Supplemental Responses to CEC Data Requests: Nos. A49, A51 and A52

Amended Application for Certification for HYDROGEN ENERGY CALIFORNIA (08-AFC-8A) Kern County, California

Prepared for:
Hydrogen Energy California LLC

hydrogen energy california

Submitted to:

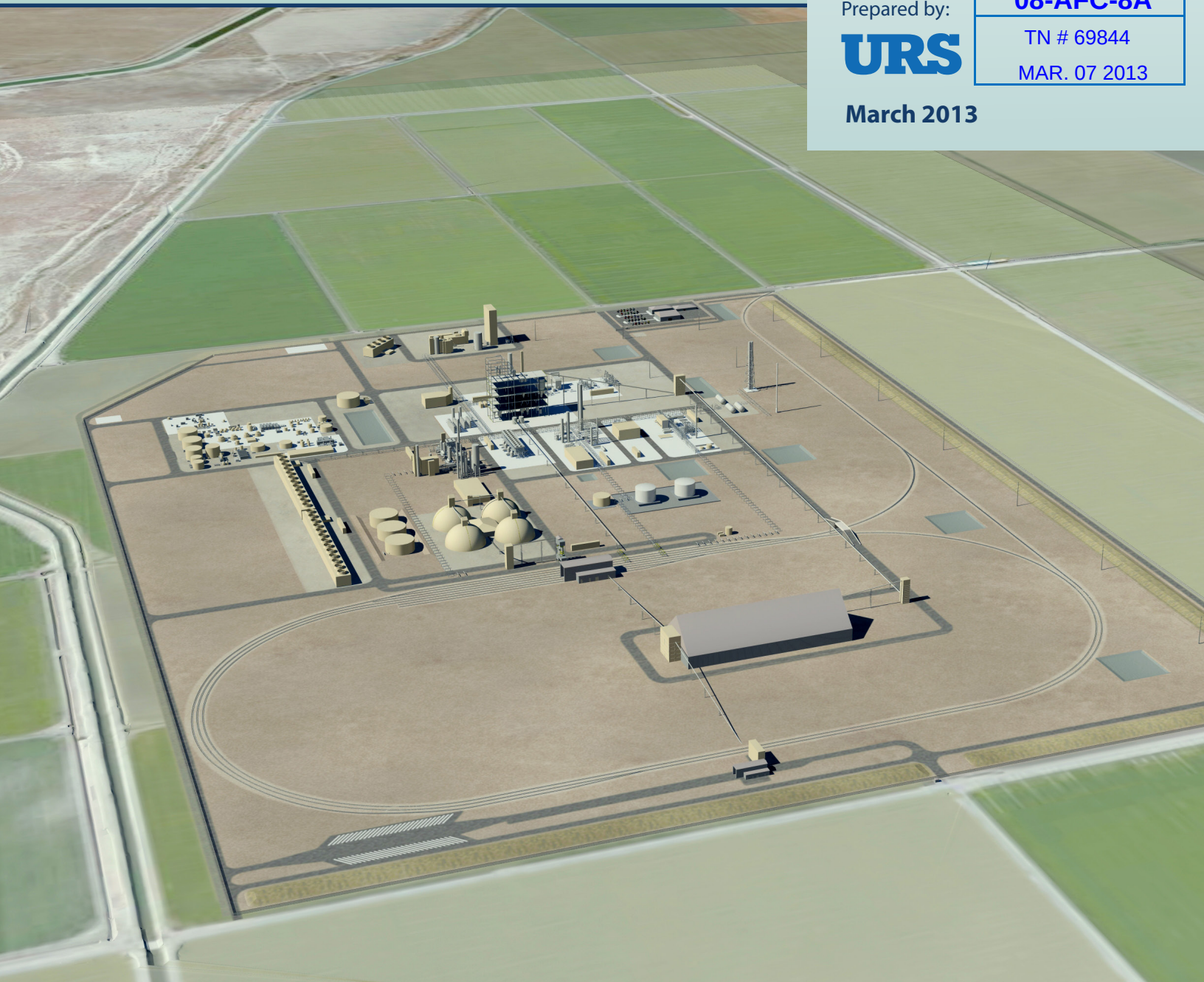
California Energy Commission

U.S Department of Energy

Prepared by:

URS

March 2013



SUPPLEMENTAL RESPONSES TO DATA REQUESTS A49, A51 and A52
FROM CALIFORNIA ENERGY COMMISSION (CEC)

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LIST OF ACRONYMS AND ABBREVIATIONS USED IN RESPONSES

CEC	California Energy Commission
HECA	Hydrogen Energy California
USACE	United States Army Corps of Engineers

Technical Area: Biological Resources
Author: Amy Golden

FEDERAL WATERS OF THE U.S.

BACKGROUND

On page 5.2-6 of the Amended AFC, the applicant identifies dates that delineation surveys were performed and that the California Aqueduct, Kern River Flood Control Channel, all drainage ditches that connect to these features, and two areas of seasonally ponded claypan depressions are potentially jurisdictional waters of the U.S. and that the West Side Canal, East Side Canal, all interconnected drainages, and several retention basins are non-jurisdictional features; however, staff believes the delineation has not been verified by the U.S. Army Corps of Engineers (Corps) to date. Staff has reviewed Appendix F-2, Waters of the U.S. in the 'Railroad and Natural Gas Linears' confidential submittal provided by the applicant.

DATA REQUEST

A49. Please provide an update on the jurisdictional determination for the HECA project including the date the formal wetland delineation was submitted to the Corps for verification and any correspondence with the Corps office.

SUPPLEMENTAL RESPONSE

The preliminary Jurisdictional Delineation Report was submitted to the U.S. Army Corps of Engineers (USACE) for verification on March 6, 2013. A copy of the report is provided in Attachment A49-1.

In addition, a Nationwide Pre-Construction Notification has been submitted to USACE. See Attachment A49-2.

ATTACHMENT A49-1
JURISDICTIONAL DELINEATION REPORT

HYDROGEN ENERGY CALIFORNIA
KERN COUNTY, CALIFORNIA

JURISDICTIONAL DELINEATION

Prepared for:
Hydrogen Energy California, LLC

30 Monument Square, Suite 235
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URS Corporation
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One Montgomery Street, Suite 900
San Francisco, CA 94104-4538
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URS Project Number 28068052

February 2013

URS

March 6, 2013

Paul Maniccia
Chief, California South Branch
Regulatory Branch
U.S. Army Corps of Engineers
1325 J Street
Sacramento, CA 95814

Re: Preconstruction Notification and Jurisdictional Delineation for the
Hydrogen Energy California Project

Dear Mr. Maniccia:

Hydrogen Energy California, LLC (HECA) proposes to construct an integrated gasification combined-cycle polygeneration project in western Kern County, California. The enclosed Preconstruction Notification and Jurisdictional Delineation Report are submitted for your review on behalf of HECA. HECA is requesting confirmation from the USACE that the proposed action and the related Occidental of Elk Hills, Inc. (OEHI) Project, also described in the enclosed materials, are authorized under Nationwide Permit 33 for temporary construction, access, and dewatering. A detailed description of the proposed action and the area that would be affected by the proposed action are provided in the enclosed documents.

The Department of Energy is the federal lead agency for NEPA and has initiated consultation with the USFWS under Section 7(a)(2) of the ESA for this action.

We look forward to working with you towards the successful completion of this process. Please contact Steve Leach, at (510) 874-3205 or Jan Novak at (510) 874-1733 regarding the enclosed documents.

Sincerely,

URS Corporation

Dale Shileikis
Project Manager
URS Corporation

URS Corporation
Post Montgomery Center
One Montgomery Street Suite 900
San Francisco, CA 94104
Tel: 415.896.5858
Fax: 415.882.9261

Enclosures:
HECA Preconstruction Notification
HECA Jurisdictional Delineation Report

cc: Marisa Mascaro, HECA
Bob Worl, CEC

Tables

Figures

Appendices

Acronyms and Abbreviations

BVWSD	Buena Vista Water Storage District
CFR	Code of Federal Regulations
CO_2	carbon dioxide
CWA	Clean Water Act
EHOF	Elk Hills Oil Field
EOR	enhanced oil recovery
°F	degrees Fahrenheit
FACU	facultative upland plant species
FAC	facultative plant species
FACW	facultative wetland plant species
HDD	horizontal directional drilling
HECA	Hydrogen Energy California LLC
I-5	Interstate 5
KRFCC	Kern River Flood Control Channel
NJ	Nonjurisdictional water of the United States
NRCS	Natural Resource Conservation Service
OEHI	Occidental of Elk Hills Incorporated
OBL	obligate wetland plant species
OHWM	ordinary high water mark
PG&E	Pacific Gas and Electric Company
Project Site	The physical location or site where the power generating facility and associated structures or components would be built.
Project	Hydrogen Energy California LLC Integrated Gasification Combined Cycle polygeneration project
RPW	relatively permanent water
SR	State Route
Study Area	Project Site and the Project Linears
syngas	synthesis gas
TNW	traditional navigable water
UPL	upland plant species
USACE	United States Army Corps of Engineers
USC	United States Code
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WL	Wetland
WRCC	Western Regional Climate Center
WUS	Other/nonwetland Waters of the United States

EXECUTIVE SUMMARY

Hydrogen Energy California (HECA) LLC is proposing an Integrated Gasification Combined-Cycle polygeneration project (hereafter referred to as the HECA Project). HECA LLC is owned by SCS Energy California LLC. The HECA Project will gasify a 75 percent coal and 25 percent petroleum coke fuel blend to produce synthesis gas (syngas). Syngas produced via gasification will be purified to hydrogen-rich fuel, which will be used to generate low-carbon baseload electricity in a Combined-Cycle Power Block; low-carbon nitrogen-based fertilizer in an integrated Manufacturing Complex; and carbon dioxide (CO_2) for use in enhanced oil recovery (EOR).

The fertilizer and power produced by the HECA Project have a low-carbon footprint, because more than 90 percent of the CO_2 in the syngas is captured and approximately 3 million tons per year of CO_2 is transported via pipeline for use in EOR, which results in simultaneous sequestration (storage) of the CO_2 in a secure geologic formation (HECA, 2012). CO_2 will be transported for use in EOR in the adjacent Elk Hills Oil Field, which is owned and operated by Occidental of Elk Hills, Inc. (OEHI) (hereafter referred to as the OEHI Project).

This report summarizes the findings of a preliminary jurisdictional delineation to determine whether the Project requires authorization from the United States Army Corps of Engineers under Section 404 of the federal Clean Water Act (CWA), pursuant to 33 United States Code § 1344. The Study Area, in reference to linear features in this report, includes the construction area plus a 250-foot buffer on either side. The study area limits were selected so that the route of the linear features could be adjusted, if necessary, to avoid wetlands and other waters. The area that would be affected during construction is substantially smaller than the area included within the study area.

The Study Area includes 187.91 acres (8,185,221 square feet) of surveyed features. Of this total, 95.39 acres (4,155,229 square feet) are nonjurisdictional waters of the United States (NJ), exempt from CWA regulations; 0.01 acre (303 square feet) is wetlands, and 92.51 acres (4,029,689 square feet) are potentially jurisdictional waters of the United States. The majority of NJ features are irrigation ditches and retention/detention basins.

1.0 INTRODUCTION

Hydrogen Energy California LLC (HECA) is proposing an Integrated Gasification Combined Cycle polygeneration project (hereafter referred to as HECA or the Project). The Project will gasify a 75 percent coal and 25 percent petroleum coke (a.k.a. petcoke) fuel blend to produce synthesis gas (syngas). Syngas produced via gasification will be purified to hydrogen-rich gas and used to generate approximately 300 megawatts output of low-carbon baseload electricity in a Combined-Cycle Power Block, and to produce low-carbon nitrogen-based fertilizer in an integrated Manufacturing Complex. Carbon dioxide (CO_2) from the HECA facility will be captured and transported to the adjacent Elk Hills Oil Field (EHOF) for use in enhanced oil recovery (EOR), which results in permanent sequestration (storage) of the CO_2. Occidental of Elk Hills Incorporated (OEHI) will use the CO_2 for EOR at the EHOF.

1.1 HECA FACILITY PROJECT SITE

The following terms are used throughout the delineation, and are defined below.

- HECA Project (or "Project") – Referring to the Hydrogen Energy California Project as a whole.
- HECA Main Project Site (or "Project Site") – The physical location or site where the power-generating facility and associated structures or components would be built.
- Controlled Areas – Areas owned by HECA that are located immediately adjacent to the Main Project Site. The purpose of the Controlled Areas is to act as a buffer between the Main Project Site and nearby properties or features.
- Project Linears – Any or all of the linear utility components (such as rail lines or pipelines) that would be built offsite (i.e., not on the Main Project Site) as part of the Project.
- Study Area – Project Site plus Project Linears. For the delineation, a 250-foot buffer was applied to all Project Linears, to encompass the general nature of the areas surrounding them.

The Project Site consists of approximately 453 acres in Kern County, California (Figure 1). The Project Site is located approximately 2 miles northwest of the unincorporated community of Tupman, and is located in Section 10 of Township 30 South, Range 24 East, in Kern County. The Project Site, Controlled Area, and Construction Staging Area are shown on Figure 2.

The Project Site is predominantly used for agricultural purposes, including cultivation of cotton, alfalfa, and onions. Land use in the vicinity of the Project Site is primarily agricultural. Adjacent land uses include Adohr Road and agricultural uses to the north; Tupman Road and agricultural uses to the east; agricultural uses and an irrigation canal to the south; and Dairy Road right-of-way and agricultural uses to the west. The West Side Canal/Outlet Canal, the Kern River Flood Control Channel (KRFCC), and the California Aqueduct (State Water Project) are approximately 500, 700, and 1,900 feet south of the Project Site, respectively.

1.2 PROJECT LINEARS

In addition to the Project Site, the Project requires the construction and installation of several offsite linear utility components (Figure 3). The Project Linears include the following:

- **Electrical transmission line.** An approximately 2-mile electrical transmission line will interconnect the Project to the future Pacific Gas and Electric Company (PG&E) switching station, east of the Project Site.

- **Natural gas supply pipeline.** An approximately 13-mile natural gas interconnection will be made with an existing PG&E natural gas pipeline north of the Project Site.

- **Water supply pipelines.** The Project will use brackish groundwater supplied from the Buena Vista Water Storage District (BVWSD), located to the northwest, for process water. The raw water supply pipeline will be approximately 15 miles in length, and will connect to five new groundwater wells. Potable water for drinking and sanitary use will be supplied by West Kern Water District to the east. The potable water supply pipeline will be approximately 1 mile in length.

- **CO_2 pipeline.** An approximately 3-mile CO_2 pipeline will transfer the CO_2 captured from the Project Site south to the OEHI CO_2 processing facility.

- **Industrial railroad spur.** An approximately 5-mile new railroad spur would connect the Project Site to the existing San Joaquin Valley Railroad Buttonwillow railroad line, north of the Project Site. The railroad spur will deliver Coal Unit Trains, as well as export products during operations. If available, the railroad spur will also be used to deliver plant equipment during construction. Public and private at-grade crossings will be required.

The Project Linears begin at the Project Site, and are generally aligned along existing rights-of-way such as roads, railroads, or canals until their termini at various locations up to 15 miles away from the Project Site. The Project Linears include several crossings of canals and other drainage features, including the East Side Canal, the West Side Canal, the KRFCC, and the California Aqueduct. Portions of the CO_2 pipeline will be constructed using horizontal directional drilling (HDD) to avoid environmentally sensitive areas associated with the KRFCC and the California Aqueduct. Other crossings of canals and drainage features will be constructed by open cuts.

This report summarizes the findings of a preliminary jurisdictional delineation to determine whether the Project requires authorization from the United States Army Corps of Engineers (USACE) under Section 404 of the federal Clean Water Act (CWA), pursuant to 33 United States Code (USC) § 1344.

The findings presented in this report reflect the best effort at estimating the boundaries of potentially jurisdictional features, based on current regulations, written policies, and guidance from the USACE. The boundaries of wetlands, other waters of the United States, and special aquatic sites were delineated in accordance with the USACE *Wetlands Delineation Manual* (Environmental Laboratory, 1987), the *Regional Supplement to the Corps of Engineers Wetland*

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PROJECT VICINITY

February 2013
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Hydrogen Energy California (HECA)
Kern County, California

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FIGURE 1

DUNFORD RD
Deep Wells Ditch
East Side Canal
Main Drain
DAIRY RD
ADOHR RD
STATION RD
West Side Canal
Kern River Flood Control Channel
California Aqueduct
Outlet Canal
TUPMAN RD

Project Site
Construction Staging Area
Controlled Area
Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

N
0 750 1,500
Feet

HECA MAIN PROJECT SITE

Hydrogen Energy California (HECA)
February 2013 Wetland Delineation
28068052 Kern County, California

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FIGURE 2

Source: Aerial Photo, Digital Globe, 2008.

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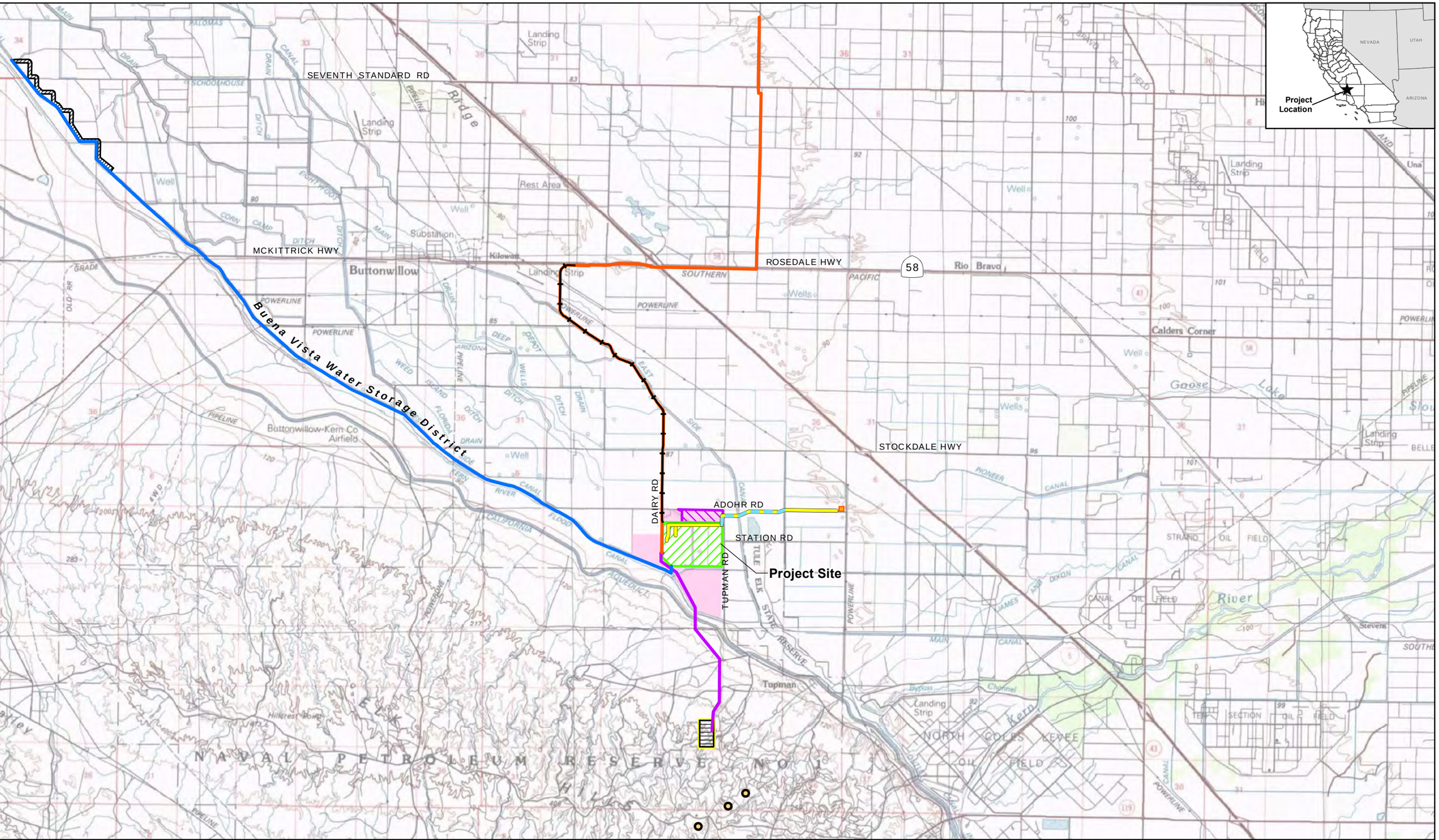

HECA PROJECT

Hydrogen Energy California (HECA)
Wetland Delineation
Kern County, California

February 2013
28068052

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FIGURE 3

Source: USGS (30'x60' quads: Taft 1982, Delano 1982). Created using TOPO!, ©2006 National Geographic Maps, All Rights Reserved. Kern County and State of California (proposed and approved projects).

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Delineation Manual: Arid West Region (Version 2.0) (USACE, 2008a), *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE, 2008b), and Regional Guidance Letter 08-02 (USACE, 2008c).

Chapter 1 summarizes wetland delineation regulations and existing conditions (climate and topography, hydrology, soils, and vegetation) in the Study Area, which encompasses the proposed HECA Project Site, the construction staging areas, the Controlled Areas surrounding the Project Site and staging areas, and the area within a 250-foot buffer along all Project Linears. All Project features are described in more detail below. Chapter 2 describes the methodology for conducting pre-survey investigations and field surveys. Chapter 3 presents the findings of desktop studies and field surveys, including significant nexus determinations for waters of the United States. Chapter 4 describes areas that may qualify as jurisdictional exemptions. Chapter 5 lists the staff who conducted the field delineation, prepared the report, and/or performed internal technical review. Chapter 6 lists references cited throughout this report.

1.3 REGULATORY SETTING

The regulatory setting is framed by enabling legislation and case law. Under Section 404 of the CWA, the USACE regulates the discharge of dredged and fill materials into "Waters of the United States." Jurisdictional waters of the United States include intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, natural ponds, and wetlands adjacent to any water of the United States (33 Code of Federal Regulations [CFR] § 328). Certain waters of the United States are considered "special aquatic sites" because they are generally recognized as having particular ecological value. Such sites include sanctuaries and refuges, mudflats, wetlands, vegetated shallows, and riffle and pool complexes. Special aquatic sites are defined by the U.S. Environmental Protection Agency (U.S. EPA), and may be afforded additional consideration in a project's permit process.

The USACE also regulates navigable waters under Section 10 of the Rivers and Harbors Act as "… those waters of the United States that… are presently used, or have been used in the past, or may be susceptible to use to transport interstate or foreign commerce" (33 CFR § 322.2).

Projects that place fill in jurisdictional wetlands and nonwetland waters of the United States require either an individual or a nationwide permit from the USACE. Nationwide permits are issued by the USACE for specific types of activities that have minimal individual or cumulative adverse environmental impacts. Individual permits are required for large and complex projects, or projects that exceed the impact threshold for nationwide permits.

Recent U.S. Supreme Court decisions, summarized below, have modified how the USACE defines certain waters of the United States.

1.3.1 Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers

On January 9, 2001, the U.S. Supreme Court issued a decision in Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers. The case involved the filling of hydrologically isolated waters that had formed from remnant excavation ditches on a 533-acre

parcel. In the decision, the Court denied the USACE jurisdiction over isolated water bodies, which the USACE had previously regulated using the "Migratory Bird Rule" established in 1986. The Court defined isolated waters as any body of water that is nonnavigable, intrastate, and lacking any significant nexus to navigable bodies of water (Pooley, 2002).

Isolated seasonal wetlands (i.e., wetlands that are not hydrologically connected with other jurisdictional wetlands or nonwetland waters of the United States) are generally considered nonjurisdictional.

1.3.2 Rapanos v. United States and Carabell v. Army Corps of Engineers

Two U.S. Supreme Court cases, Rapanos v. United States (No. 04 1034) and Carabell v. Army Corps of Engineers (No. 04-1384), challenged the USACE's interpretation of waters of the United States (USACE and U.S. EPA, 2007). The USACE had interpreted the CWA 33 USC 1362(7) to regulate wetland areas that are separated from a tributary of a navigable water by a narrow, constructed berm, where evidence of an occasional hydrologic connection existed between the wetland and the tributary. Also, the case questioned Congress' authority under the Commerce Clause to apply the CWA to the wetlands at issue.

On June 19, 2006, the Court ruled in favor of tightening the definition of "waters of the United States." According to the opinion, a water or wetland constitutes "navigable waters" under the CWA if it possesses a "significant nexus" to waters that are currently navigable or could feasibly be made navigable.

The USACE and the U.S. EPA issued a joint memorandum on June 5, 2007, with guidelines for establishing whether wetlands or other waters of the United States fall within USACE jurisdiction (USACE and U.S. EPA, 2007). The USACE and U.S. EPA assert jurisdiction over traditional navigable waters (TNW), wetlands adjacent to TNWs, nonnavigable tributaries to TNWs that are relatively permanent waters (RPWs), and wetlands that abut RPWs. The agencies may take jurisdiction over nonnavigable tributaries that are not RPWs, wetlands that are adjacent to non-RPWs, and wetlands that are adjacent to but not directly abutting a relatively permanent nonnavigable tributary. The agencies will generally not assert jurisdiction over swales; erosional features; or ditches excavated wholly in uplands, draining only uplands, and not carrying a relatively permanent flow of water.

1.3.3 Exemptions

A number of exemptions from CWA regulations exist for areas that would otherwise qualify as waters of the United States. These exemptions are classified as either discretionary or nondiscretionary exemptions.

Discretionary Exemptions

Certain areas that meet the technical definition of wetlands are generally not considered waters of the United States (33 CFR § 328.3[a]). However, the USACE and U.S. EPA reserve the right

to determine that a particular water body within the categories listed below is a water of the United States (WUS[1]) on a case-by-case basis. Such areas are:

- Nontidal drainage and irrigation ditches excavated on dry land;
- Artificially irrigated areas that would revert to upland if the irrigation ceased;
- Artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water, and that are used exclusively for purposes such as stock watering, irrigation, settling basins, and rice growing;
- Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons; and
- Water-filled depressions created in dry land incidental to construction activity, and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States.

Nondiscretionary Exemptions

USACE regulations contain a nondiscretionary exemption for waste treatment systems designed to meet the requirements of the CWA (33 CFR § 328.3[a][7]). Such areas, which include treatment ponds and lagoons, are not considered waters of the United States.

1.4 STUDY AREA SETTING

The Project Site is located in the San Joaquin Central Valley, approximately 5.5 miles southeast of the town of Buttonwillow, near the junction of Interstate 5 (I-5) and State Route (SR) 58 in Kern County. The Project Site and associated linears are located within the Tupman, East Elk Hills, West Elk Hills, Lokern, Buttonwillow, and Rio Bravo United States Geological Survey (USGS) 7.5-minute topographic quadrangle.

Prior to field investigations, a desktop analysis of the Project Site was performed using appropriate reference materials and maps. The remainder of this section provides details on these analytical methods and information related to climate, topography, hydrology, soils, and vegetation in the Study Area.

1.4.1 Climate and Topography

The Study Area has a Mediterranean climate with hot, dry summers. Most precipitation occurs in the cooler winter months. Average winter temperatures range from 35 degrees Fahrenheit (°F) to 56 °F; average summer temperatures typically range from 65 °F to 98 °F (data for Buttonwillow, California from 1940 through 2012; WRCC, 2012). Average annual precipitation

[1] In this report the acronym WUS is defined as nonwetland waters, even though wetlands are technically a subset of WUS.

in Buttonwillow is 5.66 inches per year, with approximately 88 percent of this precipitation occurring between the months of November and April (WRCC, 2012).

Elevations in the Study Area vary slightly from the high point elevation of 288 feet above mean sea level within the 453-acre HECA Project site (HECA, 2012). The Study Area is in the southwestern portion of the San Joaquin Valley, which includes several historic lakebeds, such as Buena Vista Lake and Tulare Lake. The greater San Joaquin Valley is a flat, historic floodplain, with elevations ranging from sea level to 1,000 feet (Gronberg et al., 1998). Elevations in the Elk Hills range from approximately 300 to 1,500 feet. Farther west of the Elk Hills lie the southern Coast Ranges, which separate the San Joaquin Valley from the Pacific Ocean.

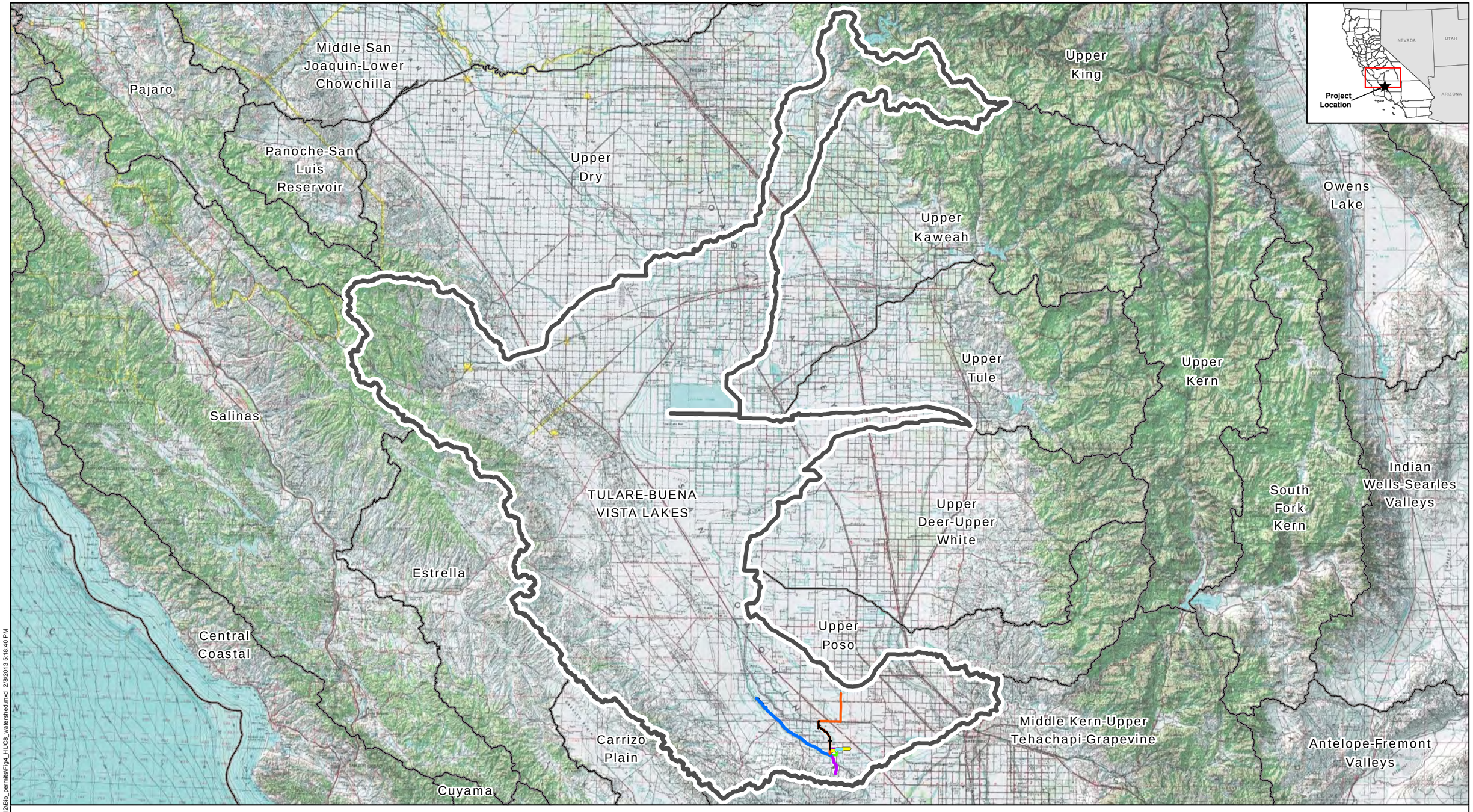
1.4.2 Hydrology

The Study Area is located in the Tulare Lake Bed watershed (as defined by the USGS Hydrologic Unit Code 18030012), which drains a 3,787-square-mile (2,423,624-acre) watershed in the southern portion of the San Joaquin Valley (Figure 4). To the south and west of the Project Site are three constructed canals and channels: the California Aqueduct, the KRFCC, and the West Side Canal. The Kern River connects with the Outlet Canal and the California Aqueduct southeast of the Project Site. The California Aqueduct continues south from the junction with the Kern River. The Outlet Canal conveys water from the Kern River to the former Buena Vista Lakebed (now known as Lake Evans and the Buena Vista Aquatic Recreational Area), and discharges water into the KRFCC, the West Side Canal, and the East Side canal. This discharge point is located south of the Tule Elk Reserve State Park. The KRFCC continues north towards the Tulare Lake basin. The East Side Canal is located east of the Project Site, and is crossed by four of the Project Linears: the railroad spur line, the natural gas pipeline, the electrical transmission line, and the potable water pipeline. The East Side and West Side canals are used to irrigate agricultural land, and are not known to discharge into any named features. Seasonal drainages from the Elk Hills that pass over the California Aqueduct drain into the KRFCC (Figure 5). Close to the Study Area is a series of levees and drainage and/or irrigation ditches around agricultural fields. Most drainage features in this area of the San Joaquin Valley ultimately drain into irrigation ditches or water canals for agricultural or municipal use.

Growing Season and Precipitation Analysis

Precipitation and growing season analyses are necessary components in establishing baseline hydrology conditions for the Study Area. They are also important in determining the validity or interpretation of hydrology field indicators during years with above- or below-normal rainfall. Therefore, establishing whether conditions during the delineation field survey were within a normal precipitation range is an important criterion.

To meet this criterion, current conditions are compared with long-term data maintained by the U.S. Department of Agriculture National Water and Climate Center. The Center publishes the ranges of weather data for more than 8,000 National Weather Service weather stations (NRCS, 2012). The data pertinent to wetland hydrology, called WETS, are standardized tables that provide a monthly summary and probability analysis of temperature and precipitation, specifically for wetland determinations (Table 1-1 and Table 1-2, below; Appendix A). The



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Source: USGS (30'x60' quads: Taft 1982, Delano 1982). Created using TOPO!, ©2006 National Geographic Maps, All Rights Reserved. USGS National Hydrography Dataset, updated 2010.

USGS HYDROLOGIC UNITS AND WATERSHEDS

Hydrogen Energy California (HECA)
Wetland Delineation
Kern County, California

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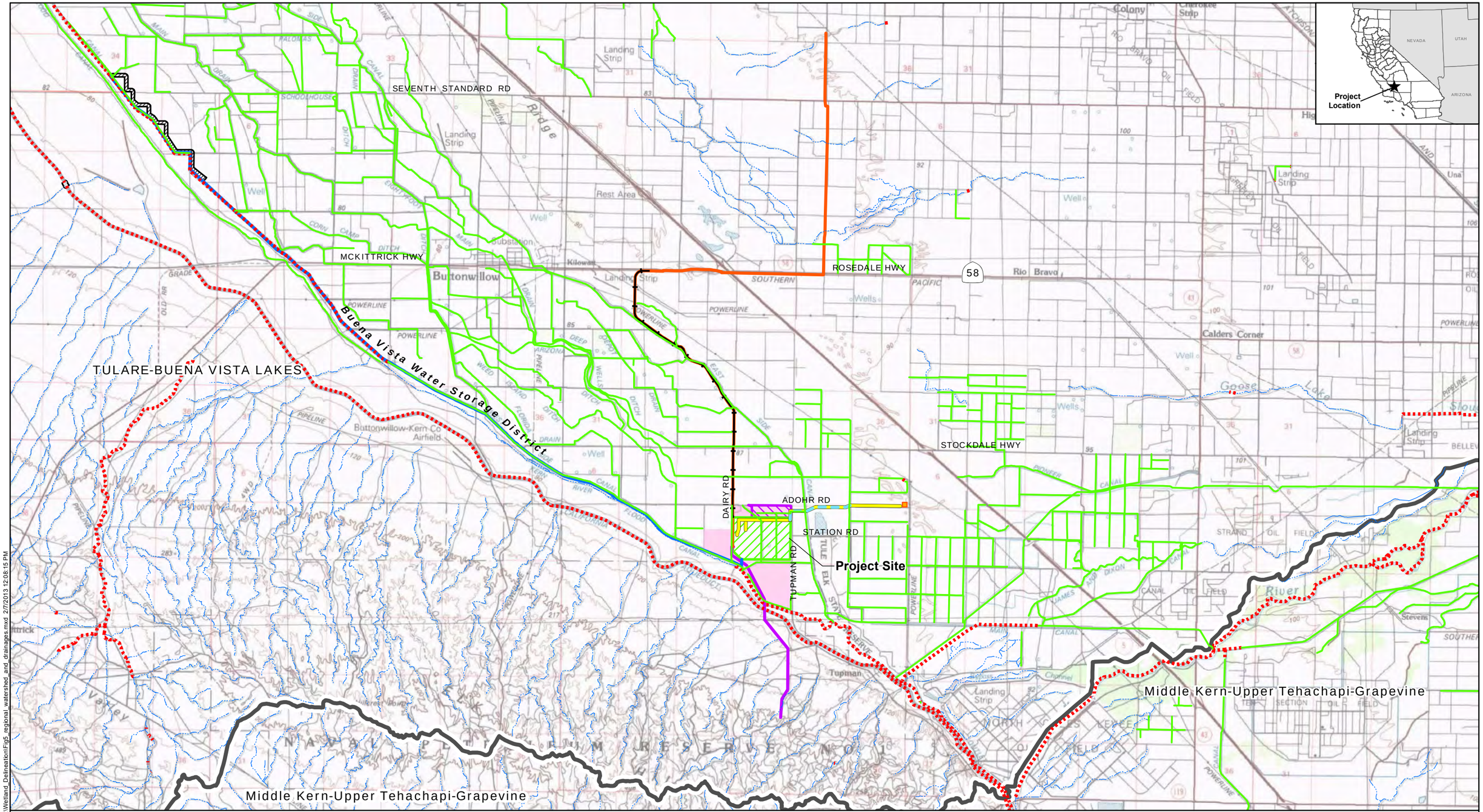
FIGURE 4



Project Site
Construction Staging Area
Controlled Area
BVWSD Well Field
Electrical Switching Station

Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

HUC 8 Watershed Boundary
ArtificialPath
Canal/ Ditch
Pipeline

Stream/River: Hydrographic Category = Intermittent
Stream/River: Hydrographic Category = Perennial

N

0 1 2 Miles

REGIONAL WATERSHEDS AND DRAINAGES

Hydrogen Energy California (HECA)
February 2013 Wetland Delineation
28068052 Kern County, California

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FIGURE 5

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Source: USGS (30'x60' quads: Taft 1982, Delano 1982). Created using TOPO!, ©2006 National Geographic Maps, All Rights Reserved. Kern County and State of California (proposed and approved projects).

Table 1-1
Growing Season Analysis

Station and Period of Record	Relative Location to Project	Elevation (Feet)	Average Annual Rainfall (Inches)	Rainfall November through April	>28°F Growing Season	Number of Days
Buttonwillow (1971-2000)	5.5 miles northwest	270	6.41	87%	January 14 – November 30	321
Bakersfield (1971-2000)	20 miles east	490	6.51	86%	January 1 – December 31	365
Wasco (1971-2000)	18 miles north	350	7.40	87%	January 9 – December 13	338

Note:
°F = degrees Fahrenheit

Table 1-2
NRCS Method for Precipitation Analysis for the Bakersfield WETS Station

Month	30th Percentile (Inches)	Average (Inches)	70th Percentile (Inches)	Observed Rainfall 2011-2012 (Inches)	Observed Condition	Condition Value	Month Weighing Factor	Product[1]
February	0.49	1.21	1.46	0.19	Dry	1	3	3
January	1.18	0.50	1.46	0.44	Dry	1	2	2
December	0.37	0.76	0.96	0.00	Dry	1	1	1
							Sum	**6**

Notes:
[1] A sum of 6 to 9 is drier than normal; 10 to 14 is normal; 15 to 18 is wetter than normal.

NRCS = Natural Resources Conservation Service
WETS = Wetlands Determination

objective of the WETS tables (in Appendix A) is to define the normal ranges for growing seasons and for monthly precipitation, so that the climatic characteristics for a geographic area may be assessed over a representative time period.

Growing Season Analysis

The growing season is defined as the period when soil temperatures 12 inches below ground surface are greater than 41 °F. Lacking field data, the growing season dates may be approximated by the median dates (50 percent probability of occurrence) of 28 °F air temperatures in spring and fall, as described in the WETS tables (USACE, 2005).

Table 1-1 provides a growing season analysis for three stations near the Study Area: Buttonwillow (located 5.5 miles northwest), Bakersfield (20 miles east), and Wasco (18 miles north) (NRCS, 2012). To meet USACE criteria for positive wetland hydrology, the required minimum number of days during the growing season of continuous surface saturation and/or inundation to the surface is 16 days (5 percent of the growing season, which is 321 days at the Buttonwillow WETS station). Observations of inundation and/or surface saturation during the early spring would be a strong positive indicator that the wetland hydrology criteria have been met, assuming that climate conditions were normal.

Precipitation Analysis

Indicators of hydrology may not be reliable during years with above- or below-normal rainfall. Using a method for assessing antecedent precipitation conditions at a site developed by the Natural Resource Conservation Service (NRCS), and defined by Sprecher and Warne as "the NRCS Method," current annual rainfall for the Study Area was analyzed to determine whether conditions were normal, drier than normal, or wetter than normal during the field inspections (NRCS, 1997; Sprecher and Warne, 2000). Normality is defined as the range of rainfall within the 30th to 70th percentiles.

Table 1-2 compares the WETS normal precipitation ranges with the actual observed rainfall for the 3 months prior to the field investigations for the Bakersfield station (the closest station to provide recent data). Using weighted averages and thresholds developed in the NRCS Method, the data show that rainfall conditions were drier than normal at the time of the 2012 field surveys.

It is likely that inundation and surface saturation observed during the field inspections are not representative of normal conditions. Low rainfall can limit the visibility and appearance of wetland and water features, making them harder to identify in the field. However, the timing of the survey did coincide well with precipitation events, allowing for visual observation of saturation and ponding; this is discussed further in Sections 3.2.3 and 3.2.4.

1.4.3 Soils

The NRCS soil survey identified the following six soil map units within the Project (the soils analysis included a 250-foot buffer around the Project Linears) (NRCS, 2009):

- Lokern-Buttonwillow complex;

- Mercey-Kettleman-Elkhills-Delgado-Cantua-Bitterwater complex;
- Milham soils;
- Panoche-Garces complex;
- Wasco-Kimberlina complex; and
- Westhaven-Lerdo-Excelsior-Cajon complex.

Hydric soil components are defined by the National Technical Committee for Hydric Soils as having formed under conditions of saturation, flooding, or ponding during the growing season that persisted long enough that anaerobic conditions could develop in the upper portion of the soil (Federal Register, 1994). Hydric soils constitute one of the three parameters required for a location to qualify as a wetland under USACE jurisdiction (see Section 3). No other soil map unit contained hydric components.

Each of the soils map units is described in more detail below. Figure 6 displays the results of the NRCS soil surveys within the Study Area and along the Project Linears.

Lokern-Buttonwillow Complex

This complex consists of a mixture of Lokern and Buttonwillow soils. Lokern soils are deep, poorly drained, clayey soils formed from mixed granitic alluvium. Buttonwillow soils are deep, somewhat poorly drained soils formed in granitic alluvium. Both soils occur in basins with slopes of 0 to 2 percent. Texture ranges from fine to clayey over loamy. Annual precipitation averages 5 inches. This soil complex is found in the San Joaquin Valley and is used in agriculture for growing irrigated crops. The Lokern and Buttonwillow soils series are listed as hydric soils on the Kern County Soil Survey *Mercey-Kettleman-Elkhills-Delgado-Cantua-Bitterwater complex.*

Mercey-Kettleman-Elkhills-Delgado-Cantua-Bitterwater Complex

This complex consists of a mixture of Mercey, Kettleman, Elkhills, Delgado, Cantua, and Bitterwater soil series. These soils range from shallow to deep, and are generally well drained. They are formed from weathered sandstone or shale—with the exception of Elkhills soils, which formed in granitic alluvium. The soils in this complex occur on hills and uplands, with slopes ranging from 5 to 75 percent. Texture ranges from fine-silty to coarse-loamy. These features occur in the foothills of the California Central Valley. Typical land use includes grazing and oil extraction.

Milham Soils

Milham soils in this map unit consist of 85 percent Milham soils, 5 percent Garces soils, 5 percent Panoche soils, and 5 percent Kimberlina soils. These soils are very deep and well drained. They occur on alluvial fans and plains, with slopes of 0 to 2 percent. Their texture ranges from sandy to clay loam. Milham soils are located on terraces and alluvial fans derived from igneous and sedimentary rock. These soils occur mainly in the southern San Joaquin Valley, and are used in agriculture for grazing or growing irrigated crops.

Panoche-Garces Complex

This complex consists of a mixture of Panoche and Garces soil series. Both of these soils consist of very deep, well-drained soils found on alluvial fans, terraces, and floodplains. Garces soils are fine-loamy, saline-sodic soils formed in granitic alluvium, and are found on slopes of 0 to 2 percent. Saline soils are soils that contain at least 2,600 parts per million soluble salts in solution, enough to reduce production of salt-sensitive crops. Sodic soils, or alkali soils, are soils with enough sodium to cause 15 percent of the cation exchange sites (negatively-charged interfaces found on clay particles) to be occupied by sodium. Sodium in the soil prevents clay particles (and other very small, colloidal sized particles such as humus) from coming together and forming large soil aggregates, a process also known as soil dispersal. Also, vegetation may fail to grow in areas where salt and alkalinity levels are highest, such as depressions. These areas are called slickspots in alkaline soils and salt scalds in saline soils.

Saline-sodic soils are known as problem soils because they do not respond to normal management practices, and may alter chemical and biological processes in the soil (Johnson and Zhang, 2012). Hydric soils which are alkaline are listed as a problematic in the Arid West Regional Supplement, because the formation of redox concentrations and depletions may not be readily visible (USACE, 2008a).

Panoche soils formed in a loamy calcareous alluvium derived from sedimentary rock, and occur on slopes of 0 to 15 percent. Soil texture for these series is fine-loamy. These soils occur in the San Joaquin Valley, and are used in agriculture for growing irrigated crops.

Wasco-Kimberlina Complex

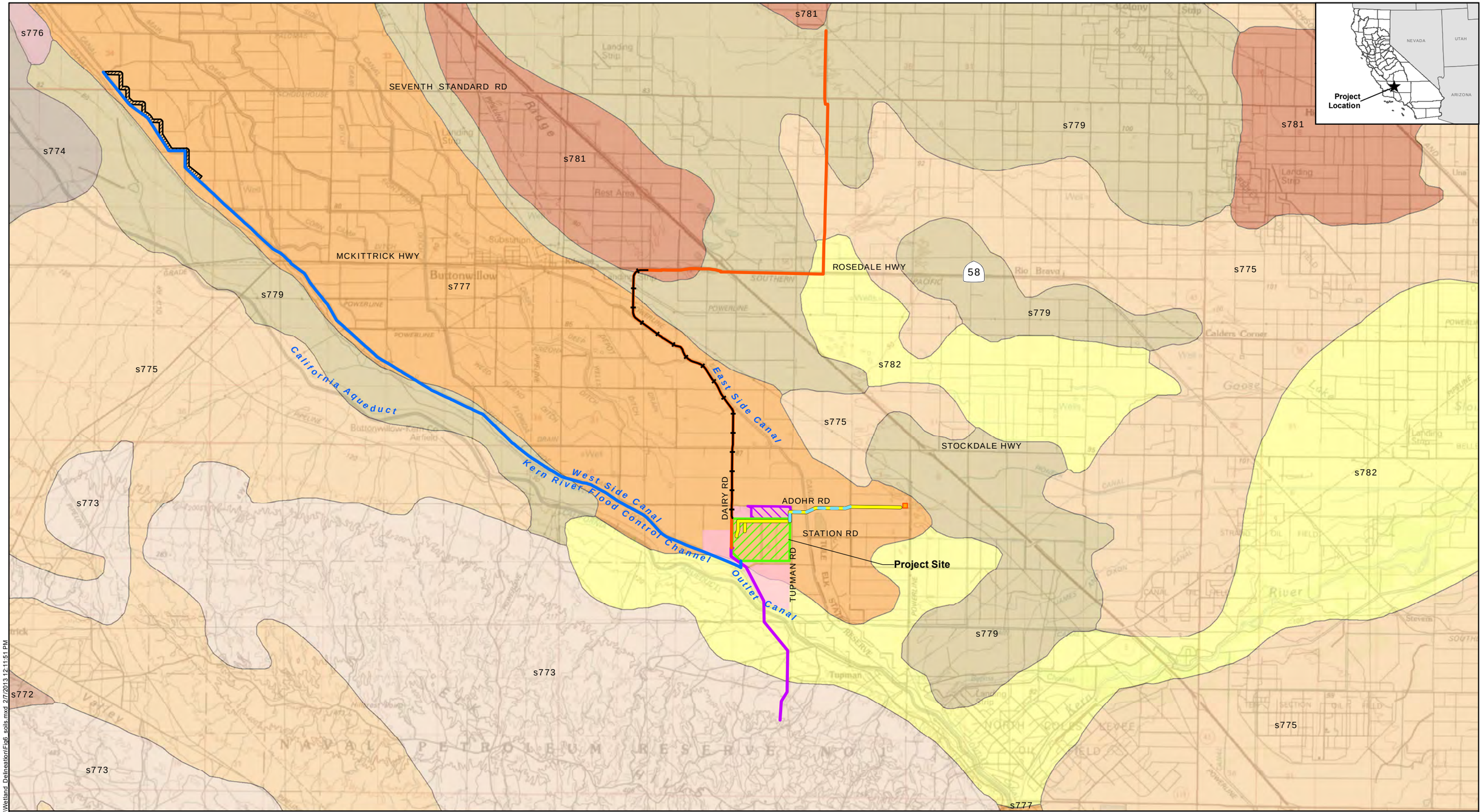
This complex consists of a mixture of Wasco and Kimberlina soil series. Both of these soils consist of very deep, well-drained soils on floodplains and recent alluvial fans. They formed in mixed alluvium derived mainly from igneous and sedimentary rock. Slopes for these soils range from 0 to 9 percent. Soil texture is coarse-loamy. These soils occur in the southern San Joaquin Valley and, to a lesser extent, in the Mojave Desert. They are used in agriculture for growing field, forage, and row crops.

Westhaven-Lerdo-Excelsior-Cajon Complex

This complex consists of a mixture of Westhaven, Lerdo, Excelsior, and Cajon soil series. These soils are deep to very deep, and poorly to well drained. These soils formed in a mixed alluvium derived from igneous and/or sedimentary rocks. These soils are found on alluvial fans and floodplains. Slopes range from 0 to 5 percent. Soil texture is mixed and ranges from fine-silty to coarse-loamy. These soils are found in the San Joaquin Valley, and are used in agriculture for growing irrigated crops. This map unit is listed as containing 3 percent hydric soils.

1.4.4 Vegetation Communities

Vegetation communities are assemblages of plant species defined by species composition and relative abundance, which occur together in the same area. The natural communities presented in this report are based on the classification presented in *A Manual of California Vegetation* (Sawyer et al., 2009). Botanical nomenclature follows *The Jepson Manual* (Baldwin et al., 2012).



Project Site
Construction Staging Area
Controlled Area
BVWSD Well Field
Electrical Switching Station

Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

Kilmer-Hillbrick-Aido (s772)
Lokern-Buttonwillow (s777)
Mercey-Kettleman-Elkhills-Delgado-Cantua-Bitterwater (s773)
Milham (s781)

Panoche-Garces (s779)
Panoche-Milham-Kimberlina (s774)
Wasco-Kimberlina (s775)
Westhaven-Lerdo-Excelsior-Cajon (s782)
Yribarren-Twisselman-Panoche (s776)

N

0 1 2 Miles

Source: USGS (30'x60' quads: Taft 1982, Delano 1982). Created using TOPO!, ©2006 National Geographic Maps, All Rights Reserved. Kern County and State of California (proposed and approved projects).

NRCS SOIL MAP UNITS LOCATED WITHIN THE STUDY AREA

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Wetland Delineation
Kern County, California

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FIGURE 6

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One natural community, valley saltbush scrub, was identified in the Study Area. The remainder of the Study Area did not contain natural plant communities, and was either under agricultural uses or barren.

Upland Vegetation Communities

Allscale Scrub

This community, also known as Valley Saltbush Scrub, is characterized by the dominant presence of one or more saltbush (*Atriplex)* species with a 10 to 40 percent shrub cover over a low, herbaceous, annual understory (Holland, 1986). It occurs on sandy to loamy soils without surface alkalinity within rolling, dissected alluvial fans with low relief. It is distributed within the southern and southwestern San Joaquin Valley and Carrizo Plains of San Luis Obispo County (Holland, 1986). The climate consists of long, hot, dry summers and short, damp winters often shrouded in Tule fog for weeks at a time. Typical dominant shrub species include alkali saltbush (*Atriplex polycarpa)*, spinescale saltbush (*A. spinifera)*, and boxthorn (*Lycium* spp.). Typical understory species include nonnative invasive grasses and forbs, including common brome (*Bromus madritensis)*, ripgut brome (*B. diandrus)*, yellow-star thistle (*Centaurea solstitialis)*, and redstem filaree (*Erodium cicutarium)*.

Cropland

Cropland in the Study Area includes alfalfa (*Medicago sativa*) fields and other agricultural crops. Except for the 2 to 6 months after plowing and replanting, vegetation is dense, with nearly 100 percent cover. Plowing may occur annually, but is usually less often. This cover type is very disturbed and is characterized by little to no native vegetation.

Barren

Barren areas in the Study Area are defined by the absence of vegetation. Barren areas include areas of bare earth resulting from industrial activities such as mining or oil extraction. Such areas are also present along unpaved roads, turnouts, and empty lots or gravel yards.

2.0 METHODS

Prior to field investigations, a desktop analysis of the Project Site was performed, using appropriate reference materials and maps. The remainder of this section provides details on these analytical methods.

2.1 REFERENCE MATERIALS

Reference materials were assembled to inform the methods and data interpretation used in the delineation. The primary reference materials include:

- *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al., 1979)
- USACE *Wetlands Delineation Manual*, online edition *Regional Supplement to the USACE Wetland Delineation Manual: Arid West Supplement The Jepson Manual* (Baldwin et al., 2012)
- *National Wetlands Inventory* (USFWS, 2009)
- *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Lichvar and McColley, 2008)
- *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Curtis and Lichvar, 2010).
- *National List of Vascular Plant Species that Occur in Wetlands* (USFWS, 1996)

Satellite and street-view images of the Study Area were examined to identify potential wetland or water features to investigate during field surveys. Imagery was from Microsoft Bing, and dated March 2011.

2.2 FIELD SURVEYS

URS staff conducted multiple surveys for wetlands (WL) and WUS in the Study Area (Table 2-2).

Three field investigations were performed: one reconnaissance visit in late 2010; primary field investigations of the Study Area in 2011; and a 2012 follow-up visit. The initial field review of potential jurisdictional waters was conducted in the Study Area during a site assessment survey on December 7, 2010. Protocol-level jurisdictional delineations were conducted March 15 through 17, 2011; and March 27 through 30, 2012.

The delineation Study Area consisted of the Project Site and all areas within 250 feet of all Project Linears. The March 2011 and March 2012 surveys included the entire Study Area. The study area for the CO_2 Project Linear south of the California Aqueduct has been studied by OEHI and summarized in the 2012 OEHI Modified CO_2 Supply

Table 2-2
Field Surveys for Potentially Jurisdictional Wetlands

Resource	Field Surveys Completed	Conducted by URS Biologists(s)
Field Reconnaissance for Wetlands and Other Waters	December 7, 2010 Field review of the natural gas linear alignment and project site.	David Kisner, Jan Novak
Wetland delineation survey	March 15, 16, and 17, 2011 The survey was conducted along the natural gas linear alignment	David Kisner, Kelly Kephart, Johanna Kisner, Chris Julian, and Jamie Deutsch
Rare Plant Survey, Wetland Delineation and Habitat Assessment	March 27 through 30, 2012 The surveys evaluated the entire Action Area, including the Project Site and all Project Linears, including the industrial rail spur alignment	Kelly Kephart, Jan Novak, and Jane Donaldson

Line Alignment Data Gap Analysis (Stantec, 2012). The survey for potential jurisdictional waters within the Study Area was performed in accordance with the methods described in the *USACE Wetlands Delineation Manual* (Environmental Laboratory, 1987) and the *Regional Supplement to the USACE of Engineers Wetland Delineation Manual: Arid West Supplement* (USACE, 2008a). The delineation of potential jurisdictional nonwetland waters in the Study Area followed the methods described in *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE, 2008b).

As previously noted in the introduction, existing landforms, vegetation, hydrology, and soil conditions were evaluated to identify potential wetlands; these parameters in addition to OHWM indicators (e.g., water marks and drift debris) were used to identify potential other waters of the United States within the Study Area. Photographs, provided in Appendix B, were taken to document important observations. Plants identified during the investigation were recorded. Plant species observed within the Study Area are reported in Appendix C with their wetland indicator status (Lichvar and Kartesz, 2009), which is defined using the following terms:[2]

- Upland (UPL) – greater than 99 percent of a species' occurrences are in nonwetlands;
- Facultative-upland (FACU) – 67 to 99 percent of a species' occurrences are in nonwetlands;
- Facultative (FAC) – 33 to 67 percent of a species' occurrences are in wetlands;
- Facultative Wetland (FACW) – 67 to 99 percent of a species' occurrences are in wetlands;
- Obligate (OBL) – greater than 99 percent of a species' occurrences are in wetlands; and
- Not Listed (NL) – treated as upland because not on wetland plant list.

[2] No Indicator (NI) is used if there was not enough information to reach a conclusion on a plants' status. It is discounted in the dominance test calculations.

3.0 FINDINGS

3.1 WETLANDS AND WATERS OF THE UNITED STATES

3.1.1 Summary of Results

The Study Area includes 187.91 acres (8,185,221 square feet) of surveyed features. Of this total, 95.39 acres (4,155,229 square feet) are nonjurisdictional waters of the United States (NJ), exempt from CWA regulations; 0.01 acre (303 square feet) is WL, and 92.51 acres (4,029,689 square feet) are potentially jurisdictional WUS (Appendix E). The majority of NJ features are irrigation ditches and retention/detention basins. Figures 7-1 through 7-8 display the features mapped in the Study Area.

3.2 WETLANDS AND OTHER WATERS POTENTIALLY EXEMPT FROM USACE JURISDICTION

A number of exemptions from CWA regulations exist for areas that would otherwise qualify as waters of the United States (Section 1.1.3). These exemptions are classified as either discretionary or nondiscretionary exemptions.

3.2.1 Discretionary Exemptions – Determination of Exemption

NJ features in the Study Area include the West Side Canal, East Side Canal, drainage ditches that connect to these features, and several retention/detention basins. Table 3-1 summarizes the nonjurisdictional waters of the United States in the Study Area.

Table 3-1
Nonjurisdictional Waters of the United States in the Study Area

Feature	Number of Features	Square Feet	Acres
West Side Canal	1	2,308,599	53.00
East Side Canal	1	478,939	10.99
Drainage Ditches	58	1,256,912	28.86
Retention/Detention Basins	11	110,779	2.54
Total	71	4,155,229	95.39

The West Side and East Side canals are irrigation canals; they were constructed in uplands by Henry Miller and Charles Lux in the 1870s and 1880s. Both canals receive water from TNWs (the Kern River, as well as two lakes in the Buena Vista Aquatic Recreation Area: Lake Evans and Lake Webb) (GoFISHn.com, 2012). However, the West Side and East Side canals are nonjurisdictional waters because they are "closed" conveyance systems that do not discharge water into jurisdictional features (Bartel, 2012). Therefore, they lack a significant nexus to a TNW and appear to be ditches excavated on dry land. In addition, tributaries (drainage ditches)

that run into the West Side and East Side canals lack a significant nexus and are therefore nonjurisdictional (Figure 8).

A total of 11 retention/detention basins occur within the Study Area. These basins store agricultural runoff and exhibit an OHWM. These features are NJ because artificial lakes or ponds excavated in uplands to collect and retain agricultural runoff for the purpose of irrigation are typically excluded from jurisdiction, as defined by the federal CWA (USACE, 1986).

3.2.2 Nondiscretionary Exemptions – Determination of Exemption

No mapped features in the Study Area meet the criteria for this nondiscretionary exemption.

3.2.3 Wetlands

Surveys identified and delineated the presence and boundaries of one potentially jurisdictional WL feature within the Study Area (Figure 9). That feature is listed in Table 3-2, and described below. One set of paired soil test pits was mapped and labeled with the suffix "a" for the wetland soil pit and "b" for upland soil pit (Appendix D).

Table 3-2
Area of Potentially Jurisdictional Wetlands in the Study Area

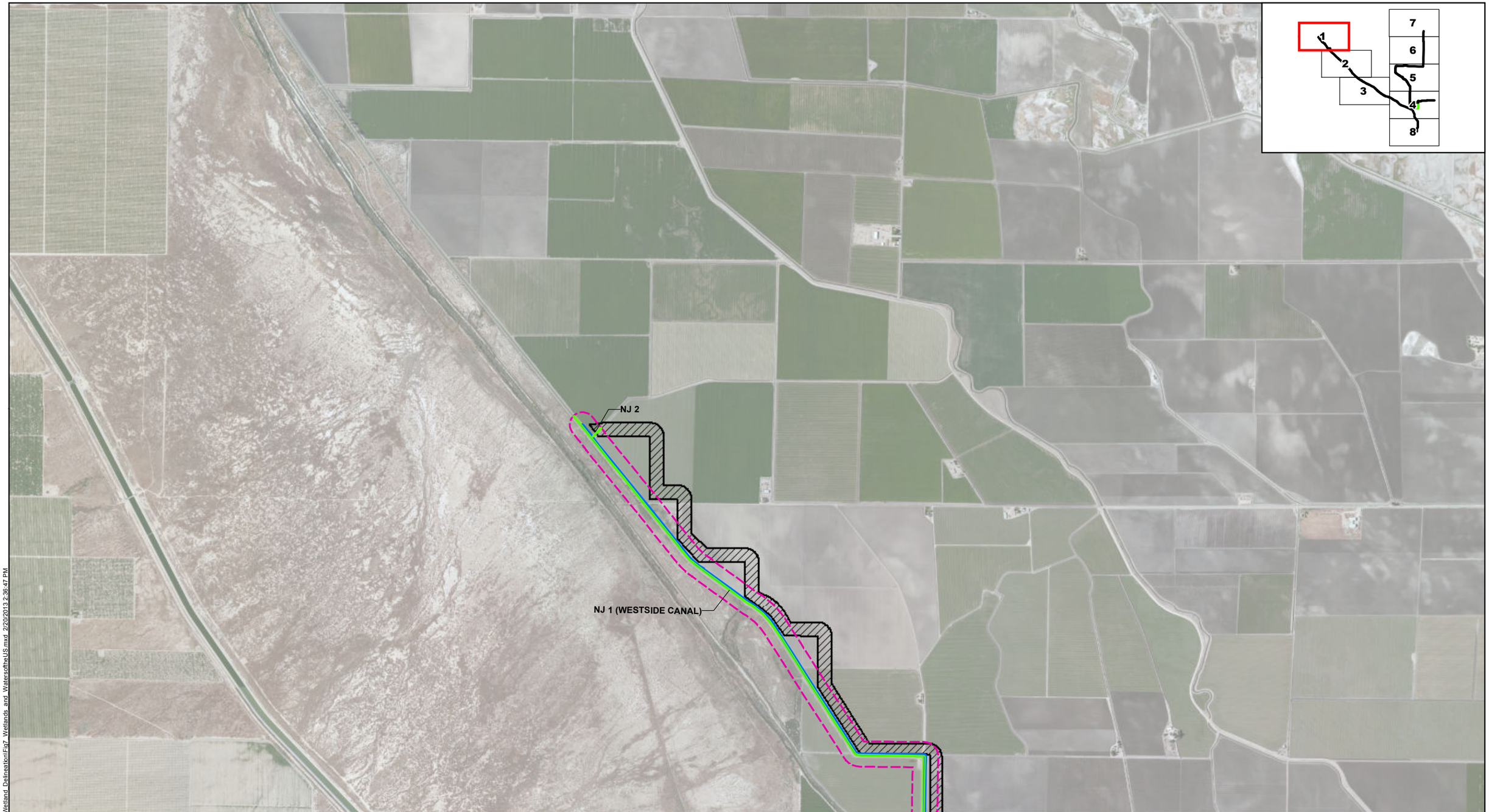
Feature	Number of Features	Square Feet	Acres
WL1	1	303	0.01

Wetland 1

WL 1 is in the Study Area for the proposed natural gas linear route adjacent to SR 58 and west of I-5. This area has numerous depressions that were ponded or saturated with water during the March 2012 surveys. WL 1 meets the USACE three-parameter WL definition.

WL 1 contained hydrophytic wetland vegetation along the fringe of the depression. Species present were herbaceous and included long leaf plantain (*Plantago elongata*), alkali pepperweed (*Lepidium dictyotum*), leaf cover saltweed (*Atriplex covillei* [=*phyllostegia*]), rabbitsfoot grass (*Polypogon monspeliensis*), Kern tarweed (*Deinandra pallida*), salt sandspurry (*Spergularia marina*), redstem filaree, spiny sow thistle (*Sonchus asper*), and annual hairgrass (*Deschampsia danthonioides*). The two dominant species, leaf plantain and alkali pepperweed, accounted for 64 percent of the total cover; they have wetland indicator statuses of FACW and OBL, respectively.

Two soil test pits, one WL and one upland, were evaluated for WL 1. The wetland soils had a sandy loam texture. Soil colors were 2.5 Y 5/3 from 0 to 2 inches; 2.5 Y 4/2 from 2 to 7 inches; and 2.5 Y 4/4 from 7 to 12 inches (Munsell, 1994). The wetland soils were very moist and had no redoximorphic features. Upland soils had a color of 2.5 Y 4/2 with a sandy clay loam texture in the 0 to 2 inches horizon; and a sandy clay texture in the 2 to 3 inches horizon, with a color of 2.5 Y 3/3. Shovel refusal in upland soils occurred at 3 inches in depth.



Project Site
Construction Staging Area
Controlled Area

250-foot Buffer from Disturbance Area
BVWSD Well Field
HDD Entry/Exit Pits
EOR Processing Facility
EOR Satellite Gathering Station

Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

Waters
Non-jurisdictional waters of the U.S. (NJ)
Other waters of the U.S. (WUS)
Wetland (WL)
Area Not Surveyed

N

0 1,000 2,000 FEET

Source: Aerial Imagery, Bing Maps, 2009.

MAPPED WETLANDS AND OTHER WATERS OF THE UNITED STATES WITHIN THE STUDY AREA

Hydrogen Energy California (HECA)
Wetland Delineation
Kern County, California

February 2013
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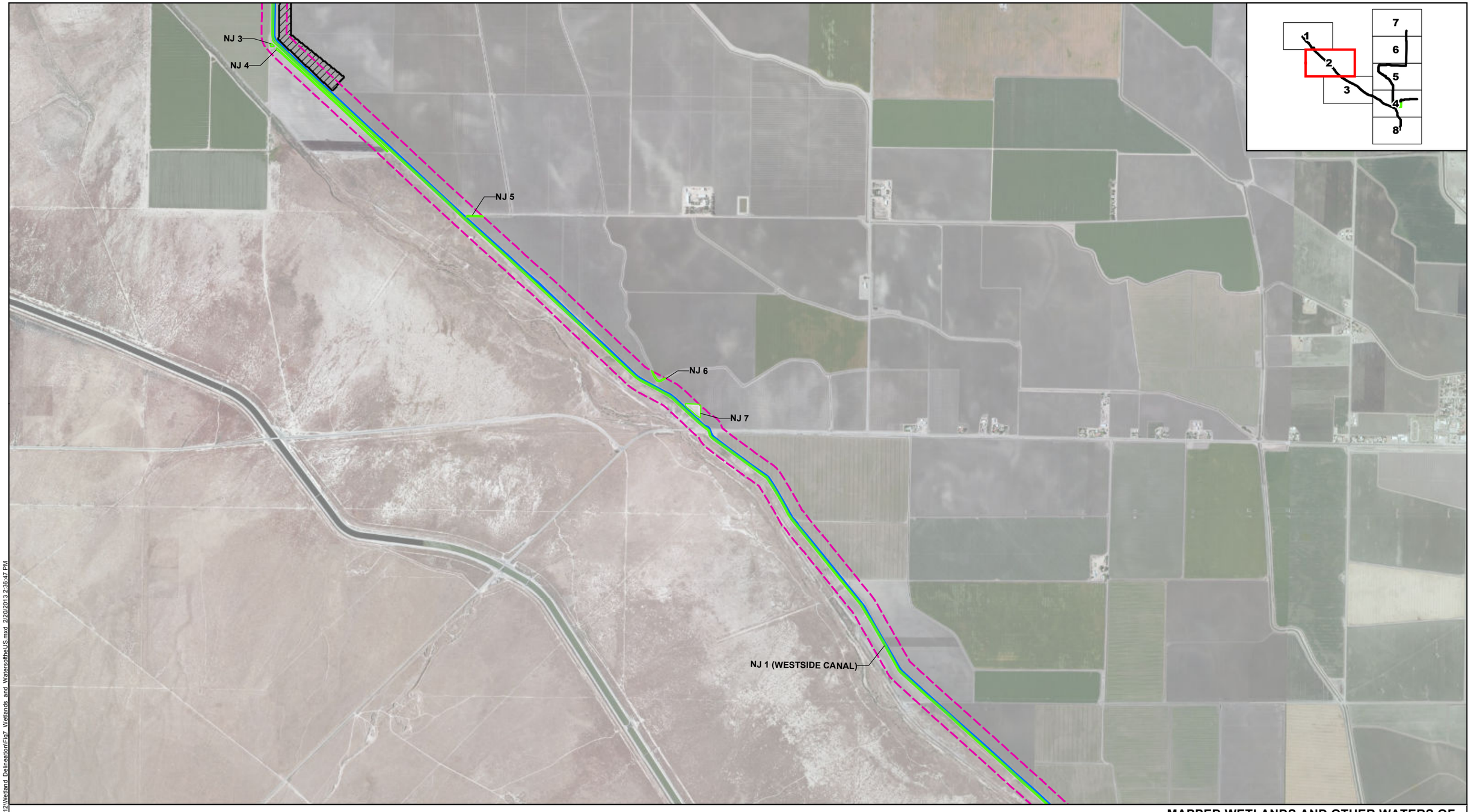
FIGURE 7 - SHEET 1



Project Site
Construction Staging Area
Controlled Area

250-foot Buffer from Disturbance Area
BVWSD Well Field
HDD Entry/Exit Pits
EOR Processing Facility
EOR Satellite Gathering Station

Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

Waters
Non-jurisdictional waters of the U.S. (NJ)
Other waters of the U.S. (WUS)
Wetland (WL)
Area Not Surveyed

N

0 1,000 2,000 FEET

Source: Aerial Imagery, Bing Maps, 2009.

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MAPPED WETLANDS AND OTHER WATERS OF THE UNITED STATES WITHIN THE STUDY AREA

Hydrogen Energy California (HECA)
Wetland Delineation
Kern County, California

February 2013
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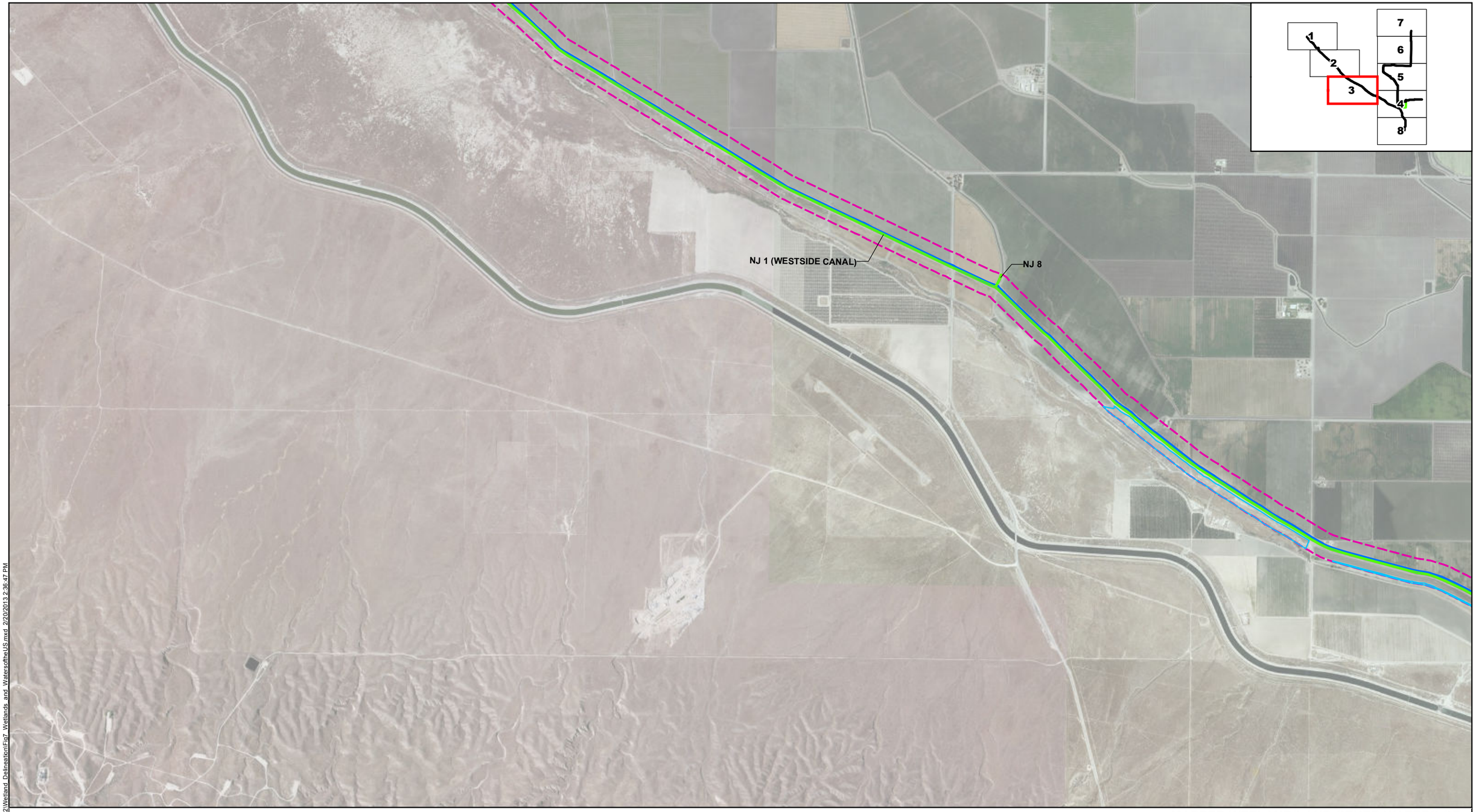
FIGURE 7 - SHEET 2



Project Site
Construction Staging Area
Controlled Area

250-foot Buffer from Disturbance Area
BVWSD Well Field
HDD Entry/Exit Pits
EOR Processing Facility
EOR Satellite Gathering Station

Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

Waters
Non-jurisdictional waters of the U.S. (NJ)
Other waters of the U.S. (WUS)
Wetland (WL)
Area Not Surveyed

N

0 1,000 2,000 FEET

Source: Aerial Imagery, Bing Maps, 2009.

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MAPPED WETLANDS AND OTHER WATERS OF THE UNITED STATES WITHIN THE STUDY AREA

Hydrogen Energy California (HECA)
Wetland Delineation
Kern County, California

February 2013
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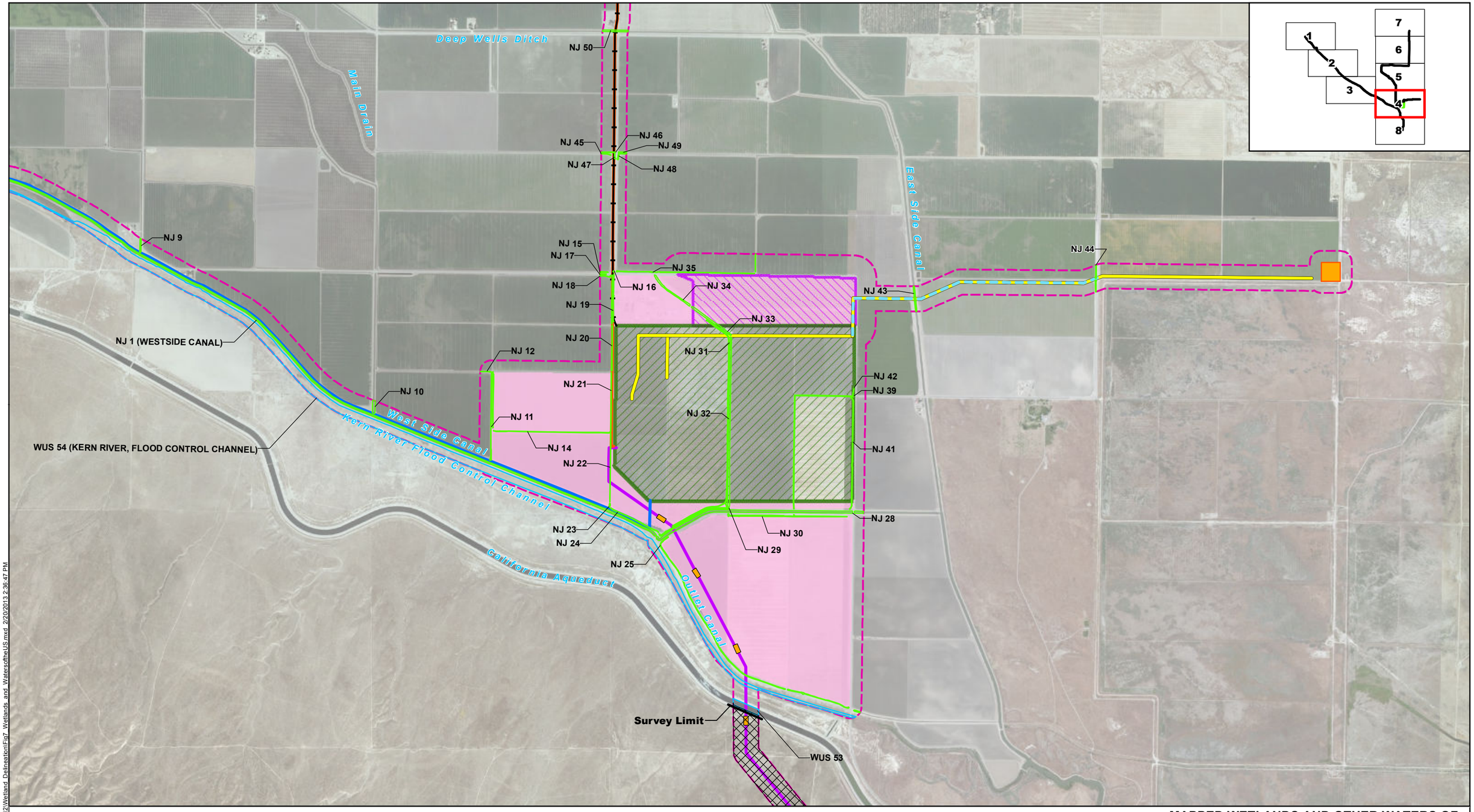
FIGURE 7 - SHEET 3



Project Site
Construction Staging Area
Controlled Area

250-foot Buffer from Disturbance Area
BVWSD Well Field
HDD Entry/Exit Pits
EOR Processing Facility
EOR Satellite Gathering Station

Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

Waters
Non-jurisdictional waters of the U.S. (NJ)
Other waters of the U.S. (WUS)
Wetland (WL)
Area Not Surveyed

N

0 1,000 2,000 FEET

Source: Aerial Imagery, Bing Maps, 2009.

MAPPED WETLANDS AND OTHER WATERS OF THE UNITED STATES WITHIN THE STUDY AREA

Hydrogen Energy California (HECA)
Wetland Delineation
Kern County, California

February 2013
28068052

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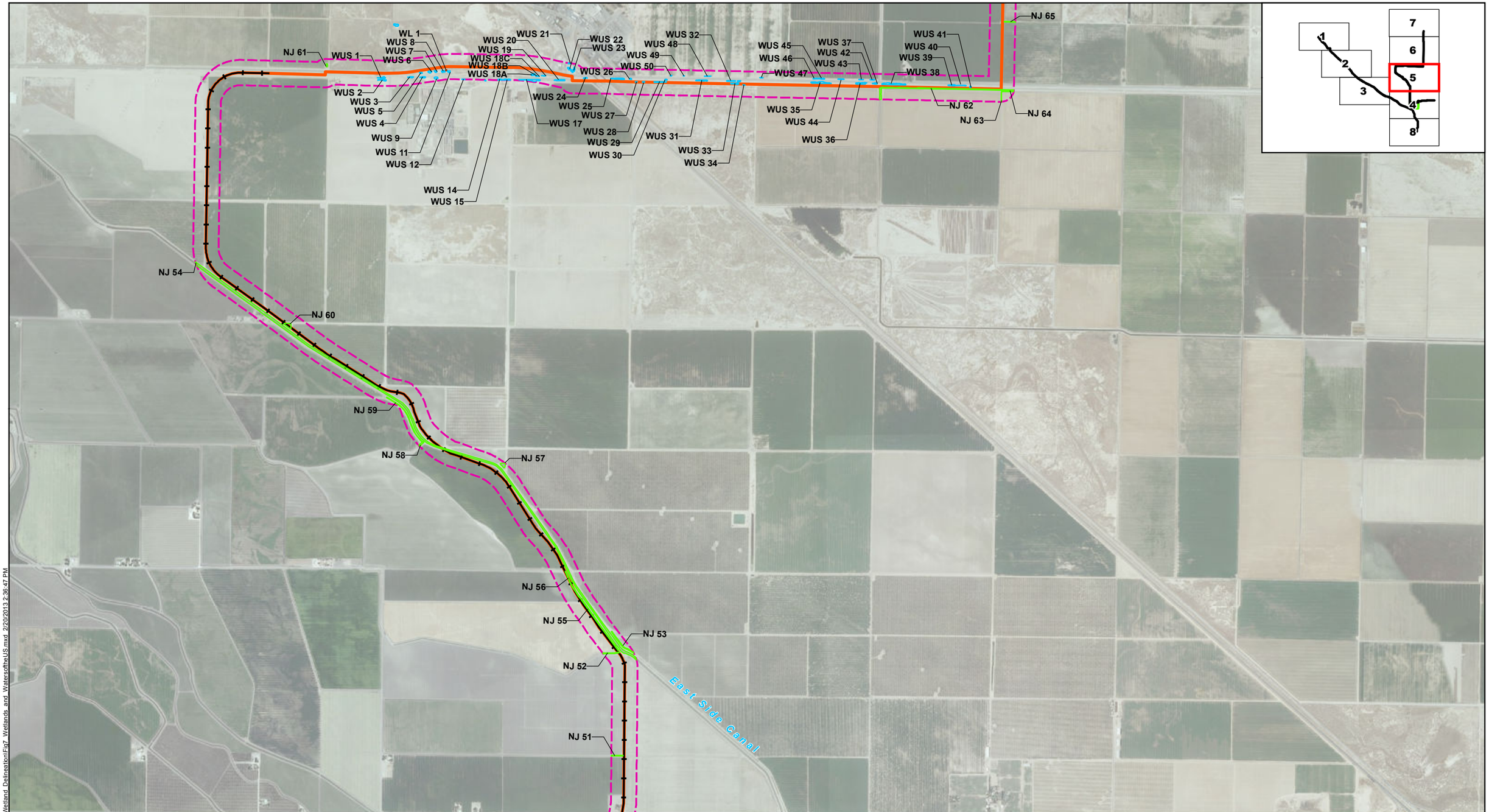
FIGURE 7 - SHEET 4



Project Site
Construction Staging Area
Controlled Area

250-foot Buffer from Disturbance Area
BVWSD Well Field
HDD Entry/Exit Pits
EOR Processing Facility
EOR Satellite Gathering Station

Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

Waters
Non-jurisdictional waters of the U.S. (NJ)
Other waters of the U.S. (WUS)
Wetland (WL)
Area Not Surveyed

N

0 1,000 2,000 FEET

Source: Aerial Imagery, Bing Maps, 2009.

MAPPED WETLANDS AND OTHER WATERS OF THE UNITED STATES WITHIN THE STUDY AREA

Hydrogen Energy California (HECA)
Wetland Delineation
Kern County, California

February 2013
28068052

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FIGURE 7 - SHEET 5

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Project Site
Construction Staging Area
Controlled Area

250-foot Buffer from Disturbance Area
BVWSD Well Field
HDD Entry/Exit Pits
EOR Processing Facility
EOR Satellite Gathering Station

Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

Waters
Non-jurisdictional waters of the U.S. (NJ)
Other waters of the U.S. (WUS)
Wetland (WL)
Area Not Surveyed

N

0 1,000 2,000 FEET

Source: Aerial Imagery, Bing Maps, 2009.

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MAPPED WETLANDS AND OTHER WATERS OF THE UNITED STATES WITHIN THE STUDY AREA

Hydrogen Energy California (HECA)
Wetland Delineation
Kern County, California

February 2013
28068052

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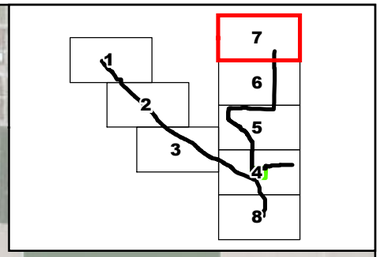
FIGURE 7 - SHEET 6



Project Site
Construction Staging Area
Controlled Area

250-foot Buffer from Disturbance Area
BVWSD Well Field
HDD Entry/Exit Pits
EOR Processing Facility
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Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

Waters
Non-jurisdictional waters of the U.S. (NJ)
Other waters of the U.S. (WUS)
Wetland (WL)
Area Not Surveyed

N

0 1,000 2,000 FEET

Source: Aerial Imagery, Bing Maps, 2009.

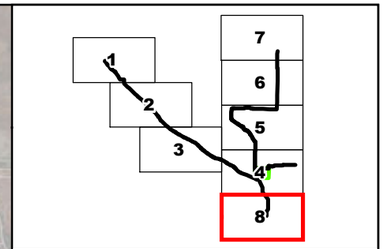
MAPPED WETLANDS AND OTHER WATERS OF THE UNITED STATES WITHIN THE STUDY AREA

Hydrogen Energy California (HECA)
Wetland Delineation
Kern County, California

February 2013
28068052

URS

FIGURE 7 - SHEET 7



Project Site
Construction Staging Area
Controlled Area

250-foot Buffer from Disturbance Area
BVWSD Well Field
HDD Entry/Exit Pits
EOR Processing Facility
EOR Satellite Gathering Station

Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

Waters
Non-jurisdictional waters of the U.S. (NJ)
Other waters of the U.S. (WUS)
Wetland (WL)
Area Not Surveyed

N

0 1,000 2,000 FEET

Source: Aerial Imagery, Bing Maps, 2009.

et U:\GIS\HECA\Projects\HECA_2012\Wetland_Delineation\Fig7_Wetlands_and_WatersoftheUS.mxd 2/20/2013 2:36:47 PM

MAPPED WETLANDS AND OTHER WATERS OF THE UNITED STATES WITHIN THE STUDY AREA

Hydrogen Energy California (HECA)
Wetland Delineation
Kern County, California

February 2013
28068052

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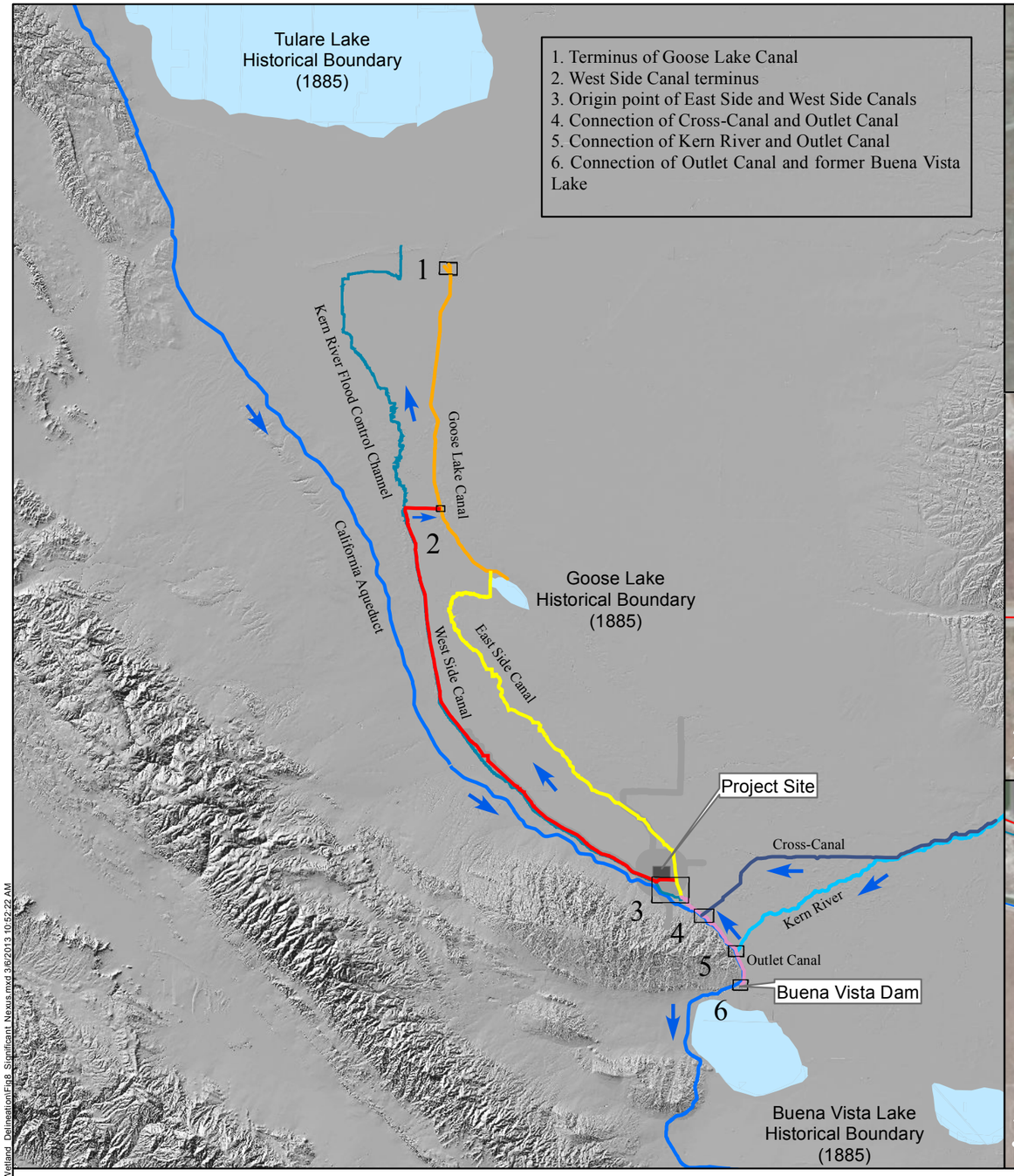
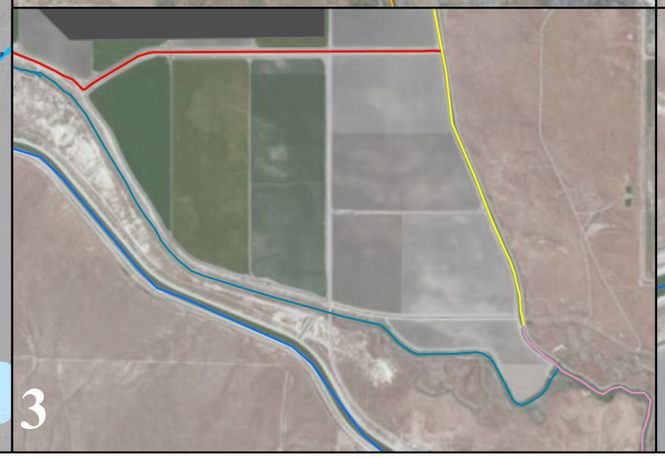
FIGURE 7 - SHEET 8





Legend

- California Aqueduct
- Cross-Canal
- East Side Canal
- Goose Lake Canal
- Kern River
- Kern River Flood-control Channel
- Outlet Canal
- West Side Canal
- Project site
- Bio-resources Study Area

N

0 5 10 Miles

SIGNIFICANT NEXUS

Hydrogen Energy California (HECA)
Wetland Delineation
Kern County, California

February 2013
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FIGURE 8

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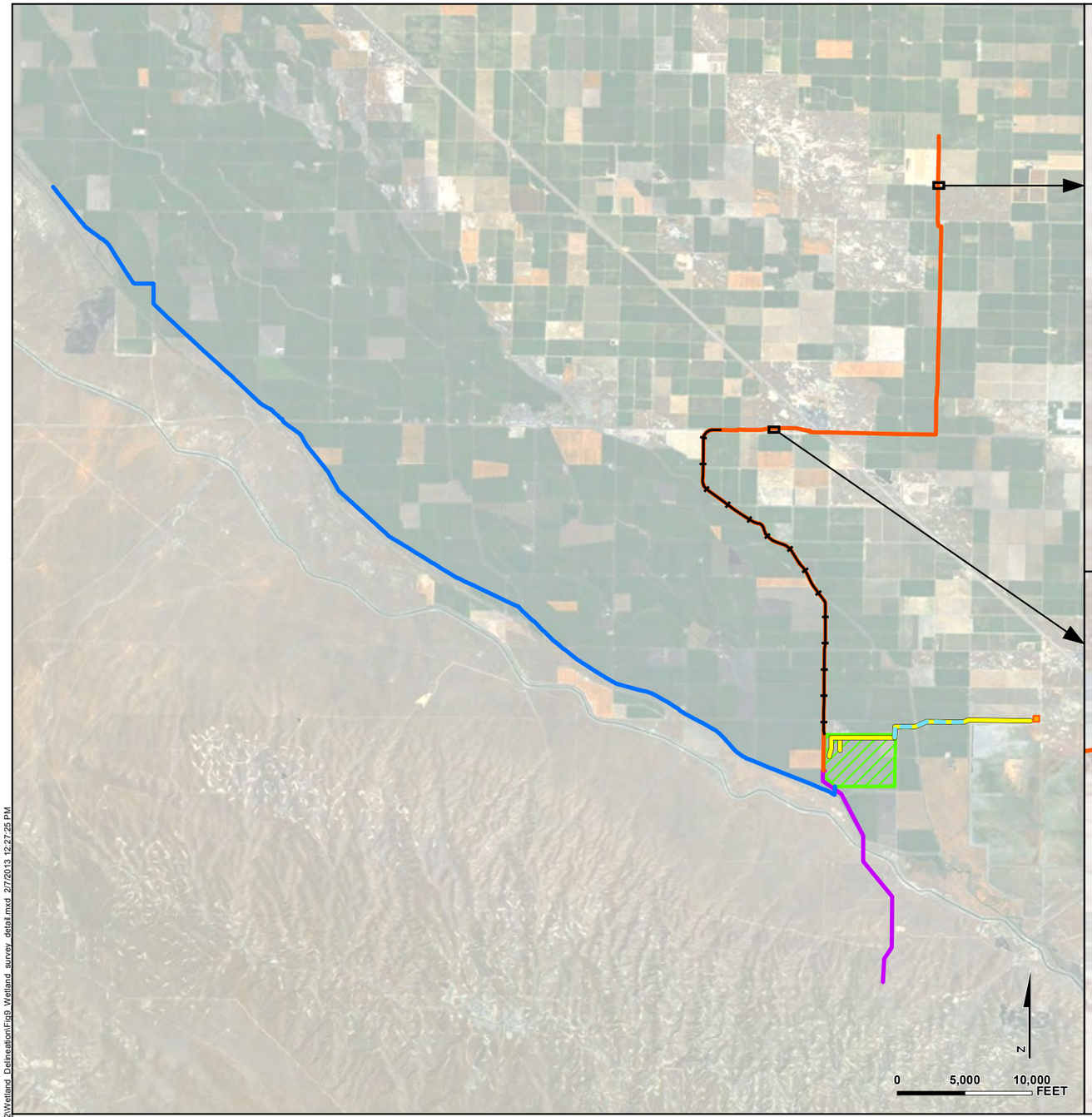

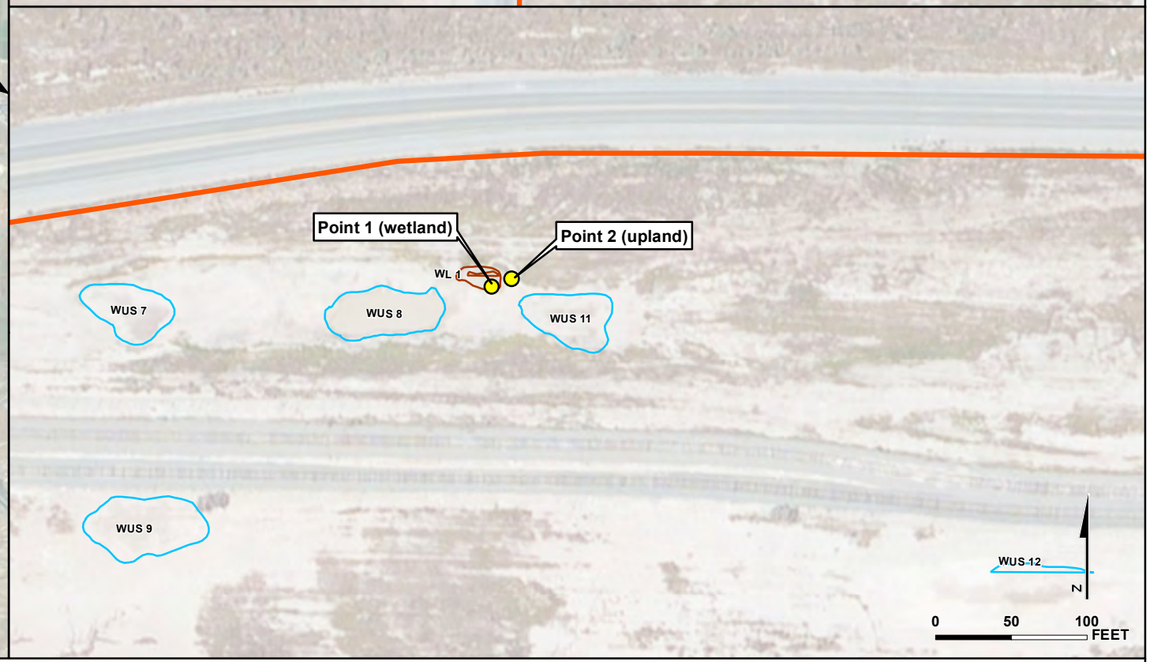

- Carbon Dioxide
- Natural Gas
- Potable Water
- Process Water
- Railroad
- Transmission
- Wetland Determination Sampling Point
- Project Site
- Electrical Switching Station

Waters

- Wetland (WL)
- Other waters of the U.S. (WUS)

Source: Aerial Imagery, Bing Maps, 2009.

lod:U:\GIS\HECA\Projects\HECA_2012\Wetland_Delineation\Fig9_Wetland_survey_detail.mxd 2/7/2013 12:27:25 PM

WETLAND DETERMINATION SAMPLING POINTS

Hydrogen Energy California (HECA)
Wetland Delineation
Kern County, California

February 2013
28068052

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FIGURE 9

WL 1 is adjacent to several WUS depressional features that featured aquatic invertebrates (as discussed further in Section 3.2.4). The presence of aquatic invertebrates qualifies as a positive hydrology indicator in the Arid West Manual (Indicator B13: Aquatic Invertebrates). Additional positive hydrologic indicators were observed in the form of soil cracking and sediment deposits.

3.2.4 Waters of the United States

The areas of WUS features identified in the Study Area are presented in Table 3-3 and Appendix E. These features are discussed below, grouped by location and type.

Table 3-3
Area of Potentially Jurisdictional Other Waters in the Study Area

Feature	Number of Features	Square Feet	Acres
Seasonally Ponded Depressions (SR 58)	50	127,284	2.92
Seasonally Ponded Depressions (WUS 62-64)	3	356	0.01
California Aqueduct	1	74,104	1.70
Kern River Flood Control Channel	1	3,827,945	87.88
Total	**55**	**4,029,689**	**92.51**

Notes:
SR = State Route
WUS = Other/nonwetland Water of the United States

SR 58 Natural Gas Linear

The area included along the proposed natural gas line along SR 58 was added to the Project after the 2011 surveys had been completed. Therefore, it was not surveyed in 2011. During the March 2012 surveys, this area had numerous depressions that were ponded or saturated. The elliptical depressions lie in an east-to-west fashion along the toe of the Union Pacific Railroad berm. This area is mostly unvegetated, and is used as an access road for the railroad adjacent to SR 58. As a result of frequent vehicle use, soils in this area have been compacted, resulting in shallow depressions with poor drainage and permeability. During times of increased rainfall, these depressions become inundated, forming shallow pools of water that persist for at least 10 to12 days during the growing season. The best evidence for the length of ponding in the shallow depressions was the presence of Mature Lindahl's fairy shrimp (*Branchinecta lindahli*), observed during the March 2012 surveys. This species of fairy shrimp is regionally common in seasonally ponded wetlands, and typically require 10 to 14 days of ponding to reach maturity; this would satisfy the hydrology indicator for the minimum duration of ponding in the depressions the 2012 field surveys (Eriksen and Belk, 1999).

None of these depressions were vegetated. Therefore, they were mapped as WUS based on the presence of ponding for greater than 5 percent of the growing season. Because these areas could not qualify as three-parameter wetlands, soil test pits were not taken for these areas.

WUS 62, 63, 64

Three features were identified in the undeveloped parcel east of the intersection of 7th Standard Road and Magnolia Avenue during the 2012 surveys. These features were characterized as ponded depressions containing compacted soils as a result of tire tracks from heavy vehicle use. These features contained positive hydrologic indicators in the form of ponding, but lacked vegetation. Therefore, they would not classify as WL. These were mapped as WUS 62, 63, and 64.

California Aqueduct

The California Aqueduct (WUS 53) conveys water from northern California to southern California for drinking water and irrigation. The California Aqueduct is a significant component of the California Department of Water Resources' State Water Project. The concrete-lined channel has a typical cross-section of approximately 40 feet at the base, and an average depth of approximately 30 feet. The CO_2 pipeline component of the Project will be installed beneath the aqueduct, using HDD so that it will not affect the bed or banks of the canal. The jurisdictional status of the aqueduct has not been confirmed by the USACE; however, this assessment assumes that the California Aqueduct is a potential jurisdictional WUS because it conveys water diverted from the San Joaquin and Sacramento Rivers to other jurisdictional streams in southern California.

Kern River Flood Control Channel

The KRFCC (WUS 54) is an overflow channel of the Kern River, approximately 700 feet to the south of the Project Site (Figure 9). The USACE has previously determined that a portion of the Kern River is navigable (Case ID: SPK-2008-00968) (USACE, 2012), making it a TNW under 33 CFR 328.3(a)(3)(i). Water from the Kern River and the former Buena Vista Lake are conveyed to the KRFCC via the Outlet Canal, which is maintained by the BVWSD. The KRFCC would likely fall under the jurisdiction of the USACE as a WUS, because it is hydrologically connected to the Kern River, a TNW; and the bed and bank of the channel are clearly defined by levees within the Study Area. Drainage canals and ditches, which have a significant hydrologic nexus with this channel, are also likely to be potentially jurisdictional WUSs.

3.2.5 Discussion of Other Habitat Surveyed

An undeveloped parcel at the intersection of 7th Standard Road and Magnolia Avenue was surveyed for wetlands or other jurisdictional waters in both 2011 and 2012. Except for WUS 62, 63, and 64, described above, this portion of the study area does not include any features that meet the USACE criteria for jurisdictional waters.

Alkaline Soil Depressions

Field surveys in 2011 found several potentially jurisdictional depressions on the undeveloped parcel surrounding WUS 62-64 (Figure 7-6). These features included hydrophytic vegetation (dominants were *Lepidium dictyotum* [OBL] and *Plantago elongata* [FACW]) as well as hydrology indicator B6 Surface Soil Cracks (Appendix D). Evidence of alkaline soils was

present in the Project vicinity, as determined through high levels of effervescence when soil was combined with hydrochloric acid; moderately to very strongly alkaline soils are considered potentially problematic hydric soils by USACE (USACE, 2008a). The shallow depressional areas did not always form distinct topographic depressions, but the hydric vegetation, B6 hydrology indicator, and problematic soils were judged, at the time, to be positive indicators of wetlands. Therefore, these features were surveyed along transects to determine the percentage of the depressions that qualified as wetland versus upland habitat.

The March 28, 2012, site visit, timed approximately 10 days after a series of significant precipitation events (0.85 inch of precipitation on March 17, 0.11 inch on March 18, and 0.09 inch on March 25, as recorded in Bakersfield), confirmed that most of the potentially jurisdictional areas lacked continuous ponding or saturation of the soil surface for more than 5 percent of the growing season (Weather Underground, 2011). A representative soil test pit in one of the depressions consisted of clay and clay loam soils, with no visible redoximorphic features. No hydrophytic vegetation was observed during the 2012 survey, although this may be due to the season's low total precipitation. Except for small areas of saturation or ponding observed within the compacted soils of a dirt roadway, all of the depressions in this portion of the Study Area failed to meet USACE criteria for WL or WUS, based on the absence of wetland hydrology.

Judging by the vegetation, soil, and hydrology characteristics observed in this area, these depressions are more aptly defined as alkaline soil depressions. These features have saline/sodic soils that disperse the clay particles within the topsoil, eliminating macropores necessary for drainage, and causing temporary surficial ponding. These areas share many of the characteristics of alkaline rain pools, described previously by Dr. Robert E. Preston (Preston, 2009), albeit without sufficient depth or total annual precipitation to be three-parameter USACE WL. The precipitation was likely sufficient, however, to lead to the soil cracking that was witnessed in some of the unvegetated alkaline soil depressions.

Based on the limited ponding that has been observed during two seasons of field surveys, it is unlikely that most of this area would meet the 5 percent minimum continuous saturation level necessary to meet USACE criteria for wetland hydrology. Therefore, the alkaline soil depressions found in the Study Area would receive sufficient moisture for soil cracking and potentially sufficient moisture for saturation and/or temporary ponding, but the duration of saturation and ponding is insufficient to meet USACE wetland hydrology or hydric soil criteria. Therefore, these areas are not jurisdictional three-parameter wetlands.

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Appendix A

WETS Tables

WETS Station : BAKERSFIELD WSO ARPT, CA0442 Creation Date: 08/29/2002
Latitude: 3525 Longitude: 11903 Elevation: 00490
State FIPS/County(FIPS): 06029 County Name: Kern
Start yr. - 1971 End yr. - 2000

Month	Temperature (Degrees F.)			Precipitation (Inches)				
	avg daily max	avg daily min	avg	avg	30% chance will have less than	30% chance will have more than	avg # of days w/.1 or more	avg total snow fall
January	57.3	39.3	48.3	1.18	0.50	1.46	3	0.0
February	64.2	43.0	53.6	1.21	0.49	1.46	3	0.0
March	68.9	46.2	57.6	1.41	0.75	1.74	3	0.1
April	76.2	49.6	62.9	0.45	0.13	0.60	1	0.0
May	84.4	56.8	70.6	0.24	0.00	0.24	0	0.0
June	92.3	63.7	78.0	0.11	0.00	0.06	0	0.0
July	97.9	69.2	83.5	0.00	0.00	0.00	0	0.0
August	96.5	68.4	82.4	0.08	0.00	0.00	0	0.0
September	90.7	63.9	77.3	0.15	0.00	0.14	0	0.0
October	80.9	54.9	67.9	0.30	0.06	0.38	0	0.0
November	66.5	44.1	55.3	0.61	0.22	0.77	1	0.0
December	57.4	38.2	47.8	0.76	0.37	0.96	2	0.0
Annual	-----	-----	-----	------	5.15	7.45	--	----
Average	77.8	53.1	65.4	------	------	------	--	----
Total	-----	-----	-----	6.51	------	------	13	0.1

GROWING SEASON DATES

Probability	Temperature		
	24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	---------- > 365 days	12/31 to 12/31 > 365 days	1/26 to 12/ 8 318 days
70 percent *	---------- > 365 days	12/31 to 12/31 > 365 days	1/17 to 12/17 335 days

* Percent chance of the growing season occurring between the Beginning

and Ending dates.

total 1938-2002 prcp

Station : CA0442, BAKERSFIELD WSO ARPT
------- Unit = inches

yr	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	annl
38	0.92	1.89	4.61	1.40	0.63	0.00	0.00	0.00	0.01	0.12	0.02	1.53	11.13
39	1.12	1.00	2.37	0.31	0.35	0.03	0.00	0.00	0.48	0.22	0.00	0.19	6.07
40	1.81	2.58	0.75	1.20	0.00	0.00	0.00	0.00	0.00	1.51	0.03	1.67	9.55
41	1.54	M2.28	2.39	2.13	0.06	0.00	0.00	0.00	0.00	0.53	0.49	1.52	10.94
42	0.47	0.19	0.60	1.03	0.19	0.00	0.00	0.01	0.00	0.24	0.20	1.33	4.26
43	2.87	1.55	0.80	2.39	0.25	0.00	0.00	0.00	0.00	0.05	0.09	1.38	9.38
44	0.71	1.18	0.76	0.63	0.23	0.13	0.00	0.00	0.00	0.14	1.70	0.60	6.08
45	0.82	2.91	1.15	0.64	0.26	0.14	0.00	0.00	0.07	0.58	0.28	M0.85	7.70
46	0.46	0.82	1.01	0.02	0.42	0.00	0.23	0.04	0.00	0.48	1.14	1.33	5.95
47	0.24	0.12	1.02	0.54	0.00	0.00	0.00	0.07	0.00	0.02	0.01	0.66	2.68
48	0.01	0.49	M1.26	M0.90	0.18	0.60	0.00	0.00	0.00	0.14	0.00	0.50	4.08
49	0.47	1.10	1.12	0.07	0.66	0.00	0.00	M0.01	0.00	0.00	0.51	0.57	4.51
50	M1.13	M0.70	0.51	0.47	0.02	0.00	0.03	0.00	0.61	0.22	0.58	M0.31	4.58
51	1.61	0.55	M0.36	0.87	0.06	0.00	0.00	M0.00	0.00	0.17	0.33	1.76	5.71
52	2.47	0.27	2.39	1.29	0.00	0.00	0.10	0.00	0.00	0.00	1.32	1.80	9.64
53	0.62	0.26	1.22	0.54	0.53	0.00	0.00	0.00	0.00	0.02	0.80	0.18	4.17
54	1.86	0.25	1.24	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.57	4.48
55	1.51	0.85	0.25	0.80	0.16	0.00	0.00	0.00	0.00	0.00	0.51	0.50	4.58
56	0.90	0.65	0.00	0.94	0.40	0.00	0.00	0.00	0.00	1.46	0.00	0.05	4.40
57	0.82	0.70	0.16	0.96	0.23	0.32	0.00	0.00	0.00	0.78	0.57	1.02	5.56
58	0.93	1.55	2.05	2.23	M0.88	0.00	0.00	0.01	0.56	0.00	0.38	0.02	8.61
59	0.32	0.88	0.02	0.23	0.03	0.00	0.00	0.00	0.04	0.00	0.00	0.35	1.87
60	1.42	1.56	0.16	0.77	0.00	0.00	0.00	0.00	0.00	0.08	3.04	0.00	7.03
61	0.39	0.12	0.38	0.04	0.02	0.00	0.00	0.02	0.00	0.00	0.67	0.34	1.98
62	M0.59	4.42	0.31	0.02	0.07	0.00	0.00	0.00	0.02	0.23	0.00	0.00	5.66
63	0.12	1.54	1.25	0.85	0.26	0.28	0.00	0.00	0.83	0.73	0.94	0.08	6.88
64	0.27	0.41	0.57	0.56	0.20	0.01	0.00	0.17	0.00	0.67	0.46	0.69	4.01
65	0.74	0.17	1.17	1.65	0.02	0.00	0.30	0.00	0.10	0.00	1.05	1.60	6.80
66	0.70	1.14	0.29	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.88	1.58	4.62
67	0.96	0.03	0.52	2.65	0.28	0.20	0.00	0.00	0.11	0.00	1.76	0.54	7.05
68	0.49	0.56	1.01	0.66	0.06	0.00	0.00	0.00	0.00	1.29	0.40	0.67	5.14
69	2.12	2.83	0.29	1.10	0.08	0.00	0.00	0.00	0.00	0.00	0.42	0.16	7.00
70	0.57	1.56	0.48	0.16	0.00	0.00	0.00	0.00	0.00	0.00	1.70	0.71	5.18
71	0.53	0.35	0.42	0.56	2.39	0.00	0.00	0.12	0.02	0.09	0.12	1.17	5.77
72	0.00	0.27	0.00	0.08	0.02	1.11	0.00	0.00	0.02	0.54	1.55	0.66	4.25
73	2.07	0.49	2.49	0.18	0.00	0.00	0.00	0.00	0.00	0.16	0.64	0.79	6.82
74	1.16	0.13	1.53	0.70	0.00	0.00	0.00	0.00	0.00	1.82	0.51	1.19	7.04
75	0.06	1.60	0.60	0.93	0.00	0.00	0.00	0.05	0.00	0.48	0.25	0.13	4.10
76	0.05	1.64	0.44	0.76	0.55	0.02	0.00	0.00	1.06	0.11	0.31	0.13	5.07
77	0.58	0.07	1.28	0.00	0.59	0.06	0.02	1.03	0.00	0.00	0.09	1.80	5.52
78	1.21	4.68	2.00	0.88	0.02	0.00	0.00	0.00	0.74	0.00	0.21	0.57	10.31
79	1.80	1.41	1.97	0.00	0.00	0.00	0.00	0.00	0.35	0.28	0.16	0.22	6.19
80	2.60	1.04	1.32	0.66	0.21	0.00	0.00	0.00	0.00	0.03	0.00	0.15	6.01
81	0.93	0.78	2.15	0.56	0.18	0.00	0.00	0.00	0.00	0.83	0.41	0.23	6.07
82	0.77	0.60	2.13	1.07	0.00	0.42	0.00	0.00	0.70	0.71	1.30	0.33	8.03
83	2.21	1.49	2.62	0.57	0.01	0.00	0.00	1.18	0.18	0.14	1.31	1.15	10.86
84	0.05	0.05	0.69	0.50	0.00	0.01	0.00	0.01	0.02	0.13	1.01	0.95	3.42
85	0.38	0.48	0.48	0.00	0.14	0.44	0.00	0.00	0.24	0.18	1.65	0.27	4.26

86	1.12	0.80	1.95	0.24	0.02	0.00	0.00	0.00	0.03	0.00	0.56	0.97	5.69
87	1.61	0.89	1.07	0.10	0.04	0.31	0.00	0.07	0.01	0.18	1.40	0.83	6.51
88	0.81	0.37	0.41	1.31	0.12	0.04	0.00	0.00	0.00	0.00	0.64	0.82	4.52
89	0.16	0.81	0.86	0.00	0.45	0.00	0.00	0.00	0.49	0.04	0.07	0.00	2.88
90	0.85	0.93	0.45	0.18	0.29	0.00	0.00	0.00	0.05	0.03	0.47	0.26	3.51
91	0.62	0.13	4.33	0.06	0.00	0.00	0.00	0.00	0.01	0.30	0.01	1.04	6.50
92	1.56	2.14	1.86	0.00	0.08	0.00	0.03	0.00	0.00	0.92	0.00	1.81	8.40
93	2.33	2.02	1.76	0.00	0.00	0.48	0.00	0.00	0.00	0.17	0.79	0.62	8.17
94	0.57	1.34	0.97	1.06	0.27	0.00	0.00	0.01	0.09	0.08	0.98	1.32	6.69
95	2.29	0.87	3.39	0.79	0.35	0.12	0.00	0.00	0.00	0.00		2.03	9.84
96	1.08	2.54	0.78	0.12	0.02	0.00	0.00	0.00	0.00	0.94	0.84	1.73	8.05
97	1.88	0.80	0.21	0.00	0.00	0.00	0.00	0.00	0.05	0.25	1.70	0.97	5.86
98	1.32	5.36	2.51	0.87	1.33	0.37	0.00	0.00	0.31	0.24	0.46	0.55	13.32
99	3.90	0.46	0.21	0.83	0.00	0.00	0.00	0.00	0.08	0.00	0.36	0.14	5.98
0	0.94	1.62	1.30	0.57	0.08	0.06	0.00	0.00	0.00	0.39	0.00	0.00	4.96
1	1.81	2.03	0.73	0.81	0.00	0.00	0.05	0.00	0.00	0.21	1.08	0.66	7.38
2													

WETS Station : BUTTONWILLOW, CA1244 Creation Date: 08/29/2002
Latitude: 3524 Longitude: 11928 Elevation: 00270
State FIPS/County(FIPS): 06029 County Name: Kern
Start yr. - 1971 End yr. - 2000

	Temperature (Degrees F.)			Precipitation (Inches)				
					30% chance will have		avg # of days w/.1 or more	avg total snow fall
Month	avg daily max	avg daily min	avg	avg	less than	more than		
January	56.0	36.1	46.1	1.23	0.62	1.55	3	0.0
February	63.7	40.0	51.9	1.23	0.38	1.48	3	0.0
March	68.9	44.0	56.5	1.39	0.54	1.71	3	0.0
April	76.2	47.0	61.6	0.49	0.12	0.61	1	0.0
May	84.8	53.9	69.3	0.23	0.00	0.19	0	0.0
June	92.2	60.2	76.2	0.07	0.00	0.03	0	0.0
July	96.9	65.0	81.0	0.01	0.00	0.00	0	0.0
August	95.7	63.4	79.5	0.04	0.00	0.00	0	0.0
September	90.7	58.3	74.5	0.20	0.00	0.14	0	0.0
October	81.7	49.1	65.4	0.28	0.07	0.39	0	0.0
November	66.9	39.4	53.1	0.55	0.12	0.68	1	0.0
December	56.8	33.8	45.3	0.69	0.28	0.85	1	0.0
Annual	-----	-----	-----	------	4.70	7.36	--	----
Average	77.5	49.2	63.4	------	------	------	--	----
Total	-----	-----	-----	6.41	------	------	12	0.0

GROWING SEASON DATES

	Temperature		
Probability	24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	12/27 to 12/27 > 365 days	1/14 to 11/30 321 days	2/17 to 11/18 275 days
70 percent *	12/27 to 12/27 > 365 days	12/31 to 12/13 348 days	2/ 6 to 11/28 296 days

* Percent chance of the growing season occurring between the Beginning and Ending dates.

total 1948-2002 prcp

Station : CA1244, BUTTONWILLOW
------- Unit = inches

yr	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	annl
48							0.00	0.00	0.00	0.00	0.00	M0.49	0.49
49	0.28	M0.25	1.11	0.37	1.05	M0.00	0.00	0.00	0.00	M0.00	M0.30	M0.53	3.89
50	M1.28	0.65	0.41	0.07	M0.06	M0.00	0.01	0.00	0.89	0.29	M0.05	M0.18	3.89
51	M0.94	M0.14	M0.27	M0.87	0.03	M0.00	M0.00	0.00	0.00	0.07	0.10	1.31	3.73
52	M2.71	0.36	2.00	0.55	0.00	0.00	0.00	M0.00	M0.11	0.04	0.94	1.68	8.39
53	0.58	M0.11	0.18	M1.12	0.37	0.00	0.00	0.00	0.00	0.00	0.83	0.06	3.25
54	1.58	0.62	1.60	0.34	0.00	0.00	0.00	0.00	M0.00	0.00	0.27	0.72	5.13
55	1.67	0.40	0.26	0.28	0.49	0.00	0.00	0.00	0.00	0.00	0.25	0.51	3.86
56	0.53	0.47	0.01	0.56	0.78	M0.00	0.00	0.00	0.00	0.53	0.00	0.15	3.03
57	M0.65	0.54	0.46	0.59	0.20	0.24	0.00	0.00	M0.00	0.52	0.41	0.52	4.13
58	1.02	1.65	1.77	1.69	0.62	0.00	0.00	0.00	0.65	0.00	0.30	0.05	7.75
59	0.37	1.33	0.00	0.43	0.06	0.00	M0.00	0.00	0.00	0.00	0.00	0.32	2.51
60	1.12	0.92	0.17	0.61	0.00	0.00	0.00	0.00	0.00	0.52	2.69	0.00	6.03
61	0.55	0.26	0.30	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.67	0.74	2.54
62	0.87	5.91	0.32	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.19
63	0.01	1.33	0.71	0.74	0.56	0.51	0.00	0.00	0.31	0.95	0.52	0.04	5.68
64	0.36	0.04	0.33	0.25	0.10	0.00	0.00	0.01	0.24	0.63	0.35	0.63	2.94
65	0.60	0.21	0.54	1.76	0.00	0.00	0.69	0.05	0.09	0.00	1.06	1.16	6.16
66	0.97	0.71	0.02	0.00	0.00	0.09	0.00	0.00	0.13	0.00	0.80	0.69	3.41
67	0.83	0.03	0.51	1.67	0.20	0.02	0.00	0.00	0.10	0.00	1.71	0.85	5.92
68	0.45	0.90	1.19	0.14	0.06	0.01	0.00	0.00	0.00	1.14	0.54	0.38	4.81
69	2.53	2.60	0.45	0.54	0.04	0.00	0.12	0.00	0.00	0.00	0.61	0.26	7.15
70	1.02	0.79	0.85	0.17	0.00	0.00	0.00	0.00	0.00	0.00	1.32	0.56	4.71
71	0.22	0.26	0.16	0.79	1.47	0.00	0.00	0.00	0.05	0.06	0.02	1.17	4.20
72	0.00	0.00	0.00	0.04	0.00	0.32	0.00	0.00	0.00	0.19	1.27	0.55	2.37
73	1.29	0.89	1.54	0.00	0.00	0.00	0.00	0.04	0.00	0.25	0.37	0.35	4.73
74	1.70	0.01	2.08	0.25	0.00	0.00	0.00	0.00	0.00	0.82	0.49	0.72	6.07
75	0.00	1.21	0.75	0.43	0.00	0.00	0.00	0.00	0.00	0.46	0.04	0.18	3.07
76	0.05	1.75	0.09	1.18	0.45	0.05	0.00	0.00	1.76	0.25	0.25	0.30	6.13
77	0.82	0.03	0.73	0.02	0.66	0.03	0.00	0.22	0.00	0.00	0.08	2.30	4.89
78	1.33	4.78	2.20	1.49	0.03	0.00	0.00	0.00	1.51	0.00	0.53	0.62	12.49

79	1.84	1.68	1.71	0.00	0.08	0.00	0.00	0.00	0.09	0.74	0.20	0.36	6.70
80	2.35	1.39	1.42	1.03	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.18	6.44
81	1.22	0.86	2.97	0.34	0.00	0.00	0.00	0.00	0.00	0.52	0.34	0.02	6.27
82	1.16	0.79	2.64	1.66	0.00	0.00	0.00	0.06	0.48	0.51	1.33	0.12	8.75
83	2.18	1.45	2.59	0.46	0.08	0.00	0.00	0.76	0.37	0.68	0.87	1.21	10.65
84	0.25	0.12	0.21	0.18	0.01	0.02	0.20	0.00	0.00	0.18	1.13	1.61	3.91
85	0.88	0.26	0.26		0.00	0.42	0.00	0.00	0.49	0.24	1.38	0.45	4.38
86	0.86	1.10	1.48	0.52	0.01	0.00	0.00	0.00	0.10	0.10	0.64	0.37	5.18
87	2.29	0.86	0.90	0.14	0.13	0.08	0.00	0.00	0.00	0.37	2.35	0.71	7.83
88	1.09	0.28	0.41	1.87	0.00	0.39	0.00	0.00	0.00	0.00	0.18	1.05	5.27
89	0.32	1.30	0.56	0.05	0.15	0.00	0.00	0.00	0.77	0.11	0.00	0.03	3.29
90	0.55	0.96	0.10	0.16	0.20	0.00	0.00	0.02	0.05	0.00	0.14	0.07	2.25
91	0.64	0.33	4.74	0.00	0.07	0.00	0.00	0.00	0.00	M0.00	0.00	0.87	6.65
92	1.57	2.15	1.86	0.00	0.00	0.00	0.03	0.00	0.00	0.26	0.00	1.05	6.92
93		1.81	M1.92	0.13	0.05	0.24	0.00	0.01	0.00	0.26	0.83	0.37	5.62
94	1.19	0.84	0.53	0.54	0.85	0.00	0.00	0.00	0.24	0.16	1.15	1.20	6.70
95	3.37	M0.00	4.37	0.58	0.31	0.10	0.00	0.00	0.00	0.00	0.03		8.76
96	1.17	3.04	0.31	0.20	0.01	0.00	0.05	0.00	0.00	1.13	0.96	1.82	8.69
97	1.90	0.13	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.63	1.34	1.17	5.45
98	0.85	5.64	3.00	0.82	2.32	0.47	0.00	0.00	0.07	0.48	0.39	0.79	14.83
99	3.17	0.27	0.59	0.58	0.00	0.00	0.00	0.00	0.07	0.00	0.17	0.34	5.19
0	1.36	1.52	1.34	0.64	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	4.97
1	1.29	2.65	0.95	0.42	0.00	0.00	0.00	0.00	0.00	0.14	0.56	0.29	6.30
2													

WETS Station : CHINA LAKE ARMITAGE, CA1733 Creation Date: 08/29/2002
Latitude: 3541 Longitude: 11741 Elevation: 02220
State FIPS/County(FIPS): 06029 County Name: Kern
Start yr. - 1978 End yr. - 2000

	Temperature (Degrees F.)			Precipitation (Inches)				
					30% chance will have		avg # of	
Month	avg daily max	avg daily min	avg	avg	less than	more than	days w/.1 or more	avg total snow fall
January	62.3	36.7	49.5	0.91	0.15	1.05	2	0.8
February	-----	-----	-----	0.83	0.14	0.96	1	0.0
March	-----	-----	-----	0.86	0.14	1.03	2	0.0
April	-----	-----	-----	0.14	0.00	0.13	0	0.0
May	87.1	53.3	70.2	0.12	0.00	0.13	0	0.0
June	-----	-----	-----	0.02	0.00	0.00	0	0.0
July	-----	-----	-----	0.09	0.00	0.08	0	0.0
August	100.6	66.5	83.6	0.34	0.00	0.28	0	0.0
September	-----	-----	-----	0.23	0.00	0.22	0	0.0
October	-----	-----	-----	0.11	0.00	0.06	0	0.0
November	-----	-----	-----	0.25	0.00	0.28	0	0.0
December	-----	-----	-----	0.44	0.01	0.50	0	0.5
Annual	-----	-----	-----	------	2.23	4.81	--	----

Average	20.8	13.0	16.9	------	------	------	--	----
Total	-----	-----	-----	4.34	------	------	5	1.3

GROWING SEASON DATES

Probability	Temperature		
	24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	----------	----------	----------
	------	------	------
70 percent *	----------	----------	----------
	------	------	------

* Percent chance of the growing season occurring between the Beginning and Ending dates.

total 1978-2002 prcp

Station : CA1733, CHINA LAKE ARMITAGE
------- Unit = inches

yr	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	annl
78							0.18	0.03	0.43	0.32		0.42	1.38
79	3.18	0.13	1.45	0.00	0.11	0.00	0.10	0.63	0.00	0.00	0.00	0.05	5.65
80	1.26	2.46	1.13	0.54	0.20	0.00	0.02	0.00	0.00	0.00	0.00	0.03	5.64
81	0.46	0.16	1.77	0.00	0.33	0.00	0.00	0.00	0.48	0.42	0.70	0.00	4.32
82	0.23	0.57	1.06	0.25	0.03	0.03	0.00	0.55	0.56	0.02	1.03	0.29	4.62
83		1.25	3.64	0.31	0.00	0.00	0.00	2.35	0.10	0.25	0.03	M1.14	9.07
84	0.00	0.00	0.02	0.00	0.01	0.00	0.89	1.65	0.04	0.01	M1.12	2.23	5.97
85	0.14	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.19	0.00	0.51	0.39	1.27
86	1.89	0.53	0.14	0.03	0.00	0.00	0.03	0.18	0.00	0.03	0.50	0.99	4.32
87	0.53	0.05	0.53	0.12	0.12	0.21	0.00	0.11	0.14	1.00		1.21	4.02
88	1.03	0.04	0.04	0.60	0.00	0.23	0.03	1.73	0.00	0.00	0.06	0.02	3.78
89	M0.08	0.57		0.00	0.12	0.00	0.00	0.01	0.02	0.01	0.00	0.00	0.81
90	M0.48				M0.00	0.00	0.15	0.10	0.05	0.01	0.15		0.94
91	0.28	1.87	2.52	0.00	0.00	0.00	0.07	0.00	0.16	0.00		0.60	5.50
92	M1.73	4.10	2.05	0.20	0.17	0.00	0.08	0.02	0.00	0.00	0.00	1.47	9.82
93	1.51	1.82	0.13	0.00	0.32	0.00	0.00	0.11	0.00	0.00	0.04	0.08	4.01
94	0.01	0.55	0.00	0.02	0.01	0.00	0.00	0.00	0.04	0.03	0.09	M0.00	0.75
95	4.98	0.11	1.18	0.00	0.18	0.00	0.00	0.02	0.01	0.00	0.00	0.05	6.53
96	0.13	0.62	0.16	0.01	0.02	0.00	0.00	0.00	0.00	0.38	0.31	0.63	2.26
97	0.14	0.00	0.00	0.00	0.03	0.00	0.44	0.00	2.68	0.00	0.37	0.12	3.78
98	0.00	2.13	0.49	0.00	0.98	0.00		0.03	0.34	0.00	0.00	0.00	3.97
99		0.03	0.12	0.84	0.01	0.00	0.04	0.00	0.03	0.00	0.00	0.00	1.07
0	0.10	0.47	0.80	0.04	0.00	0.00	0.00		0.00	0.00	0.00	0.00	1.41
1	1.24	2.36	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.05	0.04	4.01

WETS Station : DELANO, CA2346
Latitude: 3547 Longitude: 11915 Elevation: 00320
State FIPS/County(FIPS): 06029 County Name: Kern
Start yr. - 1971 End yr. - 2000

Month	Temperature (Degrees F.) avg daily max	avg daily min	avg	Precipitation (Inches) avg	30% chance will have less than	more than	avg # of days w/.1 or more	avg total snow fall
January	-----	-----	-----	1.35	0.55	1.66	4	0.1
February	-----	-----	-----	1.45	0.57	1.76	3	0.0
March	-----	-----	-----	1.59	0.66	1.99	4	0.0
April	-----	-----	-----	0.51	0.04	0.62	1	0.0
May	-----	-----	-----	0.34	0.00	0.30	0	0.0
June	-----	-----	-----	0.06	0.00	0.00	0	0.0
July	-----	-----	-----	0.00	0.00	0.00	0	0.0
August	-----	-----	-----	0.02	0.00	0.00	0	0.0
September	-----	-----	-----	0.23	0.00	0.10	0	0.0
October	-----	-----	-----	0.38	0.00	0.50	1	0.0
November	-----	-----	-----	0.80	0.25	1.04	2	0.0
December	-----	-----	-----	0.88	0.31	1.10	2	0.0
Annual	-----	-----	-----	------	5.53	8.56	--	----
Average	0.0	0.0	0.0	------	------	------	--	----
Total	-----	-----	-----	7.59	------	------	17	0.1

GROWING SEASON DATES

Probability	Temperature 24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	---------- ------	---------- ------	---------- ------
70 percent *	---------- ------	---------- ------	---------- ------

* Percent chance of the growing season occurring between the Beginning and Ending dates

total 1948-2002 prcp

Station : CA2346, DELANO
------- Unit = inches

yr	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	annl
48							0.00	0.00	M0.00	0.13	0.00	0.70	0.83
49	0.76	1.39	1.27	0.04	0.00	0.00	0.00	0.00	0.00	0.03	0.46	0.51	4.46
50	1.52	1.23	0.48	0.46	0.00	0.00	0.00	0.00	M0.00	0.22	0.30	0.57	4.78
51	1.37	0.36	0.55	0.77	0.00	0.00	0.00	0.00	0.00	0.08	0.47	1.38	4.98
52	3.84	0.08	2.88	0.62	0.00	0.00	0.00	0.00	0.25	0.00	1.40	M2.04	11.11
53	0.79	0.12	0.36	0.24	0.55	M0.00	0.00	0.00	0.00	0.00	1.10	0.14	3.30
54	1.92	0.85	1.66	0.34	0.01	0.00	0.00	0.00	0.00	0.00	0.47	1.13	6.38
55	2.43	0.61	0.28	0.53	0.57	0.00	0.00	0.00	0.00	0.00	0.73	0.74	5.89
56	1.06	0.75	0.13	1.49	0.42	0.00	0.00	0.00	0.00	0.36	0.00	0.16	4.37
57	1.27	0.57	1.07	1.06	0.59	0.10	0.00	0.00	0.00	0.63	0.99	1.26	7.54
58	1.56	2.73	3.49	2.56	0.47	0.00	0.00	0.00	1.41	0.00	0.54	0.02	12.78
59	0.80	2.40	0.04	0.66	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.37	4.30
60	0.84	1.58	0.56	1.05	0.00	0.00	0.01	0.00	0.00	0.30	3.34	0.22	7.90
61	0.98	0.13	0.74	0.36	0.14	0.00	0.00	0.02	0.00	0.00	0.76	0.58	3.71
62	1.55	5.06	M0.30	0.00	0.25	0.00	0.00	0.00	0.15	0.11	0.00	0.00	7.42
63	0.23	1.48	1.36	1.37	0.89	0.82	0.00	0.03	0.88	1.08	0.82	0.23	9.19
64	0.53	0.17	0.58	0.93	0.17	0.00	0.00	0.00	0.00	0.66	1.08	0.76	4.88
65	0.52	0.04	1.34	3.02	0.00	0.00	0.00	0.17	0.05	0.00	1.27	1.91	8.32
66	0.53	0.67	0.07	0.00	0.00	0.06	0.00	0.00	0.08	0.00	1.18	2.46	5.05
67	1.09	0.15	0.74	3.70	0.26	1.03	0.00	0.00	0.10	0.00	1.82	0.54	9.43
68	0.48	0.68	1.72	0.53	0.03	0.00	0.00	0.00	0.00	1.40	0.68	0.99	6.51
69	5.36	3.55	0.57	1.70	0.12	0.07	0.00	0.00	0.00	0.04	0.48	0.37	12.26
70	0.88	0.89	1.26	0.34	0.00	0.02	0.00	0.00	0.00	0.00	2.96	0.98	7.33
71	0.91	0.25	0.16	0.49	2.26	0.00	0.00	0.00	0.05	0.00	0.23	2.09	6.44
72	0.16	0.40	0.00	0.13	0.12	0.06	0.00	0.00	0.00	1.09	2.72	0.91	5.59
73	3.30	1.94	2.58	0.12	0.00	0.00	0.00	0.10	0.00	0.80	0.66	0.77	10.27
74	2.19	0.24	2.09	0.38	0.00	0.00	0.00	0.00	0.00	1.48	0.52	1.04	7.94
75	0.04	1.70	0.94		0.00			0.00	0.00	0.67	0.21	0.20	3.76
76	0.00	2.37	0.35	1.03	0.40	0.04	0.00	0.00	1.88	0.00	0.62	0.38	7.07
77	0.32	0.02	0.38	0.00	1.22	0.09	0.00	0.10	0.00	0.08	0.00	2.52	4.73
78	2.56	5.50	3.26	1.43	0.00	0.00	0.00	0.00	1.78	0.00	0.30	0.88	15.71
79	1.36	1.32	1.72	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.58	5.35
80	2.30	2.04	1.35		0.13	0.00	0.02	0.00	0.00	0.14		0.25	6.23
81	1.40	1.12	2.70	0.65	0.00	0.00	0.00	0.00	0.00	0.24	0.73	0.16	7.00
82	0.59	0.99	2.71	2.20	0.00	0.00	0.00	0.00	0.00	0.73	1.54	0.43	9.19
83	3.21	1.66	3.33	0.64	0.29	0.00	0.00	0.44	1.00	0.22	1.07	1.45	13.31
84	0.07	0.22	0.11	0.80	0.00	0.00	0.00	0.00	0.00	0.52	1.26	1.28	4.26
85	0.39	0.43	0.60	0.00	0.00	0.00	0.00	0.00	1.05	0.30	2.20	0.13	5.10
86	1.38	1.58	2.29		0.00	0.00	0.00	0.00	0.09		0.65	0.00	5.99
87	1.26	1.15	1.35	0.00	0.00		0.00	0.00	0.00	0.40	1.92	0.97	7.05
88	1.14	0.20	0.67	2.05	0.15	0.08	0.00	0.00	0.00	0.00	0.00	1.53	5.82
89	0.19	1.34	M0.46	0.00	0.55	0.00	0.00	0.00	0.21	0.04	0.00	0.00	2.79
90	1.21	1.04	0.28	0.20	0.45	0.00	0.00	0.00	0.05	0.00	0.40	0.04	3.67
91	0.19	0.32	5.74	0.00	0.00	0.00	0.00	0.00		0.56	0.02		6.83
92	1.23	2.60	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.51		1.81	7.13
93	2.01		1.59	0.01	0.00		0.00	0.00	0.00	0.27	0.67	0.62	5.17
94	1.24	1.69	0.75	0.86	1.20	0.00	0.00	0.00	0.23	M0.00	1.09	1.31	8.37

95	2.67	0.83	4.57	M0.60	1.11	0.28	0.00	0.00	0.00	0.00	0.00	1.32	11.38
96	0.62	1.57	0.91	0.24	M0.00	0.00	0.01	0.00	0.00	0.88	2.12	3.02	9.37
97	2.15	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.15	1.80	1.39	5.83
98	1.58	5.54	2.73	0.58	2.34	0.80	0.00	0.00	0.02	0.44	0.93	0.27	15.23
99	3.82	0.52	0.53	0.66	0.00	0.00	0.00	0.00	0.13	0.00	0.38	0.07	6.11
0	1.02	3.11	1.40	0.64	0.00	0.17	0.02	0.00	0.00	1.39	0.00	0.00	7.75
1	1.97	2.12	0.30	1.19	0.00	0.00	0.00	0.00	0.00	0.08	1.86	1.32	8.84
2													

WETS Station : INYOKERN, CA4278 Creation Date: 08/29/2002
Latitude: 3539 Longitude: 11749 Elevation: 02440
State FIPS/County(FIPS): 06029 County Name: Kern
Start yr. - 1971 End yr. - 2000

	Temperature (Degrees F.)			Precipitation (Inches)				
				30% chance will have		avg # of days w/.1 or more	avg total snow fall
Month	avg daily max	avg daily min	avg	avg	less than	more than		
January	60.2	30.9	45.5	0.87	0.11	1.02	2	0.5
February	65.7	35.1	50.4	1.04	0.05	1.20	1	0.0
March	71.3	39.5	55.4	0.76	0.09	0.86	1	0.1
April	78.6	44.7	61.6	0.16	0.00	0.15	0	0.0
May	87.1	53.0	70.0	0.10	0.00	0.10	0	0.0
June	96.9	60.3	78.6	0.02	0.00	0.00	0	0.0
July	102.6	66.1	84.4	0.13	0.00	0.09	0	0.0
August	101.1	64.9	83.0	0.35	0.00	0.22	0	0.0
September	94.0	58.3	76.2	0.25	0.00	0.22	0	0.0
October	83.1	48.2	65.7	0.07	0.00	0.05	0	0.0
November	69.2	36.9	53.0	0.28	0.00	0.34	0	0.0
December	60.3	30.4	45.4	0.57	0.00	0.69	1	0.3
Annual	-----	-----	-----	------	2.50	5.33	--	----
Average	80.8	47.3	64.1	------	------	------	--	----
Total	-----	-----	-----	4.61	------	------	5	0.8

GROWING SEASON DATES

	Temperature		
Probability	24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		

50 percent *	2/10 to 12/ 1 295 days	3/ 1 to 11/20 264 days	3/28 to 11/ 8 225 days
70 percent *	2/ 2 to 12/ 8 310 days	2/22 to 11/27 279 days	3/22 to 11/14 238 days

* Percent chance of the growing season occurring between the Beginning and Ending dates.

total 1948-2002 prcp

Station : CA4278, INYOKERN
Unit = inches

yr	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	annl
48							0.00	0.00	0.00	0.00	0.00	0.03	0.03
49	0.05	M0.20	0.08	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.03	0.80	1.19
50	0.14	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.00	0.07	0.01	1.08
51	0.24	0.00	0.05	0.05	0.37	0.00	0.04	0.00	0.00	0.04	0.06	0.91	1.76
52	M2.38		1.96	0.04	0.05	0.00	0.00	0.00	0.14	0.00	0.92	0.72	6.21
53	0.04	0.00	0.23	0.12	M0.00	0.00	0.00	0.12	0.00	0.00	0.09	M0.00	0.60
54	M1.83	1.12	0.42	0.00	0.00	0.00	0.00	0.02	0.03	0.00	0.72	M0.48	4.62
55	0.58	0.03	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.11	M0.42	1.18
56	1.67	0.00	0.00	0.66	0.19	0.00	0.04	0.00	0.00	0.33	0.00	0.00	2.89
57	0.94	0.71	0.10	0.01	0.14	0.00	0.08	0.00	0.00	0.01	0.34	0.73	3.06
58	0.65	2.04	0.79	0.74	0.00	0.00	0.00	0.00	0.23	0.50	0.00	0.00	4.95
59	0.52	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.71	0.02	0.10	0.75	2.94
60	0.43	M1.35	0.00	0.13	0.04	0.00	0.07	0.00	0.28	0.00	1.14	0.01	3.45
61	0.36	0.02	0.02	0.00	0.00	0.00	0.00	0.86	0.00	0.14	M1.15	0.61	3.16
62	0.95	1.77	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	2.93
63	0.15	0.73	0.84	0.06	0.00	0.04	0.00	0.30	0.74	0.60	0.30	0.01	3.77
64	0.34	0.00	0.09	0.00	0.00		0.00	0.00	0.00	0.10	0.31	0.33	1.17
65	0.07	0.11	0.84	1.81	0.00		0.61	0.74	0.00	0.00	2.47	1.93	8.58
66	0.13	0.02	0.00	0.00		0.02	0.00	0.00	0.00	0.00	0.33	1.29	1.79
67	0.57	0.00	0.00	0.46	0.00	0.04	0.58	0.31	0.81	0.00	2.25	0.06	5.08
68	0.00	1.44	0.33	0.02	0.00		1.54	0.01	0.00	0.14	0.00	0.13	3.61
69	1.32	3.08	0.41	0.00	0.06	0.11	0.95	0.00	0.03	0.00	0.33	0.00	6.29
70	0.13	1.39	0.71	0.00	0.00	0.00	0.00	0.00	0.00	0.17	1.80	0.61	4.81
71	0.02	0.00	0.00	0.00	0.38	0.00	0.10	0.00	0.00	0.04	0.00	1.31	1.85
72	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.06	1.60	0.09	1.76
73	0.00	1.52	0.34	0.00	0.50			0.13	0.00	0.00	0.24		2.73
74	M1.92	0.00	1.14	0.27	0.08	0.00	0.52	0.44	0.11	0.70	0.19	0.63	6.00
75	0.00	0.00	M0.01	0.29	0.00	0.00	0.00	0.00	0.95	0.00	0.00	0.00	1.25
76	0.00	3.03	0.18	0.20	0.00	0.00	0.16	0.00	1.71	0.00	0.00	0.00	5.28
77	1.33	0.00	0.85	0.00	0.79	0.00	0.00	2.91	0.00	0.00	0.00	1.68	7.56
78	2.61	2.63	3.77		0.00	0.00	0.00	0.00	0.52	0.29	0.24	0.36	10.42
79	M2.35	0.15	1.48	0.00	0.00	0.00	0.08	0.06		0.00	0.00	0.00	4.12
80				0.80	0.04	0.00			0.00	0.00	0.00	0.00	0.84
81	0.63		1.12	0.00	0.12	0.00	0.00	0.00	0.31	0.00	0.87	0.00	3.05
82	M0.36	0.57	1.31	0.25	0.06	0.20	0.00	0.02	0.45	0.01	M0.00	M0.28	3.51
83	1.74	2.58	3.05	0.07	0.00	0.00	0.00	2.29	0.21	0.10	0.09	1.55	11.68
84	0.00	0.00	0.03	0.00	0.00	0.00	1.51	2.39	0.00	0.00	1.30	M1.79	7.02
85	0.18		0.00	0.00	0.00	0.05	0.00	0.00	0.01	0.00	0.43	0.63	1.30
86	1.59	1.00	0.24	0.10	0.00	M0.00	0.27	0.00	0.00	0.00	0.55	0.78	4.53
87	0.72	0.05	0.61	0.00	M0.06	0.12	0.00	0.00	0.10	0.23	1.14	0.91	3.94

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88 1.03  0.21  0.02  0.92  0.00  0.00        1.01        0.00  0.21  0.53  3.93
89 0.10  0.25  0.04  0.00  0.16  0.00  0.00  0.00  0.04  0.00  0.00  0.00  0.59
90 0.90  0.11  0.01  0.18  0.02  0.00  0.00  0.01  0.44  0.03  0.09  0.01  1.80
91 0.26  1.99  2.25  0.00  0.12  0.00  0.02  0.00  0.13  0.00  0.02 M0.68  5.47
92 0.87  3.05  2.49  0.55  0.24  0.00  0.14  0.11  0.00  0.12  0.00 M2.34  9.91
93M2.88  3.43  0.27  0.00  0.02  0.05  0.00  0.00  0.00  0.08  0.14  0.01  6.88
94 0.01  0.94  0.21  0.00  0.00  0.00  0.00  0.00  0.00  0.10  0.12  0.24  1.62
95 4.55  0.14  1.16  0.00  0.00  0.02  0.00  0.11  0.00  0.00  0.00  1.15  7.13
96 0.19  0.84  0.20  0.01  0.00  0.00  0.08  0.04  0.00  0.27  0.31  0.92  2.86
97M0.15  0.00  0.00  0.00  0.00  0.04 M0.05  0.12  1.62  0.00  0.65  0.66  3.29
98 0.37  4.52  0.45  0.00  0.47  0.00  0.01  0.15  0.48  0.01 M0.10  0.00  6.56
99 0.41  0.06  0.14  1.05  0.00  0.00  0.62  0.00  0.01  0.00  0.00  0.00  2.29
 0 0.06  0.95  0.76  0.09  0.00  0.00  0.00  0.45  0.00  0.00  0.00  0.00  2.31
 1 1.52  3.33  0.45  0.02  0.02  0.00  0.23  0.00  0.00  0.26  0.43  0.00  6.26
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WETS Station : KERN RIVER PH 3, CA4523 Creation Date: 08/29/2002
Latitude: 3547 Longitude: 11826 Elevation: 02700
State FIPS/County(FIPS): 06029 County Name: Kern
Start yr. - 1971 End yr. - 2000

	Temperature (Degrees F.)			Precipitation (Inches)				
					30% chance will have		avg # of days w/.1 or more	avg total snow fall
Month	avg daily max	avg daily min	avg	avg	less than	more than		
January	59.8	33.3	46.6	2.93	1.20	3.66	5	0.2
February	63.2	35.9	49.6	2.83	1.16	3.44	4	0.1
March	66.5	38.8	52.6	2.40	1.09	3.01	4	0.0
April	72.8	43.5	58.1	0.68	0.18	0.87	2	0.0
May	81.0	51.0	66.0	0.30	0.09	0.40	0	0.0
June	90.4	58.6	74.5	0.13	0.00	0.05	0	0.0
July	97.1	64.3	80.7	0.13	0.00	0.10	0	0.0
August	96.5	63.6	80.1	0.19	0.00	0.20	0	0.0
September	90.4	58.2	74.3	0.42	0.00	0.40	1	0.0
October	79.9	48.3	64.1	0.44	0.11	0.55	1	0.0
November	66.8	37.7	52.3	1.23	0.31	1.50	2	0.0
December	60.4	32.5	46.5	1.74	0.63	2.16	3	0.0
Annual	-----	-----	-----	------	10.11	15.21	--	----
Average	77.1	47.1	62.1	------	------	------	--	----
Total	-----	-----	-----	13.42	------	------	22	0.3

GROWING SEASON DATES

	Temperature		
Probability	24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	1/18 to 12/17 334 days	3/ 2 to 11/18 261 days	3/29 to 11/ 9 225 days
70 percent *	1/ 3 to ----- 364 days	2/24 to 11/25 275 days	3/24 to 11/15 237 days

* Percent chance of the growing season occurring between the Beginning and Ending dates.

total 1948-2002 prcp

Station : CA4523, KERN RIVER PH 3
Unit = inches

yr	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	annl
48							0.00	0.00	0.00	0.00	0.00	M0.19	0.19
49	2.64	1.50	1.30	0.24	0.22	0.00	0.00	0.00	0.00	0.03	0.92	1.76	8.61
50	2.88	2.63	1.12	0.65	0.12	0.00	0.01	0.00	0.19	0.22	5.62	1.14	14.58
51	1.13	0.62	0.13	1.05	0.04	0.00	0.00	0.00	0.00	0.52	1.03	7.23	11.75
52	5.80	0.89	4.36	0.39	0.00	0.00	0.44	0.03	0.03	0.00	2.31	3.77	18.02
53	3.07	0.05	1.14	1.48	0.28	0.00	0.06	0.05	0.00	0.19	0.97	0.66	7.95
54	2.25	2.79	3.85	0.37	0.06	0.03	0.00	0.00	0.03	0.00	0.74	1.55	11.67
55	3.65	1.21	0.02	1.22	0.66	0.00	0.00	0.00	0.00	0.00	1.54	4.44	12.74
56	4.34	0.27	0.00	1.36	0.45	0.00	0.06	0.00	0.00	0.77	0.00	0.45	7.70
57	3.06	2.10	0.13	1.33	0.97	0.00	0.02	0.00	0.00	0.66	0.37	2.30	10.94
58	3.87	4.81	4.76	4.21	0.37	0.00	0.02	0.09	0.11	0.15	0.29	0.01	18.69
59	1.12	2.57	0.11	0.41	0.34	0.00	0.00	0.20	0.22	0.06	0.00	1.18	6.21
60	2.74	6.07	0.81	M1.27	0.10	0.00	0.02	0.00	0.18	0.18	2.32	0.09	13.78
61	0.72	0.00	1.77	0.47	0.15	0.15	0.02	2.50	0.00	0.00	2.34	0.78	8.90
62	2.40	6.27	1.96	0.00	0.03	0.00	0.00	0.00	0.02	0.04	0.00	0.00	10.72
63	4.83	2.39	3.02	1.88	0.17	0.33	0.00	0.24	1.29	1.90	1.11	0.43	17.59
64	1.48	0.09	2.40	0.48	0.77	0.07	0.05	0.00	0.01	0.44	1.89	3.80	11.48
65	1.52	0.29	1.49	3.29	0.01		0.18	0.49	0.34	0.00	3.51	2.64	13.76
66	0.49	0.86	0.46	0.00	0.00	0.00	0.00	0.13	0.00	0.00	1.43		3.37
67	3.20	0.29	1.42	3.04	0.28	0.02	0.80	0.13	1.21	0.00	2.43	2.27	15.09
68	1.23	0.80	1.78	0.69	0.01	0.00	0.26	0.00	0.00	0.36	1.20	2.05	8.38
69	11.67	7.62	1.17	1.06	0.17	0.75	0.32	0.00	0.00	0.11	0.60	0.41	23.88
70	3.67	1.53	1.56	0.34	0.00	0.12	0.05	0.00	0.00	0.02	3.35	2.52	13.16
71	0.77	0.25	0.63	0.62	0.47	0.00	0.07	0.11	0.04	0.01	0.75	3.50	7.22
72	0.10	0.53	0.00	0.51	0.00	0.39	0.00	0.59	0.00	0.23	3.08	2.37	7.80
73	4.41	3.33	2.60	0.13	0.18	0.00	0.00	0.04	0.00	0.23	1.44	1.46	13.82
74	4.03	0.19	2.86	1.65	0.22	0.00	0.22	0.12	0.00	1.82	0.06	2.12	13.29
75	0.62	2.58	2.36	0.69	0.13	0.00	0.00	0.00	0.45	0.52	0.45	0.02	7.82
76	0.00	1.34	1.31	1.08	0.22	0.00	0.03	0.00	3.72	0.12	0.01	0.40	8.23
77	1.57	1.29	0.49	0.00	0.85	1.18	0.00	0.87	0.00	0.00	0.18	6.79	13.22
78	5.69	7.51	5.78	1.27	0.00	0.00	0.07	0.00	1.50			1.32	23.14
79	3.50	3.44	2.61	0.00	0.17	0.00	0.02	0.16	1.64	0.79	0.46	0.37	13.16
80	8.76	6.65	2.48	0.44	0.31	0.00	0.08	0.00	0.07	0.07	0.00	0.95	19.81

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81 3.39  1.53  2.74  0.61  0.23  0.00  0.00  0.40  0.33  1.07  1.44  0.85 12.59
82 5.28  1.26  4.65  1.76  0.13  0.02  0.00  0.16  0.97  1.06  4.94  3.47 23.70
83 4.90  5.37  6.41  0.90  0.22  0.00  0.00  1.42  0.59  0.69  3.66  4.11 28.27
84 0.00  1.09  0.44  0.35  0.04  0.00  2.31  1.18  0.01  0.68  3.54  1.87 11.51
85 0.59  1.47  2.63  0.00  0.00  0.00  0.04  0.00  0.18  0.10  2.79  1.45  9.25
86 3.25  5.09  4.11  2.11  0.05  0.00  0.25  0.00  0.54  0.10  0.57  0.24 16.31
87 1.71  2.03  2.70  0.08  0.94  0.12  0.02  0.00  0.00  0.47  0.94  1.35 10.36
88 2.25  0.49  0.32  1.99  0.53  0.41  0.01  0.13  0.00  0.00  1.68  3.22 11.03
89 0.38  3.62  2.66  0.08  0.13  0.00  0.00  0.00  0.75  0.05  0.40  0.00  8.07
90 1.59  1.44  0.46  0.65  0.48  0.07  0.00  0.13  0.24  0.00  0.57  0.68  6.31
91 0.92  0.99  8.81  0.05  0.18  0.00  0.01  0.03  0.15  0.49  0.95  1.22 13.80
92 1.18  3.60  1.40  0.00  0.31  0.02  0.02  0.00  0.00  1.25  0.00  3.44 11.22
93 5.15  4.80  0.95  0.00  0.00  0.68  0.00  0.00  0.00  0.11  1.67  1.18 14.54
94 0.83  3.72  1.02  0.79  0.19  0.00  0.15  0.00  0.07  0.38  1.46  0.70  9.31
95 8.84  1.65  5.28  0.65  0.47  0.29  0.00  0.21                0.00 M2.00 19.39
96M4.08  4.76  2.04 M0.83 M0.00  0.00  0.16  0.11  0.00  0.59        3.73 16.30
97 6.40  0.07  0.00  0.03  0.00  0.00  0.48  0.00  0.78  0.40  2.02  3.02 13.20
98 2.82 10.55  2.08  1.23  1.35  0.62  0.00  0.01  0.01  0.12  0.98  0.40 20.17
99 3.51  0.60  0.49  1.44  0.32  0.02  0.05  0.03  0.02  0.00  0.26  0.00  6.74
 0 2.42  3.68  1.56  0.72  1.02  0.00  0.00  0.12  0.00  0.98  0.13  0.24 10.87
 1 2.51  2.12  0.12  1.82  0.00  0.00  0.50  0.00  0.00  0.64                7.71
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WETS Station : LEBEC, CA4863
Latitude: 3450 Longitude: 11852 Elevation: 03580
State FIPS/County(FIPS): 06029 County Name: Kern
Start yr. - 1971 End yr. - 2000

	Temperature (Degrees F.)			Precipitation (Inches)				
					30% chance will have		avg # of days w/.1 or more	avg total snow fall
Month	avg daily max	avg daily min	avg	avg	less than	more than		
January	-----	-----	-----	2.40	0.77	2.86	4	1.8
February	-----	-----	-----	2.93	1.10	3.54	4	0.8
March	-----	-----	-----	2.84	0.99	3.41	4	0.8
April	-----	-----	-----	0.94	0.31	1.18	2	0.1
May	-----	-----	-----	0.51	0.04	0.55	1	0.0
June	-----	-----	-----	0.10	0.00	0.12	0	0.0
July	-----	-----	-----	0.04	0.00	0.00	0	0.0
August	-----	-----	-----	0.14	0.00	0.00	0	0.0
September	-----	-----	-----	0.33	0.00	0.36	0	0.0
October	-----	-----	-----	0.57	0.17	0.74	1	0.0
November	-----	-----	-----	1.10	0.37	1.34	2	0.1
December	-----	-----	-----	1.73	0.60	2.07	3	1.3
Annual	-----	-----	-----	------	9.33	15.28	--	----
Average	0.0	0.0	0.0	------	------	------	--	----

Total	-----	-----	-----	13.62	------	------	21	5.0

GROWING SEASON DATES

Probability	Temperature: 24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates / Growing Season Length		
50 percent *	---------- / ------	---------- / ------	---------- / ------
70 percent *	---------- / ------	---------- / ------	---------- / ------

* Percent chance of the growing season occurring between the Beginning and Ending dates

total 1948-2002 prcp

Station : CA4863, LEBEC
Unit = inches

yr	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	annl
48							0.00	0.00	0.00	0.11	0.03	1.78	1.92
49	0.92	1.31	2.21	0.52	1.19	0.04	0.00	0.00	0.00	0.24	0.55	2.18	9.16
50	2.09	1.71	0.76	0.31	0.35	0.00	0.00	0.00	0.78	0.17	0.13	0.14	6.44
51	2.04	1.11	0.89	1.16	0.72	0.00	0.00	0.00	0.00	0.36	0.37	M2.20	8.85
52	M6.32	M1.20	5.10	M1.15	0.00	0.00	0.11	0.00	0.09	0.00	2.07	3.86	19.90
53	0.78	M0.15	1.05	1.44	0.56	0.00	0.02	0.00	0.00	0.14	M1.86	0.30	6.30
54	3.33	2.34	2.24	0.10	0.09	0.00	0.00	0.00	0.00	0.00	1.42	0.85	10.37
55	4.97	M0.83	0.02	1.49	2.02	0.00	0.00	0.00	0.00	0.00	0.93	M2.69	12.95
56	2.48	0.67	0.08	1.80	0.60	0.00	0.00	0.00	0.00	0.46	0.00	0.49	6.58
57	3.76	1.68			1.39	0.30	0.00	0.00	0.00	0.53	0.80	2.49	10.95
58	1.18	5.85	M3.48	3.00	0.56	0.00	0.00	0.00	0.96	0.10	1.19	M0.00	16.32
59	2.28	2.80	0.62	0.82	0.38	0.00	0.01	0.00	0.27	0.00	0.00	3.43	10.61
60	2.84	1.96	0.32	0.99	0.03	0.00	0.00	0.00	0.00	0.12	4.49	0.33	11.08
61	0.63	0.83	2.27	0.42	0.60	0.02	0.00	0.24	0.00	0.14	2.32	0.94	8.41
62	3.76	M10.31	1.67	0.12	0.20	0.00	0.00	0.00	0.00	M0.20	0.00	0.01	16.27
63	0.04	2.68	3.00	2.67	0.04	0.29	0.00	0.17	1.88	2.31	4.26	0.33	17.67
64	1.28	0.64	2.33	0.23	0.54	0.02	0.00	0.13	0.06	0.65	1.32	1.30	8.50
65	1.42	0.71	1.21	4.65	0.08	0.00	0.82	0.29	0.65	0.02	6.39	3.32	19.56
66	1.15	1.56	0.34	0.00	0.14	0.00	0.00	0.00	0.21	0.00	4.49	2.23	10.12
67	1.35	0.24	0.99	3.66	0.14	0.00	0.05	0.00	0.77	0.00	4.17	0.71	12.08
68		0.55	1.77	0.98	0.30	0.00	0.01	0.16	0.00	0.62	0.85	1.58	6.82
69	5.02	6.93	1.60	1.55	0.11	0.17	0.07	0.00	0.00	0.17	0.84	0.81	17.27
70	1.38	4.00	3.34	1.59	0.00	0.02	0.03	0.00	0.00	0.08	5.42	3.68	19.54
71	0.87	0.88	0.64	1.30	0.80	0.00	0.00	0.00	0.00	0.33	0.82	8.10	13.74
72	0.02	0.05	0.05	0.47	0.00	0.14	0.00	0.11	0.03	0.12	3.72	0.74	5.45
73	3.05	5.76		M0.39	0.18		0.00	0.00	0.02	0.15	2.02	1.17	12.74

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74 5.19  0.38  2.01  0.88  0.03  0.00  0.05  1.12  0.00  2.31  1.10  3.38 16.45
75 0.19  1.59  4.57  2.21  0.20  0.00  0.00  0.03  0.18  1.09  0.49  0.91 11.46
76 0.02 M6.49  0.42  1.08  0.14  0.07  0.03  0.00  2.89  0.31  0.68  0.05 12.18
77M4.56  0.66  2.30  0.14  3.97  0.00  0.00  1.54  0.00  0.00  0.91  2.97 17.05
78 2.91  6.95  9.47  2.17  1.32  0.00  0.00  0.10  1.38  0.30        1.35 25.95
79 3.59  2.12  4.81  0.17                          0.23  0.23  0.40  0.89 12.44
80 2.91 M5.48 M2.47  1.41  0.76  0.00  0.00              0.37        0.25 13.65
81 1.34  1.02 M6.12  0.00  0.14  0.00  0.00  0.00  0.00        1.14  0.26 10.02
82 2.25  0.73  3.38  0.88  0.00  0.04  0.00  0.00  0.26  0.44  2.58  1.38 11.94
83 3.94  4.43  6.21  1.37  0.10              0.81  0.79  1.65  2.19  1.78 23.27
84 0.06  0.53  0.50  0.00  0.00  0.15  0.08  0.00  0.13        1.70  1.76  4.91
85 0.92  0.36  1.27  0.12  0.17  0.29  0.01  0.00  0.28  0.16  1.33  0.32  5.23
86 1.84  1.69  2.15  1.83  0.25  0.00  0.00  0.00  0.09  0.00  1.00  0.30  9.15
87 1.30              0.17        0.13  0.00  0.10  0.00  0.67  2.47  2.95  7.79
88 2.44  2.18  1.22  1.45  0.34  0.15        0.00  0.16  0.00  1.09  1.87 10.90
89 0.94  3.02  0.24  0.35  0.02  0.00  0.00  0.00  0.46  0.38  0.03  0.60  6.04
90 1.68  1.00  0.16  0.17  0.53  0.00  0.00  0.00  0.15        0.88  0.10  4.67
91 0.33  1.81 10.20  0.36  0.18  0.11        0.00        0.55  0.02  2.21 15.77
92 1.34        3.04  0.17  0.01                          1.18  0.01  4.22  9.97
93M6.10  7.62 M2.61  0.10  0.00  0.76  0.00  0.00  0.00  0.20  0.89  1.04 19.32
94 0.82  5.02  2.86  1.23 M1.23  0.00  0.00  0.00  0.20  0.38  0.86 M0.39 12.99
9512.53  0.54  5.85  2.05  1.27  0.00  0.00  0.00  0.00  0.00  0.10 M2.26 24.60
96 1.51  2.15  0.73  0.24  0.00  0.00  0.00  0.00  0.00  2.82  0.52  1.66  9.63
97 1.76  1.48  0.16  0.00  0.02  0.06  0.00  0.00  0.32  1.01  1.35 M6.60 12.76
98 2.25 12.49  3.22  2.41  2.46  0.37  0.00  0.00  1.27  0.35  2.13  0.35 27.30
99 4.24  1.52  1.37  3.07  0.05  0.04  0.79  0.00  0.00  0.00  0.37  0.19 11.64
 0 1.05  3.99  1.54  2.04  0.05  0.16  0.00  0.06  0.00  0.47  0.00        9.36
 1 3.56  2.92  2.47  1.34  0.00  0.00  0.12  0.00  0.00  0.30  1.64  0.78 13.13
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WETS Station : MOJAVE, CA5756
Latitude: 3503 Longitude: 11810 Elevation: 02740
State FIPS/County(FIPS): 06029 County Name: Kern
Start yr. - 1971 End yr. - 2000

	Temperature (Degrees F.)			Precipitation (Inches)				
					30% chance will have		avg # of days w/.1 or more	avg total snow fall
Month	avg daily max	avg daily min	avg	avg	less than	more than		
January	57.5	33.5	45.5	1.34	0.28	1.59	2	0.8
February	61.5	36.8	49.1	1.41	0.21	1.58	2	0.1
March	65.4	41.0	53.2	1.13	0.16	1.40	2	0.1
April	72.0	46.3	59.1	0.22	0.00	0.26	0	0.0
May	80.3	54.5	67.4	0.16	0.00	0.16	0	0.0
June	90.0	63.2	76.6	0.06	0.00	0.00	0	0.0
July	96.8	68.4	82.6	0.16	0.00	0.00	0	0.0
August	95.9	67.1	81.5	0.28	0.00	0.08	0	0.0
September	89.0	60.3	74.6	0.27	0.00	0.22	0	0.0
October	78.3	49.8	64.0	0.28	0.00	0.30	0	0.0
November	65.0	39.3	52.1	0.43	0.00	0.54	1	0.0

December	57.7	32.7	45.2	0.82	0.19	1.06	2	0.2
Annual	-----	-----	-----	------	3.78	7.66	--	----
Average	75.8	49.4	62.6	------	------	------	--	----
Total	-----	-----	-----	6.55	------	------	9	1.3

GROWING SEASON DATES

Probability	Temperature		
	24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	1/28 to 12/14 321 days	2/24 to 11/21 271 days	3/17 to 11/13 241 days
70 percent *	1/18 to 12/25 341 days	2/16 to 11/29 288 days	3/10 to 11/21 256 days

* Percent chance of the growing season occurring between the Beginning and Ending dates.

total 1948-2002 prcp

Station : CA5756, MOJAVE
------- Unit = inches

yr	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	annl
48							0.00	0.00	0.00	0.07	0.00	M0.63	0.70
49	0.68	0.44	M0.06	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.20	1.04	2.44
50	0.42	0.32	0.32	0.28	0.00	0.00	0.00	0.00	0.24	0.00	M0.10	0.00	1.68
51		0.24	0.11	0.48	0.28	0.00	0.00	0.00	0.00	0.50	0.35	1.24	3.20
52	M2.88	0.00	M3.21	0.13	0.00	0.00	0.00	0.00	0.02	M0.00	M1.57	1.92	9.73
53	0.35	0.02	0.15	0.29	0.15	0.00	0.00	0.02	0.00	0.00	0.37	0.12	1.47
54	1.43	0.55	0.99	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.77	0.42	4.20
55	M1.21	0.19	0.00	0.11	0.19	0.00	0.00	0.00	0.00	0.00	0.24	0.61	2.55
56	1.27	M0.01	0.00	1.15	0.44	0.00	0.24	0.00	0.00	0.06	0.00	0.00	3.17
57	1.85	0.82	0.57	0.29	0.02	0.01	0.00	0.00	0.00	0.59	0.27	1.53	5.95
58	0.54	2.58	1.74	1.75	0.05	0.00	M0.00	0.01	0.33	0.16	0.13	0.00	7.29
59	1.13	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.00	0.00	0.92	3.63
60	0.99	1.08	0.03	0.09	0.00	0.00	0.00	0.00	0.20	0.00	0.97	0.00	3.36
61	0.32	0.00	0.07	0.00	0.00	0.00	0.00	0.69	0.00	0.00	0.97	1.01	3.06
62	0.48	2.85	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	3.82
63	0.08	0.83	0.80	0.27	0.00	0.41	0.00	0.29	1.64	1.03	0.90	0.04	6.29
64	0.53	0.02	0.32	0.20	0.18	0.00	0.06	0.00	0.00	0.30	0.52	0.12	2.25
65	0.00	0.00	1.31	2.08	0.00	0.01	0.24	0.26	0.00	M0.00	3.76	2.82	10.48
66	0.55	0.23	0.15	0.00	0.00	0.00	0.00	0.00	0.45	0.06	1.07	1.15	3.66

67	1.54	0.00	0.58	1.51	0.00	0.00	0.01	0.00	0.67	0.00	3.78	0.62	8.71
68	0.26	0.53	0.43	0.32		0.00	0.28	0.00	0.00	0.14	0.48	0.27	2.71
69	4.40	4.89	0.14	0.62	0.01	0.18	0.20	0.00	0.00	0.00	0.47	0.00	10.91
70	0.40		1.65	0.06	0.00	0.00	0.35	0.00	0.00	0.00	2.68	1.48	6.62
71	0.04	0.15	0.00	0.11	0.41	0.00	0.00	0.00	0.15	0.00	0.01	1.97	2.84
72	0.00	0.00	0.00	0.05	0.00	0.31	0.00	0.08	0.04	0.00	0.93	0.17	1.58
73	0.64	3.00	1.10	0.06	0.20	0.00	0.00	0.11	0.00	0.00	0.71	0.65	6.47
74	1.62	0.06	0.31	0.33	0.35	0.00	0.13	0.03	0.00	1.74	0.00	0.97	5.54
75	0.02	0.35	0.84	0.63	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.07	2.00
76	0.00	1.32	0.00	0.10	0.04	0.00	0.13	0.00	2.94	0.05		0.24	4.82
77	2.12	0.02	1.09	0.00	1.28	0.00	0.00	1.30	0.00	0.12	0.00	2.39	8.32
78	2.63	6.24	3.02	0.77		0.00	0.00	0.00		0.05		0.38	13.09
79	3.74	0.39	2.23	0.00			0.05			0.06	0.00		6.47
80	3.39		1.56	0.18	0.00	0.00	0.00	0.00	0.00	0.00		M0.00	5.13
81		0.56	2.87	0.02	0.03	0.00	0.00	0.00	0.89	1.99	1.44		7.80
82	1.72	0.46	2.55	1.15	0.04	0.00	0.00	0.01	0.33	0.06	1.47	1.04	8.83
83	2.55	M3.35	4.43	0.49	0.00	0.00	0.00	2.02	0.18	0.73	0.04	1.72	15.51
84	0.00	0.01	0.13	0.00	0.00	0.40	2.43	0.29	0.27	0.00	M0.70	3.35	7.58
85	0.11	0.21	0.00	0.00	0.00	M0.00	0.00	0.00	0.28	0.22	1.45	0.22	2.49
86	1.12	1.43	0.89	0.07	0.00	0.00	0.00	1.00	0.00	0.00	0.66	0.57	5.74
87	0.63	1.18	0.00	0.00	0.12	0.15	0.00	0.00	0.00	1.04	0.79	0.79	4.70
88	2.06	0.30	0.00	0.47	0.15	0.00	1.06	0.00	0.00	0.00	0.22	0.65	4.91
89	0.18	M0.15	0.20	0.00	0.30	0.00	0.00	0.00	0.19	0.00	0.00	0.00	1.02
90	0.65	0.03	0.10	0.08	0.06	0.00	0.00	0.00	0.16	0.00	0.41	M0.00	1.49
91	0.90	1.23	3.07	0.00	0.00	0.00	0.02	0.00	0.00	0.10	0.06	1.19	6.57
92	0.40	5.25	2.59	0.34	0.08	0.00	0.00	0.00	0.00	0.71	0.00	2.72	12.09
93	4.95	3.93	0.79	0.00	0.00	0.40	0.00	0.00	0.00	0.27	0.29	0.23	10.86
94	0.07	1.19	0.32	0.09	0.08	0.00	0.00	0.00	0.01	0.36	0.55	0.27	2.94
95	6.46	0.39	2.72	0.10	0.00	0.35	0.00	1.94	0.00	0.00	0.00	0.66	12.62
96	0.50	1.14	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.65	1.41	4.55
97	0.64	0.00	0.00	0.09	0.00	0.00	0.13	0.00	0.95	0.12	0.92	1.38	4.23
98	M0.87	6.85	1.46	0.41	1.15	0.00	0.00	1.20	1.00	0.00	0.34	0.00	13.28
99	0.50	M0.08	0.06	0.95	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	2.57
0	0.21	1.67	1.16	0.00	0.12	0.00	0.00	0.11	0.00	0.24	0.00	0.00	3.51
1	1.26	3.26	1.31	1.23	0.00	0.00	0.00	0.00	0.00	0.00	0.79	0.30	8.15
2													

WETS Station : RANDSBURG, CA7253 Creation Date: 08/29/2002
Latitude: 3522 Longitude: 11739 Elevation: 03570
State FIPS/County(FIPS): 06029 County Name: Kern
Start yr. - 1971 End yr. - 2000

	Temperature (Degrees F.)			Precipitation (Inches)				
				30% chance will have		avg # of days w/.1 or more	avg total snow fall
Month	avg daily max	avg daily min	avg	avg	less than	more than		
January	54.1	36.2	45.2	1.36	0.40	1.74	2	1.2
February	58.5	38.9	48.7	1.53	0.21	1.77	2	0.4
March	63.7	41.2	52.4	1.26	0.26	1.53	2	0.4
April	71.8	46.3	59.0	0.32	0.00	0.34	0	0.0

May	81.3	53.8	67.5	0.15	0.00	0.17	0	0.0
June	91.3	62.3	76.8	0.04	0.00	0.00	0	0.0
July	97.7	67.7	82.7	0.12	0.00	0.13	0	0.0
August	95.9	66.7	81.3	0.23	0.00	0.20	0	0.0
September	88.3	61.5	74.9	0.28	0.00	0.26	0	0.0
October	76.1	52.3	64.2	0.33	0.00	0.27	0	0.0
November	62.4	42.1	52.2	0.46	0.02	0.55	1	0.1
December	54.2	36.2	45.2	0.78	0.08	0.91	1	0.8
Annual	-----	-----	-----	------	3.77	8.12	--	----
Average	74.6	50.4	62.5	------	------	------	--	----
Total	-----	-----	-----	6.86	------	------	8	2.8

GROWING SEASON DATES

	Temperature		
Probability	24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	> 365 days	2/ 9 to 12/12	3/19 to 11/23
	> 365 days	307 days	249 days
70 percent *	> 365 days	1/25 to 12/27	3/12 to 11/30
	> 365 days	337 days	263 days

* Percent chance of the growing season occurring between the Beginning and Ending dates.

total 1948-2002 prcp

Station : CA7253, RANDSBURG
Unit = inches

yr	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	annl
48							M0.00	0.00	0.00	0.03	0.00	0.47	0.50
49	1.25	0.44	0.68	0.00	0.08	0.00	0.00	0.13	0.00	0.00	0.20	1.73	4.51
50	0.57	0.46	0.52	0.19	0.00	0.00	0.10	0.10	0.65	0.00	0.33	M0.00	2.92
51	0.30	0.06	0.00	0.35	0.74	0.00	0.38	0.00	0.00	0.33	0.29	2.16	4.61
52	3.76	0.11	2.39	0.41	0.00	0.00	0.02	0.00	0.45	0.00	0.59	1.19	8.92
53	0.33	0.01	0.08	M0.16	0.01	0.00	0.00	0.00	0.00	0.00	0.18	0.06	0.83
54	2.03	0.73	0.96	0.00	0.00	0.00	0.23	0.00	0.00	0.00	1.35	0.82	6.12
55	0.98	0.46	0.00	0.28	0.20	0.00	0.00	0.05	0.00	0.00	0.46	0.03	2.46
56	2.00	0.00	0.00	0.79	0.08	0.00	0.12	0.00	0.00	0.06	0.00	0.00	3.05
57	1.68	0.70	0.43	0.00	0.03	0.00	0.01	0.00	0.09	0.57	0.00	0.80	4.31
58	0.78	3.28	M1.96	2.04	0.00	0.00	0.03	0.16	0.24	1.00	0.05	0.00	9.54
59	1.10	1.65	0.00	0.00	0.00	0.00	0.00	M0.20	0.68	0.04	0.06	1.07	4.80

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60 1.14  1.30  0.04  0.11  0.00  0.00  0.03  0.00  0.58  0.07  1.01  0.00  4.28
61 0.13  0.00  0.14  0.00  0.00  0.00  0.00  0.41  0.00  0.02  0.79  0.94  2.43
62 1.01  2.16  0.41  0.00  0.00  0.00  0.00  0.00  0.00  0.06  0.00  0.04  3.68
63 0.34  1.22  0.54  0.23  0.00  0.22  0.00  0.60  1.17  1.60  1.22  0.00  7.14
64 0.48  0.06  0.32  0.06  0.00  0.00  0.00  0.08  0.01  0.22  0.50  0.30  2.03
65 0.07  0.04  1.14 M2.73  0.00  0.19  0.33  0.22  0.02  0.10  3.62  2.80 11.26
66 0.36  0.32  0.15  0.00  0.02  0.00  0.00  0.00  0.10  0.01  0.84  1.31  3.11
67 1.38  0.00  0.22  1.74  0.00  0.00  0.04  0.54  0.41  0.00  1.72  0.78  6.83
68 0.17  0.91  0.64  0.13  0.00  0.04  0.67  0.53  0.00  0.30  0.24  0.25  3.88
69 4.02  4.76  0.38  0.66  0.09  0.15  0.26  0.00  0.00  0.00  0.53  0.00 10.85
70 0.27  1.01  0.93  0.00  0.00  0.00  0.13  0.00  0.00  0.02  1.73  1.11  5.20
71 0.00  0.14  0.00  0.16  0.10  0.00  0.05  0.16  0.24  0.00  0.04  1.67  2.56
72 0.00  0.27  0.00  0.02  0.00  0.01  0.00  0.00  0.00  0.00  1.02  0.17  1.49
73 0.70  2.60  1.09  0.00  0.28  0.00  0.03  0.00  0.00  0.00  0.68  0.43  5.81
74 2.44  0.00  0.73  0.02  0.18  0.00  0.87  0.16  0.00  1.10  0.03  0.61  6.14
75 0.00  0.74  0.46  0.49  0.06  0.00  0.02  0.00  0.49  0.04  0.00  0.00  2.30
76 0.00  2.30  0.37  0.14  0.05  0.00  0.09  0.00  2.00  0.03  0.33  0.06  5.37
77 1.25  0.00  0.81  0.00  1.01  0.00  0.00  1.30  0.00  0.00  0.00  2.16  6.53
78 2.75  5.30  1.99  1.06  0.00  0.00  0.00  0.33  0.33  0.52  0.07  0.02 12.37
79M2.40 M0.11  2.18  0.00  0.06  0.00  0.12  0.08  0.05  0.01  0.00  0.10  5.11
80 4.22 M3.61  1.86  0.32  0.12  0.00  0.27  0.00  0.00  0.00  0.00  0.07 10.47
81 1.26  0.41  3.32  0.06  0.24  0.00  0.00  0.00  0.02  0.69  1.58  0.10  7.68
82 0.68  0.36  3.44  1.19  0.13  0.00  0.12  0.01        0.48  2.52  1.34 10.27
83 2.49  3.70  5.00  0.51  0.00  0.15  0.00  1.51  0.25  0.10  0.09  1.78 15.58
84 0.00  0.00  0.14  0.00  0.00  0.00  0.95  0.74  0.00  0.00  1.09  3.63  6.55
85M0.23  0.00  0.00  0.00  0.05  0.05  0.00  0.00  0.32  0.02  1.08 M0.66  2.41
86 1.90  2.26  1.67  0.06  0.00  0.00  0.12  0.78  0.00  0.00  0.62  0.00  7.41
87 1.24  0.20  0.72  0.00  0.33  0.46  0.00  0.01  0.26  2.12  0.81  1.83  7.98
88 1.89  0.13  0.06  1.53  0.00  0.00  0.24  0.68  0.14  0.00  0.26  0.75  5.68
89 0.19  0.51  0.57  0.00  0.01 M0.00  0.00  0.01  0.00  0.00  0.00  0.00  1.29
90 1.13  0.38  0.01  0.06  0.07  0.00  0.14  0.14  0.10  0.00  0.21  0.01  2.25
91 0.94  1.53  4.18  0.00  0.04  0.00  0.01  0.00  0.39  0.21  0.02  1.02  8.34
92M1.14  5.38  3.13  0.41 M0.23  0.00  0.06  0.00  0.00 M3.01  0.00 M3.08 16.44
93 4.06  3.17  0.50  0.00  0.01  0.41  0.00  0.00  0.00  0.22  0.45  0.39  9.21
94 0.45  0.98  0.36  0.18  0.05  0.00  0.00  0.00  0.00  0.36  0.37  0.30  3.05
95 6.21  0.79  2.31  0.93  0.04  0.00  0.00  0.10  0.00  0.00  0.00  1.13 11.51
96 0.15  2.04  0.17  0.00  0.00  0.00  0.16  0.04  0.00  0.72  0.93  1.36  5.57
97 0.61  0.01  0.00  0.04  0.00  0.00  0.08  0.00 M2.29  0.00  0.96  0.79  4.78
98 0.62  7.30  1.28  0.27  0.98  0.00  0.00  0.80  0.89  0.02  0.21  0.00 12.37
99 0.37  0.10  0.23  1.78 M0.31  0.00  0.37  0.00 M0.01  0.00  0.00  0.00  3.17
 0M0.28 M2.33 M1.49 M0.21 M0.02  0.14  0.00  0.11  0.00  0.19 M0.00 M0.00  4.77
 1 2.24  3.16  0.45  0.73  0.08  0.00  0.14  0.00  0.00  0.21 M0.99 M0.24  8.24
 2
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WETS Station : WASCO, CA9452
Latitude:  3536      Longitude:  11920        Elevation:  00350
State FIPS/County(FIPS):  06029     County Name: Kern
Start yr. - 1971   End yr. - 2000
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	Temperature (Degrees F.)			Precipitation (Inches)				
					30% chance will have		avg # of	avg
Month	avg	avg	avg	avg	less	more	days w/.1	total snow

	daily max	daily min			than	than	or more	fall
January	56.5	36.7	46.6	1.34	0.58	1.63	3	0.1
February	64.2	40.4	52.3	1.37	0.48	1.65	3	0.0
March	70.0	44.3	57.2	1.65	0.74	2.04	4	0.0
April	77.9	47.9	62.9	0.58	0.10	0.70	1	0.0
May	86.2	54.3	70.3	0.24	0.00	0.14	0	0.0
June	93.9	60.4	77.1	0.13	0.00	0.02	0	0.0
July	98.8	64.9	81.8	0.01	0.00	0.00	0	0.0
August	97.3	63.4	80.3	0.03	0.00	0.00	0	0.0
September	91.7	58.8	75.3	0.18	0.00	0.14	0	0.0
October	81.8	49.9	65.8	0.35	0.07	0.46	0	0.0
November	66.8	40.1	53.5	0.64	0.19	0.80	1	0.0
December	56.4	34.7	45.6	0.88	0.41	1.11	2	0.0
Annual	-----	-----	-----	------	5.58	8.54	--	----
Average	78.5	49.7	64.1	------	------	------	--	----
Total	-----	-----	-----	7.40	------	------	14	0.1

GROWING SEASON DATES

Probability	Temperature		
	24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	12/30 to 12/30 > 365 days	1/ 9 to 12/13 338 days	2/18 to 11/22 278 days
70 percent *	12/30 to 12/30 > 365 days	12/29 to 12/24 360 days	2/11 to 11/29 292 days

* Percent chance of the growing season occurring between the Beginning and Ending dates.

total 1948-2002 prcp

Station : CA9452, WASCO
------- Unit = inches

yr	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	annl
48							0.00	0.00	0.00	0.12	0.00	0.67	0.79
49	0.31	1.38	1.17	0.64	0.20	0.00	0.00	0.00	0.00	0.03	0.35	0.65	4.73
50	1.38	0.85	0.37	0.18	0.05	0.00	0.00	0.00	0.38	0.21	0.03	0.39	3.84
51	0.89	0.66	0.46	0.56	0.02	0.00	0.00	0.00	0.00	0.09	0.21	1.65	4.54
52	2.93	0.18	2.64	0.69	0.00	0.00	0.01	0.00	0.13	0.00	1.10	1.44	9.12

53	0.64	M0.15	M0.37	0.47	0.44	0.00	0.00	0.00	0.00	0.00	0.99	0.14	3.20
54	1.73	0.67	1.45	0.30	M0.00	0.14	0.00	0.00	0.00	0.00	0.45	0.84	5.58
55	2.22	0.45	0.20	0.47	0.54	0.00	0.00	0.00	0.00	0.00	0.37	0.63	4.88
56	1.03	0.66	0.00	1.08	1.03	0.00	0.00	0.00	0.00	0.56	0.00	0.17	4.53
57	1.05	0.67	0.99	0.73	0.33	0.25	M0.00	0.00	0.00	0.20	0.83	0.96	6.01
58	1.39	2.77	3.01	2.40	0.71	0.01	0.00	0.00	0.62	0.00	0.35	0.02	11.28
59	0.72	1.74	0.00	0.60	0.08	0.00	0.00	0.00	0.04	0.00	0.00	0.38	3.56
60	0.93	1.50	0.40	0.73	0.00	0.00	0.04	0.00	0.00	0.22	2.75	0.00	6.57
61	0.82	0.24	0.38	0.07	0.13	0.00	0.00	0.00	0.00	0.00	1.03	0.63	3.30
62	1.11	5.71	0.56	0.01	0.08	0.00	0.00	0.00	0.00	0.09	0.00	0.00	7.56
63	0.22	1.94	1.72	1.40	1.04	0.74	0.00	0.03	0.50	0.53	0.83	0.16	9.11
64	0.57	0.19	0.25	1.54	0.06	0.00	0.02	0.09	0.16	0.65	0.73	M0.91	5.17
65	0.58	0.25	0.95	2.27	0.00	0.00	0.22	0.00	0.03	0.00	1.08	1.75	7.13
66	0.94	0.80	0.06	0.00	0.01	0.05	0.00	0.00	0.00	0.00	0.61	1.70	4.17
67	0.79	0.07	0.61	2.42	0.23	0.33	0.03	0.00	0.05	0.00	1.56	0.76	6.85
68	0.58	0.92	1.11	0.21	0.03	0.00	0.00	0.00	0.00	1.36	0.70	0.81	5.72
69	4.68	2.87	0.57	0.78	0.03	0.02	0.20	0.00	0.00	0.00	0.40	0.24	9.79
70	0.77	1.30	1.28	0.20	0.00	0.00	0.03	0.00	0.00	0.00	2.07	1.19	6.84
71	0.36	0.43		0.51	2.15	0.00	0.00	0.00	0.02	0.12	0.25	1.84	5.68
72	0.03	0.36	0.00	0.02	0.01	0.14	0.00	0.00	0.00	0.32	1.60	0.64	3.12
73	2.55	1.65	M2.24	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.84	0.91	8.21
74	2.09	0.11	1.88	0.63	0.00	0.00	0.00	0.00	0.00	1.76	0.20	1.17	7.84
75	M0.08	1.56	0.84	0.52	0.00	0.00	0.00	0.00	0.00	0.62	0.10	0.10	3.82
76	0.04	2.29	0.35	1.27	0.00	0.03	0.00	0.00	1.34	0.28	0.69	0.46	6.75
77	0.77	0.01	0.79	0.00	0.80	0.00	0.00	0.19	0.00	0.00	0.11	2.68	5.35
78	2.24	5.09	2.74	1.40	0.01	0.00	0.00	0.00	1.57	0.00	0.25	0.93	14.23
79	1.50	1.33	3.09	0.11	0.02	0.00	0.00	0.00	0.00	0.58	0.19	0.60	7.42
80	1.89	1.79	1.27	1.43	0.13	0.00	0.00	0.00	0.00		0.00	0.23	6.74
81	1.24	0.79	1.66	1.90	0.03	0.00	0.00	0.00	0.00	0.19	0.52	0.13	6.46
82	0.89	0.68	5.78	1.73	0.00	0.12	0.00	M0.02	0.69	0.75	1.48	0.66	12.80
83	2.39	0.95	2.13	0.74	0.06	0.00	0.00	0.47	0.10	0.27	0.57	1.18	8.86
84	0.28	0.06	0.27	0.23	0.00	0.00	0.04	0.16	0.04	0.33	1.02	1.23	3.66
85	0.66	0.42	0.61	0.00	0.00	0.80	0.00	0.00	0.76	0.30	1.71	0.44	5.70
86	1.07	1.49	2.12	0.39	0.00	0.00	0.10	0.00	0.13	0.00	0.79	0.81	6.90
87	2.21	1.07	1.25	0.02	0.00	0.08	0.04	0.00	0.00	0.63	M1.95	0.89	8.14
88	1.03	M0.21	0.52	2.66	0.02	0.15	0.00	0.00	0.00	0.00	0.30	1.14	6.03
89	0.26	1.37	0.80	0.00	0.27	0.00	0.00	0.00	0.29	0.04	0.03	0.00	3.06
90	1.10	0.98	0.21	0.23	0.34	0.00	0.00	0.11	0.09	0.02	0.50	0.15	3.73
91	0.46	0.36	5.45	0.07	0.01	0.00	0.00	0.00	0.00	0.60	0.03	M1.45	8.43
92	1.79	2.48	1.20	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.00	1.56	7.60
93	2.35	2.13	1.91	0.11	0.01	0.29	0.00	0.00	0.00	0.21	0.54	0.56	8.11
94	1.11	1.37	0.75	0.49	0.98	0.00	0.00	0.00	0.10	0.44	1.22	0.86	7.32
95	3.02	0.67	4.26	0.53	0.59	0.08	0.00	0.00	0.00	0.00	0.00	1.14	10.29
96	0.77	3.09	0.75	0.17	0.02	0.00	0.06	0.00	0.00	1.29	1.41	M2.81	10.37
97	M2.17	0.52	0.13	0.00	0.00	0.00	0.00	0.00	0.05	0.15	1.50	1.50	6.02
98	1.20	5.78	2.72	0.84	1.79	2.00	0.00	0.00	0.06	0.52	1.08	0.30	16.29
99	3.86	0.15	0.60	0.56	0.00	0.00	0.00	0.00	0.26	0.00	0.22	0.10	5.75
0	0.79	1.82	1.46	0.82	0.00	0.17	0.00	0.07	0.00	0.25	0.00	0.00	5.38
1	3.46	2.39	M0.57	0.83	0.00	0.00	0.00	0.00	0.00	0.07	0.97	0.88	9.17
2													

Appendix B

Photographs

URS

APPENDIX B: SITE PHOTOGRAPHS

Photograph 1: Soils and vegetation at WL 1. Note hydric vegetation and pockets of moist soil and soil cracking. Dominant plant species include *Plagiobothrys trachycarpus* (FACW) and *Lepidium dictyotum* (FAC). Adjacent WUS contains mature Lindahl's fairy shrimp (*Branchinecta lindahli*), which require 10-14 days of ponding during the growing season to hatch.

Photograph 2: One of a series of depressions with Lindahl's fairy shrimp along the UPRR railroad track (WUS 10). Photograph taken on March 28, 2012, ten days after the last precipitation event great than 0.1 inch.

URS

Photograph 3: Close up view of Lindahl's fairy shrimp (*Branchinecta lindahli*) observed at WUS 1, viewed on March 28, 2012.

Photograph 4: View looking east at WUS 24 & 25. These depressions run along the north side of the UPRR railway and are located on the east side of Interstate 5.

URS

Photograph 5: WUS 62-64. Depressions formed as the result of vehicular traffic along upaved road on the alkaline soil depression property.

Photograph 6: Soil cracking typical of some areas in the alkaline soil depression property, observed on March 28, 2012. These areas were determined to be outside of USACE jurisdiction; no signs of saturation were present eleven days after a significant precipitation event (0.85 inch on 3/17/12, 0.11 inch on 3/18/12, and 0.09 inch on 3/25/12). Therefore, the soil cracking was a false positive indicator for hydrology. Hydric soils were also lacking.

URS

Photograph 7: California Aqueduct, looking east.

Photograph 8: View of the West Side Canal and the Kern River Flood Control Channel (KRFCC), looking south at the Elk Hills. The West Side Canal appears to be regularly maintained whereas the KRFCC remains in a natural state.

Photograph 9: East Side Canal, NJ 10, looking west.

Photograph 10 – View of a typical retention/detention basin in study area (NJ 33).

URS

	Photograph 11: An irrigation ditch paralleling the East Side Canal (NJ 34).

Appendix C

Plant List Observed in the Study Area

Scientific Name	Common Name	Native/ Exotic (N/E)	Wetland Indicator Status
Acroptilon repens	Russian knapweed	E	NI
Allenrolfea occidentalis	iodine bush	N	NI
Ambrosia dumosa	burrobush	N	NI
Ambrosia (*Hymenoclea*) *salsola*	cheesebrush	N	NI
Amsinckia intermedia (*menziesii* var. *intermedia*)	fiddleneck	N	NI
Amsinckia menziesii (menziesii var. *menziesii)*	fiddleneck	N	NI
Anethum graveolens	dill	E	NI
Aster sp.	N/A	N/A	NI
Astragalus lentiginosus	freckled milkvetch	N	NI
Atriplex lentiformis	quailbush	N	NI
Atriplex covillei (*phyllostegia*)	leaf cover saltweed	N	FACW
Atriplex polycarpa	desert saltbush	N	FACU
Atriplex prostrata (*triangularis*)	spear leaved saltbrush	N	FACW
Atriplex coronata var. *vallicola* (*vallicola*)	Lost Hills saltbush	N	NI
Avena fatua	common wild oats	E	NI
Baccharis salicifolia	mule fat	N	NI
Bassia hyssopifolia	five hook bassia	E	NI
Brassica nigra	black mustard	E	NI
Bromus hordeaceus	soft chess	E	NI
Bromus madritensis ssp. *rubens*	red brome	E	NI
Calycadenia spicata	spiked western rosinweed	N	NI
Camissonia campestris	Mojave suncup	N	NI
Capsella bursa-pastoris	shepherd's purse	E	FAC
Castilleja exserta ssp. *exserta*	purple owl's clover	N	NI
Caulanthus lasiophyllus (*Guillenia lasiophylla*)	California mustard	N	NI
Centaurea melitensis	tocalote	E	NI
Centaurea solstitialis	yellow star thistle	E	NI
Centromadia pungens ssp. *pungens*	common tarweed	N	NI
Chaenactis sp.	N/A	N/A	NI
Chenopodium berlandieri	Berlandier's goosefoot	N	NI
Chenopodium sp.	N/A	N/A	NI
Chloracantha sp.	N/A	N/A	NI
Convolvulus arvensis	bindweed	E	NI
Crassula connata	sand pygmy weed	N	NI
Cryptantha micrantha	redroot cryptantha	N	NI
Cuscuta sp.	dodder	N/A	NI

Scientific Name	Common Name	Native/ Exotic (N/E)	Wetland Indicator Status
Cynodon dactylon	Bermuda grass	E	NI
Datura stramonium	jimson weed	E	NI
Deinandra pallida	Kern tarweed	N	NI
Deschampsia danthonioides	annual hairgrass	N	FACW
Delphinium hesperium ssp. *hesperium*	western larkspur	N	NI
Delphinium gypsophilum	gypsum loving larkspur	N	NI
Descurainia incisa	mountain tansy mustard	N	NI
Dichelostemma capitatum	blue dicks	N	NI
Distichlis spicata	salt grass	N	NI
Eastwoodia elegans	yellow mock aster	N	NI
Encelia actoni	Acton encelia	N	NI
Eremalche parryi	Parry's mallow	N	NI
Eremothera (*Camissonia*) *boothii* ssp. *decorticans*	shredding evening primrose	N	NI
*Eriastrum hooveri**	Hoover's eriastrum	N	NI
Eriastrum pluriflorum	Tehachapi woolystar	N	NI
Eriogonum angulosum	anglestem buckwheat	N	NI
Eriogonum gossypinum	cottony buckwheat	N	NI
Eriogonum gracillimum	slender stemmed buckwheat	N	NI
Erodium botrys	broad leaf filaree	E	NI
Erodium cicutarium	redstem stork's bill	E	NI
Euphorbia chamaesyce	prostrate spurge	E	NI
Festuca (*Vulpia*) *myuros*	foxtail fescue	E	NI
Festuca (*Vulpia*) *microstachys*	small fescue	N	NI
Festuca (*Vulpia*) sp.	fescue	E	NI
Frankenia salina	alkali heath	N	NI
Galium sp.	bedstraw	N	NI
Gilia tricolor ssp. *diffusa*	bird's eye Gilia	N	NI
Helianthus annuus	common sunflower	N	NI
Heliotropium curassavicum	heliotrope	N	NI
Hemizonia sp.	N/A	N/A	NI
Hordeum brachyantherum	meadow barley	N	NI
Hordeum intercedens	bobtail barley	N	NI
Hordeum marinum	seaside barley	E	NI
Isocoma acradenia var. *bracteosa*	alkali goldenbush	N	NI
Juncus/Carex sp.	N/A	N/A	NI
Kochia californica (Bassia californica)	Mojave red sage	N	FACW

Scientific Name	Common Name	Native/ Exotic (N/E)	Wetland Indicator Status
Lactuca serriola	prickly lettuce	E	NI
Lastarriaea coriacea	leather spineflower	N	NI
Lasthenia californica	goldfields	N	NI
Lasthenia chrysantha	alkali goldfields	N	NI
Layia glandulosa	white tidytips	N	NI
Layia pentachaeta ssp. *albida*	Sierra tidytips	N	NI
Lepidium dictyotum	alkali pepperweed	N	OBL
Lepidium nitidum	peppergrass	N	NI
Lessingia glandulifera	valley lessingia	N	NI
Logfia filaginoides (*Filago californica*)	California cottonrose	N	NI
Lupinus bicolor	bi-color lupine	N	NI
Lycium cooperi	Cooper's box thorn	N	NI
Malacothrix californica	desert dandelion	N	NI
Malacothrix coulteri	snake's head	N	NI
Malva parviflora	cheeseweed	E	NI
Malvella leprosa	alkali mallow	N	NI
Marrubium vulgare	horehound	E	NI
Matricaria discoidea	pineapple weed	E	NI
Melilotus indicus	annual yellow sweetclover	E	NI
Mentzelia affinis	yellow blazing stars	N	NI
Mesembryanthemum crystallinum	crystalline ice plant	E	NI
Mesembryanthemum nodiflorum	slender-leaf iceplant	E	NI
Monolopia stricta	Crum's monolopia	N	NI
Mucronea perfoliata	perfoliate spineflower	N	NI
Nicotiana glauca	tree tobacco	E	NI
Oligomeris linifolia	oligomeris	N	NI
Papaver heterophyllum (*Stylomecon heterophylla*)	wind poppy	N	NI
Pectocarya heterocarpa	hairy-leaved comb bur	N	NI
Pectocarya linearis ssp. *ferocula*	slender comb seed	N	NI
Peritoma (*Isomeris*) *arborea*	bladderpod	N	NI
Phacelia distans	common phacelia	N	NI
Phacelia tanacetifolia	lacy phacelia	N	NI
Phalaris aquatica	Harding grass	E	NI
Plagiobothrys canescens	valley popcorn flower	N	NI
Plagiobothrys trachycarpus	roughfruit popcorn flower	N	FACW
Plantago elongata	long leaf plantain	N	FACW

Scientific Name	Common Name	Native/ Exotic (N/E)	Wetland Indicator Status
Plantago ovata	wooly plantain	N	NI
Poa annua	annual bluegrass	E	NI
Polygonum argyrocoleon	silversheath knotweed	E	NI
Polygonum aviculare ssp. *depressum*	knotweed	E	NI
Portulaca oleracea	purslane	E	NI
Prosopis glandulosa	honey mesquite	N	NI
Psilocarphus tenellus	woolyheads	N	NI
Psilocarphus tenellus var. *tenellus*	woolyheads	N	FAC
Psilocarphus oregonus	Oregon woolyheads	N	OBL
Rorippa curvisiliqua	Western yellowcress	N	OBL
Rumex crispus	curly dock	E	NI
Rumex sp.	N/A	N/A	NI
Salicornia pacifica (*virginica*)	Pacific swampfire	N	OBL
Salix nigra	black willow	N	NI
Salsola tragus	Russian thistle	E	NI
Salvia carduacea	thistle sage	N	NI
Salvia columbariae	chia	N	NI
Schismus barbatus	Mediterranean grass	E	NI
Senecio vulgaris	common groundsel	E	NI
Sisymbrium altissimum	tumble mustard	E	NI
Solanum lanceolatum	lance-leaf nightshade	E	NI
Sonchus asper	spiny sow thistle	E	NI
Sonchus oleraceus	sow thistle	E	NI
Spergularia marina	salt sandspurry	N	NI
Spergularia sp.	N/A	N/A	NI
Stephanomeria exigua	small wirelettuce	N	NI
Stylocline citroleum	oil nest straw	N	NI
Suaeda nigra (moquinii)	seablite	N	NI
Tamarisk sp.	salt cedar	E	NI
Trifolium sp.	clover	N/A	NI
Trichostema ovatum	San Joaquin bluecurls	N	NI
Typha sp.	cattail	N	NI
Urtica urens	dwarf nettle	E	NI
Uropappus lindleyi	silver puffs	N	NI
Xanthium strumarium	cocklebur	N	NI

Appendix D

Arid West Manual Data Sheets

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: HECA/ Magnolia - 01 City/County: Kern County Sampling Date: 3/16/11

Applicant/Owner: HEI (2012 – Hydrogen Energy California LLC) State: CA Sampling Point: Mag-01

Investigator(s): J. Kisner, C. Julian, K. Kephart, D. Kisner Section, Township, Range: S35 T28S R24E

Landform (hillslope, terrace, etc.): Alkali flats Local relief (concave, convex, none): slight concave Slope (%): <2%

Subregion (LRR): Mediterranean California Lat: -119.36794 Long: 35.44906 Datum: WBS 84

Soil Map Unit Name: Garces Silt Loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation **N**, Soil **N**, or Hydrology **N** significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation **N**, Soil **Y**, or Hydrology **N** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒ No ☐	**Is the Sampled Area within a Wetland?** Yes ☐ No ☒
Hydric Soil Present?	Yes ☐ No ☒	
Wetland Hydrology Present?	Yes ☐ No ☒	

Remarks:

Alkaline wetland, problematic soils

Photos: 2777-79

All comments added in 2012 by Jan Novak are preceded by: (2012).

(2012 – Hydrology and Soils changed to "no". Area no longer considered a wetland.)

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status
Sapling/Shrub Stratum (Use scientific names.)			
1. Suaeda moquinii	2	Y	NI
2.			
3.			
Total Cover:	2		
Herb Stratum			
1. Lepidium dictyotum	15	Y	OBL
2. Plantago elongata	9	Y	FACW
3. Hemizonia sp.	<1	N	UNK
4. Lasthenia californica	<1	N	NI
5. Plagiobothrys trachycarpus	<1	N	
6. Hordeum sp.	<1	N	UNK
7.			
Total Cover:	25		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 75 % Cover of Biotic Crust 5

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 2/3 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by	
OBL species	15	x 1 =	15
FACW species	9	x 2 =	18
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	24 (A)		33 (B)

Prevalence Index = B/A = 1.375

Hydrophytic Vegetation Indicators:

Y Dominance Test is >50%

Y Prevalence Index is ≤3.0[1]

N Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

Truncated radius of sample area due to different upland veg. types. Microtopography has upland species such as: *Lascal, Hormur, Isoacr, Erocic, Amsmen, Vulmic.*

Within area mapped as wetland, % upland microhabitat within wetland is approx. 15-20%

SOIL

Sampling Point: Mag-01

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 4/3	100					Clay	
6-14	10YR 5/4	100					Clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☒ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: Clay

Depth (inches): 6 inches

Hydric Soil Present? Yes ☐ No ☒

Remarks:

Soils may be alkaline, and naturally problematic due to adjacent areas with alkaline soils and dominance of plants in area adapted to alkaline conditions. Alkaline soils documented from previous projects in the region.
(results of Ph test)
(2012 - If the hydric vegetation and hydrology indicators are met, then problem soils may be considered hydric soils. Since hydrology was not met, hydric soils are not considered present.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☒ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): _____

Water Table Present? Yes ☐ No ☒ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

(2012 – The March 28, 2012 site visit, timed approximately 10 days after a significant precipitation events [0.85 inches of precipitation on March 17, 0.11 inch on March 18, and 0.09 inch on March 25, as recorded in Bakersfield] confirmed that most of the potentially jurisdictional areas lacked continuous ponding or saturation of the soil surface for more than 5 percent of the growing season. Soils in the lightly depressed areas were at field capacity, not saturated. Therefore, this area does not meet the minimum requirement for wetland hydrology. The "Wetland Hydrology Present" box has been checked "No".)

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: HECA/ Magnolia - 02 City/County: Kern County Sampling Date: 3/16/11

Applicant/Owner: HEI (2012 – Hydrogen Energy California LLC) State: CA Sampling Point: Mag-02

Investigator(s): J. Kisner, C. Julian, K. Kephart, D. Kisner Section, Township, Range: S35 T28S R24E

Landform (hillslope, terrace, etc.): Alkali flat upland Local relief (concave, convex, none): concave Slope (%): 1%

Subregion (LRR): Mediterranean California Lat: -119.36790 Long: 35.44908 Datum: WBS 84

Soil Map Unit Name: Garces Silt Loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation **N**, Soil **N**, or Hydrology **N** significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation **N**, Soil **Y**, or Hydrology **N** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐ No ☒	**Is the Sampled Area within a Wetland?** Yes ☐ No ☒
Hydric Soil Present?	Yes ☐ No ☒	
Wetland Hydrology Present?	Yes ☐ No ☒	

Remarks:

Alkaline wetland, problematic soils, lowest point in the area

Photos: 2777-79

All comments added in 2012 by Jan Novak are preceded by: (2012).

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status
Sapling/Shrub Stratum (Use scientific names.)			
1.			
2.			
3.			
Total Cover:	0		
Herb Stratum			
1. Hordeum intercedens	40	Y	NI
2. Descurainia incisa	40	Y	NI
3. Capsella bursa-pastoris	10	N	FAC-
4. Amsinckia menziesii var. menziesii	5	N	NI
5. Erodium cicutarium	2	N	NI
6. Plagiobothrys sp..	<1	N	UNK
7.			
Total Cover:	97		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 3 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0/2 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

N Dominance Test is >50%

N Prevalence Index is ≤3.0[1]

N Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOIL

Sampling Point: Mag-02

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-1								Root/thatch
1-5	10YR 5/3	100					Clay loam	Sticky
5-10	10YR 4/4	100					Clay	With small particulates

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: Clay

Depth (inches): 6 inches

Hydric Soil Present? Yes ☐ **No** ☒

Remarks:
Soils may be alkaline, and naturally problematic due to adjacent areas with alkaline soils and dominance of plants in area adapted to alkaline conditions. Alkaline soils documented from previous projects in the region.
(results of Ph test)
(2012 - If the hydric vegetation and hydrology indicators are met, then problem soils may be considered hydric soils. Since hydric vegetation and hydrology were not met, hydric soils are not considered present.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☒ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): _____

Water Table Present? Yes ☐ No ☒ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

(2012 – The March 28, 2012 site visit, timed approximately 10 days after a significant precipitation events [0.85 inches of precipitation on March 17, 0.11 inch on March 18, and 0.09 inch on March 25, as recorded in Bakersfield] confirmed that most of the potentially jurisdictional areas lacked continuous ponding or saturation of the soil surface for more than 5 percent of the growing season. Soils in the lightly depressed areas were at field capacity, not saturated. Therefore, this area does not meet the minimum requirement for wetland hydrology.)

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: HECA – along UPRR railroad tracks City/County: Kern County Sampling Date: 3/28/12

Applicant/Owner: Hydrogen Energy California LLC State: CA Sampling Point: 1 B (WL 1)

Investigator(s): J. Novak, K. Kephart, Section, Township, Range: S16 T29S R24E

Landform (hillslope, terrace, etc.): Alkali flat depression Local relief (concave, convex, none): concave Slope (%): 1%

Subregion (LRR): Mediterranean California Lat: 35.3991 Long: 119.4082 Datum: NAD 83

Soil Map Unit Name: Milham / Panoche-Garces NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☐ No ☒ (If no, explain in Remarks.)

Are Vegetation **N**, Soil **Y**, or Hydrology **N** significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation **N**, Soil **Y**, or Hydrology **N** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒	**Is the Sampled Area within a Wetland?** **Yes** ☐ **No** ☒
Hydric Soil Present?	Yes ☐	No ☒	
Wetland Hydrology Present?	Yes ☐	No ☒	

Remarks: Area lies along the UPRR railroad line. The soils are highly compacted and the topsoil was likely removed to elevate the railroad track. In addition, soils are alkaline, which are considered naturally problematic by USACE. Also, the annual rainfall for the 2011-2012 season is below average for this area.

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status
Sapling/Shrub Stratum (Use scientific names.)			
1.			
2.			
3.			
Total Cover: 0			
Herb Stratum			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:			

% Bare Ground in Herb Stratum 100 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

N Dominance Test is >50%

N Prevalence Index is ≤3.0[1]

N Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ☐ **No** ☒

Remarks: No vegetation is present. The ground is bare.

SOIL

Sampling Point: 1 B (upland)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	2.5Y 4/2	100					sandy clay loam	
2-3	2.5Y 3/3	100					sandy clay	Shovel refusal 3+

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☐ No ☒

Remarks: Soils are alkaline based on strong reaction to HCL and soil survey information. Alkaline soils are considered naturally problematic by USACE, as stated in the Arid West manual, and are likely to mask potential redoximorphic features present within the soil matrix. Therefore, more emphasis is placed on vegetation and hydrology.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): _____

Water Table Present? Yes ☐ No ☒ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: The upland point was geographically elevated from the wetland data point. The test pit was dry and showed no indicators of wetland hydrology.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: HECA – along UPRR railroad tracks City/County: Kern County Sampling Date: 3/28/12

Applicant/Owner: Hydrogen Energy California LLC State: CA Sampling Point: 1 A (WL 1)

Investigator(s): J. Novak, K. Kephart, Section, Township, Range: S16 T29S R24E

Landform (hillslope, terrace, etc.): Alkali flat depression Local relief (concave, convex, none): concave Slope (%): 1%

Subregion (LRR): Mediterranean California Lat: 35.3991 Long: 119.4082 Datum: NAD 83

Soil Map Unit Name: Milham / Panoche-Garces NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☐ No ☒ (If no, explain in Remarks.)

Are Vegetation **N**, Soil **Y**, or Hydrology **N** significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation **N**, Soil **Y**, or Hydrology **N** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒ No ☐	**Is the Sampled Area within a Wetland?** Yes ☒ No ☐
Hydric Soil Present?	Yes ☒ No ☐	
Wetland Hydrology Present?	Yes ☒ No ☐	

Remarks: Area lies along the UPRR railroad line. The soils are highly compacted and the topsoil was likely removed to elevate the railroad track. In addition, soils are alkaline, which are considered naturally problematic by USACE. Also, the annual rainfall for the 2011-2012 season is below average for this area.

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status
Sapling/Shrub Stratum (Use scientific names.)			
1.			
2.			
3.			
Total Cover:	0		
Herb Stratum			
1. Plagiobothrys trachycarpus	10	Y	FACW
2. Lepidium dictyotum	8	Y	FAC
3. Polypogon monspeliensis	3	N	FACW
4. Spergularia marina	2	N	NI
5. Deandra polyda	1	N	NI
6. Erodium cicutarium	1	N	NI
7. Sonchus asper	<1	N	FAC
8. Deschampsia danthonioides	<1	N	FACW
Total Cover:	25		

% Bare Ground in Herb Stratum 71 % Cover of Biotic Crust 1

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by	
OBL species	0	x 1 =	0
FACW species	13	x 2 =	26
FAC species	8	x 3 =	24
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	21 (A)		50 (B)

Prevalence Index = B/A = 2.38

Hydrophytic Vegetation Indicators:

Y Dominance Test is >50%

Y Prevalence Index is ≤3.0[1]

N Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks:

SOIL

Sampling Point: 1 A (WL 10)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	2.5Y 5/3	100	n/a				Silt loam	soil has massive structure, no horizon
2-7	2.5 Y 4/2	100	n/a				Clay loam	no redoximorphic features
7-12	2.5 Y 4/4	100	n/a				Clay loam	no redoximorphic features

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) (**LRR C**)
- ☐ 2 cm Muck (A10) (**LRR B**)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☒ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☒ No ☐

Remarks:
Soils are alkaline based on strong reaction to HCL and soil survey information. Alkaline soils are considered naturally problematic by USACE, as stated in the Arid West manual, and are likely to mask redoximorphic features present within the soil matrix. Therefore, more emphasis is placed on vegetation and hydrology.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) (**Nonriverine**)
- ☐ Sediment Deposits (B2) (**Nonriverine**)
- ☐ Drift Deposits (B3) (**Nonriverine**)
- ☒ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☒ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Plowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (**Riverine**)
- ☐ Sediment Deposits (B2) (**Riverine**)
- ☐ Drift Deposits (B3) (**Riverine**)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): _____

Water Table Present? Yes ☐ No ☒ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): _____

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: The depression was located adjacent to a ponded depression, which had a population of fairy shrimp (*Branchinecta lindahli*) present during the delineation. The depression featured cracked soils.

Appendix E

Wetland, Waters of the United States, and Nonjurisdictional Waters Acreages

Feature ID	Feature Area (square feet)	Feature Area (acre – rounded from square feet)
NJ 01 (Westside Canal)	2,308,599	53.00
NJ 02	7,975	0.18
NJ 03	3,942	0.09
NJ 04	88,461	2.03
NJ 05	10,806	0.25
NJ 06	12,930	0.30
NJ 07	60,200	1.38
NJ 08	8,297	0.19
NJ 09	9,133	0.21
NJ 10	16,046	0.37
NJ 11	22,484	0.52
NJ 12	1,808	0.04
NJ 13	16,654	0.38
NJ 14	29,049	0.67
NJ 15	2,948	0.07
NJ 16	551	0.01
NJ 17	2,358	0.05
NJ 18	15,714	0.36
NJ 19	9,173	0.21
NJ 20	14,014	0.32
NJ 21	10,032	0.23
NJ 22	13,731	0.32
NJ 23	1,359	0.03
NJ 24	13,601	0.31
NJ 25	63,222	1.45
NJ 26	16,889	0.39
NJ 27	3,635	0.08
NJ 28	207,865	4.77
NJ 29	31,771	0.73
NJ 30	46,857	1.08
NJ 31	78,742	1.81
NJ 32	122,443	2.81
NJ 33	34,970	0.80
NJ 34	30,703	0.70

Feature ID	Feature Area (square feet)	Feature Area (acre – rounded from square feet)
NJ 35	7,754	0.18
NJ 36	832	0.02
NJ 37	17,057	0.39
NJ 38	2,202	0.05
NJ 39	61,703	1.42
NJ 40	8,696	0.20
NJ 41	30,523	0.70
NJ 42	1,592	0.04
NJ 43	16,676	0.38
NJ 44	10,625	0.24
NJ 45	2,142	0.05
NJ 46	5,047	0.12
NJ 47	1,660	0.04
NJ 48	4,476	0.10
NJ 49	3,500	0.08
NJ 50	16,736	0.38
NJ 51	4,034	0.09
NJ 52	5,312	0.12
NJ 53	13,897	0.32
NJ 54	478,939	10.99
NJ 55	17,123	0.39
NJ 56	9,052	0.21
NJ 57	6,708	0.15
NJ 58	3,743	0.09
NJ 59	15,157	0.35
NJ 60	10,881	0.25
NJ 61	1,832	0.04
NJ 62	47,707	1.10
NJ 63	1,393	0.03
NJ 64	719	0.02
NJ 65	3,331	0.08
NJ 66	6,529	0.15
NJ 67	3,213	0.07
NJ 68	2,586	0.06

Feature ID	Feature Area (square feet)	Feature Area (acre – rounded from square feet)
NJ 69	6,192	0.14
NJ 70	4,988	0.11
NJ 71	3,706	0.09
NJ Total	**4,155,229**	**95.39**
WL 1	303	0.01
WL Total	**303**	**0.01**
WUS 1	2,854	0.07
WUS 2	3,645	0.08
WUS 3	2,221	0.05
WUS 4	2,221	0.05
WUS 5	892	0.02
WUS 6	2,412	0.06
WUS 7	1,636	0.04
WUS 8	2,115	0.05
WUS 9	2,595	0.06
WUS 11	1,726	0.04
WUS 12	260	0.01
WUS 13	384	0.01
WUS 14	1,704	0.04
WUS 15	2,896	0.07
WUS 17	10,330	0.24
WUS 19	744	0.02
WUS 20	5,137	0.12
WUS 21	551	0.01
WUS 22	1,905	0.04
WUS 23	3,353	0.08
WUS 24	1,096	0.03
WUS 25	5,530	0.13
WUS 26	842	0.02
WUS 27	373	0.01
WUS 28	648	0.01
WUS 29	4,521	0.10

Feature ID	Feature Area (square feet)	Feature Area (acre – rounded from square feet)
WUS 30	743	0.02
WUS 31	4,552	0.10
WUS 32	2,619	0.06
WUS 33	4,407	0.10
WUS 34	291	0.01
WUS 35	9,956	0.23
WUS 36	6,165	0.14
WUS 37	2,015	0.05
WUS 38	13,445	0.31
WUS 39	3,270	0.08
WUS 40	1,608	0.04
WUS 41	660	0.02
WUS 42	910	0.02
WUS 43	713	0.02
WUS 44	1,607	0.04
WUS 45	1,735	0.04
WUS 46	1,148	0.03
WUS 47	634	0.01
WUS 48	1,362	0.03
WUS 49	159	0.00
WUS 50	311	0.01
WUS 51	3,660	0.08
WUS 53 (CA Aqueduct)	74,104	1.70
WUS 54 (Kern River, Flood Control Channel)	3,827,945	87.88
WUS 62	53	0.00
WUS 63	171	0.00
WUS 64	132	0.00
WUS 18a	1,882	0.04
WUS 18b	465	0.01
WUS 18c	376	0.01
WUS Total	**4,029,689**	**92.51**

ATTACHMENT A49-2
NATIONWIDE PRE-CONSTRUCTION NOTIFICATION

U.S. Army Corps of Engineers

South Pacific Division

Nationwide Permit Pre-Construction Notification (PCN) Form

This form integrates requirements of the U.S. Army Corps of Engineers Nationwide Permit Program within the South Pacific Division (SPD), including General and Regional Conditions. You MUST fill out all boxes related to the work being done. Fillable boxes in this form expand if additional space is needed.

Box 1 Project Name Hydrogen Energy California (HECA)			
Applicant Name James L. Croyle		**Applicant Title** CEO	
Applicant Company, Agency, etc. Hydrogen Energy California, LLC		Applicant's internal tracking number (if any)	
Mailing Address 30 Monument Square, Suite 235, Concord, MA 01742			
Work Phone with area code (978) 287-9529	Mobile Phone with area code	Home Phone with area code	Fax # with area code
E-mail Address jcroyle@scsenergyllc.com	Relationship of applicant to property: ☒ Owner ☐ Purchaser ☐ Lessee ☐ Other:		

Application is hereby made for verification that subject regulated activities associated with subject project qualify for authorization under a U.S. Army Corps of Engineers Nationwide Permit or Permits as described herein. I certify that I am familiar with the information contained in this application and, that to the best of my knowledge and belief, such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities. I hereby grant to the agency to which this application is made the right to enter the above-described location to inspect the proposed, in-progress or completed work. I agree to start work only after all necessary permits have been received and to comply with all terms and conditions of the authorization.

Signature of applicant	Date (mm/dd/yyyy) 03/01/2013

If anyone other than the person named as the Applicant will be in contact with the U.S. Army Corps of Engineers representing the Applicant regarding this project during the permit process, Box 2 MUST be filled out.

Box 2 Authorized Agent/Operator Name Dale Shileikis		**Agent/Operator Title** Project Manager	
Agent/Operator Company, Agency, etc. URS Corporation		E-mail Address dale.shileikis@urs.com	
Mailing Address One Montgomery Street, Suite 900, San Francisco, CA 94104-4538			
Work Phone with area code (415) 896-5858	Mobile Phone with area code	Home Phone with area code	Fax # with area code (415) 882-9261

I hereby authorize the above named authorized agent to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application. I understand that I am bound by the actions of my agent and I understand that if a federal or state permit is issued, I, or my agent, must sign the permit.

Signature of applicant	Date (mm/dd/yyyy) 03/01/2013

I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief, such information is true, complete, and accurate.

Signature of authorized agent	Date (mm/dd/yyyy) 3/05/2013

Box 3 Name of Property Owner(s), if other than Applicant: Please see Appendix A		
Owner Title	**Owner Company, Agency, etc.**	
Mailing Address		
Work Phone with area code	Mobile Phone with area code	Home Phone with area code

Box 4 Name of Contractor(s) (if known):		
Contractor Title	**Contractor Company, Agency, etc.**	
Mailing Address		
Work Phone with area code	Mobile Phone with area code	Home Phone with area code

Box 5 Site Number 1 **of** 1**. Project location(s), including street address, city, county, state, zip code where proposed activity will occur:**

7361 Adohr Road, Buttonwillow, Kern County, CA 93206

Waterbody (if known, otherwise enter "an unnamed tributary to"): Kern River Flood Control Channel, California Aqueduct

Tributary to what known, downstream waterbody: Kern River

Latitude & Longitude (D/M/S, DD, or UTM with Zone):	Section, Township, Range:
35.33309, -119.387784	10, 30 South, 24 East
County Assessor Parcel Number (Include County name): See Supplemental Information	USGS Quadrangle map name: Tupman, East Elk Hills, West Elk Hills, Lokern, Buttonwillow, Rio Bravo
Watershed (HUC and watershed name[1]): See Supplemental Information [1]http://water.usgs.gov/GIS/regions.html	Size of permit area or project boundary: See Supplemental Information acres See Supplemental Information linear feet

Directions to the project location and other location descriptions, if known:

See Supplemental Information

Nature of Activity (Description of the project, include all features):

See Supplemental Information

Project Purpose (Description of the reason or purpose of the project):

See Supplemental Information

Box 6 Reason(s) for discharge into Waters of the United States (Description of why dredged and/or fill material needs to be placed in Waters of the United States):

See Supplemental Information

Proposed discharge of dredge and/or fill material. Indicate total surface area in **acres** and **linear feet** (where appropriate) of the proposed impacts to Waters of the United States, indicate water body type (tidal wetland, non-tidal wetland, riparian wetland, ephemeral stream/river, intermittent stream/river, perennial stream/river, pond/lake, vegetated shallows, bay/harbor, lagoon, ocean, etc.), and identify the impact(s) as permanent and/or temporary for each requested Nationwide Permit[1]:

[1] Enter the intended permit number(s). See Nationwide Permit regulations for permit numbers and qualification information: http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/NationwidePermits.aspx

Water Body Type	Requested NWP Number: 33				Requested NWP Number:				Requested NWP Number:			
	Permanent		Temporary		Permanent		Temporary		Permanent		Temporary	
	Area	Length	Area	Length	Area	Length	Area	Length	Area	Length	Area	Length
Ephemeral Waters	0	0	0.20	N/A								
Pick One												
Pick One												
Pick One												
Pick One												
Total:	0	0	0.20	N/A								

Total volume (in cubic yards) and type(s) of material proposed to be dredged from or discharged into Waters of the United States:

Material Type	Total Volume Dredged	Total Volume Discharged
Rock Slope Protection (RSP)		
Clean spawning gravel		
River rock		
Soil/Dirt/Silt/Sand/Mud	See Supplemental Information	See Supplemental Information
Concrete		
Structure		
Stumps/Root wads		
Other:		
Total:		

Activity requires a written waiver to exceed specified limits of the Nationwide Permit? ☐ Yes ☒ No
If yes, provide Nationwide Permit number and name, limit to be exceeded, and rationale for each requested waiver:

Activity will result in the loss of greater than ½-acre of Waters of the United States? ☐ Yes ☒ No
If yes, provide an electronic copy (compact disc) or multiple hard copies (7) of the complete PCN for appropriate Federal and State Pre-discharge Notification (See General Condition #31, Pre-construction Notification, Agency Coordination, Section 2 and 4).

Describe direct and indirect effects caused by the activity and how the activity has been designed (or modified) to have minimal adverse effects on the aquatic environment (See General Condition #31, Pre-construction Notification, District Engineer's Decision, Section 1):

See Supplemental Information

Potential cumulative impacts of proposed activity(if any):
None

Required drawings and figures (see each U.S. Army Corps of Engineers District's Minimum Standards Guidance):
Vicinity map: ☒ Attached (or mail copy separately if applying electronically)
To-scale Plan view drawing(s): ☒ Attached (or mail copy separately if applying electronically)
To-scale elevation and/or Cross Section drawing(s): ☐ Attached (or mail copy separately if applying electronically)
Numbered and dated pre-project color photographs: ☐ Attached (or mail copy separately if applying electronically)
Sketch drawing(s) or map(s): ☒ Attached (or mail copy separately if applying electronically)

Has a wetlands/waters of the U.S. delineation been completed?
☒ Yes, Attached[2] (or mail copy separately if applying electronically) ☐ No
If a delineation has been completed, has it been verified in writing by the Corps?
☐ Yes, Date of preliminary or approved jurisdictional determination (mm/dd/yyyy): Corps file number: ☒ No
[2]If available, provide ESRI shapefiles (NAD83) for delineated waters

For proposed discharges of dredged material resulting from navigation dredging into inland or near-shore waters of the U.S. (including beach nourishment), please attach[3] a proposed Sampling and Analysis Plan (SAP) prepared according to Inland Testing Manual (ITM) guidelines (including Tier I information, if available), or if disposed offshore, a proposed SAP prepared according to the Ocean Disposal Manual. ☐ Attached (or mail copy separately if applying electronically)
[3]Or mail copy separately if applying electronically

Is any portion of the work already complete? ☐ YES ☒ NO
If yes, describe the work:

Box 7 Authority:
Is Section 10 of the Rivers and Harbors Act applicable?: ☐ YES ☒ NO
Is Section 404 of the Clean Water Act applicable?: ☒ YES ☐ NO

Is the project located on U.S. Army Corps of Engineers property or easement?: ☐ YES ☒ NO
If yes, has Section 408 process been initiated?: ☐ YES ☒ NO
Would the project affect a U.S. Army Corps of Engineers structure?: ☐ YES ☒ NO
If yes, has Section 408 process been initiated?: ☐ YES ☒ NO

Is the project located on other Federal Lands (USFS, BLM, etc.)?: ☐ YES ☒ NO
Is the project located on Tribal Lands?: ☐ YES ☒ NO

Box 8 Is the discharge of fill or dredged material for which Section 10/404 authorization is sought part of a larger plan of development?: ☐ YES ☒ NO

If discharge of fill or dredged material is part of development, name and proposed schedule for that larger development (start-up, duration, and completion dates):

Location of larger development (if discharge of fill or dredged material is part of a plan of development, a map of suitable quality and detail of the entire project site should be included):

Box 9 Measures taken to avoid and minimize impacts to waters of the United States:
See Supplemental Text

Box 10 Proposed Compensatory Mitigation related to fill/excavation and dredge activities. Indicate in **acres** and **linear feet** (where appropriate) the total quantity of Waters of the United States proposed to be created, restored, enhanced and/or preserved for purposes of providing compensatory mitigation. Indicate water body type (tidal wetland, non-tidal wetland, riparian wetland, ephemeral stream/river, intermittent stream/river, perennial stream/river, pond/lake, vegetated shallows, bay/harbor, lagoon, ocean, etc.) or non-jurisdictional (uplands[1]). Indicate mitigation type (permittee-responsible on-site/off-site, mitigation bank, or in-lieu fee program). If the mitigation is purchase of credits from a mitigation bank, indicate the bank to be used, if known:
[1] For uplands, please indicate if designed as an upland buffer.

Site Number	Water Body Type	Created		Restored		Enhanced		Preserved		Mitigation Type
		Area	Length	Area	Length	Area	Length	Area	Length	
See Supplemental Text	Pick One									Pick One
	Pick One									Pick One
	Pick One									Pick One
	Pick One									Pick One
	Pick One									Pick One
Total:										Pick One

If no mitigation is proposed, provide detailed explanation of why no mitigation would be necessary:
Impacts would be temporary and features would be restored to pre-project condition. See Supplemental Text.

If permittee-responsible mitigation is proposed, provide justification for not utilizing a Corps-approved mitigation bank or in-lieu fee program:

Has a draft/conceptual mitigation plan been prepared in accordance with the April 10, 2008, Final Mitigation Rule[2] and District Guidelines?
[2]http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/mitig_info.aspx
[3]**Sacramento and San Francisco Districts**-http://www.spk.usace.army.mil/organizations/cespk-co/regulatory/pdf/Mitigation_Monitoring_Guidelines.pdf
[4]**Los Angeles District**-http://www.spl.usace.army.mil/regulatory/mmg_2004.pdf
[5]**Albuquerque District**-http://www.spa.usace.army.mil/reg/mitigation/SPA%20Final%20Mitigation%20Guidelines_OLD.pdf
☐ Yes, Attached (or mail copy separately if applying electronically) ☐ No
If no, a mitigation plan must be prepared and submitted, if applicable.

Mitigation site(s) Latitude & Longitude (D/M/S, DD, or UTM with Zone):	USGS Quadrangle map name(s):
Assessor Parcel Number(s):	Section(s), Township(s), Range(s):

Other location descriptions, if known:

Directions to the mitigation location(s):

Box 11 Threatened or Endangered Species

Please list any federally-listed (or proposed) threatened or endangered species or critical habitat (or proposed critical habitat) within the project area (include scientific names (e.g., Genus species), if known):

a. See Supplemental Information
b.
c.
d.
e.
f.

Have surveys, using U.S. Fish and Wildlife Service/NOAA Fisheries protocols, been conducted?
☒ Yes, Report attached (or mail copy separately if applying electronically) ☐ No

If a federally-listed species would be impacted, please provide a description of the impactand a biological evaluation, if available.
☒ Yes, Report attached (or mail copy separately if applying electronically) ☐ Not attached

Has Section 7 consultation been initiated by another federal agency?
☒ Yes, Initiation letter attached (or mail copy separately if applying electronically) ☐ No

Has Section 10 consultation been initiated for the proposed project?
☐ Yes, Initiation letter attached (or mail copy separately if applying electronically) ☒ No

Has the USFWS/NOAA Fisheries issued a Biological Opinion?
☐ Yes, Attached (or mail copy separately if applying electronically) ☒ No
If yes, list date Opinion was issued (m/d/yyyy):

Box 12 Historic properties and cultural resources:

Are any cultural resources of any type known to exist on-site? ☒ Yes ☐ No

Please list any known historic properties listed, or eligible for listing, on the National Register of Historic Places:

a. California Aqueduct
b. Old Headquarters Weir
c.
d.
e.
f.

Has a cultural resource records search been conducted?
☒ Yes, Report attached (or mail copy separately if applying electronically) ☐ No

Has a cultural resource pedestrian survey been conducted for the site?
☒ Yes, Report attached (or mail copy separately if applying electronically) ☐ No

Has another federal agency been designated the lead federal agency for Section 106 consultation?
☒ Yes, Designation letter/email attached (or mail copy separately if applying electronically) ☐ No

Has Section 106 consultation been initiated by another federal agency?
☒ Yes, Initiation letter attached (or mail copy separately if applying electronically) ☐ No

Has a Section 106 MOA or PA been signed by another federal agency and the SHPO?
☐ Yes, Attached (or mail copy separately if applying electronically) ☒ No
If yes, list date MOA or PA was signed (m/d/yyyy):

Box 13 Section 401 Water Quality Certification:
Applying for certification? ☒ Yes, Attached (or mail copy separately if applying electronically) ☐ No

Certification issued? ☐ Yes, Attached (or mail copy separately if applying electronically) ☒ No
Certification waived? ☐ Yes, Attached (or mail copy separately if applying electronically) ☒ No
Certification denied? ☐ Yes, Attached (or mail copy separately if applying electronically) ☒ No

Exempted activity? ☐ Yes ☒ No
Agency concurrence? ☐ Yes, Attached ☒ No
If exempt, state why:

Box 14 Coastal Zone Management Act:
Is the project located within the Coastal Zone? ☐ Yes ☒ No

If yes, applying for a coastal commission-approved Coastal Development Permit?
☐ Yes, Attached (or mail copy separately if applying electronically) ☐ No

If no, applying for separate CZMA-consistency certification?
☐ Yes, Attached (or mail copy separately if applying electronically) ☒ No

Permit/Consistency issued? ☐ Yes, Attached (or mail copy separately if applying electronically) ☐ No

Exempt? ☐ Yes ☐ No
Agency concurrence? ☐ Yes, Attached ☒ No
If exempt, state why:

Box 15 List of other certifications or approvals/denials received from other federal, state, or local agencies for work described in this application:

Agency	Type of Approval[4]	Identification Number	Date Applied	Date Approved	Date Denied
CDFW	Streambed Alteration Agreement	TBD	TBD	TBD	
RWQCB	401 Water Quality Certification	TBD	TBD	TBD	

[4] Would include but is not restricted to zoning, building, and flood plain permits

Nationwide Permit General Conditions (GC) checklist:

(http://www.gpo.gov/fdsys/pkg/FR-2012-02-21/pdf/2012-3687.pdf)

Check	General Condition	Rationale for compliance with General Condition
☒	1. Navigation	No work would occur in navigable waters
☒	2. Aquatic Life Movements	No work would occur in areas or waterbodies where aquatic life movement occurs
☒	3. Spawning Areas	No work would occur in spawning areas
☒	4. Migratory Bird Breeding Areas	No work would occur in migratory bird breeding areas
☒	5. Shellfish Beds	No shellfish beds are within project area.
☒	6. Suitable Material	No unsuitable materials would be used
☒	7. Water Supply Intakes	No work would occur near public water supply intakes
☒	8. Adverse Effects from Impoundments	Addressed in A&M measures
☒	9. Management of Water Flows	Work would not result in alteration to water flows. Features would be restored to pre-project condition
☒	10. Fills Within 100-Year Floodplains	Project not within 100-year floodplain
☒	11. Equipment	No work would occur in sensitive soil areas
☒	12. Soil Erosion and Sediment Controls	Addressed in A&M measures
☒	13. Removal of Temporary Fills	All temporary fill would be removed and areas restored to pre project condition
☒	14. Proper Maintenance	Installed structures would be properly maintained

☒	15. Single and Complete Project	All activities would occur within one single and complete project
☒	16. Wild and Scenic Rivers	No Wild and Scenic Rivers are within project area
☒	17. Tribal Rights	No tribal rights would be impaired as a result of the project
☒	18. Endangered Species	See Box 11 above.
☒	19. Migratory Bird and Bald and Golden Eagle Permits	Addressed in Box 11 and the attached Biological Assessment
☒	20. Historic Properties	See Box 12 above.
☒	21. Discovery of Previously Unknown Remains and Artifacts	The project would be in compliance with this condition
☒	22. Designated Critical Resource Waters	Critical Resource waters are not present within project area
☒	23. Mitigation	See Box 10 above.
☒	24. Safety of Impoundment Structures	No dams or large impoundment structures would be created as part of the project
☒	25. Water Quality	See Box 13 above.
☒	26. Coastal Zone Management	See Box 14 above.
☒	27. Regional and Case-by-Case Conditions	Regional and Case-by-Case conditions would be complied with
☒	28. Use of Multiple Nationwide Permits	Work would only be approved under NWP 33
☒	29. Transfer of Nationwide Permit Verifications	This condition would be complied with if necessary
☒	30. Compliance Certification	This condition would be complied with
☒	31. Pre-Construction Notification	A PCN (this form) would be submitted

HYDROGEN ENERGY CALIFORNIA
KERN COUNTY, CALIFORNIA

NATIONWIDE PERMIT PRE-CONSTRUCTION NOTIFICATION

SUPPLEMENTAL INFORMATION

Prepared for:

Hydrogen Energy California, LLC
30 Monument Square, Suite 235
Concord, MA 01742
Contact: Marisa Mascaro
(978) 287-9529

Prepared by:

URS Corporation
Post Montgomery Center
One Montgomery Street, Suite 900
San Francisco, CA 94104-4538
Contact: Dale Shileikis
(415) 896-5858

URS Project Number 28068052

February 2013

Tables

Figures

Appendices

Acronyms and Abbreviations

APN	Assessor's Parcel Number
BMPs	best management practices
BRMIMP	Biological Resources Mitigation Implementation and Monitoring Plan
BVWSD	Buena Vista Water Storage District
CEC	California Energy Commission
CO_2	carbon dioxide
DOE	U.S. Department of Energy
EOR	enhanced oil recovery
HDD	horizontal directional drilling
HDDP	Horizontal Directional Drilling Plan
HECA	Hydrogen Energy California
KRFCC	Kern River Flood Control Channel
NWP	Nationwide Permit
OEHI	Occidental of Elk Hills Incorporated
PCN	Pre-Construction Notification
PG&E	Pacific Gas and Electric Company
Project Site	The physical location or site where the power generating facility and associated structures or components would be built.
Project	Hydrogen Energy California LLC Integrated Gasification Combined-Cycle polygeneration project
ROW	right-of-way
SR	State Route
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
WUS	Other/nonwetland Waters of the United States

1.0 SUPPLEMENTAL INFORMATION

The following section contains supplemental information for the Hydrogen Energy California (HECA) Project Nationwide Permit (NWP) #33 for Temporary Construction, Access, and Dewatering Pre-Construction Notification. Information is organized by block and corresponding subject, based on the NWP Pre-Construction Notification (PCN) Form obtained from the United States Army Corps of Engineers (USACE) South Pacific Division.

Because of the size and complexity of the HECA Project, a complete and detailed Project Description is provided as an appendix (Appendix A, Project Description). The information presented in this supplemental text addresses each question fully and completely, but only presents the Project information that is relevant to the activities that would occur in potential jurisdictional waters.

The following terms are used throughout the application and are defined below.

- HECA Project (or "Project") – Refers to the entire Hydrogen Energy California Project, as described in Appendix A.

- Main Project Site (or "Project Site") – The physical location or site where the power-generating facility and associated structures or components would be built.

- Controlled Area – Area owned by HECA that is located immediately adjacent to the Main Project Site. The purpose of the Controlled Area is to ensure ownership and control by HECA LLC over public access and land use adjacent to the Project Site. With the exception of temporary construction impacts for linears and laydown, current plans are to continue to use the Controlled Area for agricultural purposes during construction and operations.

- Project Linears – The linear utility components of the Project (such as pipelines and electric transmission lines) that would be constructed outside the Main Project Site.

1.1 BOX 5 – PROJECT LOCATION

A brief description of the Project components and their locations is provided below. For more information, see the attached Project Description (Appendix A).

1.1.1 Main Project Site

The Project Site consists of approximately 453 acres in Kern County, California, as shown on Figure 1. The Project Site is located approximately 2 miles northwest of the unincorporated community of Tupman. The street address of the Project Site is 7361 Adohr Road, Buttonwillow, CA 93206. The Project Site is located in Section 10 of Township 30 South, Range 24 East in Kern County. The Project Site Assessor's Parcel Numbers (APNs) are as follows:

- Part of 159-040-02
- Part of 159-040-16
- Part of 159-040-18

The 653-acre Controlled Area is shown on Figure 2. The APNs associated with the Controlled Area are as follows:

- All of 159-040-04
- All of 159-040-11
- All of 159-040-17
- All of 159-190-09
- Remnant part of 159-040-02
- Remnant part of 159-040-16
- Remnant part of 159-040-18

The Project Site is used predominantly for agricultural purposes, including cultivation of cotton, alfalfa, and onions. Land use in the vicinity of the Project Site is primarily agricultural. Adjacent land uses include Adohr Road and agricultural uses to the north; Tupman Road and agricultural uses to the east; agricultural uses and an irrigation canal to the south; and Dairy Road right-of-way (ROW) and agricultural uses to the west. The West Side Canal (and the Outlet Canal), the Kern River Flood Control Channel (KRFCC), and the California Aqueduct (State Water Project) are approximately 500, 700, and 1,900 feet south of the Project Site, respectively.

1.1.2 Project Linears

In addition to the Main Project Site, the Project requires the construction and installation of several offsite linear components (Project Linears) (Figure 3). The Project Linears include the following:

- **Electrical transmission line.** An approximately 2-mile electrical transmission line will interconnect the Project to the future Pacific Gas and Electric Company (PG&E) switching station, east of the Project Site.

- **Natural gas supply pipeline.** An approximately 13-mile natural gas interconnection will be made with an existing PG&E natural gas pipeline north of the Project Site.

- **Water supply pipelines.** The Project will use brackish groundwater supplied from the Buena Vista Water Storage District, located to the northwest, for process water. The raw water supply pipeline will be approximately 15 miles in length, and will connect to five new groundwater wells. Potable water for drinking and sanitary use will be supplied by the West Kern Water District to the east. The potable water supply pipeline will be approximately 1 mile in length.

- **Carbon dioxide (CO_2) pipeline.** An approximately 3-mile CO_2 pipeline will transfer the CO_2 captured from the Project Site south to the Occidental of Elk Hills, Incorporated (OEHI) CO_2 processing facility.

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PROJECT VICINITY

February 2013
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Hydrogen Energy California (HECA)
Kern County, California

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FIGURE 1

DUNFORD RD
Deep Wells Ditch
East Side Canal
Main Drain
DAIRY RD
ADOHR RD
STATION RD
West Side Canal
Kern River Flood Control Channel
California Aqueduct
Outlet Canal
TUPMAN RD

Project Site
Construction Staging Area
Controlled Area
Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

N
0 750 1,500
Feet

HECA MAIN PROJECT SITE

February 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

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FIGURE 2

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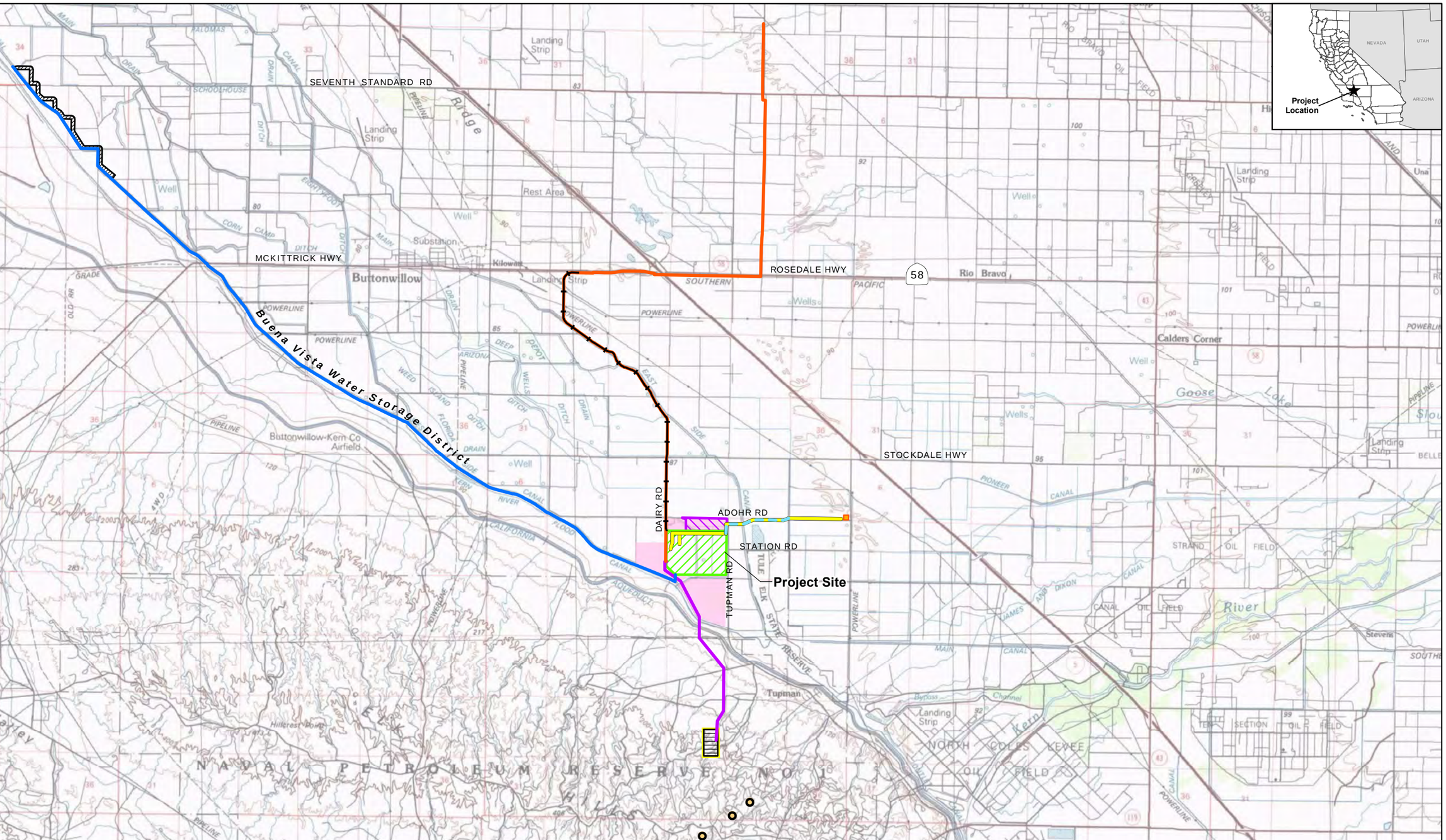
Source: Aerial Photo, Digital Globe, 2008.



Project Site
Construction Staging Area
Controlled Area
BVWSD Well Field

Electrical Switching Station
EOR Processing Facility
EOR Satellite Gathering Station

Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

N

0 1 2 Miles

PROJECT OVERVIEW

February 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

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FIGURE 3

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Source: USGS (30'x60' quads: Taft 1982, Delano 1982). Created using TOPO!, ©2006 National Geographic Maps, All Rights Reserved. Kern County and State of California (proposed and approved projects).

- **Industrial railroad spur.** A new, approximately 5-mile railroad spur would connect the Project Site to the existing San Joaquin Valley Railroad Buttonwillow railroad line, north of the Project Site. The railroad spur would deliver coal to the Project Site, as well as export products during operations. If available, the railroad spur will also be used to deliver plant equipment during construction. Public and private at-grade crossings would also be constructed.

The Project Linears begin at the Project Site, and are aligned generally along existing ROWs such as roads, railroads, or canals until their termini at various locations up to 15 miles away from the Project Site. A list containing parcel and landowner information for all properties adjacent to or within the ROWs of these features is provided in Appendix B.

1.1.3 Watershed

The HECA Project is within the Tulare-Buena Vista Lakes watershed, specifically Hydrologic Unit Code 18030012, as defined by the United States Geological Survey (USGS, 2013). See the Preliminary Jurisdictional Delineation for more information.

1.1.4 Size of Permit Area or Project Boundary

The areas and lengths of all Project Components are presented in Table 1. Note that the areas and features presented in Table 1 describe the entirety of the HECA Project. The activities and impacts to waters covered under NWP 33 and addressed in this PCN are not explicitly presented in this table.

1.1.5 Directions to Project Site

The following directions are for travel from downtown Sacramento, California, to the Project Site:

- Head south on Interstate 5 (approximately 265 miles)
- Take Exit 253 for Stockdale Highway/Bellevue Road (0.3 mile)
- Turn right to continue west on Stockdale Highway/Bellevue Road (3.2 miles)
- Turn left to head south on Dairy Road (1.0 mile)
- The Project Site is located at the intersection of Dairy Road and Adohr Road.

The Project Site is bordered by Adohr Road to the north and Tupman Road to the east (Figure 2). The routes of the Project Linears may or may not be accessible by road, depending on the segment. An overview of the proposed routes of each of the Project Linears is presented in Figure 3.

1.2 BOX 6 – NATURE OF ACTIVITY

Construction of the Project Linears is the only Project activity that would potentially affect jurisdictional features. Descriptions of each Project Linear that would potentially affect jurisdictional features are provided below. The construction of the Main Project Site does not involve any impacts to jurisdictional water features. For this reason, only a brief description of the activities pertaining to the Main Project Site is included below. See the attached Project Description (Appendix A) for more information.

Table 1
Project Features

Project Component	Description	Approx. Linear Length (miles)	ROW Construction	ROW Permanent	Temporary Disturbance[1] (acres)	Permanent Disturbance[2] (acres)
Project Site	453-acre HECA Project Site	N/A	N/A	N/A	453	453
Temporary Construction Area	**Temporary disturbance:** 91 acres in the Controlled Area. **Permanent disturbance:** None.	N/A	N/A	N/A	91	None
Railroad spur	Single track railroad. **Temporary disturbance:** 75 feet wide along linear length, plus 3 acres of laydown area. **Permanent disturbance:** 60 feet wide along linear length.	5.3	75 feet	60 feet	51.0	38.4
Natural gas linear	**Temporary disturbance:** 50 feet wide along linear length, plus 100-foot by 100-foot metering station at the inlet. Disturbance area shared with railroad spur. **Permanent disturbance:** Only the metering station at the inlet.	13	50 feet	25 feet	47.43[3]	0.23
BVWSD well field and process water pipeline	**Temporary disturbance:** 50 feet wide along linear length, plus 150-foot by 100-foot area of disturbance around each of 5 wells. **Permanent disturbance:** Only the areas around each well (100 feet by 100 feet).	15	50 feet	25 feet	90.25	1.15
Electrical transmission line	**Temporary disturbance:** 25-foot-wide road throughout linear length, plus up to 25-foot-diameter structural base for each of 15 poles. **Permanent disturbance:** Only the up to 25-foot-diameter structural base for each of 15 poles.	2.1	100 feet	100 feet	7.35	0.15
PG&E Switching Station	Proposed switching station site (417 feet by 417 feet).	N/A	N/A	N/A	4	4
Potable water pipeline	**Temporary disturbance:** 10 feet wide along linear length and within transmission line corridor. **Permanent disturbance:** None.	1	10 feet	N/A	Included with transmission line[4]	N/A

Table 1
Project Features (Continued)

Project Component	Description	Approx. Linear Length (miles)	ROW Construction	ROW Permanent	Temporary Disturbance[1] (acres)	Permanent Disturbance[2] (acres)
OEHI CO_2 pipeline[5]	**Temporary disturbance:** 80 feet along 15,240.8 feet of trenched pipe, plus 2 entry pits (120-foot by 100-foot each) and 2 exit pits for HDD (75-foot by 100-foot each), plus two 50-foot by 50-foot valve box areas. **Permanent disturbance:** Only the two 50-foot by 50-foot valve box areas.	3.4	50 to 80 feet	25 feet	29.00	0.11
OEHI EOR[6]	EOR Processing Facility of 1,200 feet by 2,200 feet, plus 3 satellites (230 by 200 feet).	N/A	N/A	N/A	63.79	63.79
Total Disturbance					**836.8**	**560.8**

Source: HECA, 2012.

Notes:

1 Temporary disturbance area is the total area disturbed during construction.

2 Permanent disturbance area is the disturbed/developed area that remains after construction.

3 The temporary disturbance area along the portion of the natural gas linear that follows the railroad spur from the Project Site to the interconnection of the railroad with the existing San Joaquin Valley Railroad line is included in the temporary disturbance area for the railroad spur.

4 The potable water pipeline temporary disturbance area is included in the temporary disturbance area for the electrical transmission line.

5 Sources: 2012 Amended AFC, Appendix A-2 [Stantec (Stantec Corporation). Modified CO_2 Supply Line Alignment Data Gap Analysis. Prepared for Occidental of Elk Hills, Inc. April 2012.] and Response to CEC Data Request A59.

6 See Biological Assessment.

BVWSD = Buena Vista Water Storage District
CO_2 = carbon dioxide
EOR = Enhanced Oil Recovery
N/A = not applicable
PG&E = Pacific Gas and Electric Company
OEHI = Occidental Elk Hills, Incorporated
ROW = right-of-way

1.2.1 Project Components

Main Project Site

The Main Project Site consists of the 453-acre area in which the Integrated Gasification Combined Cycle polygeneration project would be built.

Construction activities for the power-generating facility and other features within the Main Project Site will occur throughout the 42-month construction period. All construction laydown and parking areas will be within the Main Project Site and the Controlled Area. Onsite construction activities include clearing and grubbing, grading, hauling, layout of equipment, delivery and handling of materials and supplies, and Project facility construction and testing operations. The Main Project Site occurs in an area of relatively flat topography. Site grading will occur as necessary to form level building pads for major process units.

Construction Site access will be via Dairy Road for truck deliveries, and Adohr Road for construction craft vehicles arriving and departing the Site. Initial Site preparation will include construction of temporary access roads, parking, laydown areas, office and warehouse facilities, installation of erosion control measures, and other improvements necessary for construction. Erosion control measures will include construction of stormwater retention basins and related Site drainage facilities to control runoff within the Project Site boundary. Existing drainage patterns outside the Project Site boundary will remain unchanged, and no runoff from outside the Project Site boundary will flow onto the Project Site.

Natural Gas Supply Line

A new natural gas pipeline will interconnect with the existing PG&E natural gas pipeline north of the Project Site. The interconnect will consist of one tap off the existing natural gas line, and one metering station at the beginning of the natural gas pipeline adjacent to the PG&E Inlet. The metering station will be up to 100 feet by 100 feet, surrounded by a chain-link fence. In addition, there will be a metering station at the end of the natural gas pipeline, on the southwest side of the Project Site; and a pressure limiting station on the Project Site. HECA or PG&E will construct the natural gas pipeline. PG&E will own the natural gas pipeline. The natural gas line is approximately 13 miles in length, including 5.28 miles that would be within the railroad spur line ROW.

Construction of the natural gas pipeline interconnection will include the following standard pipeline construction activities: clearing and grubbing; hauling and stringing of the pipe along the route; welding, radiographic inspection, and coating of the pipe welds; trenching; lowering of the pipe into the trench; backfill of the trench; hydrostatic testing of the pipeline; tie-in to the existing pipeline; purging the pipeline; and cleanup and restoration of construction areas. Roads and ROWs will be restored to specifications of the Project and affected agencies.

Construction of the natural gas pipeline interconnection will take approximately 6 months. It is scheduled to be finished and operational in time to provide test gas to the Project. Construction will occur in accordance with a traffic management plan to minimize impacts to traffic. Grade cuts will be restored to their original contours, and affected areas will be restored to their original condition to minimize erosion. No new access roads would be constructed for maintenance and operation of the natural gas pipeline, because existing access roads are adequate for this purpose.

PG&E will own, operate, and maintain the natural gas pipeline. Maintenance of the natural gas pipeline would follow PG&E corporate policies and protocols. Long-term maintenance needs of the natural gas pipeline would be minimal during the 25-year lifespan of the Project.

Carbon Dioxide Pipeline

A CO_2 pipeline will be constructed to transfer the CO_2 produced by the HECA Project to the OEHI CO_2 Processing Facility used by OEHI for injection into deep underground hydrocarbon reservoirs for CO_2 enhanced oil recovery. The CO_2 pipeline route will leave the southwestern portion of the HECA Project Site, and will use Horizontal Directional Drilling (HDD) to pass under the Outlet Canal, the KRFCC, and the California Aqueduct. The number of HDD entry and exit pits will be determined based on field conditions. HDD would also be used to avoid disturbance of archaeological sites. On the south side of the aqueduct, the route extends southeast and south to the OEHI CO_2 Processing Facility, and parallels existing private roads. The route is approximately 3 miles in length. The construction ROW would be 80 feet wide along the linear length plus the two 120- foot by 100-foot entry pits and two 75-foot by 100-foot exit pits needed for HDD. The permanent ROW would be 25 feet wide. OEHI will construct and own the CO_2 pipeline.

With the exception of the proposed HDD crossings, where the depth of the CO_2 pipeline would be approximately 50 feet below grade, the pipeline will be buried approximately 5 feet below grade, protected by cathodic protection, and monitored by independent leak-detection systems. Construction of the CO_2 pipeline interconnection will include standard pipeline construction activities: clearing and grubbing; trenching; hauling and stringing of the pipe along the route; welding; radiographic inspection; coating of the pipe welds; lowering of the pipe into the trench; backfill of the trench; hydrostatic testing of the pipeline; purging the pipeline; and cleanup and restoration of construction areas. Grade cuts will be restored to their original contours, and affected areas will be restored to their original state so as to minimize erosion. Construction of the CO_2 pipeline will take approximately 6 months.

OEHI will own, operate, and maintain the CO_2 pipeline. Maintenance of the CO_2 linear will follow OEHI corporate policies and protocols. Long-term maintenance needs of the CO_2 pipeline would be minimal during the 25-year lifespan of the Project.

Horizontal Directional Drilling

HDD will be used to install the CO_2 pipeline under the Outlet Canal, the KRFCC, and the California Aqueduct. The depth of HDD under these water bodies will comply with all applicable federal and state regulations.

The California Department of Water Resources Encroachment Permit Guidelines, June 2005, identifies specific requirements regarding the use of HDD for the crossing of the California Aqueduct. The principal requirements include but are not limited to the following:

- A site-specific geotechnical report must be submitted to the California Department of Water Resources with the Encroachment Permit application.

- Pipe sleeves are required with any pipeline carrying hazardous materials or pollutants.

- The minimum separation between the bottom of the aqueduct channel and the top of pipe is 25 feet; further separation may be required depending on the actual pipe diameter.

- Drawings submitted with the Encroachment Permit Application must include the following information for buried pipelines (as a minimum):

  - Aqueduct mileposts at each crossing, pipe size, location, and type of material transported;
  - Maximum operating pressure, type of pipe and pipe joints, pipe wall thickness, maximum test pressure, and description of test procedures;
  - Type of sleeve/casing including diameter, joints, and wall thickness;
  - Protection coatings and a description of control measures;
  - Method employed to accommodate pipeline expansion and contraction;
  - Thrust block location and details;
  - Pipeline coatings and corrosion control measures;
  - Location of shutoff valves on each side of the crossing;
  - List of applicable design codes;
  - Location, including depth, of the buried aqueduct communication and control cables; and
  - Identification of existing utility easements or encroachments in the immediate vicinity of the proposed crossing.

The HDD method includes a drilling rig that will bore a horizontal hole under the water crossings. At each of these crossings, laydown areas (or entry/exit pits) have been identified on either side of the water course to accommodate the HDD installation (Figure 4, Sheet 2).

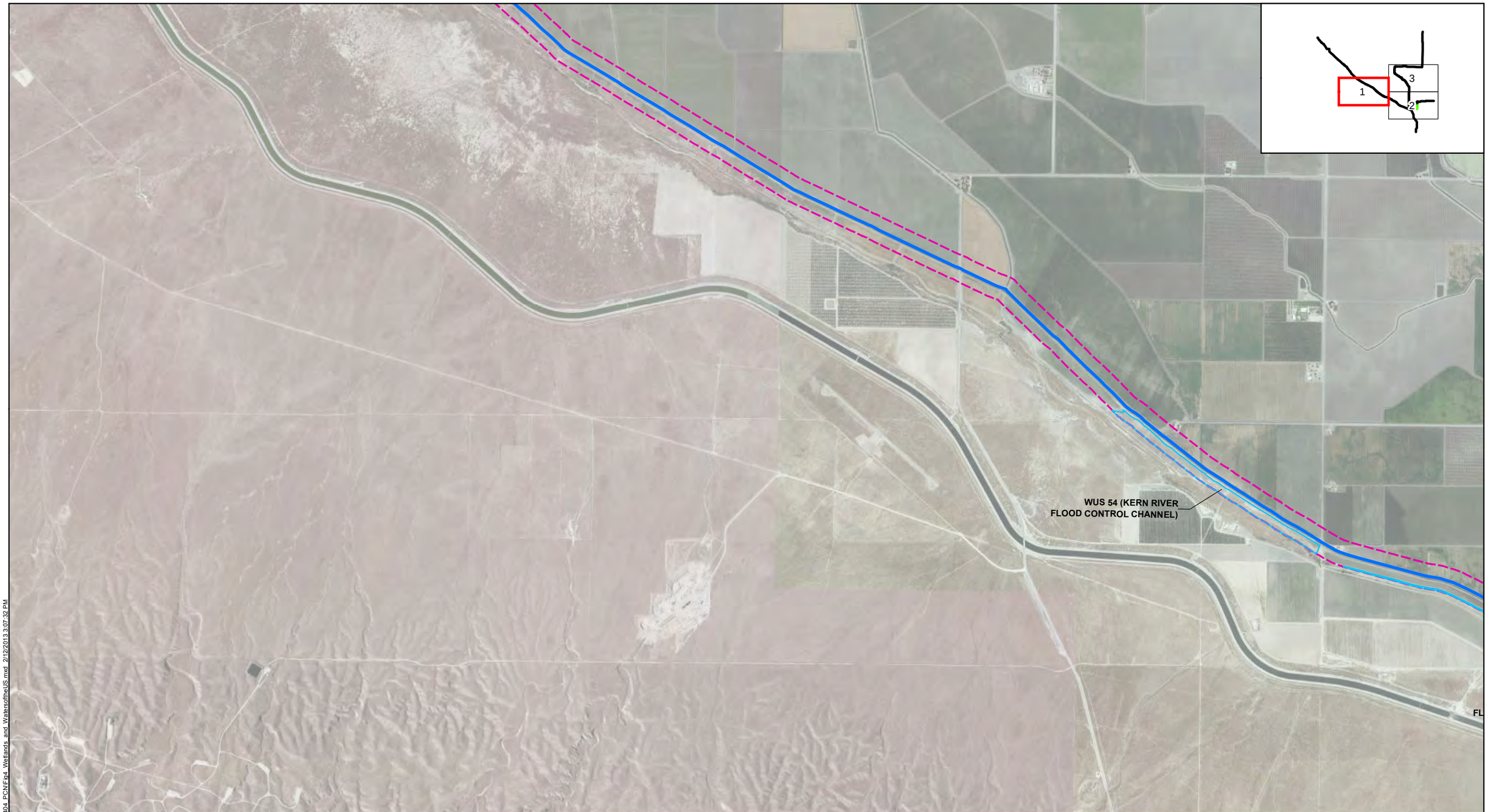
1.2.2 Project Schedule

Details of the project schedule are still under development; however, project construction activities are anticipated to start as early as late 2013, with completion of project activities to occur roughly 48 months later.

USFWS finalizes Biological Opinion.....May 2013
Completion of California Energy Commission (CEC) permitting process ...late 2013
Commencement of pre-construction and construction activities.....late 2013
Commencement of commercial operation of the Project 2017

1.2.3 Project Purpose

The HECA Project will be a state of-the-art facility that will produce electricity and other useful products for California, and that will have dramatically lower carbon emissions compared to traditional facilities. HECA will capture carbon from its processes and transport the CO_2 for use in enhanced oil recovery at a nearby oil field, resulting in sequestration of the CO_2 in secure geologic formations within the earth. The HECA Project is needed to provide dependable, low-carbon electricity to help meet future power needs, and to help "back up" intermittent renewable power sources, such as wind and solar, to support a reliable power grid. The HECA Project is also needed to provide a local source of low-carbon nitrogen-based fertilizers. The U.S. Department of Energy (DOE) is providing financial assistance to the HECA Project under the Clean Coal Power Initiative Round 3.



Project Site
Construction Staging Area
Controlled Area
250-foot Buffer from Disturbance Area
BVWSD Well Field
HDD Entry/Exit Pits

Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

Waters
Non-jurisdictional waters of the U.S. (NJ)
Other waters of the U.S. (WUS)
Wetland (WL)
Area Not Surveyed

N

0 1,000 2,000 FEET

Source: Aerial Imagery, Bing Maps, 2009.

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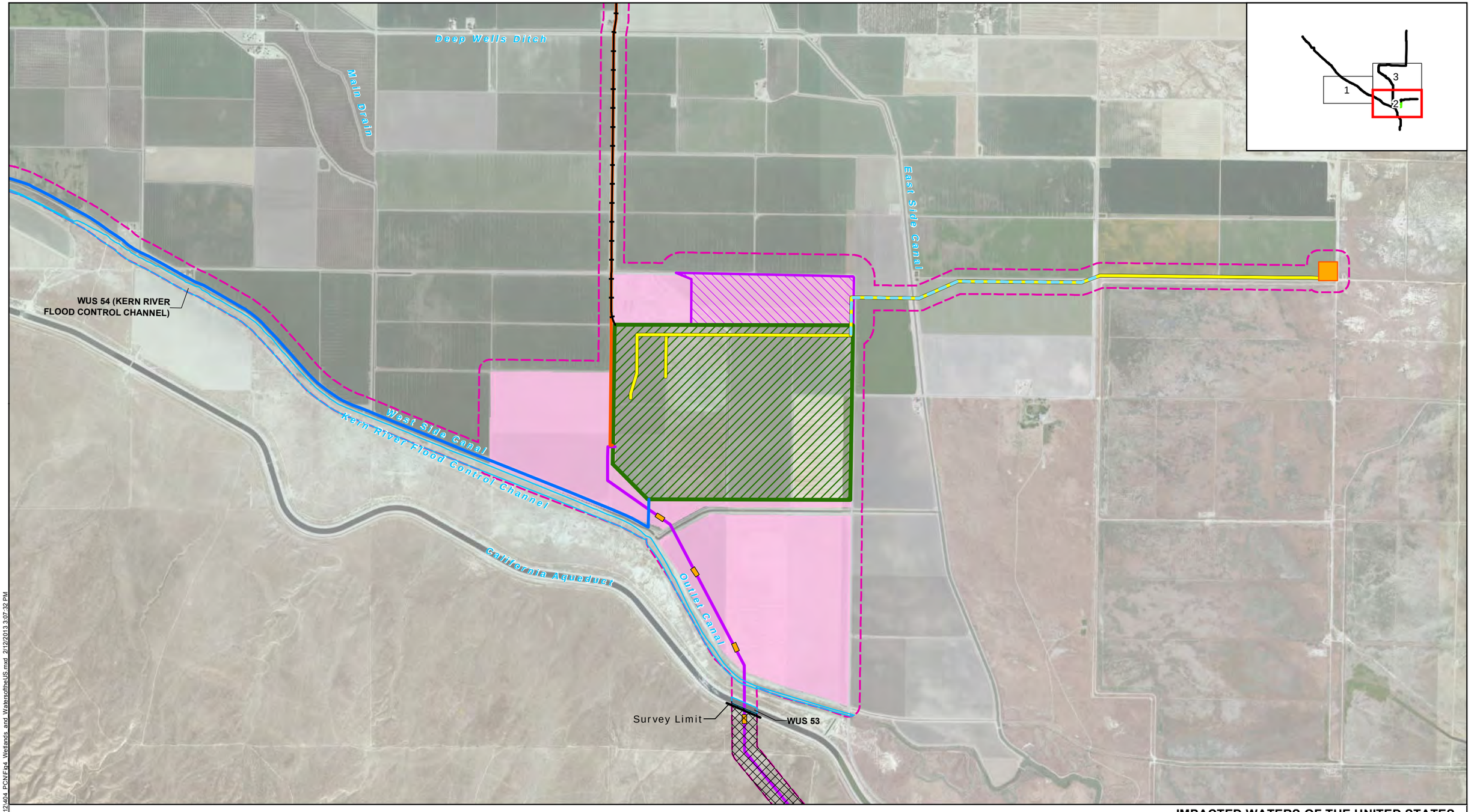
IMPACTED WATERS OF THE UNITED STATES WITHIN THE STUDY AREA

February 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 4 - SHEET 1



Project Site
Construction Staging Area
Controlled Area
250-foot Buffer from Disturbance Area
BVWSD Well Field
HDD Entry/Exit Pits

Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

Waters
Non-jurisdictional waters of the U.S. (NJ)
Other waters of the U.S. (WUS)
Wetland (WL)
Area Not Surveyed

N

0 1,000 2,000 FEET

Source: Aerial Imagery, Bing Maps, 2009.

IMPACTED WATERS OF THE UNITED STATES WITHIN THE STUDY AREA

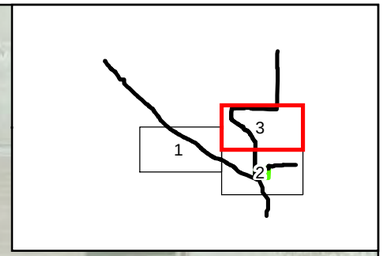
February 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 4 - SHEET 2

WUS 27
WUS 33
WUS 28
WUS 29
WUS 34
WUS 41
East Side Canal



Project Site
Construction Staging Area
Controlled Area
250-foot Buffer from Disturbance Area
BVWSD Well Field
HDD Entry/Exit Pits

Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

Waters
Non-jurisdictional waters of the U.S. (NJ)
Other waters of the U.S. (WUS)
Wetland (WL)
Area Not Surveyed

N

0 1,000 2,000 FEET

Source: Aerial Imagery, Bing Maps, 2009.

IMPACTED WATERS OF THE UNITED STATES WITHIN THE STUDY AREA

February 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 4 - SHEET 3

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1.2.4 Reasons for Discharge

Multiple alignment alternatives for the Project Linears were considered during Project development. Potential impacts to waters were avoided whenever possible when considering alignments. However, other environmental considerations, existing infrastructure, railroads, and state highway facilities were also considered during development of the Project Linear alignments, limiting the flexibility to completely avoid water features. Although potential impacts to waters were avoided whenever possible during Project development, certain features remained unavoidable. As a result, the proposed alignment of the Project Linears will result in minor and temporary impacts to jurisdictional water features.

All impacts to waters would be temporary, and all impacted features would be restored to their original condition following the completion of construction activities. Construction of the Main Project Site would not affect potential jurisdictional waters. Construction of the natural gas pipeline would require temporary placement of fill into potentially jurisdictional features (Figure 4, Sheet 3). Trenching and stockpile of excavated materials would be required during the installation of the natural gas pipeline, resulting in the temporary placement of fill within several seasonally ponded depressions. On completion of pipeline installation, the trenches and excavated areas would be backfilled and returned to grade.

1.2.5 Areas Surveyed

All Project areas within and surrounding the Main Project Site and the construction ROWs for the Project Linears were surveyed for jurisdictional waters. Separate surveys performed for the OEHI-owned portion of the CO_2 pipeline alignment have not identified any potential jurisdictional water features to be impacted (Stantec, 2012). For more information on survey methods, survey areas, and waters identified, see the Preliminary Jurisdictional Delineation.

1.2.6 Jurisdictional Waters

The area included along the proposed natural gas line along State Route (SR) 58 contains numerous depressions that are ponded or saturated during the wet season. These depressions are elliptical in shape and lie in an east-to-west fashion along the toe slopes of the existing railroad berm. This area is mostly unvegetated and is used as an access road for the railroad adjacent to SR 58. As a result of frequent vehicle use, soils in this area have been compacted, resulting in shallow depressions with poor drainage and permeability. During times of increased rainfall, these depressions become inundated, forming shallow pools of water that persist for at least 10 to 12 days during the growing season. Mature Lindahl's fairy shrimp were observed in these depressions during the March 2012 surveys. These features are considered jurisdictional nonwetland waters of the United States (WUS) in the Project's Preliminary Jurisdictional Delineation, which is pending verification from the USACE.

A total of 0.20 acre of the potential jurisdictional nonwetland WUS described above would be temporarily impacted during Project construction. No wetlands would be impacted, and no permanent impacts to any jurisdictional features are expected. Table 2 summarizes the area of impacts to potential jurisdictional features.

Table 2
Potential Jurisdictional Waters to be Impacted

Project Component	Feature	Temporary Impact		Permanent Impact	
		acres	linear feet	acres	linear feet
Natural Gas Pipeline	WUS 27 (ponded depression)	0.01	N/A	N/A	N/A
	WUS 28 (ponded depression)	0.01	N/A	N/A	N/A
	WUS 29 (ponded depression)	0.10	N/A	N/A	N/A
	WUS 33 (ponded depression)	0.07	N/A	N/A	N/A
	WUS 34 (ponded depression)	0.01	N/A	N/A	N/A
	WUS 41 (ponded depression)	<0.01	N/A	N/A	N/A
Carbon Dioxide Pipeline	WUS 53 (California Aqueduct)	N/A*	N/A*	N/A	N/A
	WUS 54 (Kern River Flood Control Channel)	N/A*	N/A*	N/A	N/A
Totals		**0.20**	**N/A**	**N/A**	**N/A**

Note:
*Crossings of these features would be constructed using HDD; therefore, no impacts are anticipated.
N/A = not applicable

WUS 27, 28, 29, 33, 34, and 41 would be temporarily impacted during the installation of the natural gas pipeline. These features would be affected by excavation and placement of spoil material to install the pipeline, and then would be backfilled on completion of installation. The installation would require excavation depths of up to 7 feet below grade. Backfilled areas would be graded to match the pre-Project topography.

The CO_2 pipeline would be installed beneath features WUS 53 and 54 (the California Aqueduct and the KRFCC, respectively). Impacts to these features would be avoided by using HDD. The pipeline would be installed at a depth of 50 to 100 feet below grade, to completely avoid impacts to these features. A Horizontal Directional Drilling Plan (HDDP) would be prepared and would be reviewed before any HDD activities occur. The HDDP includes a frac-out (unexpected leaking of hydraulic drilling fluid) spill response plan. In the case of a frac-out, any spilled hydraulic fluid would be cleaned up and removed from the water features, resulting only in temporary disturbance.

1.3 BOX 9 – DESCRIPTION OF AVOIDANCE, MINIMIZATION, AND COMPENSATION

Any work within 100 feet of waters of the United States and/or within 15 feet of nonjurisdictional waters will incorporate best management practices (BMPs) to minimize fill and/or degradation of waters. BMPs would include the following:

- Signs or other markers would be used to clearly demarcate the extent of work zones.

- Refueling of construction equipment and storage of fuel or other hazardous chemicals would not occur within 50 feet of any jurisdictional waters, or within 15 feet of nonjurisdictional waters.

BMPs to be implemented during construction activities for installation of the Project Linears include:

- Material excavated from trenches will be stockpiled outside of any canal banks or other water features.

- Excavated trench material will generally be used as backfill.

- Temporarily disturbed water features will be returned to their pre-construction contours to the extent practicable.

- Energy dissipation devices will be used for discharging water from hydrostatic testing of the pipeline.

- Soil erosion control measures will be implemented, as needed, to prevent runoff and impacts to water quality. Erosion control measures would include sandbags, filter bales, silt fences, and/or temporary dams, as needed, to minimize the volume of sediment carried by storm runoff, and to prevent the erosion of slopes and temporary drainage facilities.

In addition to the above measures, BMPs for HDD will include:

- Silt fencing will be installed around the drill sites.

- Drilling fluids will be selected for environmental compatibility.

- Spent fluids will be removed from the areas immediately adjacent to the water bodies for safe disposal, and to prevent contamination.

- The frac-out response plan will be implemented, if required.

Reporting on work adjacent to wetlands will be included in the pending Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP). The BRMIMP is being prepared as part of the environmental mitigation measures presented in HECA's Application for Certification. A quarterly BRMIMP report will be submitted to the CEC, the California Department of Fish and Game, and the U.S. Fish and Wildlife Service.

1.4 BOX 10 – RESTORATION AND COMPENSATION

The potential jurisdictional waters temporarily impacted during construction of the Project Linears would be restored following completion of construction activities. Consistent with standard pipeline construction techniques, the upper 6 inches of soil (topsoil) excavated within

WUS will be segregated and stockpiled separately from the subsoil material. The pipeline trench will be backfilled in the order in which soil was removed, and topsoil will be deposited last. Trenches will be slightly overfilled to account for future soil settlement. Backfilled soil will be compacted to a bulk density consistent with the adjacent soil.

Because no permanent impacts to potential jurisdictional waters are expected from Project activities, no compensatory mitigation or other compensation is proposed.

1.5 BOX 11 – THREATENED OR ENDANGERED SPECIES AND ESSENTIAL FISH HABITAT

A Biological Assessment has been prepared for the HECA Project, and is included with this notification. The Biological Assessment addresses potential Project effects on the following species:

- California jewel-flower (*Caulanthus californicus*)
- Kern mallow (*Eremalche kernensis*)
- San Joaquin woollythreads (*Monolopia [Lembertia] congdonii*)
- blunt-nosed leopard lizard (*Gambelia sila*)
- giant garter snake (*Thamnophis gigas*)
- Buena Vista Lake shrew (*Sorex ornatus relictus*)
- giant kangaroo rat (*Dipodomys ingens*)
- Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*)
- San Joaquin kit fox (*Vulpes macrotis mutica*)

1.6 BOX 12 – HISTORIC PROPERTIES AND CULTURAL RESOURCES

DOE is the federal lead agency for Section 106 consultation. The Section 106 initiation letters are provided in Appendix C. Additional documentation for surveys and record searches is available upon request.

1.7 REFERENCES

Stantec, 2012. Modified CO_2 Supply Line Alignment Data Gap Analysis. April. (Appendix A-2 of Amended Application for Certification.)

USGS (United States Geological Survey), 2013. Information for the Tulare-Buena Vista Lakes Watershed. Available online at: http://water.usgs.gov/wsc/cat/18030012.html. Accessed January 2013.

Appendix A

Project Description

HYDROGEN ENERGY CALIFORNIA
KERN COUNTY, CALIFORNIA

APPENDIX A
PROJECT DESCRIPTION

TABLE OF CONTENTS

List of Figures

List of Acronyms

AFC	Application for Certification
BVWSD	Buena Vista Water Storage District
CDFG	California Department of Fish and Game
CEC	California Energy Commission
CNPS	California Native Plant Society
CO_2	carbon dioxide
CRP	CO_2 Recovery Plant
CTB	Central Tank Battery
EHOF	Elk Hills Oil Field
EOR	enhanced oil recovery
HCP	Habitat Conservation Plan
HDD	horizontal directional drilling
HECA	Hydrogen Energy California
KRFCC	Kern River Flood Control Channel
MOU	Memorandum of Understanding
OEHI	Occidental of Elk Hills, Incorporated
PG&E	Pacific Gas and Electric Company
Project	HECA power generating facility
RCF	Reinjection Compression Facility
ROW	right-of-way
syngas	synthesis gas
USFWS	U.S. Fish and Wildlife Service
WKWD	West Kern Water District

1.0 PROJECT DESCRIPTION

Hydrogen Energy California (HECA) LLC is proposing an Integrated Gasification Combined-Cycle polygeneration project (hereafter referred to as the HECA Project). HECA LLC is owned by SCS Energy California LLC. The HECA Project will gasify a 75 percent coal and 25 percent petroleum coke fuel blend to produce synthesis gas (syngas). Syngas produced via gasification will be purified to hydrogen-rich fuel, which will be used to generate low-carbon baseload electricity in a Combined-Cycle Power Block; low-carbon nitrogen-based fertilizer in an integrated Manufacturing Complex; and carbon dioxide (CO_2) for use in enhanced oil recovery (EOR).

The fertilizer and power produced by the HECA Project have a low-carbon footprint, because more than 90 percent of the CO_2 in the syngas is captured and approximately 3 million tons per year of CO_2 is transported via pipeline for use in EOR, which results in simultaneous sequestration (storage) of the CO_2 in a secure geologic formation (HECA, 2012). CO_2 will be transported for use in EOR in the adjacent Elk Hills Oil Field (EHOF), which is owned and operated by Occidental of Elk Hills, Inc. (OEHI) (hereafter referred to as the OEHI Project).

The 453-acre HECA Project Site is approximately 7 miles west of the city of Bakersfield, and approximately 2 miles northwest of the unincorporated community of Tupman in western Kern County, California (Figure 1, Project Location). The HECA Project Site is adjacent to the EHOF (Figure 2, Project Vicinity). HECA has an agreement to purchase the HECA Project Site, as well as an additional 653 acres adjacent to the HECA Project Site, herein referred to as the Controlled Area (Figure 3, Project Site Map). The HECA Project Site and Controlled Area are currently used for farming purposes, including the cultivation of cotton, alfalfa, and onions.

In addition to the Project Site, the HECA Project includes construction and operation of five linear facilities, which include (1) an approximately 2-mile-long electrical transmission line to a new Pacific Gas and Electric Company (PG&E) switching station; (2) an approximately 13-mile-long natural gas interconnection with an existing PG&E natural gas pipeline; (3) an approximately 15-mile-long process water supply pipeline from the Buena Vista Water Storage District (BVWSD); (4) an approximately 1-mile-long potable water supply pipeline from West Kern Water District (WKWD); and (5) an approximately 5-mile-long industrial railroad spur that will connect to the San Joaquin Valley Rail Road.

The OEHI Project will include construction and operation of three primary EOR components, including (1) an approximately 3.4-mile-long CO_2 Pipeline from HECA to the EHOF; (2) a CO_2 EOR Processing Facility at the southern terminus of the CO_2 Pipeline; and (3) three Satellite Gathering Stations.

Construction activities associated with each of the HECA and OEHI project components, including avoidance, minimization, and conservation measures, are described below, followed by descriptions of operation and maintenance of the facilities and the project schedule.

1.1 CONSTRUCTION ACTIVITIES

This section describes the construction activities associated with the proposed action. The activities are organized by location.

1.1.1 Power Generating Facility

The 453-acre HECA Project Site is intensively cultivated for the production of alfalfa, cotton, and onions, and has little habitat value for native flora and fauna. In addition, the closest area with habitat value for native flora and fauna is the Kern River Flood Control Channel (KRFCC), approximately 700 feet south of the HECA Project Site. The majority of the 653-acre Controlled Area may remain in active agriculture and act as a buffer between the Project and the KRFCC. The western border of the Tule Elk State Natural Reserve is approximately 1,700 feet to the east of the HECA Project Site.

Construction activities for the HECA Project will occur throughout the 42-month construction period. All construction laydown and parking areas will be within the HECA Project Site and the Controlled Area. Onsite construction activities include clearing and grubbing, grading, hauling, layout of equipment, delivery and handling of materials and supplies, and HECA Project construction and testing operations. The HECA Project Site occurs in an area of relatively flat topography. Site grading will occur as necessary to form level building pads for major process units.

Construction site access will be via Dairy Road for truck deliveries and Adohr Road for construction craft vehicles arriving and departing the site. Initial site preparation will include construction of temporary access roads, parking, laydown areas, office and warehouse facilities, installation of erosion control measures, and other improvements necessary for construction. Erosion control measures will include construction of stormwater retention basins and related site drainage facilities to control runoff within the HECA Project Site boundary. Existing drainage patterns outside the HECA Project Site boundary will remain unchanged, and no runoff from outside the HECA Project Site boundary will flow onto the HECA Project Site.

1.1.2 Electrical Transmission Line

An electrical transmission line will interconnect the HECA Project to PG&E's future switching station. The transmission line will be constructed and owned by HECA up to the point of interconnection. The power generated by the HECA Project will be connected to the existing PG&E system by a single-tower, 230-kilovolt transmission line that will be constructed as part of the HECA Project. This single-circuit line will be connected to a new switchyard at the HECA Project Site.

The proposed electrical transmission line route is approximately 2 miles long to HECA's property boundary, and passes through previously disturbed areas or active agriculture, predominantly pistachio orchards, alfalfa, and cotton. Construction of the line will require installing approximately 26 (15 offsite and 11 onsite) tubular-steel transmission structures and the supporting foundations.

The electrical transmission line route extends east from the HECA Project Site to a new PG&E switching station (adjacent to the existing Midway-Wheeler Ridge transmission lines) as shown on Figure 4, Project Location Details. The new PG&E switching station will be constructed at the eastern terminus of the electrical transmission line, approximately 2 miles east of the HECA Project Site and next to Elk Valley Road. Access to the switching station site would be along an

existing unimproved farm road from Morris Road or Elk Valley Road. The electric transmission switching station will be designed, constructed, owned, and operated by PG&E.

The area occupied by the PG&E switching station will be approximately 417 feet by 417 feet. Portions of the site will be excavated to install a grounding grid, underground control and protection cabling, and foundations. It is anticipated that "dead-end" structures to terminate the transmission line from the HECA site would be approximately 30 feet tall near the western end of the switching station site. A similar set(s) of structures at the eastern end of the station for the incoming lines from Midway and the outgoing lines to Wheeler Ridge would also be required. The height of a two-level structure would be on the order of 50 to 60 feet tall. The station would also have structures associated with interconnecting buses and cable "drops" to the circuit breakers. The height of these structures would be on the order of 20 to 30 feet.

Approximately 15 steel poles are expected to be required outside of the HECA Project Site. Construction of the interconnection line will consist of installing footings, poles, insular and hardware, and pulling conductor and shield wires. The new transmission line interconnection will be placed in an approximately 100-foot-wide permanent right-of-way (ROW).

Construction of the new 230-kilovolt transmission line interconnection will require approximately 3 months. It will be scheduled for completion and be operational in time for generation testing of the HECA Project. HECA will provide for the transmission line via a Large Generator Interconnection Agreement up to the point of interconnection at the future PG&E switching station.

Upon completion of the linear installation, agricultural uses may be reestablished along the linear route within the 100-foot-wide permanent ROW. Orchards would be limited to 25 feet in height within the permanent ROW.

1.1.3 Natural Gas Supply

A 13-mile natural gas linear will interconnect with a PG&E natural gas pipeline north of the HECA Project Site. The interconnect will consist of one tap off the existing natural gas line, and one metering station at the beginning of the natural gas linear adjacent to a PG&E Inlet. The metering station will be up to 100 feet by 100 feet, and 8 feet tall, surrounded by a chain-link fence. In addition, there will be a metering station at the end of the natural gas linear, on the western side of the HECA Project Site, and a pressure-limiting station on the HECA Project Site. PG&E will construct and own the natural gas pipeline.

The majority of the natural gas linear extends across areas used for active agriculture and existing roadways. However, the natural gas linear is adjacent to several areas with natural habitat value near Interstate 5 and at the northern terminus near Magnolia Avenue.

The natural gas linear would require a 50-foot construction ROW and a 25-foot permanent ROW; however, most of the ROW would be located within cultivated fields or other disturbed habitat types adjacent to paved and unpaved roads.

Wetland features adjacent to the proposed natural gas linear ROW will be avoided. Non-wetland potential waters of the U.S. within the natural gas pipeline construction limits are degraded,

seasonally ponded claypan depressions. If avoidance of non-wetland waters is not feasible, the feature(s) will be temporarily disturbed by the construction activities during installation of the natural gas pipeline, and the site will be restored to pre-construction condition.

Construction of the natural gas pipeline interconnection will involve a variety of crews performing the following typical pipeline construction activities: hauling and stringing the pipe along the route; welding, radiographic inspection, and coating the pipe welds; trenching; lowering the pipe into the trench; backfilling the trench; hydrostatic testing of the pipeline; tying into the existing pipeline; purging the pipeline; and cleaning up and restoring construction areas. Roads and ROWs will be restored to specifications of the involved agencies. Open trenching will be minimized, and trenches will be covered or ramped when left overnight. In areas with habitat value and in agricultural areas, the topsoil from the trenching will be set aside, preserved, and used to cover the excavation.

Construction of the natural gas pipeline interconnection will take approximately 6 months. It will be scheduled to be finished and operational in time to provide test gas to the HECA Project. Construction will occur in accordance with a traffic management plan to minimize impacts to traffic traveling on the affected roadways. Affected areas will be restored to their original state so as to minimize erosion.

1.1.4 Water Supply Pipelines

For process water, the HECA Project will use brackish groundwater supplied by the BVWSD via a new 15-mile pipeline. Potable water for drinking and sanitary use will be supplied by WKWD, who will construct a new 1-mile pipeline for that purpose. Installation of the process water and potable water pipelines will involve industry standard construction activities for pipelines, including trenching; hauling and stringing of pipe along the routes; welding; radiographic inspection and coating of pipe welds; lowering welded pipe into the trench; hydrostatic testing; and backfilling and restoring the approximate surface grade. Construction of the water pipelines is expected to take approximately 6 months to complete.

Process Water Supply Pipeline

For process water, the HECA Project will use a new 15-mile, 30-inch-diameter pipeline that will convey brackish groundwater supplied by the BVWSD. BVWSD will construct and own the process water supply pipeline, approximately 14.5 miles of which will be located in an existing BVWSD ROW. The proposed process water pipeline would be constructed entirely within an existing unpaved road or within areas that are currently actively farmed, and therefore, no direct impacts to natural habitats are anticipated. Once the process water is delivered to the HECA Project Site, the brackish water will be treated on site to meet all process and utility water requirements. The process water supply pipeline will be approximately 15 miles in length and will be constructed by BVWSD.

In addition, BVWSD will own, construct, operate, and maintain the well field that will provide brackish groundwater for the HECA Project's process water supply. This well field will be in the northwestern portion of BVWSD's service area within active agricultural fields near the West Side Canal, in the vicinity of Seventh Standard Road, at the northern end of the 15-mile-

long process water line. It is currently anticipated that there will be up to five groundwater extraction wells. Two of these wells will provide operational redundancy. The maximum depth of the wells will be approximately 300 feet below ground surface. The brackish water will be treated at the Project Site to meet all process and utility water requirements. The process water supply pipeline would require a 50-foot construction ROW and a 25-foot permanent ROW.

BVWSD addressed the groundwater extraction wells and the process water supply pipeline in their Draft and Final Environmental Impact Reports for BVWSD's Groundwater Management Program, issued in October 2009 and December 2009, respectively (BVWSD, 2009a; 2009b). The Final Environmental Impact Report for the Groundwater Management Program (State Clearinghouse No. 2009011008) concludes that the wells and the process water pipeline do not result in significant impacts to any federally listed species.

Potable Water Pipeline

For drinking and sanitary use, the HECA Project will use potable water supplied by WKWD. A new 4-inch-diameter potable water line will be constructed, owned, and maintained by HECA LLC.

The potable water line would be approximately 1 mile in length. This pipeline will require a 10-foot construction and permanent ROW that will be placed within the proposed electrical transmission line ROW. Most of the proposed ROW is within or adjacent to existing dirt access roads, or in cultivated fields.

1.1.5 Industrial Railroad Spur

The industrial railroad spur is approximately 5 miles long and will connect the HECA Project Site to the existing San Joaquin Valley Railroad Buttonwillow Branch (formerly called the SP Buttonwillow Branch). Two public at-grade crossings may be required, and several private crossings will be needed for farmers' access to croplands and the irrigation canal. The industrial railroad spur would require a 75-foot construction ROW, 60-foot permanent ROW, and 3-acre rail laydown area.

1.1.6 OEHI Carbon Dioxide Pipeline

An approximately 3.36-mile-long, 12-inch-diameter CO_2 pipeline will be constructed to transfer the CO_2 from the HECA Project Site to the OEHI CO_2 Processing Facility used by OEHI for injection into deep underground hydrocarbon reservoirs for CO_2 EOR and sequestration. Additional components of the CO_2 pipeline will include metering facilities at the pipeline origin and terminus, a cathodic protection system, and four emergency block valves. Two of the block valves will be automated and two will be manual block valves.

The CO_2 pipeline route originates at the southern portion of the HECA Project Site and will be constructed using a combination of standard open-trench installation and horizontal directional drilling (HDD). One HDD will be approximately 500 feet in length under the levees associated with the West Side/Outlet Canal crossing. A second HDD will be approximately 2,000 feet long, and will be used to install the pipeline under the KRFCC and the California Aqueduct. On the southern side of the Aqueduct, the pipeline alignment extends southeast and south to the OEHI

CO_2 Processing Facility, and parallels existing private roads. OEHI will construct and own the pipeline.

With the exception of HDD crossings where the depth of the CO_2 pipeline may reach 100 feet below grade, the CO_2 Pipeline will be buried approximately 5 feet below grade. Installation of the CO_2 supply pipeline will involve typical construction activities, including trenching; hauling and stringing pipe along routes; welding; radiographic inspection and coating pipe welds; lowering welded pipe into the trench; backfill of the trench; hydrostatic testing of the pipeline; purging the pipeline; and cleanup and restoration of construction areas. Grade cuts will be restored to their original contours, and affected areas will be restored to their original condition to minimize erosion. The pipeline will be protected by cathodic protection, and monitored by independent leak-detection systems.

Construction of the CO_2 pipeline is expected to take approximately 6 months to complete. The CO_2 pipeline would require a 50- to 80-foot construction ROW and a 25-foot permanent ROW.

HDD involves using a drilling rig that will bore a horizontal hole under water crossings. At each of these crossings, a laydown area (or entry/exit pit) has been identified on either side of the water course to accommodate the HDD installation (see Figure 4, Sheet 4, Project Location Details). The temporary disturbance area would be approximately 120 feet by 100 feet for each HDD entry pit; and approximately 75 feet by 100 feet for each HDD exit pit (Stantec, 2012).

Best management practices for HDD will include silt fencing around the drill sites, energy dissipation devices for discharging water from hydrostatic testing of the pipeline, selecting drilling fluids for environmental compatibility, and removing spent fluids from the areas immediately adjacent to the water bodies for safe disposal and to prevent contamination. In addition, soil erosion control measures will be implemented to prevent runoff and impacts to water quality.

1.1.7 OEHI Carbon Dioxide EOR Processing Facility

The CO_2 from the HECA plant will be received by the CO_2 EOR Processing Facility, which will be located at the southern terminus of the CO_2 Pipeline in the southeastern quarter of Section 27S. The CO_2 EOR Processing Facility will include the Central Tank Battery (CTB), Reinjection Compression Facility (RCF), CO_2 Recovery Plant (CRP), and a Water Treatment Plant. The CO_2 EOR Processing Facility is expected to occupy and permanently disturb an area of 1,200 feet by 2,200 feet (60.61 acres).

Central Tank Battery

The CTB is the primary oil/water separation system for the CO_2 EOR process. The inlet liquid gathering lines from the Satellite Gathering Stations will be manually directed to one of the three gas separator tanks. The gas from this process will be combined with the gas from the gas separators. The oil and water will be separated, and the oil will be skimmed off and pumped to Section 18G and metered for sale. The partially treated water will be conveyed via pipeline to the existing water treating facilities.

Water Treatment Plant

The oily water from the inlet section of the CTB will be treated to remove oil, solids, and other contaminants from the produced water. The produced water will be pressurized in the injection pumps and sent to the satellites for injection. Low-pressure gas collected from the CTB will be compressed and then routed to the inlet of the RCF and the CRP for processing.

Reinjection Compression Facility

The RCF will be the first portion of the CO_2 treating/recovery facilities to be installed. Produced gas from the Satellite Gathering Stations (see Section 1.1.8) will initially flow to the RCF. At the RCF, the CO_2 gas will be dehydrated, compressed, blended with CO_2 purchased from the HECA Project, and re-injected into a closed-loop system.

CO_2 Recovery Plant

The CRP is the second part of the gas treating/recovery plant. This facility will separate CO_2 from produced hydrocarbon gas and recycle the separated CO_2. The CRP will consist of several processing units for the separation of the CO_2 from the recovered natural gas. The CRP is not expected to be constructed until 2020, and would not be part of the Demonstration Period defined by the U.S. Department of Energy.

1.1.8 OEHI Satellite Gathering Stations

The Satellite Gathering Stations (satellites, also known as Production/Well-Testing Satellites) will be a series of facilities that will provide primary separation of the oil/water and gas from the production well stream. Initially, three satellites are scheduled to be installed to handle the expected production for the first several years of the field development during the Demonstration Period. Satellites 1, 2, and 3 are each expected to have a permanent surface footprint of 230 by 200 feet. This footprint is included in the total area of the OEHI Project site evaluated in the Biological Assessment.

Each satellite will be equipped with an inlet manifold in which well flow lines associated with that satellite are connected. Flow from each well flow line will be diverted into either the production separator or the test separator via automated manual valves. The production separator is a two-phase separator to handle primary vapor liquid separation of the fluid recovered from the production wells at each satellite. The gases will be separated and routed to the inlet of the RCF. The entire field production pressure will be controlled at the RCF inlet header, and the individual satellites will "float" on that pressure.

Liquid and gas flow rates will be metered for production trending and monitoring. The test separator will be a three-phase, bucket and weir separator to allow for a 24-hour test cycle of each well serviced by that satellite. The oil and water will be controlled by level control, and the gas will be controlled by a back-pressure controller to hold the test separator pressure slightly above that of the associated production separator. Oil, water, and gas from the test separator will be re-combined and directed to the inlet manifold and then to the production separator.

1.2 OPERATION AND MAINTENANCE

This section describes the operation and maintenance of the HECA and OEHI projects.

1.2.1 HECA Project

HECA Project operation and maintenance will occur within the HECA Project Site. The adjacent Controlled Area will remain in active agriculture similar to the existing condition. Access to linears will be limited in nature, and will be along existing access roads or access roads developed during initial installation activity. HECA LLC will own, operate, and maintain the approximately 2-mile transmission line up to the interconnection with a future PG&E switching station. It is anticipated that annual maintenance of the electrical transmission line will be provided for under an agreement between PG&E and the Project. The electrical transmission line is located entirely within areas that are actively farmed or are developed. Most of the maintenance will be routine and can be scheduled during periods when damage to the crops and land can be minimized. Maintenance activities will be conducted by personnel trained to be aware of the presence of sensitive wildlife.

PG&E will own, operate, and maintain the natural gas pipeline. Maintenance of the natural gas pipeline would follow PG&E corporate policies and protocols. Long-term maintenance needs of the natural gas pipeline would be minimal during the 25-year lifespan of the Project; therefore, they are not quantified in this document.

BVWSD will own, operate, and maintain the approximately 15-mile-long, 30-inch-diameter process water pipeline and associated wells. Annual maintenance of the process water pipeline and associated groundwater wells would be conducted by BVWSD. Maintenance activities of the wells and the pipeline would follow BVWSD corporate policies and protocols. Long-term maintenance needs of the process water pipeline would be minimal during the 25-year lifespan of the Project, and therefore is not quantified in this document.

HECA LLC will own, operate, and maintain the approximately 1-mile potable water pipeline. Maintenance activities of the pipeline would include:

- Annual reconnaissance of the pipeline ROW;
- Annual inspection and exercising (opening and closing for one cycle) of valves, as necessary;
- Annual vegetation removal, re-grading, and application of dirt for the access road after wet periods and pipe work, as necessary; and
- Replacement of pipeline components (lining and coating, valves, and joints), as determined necessary by routine inspection.

Long-term maintenance needs of the potable water pipeline would be minimal during the 25-year lifespan of the HECA Project; therefore, they are not quantified in this document.

HECA LLC currently anticipates that it will own, operate, and maintain the approximately 5-mile railroad spur. Regardless of final ownership of the spur, maintenance activities will consist of routine annual maintenance activities and programmed maintenance conducted on a

periodic basis. Annual maintenance activities consist of visual inspections, vegetation control, spot surfacing and lining of rough spots in the track, and adjusting/lubrication of turnouts. In addition, any warning devices at road crossings will be inspected as frequently as monthly.

Programmed major maintenance consists of surfacing and lining the rail line, typically every 3 to 5 years; replacing the rail, potentially once during the life of the HECA Project; and replacing 15 percent of the timber ties on a 10-year cycle. If concrete ties are used, the ties will not need to be replaced. Major maintenance activities will be conducted using on-track equipment. Replaced materials will be removed from the ROW and recycled. Timber ties will be disposed of by incineration, landfill disposal, or other approved disposal options.

1.2.2 OEHI Project

OEHI will own, operate, and maintain the CO_2 pipeline and the related components of the OEHI Project. Maintenance of the CO_2 pipeline and other EOR facilities will follow existing OEHI operational procedures, as required by the existing U.S. Fish and Wildlife Service (USFWS) Biological Opinion and the related 1997 Memorandum of Understanding (MOU) between OEHI and the California Department of Fish and Game (CDFG) that has twice been updated, and remains in effect until 2014 (CDFG, 1997; 1999; 2010). The EOR facility operations will be similar to the existing facility operations by OEHI at the EHOF. Operations activities include facility inspection and maintenance. Maintenance needs of the CO_2 pipeline and associated EOR facilities would be minimal during the Demonstration Period of the Project; therefore, they are not quantified in this document.

1.3 PROPOSED CONSERVATION MEASURES

This section describes the conservation measures that are included in the HECA Project and the OEHI Project to avoid, minimize, and/or compensate for impacts on listed species.

1.3.1 HECA Project Design Modifications

The HECA Project design has been refined in coordination with the resource agencies and environmental specialists to avoid and minimize impacts on sensitive biological resources to the extent practicable. These measures include relocating the HECA Project Site from the originally proposed location to its current location across the Aqueduct to reduce impacts to the blunt-nosed leopard lizard; and relocating the natural gas pipeline to avoid portions of the Coles Levee Ecosystem Preserve. In addition, the potable water linear and electrical transmission linear were shortened and relocated to the east of the HECA Project Site, which avoided impacts to 1.9 acres of Allscale Scrub habitat.

The HECA Project also includes general and species-specific measures to avoid and minimize impacts on listed species and their habitat. For potential impacts on listed species that remain after implementation of feasible avoidance and minimization measures, comprehensive compensatory measures through habitat enhancement, establishment, and preservation are included in the Project to offset potential losses of listed species or their habitat. HECA LLC is committed to implementing these measures as part of the Project. These conservation measures are extracted from the Amended Application for Certification (AFC) submitted to the California

Energy Commission (CEC) in May 2012, and the corresponding numbers or mitigation measures from the 2012 Amended AFC (e.g., BIO-1, BIO-2, etc.) are provided where applicable.

1.3.2 OEHI Project Design

The proposed CO_2 pipeline crossings of the West Site Canal/Outlet Canal, the KRFCC, and the California Aqueduct will be constructed using HDD to avoid direct and indirect effects to species movement and dispersal at these locations.

OEHI will minimize impacts associated with the OEHI Project by using existing wells and previously disturbed areas to the maximum extent feasible. Avoidance and minimization will also be achieved by minimizing future land disturbance on those portions of the EHOF considered high value on the Habitat Conservation Plan (HCP) multi-species map. The OEHI Project will also be implemented in compliance with the 1995 Biological Opinion issued by the USFWS, and a related 1997 MOU between OEHI and the CDFG, as updated. Finally, the OEHI Project will be implemented in compliance with a 50-year HCP for the EHOF, which is currently under development and anticipated to be approved by the end of 2013.

1.4 PROJECT SCHEDULE

The anticipated schedule milestones for the Project are as follows:

USFWS finalizes Biological Opinion.....May 2013
Completion of CEC permitting process.....late 2013
Commencement of pre-construction and construction activities.....late 2013
Commencement of commercial operation of the Project 2017

2.0 REFERENCES

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FIGURES

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PROJECT VICINITY

February 2013
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Hydrogen Energy California (HECA)
Kern County, California

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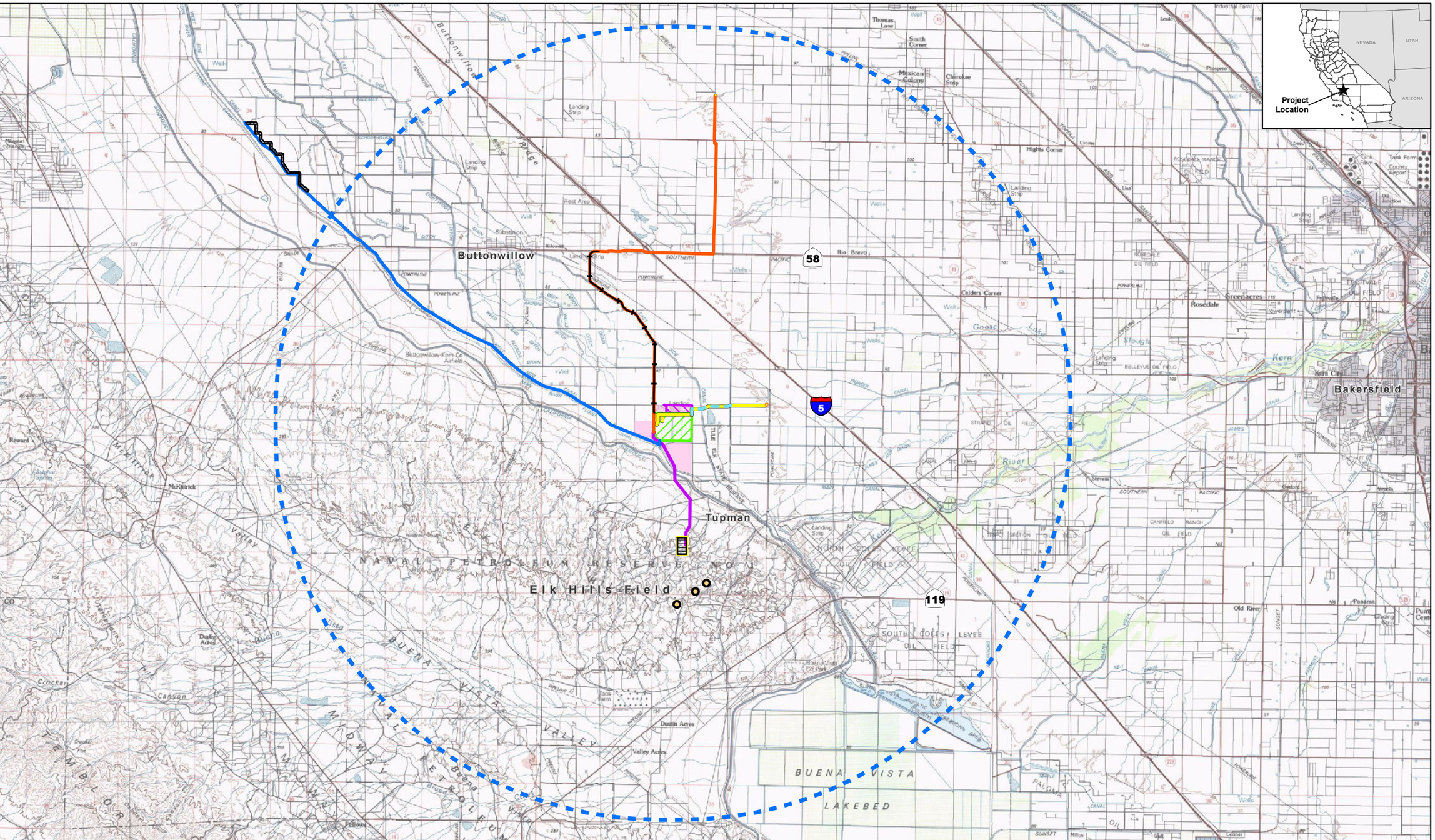
FIGURE 1



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Kern County, California

URS

FIGURE 2

Sources: USGS (30'x60' quads: Taft 1982, Delano 1982). Created using TOPO!, ©2006 National Geographic Maps, All Rights Reserved. HECA Project Team (Biological Data, 2009)

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ADOHR RD

DAIRY RD

MORRIS RD

STATION RD

TUPMAN RD

West Side Canal

Kern River Flood Control Channel

California Aqueduct

East Side Canal

Project Site
Construction Staging Area
Controlled Area

Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

N

0 750 1,500 Feet

Source: Aerial Photo, Digital Globe, 2008.

PROJECT SITE MAP

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Hydrogen Energy California (HECA)
Kern County, California

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FIGURE 3

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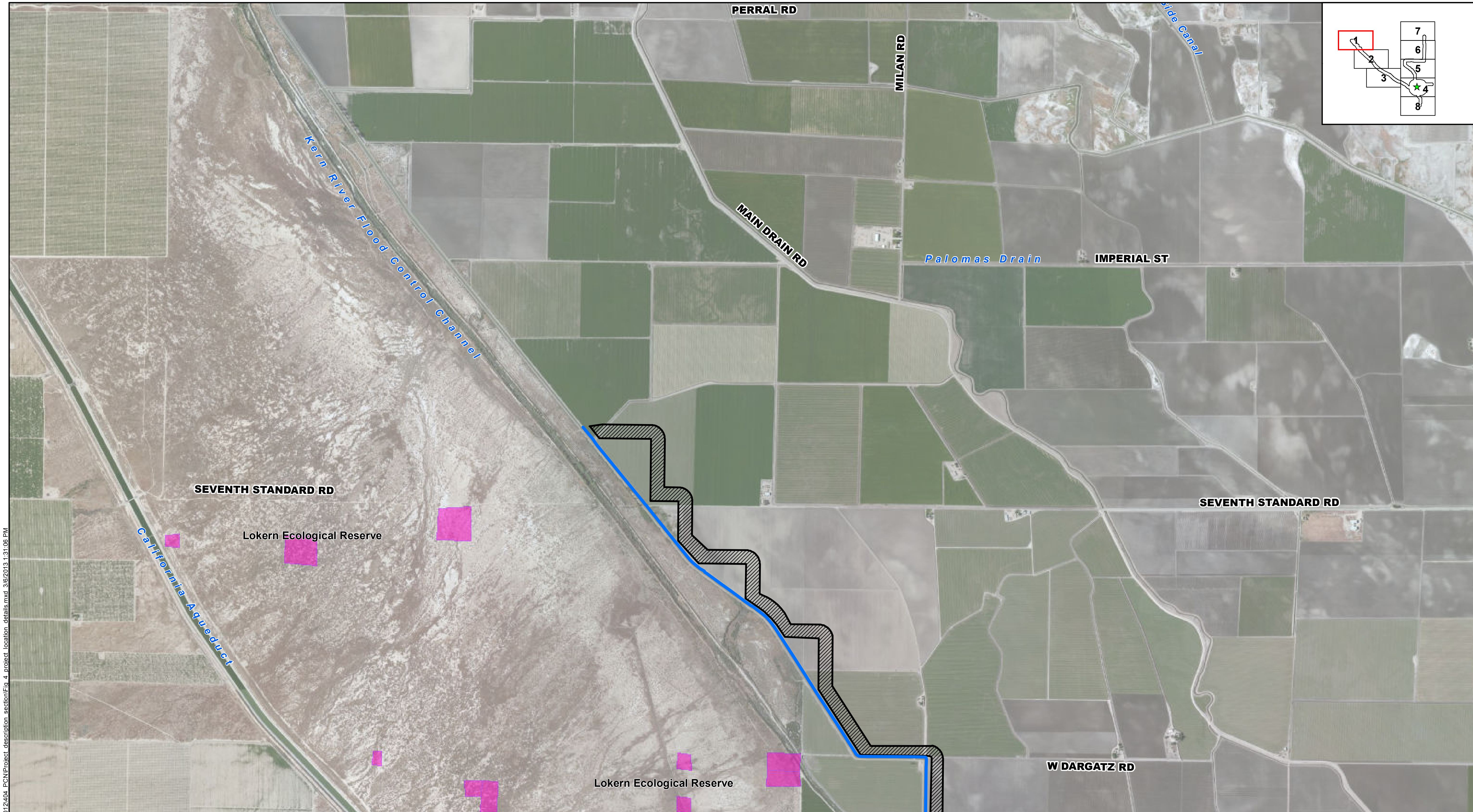

Project Site
Construction Staging Area
Controlled Area
BVWSD Well Field
Elk Hills Conservation Area
Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission
Proposed Natural Gas Valve Station
Rail Laydown Yard
HDD Entry/Exit Pits
Electrical Switching Station
OEHI CO2 EOR Project
EOR Processing Facility
EOR Satellite Gathering Station

Note:
HDD = Horizontal Directional Drilling

0 1,000 2,000 Feet

N

PROJECT LOCATION DETAILS

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Kern County, California

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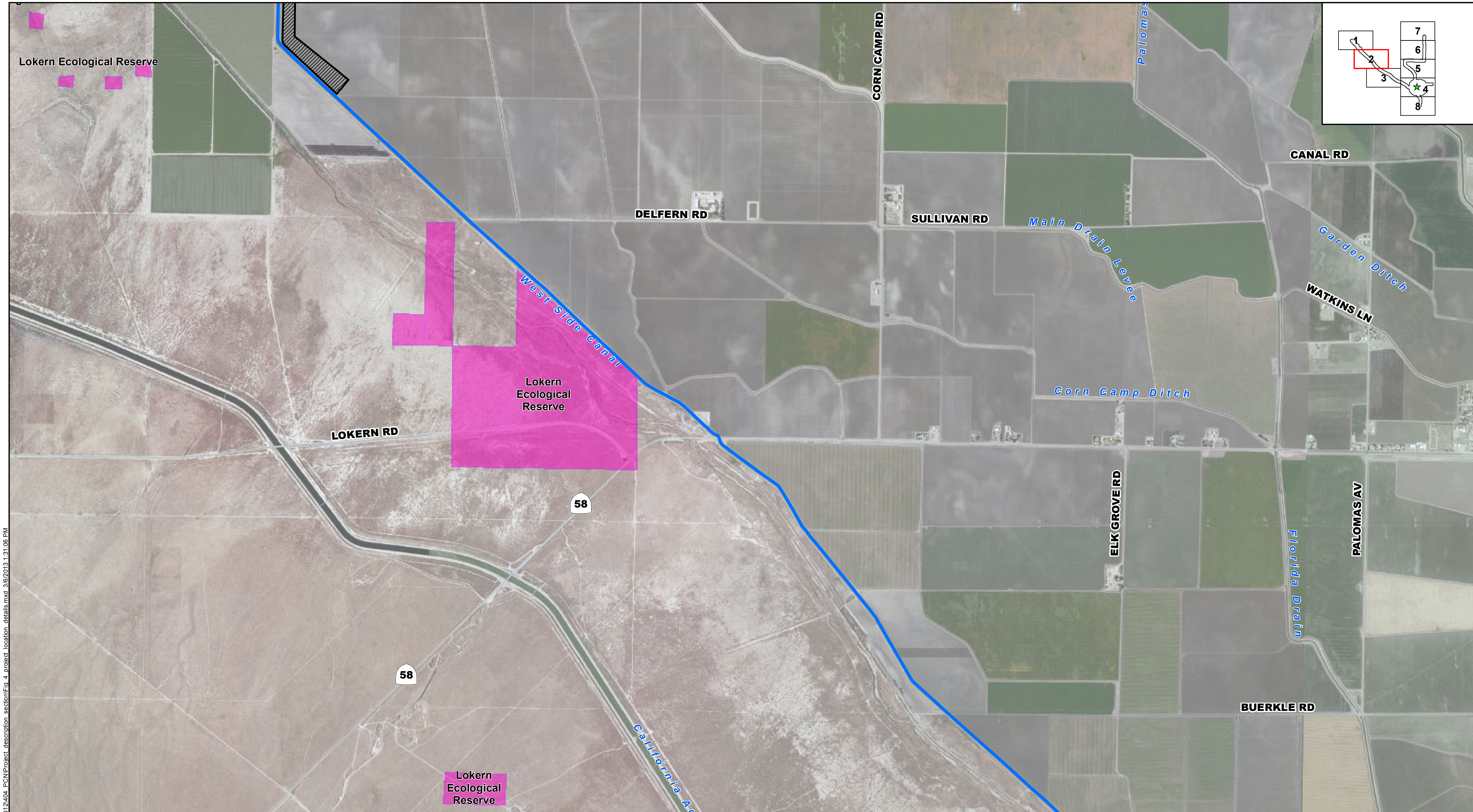
FIGURE 4 (1)

Source: Aerial Imagery, Bing Maps Hybrid, 2010



Project Site
Construction Staging Area
Controlled Area
BVWSD Well Field
Elk Hills Conservation Area
Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission
Proposed Natural Gas Valve Station
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HDD Entry/Exit Pits
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OEHI CO2 EOR Project
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N

0 1,000 2,000
Feet

PROJECT LOCATION DETAILS

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Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 4 (2)

Source: Aerial Imagery, Bing Maps Hybrid, 2010

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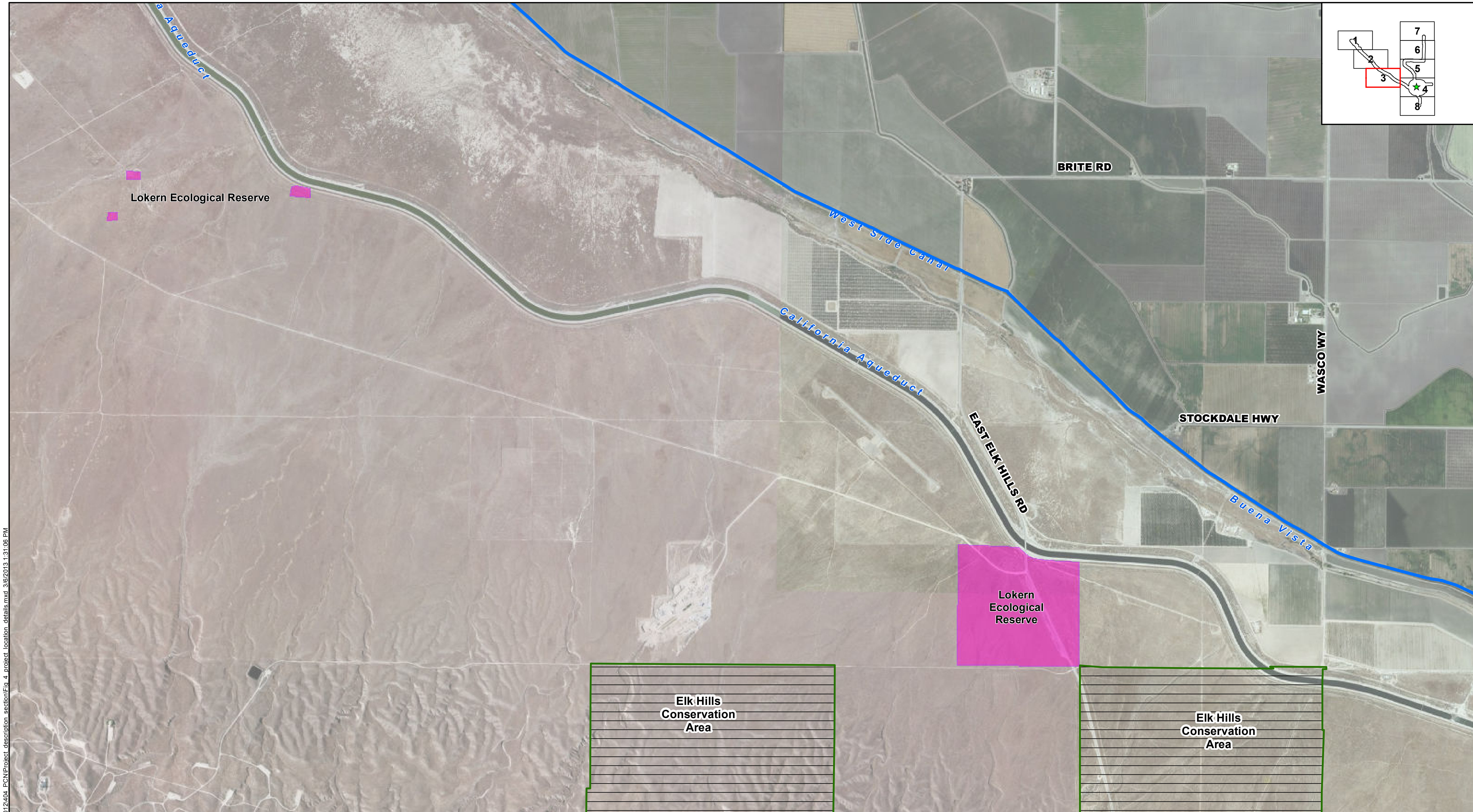

- Project Site
- Construction Staging Area
- Controlled Area
- BVWSD Well Field
- Elk Hills Conservation Area
- Carbon Dioxide
- Natural Gas
- Potable Water
- Process Water
- Railroad
- Transmission
- Proposed Natural Gas Valve Station
- Rail Laydown Yard
- HDD Entry/Exit Pits
- Electrical Switching Station

OEHI CO2 EOR Project

- EOR Processing Facility
- EOR Satellite Gathering Station

Note:
HDD = Horizontal Directional Drilling

N

0 1,000 2,000 Feet

PROJECT LOCATION DETAILS

February 2013
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Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 4 (3)

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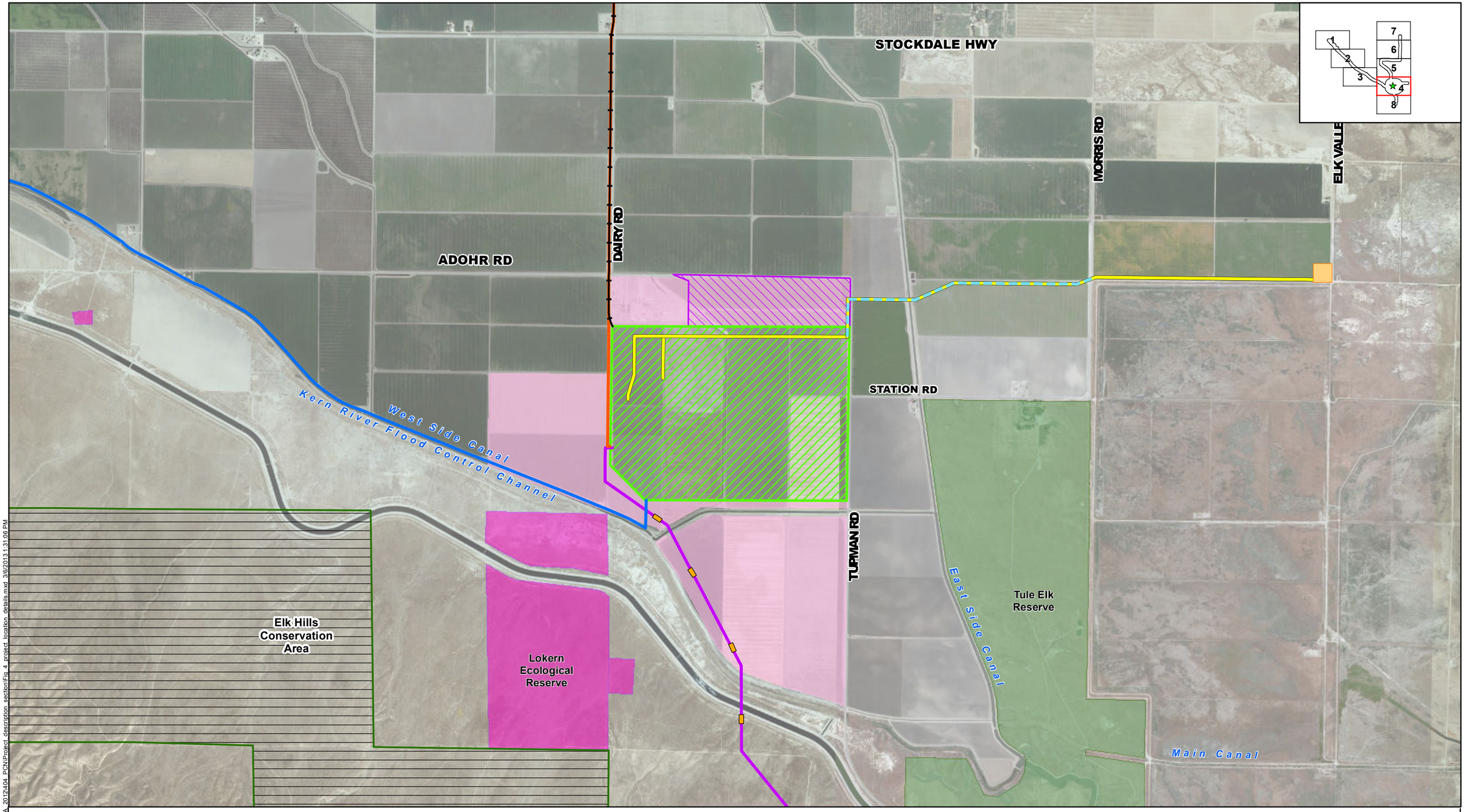
Source: Aerial Imagery, Bing Maps Hybrid, 2010



Project Site
Construction Staging Area
Controlled Area
BVWSD Well Field
Elk Hills Conservation Area

Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

Proposed Natural Gas Valve Station
Rail Laydown Yard
HDD Entry/Exit Pits
Electrical Switching Station

OEHI CO2 EOR Project
EOR Processing Facility
EOR Satellite Gathering Station

Note:
HDD = Horizontal Directional Drilling

N

0 1,000 2,000 Feet

Source: Aerial Imagery, Bing Maps Hybrid, 2010

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PROJECT LOCATION DETAILS

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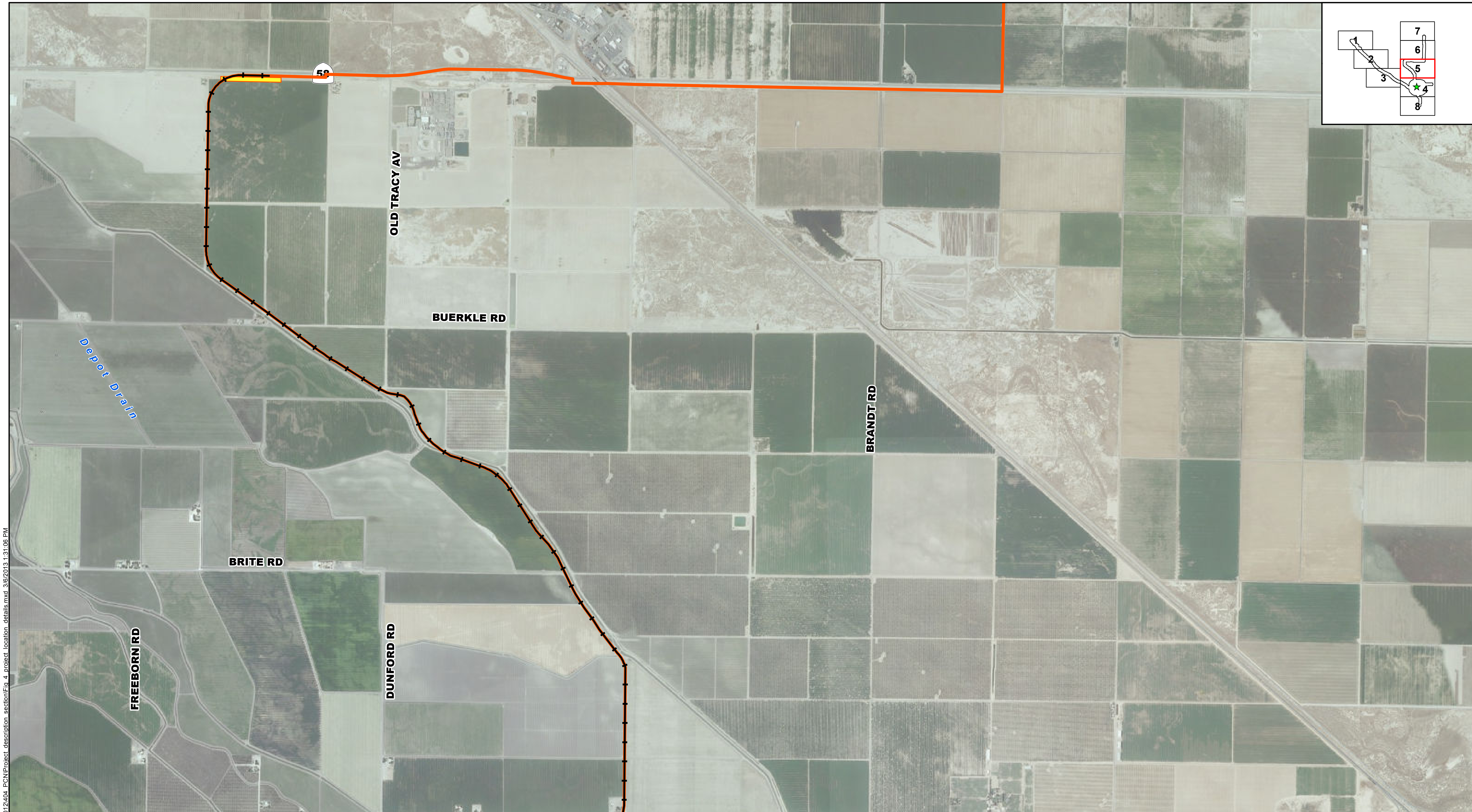
Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 4 (4)



Project Site	Carbon Dioxide	Proposed Natural Gas Valve Station	OEHI CO2 EOR Project
Construction Staging Area	Natural Gas	Rail Laydown Yard	EOR Processing Facility
Controlled Area	Potable Water	HDD Entry/Exit Pits	EOR Satellite Gathering Station
BVWSD Well Field	Process Water	Electrical Switching Station	
Elk Hills Conservation Area	Railroad		
	Transmission		

Note:
HDD = Horizontal Directional Drilling

N

0 1,000 2,000
Feet

PROJECT LOCATION DETAILS

February 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 4 (5)

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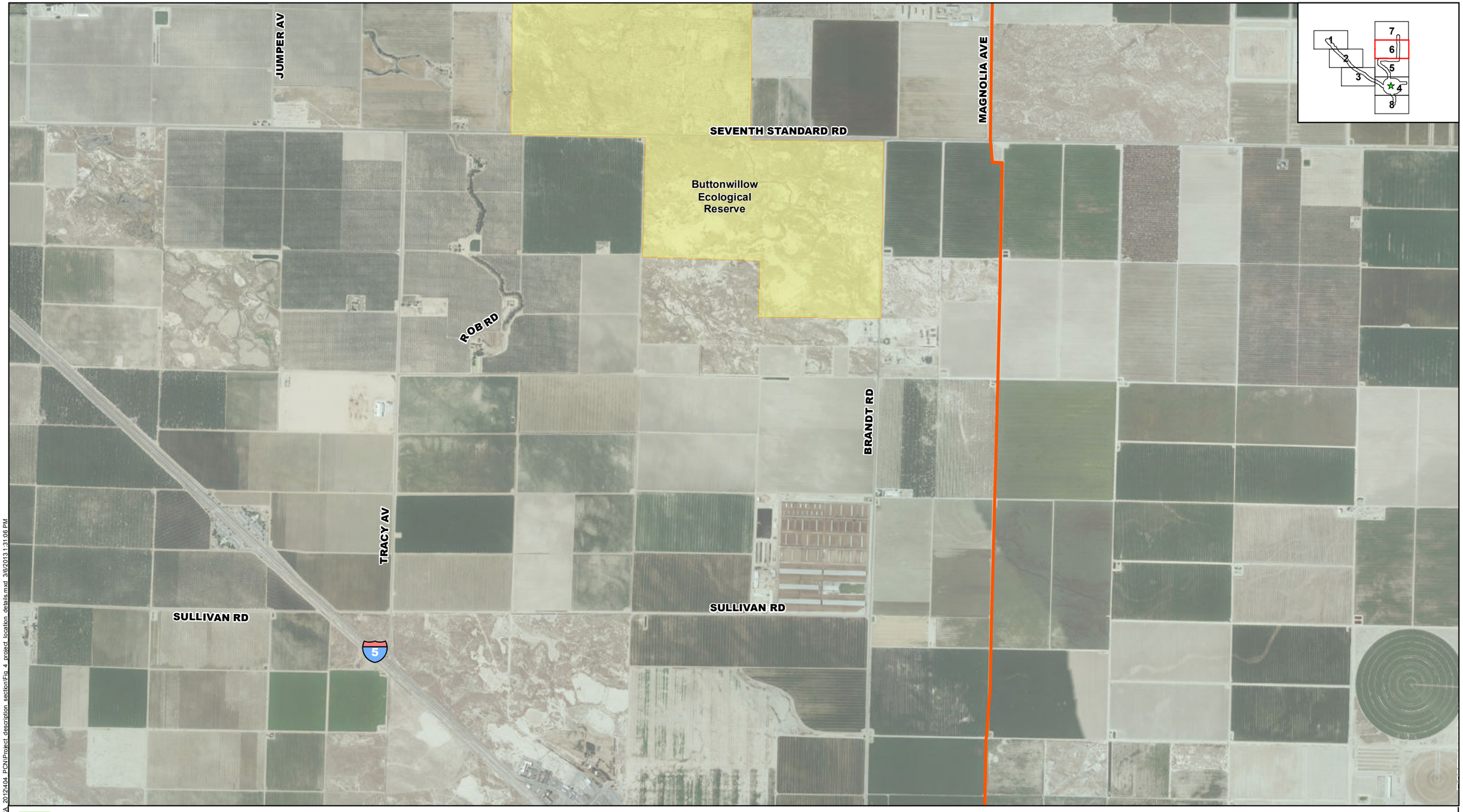
Source: Aerial Imagery, Bing Maps Hybrid, 2010



Project Site
Construction Staging Area
Controlled Area
BVWSD Well Field
Elk Hills Conservation Area

Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

Proposed Natural Gas Valve Station
Rail Laydown Yard
HDD Entry/Exit Pits
Electrical Switching Station

OEHI CO2 EOR Project
EOR Processing Facility
EOR Satellite Gathering Station

Note:
HDD = Horizontal Directional Drilling

N

0 1,000 2,000 Feet

Source: Aerial Imagery, Bing Maps Hybrid, 2010

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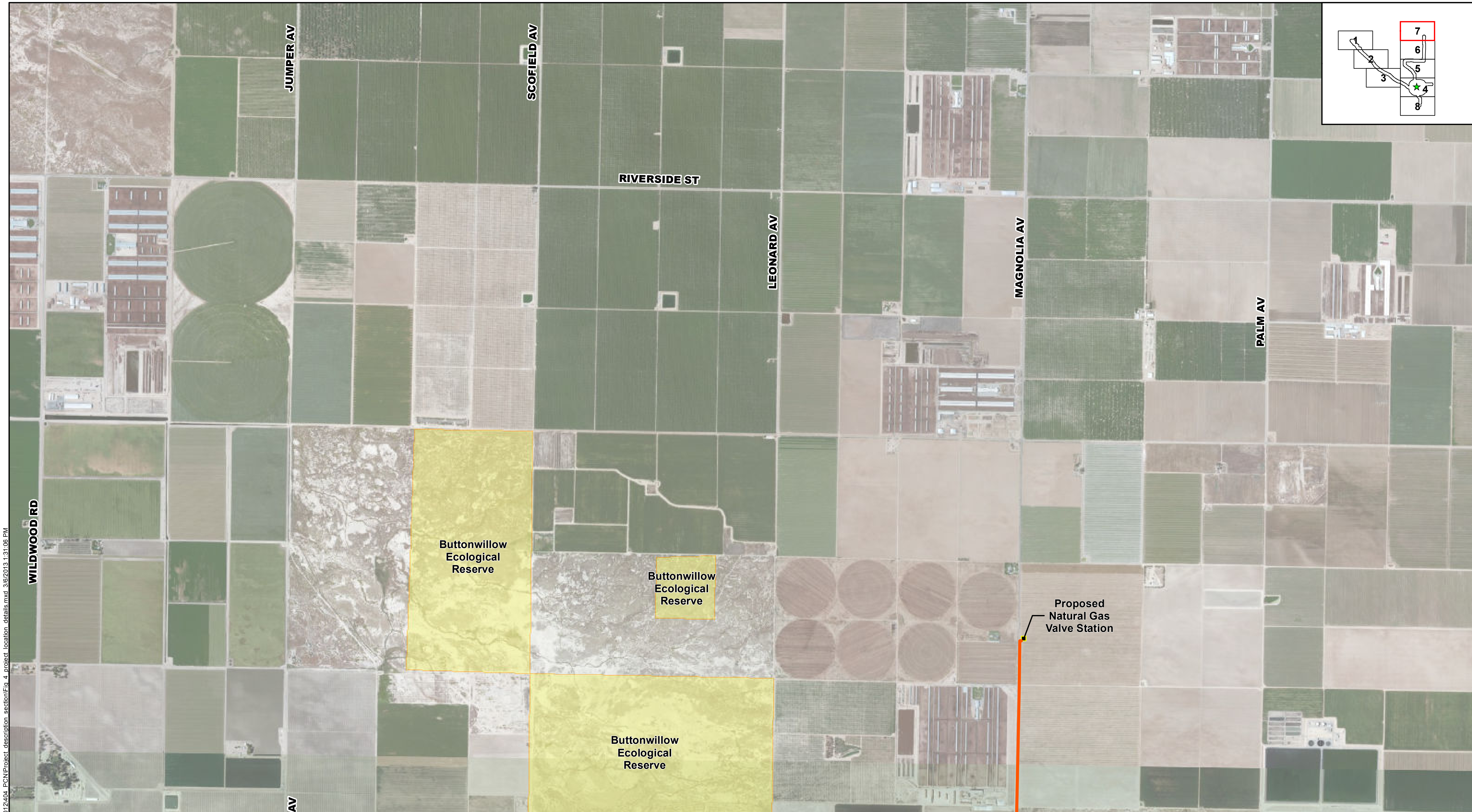
PROJECT LOCATION DETAILS

February 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 4 (6)



Project Site
Construction Staging Area
Controlled Area
BVWSD Well Field
Elk Hills Conservation Area
Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission
Proposed Natural Gas Valve Station
Rail Laydown Yard
HDD Entry/Exit Pits
Electrical Switching Station
OEHI CO2 EOR Project
EOR Processing Facility
EOR Satellite Gathering Station

Note:
HDD = Horizontal Directional Drilling

N

0 1,000 2,000 Feet

PROJECT LOCATION DETAILS

February 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 4 (7)

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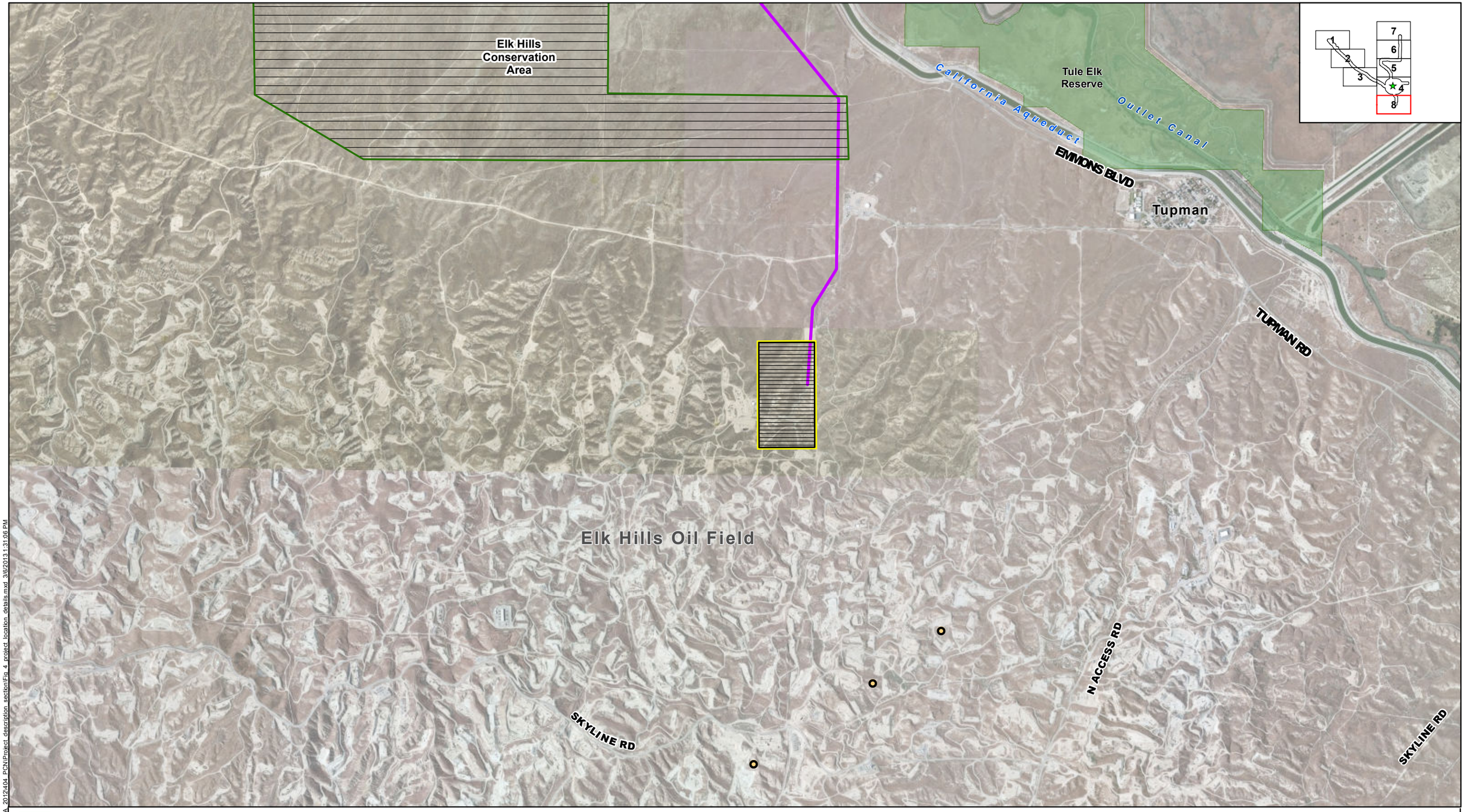
Source: Aerial Imagery, Bing Maps Hybrid, 2010



Project Site
Construction Staging Area
Controlled Area
BVWSD Well Field
Elk Hills Conservation Area

Carbon Dioxide
Natural Gas
Potable Water
Process Water
Railroad
Transmission

Proposed Natural Gas Valve Station
Rail Laydown Yard
HDD Entry/Exit Pits
Electrical Switching Station

OEHI CO2 EOR Project
EOR Processing Facility
EOR Satellite Gathering Station

Note:
HDD = Horizontal Directional Drilling

N

0 1,000 2,000 Feet

Source: Aerial Imagery, Bing Maps Hybrid, 2010

PROJECT LOCATION DETAILS

February 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 4 (8)

Appendix B

Adjacent Landowner Information

Table B-1
Adjacent Landowner Information

APN	Name	Address	City	State	Zip
100-060-03	Chicca TR et al.	46336 Highway 58	Buttonwillow	CA	93206
100-190-07	Chicca Gino Trust	46336 Highway 58	Buttonwillow	CA	93206
100-190-08	Houchin Elmer and Shirley Family Trust	P.O. Box 55	Portola	CA	96122
100-190-09	Houchin Elmer and Shirley Family Trust	2485 Beech Street	Bakersfield	CA	93301
100-190-10	Houchin Elmer and Shirley Family Trust	2485 Beech Street	Bakersfield	CA	93301
100-190-14	Houchin Elmer and Shirley Family Trust	P.O. Box 55	Portola	CA	96122
100-190-17	Houchin Wallace H.	P.O. Box 98	Buttonwillow	CA	93206
100-200-17	Chicca Gino Trust	46336 Highway 58	Buttonwillow	CA	93206
100-200-19	Chicca Gino Trust	46336 Highway 58	Buttonwillow	CA	93206
100-200-20	State of California	801 K Street	Sacramento	CA	95814-3500
102-010-08	Houchin Wallace et al.	P.O. Box 98	Buttonwillow	CA	93206
102-010-10	Toy Margaret H. TRS	13302 Red Plum Street	Cerritos	CA	90703
102-010-14	Center For Natural Lands Management	215 West Ash Street	Fallbrook	CA	92028-2904
102-010-15	Center For Natural Lands Management	215 West Ash Street	Fallbrook	CA	92028-2904
102-010-29	Yard Dorothy T.	1115 Truxtun Avenue	Bakersfield	CA	93301
102-030-09	Biggs Edward Alan	1300 West Nickerson	Seattle	WA	98119
102-030-11	Biggs Edward Alan	1300 West Nickerson	Seattle	WA	98119
102-030-13	Cohen Madelyne C.	P.O. Box 2036	Murphys	CA	95247
102-030-15	Biggs Edward Alan	1300 West Nickerson	Seattle	WA	98119
102-040-03	Houchin Wallace et al.	P.O. Box 98	Buttonwillow	CA	93206
102-040-05	Houchin L.H. TR	4045 Stockdale Highway	Bakersfield	CA	93309

Table B-1
Adjacent Landowner Information (Continued)

APN	Name	Address	City	State	Zip
102-040-06	Houchin Wallace et al.	P.O. Box 98	Buttonwillow	CA	93206
102-100-01	Ghilarducci Farms, Inc.	P.O. Box 654	Buttonwillow	CA	93206
102-100-02	Ghilarducci Farms, Inc.	P.O. Box 654	Buttonwillow	CA	93206
102-100-07	Willow Creek Ranch	5100 California Avenue	Bakersfield	CA	93309
102-100-08	Tazioli Robert and Susan Revocable Trust	7901 Calle Torcido	Bakersfield	CA	93309
102-100-09	Petrissans George and Marie Therese	15790 Twin Oaks Lane	Chino Hills	CA	91709-7853
102-100-10	South Central Farmers Health and Education Fun	1702 East 41st Street	Los Angeles	CA	90058
102-120-02	Willow Creek Ranch	5100 California Avenue	Bakersfield	CA	93309
102-120-05	Yoshimoto Zemman	4747 Knollcrest Court	Antioch	CA	94509
102-130-16	Pacific Gas and Electric Co.	P.O. Box 770000	San Francisco	CA	94177
102-130-18	Blank Dorothy B. et al.	106 Rose Lane	Belmont	CA	94002-3725
102-140-22	Welch John F.	1102 Santolina Drive	Novato	CA	94945-1840
102-140-24	Sherrell Brian Gene	7635 Jenica Road	Bakersfield	CA	93314
102-200-04	Petrissans George and Marie Therese	15790 Twin Oaks Lane	Chino Hills	CA	91709-7853
102-200-05	Franceschi Michael	8414 Ailanthus Court	Bakersfield	CA	93311
102-210-24	Stubbs Max B. and Roaslie	212 Goodman Street	Bakersfield	CA	93305-2904
102-210-26	De Gabain Colet M.	1740 Rosemary Lane	Redwood City	CA	94061-2617
102-210-28	Robison Marianne	2982 Villa Esta Drive	Atlanta	GA	30341-3710
102-210-30	Davis Melvin G. TR	P.O. Box 10926	Bakersfield	CA	93389
102-210-32	George Lloyd D.	208 Stonewood Court	Las Vegas	NV	89107-3250
102-210-34	Robison Marianne	2982 Villa Esta Drive	Atlanta	GA	30341-3710

Table B-1
Adjacent Landowner Information (Continued)

APN	Name	Address	City	State	Zip
102-210-50	Bernal Elizabeth	P.O. Box 564	Boulder Creek	CA	95006
102-220-01	Petrissans George and Marie Therese	15790 Twin Oaks Lane	Chino Hills	CA	91709-7853
102-220-05	Riccomini Ricky E. and Melinda	11501 Buffington Street	Bakersfield	CA	93312
102-220-21	Franceschi Rita T. Trust	P.O. Box 194	Buttonwillow	CA	93206
102-220-23	Franceschi Rita T. Trust	P.O. Box 194	Buttonwillow	CA	93206
102-220-26	Ornelas Juanita	P.O. Box 208	Buttonwillow	CA	93206
102-230-05	Riccomini Ricky E. and Melinda	11501 Buffington Street	Bakersfield	CA	93312
103-060-05	Affentranger & Sons D. Farm, Inc.	18107 Kratzmeyer Road	Bakersfield	CA	93314-9481
103-190-10	Fanucchi Family L.P.	2913 Still Glen Street	Bakersfield	CA	93311-2515
103-190-14	Belluomini Ranches L.P.	P.O. Box 38	Buttonwillow	CA	93206
103-200-15	Buena Vista Water Storage Dist.	P.O. Box 756	Buttonwillow	CA	93206
103-200-23	Belluomini Ranches L.P.	P.O. Box 38	Buttonwillow	CA	93206
103-200-24	Snow Willis et al.	P.O. Box 275	Buttonwillow	CA	93206
103-200-25	Belluomini Ranches L.P.	P.O. Box 38	Buttonwillow	CA	93206
103-200-27	Belluomini Ranches L.P.	P.O. Box 38	Buttonwillow	CA	93206
103-200-28	Belluomini Ranches L.P.	P.O. Box 38	Buttonwillow	CA	93206
103-200-29	Belluomini Ranches L.P.	P.O. Box 38	Buttonwillow	CA	93206
103-240-01	Toretta Donald T. and Donna M. TR	P.O. Box 565	Buttonwillow	CA	93206
103-240-04	Romanini Family L.P.	8909 Versailles Drive	Bakersfield	CA	93311
103-260-29	Young Mary N. TR et al.	P.O. Box 695	Buttonwillow	CA	93206
158-020-02	Riccomini Ricky E. and Melinda	11501 Buffington Street	Bakersfield	CA	93312
158-020-03	Zargaryan Sevak	2000 Chilton Drive	Glendale	CA	91201

Table B-1
Adjacent Landowner Information (Continued)

APN	Name	Address	City	State	Zip
158-020-11	Callon Petroleum Co.	P.O. Box 1287	Natchez	MI	39120
158-020-13	Shepherd Norman C.	396 West 3rd Street	Buttonwillow	CA	93206
158-020-14	Shepherd Norman C.	Route 1 Box 30	Buttonwillow	CA	93206
158-020-18	Shepherd Norman	396 West 3rd Street	Buttonwillow	CA	93206
158-020-25	Shepherd Norman	396 West 3rd Street	Buttonwillow	CA	93206
159-020-13	Petrissans Georges and Marie Therese Family TR	15790 Twin Oaks Lane	Chino Hills	CA	91709
159-040-02	Cauzza John B. III and Laura Kay	1600 Corn Camp Road	Buttonwillow	CA	93206
159-040-16	Kern Rice Processors, Inc.	1600 Corn Camp Road	Buttonwillow	CA	93206
159-040-18	Port Organic Products Ltd., Inc.	5060 California Avenue	Bakersfield	CA	93309-1682
159-050-08	Petrissans Georges and Marie Therese Family TR	15790 Twin Oaks Lane	Chino Hills	CA	91709
159-050-09	Petrissans George and Marie Therese	15790 Twin Oaks Lane	Chino Hills	CA	91709-7853
159-070-03	Dick Dykstra Dairies	10129 Schaefer	Ontario	CA	91761
159-070-08	Francis Erin Stuart	P.O. Box 2056	Kernville	CA	93238-2056
159-080-11	Franceschi Michael	8414 Ailanthus Court	Bakersfield	CA	93311
159-090-18	Tazioli James	396 Third Street	Buttonwillow	CA	93206
159-090-20	Tazioli James	12101 Stonington Street	Bakersfield	CA	93312-5795
159-100-08	Mills J.	346-D Avenue Sevilla	Laguna Hills	CA	92653
159-120-08	Heck Wendell and Bessie	5865 Adohr Road	Buttonwillow	CA	93206-9716
159-120-10	Douglas Ranches LLC	5100 California Avenue	Bakersfield	CA	93309
159-120-11	Douglas Ranches LLC	5100 California Avenue	Bakersfield	CA	93309
159-130-11	Dick Dykstra Dairies	10129 Schaefer	Ontario	CA	91761

Table B-1
Adjacent Landowner Information (Continued)

APN	Name	Address	City	State	Zip
159-190-06	Buena Vista Water Storage District	P.O. Box 756	Buttonwillow	CA	93206
159-300-02	McCallum Reta E.	54747 Benecia Trail	Yucca Valley	CA	92284
159-300-07	Hubbard Family Trust	273 Rockypoint Road	Palos Verdes	CA	90274
159-320-11	Methodist Chr-So. Calif. AZ Conf.	472 East Colorado Boulevard	Pasadena	CA	91109
086-320-11	Bloemhof Land & Farming	P.O. Box 747	Wasco	CA	93280
086-320-21	Bloemhof Land & Farming	P.O. Box 747	Wasco	CA	93280
086-330-12	Carey TR	2 Isabella Avenue	Atherton	CA	94025
099-010-07	Oblinger Carl G. Trust Est.	22776 Mesa Springs Way	Moreno Valley	CA	92557
099-020-06	Bloemhof Land & Farming	P.O. Box 747	Wasco	CA	93280
099-020-08	Oblinger Carl G. Trust Est.	22776 Mesa Springs Way	Moreno Valley	CA	92557
099-030-03	Bloemhof Land & Farming	P.O. Box 747	Wasco	CA	93280
099-030-12	Bloemhof Land & Farming	P.O. Box 747	Wasco	CA	93280
099-030-14	Bloemhof Land & Farming	P.O. Box 747	Wasco	CA	93280
099-040-02	Pachote Jim and Valerie	102 Lichen Court	Fremont	CA	94538-2422
099-040-03	Knaggs Albert F.	1386 East Lake Drive	Palm Springs	CA	92262
099-040-04	Miller Wylie R. and Carrie J.	798 Jordanna Road	Grand Junction	CO	81506
099-040-05	Hollinger Nell F. TR	1766 Flores Street	Seaside	CA	93955
099-040-08	Moore Living Trust	26515 Mazur Drive	Rnch Pls Vrds	CA	90275-2222
099-040-09	Alonso Angel	6423 South Oakes	Tacoma	WA	98409
099-040-10	Solinsky Jane L.	P.O. Box 262	Homewood	CA	96141
099-040-11	Miller Wylie R. and Carrie J.	798 Jordanna Road	Grand Junction	CO	81506
099-040-23	Strong Evelyn E.	879 Oxford Way	Benicia	CA	94510

Table B-1
Adjacent Landowner Information (Continued)

APN	Name	Address	City	State	Zip
099-050-21	Kelly Graham M. Fmly. Surv. TR	422 D Avenue	Coronado	CA	92118
099-081-02	Hawk Brook A.	233 Ironwood Street	Vacaville	CA	95688-2732
099-081-03	Richard Jeff L.	2247 Southwest Pumice Avenue	Redmond	OR	97756
099-081-25	Sciaroni Brian L.	1206 West Stuart Avenue	Fresno	CA	93711
099-081-27	French R.R.	P.O. Box 482	Kings Beach	CA	96143
099-081-28	Arredondo Lynnette Gutierrez	P.O. Box 931	Chino	CA	91708
099-210-01	Chicca TR et al.	46336 Highway 58	Buttonwillow	CA	93206
099-210-04	Oblinger Carl G. Trust Est.	22776 Mesa Springs Way	Moreno Valley	CA	92557
099-210-05	Oblinger Carl G. Trust Est.	22776 Mesa Springs Way	Moreno Valley	CA	92557
099-210-06	Oblinger Carl G. Trust Est.	22776 Mesa Springs Way	Moreno Valley	CA	92557-2627
099-220-06	Burdick John K.	13705 Foxhills Drive	Novelty	OH	44072
100-060-07	Chicca TR et al.	46336 Highway 58	Buttonwillow	CA	93206
100-060-08	Chicca TR et al.	46336 Highway 58	Buttonwillow	CA	93206

Appendix C

Cultural Resources Section 106 Initiation Letters

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA

U.S. DEPARTMENT OF ENERGY

May 8, 2012

Milford W. Donaldson
State Historic Preservation Officer
California State Department of Parks and Recreation
PO Box 942896
Sacramento, CA 94296-0001

Subject: Proposed Hydrogen Energy California Project in Kern County, California

Dear Mr. Donaldson:

The purpose of this letter is to inform you of the proposed Hydrogen Energy California Project (HECA or the Project) in Kern County, California; to initiate Section 106 consultation under the *National Historic Preservation Act of 1966* (NHPA); and to seek concurrence and input on the delineation of Area of Potential Effects (APE) for both archaeological and historic architectural resources (*See Attached Area Map and Area of Potential Effects Map*).

HECA is proposed by Hydrogen Energy California LLC. The Project is part of U.S. Department of Energy's (DOE) Clean Coal Power Initiative, a cost-shared collaboration between the federal government and private industry to increase investment in low-emission coal technology by demonstrating advanced coal-based power generation technologies at commercial scale. The HECA is supported in part by DOE with a $408 million grant in a cost-shared arrangement. Total project costs are estimated to be approximately $4 billion. DOE has determined that the proposed Project is a federal undertaking as defined in 36 Code of Federal Regulations § 800.16(y).

The Project consists of an Integrated Gasification Combined Cycle power facility, with an integrated manufacturing complex which will produce low-carbon nitrogen-based products, such as fertilizer. The Project will utilize a blend of coal and petroleum coke as a feedstock in order to produce hydrogen-rich syngas fuel through a gasification process. This fuel will be used in a combustion turbine to produce a nominal 300 megawatts (MW) of electricity and allow the manufacture of low-carbon nitrogen-based products such as fertilizers. The production of electricity, low-carbon nitrogen-based products, and carbon dioxide (CO_2) for enhanced oil recovery (EOR) enables the operational flexibilities to meet market demands. Because it produces several products, HECA is sometimes referred to as a "polygeneration" project.

The electricity and other products produced by the Project will have a smaller carbon footprint than similar products produced from traditional fossil fuel sources through a conventional combustion process. This is accomplished primarily by capturing approximately 90 percent of the CO_2 from the gasification process. Captured CO_2 will be transported (via a pipeline) for use in EOR, which results in sequestration of the CO_2 in secure geologic formations, at the nearby Elk Hills Oil Field (EHOF). EHOF is owned and operated by Occidental of Elk Hills, Inc. (OEHI), which will obtain necessary permits for the EOR operations.

3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507
fred.pozzuto@netl.doe.gov • Voice (304) 285-5219 • Fax (304) 285-4403 • www.netl.doe.gov

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA

U.S. DEPARTMENT OF ENERGY

May 10, 2012

Mr. Neil Peyron, Chairperson
Tule River Indian Tribe
P.O. Box 589
Porterville, CA 93258

SUBJECT: Proposed Hydrogen Energy California Project in Kern County, California

Dear Mr. Peyron:

The purpose of this letter is to inform you of the proposed Hydrogen Energy California Project (HECA or the Project) in Kern County, California that is under consideration for approval and potential future funding by the U.S. Department of Energy (DOE). HECA is proposed by Hydrogen Energy California LLC. The Project is part of DOE's Clean Coal Power Initiative, a cost-shared collaboration between the federal government and private industry to increase investment in low-emission coal technology by demonstrating advanced coal-based power generation technologies at commercial scale. DOE has determined that the Project is a federal undertaking as defined in 36 Code of Federal Regulations § 800.16(y). The HECA is supported in part by DOE with a $408 million grant in a cost-shared arrangement. Total project costs are estimated to be approximately $4 billion. In compliance with Section 106 of the *National Historic Preservation Act of 1966* (NHPA), DOE would like to initiate informal government-to-government consultation with the Tule River Indian Tribe.

The Project consists of an Integrated Gasification Combined Cycle power facility, with an integrated manufacturing complex which will produce low-carbon nitrogen-based products, such as fertilizer. The Project will utilize a blend of coal and petroleum coke as a feedstock in order to produce hydrogen-rich syngas fuel through a gasification process. This fuel will be used in a combustion turbine to produce a nominal 300 megawatts (MW) of electricity, and in the manufacturing complex to produce low-carbon nitrogen-based products such as fertilizers. The production of electricity, low-carbon nitrogen-based products, and carbon dioxide (CO_2) for enhanced oil recovery (EOR) enables the operational flexibility to meet market demand. Because it produces several products, HECA is sometimes referred to as a "polygeneration" project.

The electricity and other products produced by the Project will have a smaller carbon footprint than similar products produced from traditional fossil fuel sources. This is accomplished primarily by capturing approximately 90 percent of the CO_2 from the gasification process. Captured CO_2 will be transported (via a pipeline) for use in EOR, which results in sequestration of the CO_2 in secure geologic formations, at the nearby Elk Hills Oil Field (EHOF). EHOF is owned and operated by Occidental of Elk Hills, Inc. (OEHI) which will obtain necessary permits for the EOR operations.

The 453-acre Project site is located approximately 7-miles west of the outermost edge of the city of Bakersfield and 1.5-miles northwest of the unincorporated community of Tupman in western Kern County, California. The majority of the Project site is presently used for agricultural purposes, including

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cultivation of cotton, alfalfa, and onions. Temporary construction activities, including equipment storage, construction laydown, parking and offices, will be located on the Project site and within an adjacent 91-acre construction laydown area.

The Project also includes the following off-site facilities:

- Rail Spur – A new rail spur will be constructed to the Project site in order to facilitate feedstock and equipment delivery, as well as product and by-product off-take. The rail spur will extend approximately 4.6-miles from the existing San Joaquin Valley Railroad to the Project site.
- Electrical Transmission Line – An electrical transmission line will interconnect the Project to a future Pacific Gas & Electric (PG&E) switching station to the east of the Project site (adjacent to the existing Midway-Wheeler Ridge transmission lines). The electrical transmission line is approximately 3.5-miles long, of which 1.5-miles will be located within the Project site.
- Natural Gas Supply Line – A natural gas interconnection will be made with an existing PG&E natural gas pipeline that is located north of the Project site. The natural gas pipeline is approximately 11.1-miles in length.
- Water Supply Pipelines – The Project will utilize brackish groundwater supplied from the Buena Vista Water Storage District located northwest of the Project site. The raw water supply pipeline will be approximately 14.4-miles in length. Potable water for construction, drinking, and sanitary use will be delivered from a new West Kern Water District potable water production site approximately 1.3-miles east of the Project site.
- CO_2 Pipeline – The CO_2 pipeline will transfer the CO_2 captured during gasification from the Project site south to the EHOF for EOR and sequestration (storage). The CO_2 pipeline is approximately 3.4-miles in length.

As indicated above, DOE wishes to initiate informal consultation with the Tule River Indian Tribe in compliance with Section 106 of the NHPA. For your additional information, for the purposes of initiating informal consultation with the California Office of Historic Preservation on the delineation of the area of potential effects (APE), DOE is defining the APE for archaeological resources as all areas where ground-disturbing activities will occur in relation to the Project. More specifically, 200-feet from the Project site and Construction Laydown Area, and 50-feet from the right of way of all Project linears. The APE for historic architecture is defined as 0.5-miles around the Project site and 0.5-miles from the electric transmission and rail spur right of ways to account for potential indirect effects. Attached are copies of the proposed APEs for both archaeological and historic architectural resources.[1] The APEs for archaeological and historic architectural resources are consistent with the requirements of the California Energy Commission (CEC), which has exclusive authority for licensing thermal power plants in California with a generating capacity of 50-MW or more.

DOE's Section 106 consultation under the NHPA for the undertaking with the California State Historic Preservation Office is to further seek concurrence on the delineation of APEs for both archaeological

[1] Note that the identified APEs may be over-inclusive in the sense that they include the sites of the EOR to be undertaken by OEHI, which is not a recipient of federal funding in connection with its EOR activities.

and historic architectural resources. A joint CEC/DOE environmental impact statement (EIS) is currently being prepared for the project, and the draft version will be made available to you at a later date where you may again respond to any specific concerns you may have. DOE will include correspondence with your office in an appendix to the EIS. HECA's full application to the CEC can also be viewed at:
http://www.energy.ca.gov/sitingcases/hydrogen_energy/documents/index.html#applicant

For any overall environmental project questions please contact me at 304-285-5219. Should you have any technical questions please contact the Office of National Environmental Policy Act (NEPA) contractor, Mr. Dale Shileikis at 415-243-3708, or by email @ dale.shileikis@urs.com.

Sincerely,

Fred Pozzuto
Environmental Manager / NEPA Compliance Officer

Enclosures:

cc:
M. Mascaro - HECA-SCS Energy
D. Shileikis - URS

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA

U.S. DEPARTMENT OF ENERGY

May 10, 2012

Ms. Kathy Morgan, Chairperson
Tejon Indian Tribe
2234 – 4th Street
Wasco, CA 93280

SUBJECT: Proposed Hydrogen Energy California Project in Kern County, California

Dear Ms. Morgan:

The purpose of this letter is to inform you of the proposed Hydrogen Energy California Project (HECA or the Project) in Kern County, California that is under consideration for approval and potential future funding by the U.S. Department of Energy (DOE). HECA is proposed by Hydrogen Energy California LLC. The Project is part of DOE's Clean Coal Power Initiative, a cost-shared collaboration between the federal government and private industry to increase investment in low-emission coal technology by demonstrating advanced coal-based power generation technologies at commercial scale. DOE has determined that the Project is a federal undertaking as defined in 36 Code of Federal Regulations § 800.16(y). The HECA is supported in part by DOE with a $408 million grant in a cost-shared arrangement. Total project costs are estimated to be approximately $4 billion. In compliance with Section 106 of the *National Historic Preservation Act of 1966* (NHPA), DOE would like to initiate informal government-to-government consultation with the Tejon Indian Tribe.

The Project consists of an Integrated Gasification Combined Cycle power facility, with an integrated manufacturing complex, which will produce low-carbon nitrogen-based products, such as fertilizer. The Project will utilize a blend of coal and petroleum coke as a feedstock in order to produce hydrogen-rich syngas fuel through a gasification process. This fuel will be used in a combustion turbine to produce a nominal 300 megawatts (MW) of electricity, and in the manufacturing complex to produce low-carbon nitrogen-based products such as fertilizers. The production of electricity, low-carbon nitrogen-based products, and carbon dioxide (CO_2) for enhanced oil recovery (EOR) enables the operational flexibility to meet market demand. Because it produces several products, HECA is sometimes referred to as a "polygeneration" project.

The electricity and other products produced by the Project will have a smaller carbon footprint than similar products produced from traditional fossil fuel sources. This is accomplished primarily by capturing approximately 90 percent of the CO_2 from the gasification process. Captured CO_2 will be transported (via a pipeline) for use in EOR, which results in sequestration of the CO_2 in secure geologic formations, at the nearby Elk Hills Oil Field (EHOF). EHOF is owned and operated by Occidental of Elk Hills, Inc. (OEHI) which will obtain necessary permits for the EOR operations.

The 453-acre Project site is located approximately 7-miles west of the outermost edge of the city of Bakersfield and 1.5-miles northwest of the unincorporated community of Tupman in western Kern County, California. The majority of the Project site is presently used for agricultural purposes, including

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cultivation of cotton, alfalfa, and onions. Temporary construction activities, including equipment storage, construction laydown, parking and offices, will be located on the Project site and within an adjacent 91-acre construction laydown area.

The Project also includes the following off-site facilities:

- Rail Spur – A new rail spur will be constructed to the Project site in order to facilitate feedstock and equipment delivery, as well as product and by-product off-take. The rail spur will extend approximately 4.6-miles from the existing San Joaquin Valley Railroad to the Project site.
- Electrical Transmission Line – An electrical transmission line will interconnect the Project to a future Pacific Gas & Electric (PG&E) switching station to the east of the Project site (adjacent to the existing Midway-Wheeler Ridge transmission lines). The electrical transmission line is approximately 3.5-miles long, of which 1.5-miles will be located within the Project site.
- Natural Gas Supply Line – A natural gas interconnection will be made with an existing PG&E natural gas pipeline that is located north of the Project site. The natural gas pipeline is approximately 11.1-miles in length.
- Water Supply Pipelines – The Project will utilize brackish groundwater supplied from the Buena Vista Water Storage District located northwest of the Project site. The raw water supply pipeline will be approximately 14.4-miles in length. Potable water for construction, drinking, and sanitary use will be delivered from a new West Kern Water District potable water production site approximately 1.3-miles east of the Project site.
- CO_2 Pipeline – The CO_2 pipeline will transfer the CO_2 captured during gasification from the Project site south to the EHOF for EOR and sequestration (storage). The CO_2 pipeline is approximately 3.4-miles in length.

As indicated above, DOE wishes to initiate informal consultation with the Tejon Indian Tribe in compliance with Section 106 of the NHPA. For your additional information, for the purposes of initiating informal consultation with the California Office of Historic Preservation on the delineation of the area of potential effects (APE), DOE is defining the APE for archaeological resources as all areas where ground-disturbing activities will occur in relation to the Project. More specifically, 200-feet from the Project site and Construction Laydown Area, and 50-feet from the right of way of all Project linears. The APE for historic architecture is defined as 0.5-miles around the Project site and 0.5-miles from the electric transmission and rail spur right of ways to account for potential indirect effects. Attached are copies of the proposed APEs for both archaeological and historic architectural resources.[1] The APEs for archaeological and historic architectural resources are consistent with the requirements of the California Energy Commission (CEC), which has exclusive authority for licensing thermal power plants in California with a generating capacity of 50-MW or more.

DOE's Section 106 consultation under the NHPA for the undertaking with the California State Historic Preservation Office is to further seek concurrence on the delineation of APEs for both archaeological

[1] Note that the identified APEs may be over-inclusive in the sense that they include the sites of the EOR to be undertaken by OEHI, which is not a recipient of federal funding in connection with its EOR activities.

and historic architectural resources. A joint CEC/DOE environmental impact statement (EIS) is currently being prepared for the project, and the draft version will be made available to you at a later date where you may again respond to any specific concerns you may have. DOE will include correspondence with your office in an appendix to the EIS. HECA's full application to the CEC can also be viewed at:
http://www.energy.ca.gov/sitingcases/hydrogen_energy/documents/index.html#applicant

For any overall environmental project questions please contact me at 304-285-5219. Should you have any technical questions please contact the Office of National Environmental Policy Act (NEPA) contractor, Mr. Dale Shileikis at 415-243-3708, or by email @ dale.shileikis@urs.com.

Sincerely,

Fred Pozzuto
Environmental Manager / NEPA Compliance Officer

Enclosures:

cc:
M. Mascaro - HECA-SCS Energy
D. Shileikis - URS

NATIONAL ENERGY TECHNOLOGY LABORATORY
Albany, OR • Morgantown, WV • Pittsburgh, PA

U.S. DEPARTMENT OF ENERGY

May 10, 2012

Ruben Barrios, Chairperson
Santa Rosa Rancheria
P.O. Box 8
Lemoore, CA 93245

SUBJECT: Proposed Hydrogen Energy California Project in Kern County, California

Dear Mr. Barrios:

The purpose of this letter is to inform you of the proposed Hydrogen Energy California Project (HECA or the Project) in Kern County, California that is under consideration for approval and potential future funding by the U.S. Department of Energy (DOE). HECA is proposed by Hydrogen Energy California LLC. The Project is part of DOE's Clean Coal Power Initiative, a cost-shared collaboration between the federal government and private industry to increase investment in low-emission coal technology by demonstrating advanced coal-based power generation technologies at commercial scale. DOE has determined that the Project is a federal undertaking as defined in 36 Code of Federal Regulations § 800.16(y). The HECA is supported in part by DOE with a $408 million grant in a cost-shared arrangement. Total project costs are estimated to be approximately $4 billion. In compliance with Section 106 of the *National Historic Preservation Act of 1966* (NHPA), DOE would like to initiate informal government-to-government consultation with the Santa Rosa Rancheria.

The Project consists of an Integrated Gasification Combined Cycle power facility, with an integrated manufacturing complex, which will produce low-carbon nitrogen-based products, such as fertilizer. The Project will utilize a blend of coal and petroleum coke as a feedstock in order to produce hydrogen-rich syngas fuel through a gasification process. This fuel will be used in a combustion turbine to produce a nominal 300 megawatts (MW) of electricity, and in the manufacturing complex to produce low-carbon nitrogen-based products such as fertilizers. The production of electricity, low-carbon nitrogen-based products, and carbon dioxide (CO_2) for enhanced oil recovery (EOR) enables the operational flexibility to meet market demand. Because it produces several products, HECA is sometimes referred to as a "polygeneration" project.

The electricity and other products produced by the Project will have a smaller carbon footprint than similar products produced from traditional fossil fuel sources. This is accomplished primarily by capturing approximately 90 percent of the CO_2 from the gasification process. Captured CO_2 will be transported (via a pipeline) for use in EOR, which results in sequestration of the CO_2 in secure geologic formations, at the nearby Elk Hills Oil Field (EHOF). EHOF is owned and operated by Occidental of Elk Hills, Inc. (OEHI) which will obtain necessary permits for the EOR operations.

The 453-acre Project site is located approximately 7-miles west of the outermost edge of the city of Bakersfield and 1.5-miles northwest of the unincorporated community of Tupman in western Kern County, California. The majority of the Project site is presently used for agricultural purposes, including

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fred.pozzuto@netl.doe.gov • Voice (304) 285-5219 • Fax (304) 285-4403 • www.netl.doe.gov

cultivation of cotton, alfalfa, and onions. Temporary construction activities, including equipment storage, construction laydown, parking and offices, will be located on the Project site and within an adjacent 91-acre construction laydown area.

The Project also includes the following off-site facilities:

- Rail Spur – A new rail spur will be constructed to the Project site in order to facilitate feedstock and equipment delivery, as well as product and by-product off-take. The rail spur will extend approximately 4.6-miles from the existing San Joaquin Valley Railroad to the Project site.
- Electrical Transmission Line – An electrical transmission line will interconnect the Project to a future Pacific Gas & Electric (PG&E) switching station to the east of the Project site (adjacent to the existing Midway-Wheeler Ridge transmission lines). The electrical transmission line is approximately 3.5-miles long, of which 1.5-miles will be located within the Project site.
- Natural Gas Supply Line – A natural gas interconnection will be made with an existing PG&E natural gas pipeline that is located north of the Project site. The natural gas pipeline is approximately 11.1-miles in length.
- Water Supply Pipelines – The Project will utilize brackish groundwater supplied from the Buena Vista Water Storage District located northwest of the Project site. The raw water supply pipeline will be approximately 14.4-miles in length. Potable water for construction, drinking, and sanitary use will be delivered from a new West Kern Water District potable water production site approximately 1.3-miles east of the Project site.
- CO_2 Pipeline – The CO_2 pipeline will transfer the CO_2 captured during gasification from the Project site south to the EHOF for EOR and sequestration (storage). The CO_2 pipeline is approximately 3.4-miles in length.

As indicated above, DOE wishes to initiate informal consultation with the Santa Rosa Rancheria in compliance with Section 106 of the NHPA. For your additional information, for the purposes of initiating informal consultation with the California Office of Historic Preservation on the delineation of the area of potential effects (APE), DOE is defining the APE for archaeological resources as all areas where ground-disturbing activities will occur in relation to the Project. More specifically, 200-feet from the Project site and Construction Laydown Area, and 50-feet from the right of way of all Project linears. The APE for historic architecture is defined as 0.5-miles around the Project site and 0.5-miles from the electric transmission and rail spur right of ways to account for potential indirect effects. Attached are copies of the proposed APEs for both archaeological and historic architectural resources.[1] The APEs for archaeological and historic architectural resources are consistent with the requirements of the California Energy Commission (CEC), which has exclusive authority for licensing thermal power plants in California with a generating capacity of 50-MW or more.

DOE's Section 106 consultation under the NHPA for the undertaking with the California State Historic Preservation Office is to further seek concurrence on the delineation of APEs for both archaeological

[1] Note that the identified APEs may be over-inclusive in the sense that they include the sites of the EOR to be undertaken by OEHI, which is not a recipient of federal funding in connection with its EOR activities.

and historic architectural resources. A joint CEC/DOE environmental impact statement (EIS) is currently being prepared for the project, and the draft version will be made available to you at a later date where you may again respond to any specific concerns you may have. DOE will include correspondence with your office in an appendix to the EIS. HECA's full application to the CEC can also be viewed at:
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Sincerely,

Fred Pozzuto
Environmental Manager / NEPA Compliance Officer

Enclosures:

cc:
M. Mascaro - HECA-SCS Energy
D. Shileikis - URS

The 453-acre Project site is located approximately 7-miles west of the outermost edge of the city of Bakersfield and 1.5-miles northwest of the unincorporated community of Tupman in western Kern County, California. The majority of the Project site has been repetitively tilled and is presently used for agricultural purposes, including cultivation of cotton, alfalfa, and onions. Temporary construction activities, including equipment storage, construction laydown, parking and offices, will be located on the Project site and within an adjacent 91-acre Construction Laydown Area.

The Project also includes the following off-site facilities:

- Rail Spur – A new rail spur will be constructed to the Project site in order to facilitate feedstock and equipment delivery, as well as product and by-product off-take. The rail spur will extend approximately 4.6-miles from the existing San Joaquin Valley Railroad to the Project site.
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- Water Supply Pipelines – The Project will utilize brackish groundwater supplied from the Buena Vista Water Storage District located northwest of the Project site. The raw water supply pipeline will be approximately 14.4-miles in length. Potable water for construction, drinking, and sanitary use will be delivered from a new West Kern Water District potable water production site approximately 1.3-miles east of the Project site.
- CO_2 Pipeline – The CO_2 pipeline will transfer the CO_2 captured during gasification from the Project site (plant) south to the EHOF for EOR and sequestration (storage). The CO_2 pipeline is approximately 3.4-miles in length.

For the purposes of initiating informal consultation with the Office of Historic Preservation on the delineation of the APE, DOE is defining the APE for archaeological resources as all areas where ground-disturbing activities will occur in relation to the Project. More specifically, 200-feet from the Project site and Construction Laydown Area, and 50-feet from the right of way of all Project linears. The APE for historic architecture is defined as 0.5-miles around the Project site and 0.5-miles from the electric transmission and rail spur right of ways to account for potential indirect effects. Attached are copies of the proposed APEs for both archaeological and historic architectural resources.[1] The APEs for archaeological and historic architectural resources are consistent with the requirements of the California Energy Commission (CEC), which has exclusive authority for licensing thermal power plants in California with a generating capacity of 50-MW or more.

[1] Note that the identified APEs may be over-inclusive in the sense that they include the sites of the EOR to be undertaken by OEHI, which is not a recipient of federal funding in connection with its EOR activities.

DOE seeks to initiate informal Section 106 consultation under the NHPA for the undertaking and seek concurrence on the delineation of APEs for both archaeological and historic architectural resources. A joint CEC/DOE environmental impact statement (EIS) is currently being prepared for the project, and the draft version will be made available to you at a later date where you may again respond to any specific concerns you may have. DOE will include correspondence with your office in an appendix to the EIS. HECA's full application to the CEC can also be viewed at:
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Sincerely,

Fred Pozzuto
Environmental Manager / NEPA Compliance Officer

Enclosures:

cc:
M. Mascaro - HECA-SCS Energy
D. Shileikis - URS

STATE OF CALIFORNIA – THE NATURAL RESOURCES AGENCY EDMUND G. BROWN, JR., *Governor*

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
1725 23rd Street, Suite 100
SACRAMENTO, CA 95816-7100
(916) 445-7000 Fax: (916) 445-7053
calshpo@parks.ca.gov
www.ohp.parks.ca.gov

May 25, 2012

Reply in Reference To: DOE120514A

Fred Pozzuto
Environmental Manager
US Dept. of Energy
National Energy Technology Laboratory
3610 Collins Ferry Road
PO Box 880
Morgantown, WV 26507-0880

Re: Section 106 Consultation for Hydrogen Energy California Project, Kern County, CA

Dear Mr. Pozzuto:

Thank you for initiating consultation regarding the Department of Energy's (DOE) efforts to comply with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470f), as amended, and its implementing regulation found at 36 CFR Part 800.

The DOE is proposing to construct an Integrated Gasification Combined Cycle power facility in Kern County and are requesting my concurrence and comments with their Area of Potential Effect determination for historic architecture and archeology. Due to a lack of sufficient information I am presently unable to concur with these determinations. I look forward to reviewing additional information on this undertaking as it becomes available.

Thank you for seeking my comments and considering historic properties as part of your project planning. I look forward to continuing this consultation with the DOE. If you have any questions or concerns, please contact Ed Carroll of my staff at (916) 445-7006 or ecarroll@parks.ca.gov.

Sincerely,

Jenan Saunders
(for) Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

TEJON
INDIAN TRIBE

June 5, 2012

National Energy Technology Laboratory
Fred Pozzuto
P.O. Box 880
Morgantown, WV 26507

Re: Proposed Hydrogen Energy California Project in Kern County, California

Dear Fred Pozzuto,

Thank you for the letter and the opportunity to comment on this project. Tejon Indian Tribe has no conflict with this project nor do we know of any cultural resources that might be impacted at this site. However, we ask that you notify us immediately if any site/s and / or artifacts are discovered during your project in the area.

Sincerely,

Kathryn Montes Morgan
Tribal Chair
Tejon Indian Tribe

1731 Hasti Acres Drive, Suite 108 Bakersfield, CA 93309 (661) 834-8566

Appendix D

Biological Assessment

(provided separately)

Appendix E

Preliminary Jurisdictional Delineation

(provided separately)

DATA REQUEST

A51. Please provide a summary table showing total acreages of features that were delineated as non-jurisdictional, waters of the U.S., and wetland.

SUPPLEMENTAL RESPONSE

Please see the Jurisdictional Delineation Report provided in Attachment A49-1 for an updated summary table of the total acreages of features that were delineated as nonjurisdictional, potential waters of the U.S., and wetland waters of the U.S. The table in Appendix E of the Jurisdictional Delineation Report supersedes Table A51-1 that was previously submitted in response to Data Request A51 in August 2012.

DATA REQUEST

A52. For the two depressional claypan areas, the text indicates that representative soil test pits and data were collected regarding vegetation, soil types, and hydrology. Please provide the wetland data sheets and a map showing the location of the soil test pits in relation to the two depressional areas. Also, please indicate why the WL-1 feature was classified differently than other depressional waters of the U.S. features.

SUPPLEMENTAL RESPONSE

The requested data sheets and figures are included in the Jurisdictional Delineation Report (See Attachment A49-1, Appendix D). WL-1 was classified differently than the other depressional waters of the U.S. because WL-1 met all three wetland parameters (vegetation, soils, hydrology); the other depressional waters of the U.S. were classified as nonwetland waters because they are unvegetated.

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT
COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

AMENDED APPLICATION FOR CERTIFICATION FOR THE HYDROGEN ENERGY CALIFORNIA PROJECT

Docket No. 08-AFC-08A
PROOF OF SERVICE
(Revised 3/4/13)

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*Indicates Change

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docket@energy.ca.gov

OTHER ENERGY COMMISSION
PARTICIPANTS (LISTED FOR
CONVENIENCE ONLY):

After docketing, the Docket Unit will provide a copy to the persons listed below. Do not send copies of documents to these persons unless specifically directed to do so.

KAREN DOUGLAS
Commissioner and Presiding Member

ANDREW McALLISTER
Commissioner and Associate Member

Raoul Renaud
Hearing Adviser

Galen Lemei
Adviser to Presiding Member

Jennifer Nelson
Adviser to Presiding Member

*Hazel Miranda
Adviser to Associate Member

David Hungerford
Adviser to Associate Member

Patrick Saxton
Adviser to Associate Member

Eileen Allen
Commissioners' Technical
Adviser for Facility Siting

DECLARATION OF SERVICE

I, Dale Shileikis, declare that on March 6, 2013, 2013, I served and filed copies of the attached Supplemental Responses to CEC Data Requests Nos. A49, A51 and A52, dated March, 2013. This document is accompanied by the most recent Proof of Service, which I copied from the web page for this project at: http://www.energy.ca.gov/sitingcases/hydrogen_energy/.

The document has been sent to the other persons on the Service List above in the following manner:

(*Check one*)

For service to all other parties and filing with the Docket Unit at the Energy Commission:

___ I e-mailed the document to all e-mail addresses on the Service List above and personally delivered it or deposited it in the US mail with first class postage to those persons noted above as "hard copy required"; OR

_X_ Instead of e-mailing the document, I personally delivered it or deposited it in the US mail with first class postage to all of the persons on the Service List for whom a mailing address is given.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that I am over the age of 18 years.

Dated: 3/6/13