31,100	LF	$5,598,000	$14,554,800
27-inch	28,700	LF	$3,874,500	$10,073,700
24-inch	91,400	LF	$10,968,000	$28,516,800
16-inch	16,400	LF	$1,312,000	$3,411,200
14-inch	10,500	LF	$735,000	$1,911,000
16-24-inch	24,200	LF	$968,000	$2,516,800
Subtotals	**202,300**	**LF**	**$23,455,500**	**$60,984,300**
Subtotal Rounded	**202,000**			
5. System Flushing & Testing	1	LS	$178,100	$226,187
6. Chlorination of Tertiary Effluent	1	LS	$504,800	$641,096
SUBTOTAL			**$34,089,400**	**$74,489,583**
Contractor's OH & Profit (15%)			$5,113,410	$11,173,437
Engineering/Admin (35%)			$11,931,290	$26,071,354
Contingency (10%)			$3,408,940	$7,448,958
TOTAL			**$54,543,040**	**$119,183,333**

Phase 1A Estimated Cost

PHASE 1 Distribution Facilities	Quantity	Unit	2005 Dollars
1. Main Pump Stations			
Palmdale	0	gpm	$0
Lancaster	0	gpm	$0
Subtotals	**0**	**gpm**	**$0**
2. Booster Pump Stations			
No. 1	0	gpm	
No. 2	0	gpm	
Subtotals	**0**	**gpm**	**$0**
3. Reservoirs			
No. 1	0.0	MG	
No. 2	0.0	MG	
No. 3	0.0	MG	
Subtotals	**0.0**	**MG**	**$0**
4. Distribution Pipelines			
42-inch	0	LF	$0
36-inch	0	LF	$0
27-inch	0	LF	$0
24-inch	0	LF	$0
16-inch	0	LF	$0
14-inch	0	LF	$0
16-24-inch increase	24,200	LF	$2,516,800
Subtotals	**24,200**	**LF**	**$2,516,800**
Subtotal Rounded	**24,000**		**2,517,000**
5. System Flushing & Testing	1	LS	$30,734
6. Chlorination of Tertiary Effluer	0	LS	$0
SUBTOTAL			**$2,547,534**
Contractor's OH & Profit (15%)			$382,130
Engineering/Admin (35%)			$891,637
Contingency (10%)			$254,753
TOTAL			**$4,076,054**
Total (Rounded)			**$4,076,000**

Phase 1B Estimated Cost

PHASE 1 Distribution Facilities	Quantity	Unit	2005 Dollars
1. Main Pump Stations			
Palmdale	0	gpm	$0
Lancaster	20,833	gpm	$2,804,000
Subtotals	**20,833**	**gpm**	**$2,804,000**
2. Booster Pump Stations			
No. 1	0	gpm	
No. 2	0	gpm	
Subtotals	**0**	**gpm**	**$0**
3. Reservoirs			
No. 1	3.0	MG	$1,905,000
No. 2	0.0	MG	
No. 3	0.0	MG	
Subtotals	**3.0**	**MG**	**$1,905,000**
4. Distribution Pipelines			
42-inch	0	LF	$0
36-inch	0	LF	$0
27-inch	0	LF	$0
24-inch	38,700	LF	$12,074,400
16-inch	0	LF	$0
14-inch	0	LF	$0
16-24-inch increase		LF	$0
Subtotals	**38,700**	**LF**	**$12,074,400**
Subtotal Rounded	**39,000**		**12,074,000**
5. System Flushing & Testing	1	LS	$49,149
6. Chlorination of Tertiary Effluer	1	LS	$641,096
SUBTOTAL			**$17,473,645**
Contractor's OH & Profit (15%)			$2,621,047
Engineering/Admin (35%)			$6,115,776
Contingency (10%)			$1,747,365
TOTAL			**$27,957,832**
Total (Rounded)			**$27,958,000**

Phase 2 Estimated Cost

PHASE 2 Distribution Facilities	Quantity	Unit	2005 Dollars
1. Main Pump Stations			
Palmdale	15,555	gpm	$2,353,000
Lancaster			
Subtotals	**15,555**	**gpm**	**$2,353,000**
2. Booster Pump Stations			
No. 1			
No. 2			
Subtotals	**0**	**gpm**	**$0**
3. Reservoirs			
No. 1	0.0	MG	$0
No. 2	0.0	MG	$0
No. 3	0.0	MG	$0
Subtotals	**0.0**	**MG**	**$0**
4. Distribution Pipelines			
42-inch	0	LF	$0
36-inch	10,500	LF	$4,914,000
27-inch	28,700	LF	$10,073,700
24-inch	0	LF	$0
16-inch	16,400	LF	$3,411,200
14-inch	0	LF	$0
16-24 inch increase	0	LF	$0
Subtotals	**55,600**	**LF**	**$18,398,900**
Subtotal Rounded	**56,000**		**$ 18,399,000**
5. System Flushing & Testing	1	LS	$70,612
SUBTOTAL			**$20,822,512**
Contractor's OH & Profit (15%)			$3,123,377
Engineering/Admin (35%)			$7,287,879
Contingency (10%)			$2,082,251
TOTAL			**$33,316,019**
TOTAL Rounded			$33,316,000

Phase 3 Estimated Cost

PHASE 3 Distribution Facilities	Quantity	Unit	2005 Dollars
1. Main Pump Stations			
Palmdale			
Lancaster			
Subtotals	**0**	**gpm**	**$0**
2. Booster Pump Stations			
No. 1			
No. 2			
Subtotals	**0**	**gpm**	**$0**
3. Reservoirs			
No. 1	0.0	MG	$0
No. 2	0.0	MG	$0
No. 3	0.0	MG	$0
Subtotals	**0.0**	**MG**	**$0**
4. Distribution Pipelines			
42-inch	0	LF	$0
36-inch	20,600	LF	$9,640,800
27-inch	0	LF	$0
24-inch	0	LF	$0
16-inch	0	LF	$0
14-inch	5,800	LF	$1,055,600
16-24 inch increase	0	LF	$0
Subtotals	**26,400**	**LF**	**$ 10,696,400**
Subtotal Rounded	**26,000**		**$ 10,696,000**
5. System Flushing & Testing	1	LS	$33,528
SUBTOTAL			**$10,729,928**
Contractor's OH & Profit (15%)			$1,609,489
Engineering/Admin (35%)			$3,755,475
Contingency (10%)			$1,072,993
TOTAL			**$17,167,885**
TOTAL Rounded			**$17,168,000**

Phase 4 Estimated Cost

PHASE 4 Distribution Facilities	Quantity	Unit	2005 Dollars
1. Main Pump Stations			
Palmdale			
Lancaster			
Subtotals	**0**	**gpm**	**$0**
2. Booster Pump Stations			
No. 1	1,725	gpm	$372,000
No. 2	8,460	gpm	$1,076,000
Subtotals	**10,185**	**gpm**	**$1,448,000**
3. Reservoirs			
No. 1	0.0	MG	$0
No. 2	4.4	MG	$2,794,000
No. 3	2.1	MG	$1,334,000
Subtotals	**6.5**	**MG**	**$4,128,000**
4. Distribution Pipelines			
42-inch	0	LF	$0
36-inch	0	LF	$0
27-inch	0	LF	$0
24-inch	52,700	LF	$16,442,400
16-inch	0	LF	$0
14-inch	4,700	LF	$855,400
16-24 inch increase	0	LF	$0
Subtotals	**57,400**	**LF**	**$17,297,800**
Subtotal Rounded	**57,000**		**$ 17,298,000**
5. System Flushing & Testing	1	LS	$72,898
SUBTOTAL			**$22,946,698**
Contractor's OH & Profit (15%)			$3,442,005
Engineering/Admin (35%)			$8,031,344
Contingency (10%)			$2,294,670
TOTAL			**$36,714,717**
Total Rounded			$ 36,715,000

Non-Grant Final Phase Estimated Cost

PHASE 5 - RECHARGE - Not in GRANT

Distribution Facilities	Quantity	Unit	2005 Dollars
1. Main Pump Stations			
Palmdale			
Lancaster			
Subtotals	**0**	**gpm**	**$0**
2. Booster Pump Stations			
No. 1		gpm	
No. 2		gpm	
Subtotals	**0**	**gpm**	**$0**
3. Reservoirs			
No. 1	0.0	MG	$0
No. 2	0.0	MG	$0
No. 3	0.0	MG	$0
Subtotals	**0.0**	**MG**	**$0**
4. Distribution Pipelines			
42-inch	29,200	LF	$15,943,200
36-inch	0	LF	$0
27-inch	0	LF	$0
24-inch	0	LF	$0
16-inch	0	LF	$0
14-inch	0	LF	$0
16-24 inch increase	0	LF	$0
Subtotals	**29,200**	**LF**	**$15,943,200**
5. System Flushing & Testing	1	LS	$37,084
SUBTOTAL			**$15,980,284**
Contractor's OH & Profit (15%)			$2,397,043
Engineering/Admin (35%)			$5,593,099
Contingency (10%)			$1,598,028
TOTAL			**$25,568,454**

Appendix D

Detailed Potential Users for Phases 1-4

Table D-1: Summary of Phased Users for Antelope Valley Recycled Water System

Phase	Number of Users Served	Cumulative Number of Users Served	Total Annual Demand AFY	Cumulative Annual Demand AFY	Peak Day Demand AF/D	Peak Day Demand (mgd)	Peak Hour Demand (mgd)
1A	18	18	786	786	4.3	1.4	4.1
1	103	121	2,161	2,947	11.9	3.9	11.6
2	54	175	2,076	5,023	12.0	3.9	9.8
3	18	193	1,295	6,318	7.9	2.6	5.2
4	9	202	7,013	13,331	42.8	14.0	27.9
Total Demand Phases 1-4	**202**		**13,331**		**79.0**	**25.7**	**58.6**
All Remaining Phases	142	344	4,160	17,491	23.8	7.7	19.9
Total Demand	**344**		**17,491**		**102.7**	**33.5**	**78.6**

Table D-2: Phase 1A Users for Antelope Valley Recycled Water System

Site ID	Site/Project	Annual Average Demand (AFY)	Peak Day Demand (AF/day)	Peak Day Demand (mgd)	Peak Hour Demand (mgd)
LANCASTER – EXISTING					
1	Antelope Valley High School	67.21	0.37	0.12	0.360
3	Eastside Park	78.41	0.43	0.14	0.420
6	Fairgrounds Development	145.62	0.80	0.26	0.780
9	Lancaster Cemetery	56.01	0.31	0.10	0.300
10	Landfill	33.60	0.18	0.09	0.090
11	Linda Verde School, E	22.40	0.12	0.04	0.120
12	Mariposa Park	56.01	0.31	0.10	0.300
15	Phoenix High School	11.20	0.07	0.02	0.060
18	Carter Park	268.80	1.48	0.48	1.440
LANCASTER – FUTURE					
28	Proposed School 5	44.81	0.25	0.08	0.240
100	-	0.39	0.002	0.001	0.002
136	-	0.82	0.005	0.001	0.004
182	-	0.14	0.001	0.000	0.001
207	-	0.22	0.001	0.000	0.001
246	-	0.30	0.002	0.001	0.002
254	-	0.05	0.000	0.000	0.000
264	-	0.22	0.001	0.000	0.001
267	-	0.17	0.001	0.000	0.001
	Subtotal Existing Demand	739	4.07	1.35	3.87
	Subtotal Future Demand	47	0	0	0
	Phase 1A Total Demand	**786**	**4.32**	**1.43**	**4.12**
	Subtotal Palmdale	0	0.00	0.00	0.00
	Subtotal Lancaster	786	4.32	1.43	4.12

Table D-3: Phase 1 Users for Antelope Valley Recycled Water System

Site ID	Site/Project	Annual Average Demand (AFY)	Peak Day Demand (AF/day)	Peak Day Demand (mgd)	Peak Hour Demand (mgd)
LANCASTER – EXISTING					
4	El Dorado Park	67.21	0.37	0.12	0.360
5	El Dorado School	11.20	0.06	0.02	0.060
7	Jane Reynolds Park	33.60	0.19	0.06	0.180
8	Joshua Memorial Park	156.82	0.86	0.28	0.840
13	Park View, E, M	56.01	0.31	0.10	0.300
14	HWY 14	77.97	0.43	0.14	0.418
16	Antelope Valley College	483.44	2.65	0.86	2.590
17	Armagosa School, M	60.74	0.33	0.11	0.325
19	City Park	163.00	0.92	0.30	0.900
27	Hull Park	41.09	0.23	0.07	0.220
29	Jack Northrop E, M	131.80	0.73	0.24	0.706
30	Joshua School	73.46	0.40	0.13	0.393
32	Lancaster Golf Center	83.21	0.46	0.15	0.446
37	Nancy Cory School, E	31.05	0.17	0.06	0.166
40	Prime Desert Woodlands	272.90	1.50	0.49	1.462
LANCASTER – FUTURE					
45	Proposed School 3	76.46	0.419	0.137	0.410
46	Proposed School 4	60.39	0.331	0.108	0.323
52	Rawely Duntely Park	77.29	0.423	0.138	0.414
53	Sierra School, E	38.33	0.210	0.068	0.205
55	Sun Down School, E	37.77	0.207	0.067	0.202
58	Valley View School	60.54	0.335	0.108	0.324
59	West Wind School, E	41.10	0.225	0.073	0.220
60	-	0.00	0.000	0.000	0.000
61	-	0.02	0.000	0.000	0.000
62	-	0.03	0.000	0.000	0.000
66	-	0.17	0.001	0.000	0.001
67	-	0.10	0.001	0.000	0.001
68	-	0.19	0.001	0.000	0.001
69	-	0.19	0.001	0.000	0.001
70	-	0.19	0.001	0.000	0.001
71	-	0.15	0.001	0.000	0.001
72	-	0.14	0.001	0.000	0.001
73	-	0.10	0.001	0.000	0.001
74	-	0.09	0.000	0.000	0.000
75	-	0.20	0.001	0.000	0.001
76	-	0.19	0.001	0.000	0.001
77	-	0.21	0.001	0.000	0.001
90	-	0.29	0.002	0.001	0.002
91	-	0.39	0.002	0.001	0.002
92	-	0.29	0.002	0.001	0.002
93	-	0.38	0.002	0.001	0.002

Site ID	Site/Project	Annual Average Demand (AFY)	Peak Day Demand (AF/day)	Peak Day Demand (mgd)	Peak Hour Demand (mgd)
94	-	0.38	0.002	0.001	0.002
95	-	0.38	0.002	0.001	0.002
99	-	0.34	0.002	0.001	0.002
108	-	0.40	0.002	0.001	0.002
109	-	0.50	0.003	0.001	0.003
110	-	0.48	0.003	0.001	0.003
111	-	0.49	0.003	0.001	0.003
112	-	0.42	0.002	0.001	0.002
116	-	0.58	0.003	0.001	0.003
117	-	0.67	0.004	0.001	0.004
120	-	0.74	0.005	0.001	0.004
122	-	1.13	0.006	0.002	0.006
126	-	1.31	0.007	0.002	0.007
128	-	1.54	0.008	0.003	0.008
130	-	0.33	0.002	0.001	0.002
131	-	0.05	0.000	0.000	0.000
133	-	0.09	0.001	0.000	0.000
137	-	0.19	0.001	0.000	0.001
147	-	0.17	0.001	0.000	0.001
153	-	0.04	0.000	0.000	0.000
154	-	0.74	0.004	0.001	0.004
155	-	0.60	0.003	0.001	0.003
157	-	0.38	0.002	0.001	0.002
160	-	0.57	0.003	0.001	0.003
161	-	0.43	0.002	0.001	0.002
162	-	0.05	0.000	0.000	0.000
163	-	0.38	0.002	0.001	0.002
166	-	0.10	0.001	0.000	0.001
169	-	0.10	0.001	0.000	0.001
170	-	0.09	0.001	0.000	0.000
171	-	0.84	0.005	0.002	0.005
174	-	0.21	0.001	0.000	0.001
175	-	1.56	0.009	0.003	0.008
177	-	0.10	0.001	0.000	0.001
184	-	0.05	0.000	0.000	0.000
191	-	0.76	0.005	0.001	0.004
195	-	0.15	0.001	0.000	0.001
205	-	0.08	0.000	0.000	0.000
209	-	0.78	0.005	0.001	0.004
213	-	0.00	0.000	0.000	0.000
214	-	0.14	0.001	0.000	0.001
215	-	0.19	0.001	0.000	0.001
222	-	0.05	0.000	0.000	0.000
223	-	0.20	0.001	0.000	0.001
228	-	0.20	0.001	0.000	0.001

Site ID	Site/Project	Annual Average Demand (AFY)	Peak Day Demand (AF/day)	Peak Day Demand (mgd)	Peak Hour Demand (mgd)
231	-	0.02	0.000	0.000	0.000
235	-	0.01	0.000	0.000	0.000
236	-	0.39	0.002	0.001	0.002
245	-	0.03	0.000	0.000	0.000
249	-	0.19	0.001	0.000	0.001
250	-	0.01	0.000	0.000	0.000
253	-	0.29	0.002	0.001	0.002
257	-	0.07	0.000	0.000	0.000
260	-	0.39	0.002	0.001	0.002
261	-	0.41	0.002	0.001	0.002
262	-	0.06	0.000	0.000	0.000
268	-	0.19	0.001	0.000	0.001
269	-	0.07	0.000	0.000	0.000
271	-	1.09	0.006	0.002	0.006
277	-	0.06	0.000	0.000	0.000
282	-	0.07	0.000	0.000	0.000
283	-	0.09	0.001	0.000	0.001
	Subtotal Existing Demand	1,744	9.60	3.12	9.37
	Subtotal Future Demand	417	2.29	0.75	2.24
	Phase 1 Total Demand	**2,161**	**11.90**	**3.87**	**11.60**
	Subtotal Palmdale	0	0.00	0.00	0.00
	Subtotal Lancaster	2,161	11.90	3.87	11.60

Table D-4: Phase 2 Users for Antelope Valley Recycled Water System

Site ID	Site/Project	Annual Average Demand (AFY)	Peak Day Demand (AF/day)	Peak Day Demand (mgd)	Peak Hour Demand (mgd)
PALMDALE - EXISTING					
5020	Manzanita Elementary	23.85	0.15	0.05	0.095
5021	Mesquite Elementary	28.48	0.17	0.06	0.113
5022	Palmtree	41.77	0.26	0.08	0.166
5024	Phoenix High School	5.52	0.03	0.01	0.022
5026	Tamarisk	21.57	0.13	0.04	0.090
5027	Wildflower	30.44	0.19	0.06	0.121
5036	Dr. Robert C. St. Clair Parkway	20.50	0.13	0.04	0.082
5049	American Indian Little League	21.00	0.13	0.04	0.084
5051	Ponciltan Square	8.40	0.05	0.02	0.033
5101	Palmdale High School	138.01	0.84	0.27	0.550
5102	Desert Aire Golf Course	168.00	1.03	0.33	0.669
5104	McAdam	88.51	0.54	0.18	0.353
5105	Courson	28.02	0.17	0.06	0.110
5107	Desert Sands	84.88	0.52	0.17	0.340
5118	Desert Rose Elementary	29.68	0.18	0.06	0.118
5120	Tumbleweed Elementary	36.83	0.23	0.07	0.147
5121	Yucca Elementary	24.98	0.15	0.05	0.100
5122	Cactus K-8	31.49	0.19	0.06	0.130
5124	Mesa Intermediate	54.75	0.33	0.11	0.218
PALMDALE - FUTURE					
5030	Ana Verde	36.83	0.23	0.07	0.147
5043	Desert Sands Expansion	29.40	0.18	0.06	0.117
5047	Sierra Hwy Green Belt	15.54	0.09	0.03	0.062
LANCASTER – EXISTING					
23	Eastside HS (proposed)	291.20	1.60	0.52	1.560
35	Lincoln School, E	45.54	0.25	0.08	0.244
38	National Soccer Center	661.11	3.63	1.18	3.541
LANCASTER – FUTURE					
48	Proposed School 7	42.67	0.235	0.076	0.229
54	Skytower Park	55.01	0.301	0.098	0.295
80	-	0.09	0.000	0.000	0.000
81	-	0.15	0.001	0.000	0.001
82	-	0.18	0.001	0.000	0.001
83	-	0.10	0.001	0.000	0.001
101	-	0.35	0.002	0.001	0.002
102	-	0.32	0.002	0.001	0.002
103	-	0.39	0.002	0.001	0.002
113	-	0.53	0.003	0.001	0.003
114	-	0.50	0.003	0.001	0.003
127	-	1.41	0.008	0.003	0.008

Site ID	Site/Project	Annual Average Demand (AFY)	Peak Day Demand (AF/day)	Peak Day Demand (mgd)	Peak Hour Demand (mgd)
132	-	0.18	0.001	0.000	0.001
138	-	0.79	0.005	0.001	0.004
143	-	0.09	0.001	0.000	0.001
159	-	0.39	0.002	0.001	0.002
178	-	1.53	0.008	0.003	0.008
183	-	0.02	0.000	0.000	0.000
187	-	0.29	0.002	0.001	0.002
197	-	0.05	0.000	0.000	0.000
201	-	0.20	0.001	0.000	0.001
211	-	0.87	0.005	0.002	0.005
212	-	0.35	0.002	0.001	0.002
217	-	0.19	0.001	0.000	0.001
221	-	1.48	0.008	0.003	0.008
226	-	0.08	0.000	0.000	0.000
240	-	0.58	0.003	0.001	0.003
241	-	0.44	0.002	0.001	0.002
281	-	0.30	0.002	0.001	0.002
	Subtotal Existing Demand	1,885	10.90	3.53	8.89
	Subtotal Future Demand	191	1.10	0.36	0.91
	Phase 2 Total Demand	**2,076**	**12.00**	**3.89**	**9.80**
	Subtotal Palmdale	968	5.92	1.91	3.87
	Subtotal Lancaster	1,107	6.08	1.98	5.93

Table D-5: Phase 3 Users for Antelope Valley Recycled Water System

Site ID	Site/Project	Annual Average Demand (AFY)	Peak Day Demand (AF/day)	Peak Day Demand (mgd)	Peak Hour Demand (mgd)
	PALMDALE - EXISTING				
5015	Buena Vista	64.60	0.39	0.13	0.257
5016	Cimmaron	29.80	0.18	0.06	0.119
5017	Golden Poppy	43.46	0.27	0.09	0.173
5018	Joshua Hills	28.14	0.17	0.06	0.112
5019	Los Amigos	43.21	0.26	0.09	0.172
5023	Pete Knight High School	221.97	1.36	0.44	0.884
5025	Shadow Hills	164.31	1.00	0.33	0.654
5028	Yellen/Silpa	26.18	0.16	0.05	0.104
5035	Domenic Massari	178.79	1.09	0.36	0.712
5037	Joshua Hills	25.20	0.15	0.05	0.100
5052	Chaparral Elementary	17.86	0.11	0.04	0.071
	PALMDALE - FUTURE				
5031	Granite Hills	43.46	0.27	0.09	0.173
5032	Poderosa	31.21	0.19	0.06	0.124
5040	60th Street East/Avenue S-8	84.00	0.51	0.17	0.335
5041	72nd Street East/Avenue R-8	42.00	0.26	0.08	0.167
5042	70th Street East/Avenue R	42.00	0.26	0.08	0.167
5045	Palmdale Oasis	103.51	0.63	0.21	0.412
5046	Sam Yellen	105.00	0.64	0.21	0.418
	Subtotal Existing Demand	844	5.14	1.68	3.36
	Subtotal Future Demand	451	2.75	0.90	1.80
	Phase 3 Total Demand	**1,295**	**7.89**	**2.57**	**5.15**
	Subtotal Palmdale	1,295	7.89	2.57	5.15
	Subtotal Lancaster	0	0.00	0.00	0.00

Table D-6: Phase 4 Users for Antelope Valley Recycled Water System

Site ID	Site/Project	Annual Average Demand (AFY)	Peak Day Demand (AF/day)	Peak Day Demand (mgd)	Peak Hour Demand (mgd)
PALMDALE – EXISTING					
5009	Marie Kerr	252.00	1.54	0.50	1.004
5065	Palmdale Business Park	991.20	6.06	1.97	3.948
5100	Antelope Valley Country Club	525.00	3.21	1.05	2.091
5128	Highlands High School	113.40	0.69	0.23	0.452
5134	Summerwind Elementary	29.40	0.18	0.06	0.117
PALMDALE – FUTURE					
5002	Ritter Ranch	2108.40	12.89	4.20	8.390
5003	Anaverde	1730.40	10.57	3.45	6.890
5013	College Park	1247.40	7.62	2.49	4.970
LANCASTER – FUTURE					
208	-	16.14	0.088	0.029	0.086
	Subtotal Existing Demand	1,911	11.68	3.80	7.61
	Subtotal Future Demand	5,102	31.17	10.17	20.34
	Phase 4 Total Demand	**7,013**	**42.85**	**13.97**	**27.95**
	Subtotal Palmdale	6,997	42.76	13.94	27.86
	Subtotal Lancaster	16	0.09	0.03	0.09

Appendix E

Detailed Financial Cost Estimates

Estimated Unit Cost by Phase

	Phase 1A & 1B	Phase 2	Phase 3	Phase 4	Subtotal
Capital recovery factor 20 years @ 2.7%	0.06722	0.06722	0.06722	0.06722	
Capital Cost	$ 32,034,000	$ 33,316,000	$ 17,168,000	$ 36,715,000	$ 119,233,000
Annual Capital Cost	$ 2,153,325	$ 2,239,502	$ 1,154,033	$ 2,467,982	$ 8,014,842
O&M	$ 485,641	$ 853,531	$ 294,399	$ 1,819,600	$ 3,453,171
total annual cost	$ 2,638,966	$ 3,093,033	$ 1,448,432	$ 4,287,582	$ 11,468,013
AF/year	2,947.5	2,075.8	1,294.7	7,013.3	13,331.3
$/AF	$ 895	$ 1,490	$ 1,119	$ 611	$ 860
mg/year	960.4	676.4	421.9	2285.3	4344.0

Unit costs per Cumulative Phase

	Phase 1A & 1B	Phases 1&2	Phases 1-3	Phases 1-4
Capital recovery factor 20 years @ 2.7%	0.06722	0.06722	0.06722	0.06722
Capital Cost	$ 32,034,000	$ 65,350,000	$ 82,518,000	$ 119,233,000
Annual Capital Cost	$ 2,153,325	$ 4,392,827	$ 5,546,860	$ 8,014,842
O&M	$ 485,641	$ 1,339,172	$ 1,633,571	$ 3,453,171
total annual cost	$ 2,638,966	$ 5,731,999	$ 7,180,431	$ 11,468,013
AF/year	2,947.5	5,023.3	6,318.0	13,331.3
$/AF	$ 895	$ 1,141	$ 1,137	$ 860
mg/year	960.4	1636.8	2058.7	4344.0

Note: Costs for a given phase are the sum of the given phase and all prior phases.

O&M Calculations

Assumptions:
1. Flow (AFY) = Annual Average Demand from P:\LA_County WW_40\recycled water\Phased User Table
2. TDH = (Maximum Static for given cumulative phase + 10%), then rounded up to nearest 0 or 5
3. Pumps will run 6 hours/day, which is 25% of the time.
4. Chlorination is chlorine gas dosed at 25mg/L and a cost of $450/ton.
5. Phase 4's PS 2 - 8460 gpm is not operational, as it will only be used when need to pump from Lancaster to Palmdale.

Phase 1A & 1B

NOTE: Flow = Annual Avg Demand

Pump station	Phase 1A & 1B TDH (ft)	Phase 1A & 1B Flow (gpm)	Flow (cfs)	Flow (AFY)	Hp	Power cost (per kw-hr)	Annual Cost w/ Pumps On 100% of Time	% Time Pumps On	Annual Cost w/ Pumps On __% of Time	Labor (50% power)	Equipment/materials (25% power)	Annual Water Cost @ ($100/AF)	Total Annual Chlorination Cost	Cumulative Total Annual O&M	Individual Total Annual O&M
Palmdale	125	0	0.0	0	0	$0.14	$0	25%	$0			$0	$33,020		
Lancaster	125	1826	6.6	2947	124	$0.14	$113,648	25%	$28,412			$294,700	$44,273		
PS 1 - 1725 gpm	NA because installed in Phase 4														
PS 2 - 8460 gpm	NA because install only if interconnect Palmdale and Lancaster's RW systems														
Annual Power cost				2947			$113,648		$28,412	$56,824	$28,412	$294,700	$77,293	$485,641	$485,641

Phase 2

Pump station	Phase 1&2 TDH (ft)	Phase 1&2 Flow (gpm)	Flow (cfs)	Flow (AF)	Hp	Power cost (per kw-hr)	Annual cost	% Time Pumps On	Annual Cost w/ Pumps On __% of Time	Labor (50% power)	Equipment/materials (25% power)	Annual Water Cost @ ($100/AF)	Total Annual Chlorination Cost	Cumulative Total Annual O&M	Individual Total Annual O&M
Palmdale	255	600	2.2	968	83	$0.14	$76,153	25%	$19,038			$96,800	$36,716		
Lancaster	440	2511	9.0	4054	602	$0.14	$550,310	25%	$137,578			$405,400	$48,500		
PS 1 - 1725 gpm	NA because installed in Phase 4														
PS 2 - 8460 gpm	NA because install only if interconnect Palmdale and Lancaster's RW systems														
Annual Power cost				5022			$626,463		$156,616	$438,524	$156,616	$502,200	$85,216	$1,339,172	$853,531

Phase 3

Pump station	Phase 1-3 TDH (ft)	Phases 1-3 Flow (gpm)	Flow (cfs)	Flow (AF)	Hp	Power cost (per kw-hr)	Annual cost	% Time Pumps On	Annual Cost w/ Pumps On __% of Time	Labor (50% power)	Equipment/materials (25% power)	Annual Water Cost @ ($100/AF)	Total Annual Chlorination Cost	Cumulative Total Annual O&M	Individual Total Annual O&M
Palmdale	300	1402	5.1	2263	229	$0.14	$209,448	25%	$52,362			$226,300	$41,661		
Lancaster	440	2511	9.0	4054	602	$0.14	$550,310	25%	$137,578			$405,400	$48,500		
PS 1 - 1725 gpm	NA because installed in Phase 4														
PS 2 - 8460 gpm	NA because install only if interconnect Palmdale and Lancaster's RW systems														
Annual Power cost				6317			$759,758		$189,940	$531,831	$189,940	$631,700	$90,161	$1,633,571	$294,399

Phase 4

Pump station	Phase 1-4 TDH (ft)	Phases 1-4 Flow (gpm)	Flow (cfs)	Flow (AF)	Hp	Power cost (per kw-hr)	Annual cost	% Time Pumps On	Annual Cost w/ Pumps On __% of Time	Labor (50% power)	Equipment/materials (25% power)	Annual Water Cost @ ($100/AF)	Total Annual Chlorination Cost	Cumulative Total Annual O&M	Individual Total Annual O&M
Palmdale	300	5736	20.7	9260	938	$0.14	$857,044	25%	$214,261			$926,000	$68,379		
Lancaster	440	2522	9.1	4071	605	$0.14	$552,618	25%	$138,154			$407,100	$48,565		
PS 1 - 1725 gpm	275	1069	3.9	1725	160	$0.14	$146,350	25%	$36,588			$172,500			
PS 2 - 8460 gpm	NA because install only if interconnect Palmdale and Lancaster's RW systems														
Annual Power cost				13331			$1,556,012		$352,416	$1,089,208	$389,003	$1,505,600	$116,944	$3,453,171	$1,819,600

Appendix F

Letters of Interest/Support from the Antelope Valley Water Agencies

ANTELOPE VALLEY-EAST KERN WATER AGENCY
AVEK
ESTABLISHED 1959

A PUBLIC AGENCY

August 1, 2005

The Honorable Michael D. Antonovich
Supervisor, Fifth District
County of Los Angeles
869 Kenneth Hahn Hall of Administration
500 West Temple Street
Los Angeles, CA 90012

Re: **LETTER OF SUPPORT FOR LOS ANGELES COUNTY WATERWORKS DISTRICT NO. 40, ANTELOPE VALLEY, WATER RECYCLING FACILITIES PLANNING AND CONSTRUCTION PROGRAM GRANT APPLICATIONS**

Dear Supervisor Antonovich:

On behalf of the Antelope Valley-East Kern Water Agency, I am pleased to support the Los Angeles County Waterworks District No. 40, grant applications to the State Water Resources Control Board for the design and construction of a regional backbone recycled water system in the Antelope Valley.

The award of these grant funds would facilitate the construction of a recycled water system that would allow the use of tertiary treated waste water from the County Sanitation Districts of Los Angeles County. Because of the limited groundwater supply in the Antelope Valley and the unreliability of the imported water supply of the State Water Project water, recycled water is a valuable resource that must be developed to meet the Valley's projected increases in water demands.

The Antelope Valley-East Kern Water Agency will be partnering with the District and other stakeholders, to ensure that the proposed recycled water system meets the needs of the Antelope Valley.

Respectfully submitted,

Andy D. Rutledge
Board President

cc: State Water Resources Control Board,
Division of Financial Assistance
Los Angeles County Waterworks District No. 40,
Antelope Valley

6WEST AVENUE N • PALMDALE, CALIFORNIA 93551
(661) 943-3201 • FAX (661) 943-3204

WATER RECLAMATION
SOLID WASTE MANAGEMENT

COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY

1955 Workman Mill Road, Whittier, CA 90601-1400
Mailing Address: P.O. Box 4998, Whittier, CA 90607-4998
Telephone: (562) 699-7411, FAX: (562) 699-5422
www.lacsd.org

JAMES F. STAHL
Chief Engineer and General Manager

August 22, 2005

The Honorable Michael D. Antonovich
Supervisor, Fifth District
County of Los Angeles
869 Kenneth Hahn Hall of Administration
500 West Temple Street
Los Angeles, CA 90012

Dear Supervisor Antonovich:

Letter of Support for Los Angeles County Waterworks District No. 40, Antelope Valley, Water Recycling Facilities Planning and Construction Program Grant Applications

County Sanitation District Nos. 14 and 20 are pleased to support the grant applications of the Los Angeles County Waterworks District No. 40, Antelope Valley (District), to the State Water Resources Control Board for the design and construction of a regional backbone recycled water system in the Antelope Valley.

The award of these grant funds would facilitate the construction of a recycled water system that would allow the use of tertiary treated wastewater from the County Sanitation Districts' Lancaster and Palmdale Water Reclamation Plants. Because of the limited groundwater supply in the Antelope Valley and the unreliability of the imported water supply of the State Water Project water, recycled water is a valuable resource that should be developed to meet the Valley's projected increases in water demands.

County Sanitation District Nos. 14 and 20 will be partnering with the District, the Cities of Lancaster and Palmdale, and other stakeholders to provide recycled water that meets all regulatory requirements and to ensure that the proposed recycled water system meets the needs of the residents and businesses of the Antelope Valley.

Very truly yours,

James F. Stahl

JFS:ee

cc: Los Angeles County Waterworks
District No. 40, Antelope Valley

528 934

City of Lancaster

44933 Fern Avenue
Lancaster, California 93534-2461
661-723-6000

August 10, 2005

The Honorable Michael D. Antonovich
Supervisor, Fifth District
County of Los Angeles
869 Kenneth Hahn Hall of Administration
500 West Temple Street
Los Angeles, California 90012

Dear Supervisor Antonovich:

LETTER OF SUPPORT FOR LOS ANGELES COUNTY WATERWORKS DISTRICT NO. 40, ANTELOPE VALLEY, WATER RECYCLING FACILITIES PLANNING AND CONSTRUCTION PROGRAM GRANT APPLICATIONS

On behalf of the City of Lancaster, I am pleased to support the Los Angeles County Waterworks District No. 40 grant applications to the State Water Resources Control Board for the design and construction of a regional backbone recycled water system in the Antelope Valley.

The award of these grant funds would facilitate the construction of a recycled water system that would allow the use of tertiary treated waste water from the County Sanitation Districts of Los Angeles County. Because of the limited groundwater supply in the Antelope Valley and the unreliability of the imported water supply of the State Water Project water, recycled water is a valuable resource that must be developed to meet the Valley's projected increases in water demands.

The City of Lancaster will be partnering with the District and other stakeholders, including the City of Palmdale, Antelope Valley East Kern Water Agency (AVEK), and Antelope Valley Water Purveyors Association to ensure that the proposed recycled water system meets the needs of the residents of the Antelope Valley.

Respectfully submitted,

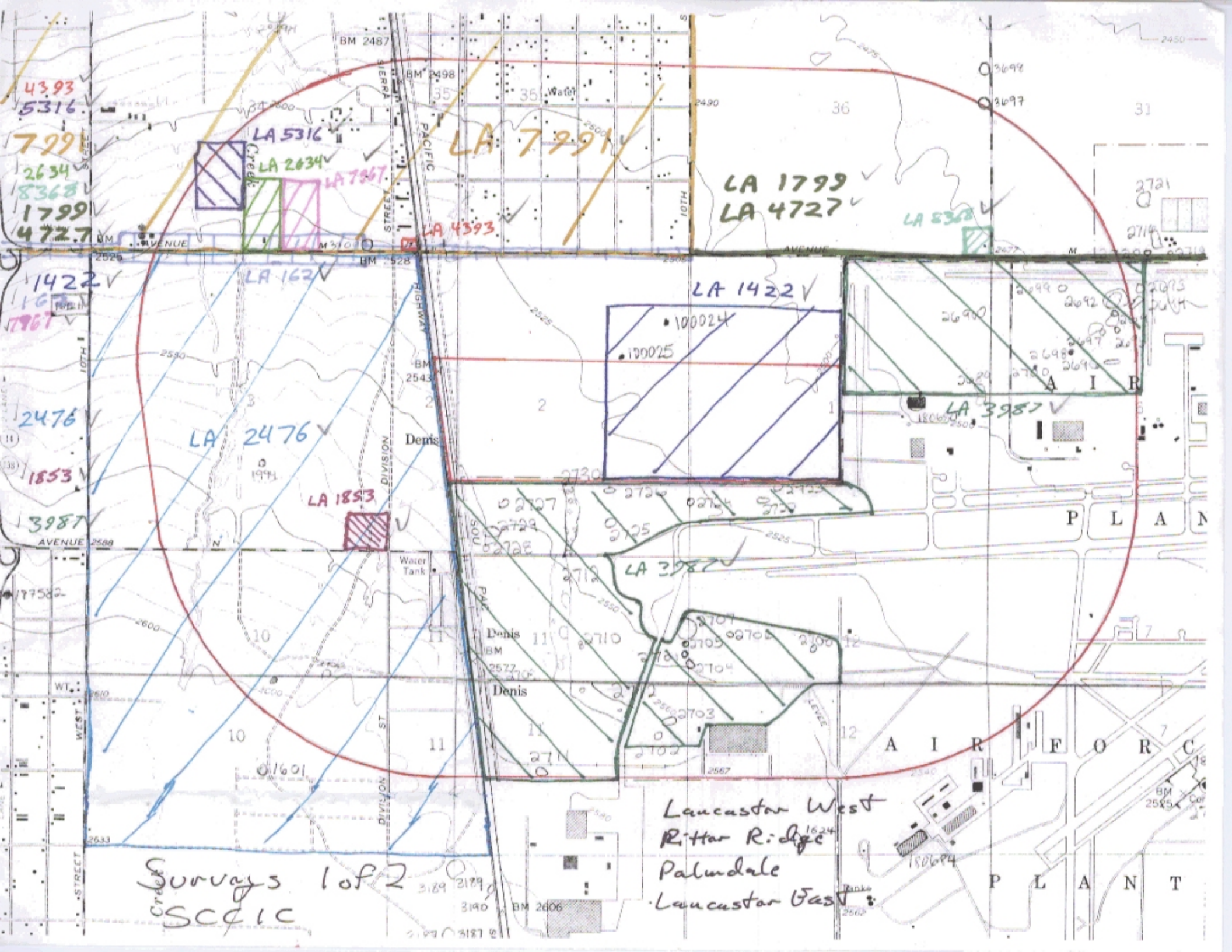
James R. Williams

James R. Williams, PE
Public Works Director

JRW/vp

Cc: State Water Resources Control Board, Division of Financial Assistance
Los Angeles County Waterworks District No 40, Antelope Valley

Attachment CUL-4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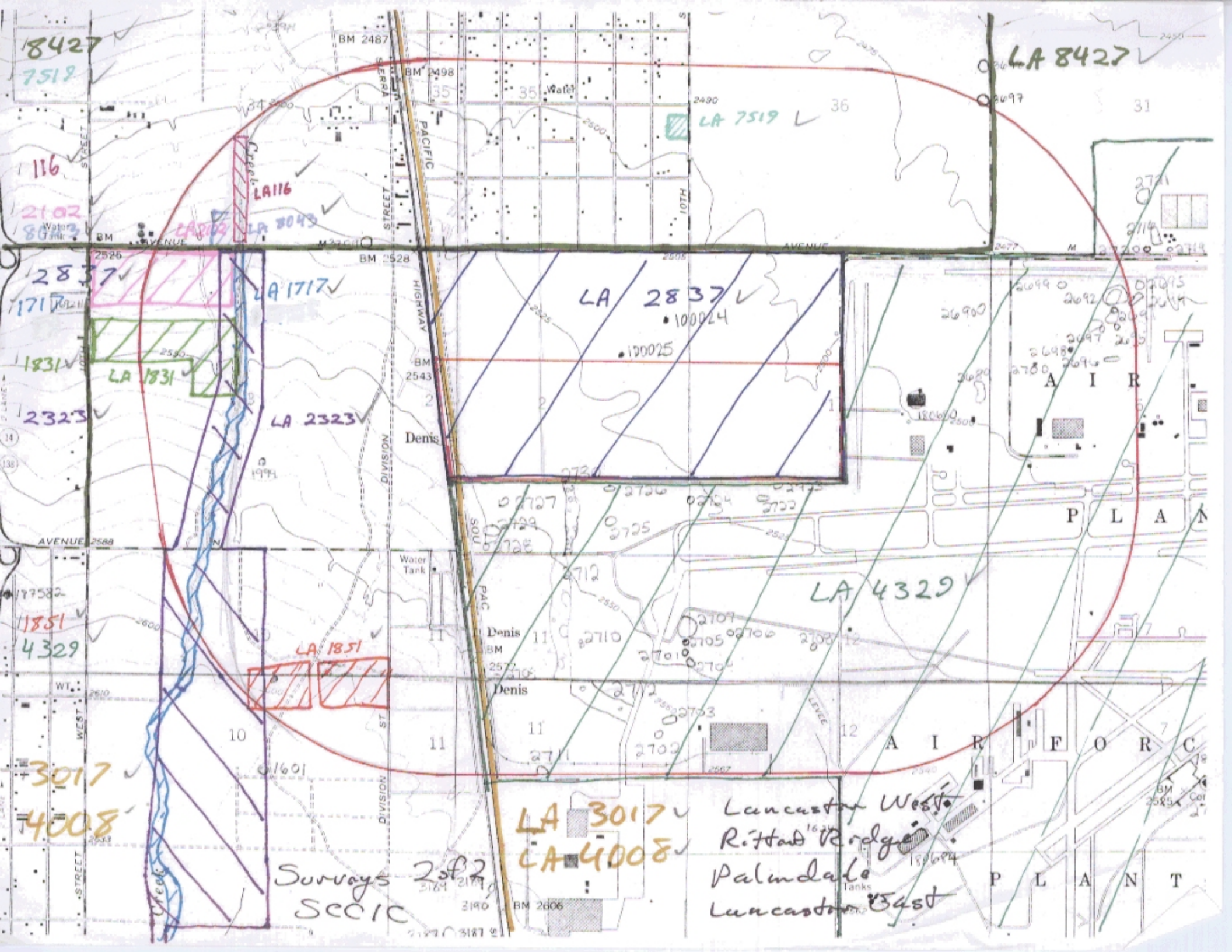
LA 2634
LA 7967
LA 4393
LA 7991
LA 1799
LA 4727
LA 8368
LA 162
LA 1422
LA 2476
LA 1853
LA 3987
100024
100025
BM 2487
BM 2498
Water
Creek
PACIFIC
STREET
10TH
AVENUE
BM 2525
BM 2528
BM 2543
HIGHWAY
DIVISION
Denis
BM 2577
Water Tank
BM 2606
WEST
A I R
P L A N
A I R F O R C
P L A N T
Lancaster West
Ritter Ridge
Palmdale
Lancaster East
Surveys 1 of 2
SCCIC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LA 2102
LA 8043
LA 1717
LA 2837
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100025
LA 1831
LA 2323
LA 1851
LA 4329
LA 3017
LA 4008
Denis
Water Tank
AVENUE
STREET
HIGHWAY
DIVISION
PACIFIC
SOUTHERN
AIR FORCE PLANT
Surveys 2 of 2
SCCIC
Lancaster West
Rittad Ridge
Palmdale
Lancaster East

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4727
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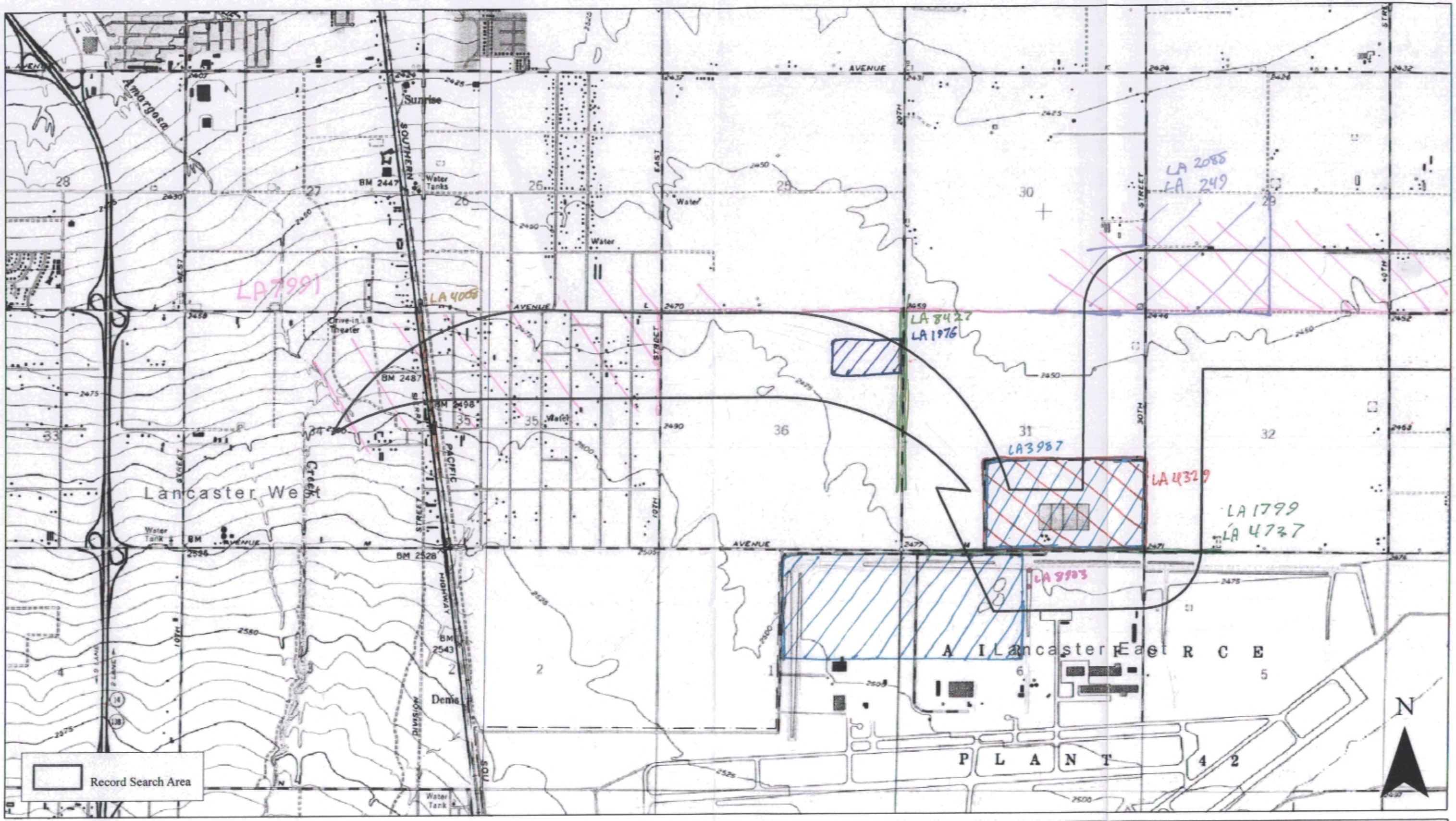


WSA

Lancaster West and Lancaster East USGS 7.5' Quadrangles

0 0.5 1 Miles

Record Search Map 1/9
Palmdale Power Plant Project
Los Angeles County, California

Survey 1 of 11

8427
7991

7510

LA 7991

LA 7510

LA 8427

Lancaster East

Alpine Butte

Record Search Area

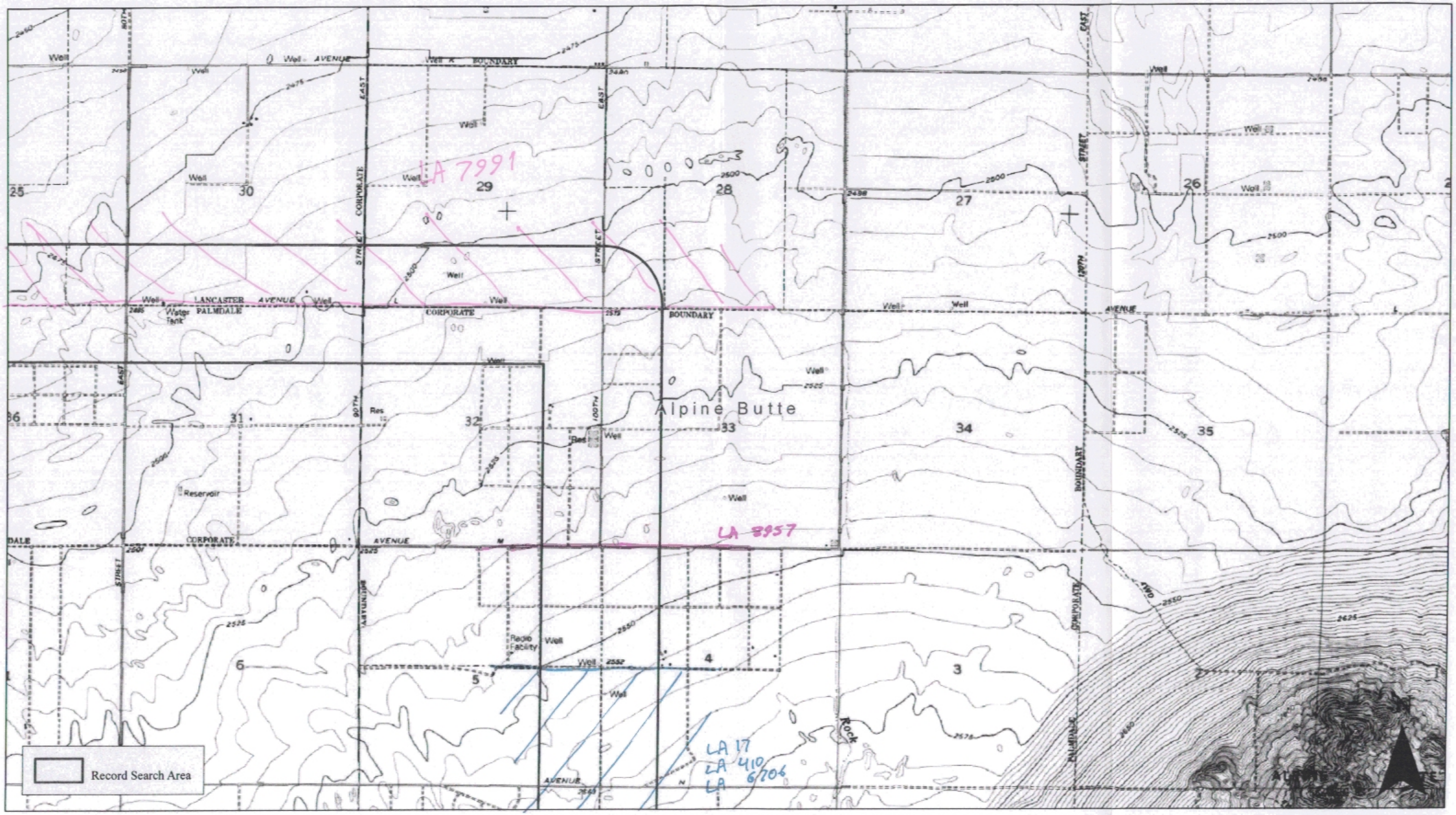
Lancaster East and Alpine Butte USGS 7.5' Quadrangles

0 0.5 1 Miles

WSA

Record Search Map 2/9
Palmdale Power Plant Project
Los Angeles County, California

Survey 2 of 11



LA 7991

LA 8957

LA 17
LA 410
LA 6706

WSA

Alpine Butte USGS 7.5' Quadrangle

0 0.5 1 Miles

Record Search Map 3/9
Palmdale Power Plant Project
Los Angeles County, California

Survey 3 of 11

17
410
6706
703

LA 17
LA 410
LA 6706
LA 703

Alpine Butte

Littlerock

Record Search Area

WSA

Alpine Butte and Littlerock USGS 7.5' Quadrangles

0 0.5 1 Miles

Record Search Map 4/9
Palmdale Power Plant Project
Los Angeles County, California

Survey 4 of 11

LA 4464
LA 4141
LA 1938

Record Search Area

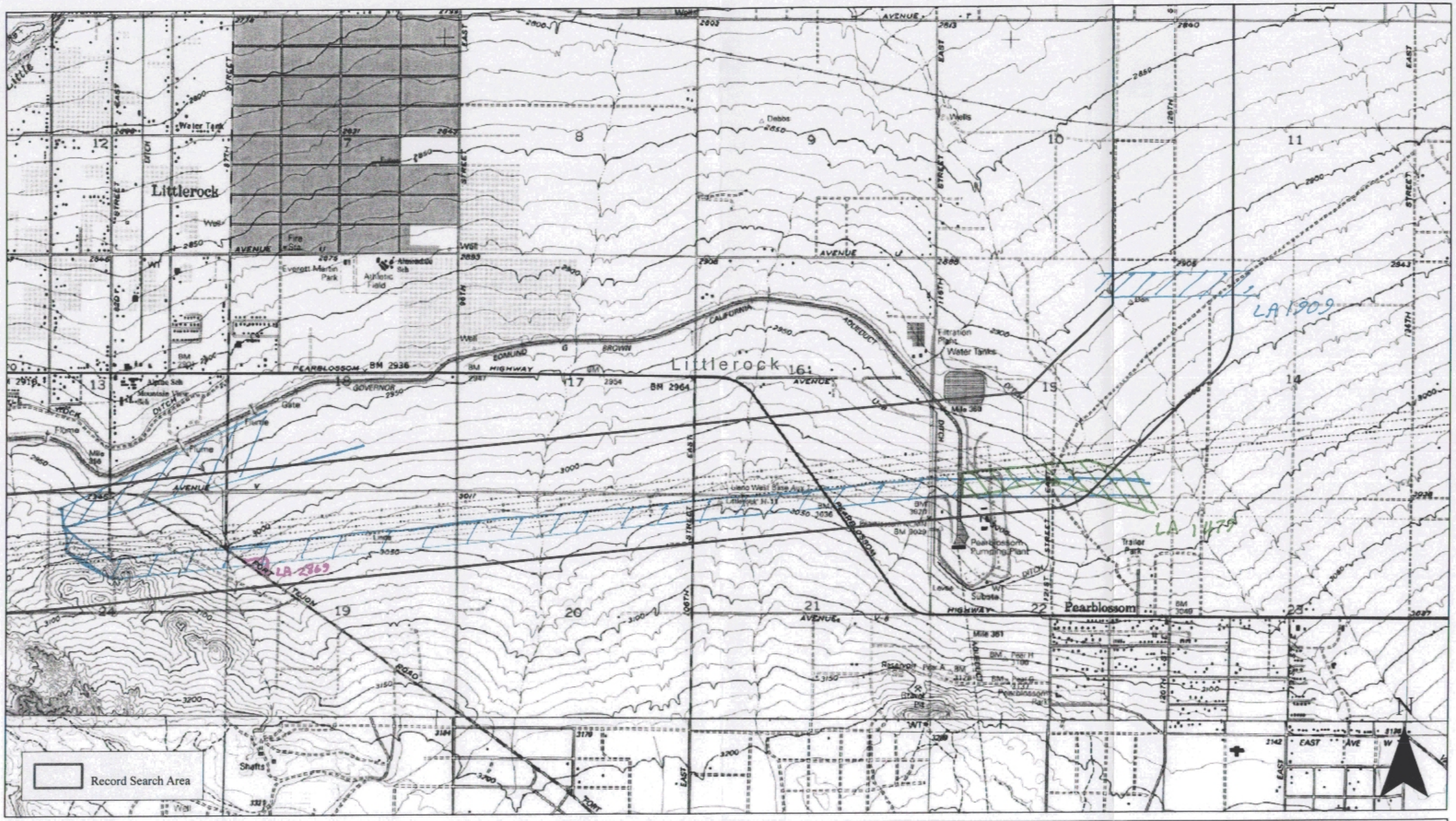
WSA

Littlerock USGS 7.5' Quadrangle

0 0.5 1 Miles

Record Search Map 5/9
Palmdale Power Plant Project
Los Angeles County, California

Survey 5 of 11



Littlerock USGS 7.5' Quadrangle

0 0.5 1 Miles

WSA

Record Search Map 6/9
Palmdale Power Plant Project
Los Angeles County, California

Survey 6 of 11

13537

J 1627

1627

Palmdale

Littlerock

Palmdale

Pacifico Mountain

Record Search Area

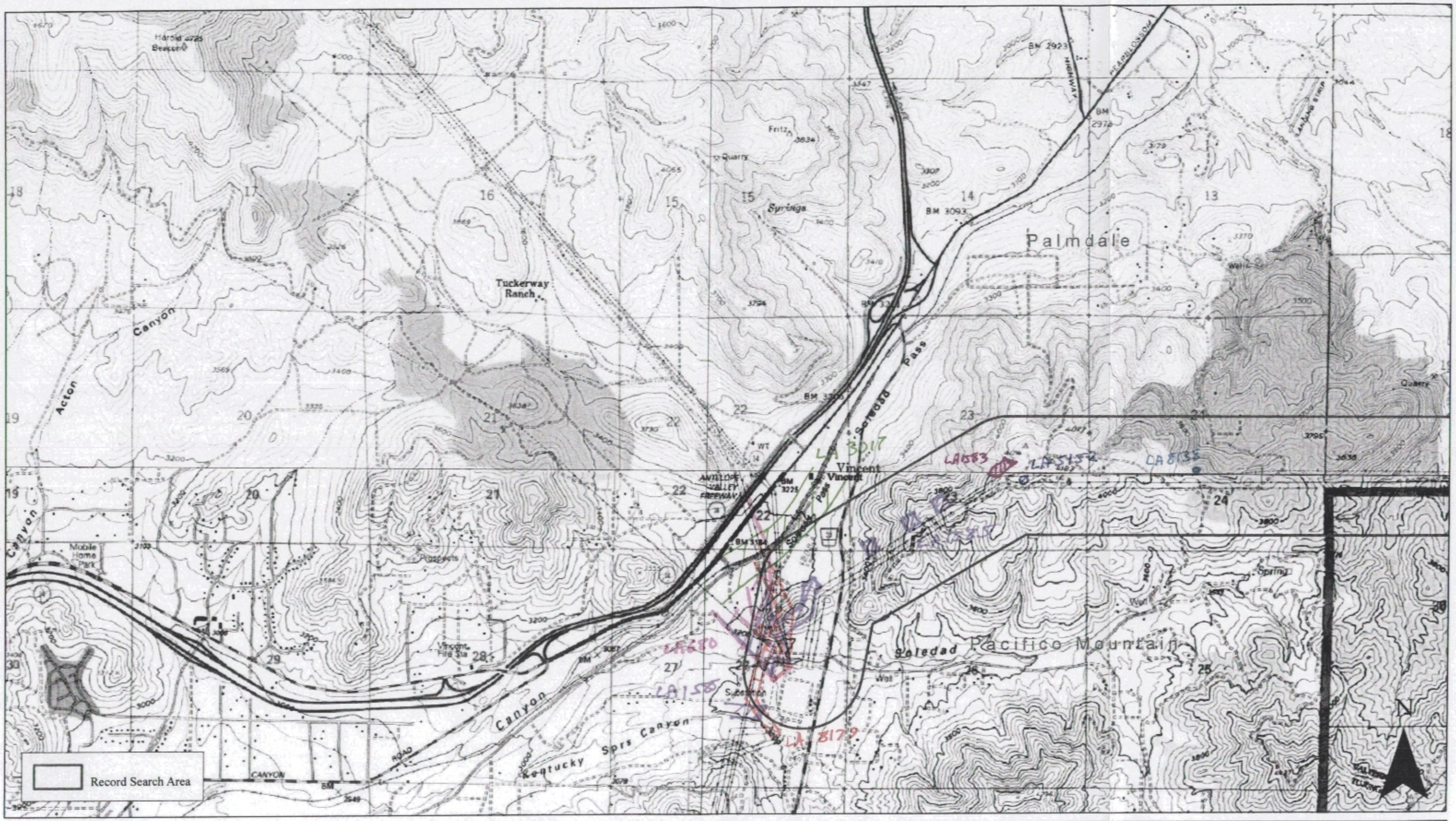
WSA

Palmdale, Pacifico Mountain and Littlerock USGS 7.5' Quadrangles

0 0.5 1 Miles

Record Search Map 7/9
Palmdale Power Plant Project
Los Angeles County, California

Survey 7 of 11



WSA

Palmdale and Pacifico Mountain USGS 7.5' Quadrangles

0 0.5 1 Miles

Record Search Map 8/9
Palmdale Power Plant Project
Los Angeles County, California

5152
3017
1583
8138
680
1585
8179

Survey 8 of 11

Lancaster West

Lancaster East

A I R F O R C E P L A N T

BOUNDARY

RESERVATION

LA 7177

7177

LA 1792

1792

LA 1547

1547

LA 2485

2485

LA 1949

1949

Palmdale

Ritter Ridge

Lake Palmdale

Una Lake

Palmdale High School

Palmdale Cemetery

Sewage Disposal Plant

Manzanita School

Trailer Park

Drive-in Theater

Water

Well

Tanks

Control Tower

BM 2525

BM 2559

BM 2616

BM 2617

BM 2682

BM 2763

BM 2805

Record Search Area

N

WSA

Palmdale and Ritter Ridge USGS 7.5' Quadrangles

0 0.5 1 Miles

Record Search Map 9/9
Palmdale Power Plant Project
Los Angeles County, California

Lancaster West

Lancaster East

A I R F O R C E

P L A N T

Palmdale

Ritter Ridge

Lake Palmdale

Record Search Area

LA 4329
LA 8427
LA 2352
LA 4008
LA 3017
LA 7160
LA 2023
LA 17
LA 410
LA 703
LA 4464
LA 2172
LA 7200
LA 1959
LA 2811
LA 3062
LA 1806
LA 1938
LA 7198
LA 1222
LA 2125
LA 4008
LA 3017

N

WSA

Palmdale and Ritter Ridge USGS 7.5' Quadrangles

0 0.5 1 Miles

Record Search Map 9/9
Palmdale Power Plant Project
Los Angeles County, California

Survey 11 of 11

Lancaster West

Lancaster East

A I R F O R C E P L A N T

Palmdale

Palmdale

Ritter Ridge

Lake Palmdale

LA 2476
2476

LA 3987
3987

LA 1857
1857

LA 1933
1983

LA 1511
1732
565

LA 653
653

LA 4070
4070

LA 8957
8957

LA 4180
4180

LA 5227
5227

LA 4070
4070

LA 6671
6671

LA 9011
9011

LA 3537
3537

LA 4069
4069

NB. LA 4180 mislabeled, should read 4141

Record Search Area

WSA

Palmdale and Ritter Ridge USGS 7.5' Quadrangles

0 0.5 1 Miles

Record Search Map 9/9
Palmdale Power Plant Project
Los Angeles County, California

Alpine Butte

Littlerock

LA17
LA410
LA703
LA6706

Transmission line
Record Search Area

N

WSA

Alpine Butte amd Littlerock USGS 7.5' Quadrangles

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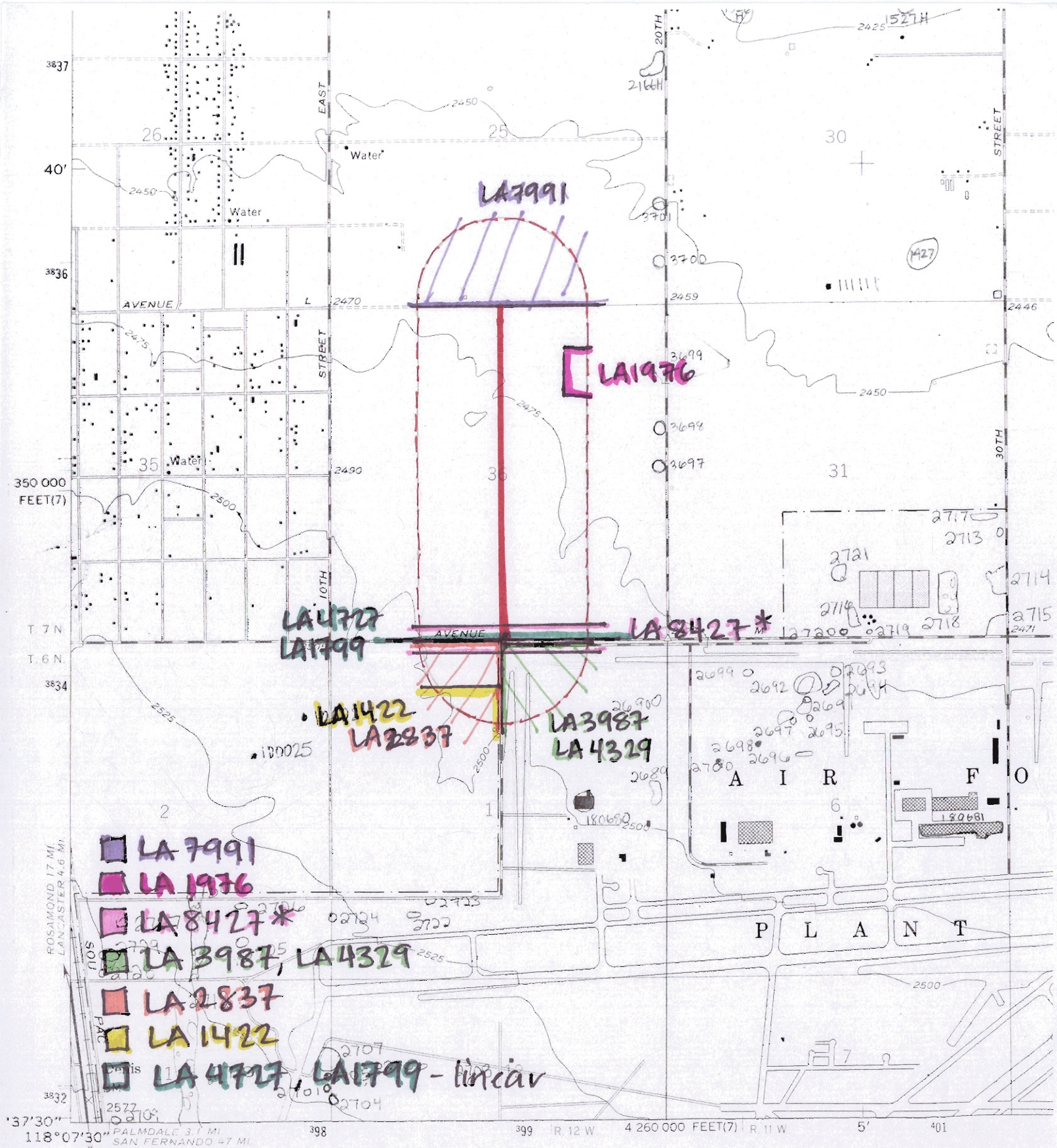
Record Search Map
Palmdale Power Plant Project
Los Angeles County, California

SCCIC #8608
June 2008



Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by planetable surveys 1929–1931
Culture revised from aerial photographs taken 1956
Field check 1958

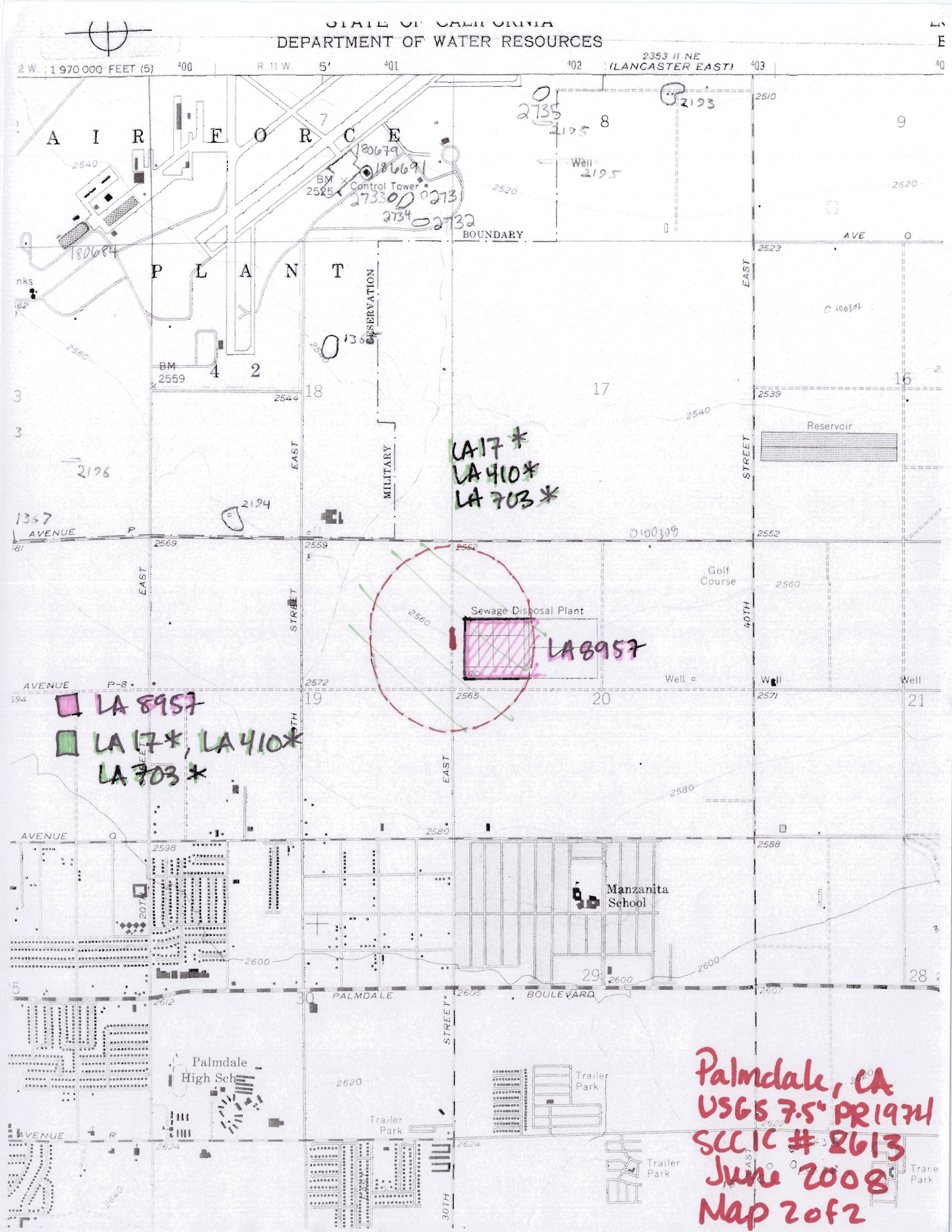
Polyconic projection. 1927 North American datum
10,000-foot grid ticks based on California coordinate system, zones 5 and 7
1000-metre Universal Transverse Mercator grid ticks, zone 11, shown in blue

Red tint indicates areas in which only

GN MN
0°36' 11 MILS
15° 267 MILS

UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Lancaster East, CA
SCIC # 8613
USGS 7.5' PR1974
June 2008
Map 1 of 2


STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
2 W. 1 970 000 FEET (5)
R. 11 W.
2353 II NE
(LANCASTER EAST)
AIR FORCE
PLANT
BM 2585 Control Tower
BM 2559
BOUNDARY
MILITARY
EAST
STREET
AVENUE P
AVENUE P-8
AVENUE Q
AVENUE R
PALMDALE BOULEVARD
Reservoir
Sewage Disposal Plant
Golf Course
Well
Manzanita School
Palmdale High Sch
Trailer Park
LA 17 *
LA 410 *
LA 703 *
LA 8957
LA 8957
LA 17*, LA 410*
LA 703 *
Palmdale, CA
USGS 7.5' PR1974
SCCIC # 8613
June 2008
Map 2 of 2