Responses to CEC Data Requests Set Three (45-Day Extension)

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

January 2013

RESPONSES TO DATA REQUESTS (45-Day Extension)
FROM CALIFORNIA ENERGY COMMISSION (CEC)

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APPENDIX

Appendix A HECA Transmission Network Upgrades Report

LIST OF ACRONYMS AND ABBREVIATIONS USED IN RESPONSES

ADT	average daily traffic
AFC	Application for Certification
BVWSD	Buena Vista Water Storage District
CAISO	California Independent System Operator
CCPI	Clean Coal Power Initiative
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CNEL	community noise equivalent level
CO_2	carbon dioxide
CPUC	California Public Utilities Commission
dBA	A-weighted decibels
DPR	Department of Parks and Recreation
DOE	U.S. Department of Energy
EHOF	Elk Hills Oil Field
EIR	Environmental Impact Report
EOR	Enhanced Oil Recovery
FTA	Federal Transit Administration
HECA	Hydrogen Energy California
I-5	Interstate 5
IGCC	Integrated Gasification Combined-Cycle
KRFCC	Kern River Flood Control Channel
kV	kilovolt
L_{dn}	day-night average sound level
MHI	Mitsubishi Heavy Industries
MW	megawatts
NETL	National Energy Technology Laboratory
NGCC	Natural Gas Combined-Cycle
OEHI	Occidental Elk Hills, Incorporated
PAA	project area of analysis
petcoke	petroleum coke
PG&E	Pacific Gas and Electric Company
PL	Public Law
ROW	right-of-way
SJVRR	San Joaquin Valley Railroad
syngas	synthetic gas
UTM	Universal Transverse Mercator
WKWD	West Kern Water District

Technical Area: Cultural Resources
Authors: Melissa Mourkas, Elizabeth A. Bagwell, Thomas Gates, Gabriel Roark

All responses to these Data Requests containing references to specific archaeological site locations or information, or resources of concern to Native Americans, must be submitted under a request for confidentiality.

BACKGROUND

Historic built environment studies were conducted in 2009 and 2012 to support the AFC and Amended AFC; separate reports were prepared for each inventory (JRP Historical Consulting 2009, 2012). Historic built environment resources were recorded as a result of both studies and were documented in the reports and on Department of Parks and Recreation 523 forms (DPR 523 forms).

Despite changes to the proposed project between 2009 and 2012, historic built environmental resources recorded in 2009 still cross the project area of analysis (PAA).

The Amended AFC (HECA, 2012: 08-AFC-8A) proposes a linear corridor for a rail line. The corridor is shown on Map 2, Historic Architectural Resources Study Area with Defined Resources, Sheets 4-6, as submitted in April, 2012. The DPR 523 forms submitted with the revised project, April 2012, are keyed to the Map Reference Numbers on Map 2. Some of the DPR 523 forms contain photographs and/or location references which, due to the revised project footprint, are now outside of the proposed Project Area of Affect (PAA).

Staff has conducted a windshield survey of the PAA and noted that some of the resources have been altered since they were previously recorded. The built environment resources in the PAA are linear resources that go well beyond the PAA, therefore the nature and integrity of the resource within the PAA could be substantially different from that outside of the PAA.

As part of staff's environmental impact analysis, staff is requesting this level of analysis in order to understand what portion(s) of the resource could be affected by the proposed project. Staff requests that the DPR 523 forms for the following resources, identified by their map reference number, be updated to include current photographs of the resource within the current PAA, a current photograph location map, and updated evaluation of the resource based upon the current PAA and changes that have occurred to the resource in the ensuing years since the original application in 2008.

DATA REQUEST

A181. Map Reference Number 2: Southern Pacific Asphalto/McKittrick Branch.

a. Please provide current photographs of the rail line and spur as they appear within the current PAA and update the evaluation as needed to specifically discuss this portion of the resource. Record where the spur line ends and/or meets the main line within the PAA. Update the sketch map to reflect the current PAA and location of the resource. Update the section views to reflect the existing conditions.

b. Provide a discussion of how the proposed Rail Laydown Yard (URS 2012: Figure 5.10-2 [1]) would impact either the existing rail line or the

historic spur identified on the DPR 523 form for Map Reference Number 2.

RESPONSE

a. The Department of Parks and Recreation (DPR) 523 form for Map Reference No. 2 (Southern Pacific Railway – McKittrick Branch) has been revised to document the segment of the railroad within the current project area of analysis (PAA). Additionally, the form has been revised to include a revised sketch map, cross section, and photographs of the existing conditions of the resources within the current PAA. Furthermore, the evaluation has been updated, where necessary, to address the specific segment of railroad within the PAA. The revised DPR 523 form is included as Attachment A181-1.

b. As described in *Applicant's Objections and Requests for Additional Time to Respond to California Energy Commission Staff Data Requests Set 3*, docketed on November 20, 2012, the Applicant objects to this Data Request.

ATTACHMENT A181-1
REVISED DPR 523 FORM FOR MAP REFERENCE NO. 2 (SOUTHERN PACIFIC RAILWAY – MCKITTRICK BRANCH)

State of California – The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary # _____
HRI # _____
Trinomial _____
NRHP Status Code 6Z
Other Listings _____
Review Code _____ Reviewer _____ Date _____

***Resource Name or #** (Assigned by recorder) Map Reference No. 2

P1. Other Identifier: Southern Pacific McKittrick (Asphalto) Branch

***P2. Location:** ☐ **Not for Publication** ☒ **Unrestricted** ***a. County** Kern

and (P2b and P2c or P2d. Attach a Location Map as necessary.)

***b. USGS 7.5' Quad** Buttonwillow, CA **Date** 1954 photorevised 1973 **T**___; **R** ___; __ ¼ **of Sec** ___; _____ **B.M.**

c. Address Highway 58 Buttonwillow City Buttonwillow Zip 93206

d. UTM: (give more than one for large and/or linear resources) Zone _____; _____mE/ _____mN

e. Other Locational Data: (e.g., parcel #, directions to resource, elevation, etc., as appropriate)

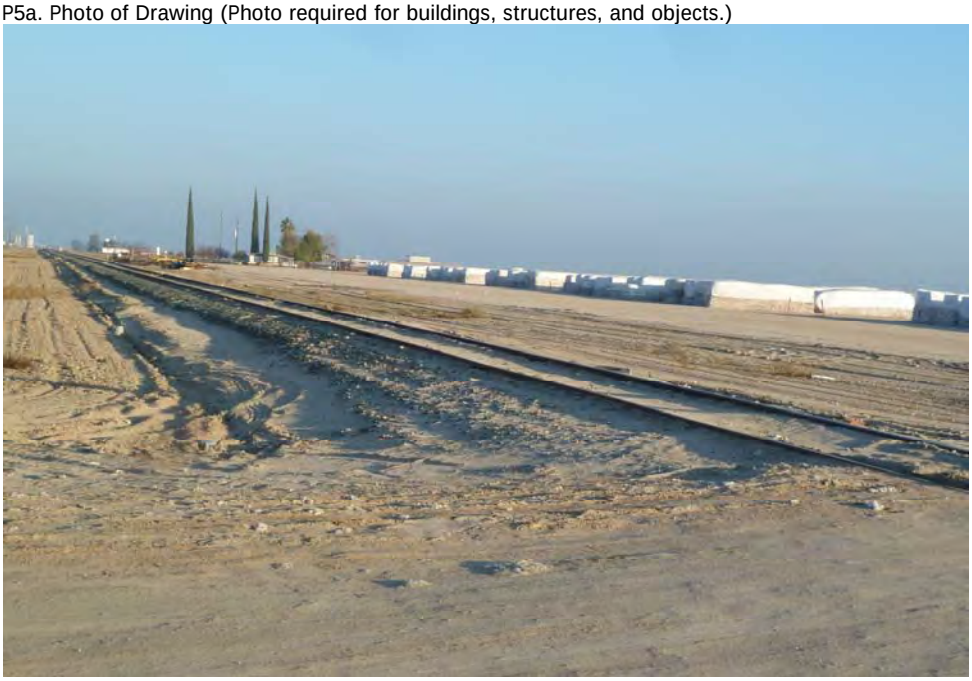
***P3a. Description:** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)

This form records a 1.3-mile segment of the McKittrick branch of the Southern Pacific Railway located approximately 0.8 miles west of Interstate 5 and 1.25 miles east to Buttonwillow. The branch line originally connected Bakersfield with McKittrick to the west. The line from Buttonwillow to McKittrick has been demolished. The portion of the Southern Pacific McKittrick spur that parallels the south side of Highway 58 consists of light weight rails with rock ballast and wood ties. The tracks become raised heading west into Buttonwillow. The rails are connected with bolted plates. Within this single-tracked segment only one automated crossing gate is found at Old Tracy Avenue. Two modern siding are located just east of Old Tracy Avenue.

***P3b. Resource Attributes:** (List attributes and codes) (HP11) Engineering Structure

***P4. Resources Present:** ☒ Structure ☐ Building ☐ Object ☐ Site ☐ District ☐ Element of District ☐ Other (Isolates, etc.)

P5a. Photo of Drawing (Photo required for buildings, structures, and objects.)



P5b. Description of Photo: Photograph 1: Railroad branch at Tracy Lane, camera facing east.

***P6. Date Constructed/Age and Sources:**
☒ Historic ☐ Prehistoric ☐ Both
1893

***P7. Owner and Address:**
San Joaquin Valley Railroad
221 North F Street
Exeter, CA 93221

***P8. Recorded by:**
Toni Webb
JRP Historical Consulting, LLC
2850 Spafford Street
Davis, CA 95618

***P9. Date Recorded:** December 2012

***P10. Survey Type:** (Describe) Intensive

***P11. Report Citation:** (Cite survey report and other sources, or enter "none.") JRP Historical Consulting, LLC, " Historic Architecture Technical Report: Inventory and Evaluation Report, Hydrogen Energy California (HECA) Project," 2012.

***Attachments:** ☐ None ☐ Location Map ☒ Sketch Map ☐ Continuation Sheet ☒ Building, Structure, and Object Record ☐ Archaeological Record
☐ District Record ☒ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record ☐ Artifact Record ☐ Photograph Record
☐ Other (list) _____

***NRHP Status Code** 6Z
***Resource Name or #** Map Reference No. 2

B1. Historic Name: Southern Pacific Asphalto Branch
B2. Common Name: Southern Pacific McKittrick Branch
B3. Original Use: Industrial B4. Present Use: Industrial
***B5. Architectural Style:** Utilitarian
***B6. Construction History:** Constructed 1893; line shortened 1982; tie replacement and reballasting 1990-1991
***B7. Moved?** ☒ **No** ☐ **Yes** ☐ **Unknown** **Date:** _____ **Original Location:** _____
***B8. Related Features:** crossing gates, spurs, sidings, bridges.
B9. Architect: Unknown b. Builder: Unknown
***B10. Significance: Theme** n/a **Area** n/a
Period of Significance n/a **Property Type** n/a **Applicable Criteria** n/a
(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)

The 1.3-mile segment of the Southern Pacific McKittrick Branch (previously the Southern Pacific Asphalto Branch) documented on this form does not appear to meet the criteria for listing in the National Register of Historic Places (NRHP) or the California Register of Historical Resources (CRHR) because it does not have historical significance or integrity. The branch line does not have significant associations with the development of petroleum production in the fields surrounding McKittrick (NRHP Criterion A or CRHR Criterion 1). While Southern Pacific constructed the branch in cooperation with Solomon Jewett and Hugh Blogget who began the asphalt industry in the area, production had begun before the railroad agreement. The branch line is not associated with a significant individual (NRHP Criterion B or CRHR Criterion 2), nor does it embody distinctive architectural characteristics of a period, type, or method of construction (NRHP Criterion C or CRHR Criterion 3). In rare instances, these types of resources can serve as sources of important information about historic construction materials or technologies (NRHP Criterion D or CRHR Criterion 4); however, this resource does not appear to be a principal source of important information in this regard. In addition to a lack of historic significance, the resource lacks historic integrity to 1893, its original date of construction and possible period of significance. This property has been evaluated in accordance with Section 15064.5(a)(2)-(3) of the CEQA Guidelines, using the criteria outlined in Section 5024.1 of the California Public Resources Code, and does not appear to be a historical resource for the purposes of CEQA.

The area around McKittrick and Asphalto was the scene of some of the original asphalt and petroleum discoveries in Kern County, being first discovered in 1863. Commercial development was first attempted in 1889, when influential Kern County residents Solomon Jewett and Hugh Blodget, and a group of other speculators, acquired 2,000 acres in the area and began explorations through their company, Standard Asphalt. They built an asphalt refinery at Asphalto, and produced and shipped refined asphalt for paving streets. In 1891 Blodget and Jewett had begun (See Continuation Sheet)

B11. Additional Resource Attributes:
***B12. References:** JRP Historical Consulting Services, "Historic Architectural Survey Report, Tier 1, for Route Adoption on Route 58, Between I-5 and State Route 99 in Kern County," 1995; John Bergman, *The History of the Sunset Railway, Including the McKittrick Branch of the Southern Pacific Company*. Bakersfield, California: Kern County Historical Society, 1994; Richard Harold Smith, "Towns Along the Tracks: Railroad Strategy and Town Promotion in the San Joaquin Valley, California" PhD, University of California Los Angeles, 1976.

B13. Remarks:
***B14. Evaluator:** Cheryl Brookshear/Toni Webb
***Date of Evaluation:** December 2012

(This space reserved for official comments.)

(Sketch Map with north arrow required.)

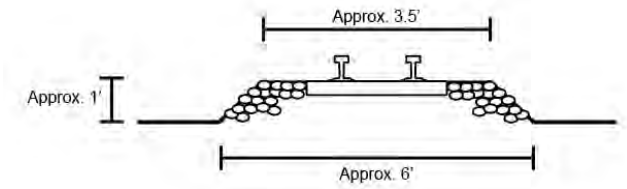
See Continuation Sheet

L1. Historic and/or Common Name: Southern Pacific Asphalto Branch/ Southern Pacific McKittrick Branch
L2a. Portion Described: ☐ Entire Resource ☐ Segment ☒ Point Observation **Designation:** SP-1
b. Location of point or segment: Intersection of the McKittrick Branch and Tracy Lane.

L3. Description: (Describe construction details, materials, and artifacts found at this segment/point. Provide plans/sections as appropriate.)
The point consists of east-west tracks of light weight rails on crushed-rock ballast and wooden ties. The rails are connected with bolted plates. No date stamps were observed. Ballast lifts the tracks approximately one foot above the surrounding grade.

L4. Dimensions:
a. Top Width: approximately 3½ feet
b. Bottom Width: approximately 6 feet
c. Height or Depth: approximately 1 feet
d. Length of Segment:

L4e. Sketch of Cross-Section (include scale) **Facing:** West



Not to scale

L5. Associated Resources: Grade crossing for Tracy Lane.

L6. Setting: The tracks parallel State Route 58 (McKittrick Highway) and are bordered to south by agricultural fields.

L7. Integrity Considerations: Records indicate that the branch was updated in 1990-91. No date stamps were visible at this location.

L8b. Description of Photo, Map, or Drawing RView of branch line at Tracy Lane, camera facing west.

L8a. Photograph, Map or Drawing

L9. Remarks:

L10. Form Prepared by:
C. Brookshear/T. Webb
JRP Historical Consulting, LLC
2850 Spafford Street
Davis, CA 95618

L11. Date: December 2012

B10. Significance (continued):

mining and refining asphalt at Sunset, located in the Sunset Oil Field southeast of McKittrick. Their product was originally hauled by wagon to Bakersfield for shipment east; this proved costly and the two began negotiations with the Southern Pacific to build a railroad to Asphalto, and later, to the Sunset fields. The railroad agreed to this arrangement, and soon thereafter altered it to build to Asphalto first, holding the Sunset line in abeyance until sufficient traffic made the line more attractive economically.[1]

The Southern Pacific constructed the line in 1892-1893, reaching the existing settlement of Asphalto (located 1.3 miles east of McKittrick) in September 1892 and McKittrick in February 1893 after approximately one year of construction. The company continued the line to McKittrick, where it owned land, instead of Asphalto where it could not obtain title to land for a station. As a part of the agreement with Jewett and Blodget, the railroad company became a partner in Standard Asphalt; and in the panic of 1893 it obtained full control of the company. The line was extended to Olig in February 1901, and the line began shipping materials and people to the developing McKittrick oil fields, while shipping out oil to market. The line used 50 lb. rails laid on 2,600 ties to the mile. Fourteen stations or sidings existed on the line in the 1920s, including Stevens, Strand, Rio Bravo, Bowerbank, and Buttonwillow. Besides shipping oil and asphalt, the line, with its stations and sidings, also provided local farmers with ready access to the railroad mainlines for their produce.[2] Of these, only the site of the Buttonwillow station is within the recorded segment.

The Southern Pacific cut the line at Buttonwillow in 1960. In 1982 a Caltrans railroad map showed that the line was still in the hands of the Southern Pacific, but that it no longer extended beyond Buttonwillow. The line underwent substantial rehabilitation in 1990-91, at which time most ties were mechanically replaced and the line reballasted. The line is currently used primarily to carry corn and oil to a food processing plant near Buttonwillow, and to carry general freight from that town to the main line at Bakersfield.[3] The branch is one of several branches in the San Joaquin Valley owned and operated by the San Joaquin Valley Railroad.

Evaluation

Under NRHP Criterion A or CRHR Criterion 1, this segment of the McKitrrick Branch is not significant for its association with the development of the petroleum industry and McKittrick (formerly Asphalto). Asphalto and the infant petroleum industry in the area was established before the railroad was constructed. While the railroad provided improved transportation, its role was that of necessary infrastructure than a motive cause of development. Under NRHP Criterion B or CRHR Criterion 2, this railroad segment is not associated with any historically significant people. While Solomon Jewett and Hugh Blodget did arrange the deal with Southern Pacific, they do not appear to be involved with the railroad in any other manner. The railroad was a side activity to their other business ventures and is not a good illustrative example of their achievements. Under NRHP Criterion C or CRHR Criterion 3, the railroad segment does not possess any distinctive characteristics or high artistic value that would render it eligible under these criteria. It is built according to standard design and practice of the time and has been altered in such a manner that it lacks integrity.

Like machines with moving parts, actively used railroads are constantly being repaired and defective or worn-out pieces replaced. The result of the years of operation and maintenance is that only the remaining resource that dates to the period of significance is the right-of-way itself; even embankments have been raised or ballasted as changing conditions demand. Within the study area, the ties, spikes, and gravel ballasting on the main lines are of relatively recent origin and do not relate to the period of significance.

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[1] John F. Bergman, *The History of the Sunset Railway, Including the McKittrick Branch of the Southern Pacific Company*. (Bakersfield: Kern County Historical Society, 1994), 3-11; Lewis E. Aubury, *Production and Use of Petroleum in California*. California State Mining Bureau Bulletin No. 32. (Sacramento: State Printing Office, 1904. 41; William Rintoul, *Spudding In: Recollections of Pioneer Days in the California Oil Fields* (San Francisco: California Historical Society, 1976), 7.

[2] Bergman, *The History of the Sunset Railway*, 1994, 6-11, 13.

[3] Southern Pacific Railroad Company, *Southern Pacific Railroad, Bakersfield to Olig, First Section, Kern County, California.* August 1913. California State Archives Railroad Alignment Maps, 102-11; USGS "Rio Bravo Quadrangle" 1954; field observations; Bergman, *The History of the Sunset Railway*, 1994, 10; Caltrans, *California State Railroad Map.* (Sacramento: Caltrans, 1982).

The segment lacks integrity because it is no longer complete and has undergone a series of rehabilitations. Originally built with 50 lb. rails, the currently installed rails are 80 lbs. The line now ends at the western margin of Buttonwillow. Beyond this point the entire line -- rails, ties, and embankment -- has been removed and local farmers have reduced the embankment to grade. Portions of the old right of way exist between Buttonwillow and McKittrick as oil field roads; the Buttonwillow depot has been demolished. This means that the overall line is now only about two-thirds its original length. Furthermore, it was substantially rebuilt in 1990-91, when the majority of the ties were replaced. The line was also reballasted at this time. In addition, most of the important stations -- Rio Bravo, Buttonwillow, McKittrick -- no longer exist. Finally, the industry in McKittrick that originally generated construction of the line -- the asphalt mine and plant -- no longer exists, the landscape of McKittrick dominated by oil wells and related development.[4]

Sketch Map:

[4] Interview with Donald Holt, June 7, 1995; field observations.

DATA REQUEST

A183. Map Reference Number 10: Old Headquarters Weir.

The Old Headquarters Weir appears to have experienced significant changes to the structure since the photographs were taken in 2009 and the resource evaluated on the DPR 523 form submitted with the application. In light of those changes, address the following potential integrity issues:

a. Please confirm that the steel walkway shown in photograph 2 on the DPR 523 form is no longer extant.

b. Assess the additional layer of concrete visible on the top of the benchwalls where the walkway was located prior to removal and determine its age and whether it was an addition to support the non-original wooden or steel walkways that were added later to the structure.

c. Determine whether these changes to the Old Headquarters Weir affect the integrity of the resource and its eligibility for listing on the California Register of Historical Resources (CRHR). Provide current photographs documenting the existing condition of the weir on the DPR 523 form.

RESPONSE

The DPR 523 form for Map Reference No. 10 (Old Headquarters Weir) has been revised to document the existing conditions of this resource. Photographs and text have been updated to document alterations to the weir, including the removal of the steel walkway on the structure's west side. Although the California Energy Commission (CEC) notes that the weir appears to have been heavily altered since the original field survey in 2009, the only visible alteration since that time was the removal of a walkway. The evaluation of the weir has also been revised to address any change to integrity and eligibility for the California Register of Historical Resources as a result of the known alterations to the resource since 2009. The revised DPR 523 form is included as Attachment A183-1.

ATTACHMENT A183-1
REVISED DPR 523 FORM FOR MAP REFERENCE NO. 10 (OLD HEADQUARTERS WEIR)

State of California – The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary # _____
HRI # _____
Trinomial _____
NRHP Status Code 3S
Other Listings _____
Review Code _____ Reviewer _____ Date _____

***Resource Name or #** Map Reference No. 10

P1. Other Identifier: Old Headquarters Weir

***P2. Location:** ☐ **Not for Publication** ☒ **Unrestricted** ***a. County** Kern

and (P2b and P2c or P2d. Attach a Location Map as necessary.)

***b. USGS 7.5' Quad** East Elk Hills, CA **Date** 1954 (revised 1973) **T** 30S; **R** 24E; NW ¼ **of Sec** 15; MD **B.M.**

c. Address: d. UTM: (give more than one for large and/or linear resources) Zone _____; _____mE/ _____mN

e. Other Locational Data: (e.g., parcel #, directions to resource, elevation, etc., as appropriate)

Approximately 7 miles southeast of Buttonwillow; southwest of intersection of Tupman Rd. and Adohr Rd.

***P3a. Description:** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)

This structure, both weir and bridge, crosses the Kern Valley Water Company Canal at the point where that canal historically began and Outlet Canal ended. Designed by consulting engineers Leonard & Day, it was constructed in 1911 entirely of reinforced concrete. The structure has a flat deck, 163 feet in length and 19 feet across. Thirteen evenly spaced solid benchwalls separate 14 seven-foot wide bays. Each bay has a set of horizontal steel beams for operation of flashboards. Low walls approximately two feet high line each side of the roadway crossing the structure. A modern metal walkway was installed in the mid-1980s on the west side of the structure but was removed (likely pilfered for scrap metal) around 2010. Concrete patches are visible where the walkway was attached to the top of the bench walls. In numerous places the concrete has spalled revealing the rebar within (see Photographs 10, 11). Exposed twisted steel rebar runs the length of the side walls, and notched rebar protrudes vertically near the roadway entrance on the north side. The spalling also reveals different concrete compositions on different parts of the structure. The façade is finished with a smoother finish coat than the layer beneath.

***P3b. Resource Attributes:** (List attributes and codes) (HP19) Bridge; (HP11) Engineering Structure

***P4. Resources Present:** ☒ Structure ☐ Building ☐ Object ☐ Site ☐ District ☐ Element of District ☐ Other (Isolates, etc.)

P5a. Photo of Drawing (Photo required for buildings, structures, and objects.)

P5b. Description of Photo: Photograph 1: Old Headquarters Weir, camera facing west.

***P6. Date Constructed/Age and Sources:**
☒ Historic ☐ Prehistoric ☐ Both
1911, "The Concrete Bridge," Leonard & Day, 1913.

***P7. Owner and Address:**
Buena Vista Water Storage District
525 North Main Street
Buttonwillow, CA 93206

***P8. Recorded by:**
Rand Herbert/Heather Norby/Toni Webb, JRP Historical Consulting, LLC, 2850 Spafford Street, Davis, CA 95618

***P9. Date Recorded:** December 2012/February 2009

***P10. Survey Type:** Intensive

***P11. Report Citation:** (Cite survey report and other sources, or enter "none.") JRP Historical Consulting, LLC," Historic Architecture Technical Report: Inventory and Evaluation Report, Hydrogen Energy California (HECA) Project," 2012.

***Attachments:** ☐ None ☐ Location Map ☐ Sketch Map ☐ Continuation Sheet ☒ Building, Structure, and Object Record ☐ Archaeological Record ☐ District Record ☐ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record ☐ Artifact Record ☐ Photograph Record ☐ Other (list) _____

B1. Historic Name: Old Headquarters Weir
B2. Common Name: Old Concrete Weir
B3. Original Use: Weir/Bridge B4. Present Use: Bridge
***B5. Architectural Style:** Utilitarian
***B6. Construction History:** 1911; addition of sidewalls at roadway, 1941; replacement walkway added to north side in mid-1980s but removed around 2010
***B7. Moved?** ☒ **No** ☐ **Yes** ☐ **Unknown** **Date:** _____ **Original Location:** _____
***B8. Related Features:** Kern Valley Water Company Canal, also known as the flood channel
B9. Architect: Leonard & Day b. Builder: unknown
***B10. Significance: Theme** Engineering **Area** Kern County
Period of Significance 1911 **Property Type** Bridge/Weir **Applicable Criteria** C/3
(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)

Old Headquarters Weir appears to meet the criteria for listing in the California Register of Historical Resources (CRHR) and the National Register of Historic Places (NRHP). This property has been evaluated in accordance with Section 15064.5(a)(2)-(3) of the CEQA Guidelines, using the criteria outlined in Section 5024.1 of the California Public Resources Code, and does appears to be a historical resource for the purposes of CEQA.

Old Headquarters Weir was constructed across the Kern Valley Water Company's Canal in 1911 on Miller & Lux's Buttonwillow Ranch to replace an existing timber weir. Designed by Leonard & Day, consulting engineers from San Francisco, the weir represents an early work in the career of a master engineer as well as an early example of the use of reinforced concrete in weir/bridge construction. The following overview provides an historic context for the Kern Valley Water Company Canal across which the structure is located, as well as context for the structure's orientation in the history of the use of reinforced concrete in bridge and weir construction.

Early History of the Buena Vista Slough

In 1851 the Yokuts along with several other San Joaquin Valley tribes, relinquished their land in the southern Central Valley, opening it to settlement under federal land law. These laws fundamentally shaped the early history of Kern County. The area located along the Buena Vista Slough, where Old Headquarters Weir is located, and the marshy area connecting Buena Vista Lake and Tulare Lake was sold under the Arkansas Act of September 28, 1850, whereby congress ceded to certain states the swamp and overflowed lands on the federal public domain within their borders. The state was then to use the proceeds from the sale of such lands to reclaim them, thereby making them useful to the new (See Continuation Sheet.)

B11. Additional Resource Attributes: (List attributes and codes) ____

***B12. References:** Margaret Aseman Cooper [Zonlight], *Land, Water and Settlement in Kern County, California, 1850-1890* (New York: Arno Press, 1979); Robert Kelley, *Battling the Inland Sea* (Berkeley, California: University of California Press, 1989); Mary Catherine Miller , *Law and Entrepreneurship in California: Miller and Lux and California Water Law, 1879-1928*, 1982*;* USGS, *Water Supply and Irrigation Papers, No. 17*, 1898; John W. Snyder, "Buildings and Bridges for the 20th Century," *California History* (Fall 1984); John W. Snyder, "The Bridges of John B. Leonard, 1905 to 1925," *Concrete International* (June 1984); John Snyder and Steve Mikesell, "The Consulting Engineer and Early Concrete Bridges in California," *Concrete International* (May 1994); B. A. Etcheverry, "Irrigation Practice and Engineering: Irrigation Structures and Distribution System," v. 3 (New York: McGraw-Hill), 1916; John B. Leonard and William P. Day, "The Concrete Bridge: How it has Proved itself in California," (San Francisco: Leonard & Day, 1913); David Hampton, Buena Vista Water Storage District, personal communication with Toni Webb, JRP Historical Consulting, LLC, December 11, 2012.

B13. Remarks:
***B14. Evaluator:** Heather Norby/Toni Webb
***Date of Evaluation:** December 2012
(This space reserved for official comments.)

B10. Significance (continued):

landowners. The land act was subject to abuse and fraud. The seasonal nature of swamp land in California led to disagreements between state and federal surveyors regarding boundaries. In some instances parcels sold as dry by the federal government were also sold by the state as swamp and overflowed. In the end the state made its own surveys, and on December 5, 1871, the secretary of the interior accepted the state's boundaries.

The state also struggled to find a means of reclaiming the swamp lands. The Green Act of 1855 placed settler's payments into an earmarked fund. When the settler could prove that the land was 'reclaimed,' usually by affidavit, they were given a cash credit, about $1 an acre - the purchase price. The Green Act also removed limits on acreage, allowing the assembly of large tracts. After 1868 the counties boards of supervisors served as reclamation commissioners. The purchase price ($1.00 per acre) was paid into the county's swampland fund, but the county swampland commissioners could waive payment if independent commissioners attested that the land had been reclaimed and cultivated for three years.[1] Upon the selection of a parcel a settler received a certificate denoting their claim; a certificate of purchase upon partial payment; and a state patent for the lands followed upon completion of payments and reclamation. It was under these provisions that Henry Miller, Charles Lux, John Redington, Horatio Stebbins, F.A. Tracy, H.L. Bonestell, and Horatio Livermore amassed their acreage on the lower Kern River west of Bakersfield. They acquired swampland certificates of purchase from would-be settlers or from local agents like Julius Chester, Duncan Beaumont, Richard Stretch and Thomas Baker, whose earliest claims were made in the area dated to January 28, 1870.[2] In this manner Miller and Lux, secured their "Southern Division" in Kern and Kings Counties.

Kern Valley Water Company Canal in the Miller & Lux Era

The partnership between Henry Miller and Charles Lux, both German immigrants, began in San Francisco where they both worked as butchers in the early 1850s. They cemented their business partnership in 1858 when they joined forces to purchase a herd of Texas cattle. From that time on they bought western lands ranches for their increasing herds.[3] After acquiring their Southern Division, they organized it into ranches, the largest being Buttonwillow Ranch, which served as headquarters ranch of that division. Originally, the headquarters complex that became known as "Old Headquarters" lay in the south at the base of Tupman Road. It moved to Buttonwillow in 1885. Buttonwillow Ranch consisted of 52,440 acres and the weir and canal lies within its former limits. The area operated under this single ownership from the 1870s until 1927, when Miller and Lux Incorporated started selling the land.[4]

The system of drainage, irrigation, flood control canals, and water control structures built by Miller and Lux has left an enduring legacy in the area. While some of their southern lands could immediately accommodate their herds of cattle, other areas required labor and capital, primarily to construct water control features. Construction of the drainage and irrigation canals was critical to their reclamation efforts for their newly acquired swampland along Buena Vista Slough. If the waters of the Kern River could be diverted away from the slough, the swamp could be dried and then cultivated. Under the Arkansas Act, Buena Vista Slough was to be reclaimed as a part of the purchase agreement. In accordance with Assembly Bill 54 of 1861, Swampland District 121 was formed in May 1871, taking in swamplands along Buena Vista Slough. Miller & Lux, along with a few others who had pastured their cattle in the slough, organized the Kern Valley Water Company in 1876. The water company acted as agents for the district. The principal works of the company were canals for irrigation

[1] The Arkansas Act's early history and administration in California is summarized in John Thompson, "The Settlement Geography of the Sacramento - San Joaquin Delta, California." Ph D Diss., Stanford University, 1958. Chapter 8, 185-207.

[2] Margaret Aseman Cooper [Zonlight], Land, Water and Settlement in Kern County, California, 1850-1890. New York: Arno Press 1979.

[3] David Igler, *Industrial Cowboys; Miller & Lux and the Transformation of the Far West 1850-1920*, Berkeley: University of California Press, 2001, 7.

[4] Settlers claiming tracts on dry lands nearer to Bakersfield resorted to other federal land patenting laws to obtain their lands. These included homestead entries, Desert Land Act filings, cash entries, and purchases from the Southern Pacific Railroad, which received patent to odd-number sections along its right of way through the San Joaquin in a strip extending ten miles on either side of the line in Kern County in April of 1876. Haggin acquired substantial acreage from the railroad, and through allies amassed a large quantity of public lands through homestead, cash entry, and Desert Land Act filings; Thomas H. Means, "Report on Farming Lands Miller & Lux, Inc. Southern Division Kern and Kings Counties California," (unpublished manuscript, Water Resources Center Archives, University of California Berkeley, Berkeley, October 1919), 8.

and for reclamation that became known as the Kern Valley Water Company's Canal (KVWCC). After the Kern Valley Water Company was organized for the reclamation of Buena Vista Slough, S. W. Wible was put in charge as engineer. The massive size of his canal was intended to drain the water of the Kern River from the slough, and also feed irrigation laterals. Canal construction began along the west side of the slough in 1877 with fifty-horse teams pulling one-ton "Fresno Scrapers" excavating the bed and building up levees of what became known as the Kern Valley Water Company's Canal. When finished, it extended 26 miles northwesterly up the slough from Old Headquarters, had a top width of 250 feet, bottom width of 125 feet, and was seven feet deep. It was a massive project that required a significant labor force. Fortunately for the company, recently laid off Southern Pacific laborers were available to do the job.[5]

A series of four timber weirs built on the KVWCC regulated the flow of water. Denominated Weir 1 through 4, and approximately four miles apart, each weir could be closed, forming a reservoir behind it whose water could then be channeled into canals for distribution. The weirs also functioned to slow the flow of water down the canal as it proceeded northwesterly up the slough. In the early years of the canal, flood waters from the Kern River posed a constant threat to the canal's water control features. In 1878, within three months of the canal's completion, water split its headgates. An 1898 map indicates four weirs along the canal, however, a U. S. Geological Survey report of that year stated that three of the four weirs were washed out, leaving only one intact.[6]

Faced with constant repairs and expense, by the early years of the 20th century Miller & Lux made the decision to invest in only one of the weirs, that located nearest their old headquarters, denominated Weir No. 1. Originally, the KVWC Canal was meant to serve as a flood and distribution canal. After they built the West Side Canal as a distribution canal parallel to the KVWC Canal, it lost its distribution function. This meant that Weirs 2, 3, and 4 were no longer needed in order to form reservoirs. Weir No. 1, however, was crucial for diverting water into both the East Side and West Side canals.

In order to combat the costly and time consuming repairs to the timber weir, Miller & Lux commissioned consulting engineers, Leonard & Day to design a reinforced concrete structure to serve as both weir and bridge over their massive flood control canal. The resulting structure became known as Old Headquarters Weir, built in 1911, was a flat span bridge and weir combination. It spanned 163 feet, was nineteen feet from bottom to bridge slab and had a thirteen foot roadway across. A series of simple columns spanned each side of the roadway serving as ornamentation and connectors for a rope guard rail.

Reinforced concrete construction: Leonard & Day

At the turn of the century, the use of reinforced concrete construction was an emerging technology, still viewed with skepticism by many in terms of structural integrity and cost efficiency. Contrary to the general belief that architectural advances spread from east to west in the United States, San Francisco was the center of this particular innovation. This may be partially attributed to the frustrations faced by construction delays in the west resulting from delayed shipments of steel from the east. Furthermore, engineers working out of San Francisco received increased interest after investigations following the Earthquake of 1906 showed that concrete construction withstood fire well.[7] As for cost, marketing combined with performance sold buyers on the investment in new materials.

Early San Francisco pioneers using reinforced concrete included Peter H. Jackson, who began using the technology for sidewalks in 1877, and the collaboration of Ernest L. Ransome and George W. Percy. In the 1880s Ransome and Percy engineered a series of buildings that made use of reinforced concrete in the floors, walls, roofs, or combinations thereof. In 1889 Ransome designed the Alvord Lake Bridge in San Francisco's Golden Gate Park, the first concrete bridge built in the United States with steel rebar reinforcement. Ransome left San Francisco in the mid-1890s for Chicago, after which the

[5] Assembly Bill 54, "An Act to provide for the Reclamation and Segregation of Swamp and Overflowed, and Salt March and Tide Lands, donated to the State of California by Act of Congress" was passed on May 31, 1861 and crated a Board of Swamp Land Commissioners who in turn authorized the creation of Swampland Districts. The districts, geographically similar areas, then had the ability to levey taxes and fees to fund reclamation projects. Robert Kelley, *Battling the Inland Sea* (Berkeley, California: Univeristy of California Press, 1989) 42-48; Miller, Mary Catherine, *Law and Entrepreneurship in California: Miller and Lux and California Water Law, 1879-1928*, 39; United States Geological Survey, *Water Supply and Irrigation Papers, No. 17*, 1898, 61-63.

[6] Kern County Map, 1898; Igler, *Industrial Cowboys*, 99, 117; Grusky, WSP 17, 62.

[7] John W. Snyder, "Buildings and Bridges for the 20th Century," *California History* (Fall 1984), 280-292.

development of reinforced concrete slowed. From that point through 1905, concrete bridges constructed in California tended to be small, and many were concrete, but not reinforced. [8]

John B. Leonard's contributions to reinforced concrete technology fueled the next period of innovation. Already trained in engineering when he arrived in San Francisco in 1889, he began working for established firms as a draughtsman and civil engineer before opening his own office as a consulting engineer in 1904. Almost immediately he was recognized as a leading designer of reinforced concrete bridges. His first reinforced concrete bridge, the Truckee River Bridge in Reno on Virginia Street, won a competition in 1905. According to bridge historians John W. Snyder and Stephen Mikesell, the years from 1905 through 1913 represent Leonard's "early" period of work prior to his development of a bridge type known as canticrete.[9]

At the end of Leonard's early period of bridge design, he and his junior partner William P. Day published a book entitled *The Concrete Bridge: How it has Proved itself in California*. The slim volume included text explaining the benefits of using reinforced concrete, followed by photographs of twenty of their concrete bridges. In a pitch to sell the economy of concrete bridges over steel they wrote, "…county bridges will not last as long as railroad bridges, because the former are not given the same care as the latter. It may be seen, therefore, that steel bridges require maintenance, and that further, they have a limited existence. Concrete bridges require absolutely no maintenance, and the effect of age is to strengthen rather than weaken."[10] Even so, by 1913 they still had to convince their audience that the new technology was a worthwhile investment.

Reinforced concrete offered new possibilities in the design and construction of weirs and dams as well as bridges. Early small scale diversion weirs made of sand, gravel, cobblestone, loose rock, and brush provided an economical but temporary solution to water control. Easily washed out, these weirs required constant maintenance and rebuilding and were only suitable for simple irrigation systems. Where logs were readily available, weirs could also be constructed entirely of wood, however, the use of the raw material had a limiting effect on design and engineering. Often, log weirs were constructed at sites where transporting other materials was not a feasible option. In the early development of California mines, crib weirs made of log frames filled with rock were used extensively for water storage. These weirs could be constructed and maintained cheaply with local materials. Wooden frame open weirs were the preferred choice for diversion structures on many of San Joaquin Valley's rivers in the mid to late nineteenth and early twentieth centuries. These weirs could also be designed for more complex water control methods. They divided the waterway into panels or bays that accommodated removable horizontal flashboards to control water flow. Also low in cost to construct, the primary concern with these weirs was the periodic replacement necessary to their substructures. In the early twentieth century, masonry or concrete weirs offered the benefit of strength and durability but generally cost more to construct than other weirs, and larger scale weirs could be constructed of concrete or masonry compared with other available materials. At this time, numerous large concrete or masonry weirs were constructed. These included the Granite Reef diversion weir on the Salt River in Arizona, built in 1908 and 1,000 feet long, a 600-foot long weir on the Rio Grande in New Mexico, a 216-foot weir on Boise River in Idaho and a 500 foot long weir in Cache Creek in California.[11]

According to prominent California hydraulic engineer, B.A. Etcheverry, by 1916 the superior weight of gravity weirs compared to earlier methods, and the relatively recent use of reinforced concrete in construction meant that comparatively few reinforced concrete diversion weirs and dams had been built. Cost also presented an obstacle to the use of the new technology. Some of the earliest reinforced concrete diversion weirs were built by the federal Bureau of Reclamation. In 1908 they constructed the Corbett Diversion Dam, stretching 400 feet across the Shoshone River in Wyoming, and later the Three Mile Falls diversion weir stretching 820 feet across the Umatilla River in Oregon in 1913.

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[8] John W. Snyder, "The Bridges of John B. Leonard, 1905 to 1925," *Concrete International* (June 1984), 60; John Snyder and Steve Mikesell, "The Consulting Engineer and Early Concrete Bridges in California," *Concrete International* (May 1994), 38-44; Snyder, "Buildings and Bridges for the 20th Century" 1984.

[9] Snyder, "Buildings and Bridges for the 20th Century,", 60; Snyder and Mikesell, "The Consulting Engineer and Early Concrete Bridges in California," 38-44; Snyder, "Buildings and Bridges for the 20th Century."

[10] John B. Leonard and William P. Day, "The Concrete Bridge: How it has Proved itself in California," (San Francisco: Leonard & Day), 1913, 10.

[11] B. A. Etcheverry, "Irrigation Practice and Engineering: Irrigation Structures and Distribution System," v. 3 (New York: McGraw-Hill), 1916, 42-69.

Constructed in 1911, Old Headquarters Weir represents an early example of the use of reinforced concrete in weir construction. It is also one of only two known hybrid (bridge and water control feature) structures designed by Leonard & Day in the early period of their career, making it a rarity in the work of this master engineer. Leonard & Day used illustrations of the structure in their 1913 book to show potential clients of the economy of this construction method. The photograph captions stressed the economy of reinforced concrete over timber weir construction and demonstrated that private corporations like Miller & Lux, not just federal agencies like the Bureau of Reclamation, could afford the technology.

Old Headquarters Weir is significant as an early example of reinforced concrete weir construction. It is also a rarity in the early work of a master engineer, John B. Leonard, in that it is one of two known bridge/water control features engineered by him in this period, and it was commissioned by Miller & Lux during the early years of the development of the technology. In Leonard & Day's promotional book, the only two bridges illustrated that also served as water control features, the Temple Slough Weir/flume/bridge and the Old Headquarters Weir/bridge, had captions that stressed the economy of concrete over timber construction. Not surprisingly, these two early examples, both built in 1911, were commissioned by Miller & Lux Inc., which certainly had the capital necessary to invest in a cutting edge technology.

Old Headquarters Weir and the Buena Vista Water Storage District

When the Buena Vista Water Storage District acquired the Miller and Lux canal system in 1926, it acquired Old Headquarters Weir. When the district incorporated they made immediate plans to construct a new concrete weir at the end of the Outlet Canal at the East Side Canal intake. From that point, Old Headquarters Weir became locally known as the "Old Concrete Weir" and the new construction the "New Concrete Weir." The Old Concrete Weir continued to operate until flood waters seriously damaged it the 1940-41 season. In July of 1941, the Buena Vista Water Storage District constructed a temporary dam in the flood canal to dewater the weir and determine the necessary repairs. The district advertised in late August for bids for construction of a concrete apron, side walls, and related structures. Bidding opened on October 15, 1941 and the following day the district awarded a contract to Wonderly Construction Company to perform the work.[12] During the 1941 repairs, replacement of the simple columns with a low side wall had the greatest impact on the appearance of the structure. Oddly, when viewing the weir from the canal bank, the alteration did not produce the appearance of an addition of side walls, but rather, the removal of posts. The other alteration, construction of a concrete apron, changed the appearance of the western bank which had originally been retained by a timber apron (Photographs 4 and 9).

Although still owned by the Buena Vista Water Storage District, they no longer operate the weir. Its last use as a weir was in 1986.[13] The structure retains its function as a bridge, connecting two unpaved country roads.

Evaluation of Old Headquarters Weir

Old Headquarters Weir appears to meet the criteria for listing in the CRHR under Criterion 3 and the NRHP under Criterion C. The structure is significant as an early example of a new construction method and as a significant work of a master engineer, John B. Leonard. Although the structure's historic integrity has diminished because of alterations, it retains enough integrity to convey its significance as a significant example of an early reinforced concrete bridge and weir.

John Buck Leonard, senior partner of Leonard & Day in San Francisco, gained fame and notoriety as a pioneer in reinforced concrete construction techniques, and is also credited with conceiving and patenting the canticrete system. Leonard studied engineering at Michigan State College, Illinois University, and the University of Michigan, and in 1888 moved to Los Angeles where he began his career in the city's engineering department. He quickly relocated to San Francisco where, during the 1890s, he became involved with bridge building as a civil engineer for several private firms. In 1904 he opened his own consulting engineering firm and quickly established a reputation as the foremost designer of concrete and reinforced concrete bridges in California. His first commission, completed in 1905, was a closed spandrel concrete arch bridge across the Truckee River in Reno, Nevada. Other early commissions included the San Joaquin River Bridge at Pollasky (1905), the Dry Creek Bridge at Modesto (1905-06), and the Stanislaus Bridge at Ripon (1905-06), all concrete arch bridges that were

[12] Bancroft Library, Miller & Lux Collection, CG-163, Carton 318 Buena Vista Water Storage District, 1938-41, Concrete Weir Repairs.
[13] Email correspondence with David Hampton, Buena Vista Water Storage District, March 2009.

recognized for the length of their spans. He culminated this early phase of his career with one of his most bold designs, Fernbridge, a massive closed spandrel arch bridge over Eel River in Humboldt County consisting of seven 200 foot spans. This bridge remains the largest of its type ever built.[14] He did not limit his designs to arch spans however, and designed flat span bridges such as Old Headquarters Weir.

As a flat span bridge, Old Headquarters Weir was not as technically challenging for Leonard & Day to design as their arch span bridges. In their 1913 book they wrote, "Forms and temporary supports for flat span bridges offer no particular difficulty."[15] Although it may not have represented one of their most technically complicated designs, Old Headquarters Weir stands out as significant because it is a rare example of Leonard & Day designing a water control feature and bridge combination. They are known to have designed two bridge/water control feature combinations in their early period of design. Both were constructed in 1911 for Miller & Lux, and both still exist today. Temple Slough Weir in Merced County was designed as a bridge, weir, and flume although it was significantly smaller than Old Headquarters Weir, at 83.5 feet in length. No other combined bridge/water control structures are known to exist from this early period of Leonard & Day's career.

The structure has significance not just as an important work of a master engineer, but also as an early example of the use of a new construction method. In 1911, when Old Headquarters Weir was constructed it was on the forefront of the transition from the construction of timber, masonry, or plain concrete weirs to reinforced concrete weirs.

Old Headquarters Weir has maintained historic integrity of location, setting, feeling, and association. When constructed the setting of the weir/bridge was on a canal system that served an area used for irrigated agricultural, and that describes the setting today. The structure retains its historical feeling through continuity of setting and retention of materials and basic form. Its associations with the canal system remain evident since it still spans the large flood control channel over which it was built.

The structure lost some historic integrity of design during the repairs of 1940-1941, but not to the degree that it has lost its ability to convey its significance as an early example of a reinforced concrete bridge/water control feature. The addition of the side walls and elimination of the original columns altered the appearance of the structure, yet it maintains its basic form of a flat slab bridge with evenly spaced benchwalls beneath that accommodate flashboards for water control (Photographs 6 and 7). At some point the original concrete slab that functioned as a walkway on the west side was removed and replaced first with a wood walkway. In the mid-1980s BVWSD replaced the wood walkway with one constructed of metal, which was subsequently removed around 2010.[16] All that remains of that walkway is some repaired concrete (at the top of the benchwalls) and metal bolts with which the walkway was secured to the weir. Because the metal walkway was an alteration made after the period of significance, its removal does not diminish the integrity of the weir, nor does the concrete repair the top of the benchwalls, as these changes do not alter the basic form of the structure (Photographs 2 and 3). The alteration of the apron from timber to concrete in the 1941 renovation also does not alter the basic form of the structure, but rather changes the appearance of the banks of the canal adjacent to it.

Old Headquarters Weir has experienced a significant degree of deterioration of materials over the years. As Leonard & Day predicted, a bridge in this remote setting would not receive the maintenance attention other bridges might. At numerous points the concrete has spalled revealing the reinforcing steel bars beneath (Photographs 10 and 11). The deterioration of some of the outer layers of concrete also exposes the coarser concrete used beneath the smoother exterior concrete sheath (Photographs 6 and 8). This deterioration does not inhibit the structure from conveying its use as a bridge and a weir, nor does it change the fundamental appearance of the structure. The retention of materials and basic design illustrate the original workmanship of the structure. Workmanship was however modestly compromised when the original columns were removed.

[14] Stornetta Bridge DPR form.
[15] Leonard & Day, 1913, pg. 8.
[16] David Hampton, Buena Vista Water Storage District, personal communication with Toni Webb, JRP Historical Consulting, LLC, December 11, 2012.

The character-defining features of Old Headquarters Weir are its extant original components and design including the flat deck, thirteen benchwalls, fourteen bays, columns lining the roadway, roadway spanning the deck, and reinforced concrete construction. The modification made when the columns were removed, and sidewalls added is the only significant change to the basic character of the structure.

Old Headquarters Weir appears eligible under CRHR Criterion 3 (and NRHP Criterion C) at the local level as a significant example of the work of a master designer and as an early example of a new construction method applied to water structure/bridge building. The structure is important as a rare surviving example of Leonard & Day's design of a reinforced concrete bridge/water control structure combination. Old Headquarters Weir, built in 1911, represents an early example of the type, and is only one of two known to have been built in this period by Leonard & Day. The structure also stands as an early example of use of reinforced concrete in construction of weirs. Furthermore, the bridge appears to retain a sufficient degree of historic integrity and therefore retains the ability to convey its historic significance. Its character-defining features are its reinforced concrete benchwalls and flat slab roadway. Old Headquarters Weir appears to meet the criteria for listing in the National Register and California Register and would therefore qualify as a significant historic property under Section 106 and a historical resource for the purposes of CEQA.

Old Headquarters Weir does not appear eligible under CRHR Criteria 1, 2, or 4 (NRHR Criteria A, B, or D). The evaluation methodologies created and implemented for the recent Caltrans Historic Bridge Inventory Update studies are helpful tools in evaluating bridges. It states that bridges are considered potentially significant under CRHR Criterion 1 (NRHP Criterion A) if they "are importantly associated with trends and/or events in transportation development, regional or local economic development, community planning or military history."[17] The study also noted that by their very nature bridges, like other infrastructural elements, are inherently vital to the community development, and that they "considerably impact communication and the distribution or people, goods, and services that facilitate development on both the local and regional levels." Care must be taken, then, not to elevate the importance of these resources to an inappropriate level; otherwise, virtually any bridge would be considered historically significant. The study concluded:

> To be eligible for listing in the National Register [under Criterion A], resource types such as bridges and other infrastructure must have demonstrable importance directly related to important historic events and trends, with emphasis given to specific demand for such facilities and the effects the structure had on social, economic, commercial, and industrial developments locally, regionally, or nationally…In this analysis, for example, a bridge that is the first in its location would be inherently more significant than one that is the second or third constructed at that location.[18]

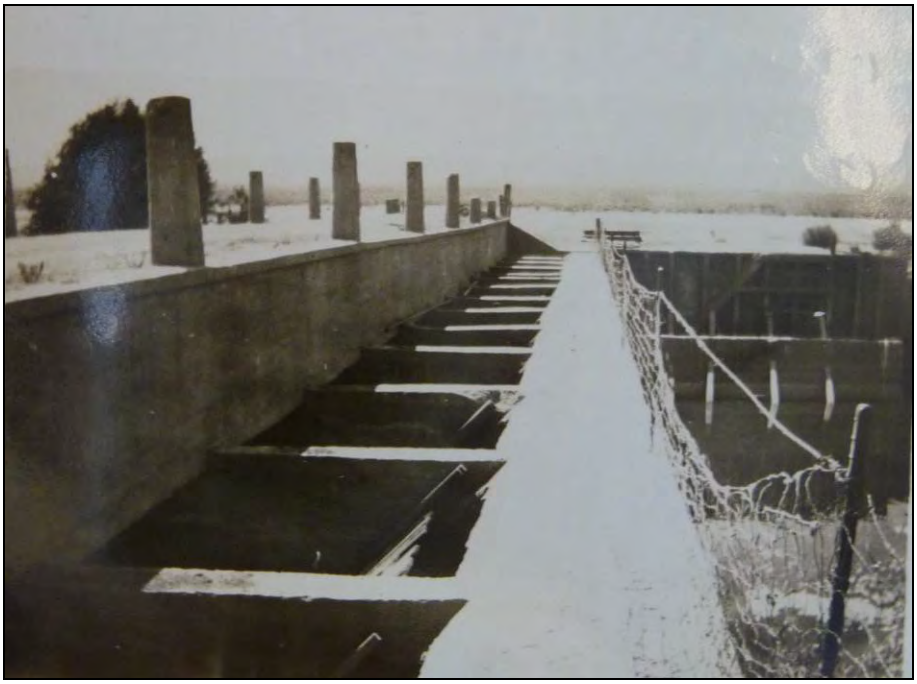
As discussed above in the historic context, Old Headquarters Weir was built to replace an existing timber weir whose maintenance had become too burdensome. Although Old Headquarters Weir was the first road bridge at this location it did not fundamentally change transportation in the area. It connected an unimproved dirt road on the southwest side of the canal to a more established road on the northeast side of the canal.[19] Its function as a bridge alone does not appear to represent a significant contribution to the transportation history of the area.

Under CRHR Criterion 2 (NRHP Criterion B), Old Headquarters Weir does not appear to be eligible for association with persons important in our history. It is not eligible for its association with Miller & Lux Inc., who commissioned the bridge. Although it is the only structure remaining from their Old Headquarters, it alone does not convey the significance of a ranch headquarters. In rare instances, buildings and structures themselves can serve as sources of important information about historic construction materials or technologies under CRHR Criterion 4 (NRHP Criterion D); however, reinforced concrete bridge technology is well documented in published and photographic sources. Therefore, Old Headquarters Weir does not appear to be a principle source of important information in this regard.

[17] JRP Historical Consulting, LLC, "Historic Context Statement, Roadway Bridges in California: 1936 to 1959," prepared for State of California, Department of Transportation, Environmental Program, January 2003, 68.
[18] JRP, "Historic Context Statement, Roadway Bridges in California," 68.
[19] USGS Quadrangle, East Elk Hills, 1932.

Photographs (cont):

Photograph 2: East side of Weir, showing location of former walkways, camera facing south.



Photograph 3: Historic photograph taken in 1919 showing east side of weir and its original walkway, camera facing south[20]

[20] Means, "Report on Farming Lands Miller & Lux, Inc. Southern Division Kern and Kings Counties California."

Photographs (cont):

Photograph 4: West side of weir, camera facing south.

Photograph 5: Historic photograph taken in 1919, camera facing east.[21]

[21] Means, "Report on Farming Lands Miller & Lux, Inc. Southern Division Kern and Kings Counties California."

Photographs (cont):

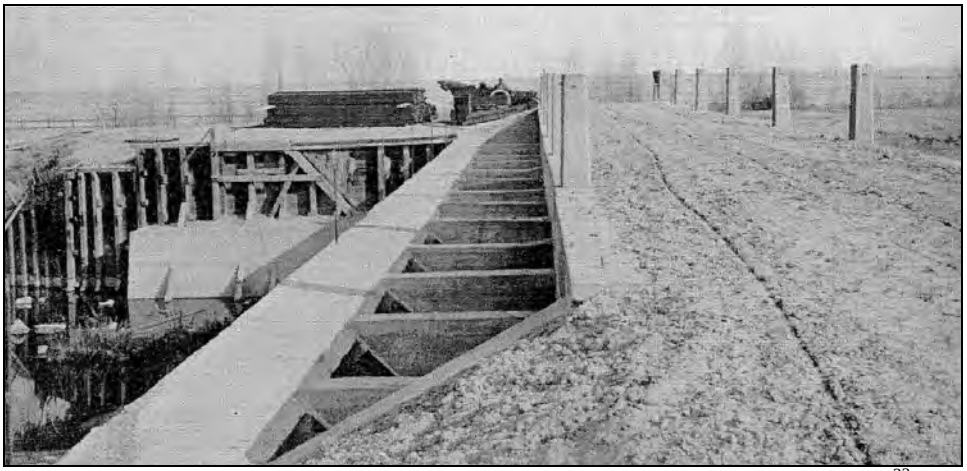
Photograph 6: East side of weir, camera facing northwest.

Photograph 7: Historic 1913 photograph of east side of weir, camera facing northwest.[22]

[22] Leonard and Day, "The Concrete Bridge: How it has Proved itself in California."

Photographs (cont):

Photograph 8: Deck/top of weir, camera facing north.



Photograph 9: Historic 1913 photograph of top of weir, camera facing north.[23]

[23] Leonard and Day, "The Concrete Bridge: How it has Proved itself in California."

Photographs (cont):

Photograph 10: 2009 view of exposed notched rebar.

Photograph 11: 2009 view of exposed twisted rebar.

DATA REQUEST

A184. Map Reference Number 11: California Aqueduct.

a. The location of photograph (dated 7/26/06) provided on the DPR 523 form map on page 2 of 4, appears to be taken in the vicinity of the Delta Mendota Canal in Tracy, CA, nearly 200 miles north of the project. As the photo location is outside the current PAA, provide a current photo of the portion of the aqueduct within the PAA and a map identifying its location. Staff suggests a photo location of the aqueduct near the Old Headquarters Weir.

RESPONSE

A DPR 523 form update sheet for Map Reference No. 11 (California Aqueduct) has been provided, which includes a current photograph and site map of the aqueduct at Tupman Road (outside the current PAA), as agreed to by the CEC in a teleconference on December 3, 2012. This new update sheet, and the original 2007 DPR form, are included as Attachment A184-1.

ATTACHMENT A184-1
NEW DPR 523 FORM UPDATE SHEET AND THE ORIGINAL 2007 DPR FORM FOR MAP REFERENCE NO. 11 (CALIFORNIA AQUEDUCT)

State of California – The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
UPDATE SHEET

Primary # _____
HRI # _____
Trinomial _____
NRHP Status Code 3S

***Resource Name or #** (Assigned by recorder) Map Reference No. 11

☐ Continuation ☒ Update

P1. Other Identifier: California Aqueduct

*P2. e. Other Locational Data: T30S R24E MDBM, Sections 23, where Tupman Road crosses the California Aqueduct.

***P3a. Description:** The California Aqueduct is a concrete-line trapezoidal canal constructed between 1961 and 1972. Presently, the aqueduct extends 444 miles from the San Joaquin-Sacramento River Delta in Northern California to Riverside County in Southern California. The aqueduct is 110 feet and 33 feet at it widest and deepest points, respectively. This segment of the California Aqueduct roughly between Dairy and Tupman roads is nearly identical to one segment in Stanislaus County that was previously inventoried in August 2007 (see attached form).

***P3b. Resource Attributes:** (HP20) Canal/Aqueduct

***P8. Recorded by:** Toni Webb, JRP Historical Consulting, LLC, 2850 Spafford Street, Davis, CA 95618

***P11. Report Citation:** JRP Historical Consulting, LLC, " Historic Architecture Technical Report: Inventory and Evaluation Report, Hydrogen Energy California (HECA) Project," 2012.

***B10. Significance:**

This form serves as an update to a previous inventory and evaluation of the California Aqueduct conducted by Carey & Co. for the 2007 report entitled "San Joaquin Pipeline Existing Conditions Report." Carey & Co. concluded that the aqueduct appears eligible for the National Register of Historic Place (NRHP) and California Register of Historical Resources (CRHR) at the state level under Criterion A (CRHR Criterion 1), for its significance as the central component of the California State Water Project and under NRHP Criterion C (CRHR Criterion 3) as a significant engineering feature. Carey & Co. identified the period of significance between 1961, when construction of the aqueduct commenced, through 1972, when the aqueduct was completed and character-defining features as its open trapezoidal shape and concrete lining. After review of the 2007 evaluation and current field check of the aqueduct segment between Dairy and Tupman roads, the Carey & Co. findings still appear to be valid. The aqueduct appears to be an historical resource for the purposes of the California Environmental Quality Act (CEQA) and has been evaluated in accordance with Section 15064.5(a)(2)-(3) of the CEQA Guidelines, using the criteria outlined in Section 5024.1 of the California Public Resources Code.

***B14. Evaluator:** Toni Webb ***Date of Evaluation:** December 2012

Photograph 1: View of the California Aqueduct at Tupman Road (see Point 1 on sketch map), camera facing west.

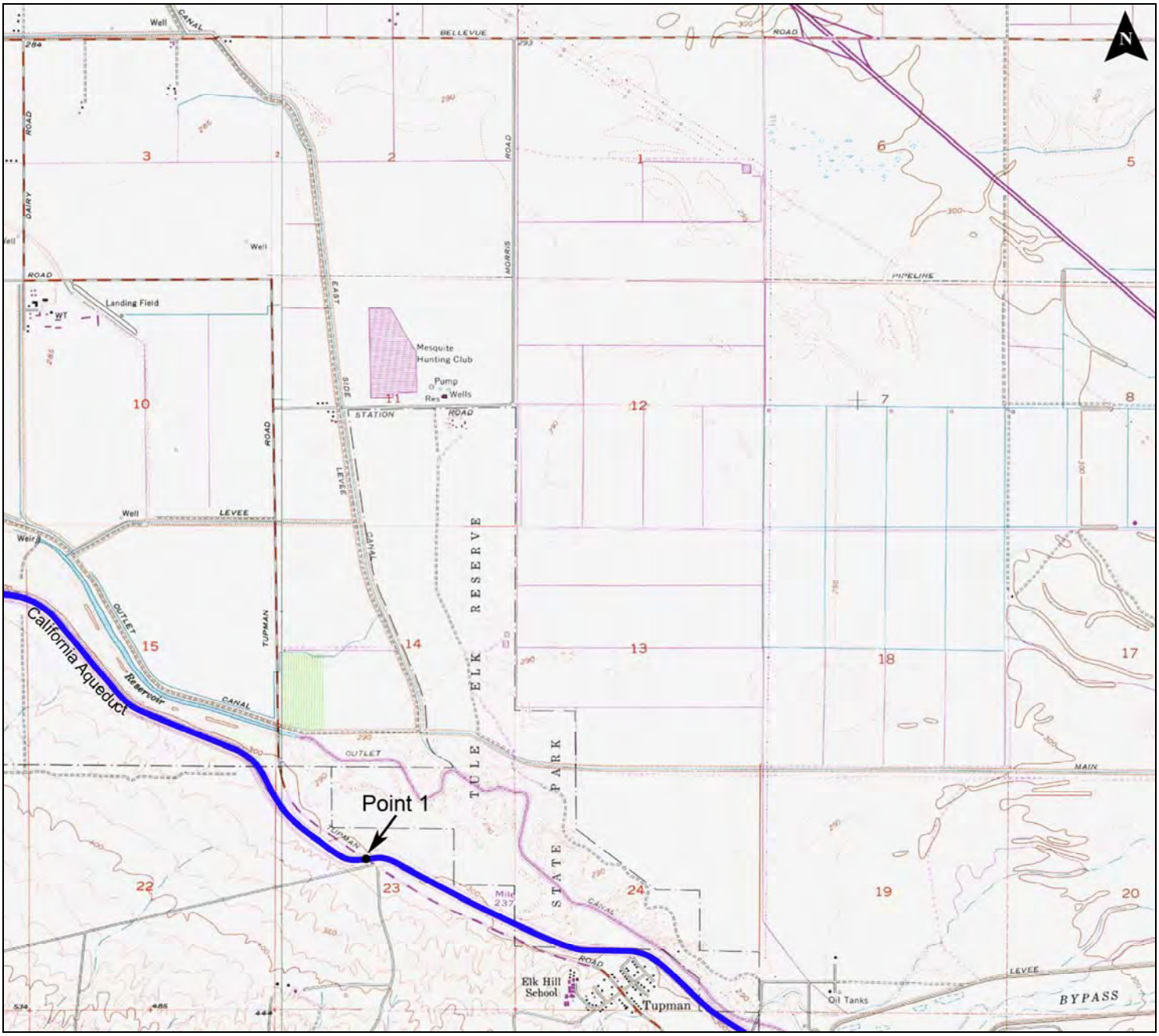
State of California – The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
UPDATE SHEET

Primary # _____
HRI # _____
Trinomial _____
NRHP Status Code 3S

***Resource Name or #** (Assigned by recorder) Map Reference No. 11

☐ Continuation ☒ Update

Sketch Map:



State of California The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

PRIMARY RECORD

Primary # _____
HRI # _____
Trinomial _____
NRHP Status Code 3S
Other Listings _____
Review Code _____ Reviewer _____ Date _____

Page 1 **of** 4 ***Resource Name or #:** (Assigned by recorder) California Aqueduct Map Reference No. 11

P1. Other Identifier: _____

***P2. Location:** __ **Not for Publication** ✓ **Unrestricted**

***a. County** Stanislaus **and** (P2c, P2e, and P2b or P2d. Attach a Location Map as necessary.)

***b. USGS 7.5' Quad** Vernalis **Date** _____ **T** __; **R** ___; __ of __ **of Sec** __; _____**B.M.**

c. Address _____ City _____ Zip _____

d. UTM: (Give more than one for large and/or linear resources) Zone 10 , 645805 mE/ 4165225 mN

e. Other Locational Data: (e.g., parcel #, directions to resource, elevation, etc., as appropriate)
Crosses the San Joaquin Pipelines around MP 93.20.

***P3a. Description:** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)

The California Aqueduct is a 444-mile water-conveying canal that runs from the Sacramento-San Joaquin Delta in the north to Riverside County in the south. Its channel capacity is 10,300 cubic feet per second (cfs) at its start, eventually reaching a maximum capacity of 13,100 cfs to the south. The aqueduct is a trapezoidal, concrete-lined canal that measures approximately 140 feet across, with depth varying from 24 to 40 feet. The aqueduct crosses the existing pipelines at approximately MP 93.20.

***P3b. Resource Attributes:** (List attributes and codes) HP20 -- canal/aqueduct

***P4. Resources Present:** ___ Building ✓ Structure ___ Object ___ Site ___ District ___ Element of District ___Other (Isolates, etc.)

P5b. Description of Photo: (view, date, accession #) SJPL crossing CA Aqueduct, looking east, 7/26/06

***P6. Date Constructed/Age and Source:** ___ Historic __ Prehistoric ___ Both
1961-1972, JRP Historical Consulting Services

***P7. Owner and Address:**
CA Dept. of Water Resources
1416 Ninth Street
Sacramento, CA 95814

***P8. Recorded by:** (Name, affiliation, and address)
Carey & Co.
460 Bush Street
San Francisco, CA. 94108

***P9. Date Recorded:** 8/13/2007

***P10. Survey Type:** (Describe) Intensive Survey

***P11. Report Citation:** (Cite survey report and other sources, or enter "none.")
San Francisco Public Utilities Commission, San Joaquin Pipeline Existing Conditions Report, 2007.

***Attachments:** ___NONE ___Location Map ___Continuation Sheet ✓ Building, Structure, and Object Record
___Archaeological Record ___District Record ___Linear Feature Record ___Milling Station Record ___Rock Art Record
___Artifact Record ___Photograph Record ___ Other (List): _____

State of California The Resources Agency Primary #
DEPARTMENT OF PARKS AND RECREATION HRI#

BUILDING, STRUCTURE, AND OBJECT RECORD

***NRHP Status Code** 3S Map Reference No. 11

Page 2 **of** 4 ***Resource Name or #** (Assigned by recorder) California Aqueduct

B1. Historic Name: California Aqueduct
B2. Common Name: California Aqueduct
B3. Original Use: Water Conveyance B4. Present Use: Water Conveyance
***B5. Architectural Style:** N/A
***B6. Construction History:** (Construction date, alterations, and date of alterations)

Constructed between 1961-1972.

***B7. Moved?** ✓**No** _**Yes** _**Unknown** **Date:** _____ **Original Location:** _____
***B8. Related Features:**

B9a. Architect: Unknown b. Builder: California Dept. of Water Resources
***B10. Significance: Theme** State Water Project **Area** Central California

Period of Significance 1961-1972 **Property Type** Canal **Applicable Criteria** A, C

(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)

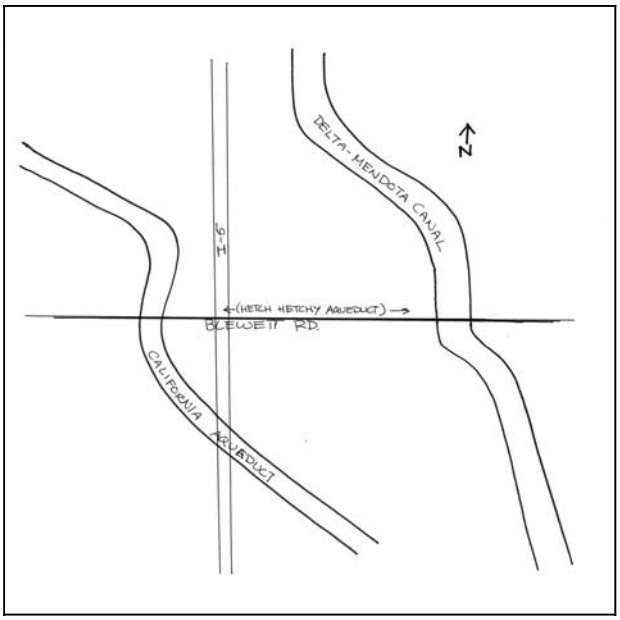
The California Aqueduct was constructed between 1961 and 1972 by the Department of Water Resources as part of the State Water Project, "the largest state-built multipurpose water project in the United States" (Carle, 2004). The North San Joaquin Division of the aqueduct was constructed between 1965 and 1967 (Hatoff et al., 1995). The aqueduct carries water from the Sacramento-San Joaquin Delta to Riverside County, but delivers some water to the San Joaquin Valley. It first supplied the San Joaquin Valley in 1968 (Hatoff et al., 1995).

The California Aqueduct has significance in relation to large-scale developments in transporting water throughout California and supplying such resources to arid regions to influence the growth of farming and agricultural development starting in 1968. Hatoff et al., when evaluating this property in 1995 stated that "[i]n the absence of the 50-year exclusion, the California Aqueduct would seem to be an obvious candidate for National Register listing, on the basis of its bold engineering solutions (See continuation sheet.)

B11. Additional Resource Attributes: (List attributes and codes) HP20 -- canal/aqueduct
***B12. References:**

(See continuation sheet.)

B13. Remarks:



***B14. Evaluator:** E. Schultz & A. Vanderslice, Carey & Co.
***Date of Evaluation:** 8/13/2007

(This space reserved for official comments.)

B10. Significance (continued)

and its role in the state's economy and society" (Carle, 2004). However, the aqueduct was mainly constructed in the late 1960s and 1970s, and therefore, does not meet the 50-year age restriction required for listing on the NRHP and CRHR (or the 45-year cutoff otherwise used in this report). Because of this, consideration needs to be given to whether the Aqueduct has exceptional importance that would make it eligible to be listed in the NRHP under Criteria Consideration G or in the CRHR under special consideration.

According to NRHP materials, "a resource whose construction began over fifty years ago, but the completion overlaps the fifty year period by a few years or less" does not need to meet the "exceptional importance" threshold in order to be deemed eligible for listing (NPS, 1997). Given that construction of the California Aqueduct began in 1961, it will soon be of sufficient age and will no longer be subject to Criteria Consideration G.

Regardless, the California Aqueduct appears to satisfy Criteria Consideration G. The aqueduct is part of the State Water Project, which "represents one of the most ambitious public works projects undertaken by the State of California" (JRP, 2000). The state Water Project provides water to more than two-thirds of the state's population (Carle, 2004). Since the Aqueduct is "by far the largest and most vital element" of the State Water Project (JRP, 2000), we feel it is of sufficiently exceptional importance to be eligible for listing in the NRHP under Criteria Consideration G.

The California Aqueduct appears to be significant under NRHP Criteria A and CRHR Criteria 1 at the state level. It is important for its association with the State of California's State Water Project. The aqueduct was the central component in the project and was integral to its operation. The State Water Project is a massive state-funded public works project that is significant for moving approximately four million acre-feet of water from the Delta southwards for commercial, industrial and residential use in the San Joaquin Valley and Southern California, thereby influencing the rapid growth of those areas over the second half of the twentieth century.

The California Aqueduct also appears to be significant under NRHP Criteria C and CRHR Criteria 3 at the state level. The California Aqueduct, as the lynchpin of the State Water Project, represents a significant engineering accomplishment. The aqueduct transported water from the Sacramento River as far south as Riverside County, rerouting major portions of the water flow from the Sacramento and San Joaquin Rivers to irrigate arid land in the San Joaquin Valley and provide municipal and industrial water to growing Southern California cities. To reach Southern California, the Edmondson Pumping Plant pumped water two thousand feet over the Tehachapi Mountains. Moving the water over the mountains was a massive effort, making the Edmondson facility the largest single user of energy in the state (Carle, 2004).

The California Aqueduct does not appear to be eligible for listing in the NRHP/CRHR under Criteria B/2 or D/4. It does not appear to be directly associated with persons that have had a broad-reaching impact on the community at the local, state, or national level. Additionally, it does not appear that the aqueduct has the potential to yield information important to the prehistory or history of the local area, state, or the nation.

The California Aqueduct's period of significance extends from 1961, when construction on the aqueduct began, through 1972, when the aqueduct extended over the Tehachapi Mountains and was completed. The aqueduct's character-defining features include its open, trapezoidal shape and concrete lining.

The California Aqueduct retains a high level of integrity, having undergone little physical alteration since its creation. It retains integrity of location and setting, as its immediate surroundings have changed little over the past 30 years. Additionally, it retains integrity of design, workmanship, and materials, in that its basic form (open, trapezoidal, concrete-lined) has not been altered. Finally, the aqueduct continues to convey its historic significance as one of the most important water conveyance structures in the state, and therefore retains integrity of feeling and association. The California Aqueduct appears to meet the criteria of the NRHP and the CRHR.

B12. References

Carle, David. *Introduction to Water in California*. Berkeley, CA: University of California Press, 2004.

Hatoff, Brian, Barbara Voss, Sharon Waechter and Steven Wee. *Cultural Resources Inventory Report for the Proposed Majove Northward Expansion Project*. Prepared for the Mojave Pipeline Company. On file at the CCIC, File # 2759, 1995.

JRP Historical Consulting Services, LLC and CalTrans. *Water Conveyance Systems in California: Historic Context Development and Evaluation Procedures*, 2000.

National Park Service (NPS). *How to Apply the National Register Criteria for Evaluation, National Register Bulletin 15.* Washington, DC: United States Department of the Interior, 1997.

DATA REQUEST

A185. Map Reference Number 14: Buena Vista Water Storage District (BVWSD).

The DPR 523 form evaluating six individual BVWSD resources was completed in 2009. One of the resources identified in the DPR 523 form is now outside the PAA. The location photographs for the five BVWSD resources listed below no longer document the portions of these resources within the PAA.

a. Provide updated photographs, location map and evaluation of the resources to reflect the revised PAA. The affected BVWSD resources are listed below, from north to south within the PAA:

1 East Side Canal;

2. Unknown drain and well (dating to at least 1954) located between Dunford Road and East Side Canal;

3. Depot Drain;

4. Levee and well at southern property boundary of the Adohr/Palm Farm complex;

5. Outlet Canal.

RESPONSE

The DPR 523 form for Map Reference No. 14 has been revised to include updated photographs, location maps, cross sections, descriptions, and evaluations of canal segments within the current PAA. Canal segments previously documented on the DPR form and extant within the current PAA include East Side Canal, West Side Canal, Kern Valley Water Company, Depot Drain, and Deep Wells Ditch. The following canals have been added to the form as directed by the CEC through this data request or in the teleconference on December 3, 2012: Cass Ditch, Short Main Canal, and Outlet Canal. The form has also been revised to remove documentation of the Main Drain, which is no longer within the current PAA.

A well and levee near the historic boundary of the former Adohr Farm property (A185.a.4) has not been included in the revised form. The well is no longer extant. The short levee supports a farmer's ditch. According to David Hampton of the Buena Vista Water Storage District (BVWSD), both structures have been continually altered by reshaping and excavation since their construction. Therefore, the current levee is of modern construction. The photos presented in the revised DPR 523 form are within the current PAA. The revised DPR 523 form is included as Attachment A185-1.

ATTACHMENT A185-1
REVISED DPR 523 FORM FOR MAP REFERENCE NO. 14 (BUENA VISTA WATER STORAGE DISTRICT)

State of California – The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary # _____
HRI # _____
Trinomial _____
NRHP Status Code 6Z
Other Listings _____
Review Code _____ Reviewer _____ Date _____

 ***Resource Name or #** Map Reference No. 14

P1. Other Identifier: Portions of the Buena Vista Water Storage District

***P2. Location:** ☐ **Not for Publication** ☒ **Unrestricted** ***a. County** Kern

and (P2b and P2c or P2d. Attach a Location Map as necessary.)

***b. USGS 7.5' Quad** East Elk Hills and Buttonwillow **Date** 1954 (revised 1973) **T**___; **R** ___; __ ¼ **of Sec** ___; _____ **B.M.**

c. Address _____ City _____ Zip _____

d. UTM: (give more than one for large and/or linear resources) See Linear Records

e. Other Locational Data: (e.g., parcel #, directions to resource, elevation, etc., as appropriate)

Located south of Highway 58 east of Wasco Way and West of Tupman Road.

***P3a. Description:** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)

The Buena Vista Water Storage District formed in 1924 and assumed ownership and management of the canal system developed by Miller & Lux. The system stretches from the second point of measurement on the Kern River to Buena Vista Lake and then northwest along the former Buena Vista Slough to Tule Lake. This form evaluates a portion of the system from the Outlet Canal (just south of the Old Headquarters Weir) northward to just south of Highway 58, and from East Side Canal to just west of Tracy Lane. An overall description of each canal is included in the following continuation sheets. Also included are Liner Feature Forms for each point surveyed, grouped by canal. (See Continuation Sheet)

***P3b. Resource Attributes:** (List attributes and codes) (HP20) Canal/aqueduct

***P4. Resources Present:** ☒ Structure ☐ Building ☐ Object ☐ Site ☐ District ☐ Element of District ☐ Other (Isolates, etc.)

P5a. Photo of Drawing (Photo required for buildings, structures, and objects.)

P5b. Description of Photo: (View, date, accession #) Photograph 1: East Side Canal, camera facing north.

***P6. Date Constructed/Age and Sources:**
☒ Historic ☐ Prehistoric ☐ Both
1876 -1920s; alterations and improvements to date.

***P7. Owner and Address:**
Buena Vista Water Storage District
525 North Main
Buttonwillow, CA 93206

***P8. Recorded by:** (Name, affiliation, address)
Toni Webb
JRP Historical Consulting, LLC
2850 Spafford Street,
Davis, CA 95618

***P9. Date Recorded:** December 2012

***P10. Survey Type:** (Describe)
Intensive

***P11. Report Citation:** (Cite survey report and other sources, or enter "none.") JRP Historical Consulting, LLC, " Historic Architecture Technical Report: Inventory and Evaluation Report, Hydrogen Energy California (HECA) Project," 2012.

***Attachments:** ☐ None ☐ Location Map ☒ Sketch Map ☒ Continuation Sheet ☒ Building, Structure, and Object Record ☐ Archaeological Record ☐ District Record ☒ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record ☐ Artifact Record ☐ Photograph Record ☐ Other (list) _____

B1. Historic Name: Kern Valley Water Company Canal, West Side Canal, East Side Canal, Deep Wells Ditch, Depot Drain, Cass Ditch, Short Main Canal, and Outlet Canal
B2. Common Name: Flood Channel, West Side Canal, East Side Canal, Deep Wells Ditch, Depot Drain
B3. Original Use: Canal B4. Present Use: Canal
***B5. Architectural Style:** Utilitarian
***B6. Construction History:** 1876-1920s; alterations and improvements up to present; see continuation sheets for individual canal histories.
***B7. Moved?** ☒ **No** ☐ **Yes** ☐ **Unknown** **Date:** _____ **Original Location:** _____
***B8. Related Features:** _____
B9. Architect: S.W. Wible b. Builder: Miller & Lux,; Buena Vista Water Storage District
***B10. Significance: Theme** n/a **Area** n/a
Period of Significance n/a **Property Type** n/a **Applicable Criteria** n/a
(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)

This form evaluates a portion of the Buena Vista Water Storage District (BVWSD) system located from just south of the Old Headquarters Weir, south of Highway 58, and east to Interstate 5. The following section contains historic context for the development of the BVWSD including the early Miller & Lux development. Also included are brief histories of each canal evaluated. Following the historic contexts are evaluations for the individual canals. The properties included on this form have been evaluated in accordance with Section 15064.5 (1)(2)-(3) of the CEQA Guidelines using the criteria outlined in Section 5024.1 of the California Public Resources Code. None of the canals appear to be historic resources for the purposes of the California Environmental Quality Act (CEQA) and they do not appear to meet the criteria for listing in the California Register of Historical Resources (CRHR). (See Continuation Sheet)

B11. Additional Resource Attributes: __
***B12. References:**
USGS Quadrangles, *Buttonwillow 1932, 1942, 1954, 1954 photorevised 1973; East Elk Hills, 1933, 1954, 1954 photorevised 1973;* W. C. Hammett, *Report on Revaluation of Physical Properties to be Acquired by Buena Vista Water Storage District*, Sept. 4, 1926 (San Francisco); Bancroft Library, Miller & Lux, CG-163, Buttonwillow Files, Carton 694. (See Footnotes)

B13. Remarks:

***B14. Evaluator:** Heather Norby/Cheryl Brookshear/Toni Webb

***Date of Evaluation:** April 2009/December 2012

(This space reserved for official comments.)

See attached map on continuation sheet.

State of California – The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
LINEAR FEATURE RECORD

Primary # _____
HRI # _____
Trinomial _____

***Resource Name or #** Map Reference No. 14

L1. Historic and/or Common Name: East Side Canal

L2a. Portion Described: ☐ Entire Resource ☐ Segment ☒ Point Observation **Designation:** ES-1

b. Location of point or segment: T29S R24 E MDBM, Section 20 and 29 at the end of Buerkle Road.

L3. Description: The East Side Canal is a trapezoidal earthen canal flowing northwest. A concrete check gate built in 1976 is north of Buerkle Road and includes six slots framed with metal. Drop gates consist of concrete slabs. Downstream of the check is a section of rubble lining. South of the check gate is the center pylon of a bridge. The concrete pylon is narrow and runs about six feet along the center of the canal.

L4. Dimensions:

a. Top Width: approximately 45 feet

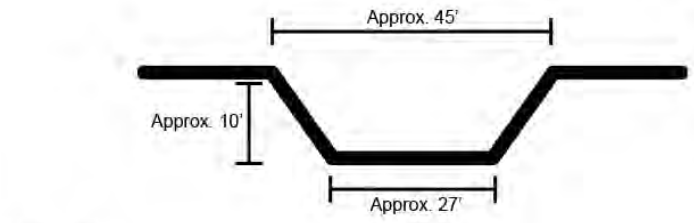
b. Bottom Width: approximately 27 feet

c. Height or Depth: approximately 10 feet

d. Length of Segment:

L5. Associated Resources: 1976 check gate, bridge pylon

L4e. Sketch of Cross-Section **Facing:** Northwest



L6. Setting: The canal is surrounded by alfalfa fields, a residence, and a fallow field.

L7. Integrity Considerations: Canals and ditches belonging to the Buena Vista Water Storage District are shaped two times a year and are excavated approximately every five to ten years.

L8b. Description of Photo, Map, or Drawing: East Side Canal and check gate, camera facing northwest.

L8a. Photograph, Map or Drawing

L9. Remarks:

L10. Form Prepared by:
H. Norby/C. Brookshear/T. Webb
JRP Historical Consulting, LLC
2850 Spafford Street
Davis, CA 95618

L11. Date: December 2012

L1. Historic and/or Common Name: East Side Canal

L2a. Portion Described: ☐ Entire Resource ☐ Segment ☒ Point Observation **Designation:** ES-2

b. Location of point or segment: T29S R24 E MDBM, Section 33, just north of Cass Ditch.

L3. Description: The East Side Canal is a trapezoidal earthen canal flowing northwest. A concrete check gate is just north of Cass Ditch and includes six slots framed with metal. Drop gates consist of wood planks. Upstream of the check is a section of rubble lining on the east canal bank.

L4. Dimensions:

a. Top Width: approximately 50 feet

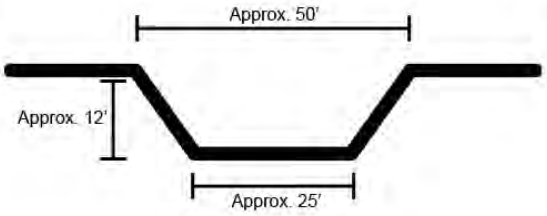
b. Bottom Width: approximately 25 feet

c. Height or Depth: approximately 12 feet

d. Length of Segment:

L5. Associated Resources: check gate

L4e. Sketch of Cross-Section **Facing:** Northeast



L6. Setting: The canal is surrounded by orchards and a fallow field.

L7. Integrity Considerations: Canals and ditches belonging to the Buena Vista Water Storage District are shaped two times a year and are excavated approximately every five to ten years.

L8b. Description of Photo, Map, or Drawing: East Side Canal and check gate, camera facing northeast.

L8a. Photograph, Map or Drawing

L9. Remarks:

L10. Form Prepared by:
H. Norby/C. Brookshear/T. Webb
JRP Historical Consulting, LLC
2850 Spafford Street
Davis, CA 95618

L11. Date: February 2012

L1. Historic and/or Common Name: East Side Canal

L2a. Portion Described: ☐ Entire Resource ☐ Segment ☒ Point Observation **Designation:** ES-3

b. Location of point or segment: T30S R24E MDBM, Section 11 at Station Road.

L3. Description: The East Side Canal is a trapezoidal earthen canal flowing northwest. The canal crosses under Station Road via a culvert of four concrete pipes. It includes rubble lining at the at the road crossing. The Short Main Canal is connects with this canal approximately .5 mile south of Station Road.

L4. Dimensions:

a. Top Width: approximately 60 feet

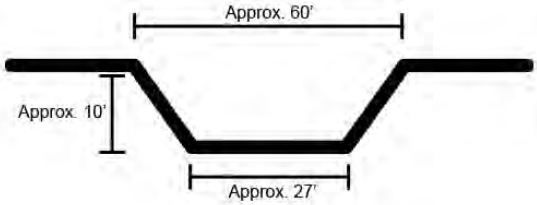
b. Bottom Width: approximately 27 feet

c. Height or Depth: approximately 10 feet

d. Length of Segment:

L5. Associated Resources: Culvert

L4e. Sketch of Cross-Section **Facing:** North



L6. Setting: The canal is surrounded by alfalfa fields, a residential complex, and a fallow field.

L7. Integrity Considerations: Canals and ditches belonging to the Buena Vista Water Storage District are shaped two times a year and are excavated approximately every five to ten years.

L8b. Description of Photo, Map, or Drawing: East Side Canal, camera facing north.

L8a. Photograph, Map or Drawing

L9. Remarks:

L10. Form Prepared by:
H. Norby/C. Brookshear/T. Webb
JRP Historical Consulting, LLC
2850 Spafford Street
Davis, CA 95618

L11. Date: December 2012

L1. Historic and/or Common Name: Depot Drain

L2a. Portion Described: ☐ Entire Resource ☐ Segment ☒ Point Observation **Designation:** DD-1

b. Location of point or segment: T29S R24E MDBM Section 33, east side of Dunford Road approximately .25 mile north of Stockdale Highway.

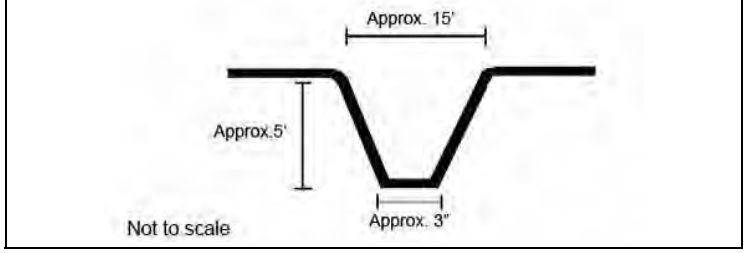
L3. Description: Depot Drain is a narrow trapezoidal earthen canal. At this location, the canal runs one mile east from Dairy Road to Dunford Road, where it then turns north, conveyed through a corrugated metal pipe under a narrow dirt farm road. The drain parallels Dunford Road for approximately .25 mile. The drain is then conveyed under Dunford Road via a round corrugated metal pipe north.

L4. Dimensions:

a. Top Width: approximately 15 feet
b. Bottom Width: approximately 3 feet
c. Height or Depth: approximately 3 feet
d. Length of Segment:

L5. Associated Resources: Culvert.

L4e. Sketch of Cross-Section **Facing:** East



L6. Setting: The drain is surrounded by alfalfa and grain fields and a farm complex is adjacent to the drain.

L7. Integrity Considerations: Canals and ditches belonging to the Buena Vista Water Storage District are shaped two times a year and are excavated approximately every five to ten years.

L8b. Description of Photo, Map, or Drawing: Depot Drain, camera facing east.

L8a. Photograph, Map or Drawing

L9. Remarks:

L10. Form Prepared by:
H. Norby/C. Brookshear/T. Webb
JRP Historical Consulting, LLC
2850 Spafford Street
Davis, CA 95618

L11. Date: December 2012

L1. Historic and/or Common Name: Deep Wells Ditch

L2a. Portion Described: ☐ Entire Resource ☐ Segment ☒ Point Observation **Designation:** DWD-1

b. Location of point or segment: T29S R24E MDBM southeast corner of Section 33, just north of the intersection of Dairy Road and Stockdale Road.

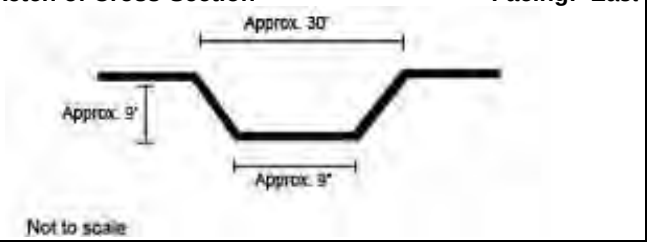
L3. Description: Deep Wells Ditch is an earthen trapezoidal ditch. The ditch begins at the East Side Canal (approximately 0.6 mile east of this point) parallels Stockdale Highway for approximately 1.6 miles to Dunford Road, where it runs through two corrugated metal pipes under the roadway. A single delivery gate with concrete headwall and flanking walls is located along the north side of the ditch just east of Dunford Road. The circular metal gate is operated with a vertical screw mechanism. At Dairy Road, the ditch includes a control structure with concrete headwalls and slide gate and two diversion structures with concrete headwalls. One diversion structure has a flap gate while the other is enclosed by a trash gate. Along the west side of the ditch's intersection with Dairy Road is rubble lining.

L4. Dimensions:

a. Top Width: approximately 30 feet
b. Bottom Width: approximately 9 feet
c. Height or Depth: approximately 9 feet
d. Length of Segment:

L5. Associated Resources: Culvert, diversion/control structures.

L4e. Sketch of Cross-Section **Facing:** East



L6. Setting: The ditch is surrounded to the north by alfalfa fields.

L7. Integrity Considerations: Canals and ditches belonging to the Buena Vista Water Storage District are shaped two times a year and are excavated approximately every five to ten years.

L8b. Description of Photo, Map, or Drawing: Deep Wells Ditch, camera facing east.

L8a. Photograph, Map or Drawing

L9. Remarks:

L10. Form Prepared by:
H. Norby/C. Brookshear/T. Webb
JRP Historical Consulting, LLC
2850 Spafford Street
Davis, CA 95618

L11. Date: December 2012

L1. Historic and/or Common Name: Cass Ditch

L2a. Portion Described: ☐ Entire Resource ☐ Segment ☒ Point Observation **Designation:** CD-1

b. Location of point or segment: T29S R24 E MDBM, Section 33 at Dunford Road.

L3. Description: Cass Ditch is a 1.4-mile earthen canal with a trapezoidal cross section. The ditch extends west from the East Side Canal to Dunford Road (this point location) where it is conveyed under the road via a corrugated metal culvert. The ditch then runs north paralleling the west side of the roadway to its end at Brite Road.

L4. Dimensions:

a. Top Width: approximately 20 feet

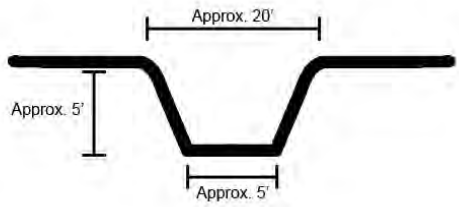
b. Bottom Width: approximately 5 feet

c. Height or Depth: approximately 5 feet

d. Length of Segment:

L5. Associated Resources: Culvert

L4e. Sketch of Cross-Section **Facing:** East



Not to scale

L6. Setting: Agricultural fields.

L7. Integrity Considerations: Canals and ditches belonging to the Buena Vista Water Storage District are shaped two times a year and are excavated approximately every five to ten years.

L8b. Description of Photo, Map, or Drawing: Cass Ditch, camera facing east

L8a. Photograph, Map or Drawing

L9. Remarks:

L10. Form Prepared by:
H. Norby/C. Brookshear/T. Webb
JRP Historical Consulting, LLC
2850 Spafford Street
Davis, CA 95618

L11. Date: December 2012

L1. Historic and/or Common Name: Cass Ditch

L2a. Portion Described: ☐ Entire Resource ☐ Segment ☒ Point Observation **Designation:** CD-2

b. Location of point or segment: T29S R24E MDBM, Section 33 just west of East Side Canal and approximately 0.7 miles north of Stockdale Highway.

L3. Description: Cass Ditch is a 1.4-mile long earthen canal with a trapezoidal cross section. The ditch extends west from the East Side Canal (at this point location) to Dunford Road where it is conveyed under the road via a corrugated metal culvert. The ditch then runs north paralleling the west side of the roadway to its end at Brite Road.

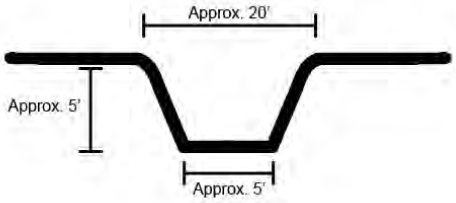
L4. Dimensions:

a. Top Width: approximately 20 feet
b. Bottom Width: approximately 5 feet
c. Height or Depth: approximately 5 feet
d. Length of Segment:

L5. Associated Resources:

L6. Setting: Agricultural fields.

L4e. Sketch of Cross-Section **Facing:** Northwest



Not to scale

L7. Integrity Considerations: Canals and ditches belonging to the Buena Vista Water Storage District are shaped two times a year and are excavated approximately every five to ten years.

L8b. Description of Photo, Map, or Drawing: Cass Ditch, camera facing northwest.

L8a. Photograph, Map or Drawing

L9. Remarks:

L10. Form Prepared by:
H. Norby/C. Brookshear/T. Webb
JRP Historical Consulting, LLC
2850 Spafford Street
Davis, CA 95618

L11. Date: December 2012

L1. Historic and/or Common Name: West Side Canal

L2a. Portion Described: ☐ Entire Resource ☐ Segment ☒ Point Observation **Designation:** WS-1

b. Location of point or segment: T30S R24 E, MDBM, northwest corner of Sections 5, just north of the Kern Valley Water Company Canal's Old Headquarters Weir.

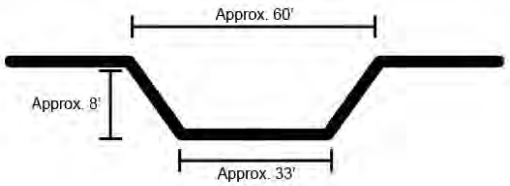
L3. Description: The West Side Canal is a neatly shaped earthen ditch with a trapezoidal cross section. The canal parallels Kern Valley Water Company's Canal to the south and forms the western boundary of the Buena Vista Water Storage District. This linear point is located approximately 0.15 northwest of the canal's origin at the Short Main Canal's flow control gate.

L4. Dimensions:

a. Top Width: approximately 60 feet
b. Bottom Width: approximately 33 feet
c. Height or Depth: approximately 8 feet
d. Length of Segment:

L5. Associated Resources:

L4e. Sketch of Cross-Section **Facing:** Northwest



L6. Setting: Chaparral and Kern Valley Water Company Canal (and Old Headquarters Weir) to the south, agricultural fields and to the north.

L7. Integrity Considerations: Canals and ditches belonging to the Buena Vista Water Storage District are shaped two times a year and are excavated approximately every five to ten years.

L8b. Description of Photo, Map, or Drawing: West Side Canal, camera facing northwest.

L8a. Photograph, Map or Drawing

L9. Remarks:

L10. Form Prepared by:
H. Norby/C. Brookshear/T. Webb
JRP Historical Consulting, LLC
2850 Spafford Street
Davis, CA 95618

L11. Date: December 2012

L1. Historic and/or Common Name: Short Main Canal

L2a. Portion Described: ☐ Entire Resource ☐ Segment ☒ Point Observation **Designation:** SM-1

b. Location of point or segment: T30S R24E MDBM, northeast quarter of Section 15, approximately 0.8 miles west of Tupman Road and 1.1 mile south of Adohr Road, at the southern end of the West Side Canal.

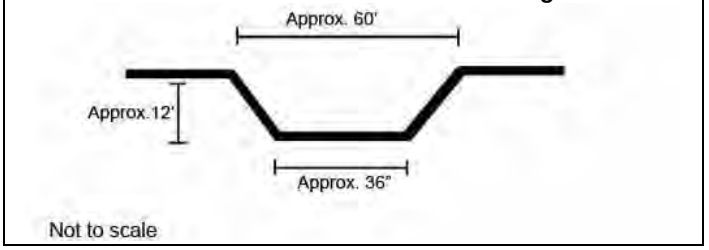
L3. Description: The Short Main Canal is a well-maintained, 1.3-mile-long earth-lined ditch with trapezoidal cross-section. This linear point, where it joins the West Side Canal, includes Short Main Canal's flow control gate, which replaced a similar structure sometime in 2010 or 2011. The canal flows west from the East Side Canal and is one source of water for the West Side Canal.

L4. Dimensions:

a. Top Width: Approximately 60 feet
b. Bottom Width: Approximately 36 feet
c. Height or Depth: Approximately 12 feet
d. Length of Segment:

L5. Associated Resources: Flow Control Gate constructed ca. 2010-2011

L4e. Sketch of Cross-Section **Facing:** Northwest



L6. Setting: The canal is surrounded to the north and south by agricultural fields.

L7. Integrity Considerations: Canals and ditches belonging to the Buena Vista Water Storage District are shaped two times a year and are excavated approximately every five to ten years.

L8b. Description of Photo, Map, or Drawing: Short Main Canal, facing northwest.

L8a. Photograph, Map or Drawing

L9. Remarks:

L10. Form Prepared by:
H. Norby/C. Brookshear/T. Webb
JRP Historical Consulting, LLC
2850 Spafford Street
Davis, CA 95618

L11. Date: December 2012

L1. Historic and/or Common Name: Short Main Canal

L2a. Portion Described: ☐ Entire Resource ☐ Segment ☒ Point Observation **Designation:** SM-2

b. Location of point or segment: T30S R24E MDBM, southeast corner of Section 10 at Tupman Road.

L3. Description: The Short Main Canal is a well-maintained, 1.3-mile-long earth-lined ditch with trapezoidal cross-section. The canal flows west from the East Side Canal, crosses under Tupman Road (just east of this point location) and is one source of water for the West Side Canal.

L4. Dimensions:

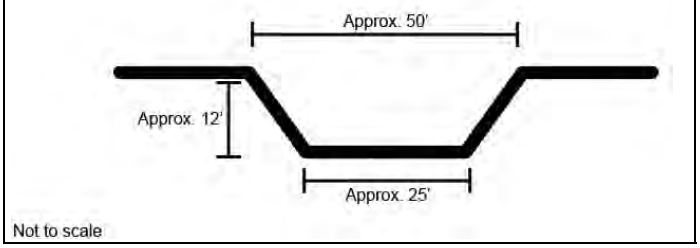
a. Top Width: Approximately 50 feet

b. Bottom Width: Approximately 25 feet

c. Height or Depth: Approximately 12 feet

d. Length of Segment:

L4e. Sketch of Cross-Section **Facing:** West



L5. Associated Resources: Bridge carrying Tupman Road over canal.

L6. Setting: The canal is surrounded to the north and south by agricultural fields.

L7. Integrity Considerations: Canals and ditches belonging to the Buena Vista Water Storage District are shaped two times a year and are excavated approximately every five to ten years.

L8b. Description of Photo, Map, or Drawing: Short Main Canal, facing west.

L8a. Photograph, Map or Drawing

L9. Remarks:

L10. Form Prepared by:
H. Norby/C. Brookshear/T. Webb
JRP Historical Consulting, LLC
2850 Spafford Street
Davis, CA 95618

L11. Date: December 2012

L1. Historic and/or Common Name: Outlet Canal

L2a. Portion Described: ☐ Entire Resource ☐ Segment ☒ Point Observation **Designation:** OC-1

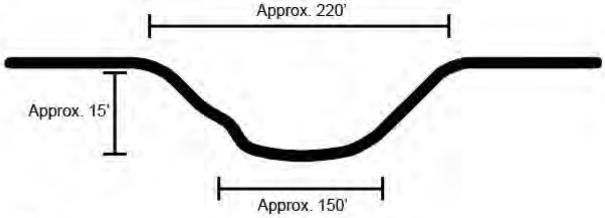
b. Location of point or segment: T30S R24E MDBM, northeast corner of Section 15 and near west end of Short Main canal.

L3. Description: The Outlet Canal is a 9-mile-long earthen canal with a U-shaped cross section. The path of the canal is irregular. The canal slopes and floor are vegetated with grasses and sagebrush. The southern side is built up and resembles a levee or sand bar in areas. The height of this southern side is irregular and undulating with a gentler slope into the canal. Originally used to convey water from Buena Vista Lake to the Kern Valley Water Company Canal (KVWCC), and later East Side and West Side canals, presently this segment (from the Old Headquarters Weir to roughly the East Side Canal where a modern waste weir is located) is occasionally used for groundwater recharge but is mostly dry year round.

L4. Dimensions:

a. Top Width: approximately 220 feet
b. Bottom Width: approximately 150 feet
c. Height or Depth: approximately 15 feet
d. Length of Segment:

L4e. Sketch of Cross-Section **Facing:** Northwest



L5. Associated Resources: Old Headquarters Weir.

L6. Setting: Agricultural fields are located north of the canal.

L7. Integrity Considerations: Canals and ditches belonging to the Buena Vista Water Storage District are shaped two times a year and are excavated approximately every five to ten years. The canal suffers from erosion and deposition of garbage.

L8b. Description of Photo, Map, or Drawing: Outlet Canal, looking northwest toward the Old Headquarters Weir.

L8a. Photograph, Map or Drawing

L9. Remarks:

L10. Form Prepared by:
H. Norby/C. Brookshear/T. Webb
JRP Historical Consulting, LLC
2850 Spafford Street
Davis, CA 95618

L11. Date: December 2012

L1. Historic and/or Common Name: Outlet Canal

L2a. Portion Described: ☐ Entire Resource ☐ Segment ☒ Point Observation **Designation:** OC-2

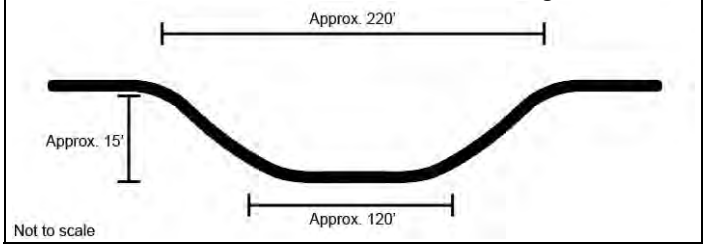
b. Location of point or segment: T30S R24E MDBM, near southeast corner of Section 15 at Tupman Road.

L3. Description: The Outlet Canal is a 9-mile-long earthen canal that is U-shaped. The path of the canal is irregular. The canal slopes and floor are vegetated with grasses and sagebrush. At this location the canal has gentle slopes. Originally used to convey water from Buena Vista Lake to the Kern Valley Water Company Canal (KVWCC), and later East Side and West Side canals, presently this segment (from the Old Headquarters Weir to roughly the East Side Canal where a modern waste weir is located) is occasionally used for groundwater recharge but is mostly dry year round.

L4. Dimensions:

a. Top Width: approximately 220 feet
b. Bottom Width: approximately 120 feet
c. Height or Depth: approximately 15 feet
d. Length of Segment:

L4e. Sketch of Cross-Section **Facing:** Northwest



L5. Associated Resources: Tupman Road bridge, California Aqueduct Tupmen Turnout.

L6. Setting: Chaparall to the south and agricultural fields to the north.

L7. Integrity Considerations: Canals and ditches belonging to the Buena Vista Water Storage District are shaped two times a year and are excavated approximately every five to ten years. The canal suffers from erosion and deposition of garbage.

L8b. Description of Photo, Map, or Drawing: Outlet Canal facing northwest.

L8a. Photograph, Map or Drawing

L9. Remarks:

L10. Form Prepared by:
H. Norby/C. Brookshear/T. Webb
JRP Historical Consulting, LLC
2850 Spafford Street
Davis, CA 95618

L11. Date: December 2012

L1. Historic and/or Common Name: Kern Valley Water Company Canal

L2a. Portion Described: ☐ Entire Resource ☐ Segment ☒ Point Observation **Designation:** KVWCC-1

b. Location of point or segment: T30S R24E MDBM, corner of Sections 9, 10, 16 and 15, at the south end of Dairy Road.

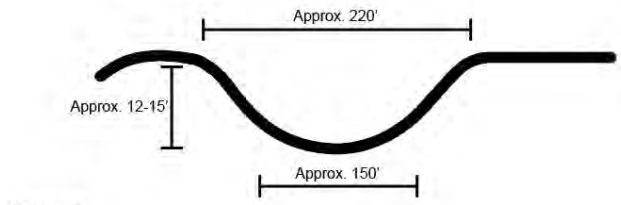
L3. Description: The Kern Valley Water Company Canal is a trapezoidal earthen canal that has an irregular path. The canal's slopes and floor are vegetated with grasses and sagebrush. The southern side is built up and resembles a levee or sand bar in areas. The height of this southern side is irregular and undulating with a gentler slope into the canal. A steel reinforced concrete weir crosses the canal at this point. The weir has thirteen gates with metal guides for angled boards. A solid concrete railing tops the weir on the eastern side. A roadway crosses the weir. A replacement metal walkway with railing added to the weir in the mid-1980s was removed (likely pilfered for scrap metal) around 2010. East of the weir is an inlet to the West Side Canal. The inlet has a concrete head wall and flanking walls. A square metal gate is raised and lowered by a screw mechanism. The gate leads to an underground culvert connecting the two canals.

L4. Dimensions:

a. Top Width: approximately 220 feet
b. Bottom Width: approximately 150 feet
c. Height or Depth: varies approximately 12-15 feet
d. Length of Segment:

L5. Associated Resources: Concrete weir, west side canal inlet.

L4e. Sketch of Cross-Section **Facing:** Northwest



L6. Setting: Chaparral to the south, agricultural fields and the west side canal to the north.

L7. Integrity Considerations: Canals and ditches belonging to the Buena Vista Water Storage District are shaped two times a year and are excavated approximately every five to ten years. The canal suffers from erosion and deposition of garbage.

L8b. Description of Photo, Map, or Drawing: Kern Valley Water Company Canal, camera facing northwest.

L8a. Photograph, Map or Drawing

L9. Remarks:

L10. Form Prepared by:
H. Norby/C. Brookshear/T. Webb
JRP Historical Consulting, LLC
2850 Spafford Street
Davis, CA 95618

L11. Date: December 2012

P3a. Descriptions (continued):

What follows are general descriptions of the canals recorded for this survey. All of the canals in the study area follow a generally northwesterly route, the natural direction that water flowed in the Buena Vista Slough. All of the following canals are currently owned and operated by the Buena Vista Water Storage District. The district grades the canals twice per year and excavates them every five to ten years. Descriptions of individual canal recordation points and comparison points, where appropriate, appear on the Linear Forms.

Individual Canal Descriptions

Kern Valley Water Company Canal - Flood Channel (KVWCC)
Originally constructed as a drainage canal and known as the Kern Valley Water Company Canal, today this waterway is simply known as the Flood Channel which accurately describes its current use. No longer used for drainage or irrigation, the channel only receives overflow waters in years of heavy flooding. The channel begins at Old Headquarters Weir in Section 15 T30S/R24E MDBM and follows a winding path for approximately 26.8 miles in a northwesterly direction along the western boundary of the Buena Vista Water Storage District, paralleling the West Side Canal. Entirely earth-lined, the channel has a variable width caused by flooding and erosion over the years. At the southern end the top width is between 108 feet and 180 feet and has a variable depth of 12 – 15 feet depending upon the height of the western levee. The canal is bounded on the east by the West Side canal. The western side is leveed above the surrounding topography with soil removed from the channel. Reshaping by bulldozers traveling perpendicular to the canal has resulted in a U-shaped cross section. Flood waters have cut meandering paths in the bottom of the canal and left silt in other areas. This form addresses approximately one mile of the canal beginning at its southern end. At present, the length of KVWCC is 141,600 feet or 26.8 miles.

Outlet Canal: (OC)
The Outlet Canal is a wide, U-shaped, earth-lined canal that meanders northwesterly approximately 9 miles north from its origin at the Buena Vista Lake bed to the Old Headquarters Weir, which presently marks the beginning of the Kern Valley Water Company Canal. When constructed, the canal diverted water from Buena Vista Lake to Kern Valley Water Company Canal, and then later to the East Side and West Side canals after they were constructed. Presently, the segment of the canal west of the East Side Canal is occasionally used for groundwater recharge but is mostly dry year round.

Miller & Lux Canals

West Side: (WS)
West Side Canal is a trapezoidal earth-lined irrigation canal that runs approximately 26.4 miles in a northwesterly direction from its origination point in Section 15 T30S/R24E MDBM where it branches off from the Short Main Canal. Water is diverted into the canal by a weir that directs the waters of the Outlet Canal into the West Side and East Side Canals. It parallels the flood channel that forms the western boundary of the Buena Vista Water Storage District. The canal acts as a main artery for the system, receiving water from drainage ditches, and supplying water to irrigation laterals. The canal slowly narrows along its path. Near its origin it is approximately 60 feet wide and 12 feet deep. Just north of its origin, it supplies Arizona Canal, and receives water from Florida Drain. West Side also receives water at two points from the California Aqueduct which runs nearby to the south. With the exception of Eighty Foot Ditch into which West Side feeds directly, the canal supplies its laterals through diversion gates. Few roads cross the canal over bridges and the canal is supplied with concrete check gates. This form addressed approximately a 0.75-mile segment commencing where it branches off from the Short Main Canal.

East Side: (ES)
East Side Canal is a wide, trapezoidal, earth-lined canal that forms the eastern boundary of the Buena Vista Water Storage District. It feeds subsidiary canals and laterals, and receives drainage water from the ditches on the eastern side of the district. It runs in a northwesterly direction for approximately 24.1 miles from its origin at the diversion weir in Section 23 T30S/R24E MDBM to its terminus at Goose Lake Canal. The canal is approximately 45 feet wide at the top and has a depth

between eight to twelve feet. Concrete and steel check dams are located along its width and culverts transport it under roads. This form address approximately 6.5 miles of the canal south of Highway 58.

Laterals

Depot Drain: (DD)

Depot Drain serves as a drainage ditch collecting water and conveying it into Main Drain on the eastern side of the Buena Vista Water Storage District. The drain, a trapezoidal earth-lined ditch, originates on the border of Sections 33 and 34 in T29S/R24E MDBM and cuts a one-mile path directly west before heading northwest for the remainder of its approximately 5.9 mile length. The path of the drain is less meandering than the other canals in the study area; its route is punctuated by ninety degree turns and straight stretches. When the drain reaches Highway 58 to the north, it heads west and feeds into Main Drain. The canal widens and deepens along its route beginning at about 15 feet wide and increasing to 24 feet near its end. The ditch is conveyed under roadways through round culverts and water is deposited into the canal by corrugated pipes that collect water in the fields. This form addresses a quarter-mile segment that runs west from its beginning point (border of Sections 33 and 34 in T29S/R24E MDBM). Presently, the overall length of Depot Drain is 31,000 feet or 5.9 miles.

Deep Wells Ditch: (DWD)

Deep Wells Ditch originates at its junction with East Side Canal in Section 34 T29S/R24E MDBM. It extends directly west along the north side of Stockdale Highway for approximately 1.5 miles before heading northwest in a circuitous route for its remaining 3.2 mile stretch. It ends abruptly in a field at a point in Section 30 T29S/R24E MDBM. The canal is trapezoidal and earth-lined. The canal narrows as it continues to the northeast from approximately 30 feet wide along Stockdale Highway to 25 feet at Brite Road. Two small farm bridges cross the canal along Stockdale Highway providing access to residential homes. As the canal continues northwest of Stockdale Highway, a few farm bridges cross it, and there are a few concrete check gates along the length. This form addresses a 1 mile segment that parallels Stockdale Highway beginning approximately 500 feet west of the East Side Canal. Presently, the overall length of Deep Wells Ditch is 24,800 feet or 4.7 miles.

Short Main Canal (SM)

The Short Main Canal originates at the East Side Canal and extends approximately 0.95 miles directly west where it turns southwest for an additional 0.24 miles passing. It then turns northwest for about 85 feet where a flow control gate, constructed ca. 2010-2011, marks its end and the beginning of West Side Canal. A total length of approximately 1.3 miles, the earth-lined trapezoidal canal crosses under Tupman Road and is paralleled intermittently to the north and south by farmer's ditches. The canal flows west from the East Side Canal and is one source of water for the West Side Canal.

Cass Ditch (CD)

Cass Ditch originates at its junction with East Side Canal in Section 33 T29S/R24E MDBM. It extends west through agricultural fields for approximately 1 mile to Dunford Road where it is crosses under the road via a culvert. The canal then takes a northerly approach, paralleling the west side of Dunford Road to its end at Brite Road. Originally, this ditch extended north of Brite Road connecting with the East Side Drain; however that portion of the ditch (north of Brite Road) was removed in 1965 and the section west of Dunford Road was subsequently realigned. The overall length of Cass Ditch is approximately 1.4 miles. This form addresses the 0.75 mile segment from its origin at the East Side Canal.

B10. Significance (continued):

Historic Context

Canal system under Miller & Lux

In 1851 the federal government removed San Joaquin Valley tribes from the region, opening it to settlement under federal land law. These laws fundamentally shaped the early history of Kern County. The study area, located along the Buena Vista Slough and the marshy area connecting Buena Vista Lake and Tulare Lake, was granted to the State of California under the Arkansas Act of September 28, 1850, whereby Congress ceded to certain states the swamp and overflowed lands on the public domain within their borders. The state was to use the proceeds from the sale of such lands to reclaim them, thereby making them useful to the new landowners. The land act was subject to abuse and fraud. The seasonal nature of swamp land in California led to disagreements between state and federal surveyors regarding the boundaries of swamp land. In some instances parcels sold as "dry" by the federal government were also sold by the state as swamp and overflowed. In the end the state made its own surveys in the area and on December 5, 1871, the Secretary of the Interior accepted the state's proposed boundaries.

The state also struggled to find a means of reclaiming the swamp lands. Rules on transfer of swamp and overflowed lands changed over the years, and by 1868 basically required payment of $1.00 per acre, which was refundable if the land was reclaimed. [1] Under these provisions, Henry Miller, Charles Lux, John Redington, Horatio Stebbins, F.A. Tracy, H.L. Bonestell, and Horatio Livermore amassed their acreage on the lower Kern River west of Bakersfield. They acquired swampland certificates of purchase from would-be settlers or from local agents like Julius Chester, Duncan Beaumont, Richard Stretch and Thomas Baker, whose earliest claims in the area dated to January 28, 1870.[2] In this manner, Miller & Lux secured their "Southern Division" surrounding Buttonwillow in Kern and Kings Counties.

The partnership between Henry Miller and Charles Lux, both German immigrants, began in San Francisco where they both worked as butchers in the early 1850s. They cemented their business partnership in 1858 when they joined forces to purchase a herd of Texas cattle. From that point forward they sought western lands to purchase for the purpose of operating ranches for their increasing herds.[3] After acquiring their Southern Division, they organized it into ranches, the largest being the Buttonwillow Ranch which served as the headquarters of that division. Originally, the complex known as "Old Headquarters" lay in the south at the base of Tupman Road before Miller & Lux moved to Buttonwillow in 1885. The Buttonwillow Ranch consisted of 52,440 acres and the study area lies entirely within its former limits. The area operated under this single ownership from the 1870s until 1927, when Miller & Lux Incorporated started selling the land.[4]

The system of drainage, irrigation, and flood control canals built by Miller & Lux has left an enduring legacy in the area. While some of their southern lands could immediately accommodate their herds of cattle, other areas required an output of time, money and effort, primarily in the form of water control features. Construction of the drainage and irrigation canals was critical to the reclamation efforts of their newly acquired swampland along the Buena Vista Slough. If the waters of the Kern River could be diverted away from the slough, the swamp could be dried and then irrigated. Under the Arkansas Act, Buena Vista Slough was to be reclaimed as a part of the purchase agreement. In accordance with Assembly Bill 54 of 1861,

[1] The Arkansas Act's early history and administration in California is summarized in John Thompson, "The Settlement Geography of the Sacramento - San Joaquin Delta, California." Ph.D. Diss., Stanford University, 1958. Chapter 8, 185-207. The Green Act of 1855 also removed limits on acreage allowing the assembly of large tracts. After 1868 the counties' boards of supervisors served as reclamation commissioners. The purchase price ($1.00 per acre) was paid into the county's swampland fund, but the county swampland commissioners could waive payment if independent commissioners attested that the land had been reclaimed and cultivated for three years. Upon the selection of a parcel, a settler received a certificate denoting their claim; a certificate of purchase upon partial payment; and a state patent for the lands followed upon completion of payments and reclamation.

[2] Margaret Aseman, Cooper [Zonlight], Land, Water and Settlement in Kern County, California, 1850-1890 (New York: Arno Press), 1979.

[3] Igler, 2001, Introduction.

[4] Settlers claiming tracts on dry lands nearer to Bakersfield resorted to other federal land patenting laws to obtain their lands. These included homestead entries, Desert Land Act filings, cash entries, and purchases from the Southern Pacific Railroad, which received patent to odd-number sections along its right of way through the San Joaquin in a strip extending ten miles on either side of the line in Kern County in April of 1876. Haggin acquired substantial acreage from the railroad, and through allies amassed a large quantity of public lands through homestead, cash entry, and Desert Land Act filings; Thomas H. Means, "Report on Farming Lands Miller & Lux, Inc. Southern Division Kern and Kings Counties California, October 1919, pg. 8.

Swampland District 121 was formed in May 1871, including swamplands along Buena Vista Slough. Miller & Lux, along with a few others who had pastured their cattle in the slough, organized the Kern Valley Water Company in 1876. The Kern Valley Water Company acted as agents for the district. The principle works of the company would be canals for irrigation and for reclamation, known as the Kern Valley Water Company Canals. The largest of these, a canal that would simply be known as the Kern Valley Water Company's Canal was a massive canal dug in 1877 to drain the slough on the west side.[5]

Miller & Lux's attempts to control the Buena Vista Slough through construction of the KVWCC played a role in the events that led to the landmark water rights case, *Lux v. Haggin*. Canal construction was completed in 1878, and Miller & Lux found themselves with a massive canal bed that had no water and 10,000 head of cattle facing starvation. Although 1876-77 had been a drought season, they quickly accused upstream diversions of water from the Kern River as being the cause of their water scarcity. In the years just prior to the arrival of the railroad, irrigationists diverting water from the Kern River had a number of canals either planned or under construction to water their lands in western Kern County. Among these were the Kern Island Canal (ca. 1870), James Canal (1871), Gates Canal (1872-73), Stine Canal, Pioneer Canal, Beardsley Canal (1873), and Calloway Canal (1874-75).[6]

In particular, the Calloway Canal and the Kern Island Canal, both controlled by their rivals in the Kern Land Company by the end of the 1870s, became the focus of Miller & Lux's ire. They formed the Riparian Suits Association as their legal arm and began filing actions against Haggin, Carr, and other upstream diverters to stop their consumption of the river's flows before it reached lands Miller & Lux et al. claimed to be riparian lands.[7] The case was a far-reaching conflict that included, as either plaintiff or defendant, what appeared to be most of the principal landowners and water users in the region. Ultimately, control of Kern River water was hammered out in an 1888 compromise that became known as the Miller-Haggin agreement. Amendments have been made to the agreement over the years, but it is still a basic document regarding division of water in the area.[8]

The system created during the Miller & Lux period consisted of canals dug and maintained by Miller & Lux, and a system of laterals dug and maintained by individual tenant farmers. After constructing a main flood control canal along the west side of the swamp, Miller & Lux also constructed East Side and West Side canals for distribution, sometime prior to the early 1890s. As their names indicate, these canals bordered the east and west sides of Buttonwillow Ranch, with West Side Canal running closely parallel to the KVWCC. Much smaller than the flood canal, the West Side was only 30 feet wide and two feet deep, and the East Side was 25 feet wide and three to five feet deep. Today the East Side Canal is 45 feet wide and ten to twelve feet deep. Miller & Lux also constructed a drainage canal, called Main Drain, from the southern end near the old headquarters northerly through the center of the ranch, generally along the line of the original Buena Vista Slough, between 1916 and 1918.[9] Farmers used the water from Main Drain, collected primarily by seepage, for irrigation. The remainder of

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[5] Assembly Bill 54, "An Act to provide for the Reclamation and Segregation of Swamp and Overflowed, and Salt March and Tide Lands, donated to the State of California by Act of Congress" was passed on May 31, 1861 and crated a Board of Swamp Land Commissioners who in turn authorized the creation of Swampland Districts. The districts, geographically similar areas, then had the ability to levy taxes and fees to fund reclamation projects. Robert Kelley, *Battling the Inland* Sea (Berkeley, California: University of California Press, 1989) 42-48; Miller, Mary Catherine, *Law and Entrepreneurship in California: Miller & Lux and California Water Law, 1879-1928, pg. 39;* United States Geological Survey, *Water Supply and Irrigation Papers, No. 17*, 1898, pgs. 61-63;

[6] C.E. Grunsky, USGS, *Irrigation Near Bakersfield, California*, WSP 17, 48-58.

[7] Igler, *Industrial Cowboys,* 101.

[8] Norris Hundley, *The Great Thirst: Californians and Water, 1770s-1990s* (Berkeley: University of California Press, 1992), 94. Hundley cites two sources for his comment: Edward F. Treadwell, *The Cattle King*. rev. ed. (Boston: Christopher Publishing House, 1950), 362; and *Bakersfield Californian*, April 23, 1881. The Treadwell book does not mention such a proposal; its discussion of *Lux v. Haggin* can be found (in the 1931 edition) in Chapter IX, "The Swamp of the Kern," 78-94; Construction of the KVWCC played a role in the litigation that led to the seminal *Lux v. Haggin* decision. The canal represented a significant investment of capital by Miller & Lux and the Kern Valley Water Company. When it failed to save 10,000 head of cattle grazing along the slough from death by starvation, Miller & Lux began to litigate. Their capital investment in the canal, combined with a failed expectation that it would save their grazing cattle, was arguably the final straw in provoking Miller & Lux to turn litigious. While this canal may represent a "final straw" it does not, however, stand alone as the only canal significant to this case. The upstream canals diverting water before it reached Miller & Lux's property also had a crucial role in setting the scene of the conflict. One particular canal or water diversion alone could not have been entirely responsible for *Lux v. Haggin.* Numerous conditions converged in Kern County to produce this fierce litigation over water.

[9] Harry Barnes, "Data on Irrigation of Buttonwillow Ranch and adjacent lands," 1920, 9.

the canals and laterals in the area, like Deep Wells Ditch, were primarily works of individual farmers and Miller & Lux farm divisions in the area, who connected to the main canal system for irrigation of their crops.[10]

The canal system allowed Miller & Lux to support settlement in the area. By 1919 Miller & Lux farmed the entire area south of Buttonwillow between East Side and West Side Canals south to Old Headquarters. Four ranches were established in the area adjoining major canal works.

Buena Vista Water Storage District Period

Miller & Lux, Incorporated had accumulated valuable land and water rights. However, neither was profitable without the other. In order to sell the land, a means of providing water with to the land was necessary. In 1920 the California State Engineer released a report on the water resources of the Kern River and recommended that a large district, including the Haggin and Miller & Lux water rights, be formed to manage water distribution. Despite the effective implementation of the Miller-Haggin agreement, the two parties chose to protect their interests by forming separate districts.[11] Miller & Lux's holdings became the nucleus of the Buena Vista Water Storage District. The district submitted a petition for formation to the State Engineer in 1922 and received approval in 1924.[12] As a part of district formation, Miller & Lux linked water rights to the land within the district, making future sales possible. The district exchanged bonds with Miller & Lux for the existing canals and sold additional bonds for construction of new canals. The district, however, postponed construction until 1926 to see if it could work with other Kern River users to construct a mountain storage reservoir. Without progress, the district left the location of water storage flexible and continued operations using Buena Vista Lake. The first major construction project was to lessen water loss at the end of the Kern River through construction of a direct connection to the canal system and a direct canal to Buena Vista Lake. Additional construction would later focus on the northern portion of the district, as the southern end around Buttonwillow had already been developed by Miller & Lux.[13]

The district acquired all the canals in the study area, including flood water canals, irrigation canals, drainage canals, and associated water control features. The Kern Valley Water Company Canal (Miller & Lux owned 86% of the company) was the largest canal the district acquired in the area, and stretched northwesterly from Old Headquarters Weir in the southern part of the study area. Constructed for flood control, the canal continued to perform that occasional function. The canal was described as "expensive of maintenance" in the years when floods caused its levees to require significant repairs, it was also acknowledged that it accrued benefits to all of the lands below Wasco. The drainage system included Main Drain bisecting the area between the East Side and West Side Canals, and various shallow ditches that collected water from sloughs or other low places where water accumulated and delivered it back to Main Drain or other irrigation canals.[14]

Despite the changing crops in the study area, the extensive network of canals constructed during the Miller & Lux period remained a largely sufficient source. With the advent of ground water pumping, farmers used the canals to move water from the wells to their fields, a practice which continues today. Several years of irrigation raised the water table in the area to less than six feet for almost 95% of the Buttonwillow area by 1943. This rapid rise from 1935 levels called for improvements to the drainage system, including improvements of the Main Drain. Between 1943 and 1944 4.8 miles of new drains were constructed in the water storage district. The drains also needed improvements to remove obstacles to water flow. Culverts and bridges added as the road system developed were insufficient to keep the water flowing. Redwood culverts and corrugated metal pipe culverts, some installed by Miller & Lux, began to be replaced. The Buena Vista Water Storage district also instituted a canal maintenance program in 1943 which called for regular hand maintenance, and mechanized

[10] Miller, *Law and Entrepreneurship in California*, 1982, 39*;* USGS, *Water Supply and Irrigation Papers, No. 17*, 1898, 61-63; *Memorial and Biographical History of the Counties of Fresno, Tulare and Kern, California* (Chicago: The Lewis Publishing Co, 1892).
[11] S.T. Harding, "Report on Bond Issue of the Buena Vista Water Storage District," April 1935, 5, 7.
[12] Harmon S.Bonte, *Financial and General Data Pertaining to Irrigation, Reclamation and other Public Districts in California, (*Sacramento: Department of Water Resources, Bulletin No. 27, 1930), 243.
[13] Harding, "Report on Bond Issue of the Buena Vista Water Storage District," 5-8.
[14] W. C. Hammett, "Report on Revaluation of Physical Properties to be acquired by Buena Vista Water Storage District," Sept. 4, 1926, San Francisco, 16-17.

maintenance every four years. Today, the canals are reshaped twice a year and re-excavated approximately every five years.[15] To ease mechanized farming, ditches and drains have been rerouted around the edges of fields within the district.[16]

Larger changes occurred to the water supply for the canals. The unsuitability of Buena Vista Lake for water storage had been a concern of the district from the beginning. The district had delayed construction of new canals to the lake for two years hoping to work with other districts to form a mountainous reservoir. The Army Corps of Engineers developed plans for Lake Isabella in the 1930s, but World War II delayed construction. The dam was finally completed in 1953. While the dam provides a reservoir for irrigation water, its main role is flood prevention.[17] The system also receives water from the California Aqueduct.

Individual Canal Histories and Evaluations

Miller & Lux Canals

Kern Valley Water Company Canal: (KVWCC)

After the Kern Valley Water Company was organized for the reclamation of the Buena Vista Slough, S. W. Wible was put in charge as engineer. Wible acquired his engineering experience in the mines of El Dorado, Amador, and Calaveras Counties before going on to work for the city of San Francisco on an extensive water system. After moving to Kern County in 1874 he undertook the engineering of the Wible and Pioneer Canals before going to work for the Kern Valley Water Company. The massive size of the canal he engineered for them was intended to drain the water of the Kern River from the slough and also feed irrigation laterals. When first constructed, it extended 26 miles northwesterly up the slough from Old Headquarters, had a top width of 250 feet, bottom width of 125 feet, and was 7 feet deep. By 1893 the canal was 12 feet deep.

A series of four numbered timber weirs built on the KVWC Canal regulated the flow of water. Approximately 4 miles apart, each weir could be closed, forming a reservoir behind it whose water could then be channeled into canals for distribution. The weirs also functioned to slow the flow of water down the canal as it proceeded northwesterly up the slough. In the early years of the canal, flood waters from the Kern River posed a constant threat to the canal's water control features. In 1878, within three months of the canal's completion, water split its headgates. An 1898 map indicates four weirs along the canal, however, Grunsky's water supply report that year states that three of the four weirs were washed out, leaving only one remaining.[18]

Faced with constant repairs and expense, Miller & Lux made the decision to invest in only one of the weirs, the one located nearest their old headquarters, "Weir No. 1." Originally, the KVWC Canal was meant to serve as a flood canal and a distribution canal. After the West Side Canal was constructed as a distribution canal parallel to the KVWC Canal, it lost its distribution function. This meant that weirs two, three, and four were no longer needed in order to form reservoirs. The first weir, however, was crucial for diverting water into both the East and West Side Canals.

In order to combat the costly and time consuming repairs to the timber weir, Miller & Lux commissioned consulting engineers, Leonard & Day to design a reinforced concrete structure to serve as both weir and bridge over the massive flood control canal. The resulting structure, built in 1911, was a flat span bridge and weir combination. It spanned 163 feet, was 19 feet from bottom to bridge slab and had a thirteen foot roadway across the top. A series of simple columns lined each side of the roadway serving as ornamentation and connectors for a rope guard.

In 1914 Miller & Lux and the Carmel Cattle Company collaborated to improve the irrigation system on the Buttonwillow Ranch. On August 20, 1914 they entered into an agreement stipulating the lands owned by each, their water rights based on the Miller-Haggin Agreement, and plans for work on irrigation structures. Their primary concern was the northern six-mile stretch of the Kern Valley Water Company Canal that had been deemed inadequate for proper flood control. After entering

[15] Raznoff, *Drainage Investigations Buttonwillow Area of Kern County, California*, 16, 18-19, Map 2.
[16] USGS, *Buttonwillow Quadrangle*, 1954 photorevised 1973; USGS, *East Elk Hills Quadrangle,* 1954 photorevised 1973.
[17] Department of Water Resources, *Bulletin No. 17 Dams Within the Jurisdiction of the State of California*, Resources Agency of California, Department of Water Resources, 1962, A-4, A-5.
[18] Kern County Map, 1898; Igler 99, 117; Grusky, WSP 17, 62.

into the agreement, work began on repairing the faulty stretch and extending the canal north. The new section of canal became known as the Kern Valley Reclamation Company's Canal.[19]

When the Buena Vista Water Storage District acquired the canal and its associated water control features, they identified the Kern Valley Water Company's Canal as both asset and liability. A report on the revaluation of the physical properties they were to acquire noted that the channel performed the function of flood control and "while the floods are not of annual occurrence they occasionally come in such volume as to be disastrous in their effects. The canal is therefore expensive of maintenance, and during and after each of these floods requires the replacement of considerable levee work."[20] In calculating the value of their canal acquisitions, they used a formula that involved the quantity of excavated material for each canal. The report stated that they did not even attempt to determine excavated quantities for the Kern Valley Water Company Canal because in places flood waters had eroded the channel to hundreds of feet wide in places and the original channel could not be determined.[21]

Today, the Kern Valley Water Company Canal serves the same purpose it did when the Buena Vista Water Storage District acquired it in 1926, occasional flood control. The district refers to the canal as the "flood channel" or simply, "the channel." Flooding in the 1970s and 1980s required additional maintenance of the canal to remove debris and control vegetation. BVWSD files contain photographs of maintenance efforts including bulldozers reshaping the canal.[22]

The Kern Valley Water Company Canal (constructed in 1876) and the later East Side and West Side canals, along with the Kern Island Canal (ca. 1870), and Calloway Canal (1874-75), precipitated the seminal *Lux v Haggin* litigation which has shaped California water rights. However, on its own the KVWCC, like the Outlet Canal, East Side Canal and West Side Canal, is not significant for its role in the litigation. The upstream canals diverting water before it reached Miller & Lux property also had a role in setting the scene of the conflict. One particular canal or water diversion alone could not have been entirely responsible for *Lux v. Haggin*. Numerous conditions converged in Kern County to produce this fierce litigation over water. The shifting course of the Kern River, the construction of numerous canals and ditches diverting water from the river, and the competing interests of two large-scale landholders combined produced lengthy litigation. For this reason, KVWCC is not eligible under NRHP Criterion A and CRHR Criterion 1.

Under NRHP Criterion B and CRHR Criterion 2 the KVWCC is not associated with a significant individual. While the canal was constructed under the auspices of Miller & Lux it is not directly associated with either of those individuals. Miller & Lux constructed numerous canals throughout their holdings to irrigate feed crops. While Henry Miller did visit most of his holdings including Buttonwillow, most of his time was spent in San Francisco or his home ranch, near Gilroy, which are more appropriately associated with him and his business.

Under NRHP Criterion C and CRHR Criterion 3 the KVWCC is not a significant example of a type, period, or method of construction nor is it a significant example of the work of a master. The canal was designed by S.W. Wible, a civil engineer who designed mines in El Dorado, Amador, and Calaveras Counties before coming to Kern County, where he designed both the Pioneer and Wible canals before designing the KVWCC. Despite his engineering knowledge, the KVWCC is not significant for its design or construction. Lastly, this property does not appear to be a source, or likely source, of important information regarding history, and is therefore not eligible under NRHP Criterion D and CRHR Criterion 4. In addition, this canal lacks integrity to any historical period of significance, owing to regular realignment, reshaping, and replacement of control structures

Outlet Canal (OC)

After constructing the main flood control canal along the west side of the swamp in the 1870s, Miller & Lux also constructed Outlet Canal, which conveyed water from the Buena Vista Lake to the Kern Valley Water Company Canal. When the East Side and West Side canals were completed a few years later, the Outlet Canal became the source of water for

[19] J. E. Woolley, "Review of River History and Second Point Water Rights," 13 May 1963, unpublished report, Buena Vista Water Storage District company archives, pgs. 12-15; "Miller & Lux Incorporated and Carmel Cattle Company," Agreement, 20 August 1914.
[20] W. C. Hammett, "Report on Revaluation of Physical Properties to be acquired by Buena Vista Water Storage District," 4 Sept. 1926, pg. 13.
[21] Hammett, "Report on Revaluation," 1926, pg. 5.
[22] Telephone interview with David Hampton, February 12, 2009.

those two canals as well. As constructed, the canal followed the general alignment of the natural Buena Vista Slough, meandering more than 9 miles northwest to "Weir No. 1" at the old headquarters. At its confluence with the East Side Canal, a wood weir was constructed to control water flow. In 1919, the flow of the Outlet Canal and was controlled by a two wood weirs, one located near Buena Vista Lake, and the other at its confluence with the East Side Canal. Both weirs have since been replace with modern structures. In the 1970s the Outlet Canal ceased its function as the source of water for the Kern Valley Water Company Canal, and East Side and West Side canals and presently is only used occasionally for groundwater recharge but is mostly dry year round.

Under NRHP Criterion A and CRHR Criterion 1 the Outlet Canal lacks historical significance for its association with the *Lux v. Haggin* litigation. Like the KVWCC, it was one of several contributing factors for the litigation. Under NRHP Criterion B and CRHR Criterion 2 the Outlet Canal is not associated with a significant individual. While the canal was constructed under the auspices of Miller & Lux it is not directly associated with either of those individuals. Under NRHP Criterion C and CRHR Criterion 3 the Outlet Canal is not a significant example of a type, period, or method of construction nor is it a significant example of the work of a master. The canal was constructed using standard methods of the time period and is not a master work of S.W. Wible. Lastly, this property does not appear to be a source, or likely source, of important information regarding history, and is therefore not eligible under NRHP Criterion D and CRHR Criterion 4. In addition, this canal lacks integrity to any historical period of significance, owing to its regular realignment, reshaping, and replacement of control structures.

West Side: (WS)

After constructing the main flood control canal along the west side of the swamp, Miller & Lux also constructed portions of East Side and West Side Canals for distribution, sometime prior to the early 1890s. The intent of the West Side Canal was to collect and drain water. The canal was wide and shallow approximately 30 feet wide and two feet deep. In 1912 the canal ended in Section 27 T28S/R23E MDBM. Miller & Lux records indicated problems with the planned system in 1916, "this year's experience has proved that we cannot depend on the East Side Canal and 17th canal to supply water west of the main drain, as the demands for water east of the main drain are too great."[23] A rapid program of expansion, lengthening the canal north of its former terminus and reconstructing the wooden headgates was undertaken to provide enough water for the 1917 crops.

Additional construction and maintenance under the control of the BVWSD resulted in the replacement of old weirs and headgates of the canal with modern concrete structures. The water supply for the canal has also been altered. Water previously entered the canal from Outlet Canal to the southeast. Since 1973 water has entered the canal from the Short Main Canal that connects the East Side and West Side Canal.

Under NRHP Criterion A and CRHR Criterion 1 the West Side Canal lacks historical significance for its association with the *Lux v. Haggin* litigation. Like the KVWCC, it was one of several contributing factors for the litigation. Under NRHP Criterion B and CRHR Criterion 2 the canal is not significant for its association with the individual partners of Miller & Lux. The canals are a result of the organization not the individuals. Under NRHP Criterion C and CRHR Criterion 3, the canal was constructed using standard methods of the time period and is not a master work of S.W. Wible. Lastly, this property does not appear to be a source, or likely source, of important information regarding history, and is therefore not eligible under NRHP Criterion D and CRHR Criterion 4. In addition, this canal lacks integrity to any historical period of significance, owing to its regular realignment, reshaping, and replacement of control structures.

East Side: (ES)

The East Side Canal was also constructed by the Kern Valley Water Company under the direction of S.W. Wible in the late 1870s. Initially, the East Side Canal was to serve as the primary irrigation canal for the Buttonwillow Ranch, while the KVWCC was to drain the slough on the western side. In 1898 the canal was 25 feet wide and three to five feet deep. At its intake from the Buena Vista Slough a regulating gate with vertical flashboards controlled water flow and also functioned as a road bridge.

[23] Miller & Lux to E.F. Ogle at Buttonwillow, April 6, 1916, Flood Canal Levees and West Side Canal 1916, Carton 694, Miller & Lux Papers, Bancroft Library, University of California, Berkeley.

As of 1920 the East Side Canal had a 25-foot wide timber flash board headgate that served an intake from Outlet Canal. Starting in 1918 through at least 1920, Miller & Lux had extensive work done to the canal. A levee was constructed along the East Side Canal north of the Southern Pacific Railroad tracks running through Buttonwillow. Extensive excavation was performed on the canal to increase the working capacity of the canal from 100 second feet to 300 second feet throughout.[24]

When the BVWSD acquired East Side Canal in 1926, the canal was 27 miles long and served as the main artery on the east side of the district, supplying with few eastern exceptions, irrigation canals on its west side. At the time, most of the control structures on the entire canal system were of wood construction. There were also a few concrete structures present, at Old Headquarters Weir and a few small concrete drops.[25] The historical record is not dispositive on exactly when the abutments were made. Aerial photographs taken in 1942 show a check dam at the location of the extant check dam south of Bishop Ditch.[26] The check dam currently has abutments made of board-formed concrete that could date to the Miller & Lux period, however the gates and footbridge are modern additions that BVWSD installed in 1987.[27] On the other hand, a BVWSD engineer stated that the concrete work on the check dam was constructed in 1967.[28] The drop at the end of Buerkle Road is a modern concrete structure that may have replaced one of the older wooden structures.

Under NRHP Criterion A and CRHR Criterion 1 the East Side Canal lacks historical significance for its association with the development of and subsequent success of irrigation in western Kern County or with the *Lux v. Haggin* litigation. This canal was one of many canals, wells, weirs, and other water structures that enabled western Kern County to develop successful agriculture. East Side Canal is not directly responsible for that success, but rather one of many factors leading to that result. Also, like the KVWCC, it was one of several canals that led to the important *Lux v. Haggin* litigation and does not have direct associations with the case. Under NRHP Criterion B and CRHR Criterion 2 the canal is not significant for its association with the individual partners of Miller & Lux. The canals are a result of the organization not the individuals. Research did not reveal any other direct associations between East Side Canal and a person important to history at the national, state, or local level. Under NRHP Criterion C and CRHR Criterion 3, the canal was constructed using standard methods of the time period and is not a master work of S.W. Wible. Lastly, this property does not appear to be a source, or likely source, of important information regarding history, and is therefore not eligible under NRHP Criterion D and CRHR Criterion 4. In addition, this canal lacks integrity to any historical period of significance, owing to its regular realignment, reshaping, and replacement of control structures.

Short Main Canal (SM)

The Short Main Canal was constructed as part of the present-day Main Canal, which was constructed by Kern Valley Water Company in the nineteenth century. Its exact construction date in unknown; however, it was constructed as an addition to the Main canal. BVWSD obtained its right of way from Miller & Lux in 1929. The canal delivers water from East Side Canal to the West Side Canal and is also a source of irrigation for adjacent farmland. Both of its control gates (at West Side Canal and East Side Canal) are of modern construction.[29] Under NRHP Criterion A and CRHR Criterion 1 the Short Main Canal lacks historical significance for its association with the *Lux v. Haggin* litigation. Like the KVWCC, it was one of several contributing factors for the litigation. Under NRHP Criterion B and CRHR Criterion 2 it is not associated with a significant individual. Under NRHP Criterion C and CRHR Criterion 3 the Short Main Canal is not a significant example of a type, period, or method of construction nor is it a significant example of the work of a master. The canal was constructed using standard methods of the time period. Lastly, this canal does not appear to be a source, or likely source, of important information regarding history, and is therefore not eligible under NRHP Criterion D and CRHR Criterion 4. In addition, this

[24] Harry Barnes, "Data on Irrigation of Buttonwillow Ranch and Adjacent Lands," 1920, WRCA Berkeley, 7-8; Bancroft Library, Miller & Lux, CG-163, Buttonwillow Files, Carton 694, East Side Canal, 1916-1919.
[25] Harry Barnes, "Data on Irrigation of Buttonwillow Ranch and adjacent lands, 1920, pg. 23.
[26] Aerial Photographs, Kern County, ABL-2B-174, 1942.
[27] Carl W. Condit, *American Building: Materials and Techniques from the Beginning of the Colonial Settlements to the Present* (Chicago: University of Chicago Press, 1982), 158-159.
[28] Correspondence from David Hampton, BVWSD to Heather Norby, JRP, January 21, 2011.
[29] David Hampton, Buena Vista Water Storage District, personal communication with Toni Webb, JRP Historical Consulting, LLC, December 11, 2012.

canal lacks integrity to any historical period of significance, owing to its regular reshaping and replacement of control structures.

Farmer-dug Canals/Laterals

The lateral canals and drains in the area were primarily the works of tenant farmers or ranch employees who sought to hook into the main canal system for irrigation of individual farms and ranches. The Miller & Lux papers at the Bancroft Library do not provide documentation on the individual laterals. While the 1912 USGS Buena Vista Quadrangle does not show the lateral canals, property ownership maps from the period do show a system of shifting lateral canals. USGS mapping from the 1930s indicates that the system of laterals was more extensive than the current system. Engineering reports indicate that all of the following canals/ditches except Depot Drain were part of the Buena Vista Water Storage district's acquisitions in 1926.

Depot Drain: (DD)
Depot Drain was not one of the existing canals acquired by BVWSD in 1926. Rather, portions of its current route appear as two separate ditches in mapping from the early 1930s. The path of the drain meandered through the east side of the district. By 1942 the ditches were joined, the drain named, and the path of the ditch was closer to its modern route, cutting in straight diagonals through fields and following roads along cardinal directions. Additional straightening has occurred through the period between 1954 and 1973.[30]

Under NRHP Criterion A and CRHR Criterion 1 the drain is not significant for its association with irrigated agriculture around Buttonwillow. The drain is one of several laterals constructed by the Buena Vista Water Storage District following the subdivision of Miller & Lux holdings. At that time irrigated agriculture had already been practiced in the area for over 40 years. Under NRHP Criterion B and CRHR Criterion 2 the drain is not significant for its association with any individual, having been constructed by the Buena Vista Water Storage District. Under NRHP Criterion C and CRHR Criterion 3, the canal was constructed using standard methods of the time period. Lastly, this property does not appear to be a source, or likely source, of important information regarding history, and is therefore not eligible under NRHP Criterion D and CRHR Criterion 4. In addition, this canal lacks integrity to any historical period of significance, owing to its regular realignment, reshaping, and replacement of control structures.

Deep Wells Ditch: (DWD)
Deep Wells Ditch, also known as Deep Wells Canal, was associated with the irrigation of Miller & Lux's Deep Wells Ranch. It originated from the East Side Canal and between Stockdale Highway and Brite Road it divided into three paths, one of which connected to Depot Ditch near Deep Wells Ranch. When the BVWSD acquired the canal in 1926 it was approximately six miles long. The ditch was originally consolidated along its eastern path connecting with Depot Drain and then Main Drain. Between 1937 and 1952 it was rerouted along its western route paralleling Main Drain. Today, the canal ends closer to the point of the former Deep Wells Ranch and measures approximately 4.7 miles long.[31]

Under NRHP Criterion A and CRHR Criterion 1 the canal is not significant for its association with irrigated agriculture around Buttonwillow. The canal is one of many farm-dug laterals constructed during the Miller & Lux era providing needed drainage and irrigation. Deep Wells Ranch was one of several satellite ranches in the Buena Vista Slough under the management of the Buttonwillow headquarters. Under NRHP Criterion B and CRHR Criterion 2 the drain is not significant for its association with the individual partners of Miller & Lux. The canal is a result of the organization not the individuals. Under NRHP Criterion C and CRHR Criterion 3, the canal was constructed using standard methods of the time period. Lastly, this property does not appear to be a source, or likely source, of important information regarding history, and is

[30] Hammett, *Report on Revaluation of Physical Properties*, 1926; Buena Vista Water Storage District, District Boundary Map, July 2003; USGS Quadrangles, *Buttonwillow 1932, 1942, 1954, 1954 photorevised 1973; East Elk Hills, 1933, 1954, 1954 photorevised 1973;* Aerial Photographs, Kern County, 1942.
[31] W. C. Hammett, *Report on Revaluation of Physical Properties to be Acquired by Buena Vista Water Storage District*, Sept. 4, 1926 (San Francisco); Buena Vista Water Storage District, District Boundary Map, July 2003; USGS Quadrangles, *Buttonwillow 1932, 1942, 1954, 1954 photorevised 1973; East Elk Hills, 1933, 1954, 1954 photorevised 1973;* Aerial Photographs, Kern County, 1942.

therefore not eligible under NRHP Criterion D and CRHR Criterion 4. In addition, this canal lacks integrity to any historical period of significance, owing to its regular realignment, reshaping, and replacement of control structures.

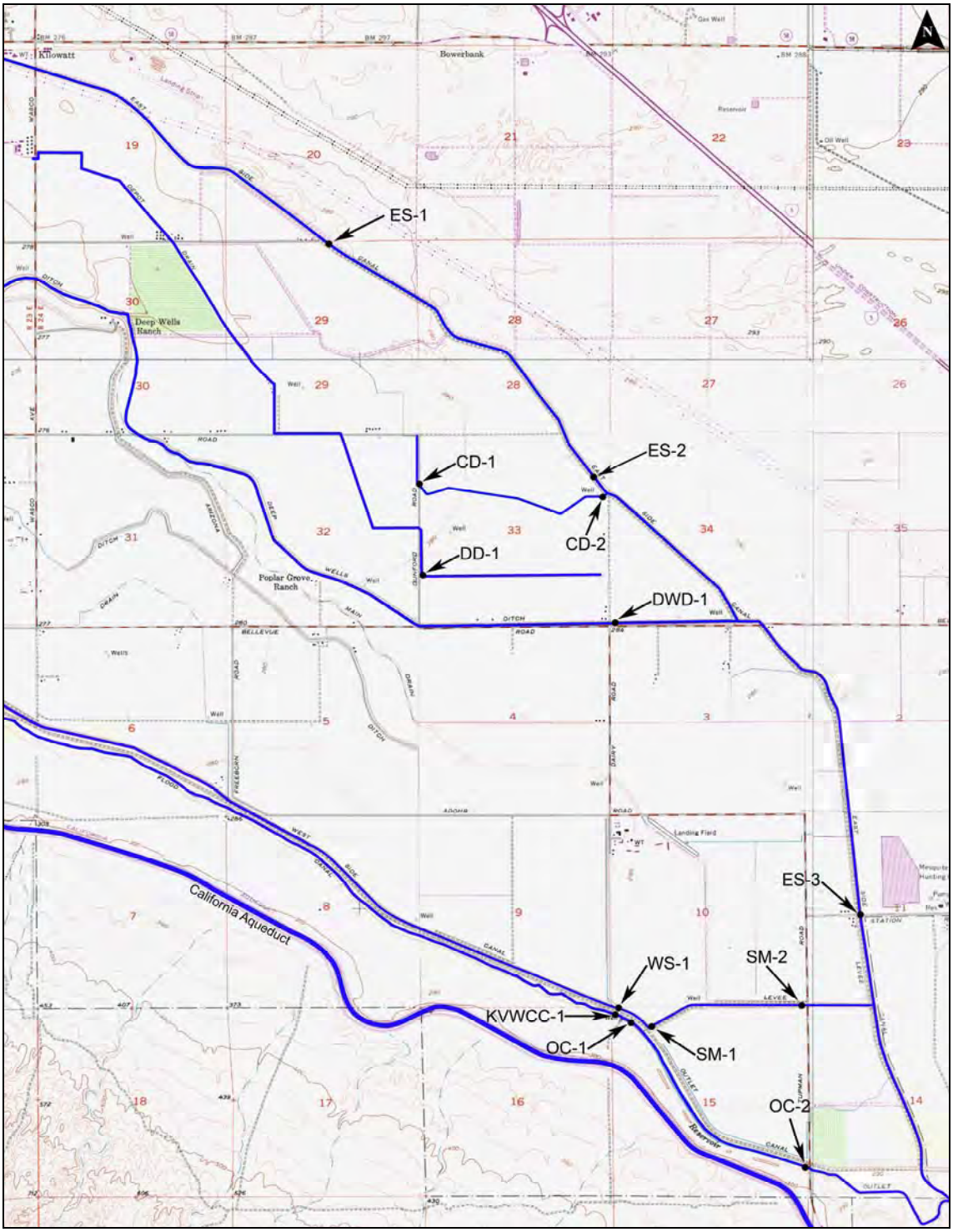
Cass Ditch (CD)

The exact date of construction for the Cass Ditch is unknown. BVWSD acquired Cass Ditch in 1936 from Miller & Lux and Marjorie T. Nance, Harold P. Cass and W. H. Parsons. In 1933, Cass and Parsons, partners in a local Greenfield dairy ranch (Cass & Parsons) purchased a 150-acre farm formerly owned by Miller & Lux near Buttonwillow where the re-established their Greenfield operations. It is unclear if Cass and Parsons constructed this ditch to irrigate the alfalfa fields on their farm or if the ditch was already extant when they purchased the property. When purchased by BVWSD, the ditch was over 2 miles and extended west from East Side Canal to present-day Dunford Road, and then turned north and ended at Deep Drain. In 1964, the portion of the ditch north of Brite Road was abandoned and the section west of Dunford Road was subsequently realigned.[32]

Under NRHP Criterion A and CRHR Criterion 1 the ditch is not significant for its association with irrigated agriculture around Buttonwillow. The canal is one of many farm-dug laterals constructed during or shortly after the Miller & Lux era providing needed drainage and irrigation. Under NRHP Criterion B and CRHR Criterion 2 the ditch is not significant for its association with the individual partners of Miller & Lux nor Cass and Parsons. Under NRHP Criterion C and CRHR Criterion 3, the ditch was constructed using standard methods of the time period. Lastly, this ditch does not appear to be a source, or likely source, of important information regarding history, and is therefore not eligible under NRHP Criterion D and CRHR Criterion 4. In addition, this ditch lacks integrity to any historical period of significance, owing to its regular realignment, reshaping, replacement of control structures, and the abandonment of a large segment.

[32] David Hampton, Buena Vista Water Storage District, personal communication with Toni Webb, JRP Historical Consulting, LLC, December 11, 2012; "Section of Fine Kern Land Sold," *Bakersfield Californian*, October 19, 1933, p. 11.

CD:	**Cass Ditch**	**KVWCC:**	**Kern Valley Water Company Canal**
DD:	**Depot Drain**	**OC:**	**Outlet Canal**
DWD:	**Deep Wells Ditch**	**SM:**	**Short Main Canal**
ES:	**East Side Canal**	**WS:**	**West Side Canal**



Maps: Buttonwillow Quadrangle (1954 photorevised 1973); East Elk Hills Quadrangle (1954 photorevised 1973); Tupman Quadrangle (1954 photorevised 1973)

BACKGROUND

This background and associated data request is intended to clarify information needs connected with Data Request A85. The Western Naval Oil Preserve No. 1, Elk Hills (NPR-1), now Occidental Elk Hills, Incorporated (OEHI), is the location for an Enhanced Oil Recovery (EOR) project. This project, pursuant to CEQA, is part of the proposed project under review.

NPR-1 was the subject of a historical resources evaluation and assessment report (Hamusek-McGann et al., 1997) at the time of the transfer of the property from the Department of Energy to Occidental Petroleum, parent company of OEHI. The report assessed both historic archeological resources and built environment resources. Several periods of significance were found in the report, including Early Exploration (1910-1918), Initial Development Rush (1918-1930), Depression Years (1930-1941) and the War Years (1941-1946). The report authors identified the Elk Hills Rural Historic Industrial Landscape as a historic property eligible for the National Register of Historic Places (NRHP) under Criterion A.

The State Historic Preservation Officer (SHPO) took issue with this conclusion, calling into question the landscape's integrity. The SHPO wrote: "For no period of significance does the property today exhibit enough integrity in all applicable categories to readily convey its historic appearance..." (Widell1997:1). Apparently, the report lacked identification of the landscape's character-defining features, which would have bolstered the authors' contention that it is NRHP-eligible.

Military Sites:

Staff visited the NPR-1/EOR site on September 19, 2012. Many of the early period (1910 to 1941) built environment features appear to be missing, damaged or altered.

However, there are two areas that appear to have integrity and warrant survey and evaluation. Hamusek-McGann et al. (1997) provides some documentation of Navy activity during the War Years and the activities of the Sea Bees (Construction Battalions or CBs) in particular.

According to Hamusek-McGann et al. (1997), the Sea Bees constructed roads, drill pads, wells and military trenches, bunkers and other defensive earthworks on the north and west flanks of the landscape. Of these activities, the trenches, bunkers and other earthworks appear to be intact.

These earthworks seem to be located primarily in the low oil-production areas of Elk Hills and this may contribute to their high degree of integrity. Hamusek-McGann et al. (1997) found that the relationship of the trenches to the topography offers an insight into the military's approach to defensive positions on the ground during this period.

The report states that physical evidence of defensive infrastructure during WWII are rapidly disappearing, increasing the value of NPR-1 military sites and may be eligible as historic properties under Criterion A (NRHP).

Check Dams:

During staff's site visit, OEHI staff pointed out a series of check dams constructed on the property meant to control the flow of water off the site to the valley. These check dams appear to have a design that incorporates a metal pipe that siphons the water through an earthen dam,

at a point below the water level of the dam, allowing water to pass through the pipe and leaving any oily residue to collect at the bottom of the basin.

This in effect reduces the potential for oil to flow beyond the property boundary during a rain event or a spill. These check dams are prevalent throughout the site and it is not known when these dams were constructed or by whom. Hamusek-McGann et al. (1997) report that WPA crews were on site during the Depression years constructing culverts, laying pipeline, repairing equipment and constructing roads.

The check dams are not discussed in the report and their origin is not known by staff. They are a landscape element specifically relating to this site's topography and function and require evaluation to determine their contribution to the overall landscape, their association with one of the historic periods noted above and if they qualify as historic resources under CEQA or the NRHP.

Data Requests

Supplemental information for NPR-1 is required to complete the evaluation of the resources discussed above. This may be submitted as part of the data response to Data Request Number A85.

DATA REQUEST

A189. Provide documentation of the existing military sites (trenches, bunkers and defensive earthworks) found on the north and west flanks of the NPR-1 site. Documentation shall include survey and inventory, evaluation of significance and integrity for both the CRHR and NRHP. Prepare a context statement and record the findings on the appropriate DPR 523 forms.

RESPONSE

The Applicant is requesting additional time to address this Data Request.

DATA REQUEST

A190. Provide documentation of the existing check dams found throughout the drainage draws, gullies and washes on the NPR-1 site. Documentation shall include survey and inventory, evaluation of significance and integrity for both the CRHR and NRHP. Prepare a context statement and record the findings on the appropriate DPR 523 forms.

RESPONSE

The Applicant is requesting additional time to address this Data Request.

BACKGROUND

The proposed process water pipeline would extend through or adjacent to the following archaeological resources and therefore would potentially damage the archaeological resources listed below. The applicant is currently addressing a related data request (A147), which asks the applicant to determine the depth of fill material in which the proposed process water line would be installed (California Energy Commission 2012:13-14).

Staff has requested that the applicant focus on those portions of the proposed process water line that would intersect the archaeological resources listed below and to provide substantiation for its estimate of the depth of fill.

- KRM-IF-006 and P-15-89 (CA-KER-89/H)
- P-15-171 (CA-KER-171)
- P-15-7176 and P-15-6725 (CA-KER-5356/H)
- HECA-2008-1 (JM-BVWD-1)
- HECA-2009-9
- HECA-2009-10
- BS-BVWD-1
- P-15-2485 (CA-KER-2485) and BS-IF-003
- P-15-179 (CA-KER-179), KRM-IF-003, and KRM-IF-004

Similarly, the proposed natural gas pipeline is situated adjacent to archaeological site P-15-3108 (CA-KER-3108) and HECA-2009-2 is located in the Controlled Area and near the proposed CO_2 pipeline. HECA-2009-2 would be subject to ground disturbance associated with agricultural activities in the Controlled Area.

Unless the applicant demonstrates that the proposed project would not affect the aforementioned archaeological resources, such resources must be evaluated for significance under CEQA's criteria as well as those of the NRHP.

The applicant can demonstrate that one or more of the aforementioned archaeological resources would not be affected by the proposed project by showing that, for instance, a given archaeological resource is situated outside the PAA and that its surface and subsurface extent are firmly established or that ground disturbance would only take place within fill sediments overlying a given archaeological resource.

Staff is requesting the applicant conduct a significance evaluation of affected archaeological resources so that staff has the ability to assess impacts on resources considered significant under CEQA and eligible for the NRHP.

DATA REQUEST

A192. Please submit, for staff review and approval, a subsurface testing plan for any of the aforementioned archaeological resources that the proposed project would not avoid. The subsurface testing plan should be prepared by an archaeologist who meets the U.S. Secretary of the Interior's Professional Qualifications Standards, as published in 36 Code of Federal Regulations 61. Please provide a resume demonstrating the archaeologist's qualifications. Testing methods should be scaled to the size and quality of evidence for the resources' presence in the PAA. For archaeological resources with scant archaeological materials in

the PAA, methods consistent with determining presence/absence would be appropriate.

RESPONSE

As indicated in Amended Application for Certification (AFC) Section 5.3, the Applicant's preferred treatment of known archaeological sites is avoidance. The Applicant proposes mitigation in the unlikely event that the avoidance of known archaeological sites becomes infeasible. The Applicant's proposed mitigation includes testing and evaluation of the significance of any archeological resources found; and redesign of the Project or implementation of a data recovery plan if a resource is determined to be significant. However, the Applicant expects to avoid the archaeological sites cited in the CEC's background statement for Data Requests A192 through A194, and is working with CEC staff to demonstrate that these cultural resources can be avoided (e.g., under Data Request A147, the Applicant is determining the depth of fill material in which the proposed process water line would be installed). Because the Applicant's intent is to avoid archaeological resources, conducting a significance evaluation is unnecessary for CEC staff to complete their analysis under the California Environmental Quality Act (CEQA) (including development of a subsurface testing plan, undertaking test excavations, recovering sample materials if deposits are found, evaluating recovered data, and preparing a report). The archaeological sites cited in the CEC's background statement for Data Requests A192 through A194 are discussed in Table A192-1.

Table A192-1
Known Archaeological Sites

Known Archaeological Site(s)	Comments/Notes
• KRM-IF-006 and P-15-89 (CA-KER-89/H) • P-15-171 (CA-KER-171) • P-15-7176 and P-15-6725 (CA-KER-5356/H) • HECA-2008-1 (JM-BVWD-1) • HECA-2009-9 • HECA-2009-10 • BS-BVWD-1 • P-15-2485 (CA-KER-2485) and BS-IF-003 • P-15-179 (CA-KER-179), KRM-IF-003, and KRM-IF-004	• The Applicant's intent is to avoid archaeological resources along the process water line. • Under Data Request A147, the Applicant is determining the depth of fill material in which the proposed process water line would be installed. • In addition, the Applicant is investigating various avoidance strategies in coordination with Buena Vista Water Storage District engineers, including constructing the process water line within fill in areas proximate to archaeological sites, and coincident with lower existing depths of fill along the levee road.
• P-15-3108 (CA-KER-3108)	• The Applicant's intent is to avoid P-15-3108 (CA-KER-3108). • Developing a subsurface testing plan is not warranted at this time. Furthermore, Applicant does not currently have permission from the landowner to conduct test excavations. Previous access permission from the landowner was limited to conducting pedestrian field surveys.

Table A192-1
Archaeological Sites (Continued)

Archaeological Site	Comments/Notes
	• Also, as stated in Amended AFC Section 5.3.3.3, several of the sites identified during the initial field efforts by Everson (1991) could not be relocated by colleagues of Everson (Garcia and Valdez, 1992). No evidence of P-15-3108 was observed during surveys for the HECA Project. In addition, there are discrepancies between the reported site location and the map data (i.e., UTM coordinates) provided on the site record. As such, it is questionable whether a site ever existed at this locale.
• HECA-2009-2	• The Applicant's intent is to avoid HECA-2009-2. • HECA-2009-2 is located in the Controlled Area. CEC Staff indicate that the site may be impacted by "ground disturbance associated with agricultural activities in the Controlled Area." Continued agricultural use of the Controlled Area constitutes the pre-Project baseline condition, and any impacts resulting therefrom are not Project-related.

Notes:

AFC = Application for Certification
CEC = California Energy Commission
HECA = Hydrogen Energy California
UTM = Universal Transverse Mercator

References

Everson, Dicken, 1991. Archaeological Site Form: CA-KER-3108. On file at the SSJVIC.

Garcia, Sharynn and J. Valdez, 1992. Archaeological Site Form: CA-KER-3108 UPDATE. On file at SSJVIC.

DATA REQUEST

A193. After staff approves the subsurface testing plan, please initiate the test excavations, as specified in the approved plan. A qualified archaeologist, as identified in Data Request A192 above, shall carry out the test excavations. (Note: Please ensure that a biological monitor is present during the test excavations). If deposits are found, please recover a sample of materials sufficient to support recommendations of significance for these sites. Evaluate the recovered data for its potential to address the research questions posed in the testing plan.

RESPONSE

As described in the response to Data Request A192, the Applicant expects to avoid the known archaeological sites cited in the CEC's background statement for Data Requests A192 through A194, and does not propose to initiate test excavations at this time.

DATA REQUEST

A194. Please provide a report, written by the qualified archaeologist conducting the excavations, on the testing and findings at these resources. The report should present an analysis of the recovered data, recommendations regarding the significance of the sites, and justifications for the recommendations, based on the recovered data. Please complete or update and file DPR 523 "Archaeological Site" detail forms for these sites, including dating and significance recommendations, and submit copies to staff.

RESPONSE

As described in the response to Data Request A192, the Applicant expects to avoid the known archaeological sites cited in the CEC's background statement for Data Requests A192 through A194, and at this time does not propose to initiate test excavations, or prepare a report on the findings of these excavations.

BACKGROUND

The Amended AFC indicates that the proposed 230-kilovolt (kV) electrical transmission line would connect to existing Pacific Gas and Electric Company (PG&E) transmission lines via a new (not yet built) electrical switching station. Staff understands that PG&E would build and operate the switching station. The Energy Commission considers the electrical switching station to be a related facility, as defined at Title 20, California Code of Regulations, Section 1702(n), to the proposed HECA project. The proposed electrical switching station must, therefore, be included in the HECA project area of analysis. The site of the proposed electrical switching station is included in the applicant's records search area, but has not been surveyed for the presence of cultural resources (Farmer 2008; Hale and Laurie 2009, 2010; Hale et al., 2012; JRP Historical Consulting 2009, 2012).

DATA REQUEST

A196. Conduct a pedestrian survey of the proposed electrical switching station, plus a 200-foot buffer surrounding the proposed facility's location (20 Cal. Code Regs., §§ 2001-2012, Appendix B[g][2][C]).

RESPONSE

Survey results for the proposed electrical switching station, plus a 200-foot buffer surrounding the proposed facility's location, are provided in Appendix A, Hydrogen Energy California (HECA) Transmission Upgrades Report and the Cultural Resources Survey Report for the Switching Station. The Cultural Resources Survey Report for the Switching Station is being filed confidentially under separate cover as Attachment A197-1 in response to CEC Data Request A197.

DATA REQUEST

A197. Prepare and submit an addendum to Appendix G-3 (Hale et al., 2012) that describes:

a. The methods used to identify cultural resources in the proposed switching station site.

b. The results of the pedestrian survey.

c. Descriptions of newly recorded cultural resources in the proposed switching station location.

d. An assessment of impacts to cultural resources in the proposed switching station.

e. Proposed mitigation measures for identified impacts.

References Cited

California Energy Commission 2012-California Energy Commission. *Hydrogen Energy California (08-AFC-8A): Energy Commission Staff's Data Requests A124-A180.* September 6. Sacramento, CA. Docket No. 08-AFC-8A, TN# 67037. Electronic document, http://www.energy.ca.gov/sitingcases/hydrogen energy/documents/ 2012-09-06 CEC Staffs Data Requests A124-A180 TN-67037.pdf, accessed October 15, 2012.

Farmer 2008-Reid Farmer. *Confidential Hydrogen Energy California Cultural Resources Technical Report.* July. URS Corporation, Denver, CO. Prepared for Hydrogen Energy International, Long Beach, CA. Submitted to California Energy Commission, Sacramento, CA. Docket No. 08-AFC-8.

Hale and Laurie 2009-Hale, Mark R., and Leroy T. Laurie. *Confidential" Archaeological Reconnaissance, Hydrogen Energy California Study Area, Kern County, California.* May. URS Corporation. Confidential Appendix H3 to *Application for Certification, Volume I, Hydrogen Energy California,* by Hydrogen Energy International, with URS. July. Hydrogen Energy International, Long Beach, CA, with URS, Denver, CO. Submitted to California Energy Commission, Sacramento, CA. Prepared for Hydrogen Energy International LLC, Long Beach, CA. Submitted to California Energy Commission, Sacramento, CA. Docket No. 08-AFC-8.

Hale and Laurie 2010-Hale, Mark R., and Leroy T. Laurie. Confidential Survey Report Addendum: Archaeological Reconnaissance, HECA Study Area, Kern County, CA. January. URS. Attachment 65-1 to

Hale et al., 2012.-Mark R. Hale, Leroy T. Laurie, and Jay Rehor. *Confidential Archaeological Reconnaissance, Hydrogen Energy California Study Area, Kern County, California.* April. URS Corporation. Appendix G-3 in *Amended Application for Certification for Hydrogen Energy California (08-AFC-8), Kern County, California,* by URS. May. Prepared for Hydrogen Energy California LLC. Submitted to California Energy Commission, Sacramento, CA (Docket No. 08-AFC-8A), and National Energy Technology Laboratory, U.S. Department of Energy, Morgantown, WV.

Hamusek-McGann et al., 1997-Hamusek-McGann, Blossom, Cindy L. Baker, and Mary L. Maniery. *Historical Resources Evaluation and Assessment Report of Western Naval Petroleum Preserve No. 1, Elk Hills, Kern County, California.* Final. September. PAR Environmental Services, Inc., Sacramento, CA. Prepared for ICF Kaiser, ICF Resources Incorporated, Fairfax, VA. On file, Southern San Joaquin Valley Information Center, California Historical Resources Information System, Bakersfield.

JRP Historical Consulting 1995-JRP Historical Consulting. *Historic Architecture Survey Report, Tier 1, For Route Adoption on Route 58 between 1-5 and* State *Route* 99 *in Kern County.* June 9.

JRP Historical Consulting 2009-JRP Historical Consulting. Historic Architecture Technical Report: Inventory and Evaluation, Hydrogen Energy California Project, April 2009, Davis, CA. Prepared for URS Corporation. Appendix H-4 in *Application for Certification for Hydrogen Energy California (08-AFC-8), Kern County, California,* by URS. May. Prepared for Hydrogen Energy California LLC. Submitted to California Energy Commission, Sacramento, CA (Docket No. 08-AFC-8A), and National Energy Technology Laboratory, U.S. Department of Energy, Morgantown, WV.

JRP Historical Consulting 2012-JRP Historical Consulting. *Historic Architecture Technical Report: Inventory and Evaluation, Hydrogen Energy California Project.* April. Davis, CA. Prepared for URS Corporation. Confidential Appendix G-4 in *Amended Application for Certification for Hydrogen Energy California (08-AFC-8), Kern County, California,* by URS. May. Prepared for Hydrogen Energy California LLC. Submitted to California Energy Commission, Sacramento, CA (Docket No. 08-AFC-8A), and National Energy Technology Laboratory, U.S. Department of Energy, Morgantown, WV.

Meyer et al., 2009-Meyer, Jack, Jeffrey S. Rosenthal, and D. Craig Young. *A Geoarchaeological Overview and Assessment of Caltrans Districts 6 and 9.* Cultural Resources Inventory of Caltrans District 6/9 Rural Conventional Highways. Draft. December. Far Western Anthropological Research Group, Davis, CA. Submitted to District 6, California Department of Transportation, Fresno. EA 06-0A7408 TEA Grant.

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Weber 1998-Weber, Gerald E. Geologic History of Site CA-KER-3080, Interpretations and Conclusions. In *Prehistoric Archaeological Resources Inventory and Evaluation at Naval Petroleum Reserve No. 1 (Elk Hills). Kern County, California,* by Thomas L. Jackson, Lisa A. Shapiro, and Jerome H. King, H1 Vol. 4. Pacific Legacy. On file, Southern San Joaquin Information Center, California Historical Resources Information System, Bakersfield.

Widdell 1997-Widdell, Cherilyn. Letter Regarding Sale of NPR-1, Kern County, California. December 11. Office of Historic Preservation, Department of Parks and Recreation, Sacramento, CA. Submitted to U.S. Department of Energy, Washington, D.C.

RESPONSE

The Cultural Resources Survey Report for the Switching Station has been submitted confidentially as Attachment A197-1.

ATTACHMENT A197-1
CULTURAL RESOURCES SURVEY REPORT
FOR THE SWITCHING STATION

(SUBMITTED SEPARATELY UNDER CONFIDENTIAL COVER)

Technical Area: Noise
Authors: Edward Brady, Shahab Khoshmashrab

BACKGROUND

Amended AFC Tables 5.10-4 and 5.10-5 provide the number of delivery trips to the project site for feedstock, operations and maintenance, and process materials and byproducts. In order for staff to adequately evaluate the noise impacts of the deliveries utilizing truck and/or railway, additional information and analysis need to be provided on the impacts of increased traffic along existing surface routes and the preferred routing of the railroad track serving the HECA project.

DATA REQUEST

A198. Please identify the proposed routing for the truck delivery. Identify the noise-sensitive receptors along the path of travel. Analyze the noise impact of the truck traffic at these receptors during both, day and night. In this analysis, please include a comparison of the existing ambient noise levels to the noise levels resulting from the deliveries, at representative locations. Please provide the resultant noise levels in terms of L_{eq}, L_{10}, L_{50}, L_{min}, L_{max}, and L_{90}.

RESPONSE

Truck deliveries associated with Alternative 1 (Rail) were evaluated in Amended AFC Section 5.5 (see Table 5.5-34). The results of the noise analysis for Alternative 1 are summarized below in the response to Data Request A199.

Truck deliveries associated with Alternative 2 (Truck) were evaluated in the Amended AFC Section 5.5 (see Table 5.5-35). Based on a teleconference with CEC staff on December 11, 2012, the Applicant is preparing additional details regarding the noise evaluation for Alternative 2. Therefore, the Applicant is requesting additional time to address this data request as it relates to Alternative 2.

DATA REQUEST

A199. Please identify the proposed routing for the rail delivery. Identify the noise-sensitive receptors along the path of travel. Analyze the noise impact of the rail traffic at these receptors during both day and night. In this analysis, please include a comparison of the existing ambient noise levels to the noise levels resulting from the deliveries, at representative locations. Please provide the resultant noise levels in terms of L_{eq}, L_{10}, L_{50}, L_{min}, L_{max}, and L_{90}.

RESPONSE

Alternative 1 of the Project proposes an approximately 5-mile-long new industrial railroad spur that will connect the Project Site to the existing San Joaquin Valley Railroad (SJVRR) Buttonwillow railroad line, north of the Project Site. This railroad spur will also be used to transport some HECA products to market.

In May 2012, the following two filings were submitted to the CEC, analyzing potential noise and vibration impacts from operations of Alternative 1 (see Section 5.5 of both documents for the noise evaluation):

- Amended AFC
- Confidential Railroad and Natural Gas Linears (submitted confidentially to the CEC)

The noise evaluation provided in these two documents included an assessment of noise from the new railroad spur, as well as the vehicular traffic associated with this alternative. The following provides a summary of the noise evaluation provided in these documents.

The proposed routing for the rail delivery is provided on Figure 5.5-1 of the Confidential Railroad and Natural Gas Linears. Because the route is no longer considered confidential, that figure is attached for reference and relabeled Figure A199-1.

Regulatory Setting

Potential noise impacts associated with Alternative 1 (Rail) were evaluated based on the most relevant noise criteria from federal, state, and local agencies. As indicated in the two aforementioned filings, the noise evaluation for the new railroad spur was based on Federal Transit Administration (FTA) noise analysis methodology. In addition, FTA guidance and methodology is available online at: http://www.fta.dot.gov/documents/FTA_Noise_and_ Vibration_Manual.pdf. The FTA methodology is widely used to assess noise impacts from railway operations. The methodology is based on the existing ambient noise level, in terms of day-night average sound level (L_{dn}), and uses a sliding scale to determine impact based on the increase in noise exposure. The methodology includes all major noise sources such as engines, rail cars, and horns. FTA's methodology is described in detail on Amended AFC pages 5.5-12 through 5.5-14, and a summary of the FTA noise impact criteria is provided in the Amended AFC Figure 5.5-2.

Potential noise impacts associated with vehicular traffic were assessed based on guidance contained in the Kern County General Plan Noise Element. Specifically, noise impact criteria for traffic noise impacts are: (1) an increase of 3 A-weighted decibels (dBA) or more in L_{dn}/ community noise equivalent level (CNEL) due to the introduction of Project-related traffic; and

(2) a resulting noise level of 65 dBA L_{dn}/CNEL or greater due to the introduction of Project-related traffic.

Project Description Related to Alternative 1 (Rail)

As listed in Table 2-21 of the Amended AFC, the maximum material delivery rate is estimated to be 2 unit trains per day, with the average being 2.1 unit trains per week. Although trains may be received at the HECA Project Site anytime during the day, the noise analysis included a very conservative operational assumption of one train arriving at and leaving the project (two train events) each day, exclusively during nighttime hours.

Noise Field Monitoring

URS collected noise measurements from four locations along the proposed 5-mile railroad spur to determine existing ambient noise levels (referred to as LT-1, LT-7, LT-8, and LT-9). These noise monitoring locations specific to rail operations were previously shown on Figure 5.5-1 of the Confidential Railroad and Natural Gas Linears. Because the route is no longer considered confidential, that figure is attached for reference and relabeled Figure A199-1.

Monitoring locations identified as LT-7, LT-8, and LT-9 represent noise measurement locations used to determine existing ambient noise levels along the proposed railroad spur. Two additional sensitive noise receptors identified as MR-1 and MR-2 on Figure A199-1 were also analyzed as modeled receptors, whereby existing noise monitoring data were extrapolated to these locations. For example, MR-1 was modeled using measurements collected at LT-7 because both of these locations are along Highway 58; therefore, noise levels at LT-7 are representative of noise levels at MR-1. In addition, MR-2 was modeled using measurements collected at LT-8 because both of these locations are in agricultural areas; therefore, noise levels at MR-2 are representative of noise levels at LT-8. A summary of the ambient noise levels and associated significance criteria is shown in Table 5.5-31.

Noise Impact from Railroad Spur Associated with Alternative 1 (Rail)

Analysis was conducted at MR-1, MR-2, LT-8, and LT-9 to assess potential noise impacts from rail operations. The following are the distances of each of these locations from the railroad spur:

- MR-1: 115 feet
- MR-2: 180 feet
- LT-8: 5,000 feet
- LT-9: 3,170 feet

The results of the analysis of noise associated with the new railroad spur are presented in the Amended AFC in Table 5.5-31. As shown in Table 5.5-31, the modeled Project noise levels that result from the combination of horn noise and engine and rail noise would result in moderate noise impacts at MR-1 and MR-2, but a moderate impact is considered to be less than significant. No significant impacts were identified for Locations LT-8 or LT-9. Therefore, noise impacts that would result from operations of the railroad spur would be less than significant.

In addition to evaluating noise impacts, a screening analysis was conducted to assess potential vibration levels at MR-1, which represents the nearest sensitive receptor to the new railroad spur. The results of the vibration analysis are presented in Amended AFC Table 5.5-32. As

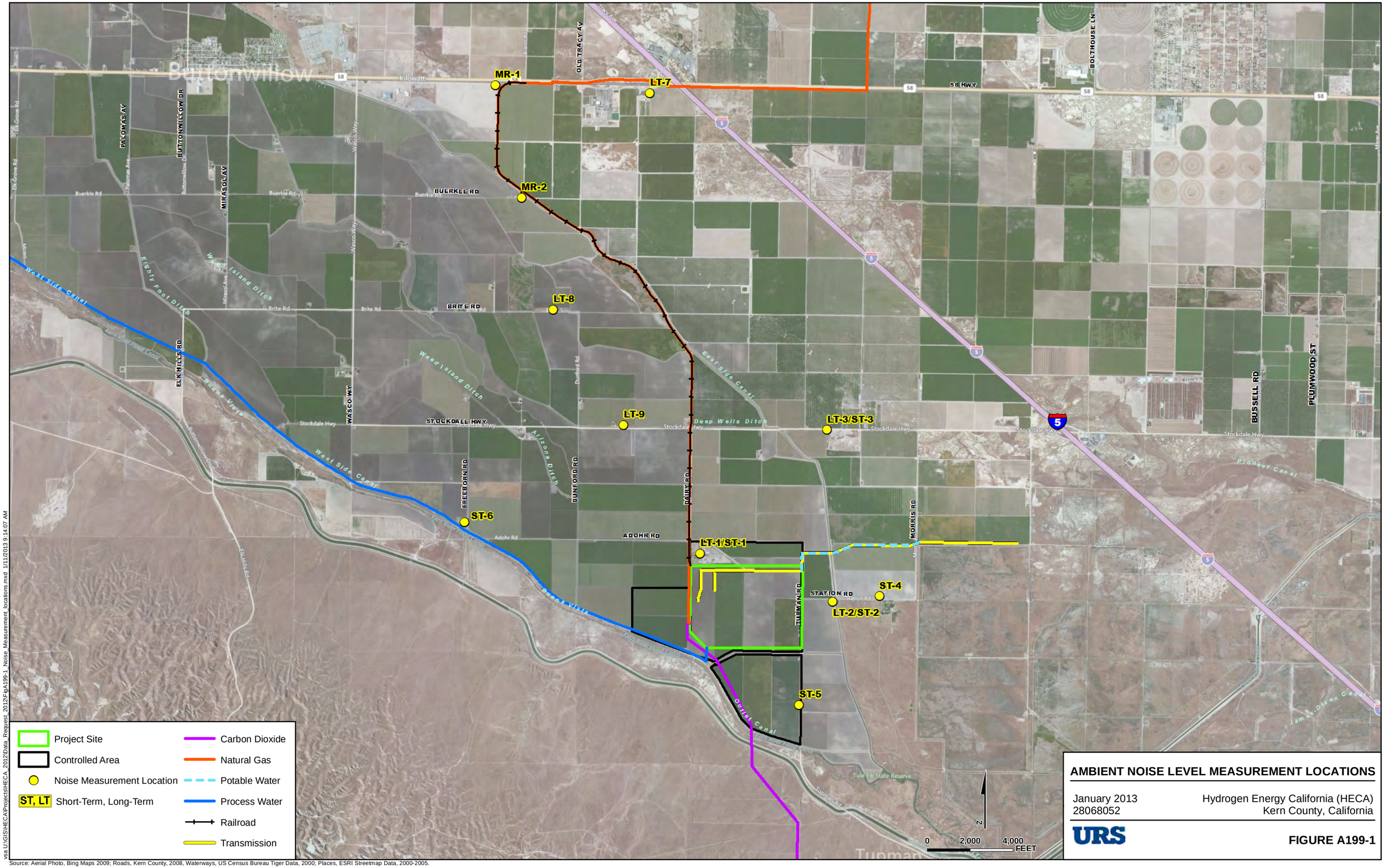
shown in Table 5.5-32, if the railroad spur is constructed and used during operations of the Project, potential vibration impacts are considered to be less than significant.

Noise Impacts from Vehicular Trips Associated with Alternative 1 (Rail)

Noise impacts were also evaluated for the vehicular trips associated with Alternative 1. Acoustic calculations were performed for vehicular traffic during the operational period of the HECA Project. This traffic analysis takes into account that the proposed railroad spur line will be built and operational in the year 2017. Year 2010 average daily traffic (ADT) volumes were provided. A 2 percent increase in traffic volumes was assumed to occur each year. Traffic volumes resulting from an operational HECA Project were added to the estimated year 2017 ADT volumes to determine the "future with Project" traffic scenario so that changes in L_{dn}/CNEL along each roadway segment could be analyzed. Adjustments to the traffic mix for the future with Project scenario were made based on the increase that operations would cause in automobile, medium truck, and heavy truck ADT volumes. Amended AFC Table 5.5-34 illustrates the change in L_{dn}/CNEL and the noise levels in L_{dn}/CNEL at a distance of 50 feet from the centerline of each intersection leg for both "no Project" and "with Project" scenarios for operations starting in 2017.

There will be noticeable increases in traffic noise (10 dBA or more) at the intersections of Dairy Road/Adohr Road, Dairy Road/Stockdale Highway, Tupman Road/Station Road and Stockdale Highway/Morris Road. None of the 48 intersection segments have both (1) an increase of 3 dBA or more in L_{dn}/CNEL due to the introduction of Project-related traffic and (2) a resulting noise level of 65 dBA L_{dn}/CNEL or greater due to the introduction of Project-related traffic.

Potential noise impacts during operations due to traffic are considered to be less than significant for Alternative 1.



AMBIENT NOISE LEVEL MEASUREMENT LOCATIONS

January 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE A199-1

Source: Aerial Photo, Bing Maps 2009; Roads, Kern County, 2008, Waterways, US Census Bureau Tiger Data, 2000; Places, ESRI Streetmap Data, 2000-2005.

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Technical Area: Alternatives
Authors: Negar Vahidi, Scott Debauche

BACKGROUND

Subsection 6.3 of the Amended Application for Certification (AFC) discusses alternative site and linear facilities locations that were part of the screening analysis for the proposed project. The four alternative sites considered within the Amended AFC include the following (as shown in AFC Figure 6-1):

- Alternative Site 1 - located approximately 1-mile west of the proposed site;
- Alternative Site 2 - located approximately 0.4-mile west of the proposed site;
- Alternative Site 3 - located approximately 4-miles north/northwest of the proposed site; and
- Alternative Site 4 - located approximately 13-miles southeast of the proposed site.

The evaluation screening criteria utilized within the Amended AFC for evaluating each site included:

- Environmental impacts;
- Safety (proximity to residents, schools, day-care centers, etc.);
- Proximity to sensitive receptors (population and sensitive species);
- Environmental justice considerations·;
- Economic feasibility;
- Site acreage (300+ acres), topography, lowest elevation (to maximize power generation);
- Proximity to the CO_2 customer for CO_2 enhanced oil recovery (EOR) and sequestration;
- Minimization of impacts on transportation corridors;
- Feasibility of land acquisition;
- Proximity to infrastructure to minimize impacts from site access and linear facilities; and
- Proximity to raw water supply.

Within the Amended AFC, the elimination of Alternative Sites 1 through 4 is limited to the following reasoning and analysis: "(1) topography, (2) distance from the proposed CO_2 custody transfer point, (3) lengths of linear facilities, (4) sensitive environmental receptors, and/or (5) land availability."

Additional information is needed for Energy Commission staff to adequately consider and analyze these four alternative sites. The purpose of staff's alternatives analysis is to evaluate a reasonable range of feasible alternatives that could substantially reduce or avoid any potentially significant adverse impacts of the proposed project while obtaining basic project objectives, yet to be defined by the Energy Commission, pursuant to the California Environmental Quality Act (CEQA) (Cal. Code Regs., tit. 14, §15126.6; Cal. Code Regs., tit. 20, §1765).

When determining feasible alternatives, staff includes alternative locations or sites, to determine whether such alternatives would avoid project impacts identified as significantly adverse. Given the complex nature of the siting constraints associated with this project, staff

believes that further detailed evaluation of sites already reviewed by the applicant as potentially feasible is warranted.

DATA REQUEST

A200. For Alternative Sites 1 through 4, please provide the following:

1. Topography

a. Information on slope and potential available acreage for each site. Include a map showing the project footprint. Describe the topography and elevations within each site and the required linears. Compare these features to those of the proposed project site, explaining the differences.

b. Details explaining how topography influenced the site selection criteria. Provide feasibility and benefit analysis of how the topography of these alternative sites differed from that of the proposed project site.

2. Distance from the proposed CO_2 custody transfer point.

a. Details and a map explaining where the CO_2 custody transfer point is located.

b. Details and a map displaying the CO_2 pipeline routes evaluated for each site alternative. Provide a matrix displaying the lengths of each pipeline in comparison to the length of the proposed project CO_2 pipeline.

c. Provide a matrix on the number and type of landowners traversed by the CO_2 pipeline for each site alternative in comparison to those of the proposed project CO_2 pipeline.

d. Information on any engineering infeasibility of the CO_2 pipeline route for each site alternative.

3. Lengths of linear facilities

a. Details and a map displaying all proposed alternative linear infrastructure routes (including, but not limited to: water, wastewater, natural gas, rail spur(s) and electrical gen-tie) evaluated for each site alternative. Provide a matrix displaying the lengths of each site alternative infrastructure linears in comparison to those of the proposed project.

b. Provide a matrix on the number and type of infrastructure linears that traverse across property owners land for each site alternative in comparison to those of the proposed project.

4. Sensitive environmental receptors

a. Details and a map displaying the geographic extent utilized to define sensitive environmental receptors (including, but not limited to: residences, schools, hospitals, recreational areas, sensitive species) for each site alternative.

b. Provide a matrix on the number and type of sensitive receptors considered for each site alternative in comparison to those of the proposed project.

5. Land availability

a. Discuss land ownership for each site alternative and linear right-of-ways and identify the acreage by owner type. Provide information on public versus private lands controlling each site and linear ROWs. Describe all federal, State, and local applicable land use plans for these lands

b. Description of existing land uses of each site and in the surrounding area. Include acreage figures for areas in agricultural use.

c. Description of how the economic viability of acquiring each site alternative compares to that of the proposed project site.

RESPONSE

This Data Request focuses on the four alternative sites presented in Amended AFC Section 6.3.1. However, it should be noted that over the course of several years, prior to the filing of the Amended AFC in May of 2012, HECA evaluated numerous sites before narrowing the search to the alternatives presented in Amended AFC Table 6-1.

The Project has been proposed in three main filings with the CEC, as follows:

- **July 2008.** An AFC (08-AFC-8) was submitted to the CEC, proposing that the Project be located on a different site, south of the California Aqueduct (referred to herein as the "Former Project Site").

- **May 2009.** A Revised AFC was submitted to the CEC, relocating the Project to essentially the currently proposed site, but with certain design modifications and site boundary changes.

- **May 2012.** An Amended AFC was submitted to the CEC, evaluating the Project on the current site (herein referred to as the "Project Site").

A brief summary of the previous siting analyses conducted for the Project is presented below; it includes the analyses conducted prior to the 2008 AFC filed for the Project, and the analyses conducted for the 2009 and 2012 AFC filings. Responses to the specific questions outlined in Data Request 200 follow the summary.

Summary of Siting Analysis Prior to 2008

Multiple siting evaluations have been conducted since the HECA Project was initially conceived. Those siting evaluations have considered areas in various parts of California for the appropriate siting requirements. Because the Project's fundamental goals include providing dependable, low-carbon electricity as well as carbon dioxide (CO_2) capture and sequestration, the siting process has focused on the distance to and viability of carbon sequestration at or near the site, as well as other essential criteria discussed in the Amended AFC Section 6.3 (e.g., site acreage, proximity to infrastructure, environmental impacts, and transportation corridors).

During the siting evaluations, various factors have contributed to the elimination of sites, including but not limited to the five criteria outlined in the CEC's Data Request and discussed in the Amended AFC. For example, locations evaluated within California included the following:

- **Los Angeles County.** HECA considered siting the Project on the property of the BP Carson Refinery in Los Angeles County, where the refinery could provide HECA with petroleum coke (petcoke), and HECA could provide the refinery with steam. However, in 2007, HECA was unable to reach consensus with the multiple owners and operator of a nearby oil field for a viable off-take agreement for CO_2 injection.

- **Ventura County.** Siting within Ventura County was considered. Work on this was discontinued due to the lack of viable site locations, proven sequestration targets, and the distance from existing transmission.

- **Other areas in Kern County.** Several sites were evaluated within Kern County, including areas near Taft; west and northwest of Buttonwillow; and southeast of the current Project Site. These sites were eliminated for various reasons, but primarily due to the presence of sensitive species habitat and/or the distance from the CO_2 injection facility.

- **Areas within the Elk Hills Oil Field (EHOF) in Kern County.** Much of the terrain in the EHOF presents challenges based on topography. After evaluating sites within and near the EHOF, HECA initially selected a moderately sloped site south of the California Aqueduct. This site was the Former Project Site proposed in the 2008 AFC for the HECA Project.

As summarized above, an AFC was previously submitted to the CEC in July 2008, proposing that the Project be located south of the California Aqueduct. The Project was subsequently moved following discussions with regulatory agencies regarding the presence of sensitive biological resources, and discussion of the site for inclusion in habitat protection plans. As a result, HECA conducted another extensive siting analysis to identify an alternative site near the EHOF. These analyses are discussed in 2009 Revised AFC Section 6.0 and 2012 Amended AFC Section 6.0, and summarized below.

Summary of Siting Analysis Subsequent to 2008

During the siting analyses conducted subsequent to the filing of the 2008 AFC, alternative sites were rejected for various reasons, including: (1) topography; (2) distance from the proposed CO_2 custody transfer point; (3) lengths of linear facilities; (4) sensitive environmental receptors; and/or (5) land availability. Based on these siting evaluations, the Project Site was selected for the 2009 AFC and maintained for the 2012 AFC.

This data request asks for information related to the five criteria listed above for each of the four alternative sites presented in Amended AFC Section 6.0, as well as for the linears associated with each alternative site. However, HECA did not develop proposed routes for linear facilities or some of the other CEC-requested data on each alternative if the alternative was eliminated for other reasons, such as an owner's unwillingness to sell. Amended AFC Table 6-1 is included below for reference, as Table A200-1.

Table A200-1 (Amended AFC Table 6-1)
Alternative Sites Reviewed and Status

Property	Status
Project Site	Project Site—submitted in the 2009 Revised AFC and in this 2012 AFC Amendment
Former Project Site	Eliminated—due primarily to concentration of California threatened species identified
Alternate 1	Eliminated—owner not willing to sell
Alternate 2	Eliminated—sold to another buyer
Alternate 3	Eliminated—less desirable due to close proximity to I-5
Alternate 4	Eliminated—due primarily to length of linears and number of private land owners involved

Notes:
AFC = Application for Certification
I-5 = Interstate 5

If a site failed one or more of the siting evaluation criteria, it was eliminated from further evaluation. Consequently, detailed assessments of each criterion were not performed for each potential site. Available information regarding each of the alternatives is provided below.

Table A200-2 provides information related to topography; distance from the CO_2 custody transfer point; linear facility lengths; sensitive environmental receptors; and land availability for Alternative Sites 1 through 4, the Former Project Site, and the Project Site. Although linear routes were not developed for Alternative Sites 1 through 4, straight-line measurements from the alternative site to the requested location (i.e., electrical and gas interconnection points, potable and process water supplies) are provided for comparison purposes. A summary of the findings for each of these environmental criteria is provided below:

- **Topography (see Figure A200-1).** Alternative Sites 1 through 4 and the Project Site are generally flat. The Former Project Site is moderately sloped. Based on this analysis, topography was not a key factor in eliminating Alternative Sites 1 through 4 during the site selection process.

- **Distance from the CO_2 Custody Transfer Point.** Table A200-2 lists the straight-line measurements from Alternative Sites 1 through 4 to the CO_2 Custody Transfer Point rather than linear routes, because these alternatives were eliminated from consideration prior to developing linear routes. The distance to the CO_2 Custody Transfer Point ranges from 1.2 miles (Former Project Site) to 13.6 miles (Alternative Site 4). Based on these distances, Alternative Sites 3 and 4 were considered less desirable.

- **Length of Linear Facilities.** Table A200-2 lists the straight-line measurements from Alternative Sites 1 through 4 to the interconnection point rather than linear routes, because these alternatives were eliminated from consideration prior to developing linear routes. Alternative Sites 3 and 4 were considered less desirable based on their distance from the CO_2 Custody Transfer Point. Distances from the sites to electrical transmission interconnection ranged from 0.9 mile (Alternative Site 2) to 15.1 miles (Alternative Site 4). Distances from the sites to natural gas interconnection ranged from 4.2 miles (Alternative Site 3) to 22.9 miles (Alternative Site 4). Distances from the site to potable water connection ranged from 0.02 mile (Alternative Site 2) to 15.6 miles (Alternative Site 4). Distances from the sites to the process water connection ranged from 9.2 miles (Alternative Site 3) to 29.7 miles (Alternative Site 4). Based on these distances, Alternative Site 4 was eliminated from consideration.

- **Sensitive Environmental Receptors (see Figures A200-2 and A200-3).** None of the alternative sites are located in urban settings, and none are in close proximity to a substantial number of residences. The Project Site and Alternative Site 4 have the fewest residences in close proximity to the site. Based on the California Natural Diversity Database search results, the most records of sensitive species are found in the area south of the California Aqueduct. Based on the presence of sensitive species (blunt-nosed leopard lizard), the Former Project Site was eliminated from consideration.

- **Land Availability (see Figures A200-2, A200-4, and A200-5).** All the alternative sites are used for agricultural purposes. All of the alternative sites are 96 percent farmland or greater, and contain land contracted under the Williamson Act. Based on the proximity to Interstate 5, Alternative Site 3 was considered less desirable. Based on the inability to purchase the property, Alternative Sites 1 and 2 were eliminated from consideration.

Based on siting analysis using the criteria above, the Project Site was selected.

Table A200-2
Comparison of Alternative Sites

Alternatives Criteria	Alternative Site 1	Alternative Site 2	Alternative Site 3	Alternative Site 4	Former Project Site (Proposed in the 2008 AFC)	Project Site
Property acreage	774	769	515	4,199	315	453 (Plus 653 acres of Controlled Area)
1. Topography (see Figure A200-1)						
(a)(1) and (4) Slope, topography descriptions, and elevations	**Description:** The site is generally flat. The topography varies 10 feet throughout the site. **Elevations:** Minimum: 273 feet Maximum: 283 feet **Average Slope:** Less than 0.5 percent	**Description:** The site is generally flat. The topography varies 8 feet throughout the site. **Elevations:** Minimum: 288 feet Maximum: 296 feet **Average Slope:** Less than 0.5 percent	**Description:** The site is generally flat. The topography varies 12 feet throughout the site. **Elevations:** Minimum: 291 feet Maximum: 303 feet **Average Slope:** Less than 0.5 percent	**Description:** The site is generally flat. The topography varies 42 feet throughout the site **Elevations:** Minimum: 296 feet Maximum: 338 feet **Average Slope:** Less than 0.5 percent	**Description:** Elevations: Existing surface elevations vary from about 445 feet in the southwest corner to about 310 feet in the northeast corner above mean sea level. **Elevations:** Minimum: 311 feet Maximum: 446 feet **Average Slope:** Approximately 3.0 percent	**Description:** Generally flat. The topography varies 4 feet throughout the site. **Elevations:** Minimum: 284 feet Maximum: 288 feet **Average Slope:** Less than 0.5 percent
(a)(2) Potential Available Acreage [i.e., percentage available due to topographic constraints] < 15 percent slope criteria.	100 percent	100 percent	100 percent	100 percent	100 percent	100 percent
(a)(3) Map Showing Project Footprint	Figure A200-1 shows the footprint of the current Project Site, and existing topographic contours for the Project Site, the Former Project Site, and Alternative Sites 1 through 4.					

Table A200-2
Comparison of Alternative Sites (Continued)

Alternatives Criteria	Alternative Site 1	Alternative Site 2	Alternative Site 3	Alternative Site 4	Former Project Site (Proposed in the 2008 AFC)	Project Site
(b)(1) Explanation of how topography influenced site selection criteria.	Difference in topography compared to current Project Site is insignificant.				Generally flat, but not as flat as the current Project Site. Significant grading would have been required, compared to the current Project Site.	Flatter than Former Project Site, which reduces grading requirements.
(b)(2) Feasibility and benefit analysis of how the topography differed from that of the proposed project site.	Analysis not performed because Alternatives 1 through 4 were not further analyzed for reasons other than topography.				Generally flat, but not as flat as the current Project Site. Significant grading would have been required, compared to the current Project Site.	Flatter than Former Project Site, which reduces grading requirements.
2. Distance from CO_2 Custody Transfer Point						
(2) Distance from CO_2 Custody Transfer Point It is presumed the CEC meant the injection facility because the custody transfer point is the Project Site boundary.	3.6 miles[1]	3.2 miles[1]	8.0 miles[1]	13.6 miles[1]	1.2 miles	Approximately 4 miles as routed
(a) Details and map explaining where CO_2 custody transfer point is located.	See Figure A200-1. The CO_2 injection facility is located at the southern end of the CO_2 pipeline linear.					
(b) Details and map displaying CO_2 pipeline routes evaluated for each site alternative. Matrix displaying lengths of each pipeline in comparison to those of proposed project CO_2 pipeline.	See Figure A200-1 for the current linear routes. Routes were not developed for the four alternate sites. However, Alternative Sites 3 and 4 are less desirable based on the distance from the CO_2 Custody Transfer Point.					

Table A200-2
Comparison of Alternative Sites (Continued)

Alternatives Criteria	Alternative Site 1	Alternative Site 2	Alternative Site 3	Alternative Site 4	Former Project Site (Proposed in the 2008 AFC)	Project Site
(c) Matrix on number and type of landowners traversed by the CO_2 pipeline.	This information is not available for Alternatives 1 through 4 because these alternatives were eliminated from consideration prior to development of linear routes. The OEHI-determined point of entry to the EHOF may be the same regardless of project site location (although potential points of entry into EHOF were not evaluated for Alternatives 1 through 4). Consequently, the greater the distance of an alternative site from the CO_2 injection facility, the greater the number of landowners that are likely to be traversed.				The CO_2 linear for the Former Project Site (see the 2008 AFC) traversed only properties owned by OEHI and Chevron.	The CO_2 linear for the Project Site goes underneath the non-HECA land north of the Aqueduct, then surfaces and crosses one or two properties before crossing the EHOF boundary. Within EHOF, it crosses only land owned by OEHI.
(d) Information on any engineering infeasibility of the CO_2 pipeline route.	This information is not available for Alternatives 1 through 4 because these alternatives were eliminated from consideration prior to development of linear routes.				Route as presented in the 2008 AFC considered feasible	Route as presented in the 2012 Amended AFC considered feasible
3. Lengths of Linear Facilities						
(a) Details and map of all proposed alternative linear infrastructure routes. Matrix of lengths of each.	Linear routes were not developed for Alternative Sites 1 through 4. Figure A200-1 presents the linears associated with the Project Site. The matrix of approximate linear lengths is presented in the rows below.					
(a)(1) Electrical Transmission	3.9 miles[2] The distance was approximately 6 miles to the 2009 point of interconnect (Midway Station)	0.9 miles[2] The distance was approximately 8 miles to 2009 point of interconnect (Midway Station)	5.8 miles[2] The distance was approximately 2 miles to 2009 point of interconnect (Midway Station)	15.1 miles[2] The distance was approximately 28 miles to 2009 point of interconnect (Midway Station)	2.8 miles[2] The distance was approximately 9 miles as routed in the 2008 AFC to Midway Station	2.1 miles as routed For comparison: The distance was approximately 8 miles as routed to Midway Station
(a)(2) Natural Gas	7.6 miles[3] The distance was approximately 8 miles to the 2009 point of interconnect (near Tupman Road and Highway 119).	7.2 miles[3] The distance was approximately 6 miles to the 2009 point of interconnect.	4.2 miles[3] The distance was approximately 5 miles to the 2009 point of interconnect.	22.9 miles[3] The distance was approximately 3 miles to the 2008-2009 point of interconnect.	10.2 miles[3] The distance was approximately 7 miles as routed to the 2008 point of interconnect	13 miles as routed For comparison: The distance was approximately 8 miles as routed to 2009's point of interconnect

Table A200-2
Comparison of Alternative Sites (Continued)

Alternatives Criteria	Alternative Site 1	Alternative Site 2	Alternative Site 3	Alternative Site 4	Former Project Site (Proposed in the 2008 AFC)	Project Site
(a)(3) Potable Water	3.0 miles[4]	0.02 miles[4]	5.2 miles[4]	15.6 miles[4]	2.3 miles[4] The distance was 5.5 miles as routed to previous point of interconnect near Tupman Road and Highway 119 (per 2008 AFC).	1 mile as routed Was 7 miles as routed to previous point of interconnect (per 2009 Revised AFC).
(a)(4) Process Water	11.0 miles[5]	13.5 miles[5]	9.2 miles[5]	29.7 miles[5]	12 miles[5] The distance was approximately 18 miles as routed (per 2008 AFC).	15 miles as routed
(b) Matrix on number and type of infrastructure linears that traverse across property owners land.	This information is not available for Alternatives 1 through 4 because these alternatives were eliminated from consideration prior to development of linear routes.				Information not needed—and therefore not developed—for the Alternative Analysis.	Information not needed—and therefore not developed—for the Alternative Analysis.
4. Sensitive Environmental Receptors						
(4) Sensitive Environmental Receptors (including residences, schools, hospitals, recreational areas, sensitive species). See Figures A200-2 and A200-3.[6]	• Four residences within 1,000 feet • Elk Hills Elementary School – 4 miles • First Southern Baptist Church – 3.75 miles • Buttonwillow Park – 3.5 miles away	• Seven residences within 1,000 feet • Elk Hills Elementary School – 2.5 miles • First Southern Baptist Church – 5.8 miles • Buttonwillow Park – 5.6 miles	• One residence within 1,500 feet, and three other residences within 5,500 feet • Buttonwillow Elementary School – 2.5 miles • Community Baptist Church – 2.1 miles • Buttonwillow Park – 1.6 miles	• Three residences within 3,500 feet • Lakeside Elementary School – 5 miles • First Southern Baptist Church – 22.5 miles • Buttonwillow Park – 22.3 miles	• One residence within 2,700 feet, and 37 residences within 8,000 feet • Elk Hills Elementary School – 1.3 miles • First Southern Baptist Church – 7.3 miles • Buttonwillow Park – 7.1 miles	• One residence within 1,400 feet, and one residence within 3,300 feet • Elk Hills Elementary School – 1.3 miles • Tule Elk State Natural Reserve – 1,700 feet

Table A200-2
Comparison of Alternative Sites (Continued)

Alternatives Criteria	Alternative Site 1	Alternative Site 2	Alternative Site 3	Alternative Site 4	Former Project Site (Proposed in the 2008 AFC)	Project Site
(a) Details and map displaying geographic extent used to define sensitive environmental receptors	See Figure A200-2 for Existing Land Use within 1 Mile of each site. California Natural Diversity Database records of special-status species occurrences in the vicinity of the alternative sites are shown on Figure A200-3. Figure A200-3 also shows observations of blunt-nosed leopard lizards documented by URS during surveys for the HECA Project. Most of the special-status species occurrences are associated with natural habitats south of the California Aqueduct and within the Tule Elk State Natural Reserve.				Within 3 miles of the Project Site. The Former Project Site was eliminated from consideration based on multiple environmental criteria, including the presence of several listed species. One of the species, the blunt-nosed leopard lizard, is fully protected under the California Fish and Game Code. This status precludes the ability of the California Department of Fish and Wildlife (formerly the Department of Fish and Game) from issuing take authorization for mortality of the species. The Former Project Site is also located within the Bureau of Land Management's Lokern Area of Critical Environmental Concern, and adjacent to conservation lands managed by the California Department of Fish and Game and Occidental Petroleum.	Within 6 miles of the Project Site.

Table A200-2
Comparison of Alternative Sites (Continued)

Alternatives Criteria	Alternative Site 1	Alternative Site 2	Alternative Site 3	Alternative Site 4	Former Project Site (Proposed in the 2008 AFC)	Project Site
(b) Matrix on number and type of sensitive receptors considered for each site alternative.	A full analysis of environmental receptors was not performed for Alternative Sites 1 through 4 because these alternatives were eliminated from consideration prior to development of this information.				See Section 5.4 of the 2008 AFC for a discussion of sensitive land uses near the Former Project Site.	See Section 5.4 of the 2012 Amended AFC for a discussion of sensitive land uses near the Project Site.
5. Land Availability						
(a) Land ownership for each site alternative and linear ROWs. Describe all federal, state, and local applicable land use plans for these lands.	Private	Private	Private	Private	Private	Private
(b)(1) Description of existing land uses (Include acreage figures for areas in agricultural use. See Figures A200-2, A200-4, and A200-5	**98 percent Farmland** • 752 acres of Prime Farmland • 20 acres of other farmland • 225 acres of alfalfa, 351 acres of cotton, 201 acres of pistachio **2 percent Residential**	**99.9 percent Farmland** • 664 acres of Prime Farmland • 66 acres of other farmland • 34 acres of natural vegetation • 186 acres of alfalfa • 46 acres of cotton • 31 acres of wheat **0.1 percent Canals**	**97 percent Farmland** • 297 acres of Prime Farmland • 218 acres of other farmland • 329 acres of almond • 67 acres of carrot • 75 acres of pistachio **3 percent Undeveloped**	**96 percent Farmland** • No Prime Farmland • 4,159 acres of other farmland (including 2,310 acres of uncultivated agricultural land) • 10 acres of natural vegetation • 8 acres of rural residential • 8 acre of alfalfa • 3 acres of cotton • 1,771 acres of wheat **4 percent Undeveloped**	**99 percent Farmland** • 316 acres of other farmland **1 percent Undeveloped** • 3 acres of natural vegetation	**99.8 percent Farmland** • 453 acres Prime Farmland **0.2 percent Industrial**

Table A200-2
Comparison of Alternative Sites (Continued)

Alternatives Criteria	Alternative Site 1	Alternative Site 2	Alternative Site 3	Alternative Site 4	Former Project Site (Proposed in the 2008 AFC)	Project Site
(b)(2) Surrounding Land Uses	Land uses to the north, east, and west are mostly farmland, with a small amount of residential land use. Land use to the south is undeveloped and public or public/quasi-public. Farmland surrounding the project site is composed of Williamson Act Contracted Land, prime farmland, farmland on statewide importance, and semi-agriculture and rural commercial land. The surrounding farmland contains the following crop coverage: bok choy, cotton, alfalfa, wheat, onions, almonds, and persimmon.	The site is surrounded by farmland. There is a small amount of residential land use to the north and southwest. Land immediately south of the project is public/ quasi-public. Farmland surrounding the project site is composed of Williamson Act Contracted Land, prime farmland, farmland of statewide importance, and semi-agriculture and rural commercial land. The surrounding farmland contains the following crop coverage: bok choy, almonds, alfalfa, grape, tomato process, persimmon, cotton, and onion.	Site located adjacent to Interstate 5. Land to the north of the site is farmland. Land to the west and south of the site is farmland, residential, and undeveloped. Land east of the site is undeveloped and commercial. Farmland surrounding the project site is composed of Williamson Act Contracted Land, prime farmland, farmland of statewide importance, and semi-agriculture and rural commercial land. The surrounding farmland contains the following crop coverage: bok choy, almond, alfalfa, onion, carrot, wine grapes, sudangrass, and tomato process.	The site is surrounded by farmland. There are small areas of undeveloped land to the west of the site. There is some residential land southwest of the site. Land southeast of the site is mostly undeveloped with small residential and commercial areas. Farmland surrounding the project site is composed of Williamson Act Contracted Land, prime farmland, farmland of statewide importance, and semi-agriculture and rural commercial land. The surrounding farmland contains the following crop coverage: tomato process, wheat, alfalfa, onion, safflower, prune, pomegranate, wine grape, oats for food, corn for food, rapeseed, Napa cabbage, potato, and mustard.	Land to the south and north of the site is farmland and undeveloped, with small areas of public/quasi-public. Land to the west is undeveloped. Land to the east is farmland, undeveloped, and public/ quasi-public. Farmland surrounding the project site is composed of Williamson Act Contracted Land and prime farmland. The surrounding farmland contains the following crop coverage: alfalfa, onions, and oats.	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 (and the Outlet Canal, KRFCC, and the California Aqueduct (State Water Project) are approximately 500, 700, and 1,900 feet south of the Project Site, respectively. Most of the land in the vicinity of the Project Site and Project linears is included in the Exclusive Agriculture (A) zone or the Limited Agriculture (A-1) zone.

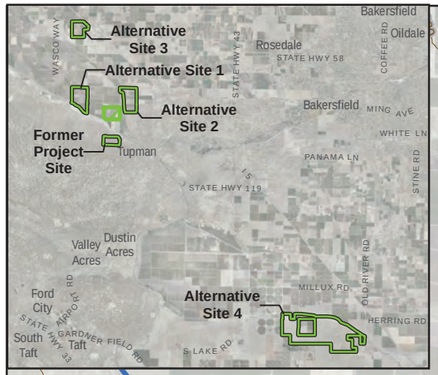
Table A200-2
Comparison of Alternative Sites (Continued)

Alternatives Criteria	Alternative Site 1	Alternative Site 2	Alternative Site 3	Alternative Site 4	Former Project Site (Proposed in the 2008 AFC)	Project Site
(c) Description of how the economic viability of acquiring each site alternative.	Owner not willing to sell.	Owner sold to another buyer.	Owner possibly willing to sell.	Owner possibly willing to sell.	Owner willing to sell.	Owner sold to HEI, LLC. HECA LLC has an option to purchase from HEI LLC.

Notes:

[1] Except as noted, these are straight-line measurements, not distances of routed linears.
[2] Except as noted, these are straight-line distances to the present proposed point of interconnect (future PG&E Switching Station).
[3] Except as noted, these are straight-line distances to the present point of interconnect north of the Project Site (PG&E).
[4] Except as noted, these are straight-line distances to the present proposed source east of the Project Site (WKWD).
[5] Except as noted, these are straight-line distances to the present proposed source of Buena Vista Water Storage District
[6] Information regarding sensitive receptors near alternative sites is based on best available public information, but had not been field-verified.

AFC = Application for Certification
CEC = California Energy Commission
CO_2 = carbon dioxide
EHOF = Elk Hills Oil Field
KRFCC = Kern River Flood Control Channel
OEHI = Occidental Elk Hills, Incorporated
PG&E = Pacific Gas and Electric Company
ROW = right-of-way
WKWD = West Kern Water District



Project Site
Alternative Site
20-foot contour line
Project Site Carbon Dioxide
Project Site Natural Gas
Project Site Potable Water
Project Site Process Water
Project Site Railroad
Project Site Transmission

N

0 3,250 6,500 Feet

Imagery Source: USDA, NAIP, 2010.

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ALTERNATIVE SITES TOPOGRAPHY

January 2013 — Hydrogen Energy California (HECA)
28068052 — Kern County, California

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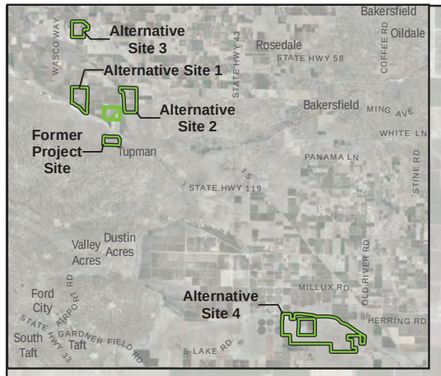
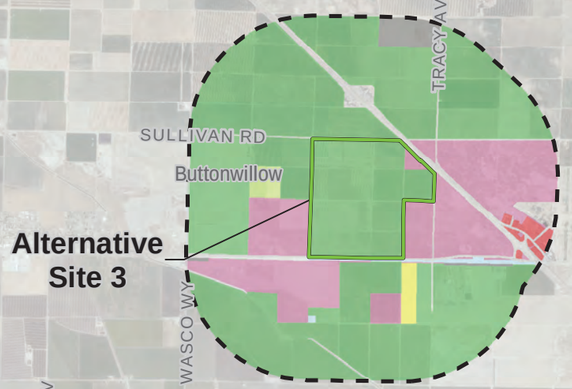
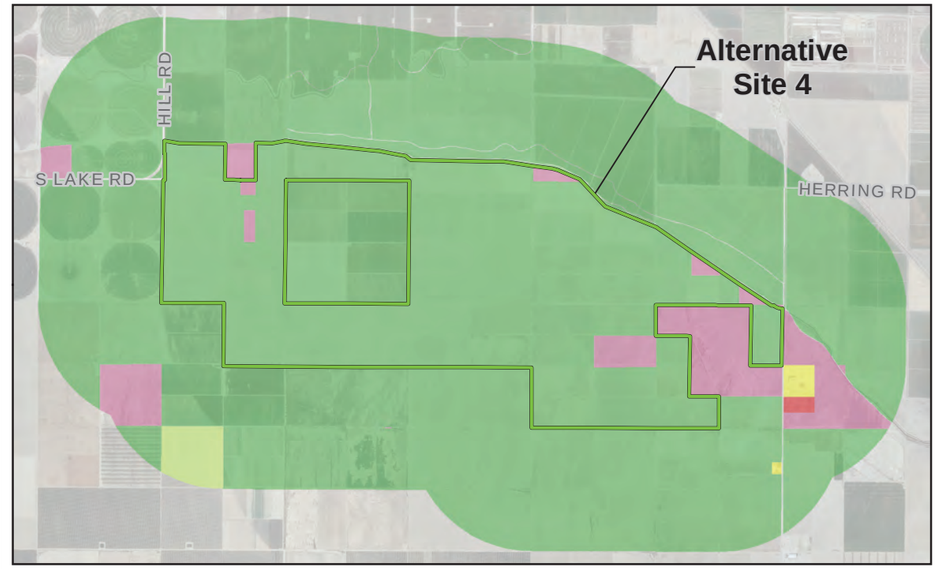
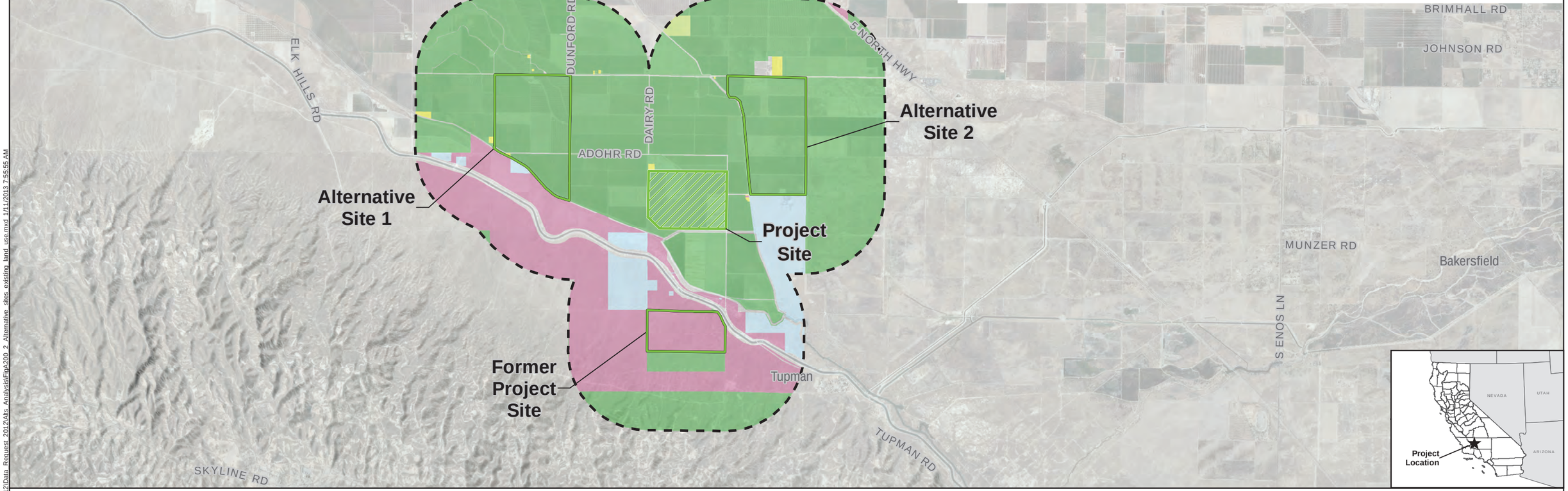
FIGURE A200-1









Project Site
Alternative Site
1-mile buffer

Existing land use
Commercial
Farming
Industrial

Orchards
Public/Quasi-Public
Residential
Undeveloped

N

0 3,250 6,500 Feet

Imagery Source: USDA, NAIP, 2010.

ALTERNATIVE SITES
EXISTING LAND USE WITHIN 1 MILE

January 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE A200-2

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Alternative Site 3

Alternative Site 1

Alternative Site 2

Project Site

Former Project Site

Alternative Site 4

Project Location

NEVADA

UTAH

ARIZONA

CALIFORNIA AQUEDUCT

ELK HILLS

BUENA VISTA HILLS

BUENA VISTA LAKE BED

KERN LAKE BED

Buttonwillow

Fellows

Taft

Bakersfield

Lamont

Lokern Rd

Buttonwillow Dr

Brandt Rd

Wasco Way

CA-58

Stockdale Hwy

Rosedale Hwy

Hageman Rd

Allen Rd

Calloway Dr

Coffee Rd

Olive Dr

China Grade Loop

Panorama Park

Heath Rd

Truxtun Ave

California Ave

E California Ave

Niles St

Bakersfield-Tehachapi Hwy

Ming Ave

Buena Vista Rd

Gosford Rd

Valley Plaza

White Ln

S H St

S Union Ave

CA-99-BR

S Fairfax Rd

CA-184-Weedpatch Hwy

Panama Ln

E Panama Ln

Stine Rd

Wible Rd

CA-119

Taft Hwy

Panama Rd

CA-99

Main St

Golf Course Rd

Buena Vista Aquatic Recreation Area

Lake Webb

Coles Levee Rd

Bear Mountain Blvd

CA-223

Elk Hills Rd

Airport Rd

Broad Creek

Midway Rd

Kern St

Gardner Field Rd

S Lake Rd

Herring Rd

N Wheeler Ridge Rd

515 m

N

0 1.5 3 MILES

Project Site
Alternative Site
1-mile radius
Denotes state or federally-listed species

Sensitive Natural Communities
Great Valley Mesquite Scrub
Valley Saltbush Scrub
Valley Sink Scrub

Sensitive Plants/Animals
Hoover's eriastrum
Kern mallow
Lost Hills crownscale
oil neststraw
recurved larkspur
slough thistle
Le Conte's thrasher
Nelson's antelope squirrel
San Joaquin kit fox
San Joaquin pocket mouse
Tipton kangaroo rat
blunt-nosed leopard lizard
burrowing owl
giant garter snake
giant kangaroo rat
mountain plover
western pond turtle
Blunt-nosed leopard lizard - URS observation

Buena Vista Aquatic Recreation Area
Coles Levee
Lokern Area of Critical Environmental Concern
Tule Elk State Natural Reserve
Lokern Ecological Reserve

California Aqueduct San Joaquin Field Division Draft Habitat Conservation Plan (Approximate Extent)
Elk Hills Conservation Area
Bureau of Land Management
Other Public Land

ALTERNATIVE SITES SPECIAL-STATUS SPECIES WITHIN 1 MILE

January 2013
28068052

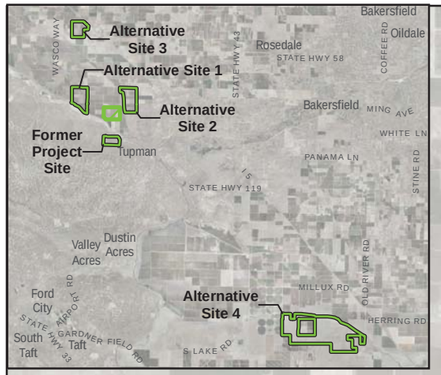
Hydrogen Energy California (HECA)
Kern County, California

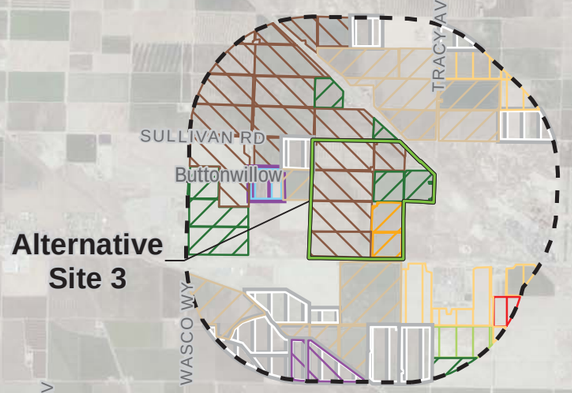
URS

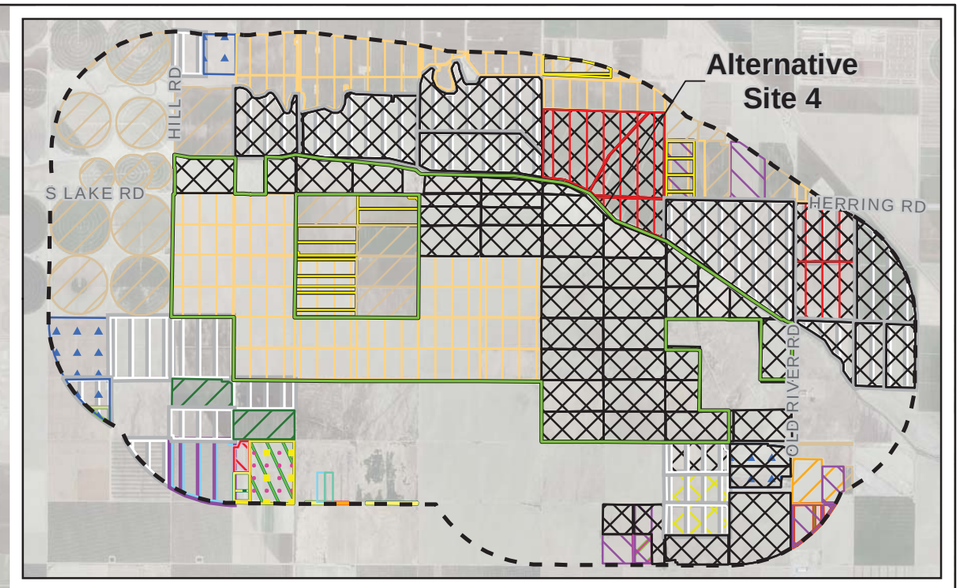
FIGURE A200-3

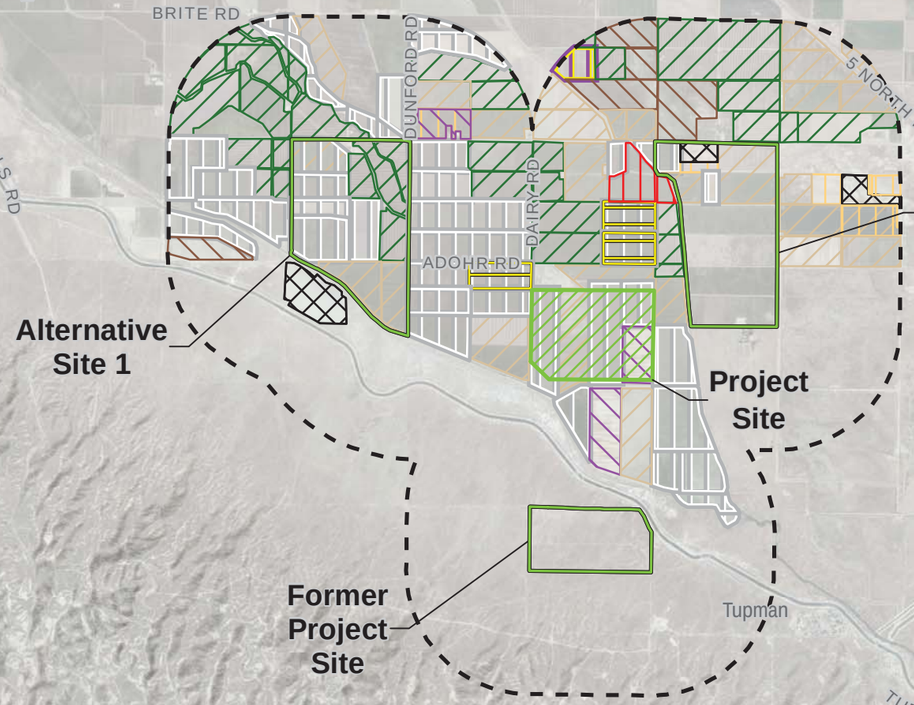
Source: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, iPC, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), and the GIS User Community; Special-status species, California Natural Diversity Database (CNDDB), CA Dept. of Fish & Game, November 2012; Blunt-nosed leopard lizard observations, URS, 2008-2010.

I:\U\GIS\HECA\Projects\HECA_2012\Data_Request_2012\Alts_Analysis\Fig A200_3 Alternative_sites_cnddb.mxd 1/10/2013 4:14:35 PM









Project Site
Alternative Site
1-mile buffer

Commodity
Alfalfa
Alfalfa seed
Almond
Asparagus
Bok choy
Brussel sprout
Cabbage
Cantaloupe
Carrot
Cherry
Corn
Corn for food
Cotton
Grape
Grape, wine
Herb, spice
Melon
Napa cabbage
Oat for food
Onion
Persimmon
Pistachio
Pomegranate
Potato
Prune
Rape
Safflower
Sudangrass
Tomato process
Triticale
Uncultivated Ag
Watermelon
Wheat

N
0 3,250 6,500 Feet

Imagery Source: USDA, NAIP, 2010.

ALTERNATIVE SITES CROPS WITHIN 1 MILE

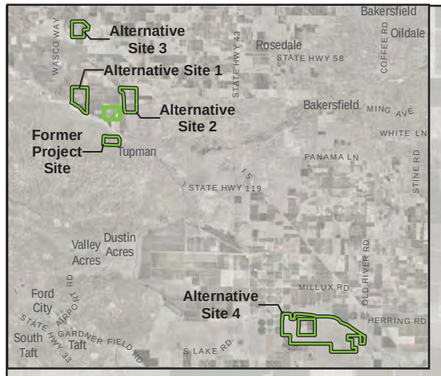
January 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE A200-4

K:\UG\SHECA\Projects\HECA_2012\Data_Request_2012\Alts_Analysis\Fig\A200_4_Alternative_sites_crops.mxd 1/16/2013 10:04:19 AM



Project Site
Alternative Site
1-mile buffer
Williamson Act Contracted Land

Important Farmland Areas
Prime Farmland
Farmland of Statewide Importance
Unique Farmland

Grazing Land
Nonagriculture or Natural Vegetation
Semi-Agriculture and Rural Commercial Land
Vacant or Disturbed Land

N

0 3,250 6,500 Feet

ALTERNATIVE SITES
FARMLANDS WITHIN 1 MILE

January 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE A200-5

Imagery Source: USDA, NAIP, 2010.

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BACKGROUND

On July 26, 2012, the United States Environmental Protection Agency (EPA) provided scoping comments on the amended Notice of Intent (NOI) modifying the scope of the Environmental Impact Statement (EIS) for the proposed project. EPA has regulatory authority regarding the CO_2 sequestration component, as well as any other fluid injection activities, of the proposed project. Within the EPA scoping comments, alternatives issues were identified requiring analysis in the EIS.

As noted in the EPA scoping comment letter, the Department of Energy (DOE) utilizes a financing selection process separate from NEPA that includes an "environmental critique" for the proposals deemed suitable for selection of funding. DOE selected the proposed project for a funding award, and only considers alternatives considered within the Amended AFC.

Based on EPA scoping comments, additional information is needed to evaluate the following alternatives within the Amended AFC. The alternatives mentioned by EPA seek to evaluate a reduction in project size and/or different technologies for particular component processes of the project. Consistent with CEQA Section 15126.6, the Preliminary Staff Assessment will evaluate a range of potential alternatives to the proposed project. Energy Commission staff is requesting the information below to determine alternatives that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects. These types of alternatives potentially could result in an incremental reduction in emissions vehicle trips, site footprint, and water consumption. Therefore, Energy Commission staff is requesting the information below to ensure that EPA comments are addressed and these alternatives adequately analyzed per CEQA in the Staff Assessment.

DATA REQUEST

A201. Provide a description of what proposed project activities would occur should DOE funding not be obtained. Describe the differences between the proposed project as funded by DOE and that without receiving funding. Discuss any activities that would occur, and the feasibility of those actions, should DOE funding not be obtained.

RESPONSE

The U.S. Department of Energy (DOE) Clean Coal Power Initiative (CCPI) program is intended to move “technologies more quickly into the market place that may not ordinarily be developed by the private sector due to the risk involved, allowing substantial benefits to be realized” (NETL, 2002). DOE has selected the HECA Project through a competitive process under the Round 3 CCPI program, and this funding is an integral component of the HECA project financing. As described in Section 6.2 of the Amended AFC, under the No Project/Action Alternative, HECA would not receive authorization from the CEC to construct and operate a low-carbon Integrated Gasification Combined-Cycle (IGCC) polygeneration facility, or receive funding from DOE to build the facility. As a result, the Project would not be developed.

Reference

NETL (National Energy Technology Laboratory), 2002. Clean Coal Power Initiative. Review paper by Michael L. Eastman, Manager, Clean Coal Technology Demonstrations, NETL. Available online at: http://www.netl.doe.gov/technologies/coalpower/cctc/ccpi/pubs/ccpi%20(status%20report%20and%20program%20review).pdf.

DATA REQUEST

A202. Provide a project description, feasibility analysis, and environmental analysis discussing a reduced size project alternative (minimum of 25 percent reduction in project footprint). Provide figures and a matrix showing the configuration of this reduced project alternative and any change in megawatt (MW) output, CO_2 sequestration, fertilizer production and vehicle trips, coal and petcoke usage, and all other considerations when compared to the proposed project.

RESPONSE

The HECA Project is configured around proven Mitsubishi Heavy Industries (MHI) gasification technology and MHI combustion turbine technology. These two key equipment systems are only offered in the sizes used for the HECA Project, and are not scalable by 25 percent or any other value. The selection of these key technologies also determines the amount of hydrogen that can be produced for combustion turbine fuel and fertilizer production, as well as the CO_2 available for Enhanced Oil Recovery (EOR) and permanent sequestration. The engineering design work process includes optimizing the plot plan. Plot plan optimization includes minimizing the footprint to the extent practical when spacing required for plant maintenance, safety, constructability and environmental impacts are considered.

DATA REQUEST

A203. Provide a project description, feasibility analysis, and environmental analysis discussing a dry cooling or wet-dry hybrid cooling alternative. As noted within the EPA scoping letter, these technologies would reduce water use and be more sustainable in the long-term. Please provide a focused analysis of water use/ reduction in comparison to that of the proposed project.

RESPONSE

The Applicant evaluated the suitability of air cooling for heat rejection. The Project uses heat integration and/or air cooling to reduce process stream temperatures to 140 degrees Fahrenheit everywhere that it was effective to do so. A water trim cooler is used to provide further cooling where necessary to meet process requirements. Approximately eight air coolers and extensive process heat integration have been incorporated into the plant design, and this conserves water. Air cooling was not selected for the steam turbine surface condenser because it results in a substantial increase in parasitic electrical demand and a dramatic decrease in power output. These effects result in a markedly negative impact on the cost and availability of electricity. Further support for the economic impact is provided by referencing two technical reports prepared for the CEC, titled "*Cost and value of water use at combined-cycle power plants"*[1] and "*Comparison of Alternate Cooling Technologies for California Power Plants: Economic, Environmental, and Other Tradeoffs.*"[2] These studies provide a comparison between water and dry-cooled configurations for power plants in four different California geographies, with correspondingly different typical meteorological conditions. Of particular relevance to HECA, each study has a "Valley" location case that features a comparison of cooling methods for a combined-cycle power plant in Kern County. The 2006 CEC report provides a further description for the Valley site as follows: **"**while still having high summertime temperatures, represents a more moderate climate than the desert site. At this location, fresh water is highly valued by the agricultural community, but saline groundwater, which is unsuitable for irrigation, is available." The CEC reports are a relevant comparison because:

- The location and meteorological conditions between HECA and the CEC "Valley" site are the same.
- The cooling loads for both plants are similar. Both also have similar steam turbine output and condenser loads.
- Annual average brackish/saline water consumption for the combined cycle is similar between reports and the HECA plant design.

The CEC water minimization studies provide information and support for selection of a water-cooled condenser for the combined-cycle power plant, as follows:

- Capital cost differential of approximately $20-30 million;
- Reduced power output of between 20 to 40 megawatts (MW) (range of 2002 and 2006 study results); and
- Overall total cost impact of about $50 million (2002 study).

In a typical Natural Gas Combined-Cycle (NGCC) plant, about one-third of the gross power output is generated by the steam turbine and the other two-thirds is generated by the gas turbine. NGCC plants in California and Nevada typically use evaporative cooling to chill the inlet

[1] April 2006 CEC-500-2006-034
[2] February 2002 CEC 500-02-079F

air to the gas turbine, which increases gas turbine output on hot days. Using air cooled condensers in NGCC plants imposes a substantial output penalty on the project that is most pronounced on hot days. However, the penalty is only on the steam turbine output, which may make the choice economically feasible.

The output, cost, and efficiency penalties associated with using only air cooling are much more significant for the HECA Project than for a typical NGCC project. This is because for an NGCC, the efficiency impact is confined to the steam turbine; whereas in the HECA process units (gasification, gas treatment, and manufacturing complex), the impacts occur to many pieces of equipment, most of which are significantly more sensitive to heat rejection temperature than the steam turbine.

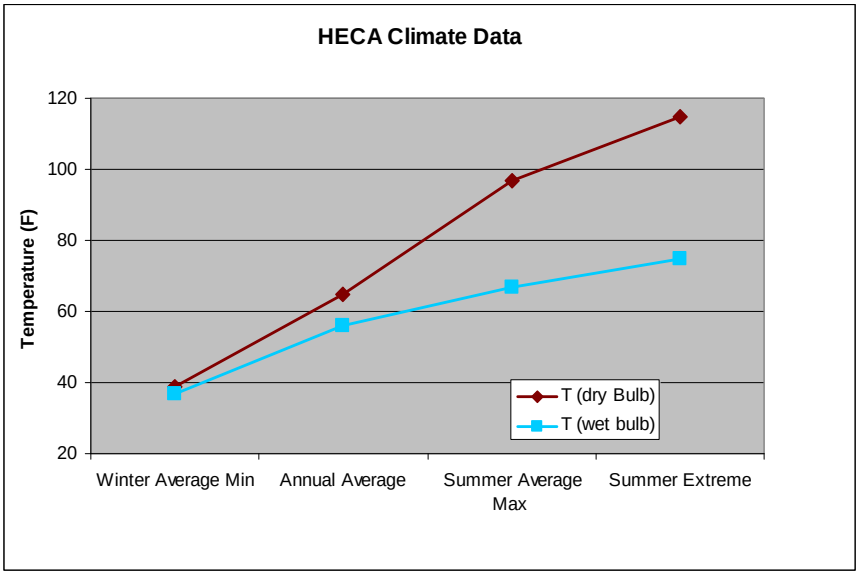
The efficiency loss (increase in auxiliary load) and capital cost impacts associated with implementing air cooling in the process portion of the plant is real and large, but much more pervasive and difficult to quantify than in the power block. The loss of revenue caused by a lower net power output is large and would outweigh any net capital cost change.

To apply air cooling only to the process units, each piece of equipment that requires cooling would be evaluated, and changes would be made to address the process, hydraulics, equipment location, and other aspects of the basic configuration that are needed. This is because air cooling involves a higher heat rejection temperature. This higher heat rejection temperature will require larger equipment, which in some cases may still not be able to achieve the required process temperatures. The larger equipment will also impact plot configuration and process hydraulics. As an example, a multistage compressor would likely require additional stages of compression and changes in plot location to accommodate air cooling. This would require additional energy consumption and operating complexities that have not been considered. Most importantly, even if this information were available, it is really the efficiency loss that drives the economic impacts. In addition to being economically unsound, the use of dry cooling would be environmentally undesirable because benefits for the BVWSD would not be achieved.[3] See the response to AIR Data Request 14 for further description of these benefits.

From a thermodynamic point of view, air cooling requires the heat rejection temperature to be above the ambient dry bulb temperature. Using mechanical draft cooling towers allows the heat rejection temperature to be below the ambient dry bulb temperature and approaching the ambient wet bulb temperature. As indicated on Figure 127-1, an additional 30 to 40 degrees of temperature-driving force is available using water cooling, because the difference between the dry bulb temperature and the wet bulb temperature is much higher on hot summer days than the annual average day. Because the need for power and the price for power is much higher on hot summer days, the loss in power output comes precisely when it is most valuable and needed in the California Independent System Operator (CAISO) grid. The process areas associated with an IGCC have many pieces of equipment in comparison to a power block, which only has a final condenser serving the steam turbine generator. Figure 127-1 illustrates how the heat rejection temperature penalty for air cooling increases on hot days.

[3] Withdrawal of impaired quality groundwater to alleviate impacts on agriculture is consistent with the Drainage Control and Irrigation Conservation Programs described in the BVWSD Groundwater Management Plan (Boyle Engineering, 2002), and is part of BVWSD's Brackish Groundwater Remediation Project, which provides benefits for BVWSD's Buttonwillow Service Area. BVWSD's Brackish Groundwater Remediation Project was analyzed in the Final Environmental Impact Report for the Buena Vista Water Storage District Buena Vista Water Management Program, dated December 2009 (Krieger and Stewart, Inc., 2009).

Figure A203-1
HECA Climate Data



References

Boyle Engineering Corporation, 2002. Groundwater Status and Management Plan for Buena Vista Water Storage District. California Energy Commission.

Krieger and Stewart, Inc., 2009. Final Environmental Impact Report for the Buena Vista Water Storage District Buena Vista Water Management Program. December.

DATA REQUEST

A204. Provide a project description, feasibility analysis, and environmental analysis discussing a dry scrubbing alternative. As noted within the EPA scoping comment letter, this technology would reduce water use and be more sustainable in the long-term. Please provide a focused analysis of water use/reduction in comparison to that of the proposed project.

RESPONSE

A dry scrubbing alternative is not applicable to an IGCC plant. Dry scrubbing is a post-combustion, low-pressure (near atmospheric) technology for removal of sulfur dioxide from a fired boiler flue gas stream. Dry scrubbing can be an alternative post-combustion flue gas cleanup method (as compared to wet scrubbing for a typical pulverized coal boiler/cycle plant). An IGCC plant removes sulfur (in the form of hydrogen sulfide) from the high-pressure synthetic gas (syngas) (about 550 pounds per square inch, gage) prior to combustion; therefore, potential water savings through the use of dry scrubbing is not applicable to this process.

BACKGROUND

Section 6.0 of the Amended AFC discusses alternatives evaluated as part of the screening analysis for the proposed project. Additional information is needed documenting the applicant's reasoning for not evaluating additional alternatives beyond those presented within Section 6.0 of the Amended AFC.

Consistent with CEQA Section 15126.6, the Preliminary Staff Assessment will evaluate a range of potential alternatives to the proposed project. Energy Commission staff is requesting the information below to determine alternatives that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects. The alternatives potentially would reduce the project size or the size of project-related components, which may lead to reduced project air emissions, vehicle trips, rail traffic, water use, traffic hazards, public health and safety concerns, and avoidance of carbon sequestration.

The following information is necessary for Energy Commission staff to adequately consider a broad range of site and technology alternatives for the Preliminary Staff Assessment or adequately determine the factors that may be used to eliminate alternatives from detailed consideration in the Preliminary Staff Assessment, per CEQA requirements.

DATA REQUEST

A205. Provide a project description, feasibility analysis, and environmental analysis discussing locating the proposed project on a site within the Elk Hills Oil Field. This analysis should adequately identify all linear facilities and compare this alternative site against the site evaluation criteria identified within Amended AFC Subsection 6.3. For an Elk Hills Oil Field Site Alternative, the feasibility analysis should consider, but not be limited to, the following:

a. Topography. Discuss topography issues against the necessary acreage of land required. Include a map showing a possible project site and footprint. Describe the topography and elevations within the site and the required linear facilities. Compare these features against those of the proposed project site, explaining the differences or any engineering infeasibility.

b. Linear facilities. Details and a map displaying all linear infrastructure routes (including the CO_2 pipeline route to custody transfer point). Provide a matrix displaying the lengths of each linear in comparison to those of the proposed project. Compare estimated linear cost to those of the proposed project.

c. Land Availability. Discuss land ownership issues against the necessary acreage of land required. Describe any land use siting conflicts and the economic viability of siting the proposed project within the oil field in comparison to the proposed project.

RESPONSE

The Project presented in the 2008 AFC was proposed on a site south of the California Aqueduct, and within the EHOF. See Figure 4.4-1, Supplemental Environmental Information, Appendix A-1 of the Amended AFC, for the EHOF boundary. Specific information on the

Former Project Site's topography, linear facilities, and land availability is presented in Table A200-2 above, as well as in the 2008 AFC.

This site was originally selected as the Project Site, based on criteria that included linear lengths and land availability. HECA (then HEI) filed an AFC featuring this project site in 2008. HECA subsequently decided to move the Project when it confirmed the presence of previously undisclosed sensitive biological resources (blunt-nosed leopard lizard).

HECA considered several other locations within EHOF, but these areas were also within potential habitat for sensitive biological resources. In addition, the terrain/topography of most of the EHOF is significantly less suitable than that of the Project Site.

DATA REQUEST

A206. Provide a project description, feasibility analysis, and environmental analysis discussing a Coal Provider and Storage Alternative. Information provided should include, but not be limited to:

a. Available alternative coal supply and storage options,

b. Available alternative coal supply and storage location(s),

c. What means of transport would be available to supply the proposed project with an alternative coal source(s); and

d. How the economic viability of purchasing coal from an alternative source compares to that of the proposed project.

RESPONSE

Coal Supply

The Applicant assessed domestic mines within the Western United States capable of providing the quantity and quality of required solid feedstocks. Coal sourced from New Mexico, Utah, and Colorado was among the analyzed alternatives.

Based on this alternatives analysis and as detailed below, the Project currently plans to use Western sub-bituminous coal from New Mexico (URS, 2012a). As reported in the Applicant's Response to Sierra Club Data Request 17, the Project is in the process of discussing contractual terms with Peabody Energy to supply coal from their portfolio of mines, including, but not limited to, Lee Ranch and, more likely, El Segundo (URS, 2012b). In contrast, an alternative coal supply proposed for the Project and presented in the 2008 AFC was to be Western bituminous, sourced from the Uinta Basin in Utah and Colorado (CEC, 2012).

The coal supply identified in the current Amended AFC has several advantages over alternative sources. Sub-bituminous coal derived from New Mexico was selected for the current Project due to the quality of the feedstock, the proximity of the mine to the Project site,[4] the availability of a direct rail corridor, and lower transportation costs.

During pre-FEED, sub-bituminous New Mexico coal was tested and approved by MHI, the Project gasifier supplier. Sub-bituminous New Mexico coal was deemed preferable by MHI in terms of ash composition and other characteristics that enhance reliability and efficiency, resulting in more favorable Project economics.

Storage

As detailed in the current Amended AFC, coal and petcoke deliveries to the Project Site will be unloaded and stored at the Project Site in a coal/petcoke barn designed to contain feedstock sufficient for 30 days of operation (approximately 172,000 tons of coal and petcoke). Storage of feedstocks in a covered barn eliminates the need for an uncovered, onsite storage pile, thereby reducing the risk of precipitation coming into contact with solid feedstocks and the generation of contaminated stormwater.

[4] The sub-bituminous mines in New Mexico proposed for the current Project are approximately 200 miles closer to the Project Site than the bituminous Uinta Basin mines presented in the 2008 AFC.

A storage alternative was presented in the 2008 AFC. Under the Project presented in the 2008 AFC, coal was to be brought in-state by rail; loaded onto trucks at a nearby loading terminal in Wasco, California, and then transported from the truck unloading system to the active storage silos at the Project Site. Onsite feedstock storage would include 15,000 tons of active storage (sufficient for 3 to 5 days of operation) and at least 30 days inactive emergency storage based on the maximum plant production rate. Active storage would include three 5,000-ton, entirely enclosed, cone-bottom silos with baghouses, with one or more silos dedicated for each type of feedstock. An inactive storage pile, covered with stabilizer, would also be located on site.

Transport

For the current Project, the sub-bituminous New Mexico coal can be railed along a continuous route on the Burlington Northern railroad line. Selection of a continuous rail route eliminates the need for multiple transloading facilities en route, thereby minimizing emissions and transportation costs.

Transport of coal in the quantities required for the Project can be accomplished by either rail directly to the Project site or a combination of both rail and trucks. In the current Amended AFC, two alternative coal transport methods are proposed, and the Applicant is seeking approval of both alternatives:

- **Alternative 1 (Rail).** An approximately 5-mile new industrial railroad spur that would connect the Project Site to the existing SJVRR Buttonwillow railroad line, north of the Project Site.

- **Alternative 2 (Truck).** Truck transport would be via existing roads from an existing coal transloading facility northeast of the Project Site. The truck route distance is approximately 27 miles. This alternative was presented in the 2009 Revised AFC.

Due to the absence of nearby navigable waterways, there are no other transportation methods available for transporting the volume of coal required to the Project Site. In addition, there are no existing transloading facilities closer to the Project Site that are capable of handling the volume of coal required for the Project. Therefore, the above transportation alternatives represent the most economical and environmentally sensitive methods by which to transport coal to the Project Site.

Economics

For the above-mentioned reasons, notably the quality of the feedstock and the presence of a direct rail corridor, the economic viability of purchasing New Mexico sub- bituminous coal is preferred over alternative sources. Moreover, the transportation and storage options for the current Project represent the most cost-effective and environmentally sensitive options available to support the Project.

References

California Energy Commission (CEC), 2012. Hydrogen Energy California Project Preliminary Staff Assessment, Part 1. CEC-700-2010-015 PSA-PT1. Docket Number 08-AFC-8. http://www.energy.ca.gov/2010publications/CEC-700-2010-015/CEC-700-2010-015-PSA-PT1.PDF.

URS (URS Corporation), 2012a. Amended Application for Certification for Hydrogen Energy California (08-AFC-8) Kern County, California. Chapter 2, Project Description. Available online at: http://www.energy.ca.gov/sitingcases/hydrogen_energy/documents/applicant/amended_afc/Vol-I/2.0_Project_Description.pdf.

URS (URS Corporation), 2012b. Responses to Sierra Data Requests: Nos. 1 through 97. Amended Application for Certification for Hydrogen Energy California (09-AFC-81), Kern County, California. September.

DATA REQUEST

A207. Provide a project description, feasibility analysis, and environmental analysis discussing a No Fertilizer Manufacturing Complex Alternative. Provide information on what activities would occur without the fertilizer manufacturing complex, and the ways in which the economic viability of this alternative compares to that of the proposed project.

RESPONSE

The No Fertilizer manufacturing Complex Alternative is the previous HECA Project design set forth by the prior HECA owners. That design was thoroughly analyzed in the Revised AFC (08-AFC-8) filed on May 28, 2009. As set forth in the Executive Summary of that document:

> *"The Project will gasify petcoke (or blends of petcoke and coal, as needed) to produce hydrogen to fuel a combustion turbine operating in combined cycle mode. The Gasification Block feeds a 390-gross-MW combined cycle plant. The net electrical generation output from the Project will provide California with approximately 250 MW of low carbon baseload power to the grid. The Gasification Block will also capture approximately 90 percent of the carbon from the raw syngas at steady-state operation, which will be transported to the Elk Hills Field for CO_2 EOR and Sequestration."*

The major difference between the prior HECA design and the design presented in the Amended AFC is the addition of the Manufacturing Complex. Without the Manufacturing Complex, HECA would use the hydrogen to produce electricity only. The Manufacturing Complex allows HECA to use its hydrogen to produce fertilizers during periods of low electrical demand. The prior design was abandoned by the previous project owners, in part because it was not economically viable.

DATA REQUEST

A208. Provide a project description, feasibility analysis, and environmental analysis discussing a Coal/Petcoke Mix Alternative with an increased Petcoke percentage. Provide information on what activities would occur by altering the proposed fuel mixture, and of the ways in which the economic viability of this alternative compares to that of the proposed project.

RESPONSE

During the gasification process, ash from coal and petcoke is melted, and then cooled by a membrane wall in the MHI design, where it vitrifies to form a protective layer. This protective function is a critical design element of all entrained flow gasifiers, and the melting point, viscosity, and other important properties are very dependent on the ash properties of the feedstock. Petcoke has a much different quantity and composition of ash; demonstration at scale must be incorporated into the experience base of MHI before the full range of feedstock flexibility can be determined and guarantees can be made. This is part of the normal technology deployment/learning cycle, and is consistent with the step-by-step progression that other technologies have followed. The blend of feedstock was determined because to date, the maximum performance guarantee the manufacturer has been willing to provide HECA is a 25 percent petcoke, 75 percent coal blend. Without this guarantee, the Project financing is threatened and the Project would no longer be viable.

DATA REQUEST

A209. Provide a project description, feasibility analysis, and environmental analysis discussing a Natural Gas Combined Cycle Alternative. Provide information on what activities would occur by altering the proposed technology, and the ways in which the economic viability of this alternative compares to that of the proposed project.

RESPONSE

The DOE is providing financial assistance to HECA under the CCPI Round 3, along with private capital cost sharing, to demonstrate an advanced coal-based generating plant that co-produces electricity and low-carbon nitrogen-based products. CCPI was established, in part, to demonstrate the commercial viability of next-generation coal-based technologies that will capture CO_2 emissions, and either sequester those emissions or beneficially reuse them. Once demonstrated, the technologies can be readily considered in the commercial marketplace by the electric power industry.

Public Law (PL) 107-63, enacted in November 2001, initiated and funded the initial phases of the CCPI, as a government and private-sector partnership to increase investment in clean coal technology. Through cooperative agreements with private sector partners, the program advances clean coal technologies to commercialization. Congress established criteria for projects receiving financial assistance under this program in Title IV of the Energy Policy Act of 2005 (EPAct, 2005: PL 109-58). Under this statute, CCPI projects must "advance efficiency, environmental performance, and cost competitiveness well beyond the level of technologies that are in commercial service" (PL 109-58, Section [§] 402(a).

In February 2009, the American Recovery and Reinvestment Act of 2009 (PL 111-5, 123 Statute 115 [February 17, 2009]) appropriated $3.4 billion to DOE for "Fossil Energy Research and Development." DOE intends to use a significant portion of these funds to provide financial assistance to CCPI projects. The CCPI program selects projects for its government-private sector partnerships through an open and competitive process. Applications are reviewed according to the criteria specified in each funding opportunity announcement; these criteria include technical, financial, environmental, and other programmatic considerations. DOE selects the projects that demonstrate the most promise when evaluated against these criteria, and enters into a cooperative agreement with the applicant.

The cooperative agreements set out the project's objectives, the obligations of the parties, and other features of the partnership. To date, the CCPI has conducted three rounds of solicitations and project selections. DOE's overarching goal for Round 3 projects was to demonstrate commercial-scale technologies that would (1) operate at more than 90 percent capture efficiency for CO_2; (2) make progress towards capture and sequestration at less than a 10 percent increase in the cost of electricity for gasification systems, and a less than 35 percent increase for combustion and oxy-combustion systems; and (3) make progress toward capture and sequestration of 50 percent of the facility-generated CO_2 at a scale sufficient to evaluate the full impacts of carbon capture technology on operations, economics, and performance of a generating facility. HECA was one of two projects selected in the first phase of Round 3. DOE entered into a Cooperative Agreement with HECA on September 30, 2009.

Thus, use of coal as a fuel source is a fundamental and immutable aspect of the HECA Project. The overall objective of the Project, as reflected by the award of funding under the CCPI, is to demonstrate the commercial viability of carbon capture technologies *using coal as a fuel*. Under

these circumstances, analysis of a natural gas alternative would be meaningless, because such an alternative would be antithetical to the overall objective of the Project and the basis of the federal funding. Under applicable CEQA case law, analysis of an alternative so contrary to the overall objective of the Project is not required, because it would not contribute to the decision-making process in any meaningful way.

It is well established that an Environmental Impact Report (EIR) "need not consider every conceivable alternative to a project or alternatives that are infeasible." *In re Bay-Delta etc.* (2008) 43 Cal. 4th 1143, 1163 (citation omitted). Furthermore, "an EIR need not study in detail an alternative that is infeasible or that the lead agency has reasonably determined cannot achieve the project's underlying fundamental purpose." *Id* at 1165 (citation omitted).

While the Applicant acknowledges that alternatives need not meet all of the project objectives, the courts have made clear that analysis of alternatives that will ultimately be eliminated for failing to meet few if any of the project objectives is not warranted. "The purpose of an EIR is *not* to identify alleged alternatives that meet few if any of the project's objectives so that these alleged alternatives may be readily eliminated. Since the purpose of an alternatives analysis is to allow the decision maker to determine whether there is an environmentally superior alternative that will meet most of the project's objectives, the key to the selection of the range of alternatives is to identify alternatives that meet most of the project's objectives but have a reduced level of environmental impacts." *Watsonville Pilots Assn. v. City of Watsonville* (2010) 183 Cal.App.4th 1059, 1089

Use of coal as a fuel source is so fundamental to the purpose and objectives of the Project that analysis of a natural gas alternative is not required for a complete and robust alternatives analysis, and would amount to a meaningless expenditure of resources on the part of all Parties.

Technical Area: Land Use and Agricultural
Author: Jonathan Fong

BACKGROUND

Land Use and Agriculture Tables:

All page numbers, figures, and tables cited in this document refer to the 2012 HECA Amended Application for Certification (08-AFC-SA) (AFC), unless otherwise stated.

Section 4, "Electrical Transmission," Subsection 4.1 "Project Description" states "[t]he project intends to connect to the Pacific Gas and Electric Company (PG&E) Midway Substation via 230- kilovolt (kV) Midway-Wheeler Ridge transmission line and a new PG&E switching station." Figure 2-12 "Overall Single-Line Diagram" in the Amended AFC references the proposed 230 kV Switching Station (at Olean Avenue and Elk Valley Road) but provides no map or other description of the location. Staff verified that the new PG&E switching station would be the first point of interconnect to the electrical grid, which would make it part of the HECA project and subject to Energy Commission staff review for CEQA and laws, ordinances, regulations and standards (LORS) compliance.

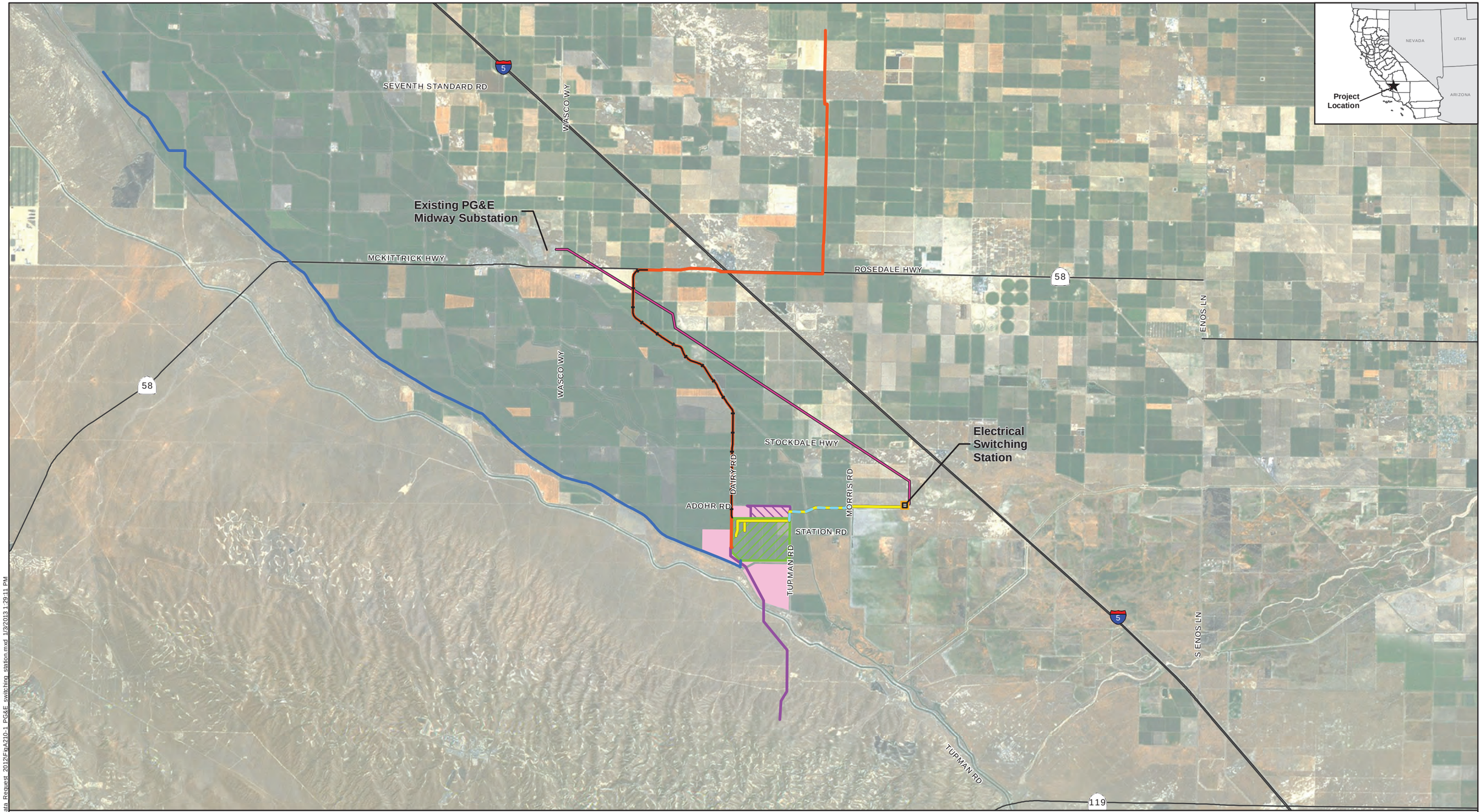
DATA REQUEST

A210. Please provide a map to scale and written description of the location of the proposed PG&E switching station and also provide the Assessor's Parcel Number.

RESPONSE

The proposed Pacific Gas and Electric Company (PG&E) switching station will be located approximately 2 miles east of the HECA Project Site at the intersection of an unimproved farm road and Elk Valley Road as shown on Figure A210-1. The switching station is located within Assessor's Parcel Number 159-010-06, in unincorporated Kern County, California. The 4-acre switching station site is located on land currently used to grow alfalfa. Additional information about the switching station is provided in Appendix A.

Transmission network upgrades due to the HECA Project may also include reconductoring of the existing 230-kilovolt (kV) Midway-Wheeler Ridge transmission line between the new switching station and the existing PG&E Midway Substation (approximately 8 miles). The CEC's direct jurisdiction extends to the first point of interconnection with the electrical transmission system at the PG&E switching station. The 2012 Amended AFC included an analysis of all HECA Project facilities to that point. The transmission network upgrade program will be permitted under the jurisdiction of the California Public Utilities Commission (CPUC), and CPUC will be responsible for ensuring compliance with CEQA. To ensure that any impacts associated with the reconductoring are fully analyzed, the Applicant has prepared an environmental analysis of the potential effects of utility upgrades that may be required for the electrical interconnection of the HECA Project with the CAISO electrical grid. This analysis that addresses potential reconductoring of the existing Midway-Wheeler Ridge 230-kV transmission line is provided in Appendix A.



HECA Project

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

Midway- Wheeler Ridge Upgrades

- Existing PG&E 230kV transmission line (to be reconductored)
- Electrical Switching Station

N

0 1 2 Miles

LOCATION OF PG&E SWITCHING STATION

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

URS

FIGURE A210-1

U:\GIS\HECA\Projects\HECA_2012\Data Request_2012\FigA210-1 PG&E switching station.mxd 1/3/2013 1:29:11 PM

Source: Imagery, ESRI.

DATA REQUEST

A211. Please amend Table 2-1 "Disturbed Acreage" to include the PG&E switching station as a project component and include the size, temporary disturbance and permanent disturbance figures.

RESPONSE

Table 2-1 from the 2012 Amended AFC has been updated to include the PG&E switching station and the revised temporary disturbance area associated with the CO_2 pipeline presented in Amended AFC Appendix A-2. This updated table is included herein as Table A211-1.

Table A211-1 (Revised Table 2-1)
Disturbed Acreage

Project Component	Size	Approx. Linear Length (miles)	ROW Construction	ROW Permanent	Temporary Disturbance (acres)	Permanent Disturbance (acres)
Project Site	453 acres	N/A	N/A	N/A	453	453
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	0.17
Natural gas linear	**Temporary disturbance:** 50 feet wide along linear length, plus 100-foot by 100-foot metering station at the inlet. **Permanent disturbance:** Only the metering station at the inlet.	13	50 feet	25 feet	79	0.23
BVWSD well field and process water pipeline	**Temporary disturbance:** 50 feet wide along linear length, plus 50-foot by 50-foot area of disturbance around each of 5 wells. **Permanent disturbance:** Only the areas around each well.	15	50 feet	25 feet	91.2	0.29
Potable water pipeline	**Temporary disturbance:** 10 feet wide along linear length. **Permanent disturbance:** None.	1	10 feet	N/A	1.25	N/A
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	51.2	38.6

Table A211-1 (Revised Table 2-1)
Disturbed Acreage (Continued)

Project Component	Size	Approx. Linear Length (miles)	ROW Construction	ROW Permanent	Temporary Disturbance (acres)	Permanent Disturbance (acres)
Temporary Construction Areas	**Temporary disturbance:** 91 acres in the Controlled Area. **Permanent disturbance:** None.	N/A	N/A	N/A	91	None
OEHI CO_2 pipeline[1]	**Temporary disturbance:** 50 feet along linear length, 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 feet	25 feet	28.89	0.11
PG&E Switching Station	**Temporary disturbance:** 4 acres. **Permanent disturbance:** 4 acres.	N/A	N/A	N/A	4	4
Total Disturbance					**806.5**	**496.4**

Source: HECA, 2012.

Notes:

[1] Source: Stantec, 2012 (Appendix A-2 of Amended AFC)

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

DATA REQUEST

A212. Provide the following information of the switching station and within a 1/4-mile vicinity of the station:

- ***Existing General Plan Land Use Designation and Zone District.***
- ***Indicate whether the proposed switching station is a permitted or conditional use.***
- ***Identify Farmland Areas on-site and within 1/4 mile of the site as designated on the Department of Conservation Important Farmland Mapping and Monitoring Program Maps and lands under Williamson Act Contract.***
- ***Identify the crop types in production.***

RESPONSE

As requested in Data Request A212, the study area for the switching station includes the 4-acre switching station site and a 0.25-mile buffer. Responses to the requested information are as follows:

- The existing General Plan land use designation is Intensive Agriculture (Map Code 8.1) and the zoning district is Exclusive Agriculture (A) for the switching station study area.
- The switching station would be consistent with the purpose of the Exclusive Agriculture (A) zoning district because Transmission Lines and Utility Substations are permitted uses under Zoning Ordinance § 19.12.020.D.
- The 4-acre switching station site is designated as Prime Farmland and is under Williamson Act contract. Farmland within the study area includes Prime Farmland (32.81 percent) and Grazing land (67.19 percent). Approximately 32.87 percent of the lands within the study area are under Williamson Act contract. The switching station is not expected to require cancellation of Williamson Act restrictions over the site, because it is identified as a compatible use under California Government Code Section 51238 and Kern County Agricultural Preserve Standard Uniform Rules (see paragraph 5 of Compatible Uses).
- The 4-acre switching station site would be located on land that is currently used for growing alfalfa. Within the switching station study area, crop types mainly include alfalfa (47.54 acres) and wheat (8.15 acres).

For additional information, including figures, please see Appendix A, HECA Transmission Network Upgrades Report.

APPENDIX A
HECA TRANSMISSION NETWORK UPGRADES REPORT

HECA Transmission Network Upgrades

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

January 2013

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Acronyms

AFC	Application for Certification
APN	Assessor's Parcel Number
BMP	best management practice
CAISO	California Independent System Operator
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CNDDB	California Natural Diversity Database
CO_2	carbon dioxide
CPUC	California Public Utilities Commission
CRHR	California Register of Historical Resources
DPR	Department of Recreation Form
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FIRM	Flood Insurance Rate Map
GIDAP	Generator Interconnection and Delivery Allocation Procedure
HECA	Hydrogen Energy California
JRP	JRP Historical Consulting, LLC
kV	kilovolt
KWBA	Kern Water Bank Authority
LGIP	Large Generator Interconnection Procedures
LORS	laws, ordinances and regulations
MW	megawatt
NRHP	National Register of Historic Places
OHP	Office of Historic Preservation
PG&E	Pacific Gas and Electric Company
ROW	right-of-way
SCE	Southern California Edison
RWQCB	Regional Water Quality Control Board
NPDES	National Pollutant Discharge Elimination System
SWRCB	State Water Resources Control Board
URS	URS Corporation

1. INTRODUCTION

In May 2012, Hydrogen Energy California LLC (HECA, or Applicant) filed an Amended Application for Certification (AFC) with the California Energy Commission (CEC) seeking approval to construct and operate the HECA Project (Docket 08-AFC-8A). As indicated in that filing, the Project includes an approximately 2-mile-long electrical transmission line that will interconnect the Project to a future Pacific Gas and Electric Company (PG&E) switching station east of the Project Site.

The CEC's direct jurisdiction extends to the first point of interconnection with the electrical transmission system, which is the future PG&E switching station. The 2012 Amended AFC included an analysis of all HECA Project facilities to that point of interconnection. PG&E will build and operate the switching station. To ensure that any environmental impacts associated with the construction of the switching station have been fully considered pursuant to the California Environmental Quality Act (CEQA), this report provides an environmental analysis of the potential effects of the proposed switching station.

Pending the results of the California Independent System Operator's (CAISO's) electrical interconnection study of the HECA Project, as detailed below, the anticipated network upgrades also could include reconductoring a portion of the existing Midway-Wheeler Ridge transmission line. These transmission network upgrades, if required, will be permitted separately under the jurisdiction of the California Public Utilities Commission (CPUC), and the CPUC will be responsible for ensuring compliance with CEQA. To facilitate the CPUC's review of the transmission network upgrades, the potential impacts of reconductoring—as it may pertain to the HECA Project—are also presented in this report.

HECA submitted an interconnection request to the CAISO for interconnecting the HECA Project to the CAISO-controlled grid in November 2011. CAISO is in the process of completing a Phase I Interconnection Study to determine the impacts of the HECA Project, along with other electric generation projects, on CAISO system facilities. Under the Federal Energy Regulatory Commission (FERC)-approved Large Generator Interconnection Procedures (LGIP), interconnection requests are processed together in clusters. The project was assigned queue number Q 870 as part of the Cluster 5 CAISO application group.

The schedule for Cluster 5 Phase I Studies was amended to a start date of August 6, 2012, and a release of the Phase I Interconnection Study Report on January 31, 2013. The Phase II Interconnection Study is scheduled to be conducted between May 1, 2013 and November 22, 2013.

Although the Phase I and Phase II reports for Cluster 5—which will include the current HECA Project design—are not yet available, transmission network upgrades identified in the previous interconnection study provide information regarding the potential upgrades that may be required for the HECA Project. In the previous interconnection study, the HECA Project was identified as Q300 in the CAISO Transition Cluster Group 3, and had a requested interconnection for 400 megawatts (MW). For the pending interconnection study, the HECA Project has a requested interconnection of 300 MW.

For the previous interconnection study, the HECA Project was part of the Transition Cluster Group 3 that included seven generation projects located in Los Padres and Kern divisions. The *Transition Cluster Phase I Interconnection Study* was issued in July 2009 (CAISO, 2009). The total requested interconnection capacities for Group 3 was 1,295 MW, including 400 MW for HECA. Their transmission system impacts were assessed as a group, but with the relative contribution of each proposed project in the cluster assigned a percentage weight.

The Transition Cluster Phase II Interconnection Study for Group 3 was issued in June, and subsequently was revised and re-released in September 2010. Due to the withdrawal of two of the proposed projects between the Phase I and Phase II Studies, the total requested interconnection for Group 3 was reduced to 890 MW. The Phase II study identified potential overloads and equipment limitations of the transmission facilities. In order to eliminate the identified overloads related to the HECA Project, mitigations were identified in the Phase II Study and included reconductoring of a section of the Midway to Wheeler Ridge transmission line with higher-capacity conductors, possibly replacing or extending transmission towers, and installing a new switching station. It is noted that the extent or need for any transmission tower work was to be determined during transmission line design.

As noted above, the CAISO's *Phase II Study for the Transition Cluster Group 3* (CAISO, 2010) identified transmission system upgrades that are predicted to be needed to accommodate the interconnection of the five projects in the cluster. Those predicted upgrades reflected the total of 890 MW of new capacity, including 400 MW for the HECA Project. The transmission network upgrades identified by the September 2010 Phase II Study were not solely caused by the HECA Project, conditions may have changed since the previous interconnection study. For example, the HECA Project's lower requested interconnection capacity of 300 MW may affect the results of the interconnection study and network upgrade requirements. Nevertheless, the following analysis was prepared to assist CEC Staff in disclosing the potential indirect environmental effects due to the identified utility upgrades.

PG&E is a regulated public utility that has developed standard operating procedures, including Best Management Practices (BMPs) recognized by regulatory agencies and the electric power industry as effective measures to avoid, mitigate, or minimize adverse environmental impacts during network upgrade operations. In this analysis, it is assumed that PG&E would apply BMPs that are standard requirements for similar projects. Final mitigation planning would take place through the CPUC's regulatory process.

2. UPGRADE DESCRIPTION

This section identifies the location for the potential utility upgrades that could consist of a new switching station and reconductoring of existing transmission line segments. A description of the work that could be involved with the upgrades is presented below.

2.1 UPGRADE LOCATION

The new PG&E switching station will be constructed at the eastern terminus of the HECA Project's electrical transmission line approximately 2 miles east of the HECA Project Site, and next to Elk Valley Road. The 4-acre switching station site is located in the southeastern corner of Township 30 South, Range 24 East, Section 01 in Kern County. Access to the switching station site would be along an existing unimproved farm road from Morris Road or Elk Valley Road.

The September 2010 Phase II Study for the Group 3 transition cluster predicted that PG&E might need to upgrade an approximately 8-mile portion of an existing transmission line system. The approximately 8-mile portion of the Midway-Wheeler Ridge 230 kilovolt (kV) line(s) to be upgraded is in the existing PG&E transmission corridor near the town of Buttonwillow in Kern County. The transmission line to be upgraded begins at the existing PG&E Midway Substation west of Buttonwillow, near the intersection of Rosedale/McKittrick Highway and Wasco Way, and terminates at the new PG&E switching station.

The portion of the transmission line identified for potential upgrade crosses several County roads, State Route 58/Stockdale Highway, and agricultural areas. The reconductoring project would be located within an approximately 100-foot-wide right-of-way (ROW) that is jointly owned by PG&E and Southern California Edison (SCE).

Figure 2-1 shows the locations of the network upgrade improvements on recent aerial photography; and Figure 2-2 shows the upgrade improvements on the USGS topographic quadrangle.

2.2 CONSTRUCTION METHODS

2.2.1 Switching Station

It is anticipated that the Project's interconnection with the CAISO grid would include building a new 230 kV switching station approximately 2 miles east of the HECA Project Site next to Elk Valley Road, allowing the Midway Wheeler-Ridge 230 kV Line Nos. 1 and 2 to loop in and out of the switching station, and provide interconnection positions for the HECA generator tie line. The new 230 kV switching station would include three bays in a breaker-and-a-half configuration. The switching station would include steel structures and interconnecting cabling, a relaying/metering/communications enclosure, potential and current transformers, 230 kV circuit breakers, and other line protection devices such as lightning protectors and surge capacitors. The electric transmission switching station will be designed, constructed, owned, and operated by PG&E.

The area for the switching station is approximately 4 acres (i.e., approximately 417 feet by 417 feet) of a 10-acre parcel. Portions of the site will be excavated to install a grounding grid, underground control and protection cabling, and foundations; the maximum excavation depth is expected to be 9 feet. 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 approximately 50 to 60 feet tall. The remainder of the station would have structures associated with interconnecting busses and cable "drops" to the circuit breakers. The height of these structures would be on the order of 20 to 30 feet.

Based on discussions with PG&E, another transmission lattice tower may be required in PG&E's existing ROW to make the transition to the switching station. It can reasonably be assumed that the height and configuration of the tower (if required) would be similar to the existing lattice towers, which are approximately 110 feet high.

2.2.2 Reconductoring

The transmission network upgrades, if required, could include reconductoring the 230 kV Line between the new switching station and the Midway Substation (approximately 8 miles). The Midway–Wheeler Ridge 230 kV Lines #1 and #2 are currently 230 kV double-circuit lines with three conductors per circuit mounted on lattice structure transmission towers in the existing utility ROW. There are several methods for reconductoring the approximately 8-mile segment of the double-circuit lines, which include double-circuit conductors or cable replacement with a larger single conductor.

Prior to commencement of the overall network upgrade activities, PG&E would coordinate with the CAISO for permission to take the existing line out of service. This action would ensure that adequate power is redistributed to substations and customers when the line is out of service. The project upgrades would be constructed using historic stringing sites in existing easements. The project upgrades could also include components associated with the transmission and sub-transmission line disconnects and getaways. All substation work (i.e., at the Midway Substation) would take place aboveground inside the existing substation fenceline. No below-grade work would be required at the substation.

The existing transmission corridor would be accessed by trucks, all-terrain vehicles, and/or by foot. No new access roads are anticipated. As shown on Figures 2-1 and 2-2, the construction areas would be located near existing roads and in existing ROWs. BMPs would be implemented during construction. Any disturbed areas would be restored to original conditions after project completion. Access to towers would be from public roads or through private property. No new access roads would be constructed through drainages or wetlands. Helicopters may be used to string the lines

It is anticipated that reconductoring work would be done within the existing PG&E ROW along the existing transmission line corridor, and within the footprint of the existing Midway Substation and the new switching station. Temporary material storage and laydown areas, and temporary construction yards would be selected by engineering and construction personnel

during the design phase, and are anticipated to be located on PG&E-owned properties at the Midway Substation, and along the transmission line routes. Work crews will have a great deal of flexibility in choosing the locations of the pull and tension sites and temporary staging areas; crews can generally select sites to avoid environmental impacts. The reconductoring could also include replacement, extension, or modification of the transmission towers. If the towers are modified, the existing concrete foundations may require some limited work. The need for foundation work would be determined through inspections conducted by PG&E during engineering design for the reconductoring project. Foundation work could range from patching minor cracks in the concrete, to complete replacement of the foundation, which would require excavation work around the base of the tower. If any of the towers need to be modified, work crews would also set up equipment at those towers as part of the reconductoring project. For the vast majority of reconductoring projects, however, excavation work near the towers is not needed.

2.3 CONSTRUCTION SCHEDULE AND WORKERS

CAISO's September 2010 Interconnection Study estimated that the overall duration for engineering and construction for all of the network upgrades would be approximately 24 to 36 months, starting from the signing of the Large Generator Interconnection Agreement. It is not expected that construction of the switching station and reconductoring activities will occur continuously over this 24- to 36-month period. Construction of the new switching station would be expected to take a few months. For the reconductoring, workers would occupy each pull and tension site for about 3 days. The reconductoring work would probably occur during times of relatively low electrical demand to protect system reliability while the lines are out of commission.

Typically, transmission line upgrade activities would involve setting up two work crews (for a total of 20 workers) on each end of a transmission line segment that is being replaced. Each crew would consist of approximately 10 workers; two tractor/trailer units, which either feed out the new line or wind in the old line on spools mounted on the trailers; and two or three utility trucks carrying tools, other materials, and workers, for a total of 6 to 8 trucks.

3. ENVIRONMENTAL CONSEQUENCES

This section discusses potential environmental impacts associated with the electrical transmission system upgrades.

3.1 AIR QUALITY

The anticipated Midway-Wheeler Ridge transmission network upgrade activities would include construction of a new switching station, and could include reconductoring approximately 8 miles of the existing Midway-Wheeler Ridge transmission line.

The network upgrades would include constructing a new switching station approximately 2 miles east of the HECA Project Site, adjacent to Elk Valley Road. The footprint of the entire site would be approximately 4 acres. Maximum depth of excavation would be approximately 9 feet deep; only portions of the site will be excavated. Based on the low level of earth clearing activities and the short duration of construction, construction activities at the new switching station are not expected to result in significant air emissions.

Reconductoring could require replacement of approximately 8 miles of transmission line. Approximately 20 extra workers would be present at any time during the construction activities. While the overall duration of the transmission network upgrade work could be 24 to 36 months, it is not expected that construction activities will take place continuously for this length of time. The emissions associated with worker commutes would be expected to be very low. Furthermore, because the reconductoring activities would likely not require additional grading within the transmission line corridor, the reconductoring activities are not expected to significantly increase the criteria pollutants associated with the quantity of equipment, or the number of deliveries required for construction of the HECA Project.

Therefore, the construction of the switching station and reconductoring activities are not expected to result in significant adverse air quality impacts.

3.2 BIOLOGICAL RESOURCES

This section documents the findings of an evaluation of biological resources for the potential new switching station, and reconductoring of the existing transmission line associated with the network upgrades. Figure 3.2-1 shows the natural conservation areas in the project vicinity. The California Natural Diversity Database (CNDDB) records are shown on Figure 3.2-2. Figure 3.2-3 shows burrowing owl (*Athene cunicularia*) occurrences, and Figure 3.2-4 shows Swainson's Hawk (*Buteo swainsoni*) occurrences in the vicinity of the HECA Project, including the switching station and Midway-Wheeler Ridge transmission line that may be reconductored by PG&E.

3.2.1 Switching Station

The switching station "study area" for biological resources includes the 4-acre switching station site and a 1,000-foot buffer. The switching station site is at the eastern terminus of the HECA Project's electrical transmission line; therefore, the switching station site and majority of the switching area study area is covered by the biological resources surveys conducted to date, and

summarized in the Amended AFC and subsequent responses to CEC Data Requests (e.g., Data Requests A44 through A47 and A53). In April 2010, URS biologists David Kisner, Kate Eldredge, Alyssa Berry, and Kelly Kephart conducted a survey of the switching station study area.

The CNDDB was consulted. The proposed switching station is located in active alfalfa fields that extend to the north and west. The site is adjacent to the Kern Water Bank Authority (KWBA) property on the eastern and southern sides (see Figure 3.2-1). This portion of the KWBA property does not have many CNDDB records, but it is part of a habitat conservation plan, and there may be undocumented biological resources in the area. Access to the site would likely be along an existing unimproved farm road from Morris Road that lies between the alfalfa field and the KWBA property. No sensitive plant species are expected in the proposed switching station site or along the access road due to the regular and significant levels of disturbance.

Sensitive wildlife may be present in the KWBA property and could be indirectly impacted by construction activity. The sensitive wildlife species that could be present are listed in Table A-1.

While conducting the pedestrian survey, small mammal burrows were found along the farm road and Elk Valley Road; however, these appeared to be old or inactive. Nevertheless, these signs could be indicative of wildlife activity. Based on information contained in the CNDDB and other sources, and based on habitat type and proximity to other known species, the sensitive small mammals that could use these burrows include: Nelson's antelope squirrel (*Ammospermophilus nelsoni*), giant kangaroo rat (*Dipodomys ingens*), short-nosed kangaroo rat (*Dipodomys nitratoides brevinasus*), Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*) and San Joaquin pocket mouse (*Perognathus inornatus*). Burrowing owls have been detected in the switching station study area, although there has been no confirmed breeding in the area. Owls have been seen posted on the KWBA fence and within the KWBA property south and east of the switching station site. California ground squirrels (*Otospermophilus beecheyi*)are known to inhabit the KWBA berm and, though not directly observed, they could create potential burrows or dens for both burrowing owls and/or San Joaquin kit fox (*Vulpes macrotis mutica*). Vehicle activity adjacent to an active breeding burrow or natal den would need to be avoided.

Potential impacts to biological resources could result due to construction of the switching station. Impacts may include disturbance, injury, or death of wildlife species or their nests; temporary ground or habitat disturbance; or temporary visual, wind, or noise disturbances. Avoidance and minimization measures similar to those proposed for the HECA Project would be implemented to avoid, eliminate, and reduce these impacts to a less-than-significant level, or compensate for any impacts. The network upgrades will be subject to approval by the CPUC, and may incorporate additional avoidance and minimization measures or BMPs as required by the CPUC.

3.2.2 Reconductoring

The biological resources study area for the transmission reconductoring includes the existing transmission line ROW between the new switching station and the existing Midway Substation, and a 1,000-foot buffer. This evaluation is based on the biological resources studies performed to date for the HECA Project.

The Midway-Wheeler Ridge 230 kV #1 and #2 lines between the proposed switching station and the existing Midway Substation cross over mostly agricultural areas. The route of the Midway-Wheeler Ridge transmission line between the proposed switching station and the Midway Substation is approximately 8 miles long, with less than 1.5 miles crossing over ruderal or undeveloped land.

Ground disturbance associated with the reconductoring of the 8 miles between the proposed switching station and the Midway Substation would potentially disturb the same wildlife identified for the switching station study area (Table A-1 in Appendix A) and sensitive plants listed in Table A-2 in Appendix A. Impacts would be limited to staging areas, access routes, and work areas at the base of the electrical towers. Staging areas and access routes should be selected based on avoiding and minimizing potential impacts, and using already disturbed or developed areas, when possible.

Potential impacts to biological resources could result at construction work sites during upgrade activities. These sites include, but are not limited to, pull and tensioning sites where new conductors will be placed in existing towers, underground conduits, towers that may require modification, staging areas, laydown yards, and access roads. Impacts may include disturbance, injury, or death of wildlife species or their nests; temporary ground or habitat disturbance; or temporary visual, wind, or noise disturbances. Avoidance and minimization measures similar to those proposed for the HECA Project would be implemented to avoid, eliminate, and reduce these impacts to a less-than-significant level, or compensate for any impacts. The network upgrades will be subject to approval by the CPUC, and may incorporate additional avoidance and minimization measures or BMPs as required by the CPUC.

3.2.3 Mitigation Measures

Similar to avoidance, minimization, and mitigation measures provided in the HECA Project Amended AFC, the following avoidance and minimization measures may be implemented to reduce impacts from transmission network upgrade activities.

3.2.3.1 General Measures

- The project owner will assign a qualified biologist to monitor construction activities.
- Establish boundaries for staging and construction areas.
- Delineate and identify all Environmentally Sensitive Areas, including habitats of sensitive species and wetlands and other waters (streams) of the United States.
- Use existing roadways to the maximum extent possible.
- Limit vegetation removal to the minimum amount required for construction.
- All temporary fill and construction debris should be removed from the project site at completion of construction activities.
- Construction should be timed to minimize potential impacts to sensitive biological resources, to the extent possible.

- If federally protected species are identified within the proposed ground-disturbance footprint, the applicant will comply with the state and federal Endangered Species Acts to ensure that impacts to special-status species would be less than significant with mitigation.

3.2.4 Conclusion

Activities associated with construction of the switching station and reconductoring the transmission line would require compliance with applicable federal, state, and local laws, ordinances and regulations (LORS), including Federal and California Endangered Species Acts, the federal Migratory Bird Treaty Act, the federal Clean Water Act, and the State Fish and Game Code (Streambed Alteration Agreement). Specific agency permits might be required before reconductoring work could commence. PG&E would presumably consult with the following agencies: U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Army Corps of Engineers, Central Valley Regional Water Quality Control Board (RWQCB), and the California Department of Fish and Game to determine the permits or approvals that may be required to implement the proposed project.

If the network upgrade work complies with all applicable LORS and implements all required mitigation measures, potential adverse impacts would be reduced to a less-than-significant level.

3.3 CULTURAL RESOURCES

The transmission system upgrades consist of constructing a new switching station and possibly reconductoring approximately 8 miles of the existing Midway-Wheeler 230 kV electrical transmission line between the new switching station and the existing PG&E Midway substation. The new switching station site is approximately 2 miles east of the HECA Project Site next to Elk Valley Road on actively farmed land.

3.3.1 Archaeological Resources

3.3.1.1 Switching Station

As required by the CEC (see CEC Data Requests A196 and A197), an archaeological survey of the 4-acre switching station site—as well as a CEC-mandated 200-foot-wide buffer radius—was completed in 2010.

As a result of these archaeological survey efforts, which included the completion of a record search, Native American consultation, and an archaeological pedestrian survey, one new archaeological resource was identified. The site, consisting of a very light scatter of lithic material, was identified within the CEC-mandated 200-foot buffer area surrounding the switching station. No evidence of the site extending into the 4-acre switching station site boundaries was observed.

The cultural resources survey report documenting these efforts related to the switching station, including the Department of Parks and Recreation (DPR) 523 form completed for the new archaeological site, is provided as Attachment A197-1 to the Responses to CEC Data Requests Set Three.

The one identified archaeological site is situated within the 200-foot-wide buffer area surrounding the switching station site. Because the construction will be confined entirely to the 4-acre switching station site and will not extend into the CEC-mandated buffer area, the identified archeological site is avoidable with the installation of temporary barricades to prevent inadvertent disturbance to the site; therefore, impacts to the identified archaeological site are not anticipated.

3.3.1.2 Reconductoring

A records search for the Midway-Wheeler Ridge transmission line, including a 1-mile radius, was conducted at the Southern San Joaquin Information Center of the California Historical Resources Information System on January 4, 2012 (RS #09-056). The purpose of the records search was to identify all previously recorded archaeological (including both prehistoric and historic) sites and historic architectural resources within the records search radius.

The following historical resources files, publications, manuscripts, or correspondence were also consulted:

- NRHP;
- Office of Historic Preservation (OHP) Archaeological Determinations of Eligibility – Records entered into the OHP computer file, received quarterly (2012);
- OHP Directory of Historic Properties — Records entered into the OHP computer file of historic resources, received quarterly (2012);
- Five Views: An Ethnic Sites Survey for California (1988);
- California Historic Landmarks (1988); and
- California Points of Historical Interest (1988).

In addition, previously conducted archaeological resources inventory efforts for the HECA Project resulted in the identification of three additional archaeological sites within the current search radius (URS, 2009b, 2012, and 2013). Because the technical studies detailing the methods and results of these efforts have yet to be submitted to the Information Center, the site forms for the three aforementioned sites have not yet been submitted to the Southern San Joaquin Information Center. These additional site forms, and the material collected for this record search, are included as Confidential Appendix B.

The records and archival search revealed the presence of 11 previously documented archaeological resources within the search radius, three of which are adjacent to (i.e., within 50 feet of) the transmission line corridor (see Table 3.3-1). Reconductoring of the Midway-Wheeler Ridge transmission line could thus potentially result in impacts to identified archaeological resources. During reconductoring activities, ground disturbance would be caused by driving vehicles, staging of equipment, or working in areas at the base of the electrical towers within archaeological resources. Mitigation measures, including the installation of temporary barricades to ensure resource avoidance, may be necessary to reduce potential impacts to less-than-significant levels.

Table 3.3-1
Previously Identified Archaeological Resources within
1 Mile of the Transmission Line Corridor

(P-15) or Temporary Designation	Trinomial (CA-KER-)	Resource Type	Approximate Distance From Transmission Line (feet)	NRHP/CRHR Eligibility Status
52	52	Prehistoric Lithic Scatter	2,050	Not Evaluated
325	325	Prehistoric Lithic and Shell Scatter	250	Not Evaluated
2504	2504	Prehistoric Lithic Scatter	5,100	Not Evaluated
3071	3071	Prehistoric Lithic Scatter	4,800	Not Evaluated
3088	3088	Prehistoric Lithic Scatter	4,650	Not Evaluated
3150	3150	Prehistoric Lithic Scatter	4,950	Not Evaluated
5984	5018	Prehistoric Lithic Scatter	1,800	Not Evaluated
9737	None	Historic Feed Mill and Ranch Remnants	< 50	Not Evaluated
HECA-2009-1	None	Prehistoric Lithic Scatter	< 50	Not Evaluated
HECA-2010-1	None	Prehistoric Lithic Scatter	< 50	Not Evaluated
HECA-2012-1	None	Prehistoric Lithic Scatter	5,000	Not Evaluated

Notes:
CRHR = California Register of Historical Resources
NRHP = National Register of Historic Places

3.3.2 Historic Architecture Resources

3.3.2.1 Switching Station

As required by the CEC, an examination of the 4-acre switching station site and CEC-mandated 0.5-mile buffer area was completed. The historic architectural survey determined that two of the four PG&E and/or SCE transmissions lines that were previously recorded (JRP, 2012) pass within 0.5 mile of the switching station. These transmission lines were determined ineligible for inclusion to either the National Register of Historic Places (NRHP) or the California Register of Historical Resources (CRHR). As such, impacts to these historic architectural resources are not anticipated to occur with construction of the proposed electrical switching station.

3.3.2.2 Reconductoring

A records search was completed for the transmission line study area. The records search revealed the presence of three historic architectural resources within 1 mile of the transmission line corridor. In addition, historic architectural inventory efforts for the HECA Project (JRP, 2009 and 2012) resulted in the identification of an additional nine historic architectural resources within 1 mile of the transmission line corridor (Table 3.3-2). Copies of these resource forms are provided in Confidential Appendix B.

Table 3.3-2
Previously Identified Historic Architectural Resources
within 1 Mile of the Transmission Line Corridor

(P-15) or Temporary Designation	Trinomial (CA-KER-)	Resource Type	Approximate Distance From Transmission Line (feet)	NRHP/CRHR Eligibility Status
9738	None	Steam Plant	< 50	Recommended Ineligible
13725	7701H	Canal	2,400	Not Evaluated*
13726	7702H	Canal	5,000	Not Evaluated*
Midway Substation	None	Public Utilities Building	< 50	Recommended Ineligible
Pacific Gas and Electric Southern California Edison Transmission Line	None	Utility	N/A	Recommended Ineligible
2530 Wasco Way	None	Industrial Building and Residence	1,800	Recommended Ineligible
Farmer's Cooperative Gin	None	Industrial Building (Farmer's Cooperative Gin)	300	Recommended Ineligible
Hangar and Airfield Strip	None	Industrial Building	450	Recommended Ineligible
5500 Buerkle Road	None	Residence and Farmstead	4,500	Recommended Ineligible
6010 Buerkle Road	None	Residence	2,700	Recommended Ineligible
Buena Vista Water District System	None	Water Conveyance and Drainage System	Varies, closest distance < 50	Recommended Ineligible
Southern Pacific McKitrrick Branch	None	Railroad	< 50	Recommended Ineligible

Notes:

* P-15-13725 and P-13726 (both segments of canals associated with the Buena Vista Water District) were recorded by Far Western Anthropological Group, Inc. (Leach Palm et al., 2009) as part of the California Department of Transportation's rural highway inventory, but were not formally evaluated. Subsequent architectural inventory efforts for the HECA Project, however, resulted in the recordation of the entirety of these resources (Map Reference #13), which was found ineligible for listing in either the NRHP or the CRHR.

CRHR = California Register of Historical Resources
HECA = Hydrogen Energy California
NRHP = National Register of Historic Places

No direct impacts to historic architectural resources are anticipated as a result of any necessary reconductoring of the Midway-Wheeler Ridge transmission line. As discussed in Applicant's response to CEC Data Request A182, and the accompanying DPR 523 form for the PG&E and SCE Transmission Lines and Towers (see Appendix B), the transmission line has been evaluated as ineligible for listing on both the NRHP and the CRHR. Likewise, as discussed in the Historic Architecture Technical Report submitted with the Revised AFC (08-AFC-8) dated April 2009 and the Responses to CEC Data Requests Set One (Nos. 17, 65, 77, and 85 through 90) for the Revised AFC (08-AFC-8) dated January 2010, the Midway Substation—including the steam plant (P-15-9738)—has been evaluated as ineligible for listing on the NRHP.

The reconductoring, including potential modifications to the existing towers, if any, would not result in indirect impacts to adjacent historic architectural resources. The construction at the Midway Substation work will be limited to possible resetting of the protection and monitoring equipment that are within the existing substation and existing control room, none of which would alter the historic setting of adjacent resources. In addition, all identified historic architectural resources within the records search radius for the Wheeler-Sunset Ridge transmission line, including those associated with the Buena Vista Water Storage District (e.g., canals and ditches), as well as all of the industrial and residential buildings, have been evaluated as ineligible for listing on the NRHP (Table 3.3-2; Appendix B).

3.3.3 Mitigation Measures

Cultural resources have been identified within the Midway-Wheeler Ridge transmission line. Where feasible, these resources should be avoided by vehicles or other necessary construction activities. If sites cannot be avoided, these sites should be evaluated for eligibility for listing in the NRHP or CRHR. Sites that have been evaluated as not eligible warrant no further consideration, and avoidance is not required for these resources. Sites that have not been evaluated and sites that are considered potentially eligible should be treated as eligible resources, pending formal evaluation. Data recovery should be conducted as a mitigation measure for archaeological sites that are recommended as eligible to the NRHP or CRHR, and will be impacted by the project. If any cultural materials are encountered during construction of the switching station or during reconductoring efforts, all activities in the vicinity of the find should cease until the significance of the discovery is evaluated by a qualified archaeologist. If the discovery were to be determined significant, mitigation will be necessary. PG&E should consult with the California OHP regarding appropriate mitigation.

3.4 LAND USE AND AGRICULTURE

The transmission system upgrades consist of constructing a new switching station approximately 2 miles east of the HECA Project Site next to Elk Valley Road on actively farmed land. In addition, the upgrades could potentially include reconductoring approximately 8 miles of the existing Midway-Wheeler 230 kV electrical transmission line between the new switching station and the existing PG&E Midway substation. The existing PG&E Midway substation is located at Wasco Way and Rosedale Highway.

3.4.1.1 Switching Station

The switching station is within Assessor's Parcel Number (APN) 159-010-06, in unincorporated Kern County, California. The study area for the evaluation of land use related to the switching station consists of the 4-acre switching station site and a 0.25-mile buffer. The total switching station study area is approximately 180 acres. Table 3.4-1 summarizes the existing land uses and agricultural setting within the switching station study area.

Table 3.4-1
Land Uses and Agricultural Uses within the Switching Station Study Area

Uses	Acres	Percent
Electrical Switching Station (0.25-Mile Buffer)	180.11	100.00
Existing Land Use		
Farming	135.58	75.27
Public/Quasi-Public	44.53	24.73
Crop Type		
Alfalfa	47.54	26.40
Alfalfa/Wheat	8.15	4.53
Other	55.69	69.00
Farmlands		
Grazing Land	121.02	67.19
Prime Farmland	59.09	32.81
Williamson Act Contracts		
Williamson Act Contract	59.20	32.87
General and Specific Plan Land Use		
Intensive Agriculture (Map Code 8.1)	180.11	100.00
Zoning		
Exclusive Agriculture (A)	180.11	100.00

Notes:
The land use and agricultural categories listed under each bolded heading do not necessarily equal the total study acreage when added together, due to parcels that are not assigned values.
Data sources include Aerial Imagery, BingMaps, 2012; Kern County, 2011; Kern County, 2007.

Existing land uses within the switching station study area consist primarily of farming and a small area used for public/quasi-public uses. There are no sensitive receptors in the study area. However, as shown on Figure 3.4-1, a dwelling unit is located approximately 1.3 miles southeast of the study area within the Tule Elk State Natural Reserve.

Within the switching station study area, crop types mainly include alfalfa (47.54 acres) and wheat (8.15 acres). Important farmland in the study area includes Prime Farmland (32.81 percent) and Grazing land (67.19 percent); approximately 32.87 percent of the lands within the electrical switching station study area are under Williamson Act contract. Refer to Figure 3.4-1 for the land use designations and crops locations; and Figure 3.4-2 for farmland areas and Williamson Act contracts. This mix of land and agricultural uses is consistent with those uses analyzed for the Project Site in the Amended AFC, and subsequent responses to CEC Data Requests.

Table 3.4-2 includes the General Plan land use designations and zoning district within the switching station study area. The 4-acre switching station site would be located on land that is currently used for growing alfalfa. The General Plan land use designation is Intensive Agriculture (Map Code 8.1), and the zoning district is Exclusive Agriculture (A) for the study area. Figure 3.4-3 depicts the General Plan land use designations; and Figure 3.4-4 shows the zoning districts.

Table 3.4-2
General Plan Land Use Designations and Zoning District in the Switching Station Study Area

Designation (Map Code)	Intent	Area (Acres)	Percent
General Plan Land Use Designation			
Intensive Agriculture (Map Code 8.1)	Areas devoted to the production of irrigated crops or having a potential for such use. Other agriculture uses, although not directly dependent on irrigation for production, may also be consistent with the intensive agriculture designation. Minimum parcel size is 20 acres gross. Uses shall include, but are not limited to: Irrigated cropland; orchards; vineyards; horse ranches; raising of nursery stock, ornamental flowers, and Christmas trees; fish farms, bee keeping, ranch and farm facilities, and related uses; one single-family dwelling unit; cattle feed yards; dairies; dry land farming; livestock grazing; water storage; groundwater recharge acres; mineral, aggregate, and petroleum exploration and extraction; hunting clubs; wildlife preserves; farm labor housing; public utility uses; agricultural industries pursuant to provisions of the Kern County Zoning Ordinance; and land in development areas subject to significant physical constraints.	180.11	100
Zoning District			
Exclusive Agriculture (A)	The purpose of the Exclusive Agriculture (A) District is to designate areas suitable for agricultural uses and to prevent the encroachment of incompatible uses onto agricultural lands and the premature conversion of such lands to nonagricultural uses. Uses in the A District are limited primarily to agricultural uses, and other activities compatible with agricultural uses. Minimum lot size is 20 gross acres. A minimum lot size of 80 gross acres applies to lots under Williamson Act Contract and designated 8.2, 8.3, or 8.5 by the County General Plan, or equivalent designation of any other adopted General or Specific Plan. The minimum front yard setback is 55 feet from the legal centerline of any existing or proposed private local street or access easements. The minimum side-yard setback is 5 feet, except a minimum of 10 feet is required on the street side or corner lots. The minimum rear yard setback is 5 feet. There are no height limits for non-residential structures.	180.11	100

As described in the Amended AFC, non-agricultural uses permitted within the Intensive Agriculture (A) General Plan land use designation include pipelines and power transmission facilities. The switching station would be consistent with the purpose of the Exclusive Agriculture (A) zoning district because Transmission Lines and Utility Substations are permitted uses under Zoning Ordinance § 19.12.020.D. The switching station is not expected to require cancellation of Williamson Act restrictions over the site because it is identified as a compatible use under California Government Code § 51238 and Kern County Agricultural Preserve Standard Uniform Rules (see paragraph 5 of Compatible Uses).

3.4.1.2 Reconductoring

The study area for the evaluation of land use related to the transmission line reconductoring consists of the existing transmission line ROW and a 0.25-mile buffer, which together totals approximately 2,607 acres. Table 3.4-3 summarizes the existing land uses and agricultural setting within the transmission line study area.

Existing land uses within the transmission line study area consist primarily of farming, orchards, public/quasi-public, residential, and undeveloped land. Crop types mainly include alfalfa, almond, cotton, pistachio, sudangrass, uncultivated agriculture land, and wheat cultivation. Farmland within the study area includes Prime Farmland (51.59 percent), Semi-Agricultural and Rural Commercial Land (2.24 percent), Grazing Land (7.11 percent), Farmland of Statewide Importance (17.46 percent), and Unique Farmland (1.18 percent). The transmission line study area also includes Urban and Built-up Land (1.93 percent), Non-agriculture or Natural Vegetation (9.53 percent), and Vacant or Disturbed Land (9.28 percent). Approximately 46 percent of the lands within transmission line study area are under Williamson Act contract. Figure 3.4-1 presents the existing land uses and crop types; and Figure 3.4-2 presents farmland areas and Williamson Act contracts within the transmission line study area.

Table 3.4-3 indicates that along the transmission line study area, approximately 74 percent of land has a General Plan land use designation of Intensive Agriculture (Map Code 8.1). Other General Plan land use designations within the transmission line study area are Agriculturally Oriented Industry (less than 1 percent), Greenbelt Areas (less than 1 percent), Intensive Agriculture (2.63 percent), Midway Substation (3.10 percent), and Resource Management (minimum 20-acre parcel) (19.09 percent). Zoning districts along the transmission line study area are classified as Exclusive Agriculture (96.64 percent) and Limited Agriculture. The northernmost area of the transmission line study area is within the Buttonwillow Specific Plan. Figure 3.4-3 depicts the General Plan Land Use designations; and Figure 3.4-4 shows the zoning districts.

The reconductoring of the existing transmission line does not involve changes to the existing land use, and is consistent with all applicable General Plan land use and zoning district requirements. Because the electrical transmission line towers and corridor are pre-existing, long-term impacts to the current surrounding land uses would not be created. It is assumed that PG&E has rights of access to all of their facilities for maintenance and upgrade activities, based on PG&E's existing ROWs.

Table 3.4-3
Land Uses and Agricultural Uses within Transmission Line Study Area

Uses	Acres	Percent
Electrical Transmission Line (0.25-Mile Buffer)	2,606.92	100.00
Existing Land Use		
Farming	1,978.98	75.91
Orchards	115.47	4.43
Public/Quasi-Public	175.57	6.73
Residential	21.05	0.81
Undeveloped	284.00	10.89
Crop Type		
Alfalfa	478.68	18.36
Almond	180.41	6.92
Cotton	220.23	8.45
Pistachio	831.83	31.91
Sudangrass	24.69	0.95
Uncultivated Agricultural	45.75	1.76
Wheat	112.00	4.30
Other	713.33	27.36
Farmlands		
Urban and Built-up Land	50.24	1.93
Grazing Land	185.38	7.11
Nonagricultural or Natural Vegetation	248.47	9.53
Prime Farmland	1,344.84	51.59
Semi-Agricultural and Rural Commercial Land	58.48	2.24
Farmland of Statewide Importance	446.86	17.14
Unique Farmland	30.74	1.18
Vacant or Disturbed Land	241.91	9.28
Williamson Act Contracts		
Williamson Act Contract	1,200.41	46.05

Table 3.4-3
Land Uses and Agricultural Uses within Transmission Line Study Area
(Continued)

Uses	Acres	Percent
General and Specific Plan Land Uses		
Agriculturally Oriented Industry	0.63	0.02
Greenbelt Areas (Transmission Line Easements)	8.43	0.32
Intensive Agriculture	68.47	2.63
Intensive Agriculture (minimum 20-Acre Parcel Size)	1,951.08	74.84
Midway Substation	80.75	3.10
Resource Management (minimum 20-Acre Parcel Size)	497.54	19.09
Zoning		
Exclusive Agriculture (A)	2,519.32	96.64
Limited Agriculture (A-1)	79.31	3.04

Notes:

The land use and agricultural categories listed under each bolded heading do not necessarily equal the total study acreage when added together, due to parcels that are not assigned values.

Data sources include Aerial Imagery, BingMaps, 2012; Kern County, 2011; Kern County, 2007.

Temporary construction staging and work areas are anticipated to be sited in the existing ROW, historic stringing sites, and/or on PG&E-owned properties to minimize potential impacts to existing land uses. In addition, work areas would be delineated so as to avoid sensitive uses (i.e., residences, etc.). The ROW for the transmission corridor would be restored to pre-project conditions when reconductoring activities are complete. Reconductoring would not change the existing land use or displace any existing uses. As a result, potential impacts to land use are expected to be less than significant.

The new switching station and possible reconductoring of existing transmission line segments would result in less-than-significant impacts to land use; therefore, no mitigation would be required.

3.5 NOISE

The transmission network upgrades would require use of construction equipment identified in Section 2.0 for the switching station and reconductoring construction activities, which would result in short-term increases in noise levels during construction. Reconductoring work would require operation of construction-type equipment at the pull and tensioning sites. In some cases, a helicopter may be used to string line. Reconductoring work at each of the pull and tensioning sites would be short-term (approximately 3 days each site), and are anticipated to take place between 7 a.m. and 5 p.m. on weekdays. Standard noise reduction devices would be implemented to reduce equipment noise.

The switching station site is not near residential areas; the closest residential dwellings to the switching station are the two dwellings located to the southwest, both at a distance of more than

1 mile. At residences within a quarter mile along the Midway-Wheeler Ridge reconductoring (see Figure 3.4-1 for location of dwellings), the reconductoring activities may result in a noticeable temporary increase in noise levels. Because construction noise would be required to comply with local ordinances, and construction would be temporary, potential noise impacts from construction of the switching station and reconductoring would be less than significant.

3.6 PUBLIC HEALTH

The transmission network upgrades will require construction of a new switching station and the potential reconductoring of approximately 8 miles of existing electrical transmission line. However, because the upgrade activities would not require substantial grading of a large area or new transmission line routes, the upgrading activities are not expected to result in significant quantities of toxic air contaminant emissions. Other activities related to the transmission network upgrades are not expected to have an adverse effect on public health.

3.7 WORKER SAFETY AND HEALTH

PG&E would follow industry standard health and safety practices in accordance with its own health and safety plans and procedures during the upgrade project. Such standards and practices include written safety programs (i.e., accident/incident reporting procedures, electrical safety procedures, emergency response plan, motor vehicle safety, etc.). As a result, no significant impacts related to worker safety and fire protection are expected.

3.8 SOCIOECONOMICS/ENVIRONMENTAL JUSTICE

The workforce for the construction of the new switching station and reconductoring would be relatively small (up to 20 workers), and would be drawn from the existing PG&E and contractor workforce in the Bakersfield area. Workers would be employed and/or contracted by PG&E, and are expected to include electricians, laborers, operating engineers, and supervisors. Construction of the project would result in a minor increase in local purchases of materials or local construction labor, but would cause no adverse socioeconomic impacts.

3.9 SOILS

Figure 3.9-1 presents the soil types near the switching station site and electrical transmission line corridor. The soil type at the 4-acre switching station site is Buttonwillow clay. The soil mapping units along the electrical transmission line include Buttonwillow clay; Garces silt loam, Kimberlina fine sandy loam, and Panoche clay loam.

The transmission system upgrades consist of construction of a new switching station, and the potential reconductoring of approximately 8 miles of existing electrical transmission line. For purposes of this assessment, it is assumed that the entire 4 acres of the switching station site will be graded. Modifications to towers, if any, could involve earth disturbance that could increase the potential for erosion. Impacts during construction and operation are expected to be less than significant with implementation of BMPs typically employed by PG&E, such as temporary erosion control measures.

3.10 TRAFFIC AND TRANSPORTATION

The transmission upgrade activities are located in predominantly agricultural areas in unincorporated Kern County. The existing transportation network is comprised of local, regional, and interstate roadways and would be used for transportation of equipment, and access to the transmission corridor and temporary construction staging areas.

The transmission upgrade project would require approximately 20 workers involved at any one time at the switching station and pull and tension sites. The work areas would be expected to be within the existing transmission corridor and on PG&E-owned property, and would be accessed by trucks, all-terrain vehicles, by foot, and by helicopter. Access would be over existing roads, and no new access roads are anticipated. Access to towers would be from public roads or through private property or agricultural fields. Helicopters may be used to string the lines and transport workers and materials to the towers.

The construction activities associated with the transmission network upgrades could potentially affect the flow of traffic on short segments of Elk Valley Road, Stockdale Highway, and Rosedale Highway, as well as several local and unpaved farm roads between the new switching station and the existing PG&E Midway substation. Most of the transmission line upgrades will be located within PG&E's transmission line ROW, and outside of the road ROW, but some transmission line construction activities (i.e., construction equipment movements and the need for a construction zone safety buffer) could encroach on the roadways and may require short-term partial closures and traffic handling. The effects of the transmission line reconductoring activity to the aforementioned roadway segments will be short-term. Any activity that needs to occur outside of the transmission line ROW will require landowner notification and permission for access.

It is anticipated that the majority of the transmission line construction activities (stringing of transmission lines) will take place outside of the roadway travel lanes and shoulders, and in the worst case, require closure of one directional lane to provide a construction work area envelope and a protective safety buffer to existing traffic. In addition to traffic control measures and lane closures, these short-term linear construction activities would be adequately addressed with the deployment of standard best practices and standard operating procedures: advance traffic signage informing the traveling public of construction activities ahead; use of approved traffic-handling plans as specified in the Work Area Traffic Control Handbook or the Work Area Protection and Traffic Control Manual; minimizing the length of closure areas to prevent stacking of traffic; and use of flagmen to assign ROW at closure segments.

The reconductoring of the 8-mile portion of the Midway-Wheeler Ridge transmission line would not affect the Elk Hills-Buttonwillow Airport. Modifications to towers, if any, would not change the location of the towers or substantially change the tower heights.

Movement of heavy machinery on local roads would occur infrequently during the construction. Based on the temporary nature of the reconductoring and switching station construction activities, and the minimal staffing and equipment expected to be required for this effort, no significant traffic impacts from the transmission network upgrades are anticipated.

3.11 VISUAL RESOURCES

The transmission network upgrades involve construction of a new switching station and potential reconductoring of approximately 8 miles of existing transmission line. The 4-acre switching station site is located on land currently used to grow alfalfa, near the existing Midway-Wheeler 230-kV No. 1 and No. 2 Lines. The existing transmission corridor generally runs within 1 mile west of and parallel to Interstate 5. It crosses Stockdale Highway and Rosedale Highway. Nearby uses along the high-voltage transmission corridor is primarily agricultural.

Sensitive viewers identified in the vicinity of the new switching station and reconductoring of existing transmission line segments include residences and recreational visitors to the Tule Elk State Natural Reserve. Residential areas are limited to two dwellings located to the southwest, both at a distance of approximately 1.3 miles.

The Tule Elk State Natural Reserve is an approximately 955-acre reserve area. Management of the Tule Elk State Natural Reserve is under the jurisdiction of the California Department of Parks and Recreation. The Tule Elk State Natural Reserve is a refuge to the tule elk, a rare species of elk that was once nearly hunted to the point of extinction. The reserve contains the Tule Elk Reserve State Park, with a visitor center, a small park with shaded picnic tables, and a viewing platform/observation deck). The observation deck, approximately 1.3 miles southwest from the switching station, provides visitors views of the reserve area. The visitors' view from the observation deck is directed to the south towards the reserve area.

Construction of the new switching station would include steel structures, switches, and breakers. The maximum height of the steel structures would not be expected to exceed approximately 50 feet. These features would not be expected to result in a change in the visual characteristics of the area, because they are consistent with visual elements of the existing high-voltage transmission towers and lines. Consequently, the new switching station is not expected to attract attention from residential areas, or dominate views. Views experienced by visitors to the Tule Elk State Natural Reserve are primarily directed southward across the reserve area from the observation deck. Because the switching station is northeast of the observation deck, it would not alter focal views typically experienced from this location. Therefore, visual impacts associated with the new switching station would be considered less than significant.

Reconductoring would be restricted to temporary disturbance necessary for replacement of existing transmission lines. Replacement or modification of existing towers, if needed, would not substantially change the appearance of the towers. At the end of the construction, all disturbed areas and ROWs would be restored to pre-Project conditions. Because reconductoring involves the replacement of existing electrical transmission line with new conductors, the resulting changes to the existing structure would not differ significantly from current conditions. Any potentially adverse visual impacts associated with reconductoring construction activities would be temporary, and would be considered to be less than significant.

Upgrades to switches and breakers at the Midway substation may also be required as a part of the network upgrade project. These changes would be minor and would occur within the fenced-in structures of the substation, and would not be expected to result in a change in the visual characteristics of the substation. Therefore, substation upgrades would be considered less than significant.

3.12 HAZARDOUS MATERIALS

Hazardous materials used during construction of the switching station and reconductoring activities would be limited to fuels and lubricants associated with the equipment. Potential impacts would be limited to small fuel or oil spills. PG&E would use BMPs as standard procedures to avoid the release of hazardous materials. These might include measures such as equipment refueling away from the immediate project area, and use of hazardous materials in locations away from water bodies to prevent contamination of water in the event of a spill. Using these BMPs, any potential environmental effects would be limited to small areas of contaminated soil. In the unlikely event of a spill, BMPs would call for the contaminated soil to be placed into barrels or trucks for offsite disposal as hazardous waste. Therefore, significant and adverse impacts from the handling of hazardous materials are not likely.

3.13 WASTE MANAGEMENT

Construction of the project would not result in a significant amount of waste. Wastes generated would include the old conductor and conductor spools, which would be disposed of in accordance with PG&E's standard recycling and waste management procedures. The network upgrade project would, therefore, not cause significant and adverse impacts in terms of waste management.

3.14 WATER RESOURCES

The transmission network upgrades consist of constructing a new switching station, and potentially reconductoring approximately 8 miles of existing electrical transmission line.

The 4-acre switching station site is located on land currently used to grow alfalfa. There are no water bodies or water conveyance features adjacent to the switching station site. The closest water feature is the East Side Canal, which is approximately 1.5 miles west of the switching station site. Construction of the switching station would require grading of the site. Although the site is not located adjacent to any watercourse, BMPs should be implemented to prevent the discharge of sediments and pollutants associated with construction activities from being discharged off site and into local irrigation canals.

The transmission lines are located within existing PG&E ROWs that traverse mostly agricultural lands. The transmission lines do not cross any water bodies, except for minor irrigation canals. The closest water feature is the East Side Canal, which is approximately 0.25 mile to 1.5 miles west of the existing transmission line corridor.

For the reconductoring, access would be on existing roads, and temporary construction staging and work areas are anticipated to be sited in the existing ROW, historic stringing sites, and/or on PG&E-owned properties. Ground disturbance, if any, would be limited to the base of the existing towers. The transmission lines do not cross water conveyance features, and construction activities for the switching station would not occur within any watercourses; therefore, impacts to hydrology and water quality for construction and operation of the transmission network upgrades would be less than significant.

Modifications of the existing towers, if any, as part of the reconductoring may require new foundations. These activities could involve limited and localized earth disturbance that could increase the potential for erosion. Construction activities for new towers and footings, if needed, would not occur within any watercourses; therefore, impacts to water quality for construction and operation of the transmission line upgrades would be less than significant.

By implementing standard construction BMPs required for any ground-disturbing activities, such as performing construction in accordance with an Erosion and Sediment Control Plan; adhering to the requirements of a Storm Water Pollution Prevention Plan, per the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity (SWRCB, 2010); using existing roads, and ROWs to the extent possible; revegetating construction areas and restoring them to pre-project conditions; limiting the amount of exposed areas at a given time; and restabilizing disturbed areas, the overall impacts related to erosion and water quality would be less than significant. As a result, no mitigation would be required.

Impacts to soils and water resources from the transmission network upgrades are anticipated to be less than significant due to required implementation of standard construction BMPs associated with compliance with the NPDES General Construction permit. As a result, no mitigation would be expected.

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) for areas crossed by the transmission lines (FEMA, 2008) were reviewed. The FIRMs show that the portion of the Midway-Wheeler Ridge transmission line that would be upgraded, and the site of the new switching station, do not pass over a FEMA-designated 100-year floodplain area (i.e., FEMA designated Zone A, which is the flood insurance rate zone that corresponds to areas within the 100-year floodplain zone). In addition, the site of the new switching station is not located within a FEMA-designated 100-year floodplain; therefore, there would be no impacts to floodplains.

3.15 GEOLOGIC HAZARDS AND RESOURCES

The geologic units present in the vicinity of the new switching station and along the portion of the Midway-Wheeler Ridge transmission line that may be reconductored are shown on Figure 3.15-1. Although located in an acknowledged seismically active area, the switching station site and the transmission line do not cross any fault traces, but there are numerous fault traces in the vicinity within 4 to 10 miles, as shown on Figure 3.15-1).

Minor grading and some excavation to a maximum depth of approximately 9 feet would be required for construction of the switching station. For the reconductoring, access would be on existing roads, and temporary construction staging and work areas are anticipated to be sited in the existing ROW, historic stringing sites, and/or on PG&E-owned properties. Ground disturbance, if any, would be limited to the base of the existing towers. These sites would not require significant grading or other disturbance of soils at depth. Modifications of the existing towers, if any, may require new foundations, which would be designed by a California-registered professional geotechnical engineer. The project features would be designed and constructed to meet the seismic requirements of the California Building Code; therefore, construction and

operation of the project would not cause significant impacts to geological resources, and geological hazards would not adversely affect the transmission network upgrades.

3.16 PALEONTOLOGICAL RESOURCES

The transmission network upgrades consist of constructing a new switching station, and the potential reconductoring of approximately 8 miles of existing transmission line. The new switching station site is located approximately 2 miles east of the HECA Project Site next to Elk Valley Road on actively farmed land. The 4-acre switching station site is within the paleontological resources study area evaluated for the HECA Project, and associated linears as summarized in Appendix O of the 2012 Amended AFC.

The switching station site and the transmission line corridor are mapped as Quaternary alluvium (see Figure 3.15-1). As discussed in the 2012 Amended AFC, although Quaternary alluvium is mapped as being present at the surface in the project vicinity, the older Tulare Formation may still be encountered in the shallow subsurface. This was confirmed in a geotechnical investigation performed for a previous project at the HECA Project Site, which indicated that sediments of the Tulare Formation are present at approximately 10 feet below ground surface. The maximum depth of excavation at the switching station site is expected to be on the order of 9 feet, and therefore would not be expected to impact sediments of the Tulare Formation. For the reconductoring, access would be on existing roads, and temporary construction staging and work areas are anticipated to be sited in the existing ROW, historic stringing sites, and/or on PG&E-owned properties. Ground disturbance, if any, would be limited to the base of the existing towers. These sites would not require significant grading or other disturbance of soils at depth.

As summarized in the 2012 Amended AFC, Section 5.16, Paleontological Resources and Appendix O Paleontological Resources Report, nearby fossil localities within the Quaternary alluvium and the Tulare Formation have been reported in both the published scientific literature and museum records. The presence of fossils in sediments of Quaternary alluvium and of fossils in sediments of Plio-Pleistocene Tulare Formation suggests that there is a high potential for additional similar fossil remains to be uncovered by excavations during Project construction.

Because fossils may be present in the Quaternary alluvium and Tulare Formation, ground disturbance associated with the switching station construction and reconductoring could have adverse impacts on significant paleontological resources. Implementation of a paleontological resource monitoring and mitigation program, similar to the program proposed for the HECA Project, would reduce these impacts to less than significant.

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Appendix A
Special-Status Plant and Wildlife Species Potential for Occurrence

Table A-1
Special-Status Wildlife Species with Potential to Occur near the Proposed Switching Station or Along Midway-Wheeler Ridge 230 kV Transmission Line

Common Name	*Scientific Name*	Listing Status			Likelihood of Occurrence in Project Area	Habitat Associations
		Federal	State	Other		
Amphibians						
Western spadefoot	*Spea hammondii*	—	SC	—	Present Tadpoles observed in 2009 along KRFCC less than 1 mile south of the Project Site	Inhabits sparsely vegetated alkali and desert scrub habitats in areas of low topographic relief. Preferred habitat includes semiarid grasslands, alkali flats, and washes.
Reptiles						
Blunt-nosed leopard lizard	*Gambelia sila*	E	E and FP	—	Present Observed in 2008 within 1 mile south of the Project Site along previously proposed carbon dioxide (CO_2) linear, and in 2010 near the northern terminus of the natural gas linear	Inhabits sparsely vegetated alkali and desert scrub habitats in areas of low topographic relief. Preferred habitat includes semiarid grasslands, alkali flats, and washes.
California horned lizard	*Phrynosoma coronatum*	—	SC	—	Low No known occurrences within 5 miles of the Project Area	Inhabits a wide range of habitats, including grassland, oak woodland, and riparian habitats. Requirements include an exposed gravelly-sandy substrate.

Table A-1
Special-Status Wildlife Species with Potential to Occur near the Proposed Switching Station or Along Midway-Wheeler Ridge 230 kV Transmission Line (Continued)

Common Name	*Scientific Name*	Listing Status			Likelihood of Occurrence in Project Area	Habitat Associations
		Federal	State	Other		
Giant garter snake	*Thamnophis gigas*	T	T	—	Low Last recorded in 1940 within the region. Likely extirpated from Kern County	Requires adequate water during its active season, herbaceous wetland vegetation as cover, openings in wetland vegetation for basking, and higher elevations for refuge from flood waters during the dormant season. Adapted to irrigation ditches and canals.
San Joaquin whipsnake	*Masticophis flagellum ruddocki*	—	SC	—	Low No known occurrences within 5 miles of the Project Site	Inhabits valley grassland and saltbush scrub habitats. Uses mammal burrows for refuge.
Southwestern pond turtle	*Actinemys marmorata pallida*	—	SC	—	Moderate One recorded occurrence within 1 mile of the Project Site in 1990	Inhabits riparian zone and fresh water bodies; known to use associated upland habitats.
Birds						
Fulvous whistling-duck	*Dendrocygna bicolor*	—	SC	—	Very Low No known occurrences within 5 miles of the Project Area	Inhabits freshwater marshes, lakes, ponds, and rice fields.

Table A-1
Special-Status Wildlife Species with Potential to Occur near the Proposed Switching Station or Along Midway-Wheeler Ridge 230 kV Transmission Line (Continued)

Common Name	*Scientific Name*	Listing Status			Likelihood of Occurrence in Project Area	Habitat Associations
		Federal	State	Other		
White-tailed kite	*Elanus leucurus*	—	FP	—	Very Low No known occurrences within 5 miles of the Project Area	Inhabits open grasslands with scattered trees for nesting and perching. Often frequent tree-lined river valleys with adjacent open areas.
Swainson's hawk	*Buteo swainsoni*	SC	T	—	Present Individuals observed foraging over the Tule Elk Preserve, with potential nest structures 1 mile east of the Project Site. Active nest confirmed in 2011 approximately 500 feet south of process water linear, and less than 3 miles west of the Project Site	Inhabits open grasslands and desert-like habitats, as well as agricultural areas.
Golden eagle	*Aquila chrysaetos*	SC	FP	—	Moderate Limited nesting habitat; individuals may pass through the Project Area	Found in open and semi-open areas, including tundra, shrublands, woodlands, grasslands, and coniferous forests. Primarily inhabits mountainous areas, but can also nest in wetland, riparian, and estuarine habitats.

Table A-1
Special-Status Wildlife Species with Potential to Occur near the Proposed Switching Station or Along Midway-Wheeler Ridge 230 kV Transmission Line (Continued)

Common Name	*Scientific Name*	Listing Status			Likelihood of Occurrence in Project Area	Habitat Associations
		Federal	State	Other		
Prairie falcon	*Falco mexicanus*	SC	—	—	Low Nesting habitat is not present in the Project Area or vicinity; migrants may pass through area	Inhabits arid and semi-arid plains. Nests on rock cliffs in river gorges, as well as mountainous regions.
American peregrine falcon	*Falco peregrinus*	—	E	FP	Low Nesting habitat is not present in the Project Area; migrants may pass through area	Prefers open habitats such as grasslands, tundra, and meadows. Nests on cliff faces and crevices.
Western snowy plover	*Charadrius alexandrinus nivosus*	T	SC	—	Very Low No known occurrences within 5 miles of the Project Area	Breeds above high tide line on coastal beaches, sand spits, sparsely vegetated dunes, and beaches at creek or river mouths.
Mountain plover	*Charadrius montanus*	SC	SC	—	Low Uncommon in the Project vicinity during winter; outside of breeding range. One observation within 1 mile of the Project Area in 1990	Inhabits open grasslands, plowed fields, and open sagebrush areas. Often roosts in depressions in the ground. Avoids areas with high or dense vegetative cover.

Table A-1
Special-Status Wildlife Species with Potential to Occur near the Proposed Switching Station or Along Midway-Wheeler Ridge 230 kV Transmission Line (Continued)

Common Name	*Scientific Name*	Listing Status			Likelihood of Occurrence in Project Area	Habitat Associations
		Federal	State	Other		
Burrowing owl	*Athene cunicularia*	—	SC	—	Present Individuals detected in the Biological Resources Study Area at several locations during surveys in 2008, 2010, and 2011	Inhabits open, dry grasslands, deserts, and sometimes, ruderal areas along ditch levees. Requires burrows, principally those made by California ground squirrels.
Loggerhead shrike	*Lanius ludovicianus*	—	SC	—	Present Individuals observed during survey in 2008 at the Project Site and along linear Project components	Inhabits open spaces bordered by vegetation.
LeConte's thrasher	*Toxostoma lecontei*	SC	SC	—	Moderate Potential breeding habitat on edges of the Project Site and along previously proposed linear alignments. One record within 1 mile of the Project Area in 1989	Open desert wash, desert scrub, alkali desert scrub, and desert succulent shrub habitats; also occurs in Joshua tree habitat with scattered shrubs.
California horned lark	*Eremophila alpestris actia*	—	—	DFG:WL	Present Individuals detected during survey in 2008	Inhabits open habitat, usually where trees and large shrubs are absent. Prefers to breed in short grasslands, rangelands, and open fields.

Table A-1
Special-Status Wildlife Species with Potential to Occur near the Proposed Switching Station or Along Midway-Wheeler Ridge 230 kV Transmission Line (Continued)

Common Name	*Scientific Name*	Listing Status			Likelihood of Occurrence in Project Area	Habitat Associations
		Federal	State	Other		
Tricolored blackbird	*Agelaius tricolor*	SC	SC	—	Low Typical nesting habitat for this species is not present in the Project Area; foraging possible	Nests in emergent wetland vegetation or near it. Roosts in large flocks in wetland vegetation or in trees.
Mammals						
Buena Vista lake shrew	*Sorex ornatus relictus*	E	SC	—	Low Habitats in the Project Area are not suitable for this species; no freshwater marsh wetlands or riparian habitats with dense cover in the Project Area	Inhabits valley freshwater marsh with dense wetland vegetative cover and detritus.
Nelson's antelope squirrel	*Ammospermophilus nelsoni*	—	T	—	High Documented occurrences are only known to the west of the California Aqueduct (Elk Hills area). Individuals observed in vicinity of CO_2 linear in 2008 and 2009 approxi-mately 2 miles south of the Project Site. No habitat for this species at the Project Site or along other linear components, except CO_2 linear alignment west of California Aqueduct.	Dry, sparsely vegetated loam soils. Needs widely scattered shrubs, forbs, and grasses in broken terrain with gullies and washes.

Table A-1
Special-Status Wildlife Species with Potential to Occur near the Proposed Switching Station or Along Midway-Wheeler Ridge 230 kV Transmission Line (Continued)

Common Name	*Scientific Name*	Listing Status			Likelihood of Occurrence in Project Area	Habitat Associations
		Federal	State	Other		
Giant kangaroo rat	*Dipodomys ingens*	E	E	—	High Observed approximately 1 mile south of the Project Site in 1990. Per February 2012 communication with CDFG, this species is expected on the western side of California Aqueduct, but not likely to occur east of the Aqueduct	Saltbush scrub and sink scrub communities in the Tulare Lake Basin of the southern San Joaquin Valley. Requires soft, friable soils that escape seasonal flooding, where it will dig burrows in elevated soil mounds at the base of shrubs.
Short-nosed kangaroo rat	*Dipodomys nitratoides brevinasus*	—	SC	—	High Previously documented within 1 mile of the Project Site	Western San Joaquin Valley in grassland and shrub associations, especially *Atriplex.* Favors flat to gently sloping terrain. Requires soft, friable soils that escape seasonal flooding, where it will dig burrows in elevated soil mounds at the base of shrubs

Table A-1
Special-Status Wildlife Species with Potential to Occur near the Proposed Switching Station or Along Midway-Wheeler Ridge 230 kV Transmission Line (Continued)

Common Name	*Scientific Name*	Listing Status			Likelihood of Occurrence in Project Area	Habitat Associations
		Federal	State	Other		
Tipton kangaroo rat	*Dipodomys nitratoides nitratoides*	E	E	—	High Previously documented within 1 mile of the Project Site, and within the BRSA for the linear Project components	Valley sink scrub and valley saltbush scrub in the Tulare basin. Sparse to moderate shrub cover is associated with high-density populations. Terrain not subject to flooding is an important factor for permanent occupancy.
Tulare grasshopper mouse	*Onychomys torridus tularensis*	—	SC	—	Moderate Previously documented within 5 miles of the Project Site in 2004	Arid shrub-land communities in hot, arid grassland and shrub-land associations.
Tule elk	*Cervus elaphus nannodes*	—	—	—	Low Restricted to the Tule Elk Preserve approximately 1 mile east of Project Site	Typically found in grasslands and oak savannas.
San Joaquin kit fox	*Vulpes macrotis mutica*	E	T	—	Present Active dens observed near in vicinity of CO_2 linear in 2008 and potential tracks/ sign observed KRFCC in 2009	Chenopod scrub, grasslands, and other habitats. Sometimes forage in agricultural areas.

Table A-1
Special-Status Wildlife Species with Potential to Occur near the Proposed Switching Station or Along Midway-Wheeler Ridge 230 kV Transmission Line (Continued)

Common Name	*Scientific Name*	Listing Status			Likelihood of Occurrence in Project Area	Habitat Associations
		Federal	State	Other		
American badger	*Taxidea taxus*	—	SC	—	High Carcass and other evidence of this species identified along previously proposed linear alignments in 2008; potential to occur in Project Site and linear components of Project Area	Abundant in drier open stages of most shrub, forest, and herbaceous habitats with friable soils.
San Joaquin pocket mouse	*Perognathus inornatus*	—	—	BLM	High Occurrences documented within 1 mile of the Project Site	Inhabits dry, open grasslands or scrub areas in the Central and Salinas valleys. Inhabits shrubby ridgetops and hillsides.

Notes:

E	Federal/State Endangered	FP	State Fully Protected
T	Federal/State Threatened	IUCN:EN	International Union for Conservation of Nature and Natural Resources: Endangered
SC	Federal/California Species of Concern	DFG:WL	Department of Fish and Game Watch List
C	Candidate Species	BLM	Bureau of Land Management Sensitive Species

Table A-2
Special-Status Plant Species with Potential to Occur along Midway-Wheeler Ridge 230 kV Transmission Line

Common Name	Scientific Name	Listing Status			Likelihood of Occurrence in Project Area	Habitat Associations and Flowering/Greatest Activity Period for Area
		Federal	State	Other		
Plants						
Horn's milk-vetch	*Astragalus hornii* var. *hornii*	—	—	CNPS 1B.1	Low Recorded 5 miles south of the Project Site	Meadows, seeps, alkaline lake margins; May-October
Heartscale	*Atriplex cordulata*	—	—	CNPS 1B.2	Low Found approximately 5 miles south of the Project Site	Chenopod scrub, meadows, seeps, valley and foothill grassland; April-October
Subtle orache	*Atriplex subtilis*	—	—	CNPS 1B.2	Moderate Recorded approximately 5 miles north of the Project Site	Valley and foothill grassland; June-August
Bakersfield smallscale	*Atriplex tularensis*	—	E	CNPS 1B.1	Very Low Not recorded in area	Chenopod scrub; June-October
Lost Hills crownscale	*Atriplex vallicola*	—	—	CNPS 1B.2	Moderate Found in the Project vicinity, approximately 1.5 miles south of the Project Site	Chenopod scrub, vernal pools, valley and foothill grassland; April-August
Alkali mariposa lily	*Calochortus striata*	—	—	CNPS 1B.2	Very Low Found approximately 10 miles south of the Project Site	Chenopod scrub, Mojavean desert scrub, chaparral, meadows and seeps; April-June
California jewel-flower	*Caulanthus californicus*	E	E	CNPS 1B.1	Low Recorded approximately 8 miles south of the Project Site	Chenopod scrub, pinyon and juniper woodlands, valley and foothill grasslands; February-May

Table A-2
Special-Status Plant Species with Potential to Occur along Midway-Wheeler Ridge 230 kV Transmission Line (Continued)

Common Name	Scientific Name	Listing Status			Likelihood of Occurrence in Project Area	Habitat Associations and Flowering/Greatest Activity Period for Area
		Federal	State	Other		
Slough thistle	*Cirsium crassicaule*	—	—	CNPS 1B.1	Moderate Recorded within one-half mile of the Project Site	Chenopod scrub, riparian scrub, marshes and swamps; May-August
Gypsum-loving larkspur	*Delphinium gypsophilum* ssp. *Gypsophilum*	—	—	CNPS 4.2	High Found within 1 mile southwest of the Project Site	Chenopod scrub, cismontane woodland, valley and foothill grassland; February-May
Recurved larkspur	*Delphinium recurvatum*	—	—	CNPS 1B.2	Moderate Recorded near the Project Site and in the vicinity of linear Project components	Chenopod scrub, cismontane woodland, valley and foothill grassland; March-June
Kern mallow	*Eremalche kernensis*	E	—	CNPS 1B.2	Low Recorded near the northern portion of the potable water linear	Chenopod scrub, valley and foothill grassland; March-May
Hoover's eriastrum	*Eriastrum hooveri*	—	—	CNPS 4.2	Moderate Found approximately 1.5 miles southwest of the Project Site	Chenopod scrub, pinyon and juniper woodland, valley and foothill grassland; February-May
Cottony buckwheat	*Eriogonum gossypinum*	—	—	CNPS 4.2	Moderate Found approximately 3 miles southwest of the Project Site	Chenopod scrub, valley and foothill grassland, March-September
Tejon poppy	*Eschscholzia lemmonii* ssp. *Kernensis*	—	—	CNPS 1B.1	Moderate Numerous populations have been recorded just over 1 mile from the Project Site	Chenopod scrub, valley and foothill grassland; March-May

Table A-2
Special-Status Plant Species with Potential to Occur along Midway-Wheeler Ridge 230 kV Transmission Line (Continued)

Common Name	Scientific Name	Listing Status			Likelihood of Occurrence in Project Area	Habitat Associations and Flowering/Greatest Activity Period for Area
		Federal	State	Other		
Showy madia	*Madia glabrata*	—	—	CNPS 1B.1	Very Low Found over 10 miles northwest of the Project Site	Cismontane woodland, valley and foothill grassland; March-May
San Joaquin woollythreads	*Monolopia [Lembertia] congdonii*	E	—	CNPS 1B.2	Moderate Found approximately 2 miles east of the Project Site	Chenopod scrub, valley and foothill grassland; February-May
Bakersfield cactus	*Opuntia basilaris* var. *treleasei*	E	E	CNPS 1B.1	Very Low Not recorded in area	Chenopod scrub, cismontane woodland, valley and foothill grassland; April-May
California chalk moss	*Pterygoneurum californicum*	—	—	CNPS 1B.1	Very Low Not recorded in area	Chenopod scrub, valley and foothill grassland
Oil neststraw	*Stylocline citroleum*	—	—	CNPS 1B.1	High Numerous observations within 1 mile of the Project Site	Chenopod scrub, valley and foothill grassland; March-April
Mason's neststraw	*Stylocline masonii*	—	—	CNPS 1B.1	Very Low Not recorded in area	Chenopod scrub, pinyon and juniper woodland; March-May

Notes:

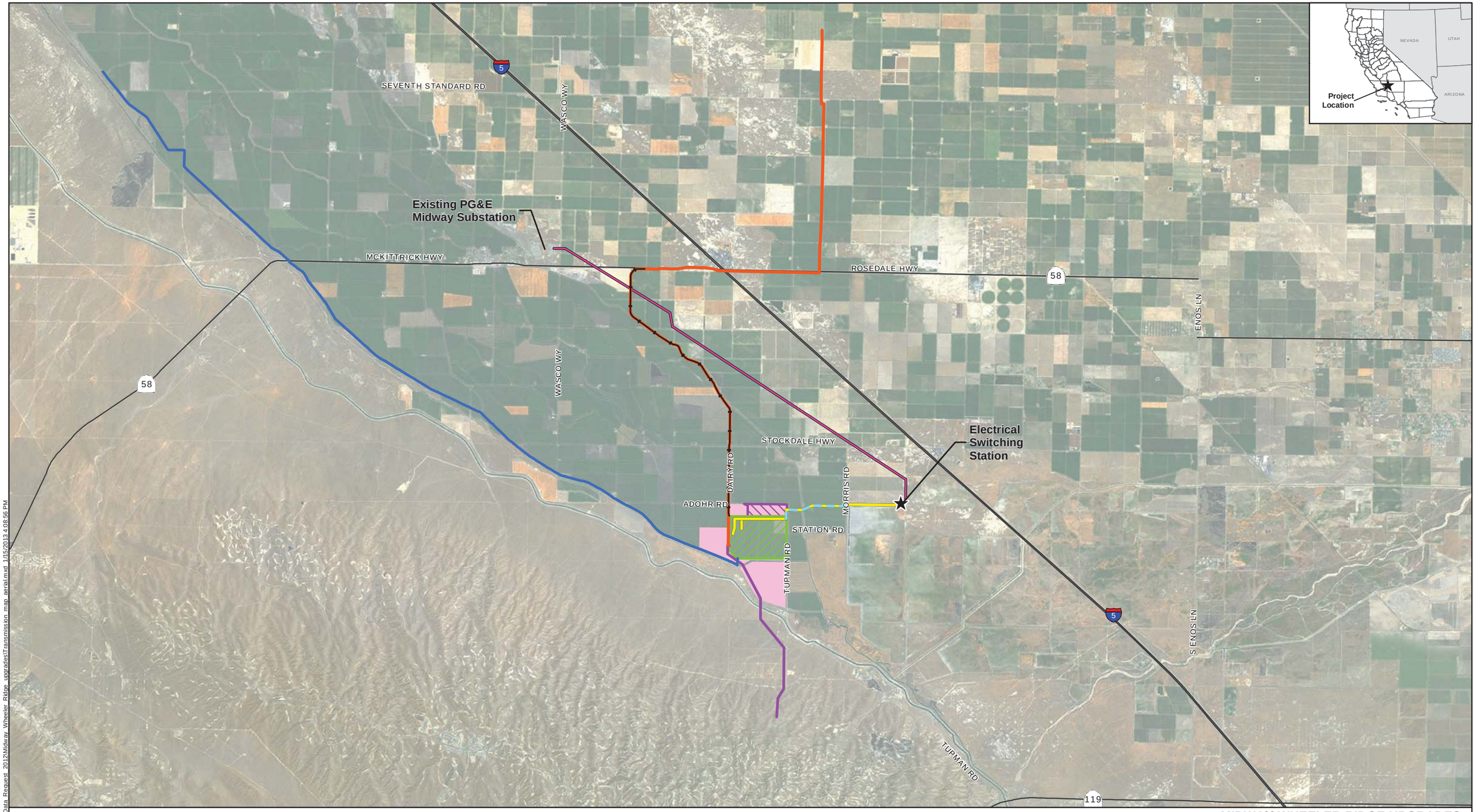
E	Federal/State Endangered	1	Seriously endangered in California
CNPS 1B	Plants that are rare or endangered in California and elsewhere	2	Fairly endangered in California
CNPS 4	Plants that have limited distribution in California	3	Not very endangered in California

Appendix B

Midway-Wheeler Ridge Transmission Line
Cultural Resources Records Search Results

(Submitted Separately Under Confidential Cover)

Figures



HECA Project

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

Midway-Wheeler Ridge Upgrades

- Existing PG&E 230kV transmission line (to be reconductored)
- Electrical Switching Station

N

0 1 2 Miles

MIDWAY-WHEELER RIDGE UPGRADES
AERIAL VIEW

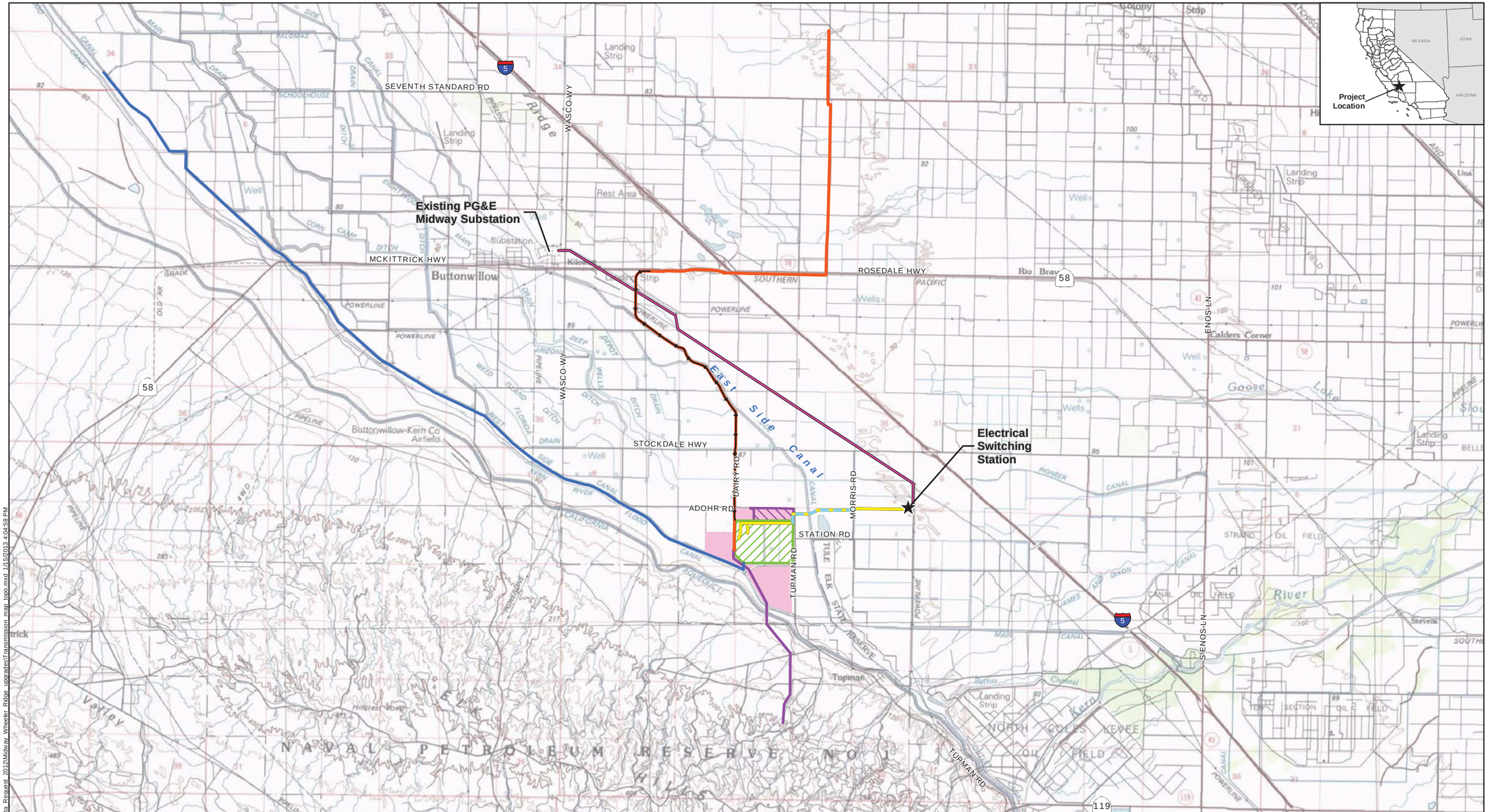
Hydrogen Energy California (HECA)
January 2013 Kern County, California

URS

FIGURE 2-1

U:\GIS\HECA\Projects\HECA_2012\Data Request_2012\Midway_Wheeler_Ridge_upgrades\Transmission_map_aerial.mxd 1/15/2013 4:08:56 PM

Source: Imagery, ESRI.



HECA Project

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

Midway-Wheeler Ridge Upgrades

- Existing PG&E 230kV transmission line (to be reconductored)
- Electrical Switching Station

N

0 1 2 Miles

MIDWAY-WHEELER RIDGE UPGRADES ON USGS TOPOGRAPHIC MAP

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

URS

FIGURE 2-2

U:\G\SHECA\Projects\HECA_2012\Data Request_2012\Midway_Wheeler_Ridge_upgrades\Transmission_map_topo.mxd 1/15/2013 4:04:58 PM

Source: USGS (30'x60' quads: Taft 1982, Delano 1982).

Buttonwillow Ecological Reserve

PG&E Midway Substation

Lokern Area of Critical Environmental Concern

Electrical Switching Station

Kern Water Bank Property

Elk Hills Conservation Area

Coles Levee

Elk Hills Field

NAVAL PETROLEUM RESERVE NO 1

Project Location

NEVADA

UTAH

ARIZONA

Buttonwillow

Rio Bravo

Calders Corner

Goose Lake

Tupman

58

5

119

HECA Project
- Project Site
- Construction Staging Area

- Carbon Dioxide
- Natural Gas
- Potable Water
- Process Water
- Railroad
- Transmission

Midway-Wheeler Ridge Upgrades
- Existing PG&E 230kV transmission line (to be reconductored)
- 1,000-foot Buffer from Transmission Line Improvement
- Electrical Switching Station
- 1,000-foot Buffer from Electrical Switching Station

- Buena Vista Aquatic Recreation Area
- Kern Water Bank Property
- Coles Levee
- Lokern Area of Critical Environmental Concern

- Tule Elk State Natural Reserve
- Buttonwillow Ecological Reserve
- Lokern Ecological Reserve
- California Aqueduct
- San Joaquin Field Division Draft Habitat Conservation Plan (Approximate Extent)

- Elk Hills Conservation Area
- Bureau of Land Management
- Other Public Land

N

0 1 2 MILES

MIDWAY-WHEELER RIDGE UPGRADES
EXISTING NATURAL RESOURCE CONSERVATION AREAS

January 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

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FIGURE 3.2-1

Source: 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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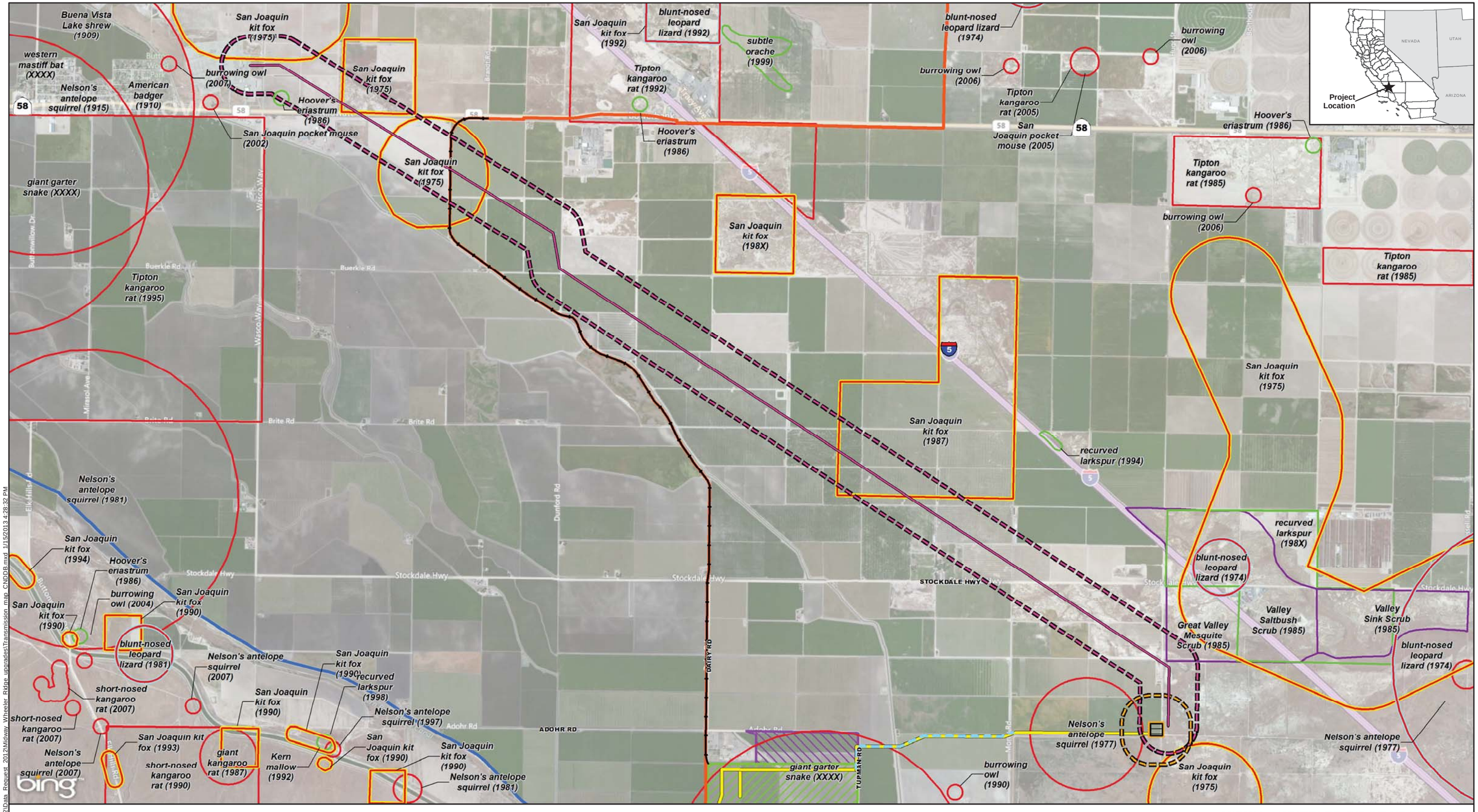

HECA Project
- Project Site
- Construction Staging Area

- Carbon Dioxide
- Natural Gas
- Potable Water
- Process Water
- Railroad
- Transmission

Midway-Wheeler Ridge Upgrades
- Existing PG&E 230kV transmission line (to be reconductored)
- 1,000-foot Buffer from Transmission Line Improvement
- Electrical Switching Station
- 1,000-foot Buffer from Electrical Switching Station

CNDDB Species - November 2012
- blunt-nosed leopard lizard
- San Joaquin kit fox
- All Other Animal Communities

- Plant Communities
- Terrestrial Communities

N

0 2,000 4,000 FEET

MIDWAY-WHEELER RIDGE UPGRADES CNDDB SENSITIVE SPECIES

January 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 3.2-2

Source: Aerial Imagery, © Harris Corp, Earthstar Geographics LLC © 2013 Microsoft Corporation © 2010 NAVTEQ © AND ; Special Status Species, California Natural Diversity Database, March 2012.

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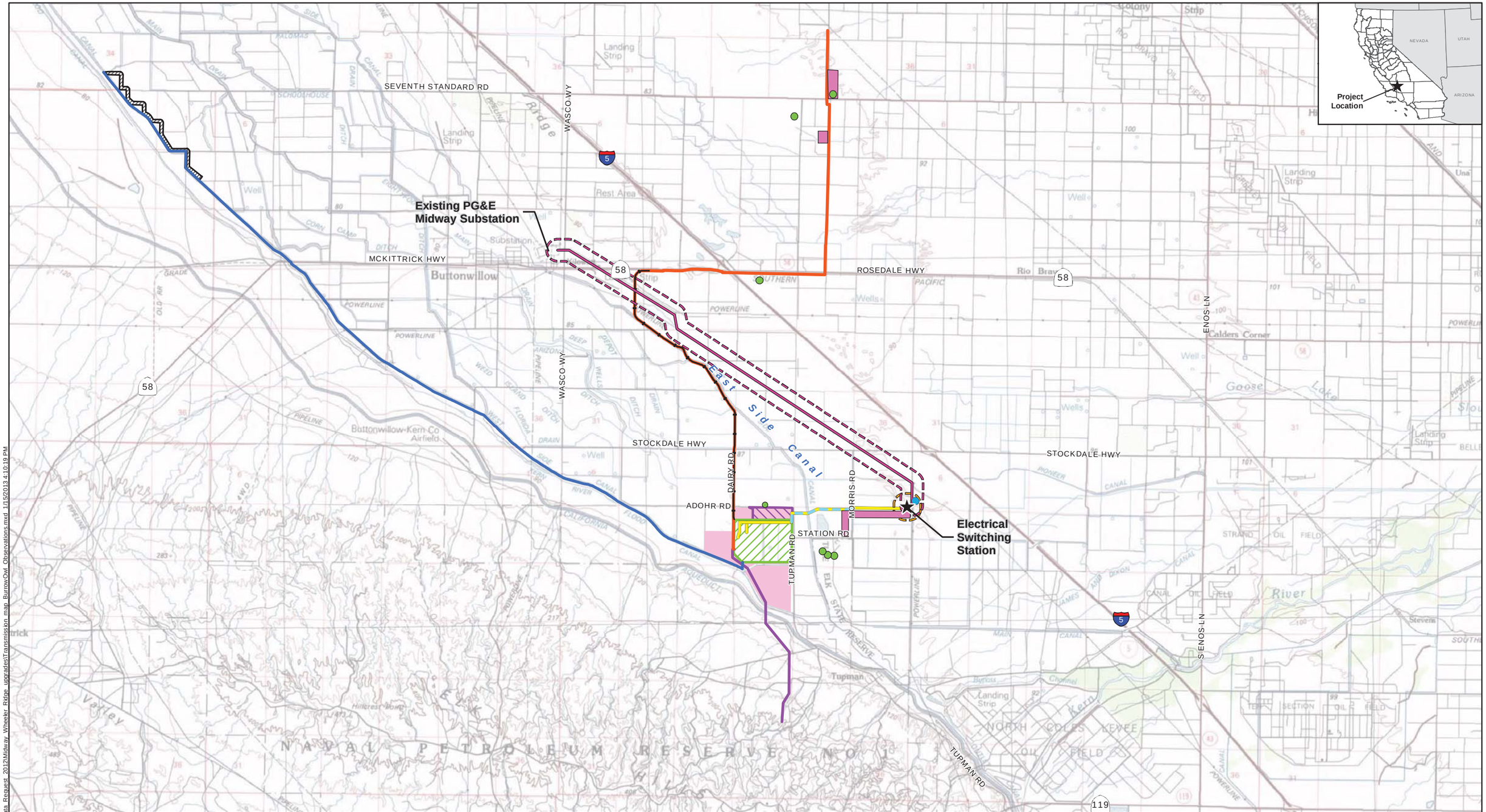


HECA Project

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

Midway-Wheeler Ridge Upgrades

- Existing PG&E 230kV transmission line (to be reconductored)
- 1,000-foot Buffer from Transmission Line Improvement
- Electrical Switching Station
- 1,000-foot Buffer from Electrical Switching Station
- Burrowing Owl Occurrence - 2010
- Burrowing Owl Occurrence - 2011
- Burrowing Owl Occurrence - 2012

N

0 1 2 Miles

MIDWAY-WHEELER RIDGE UPGRADES BURROWING OWL OCCURRENCES

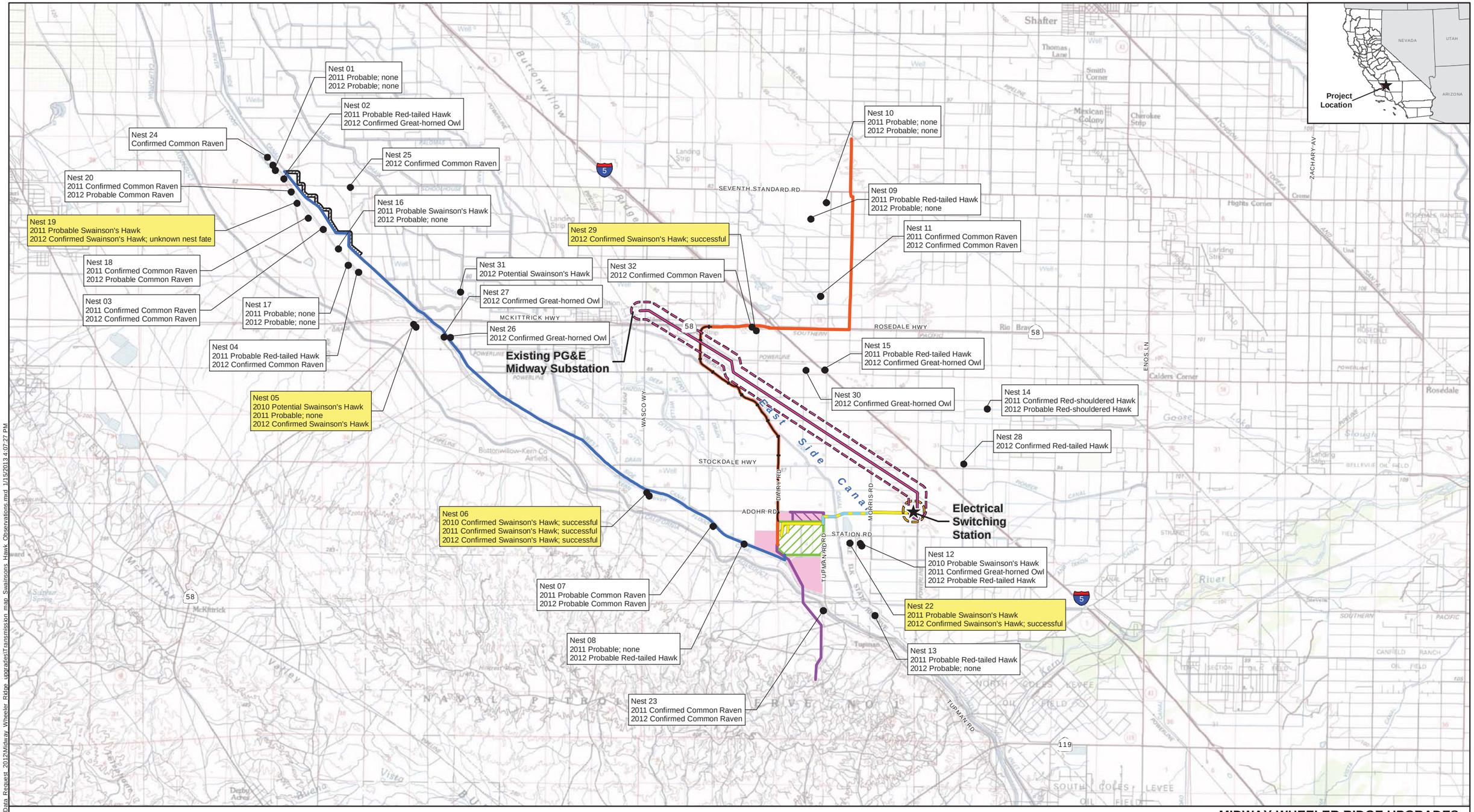
Hydrogen Energy California (HECA)
January 2013 Kern County, California

URS

FIGURE 3.2-3

Source: USGS (30'x60' quads: Taft 1982, Delano 1982).

U:\GIS\HECA\Projects\HECA_2012\Data Request_2012\Midway_Wheeler_Ridge_upgrades\Transmission_map_BurrowOwl_Observations.mxd 1/15/2013 4:10:19 PM



HECA Project

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

Midway-Wheeler Ridge Upgrades

- Existing PG&E 230kV transmission line (to be reconductored)
- 1,000-foot Buffer from Transmission Line Improvement
- Electrical Switching Station
- 1,000-foot Buffer from Electrical Switching Station
- Nest Observations

N

0 1 2 Miles

MIDWAY-WHEELER RIDGE UPGRADES SWAINSON'S HAWK OBSERVATIONS

Hydrogen Energy California (HECA)
Kern County, California

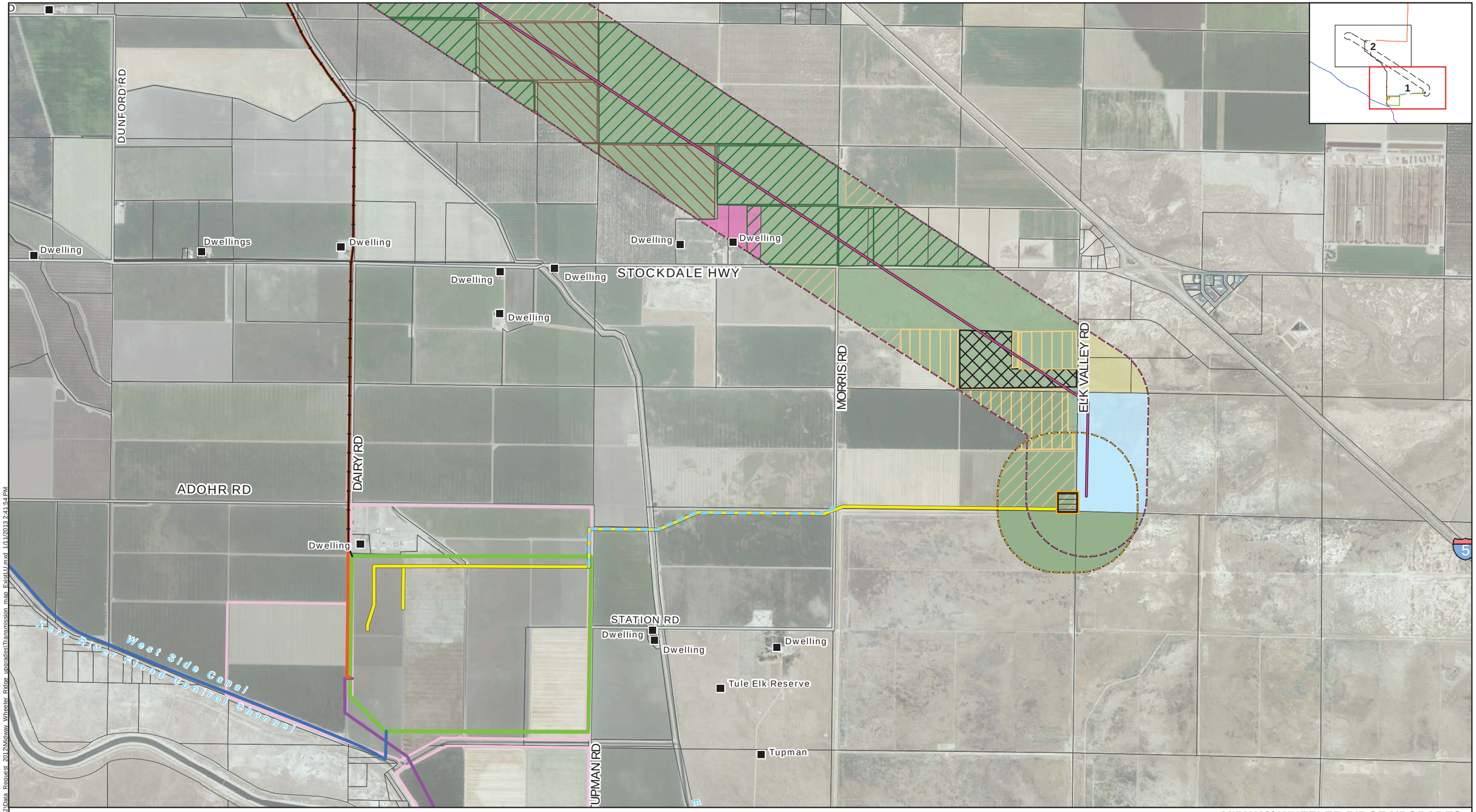
January 2013

URS

FIGURE 3.2-4

Source: USGS (30'x60' quads: Taft 1982, Delano 1982).

U:\GIS\HECA\Projects\HECA_2012\Data Request 2012\Midway Wheeler Ridge upgrades\Transmission map Swainsons Hawk Observations.mxd 1/15/2013 4:07:27 PM



HECA Project

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

Midway-Wheeler Ridge Upgrades

- Existing PG&E 230kV transmission line (to be reconductored)
- 1/4-mile Buffer from Transmission Line Improvement
- Electrical Switching Station
- 1/4-mile Buffer from Electrical Switching Station

Land Use

- Farming
- Orchards
- Public/Quasi-Public
- Residential
- Undeveloped

Crop Type

- Alfalfa
- Almond
- Cotton
- Pistachio
- Sudangrass
- Uncultivated Ag
- Wheat

- Parcel Boundary

N

0 2,000 4,000 FEET

MIDWAY-WHEELER RIDGE UPGRADES EXISTING LAND USE

January 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 3.4-1 - SHEET 1

Source: Aerial Imagery, Bing Maps, 2009; Existing Land Use: Kern County, 2011

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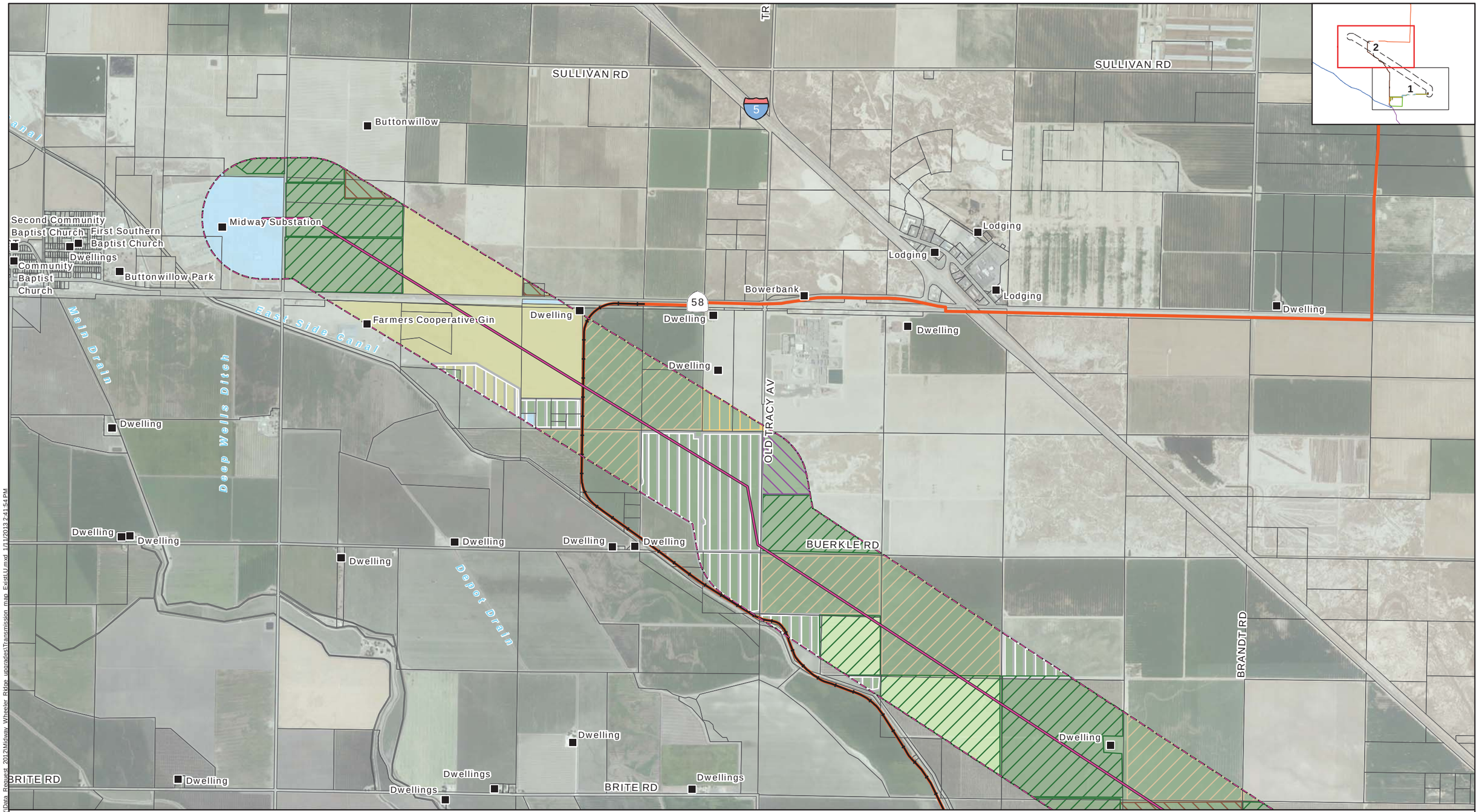

HECA Project

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

Midway-Wheeler Ridge Upgrades

- Existing PG&E 230kV transmission line (to be reconductored)
- 1/4-mile Buffer from Transmission Line Improvement
- Electrical Switching Station
- 1/4-mile Buffer from Electrical Switching Station

Land Use

- Farming
- Orchards
- Public/Quasi-Public
- Residential
- Undeveloped

Crop Type

- Alfalfa
- Almond
- Cotton
- Pistachio
- Sudangrass
- Uncultivated Ag
- Wheat

- Parcel Boundary

N

0 2,000 4,000 FEET

Source: Aerial Imagery, Bing Maps, 2009; Existing Land Use: Kern County, 2011

MIDWAY-WHEELER RIDGE UPGRADES EXISTING LAND USE

January 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

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FIGURE 3.4-1 - SHEET 2

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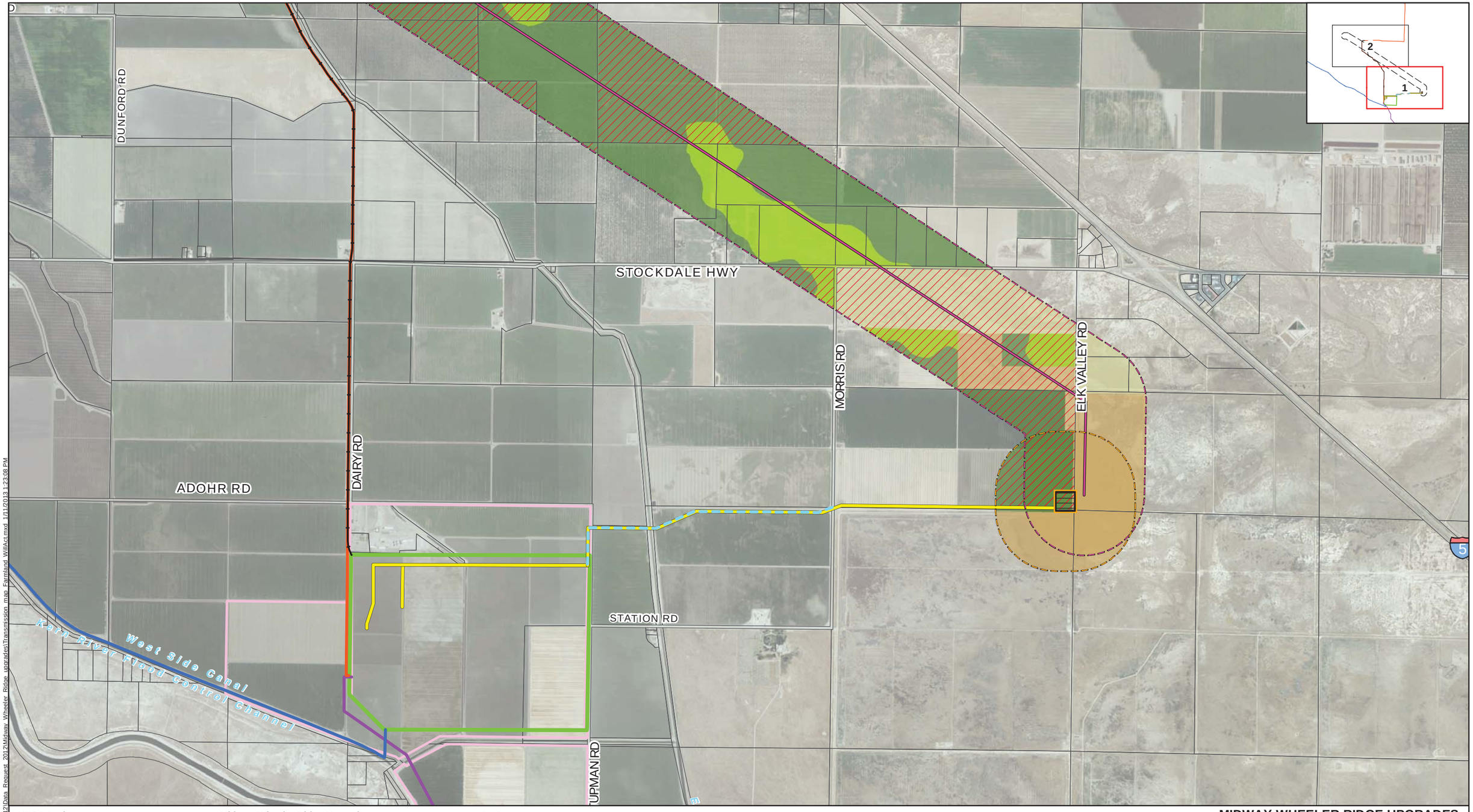


HECA Project

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

Midway-Wheeler Ridge Upgrades

- Existing PG&E 230kV transmission line (to be reconductored)
- 1/4-mile Buffer from Transmission Line Improvement
- Electrical Switching Station
- 1/4-mile Buffer from Electrical Switching Station

Important Farmland Areas

- Prime Farmland
- Farmland of Statewide Importance
- Unique Farmland
- Grazing Land
- Nonagriculture or Natural Vegetation
- Semi-Agriculture and Rural Commercial Land
- Vacant or Disturbed Land
- Urban and Built-Up Land
- Williamson Act Contracted Land
- Parcel Boundary

N

0 2,000 4,000 FEET

Source: Aerial Imagery, Bing Maps, 2009; Existing Land Use: Kern County, 2011

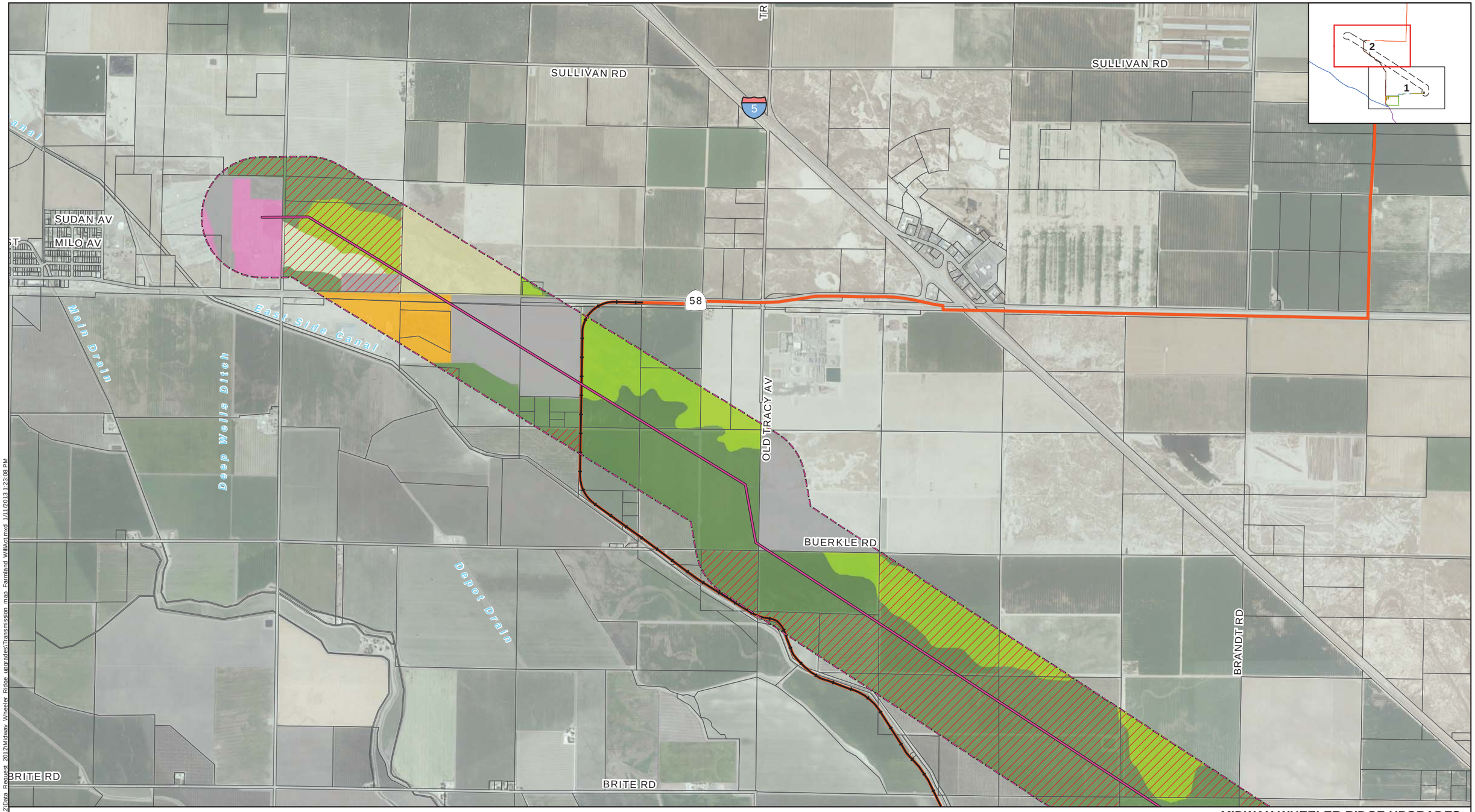
MIDWAY-WHEELER RIDGE UPGRADES
FARMLAND AREAS AND WILLIAMSON ACT CONTRACTS

January 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 3.4-2 - SHEET 1



HECA Project

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- Railroad
- Transmission

Midway-Wheeler Ridge Upgrades

- Existing PG&E 230kV transmission line (to be reconductored)
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- 1/4-mile Buffer from Electrical Switching Station

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- Farmland of Statewide Importance
- Unique Farmland
- Grazing Land
- Nonagriculture or Natural Vegetation
- Semi-Agriculture and Rural Commercial Land
- Vacant or Disturbed Land
- Urban and Built-Up Land
- Williamson Act Contracted Land
- Parcel Boundary

N

0 2,000 4,000 FEET

MIDWAY-WHEELER RIDGE UPGRADES
FARMLAND AREAS AND WILLIAMSON ACT CONTRACTS

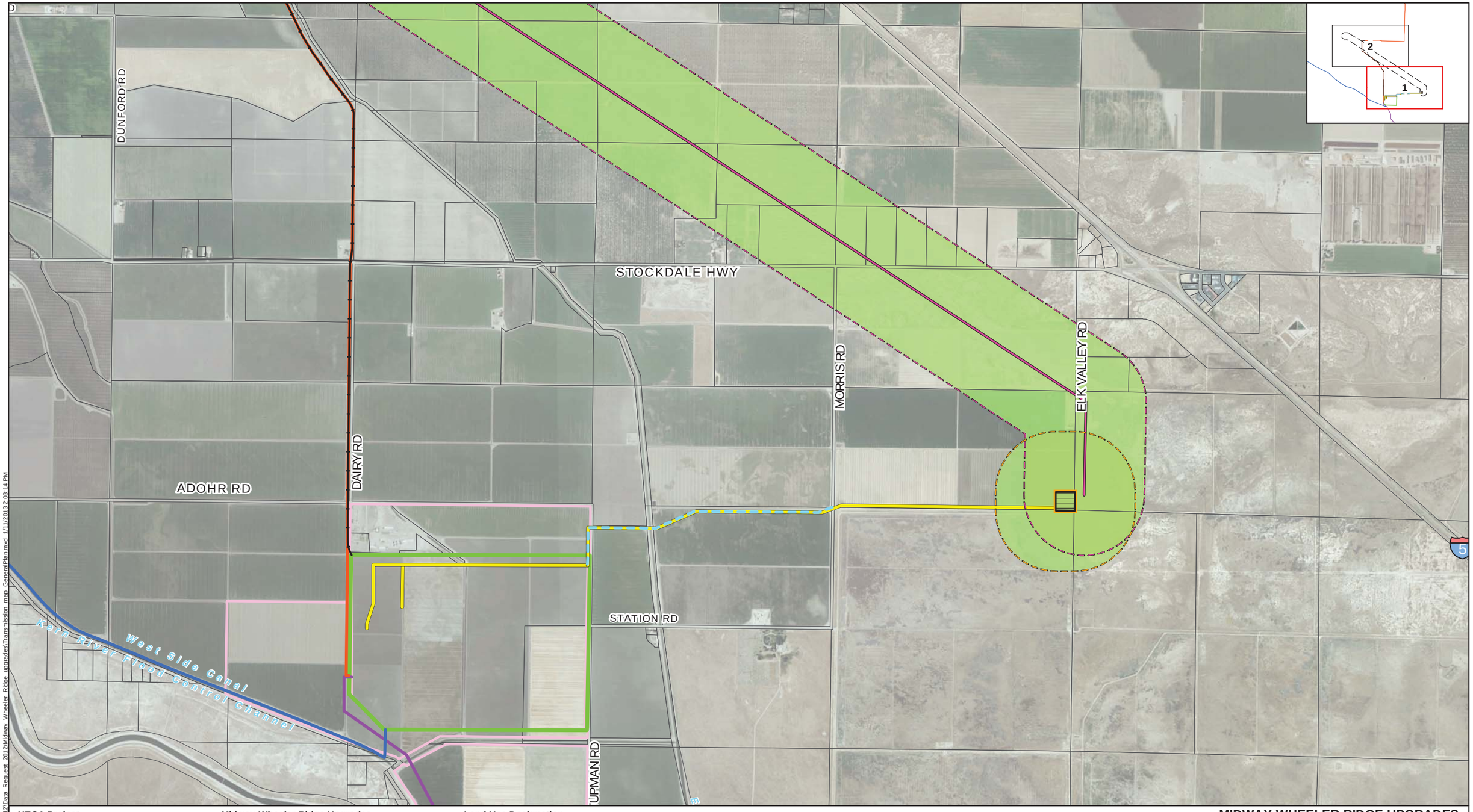
January 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 3.4-2 - SHEET 2

Source: Aerial Imagery, Bing Maps, 2009; Existing Land Use: Kern County, 2011



HECA Project

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

Midway-Wheeler Ridge Upgrades

- Existing PG&E 230kV transmission line (to be reconductored)
- 1/4-mile Buffer from Transmission Line Improvement
- Electrical Switching Station
- 1/4-mile Buffer from Electrical Switching Station

Land Use Designation

- Agriculturally Oriented Industry
- Intensive Agriculture
- Midway Substation
- Resource Management (Min. 20 Acre Parcel Size)
- Greenbelt Areas (Transmission Line Easements)
- Specific Plan - 4.1 Buttonwillow and Vicinity
- Parcel Boundary

N

0 2,000 4,000 FEET

Source: Aerial Imagery, Bing Maps, 2009; Existing Land Use: Kern County, 2011

MIDWAY-WHEELER RIDGE UPGRADES
GENERAL AND SPECIFIC PLAN LAND USE DESIGNATIONS

January 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 3.4-3 - SHEET 1

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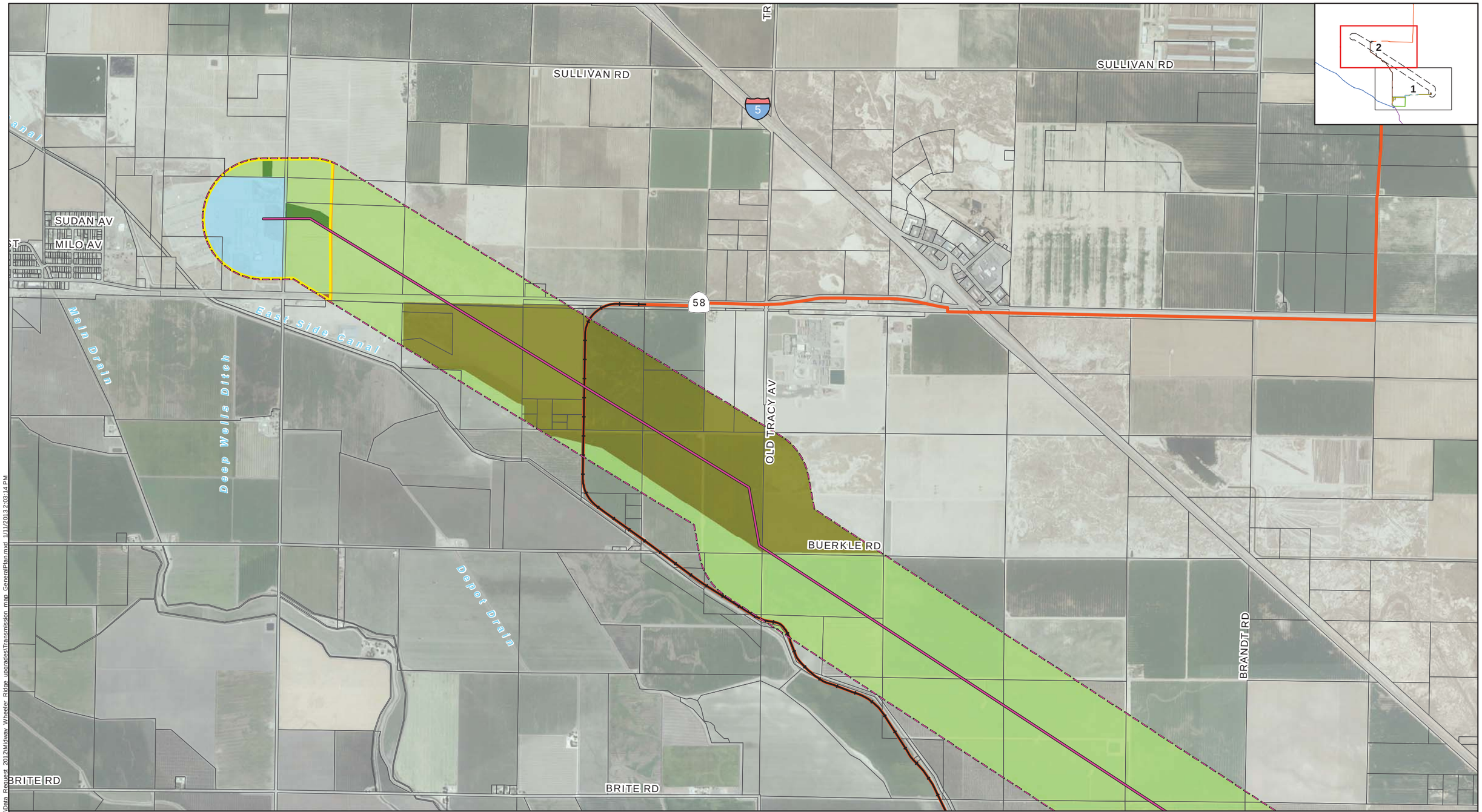

HECA Project

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

Midway-Wheeler Ridge Upgrades

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- 1/4-mile Buffer from Electrical Switching Station

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- Resource Management (Min. 20 Acre Parcel Size)
- Greenbelt Areas (Transmission Line Easements)
- Specific Plan - 4.1 Buttonwillow and Vicinity
- Parcel Boundary

N

0 2,000 4,000 FEET

Source: Aerial Imagery, Bing Maps, 2009; Existing Land Use: Kern County, 2011

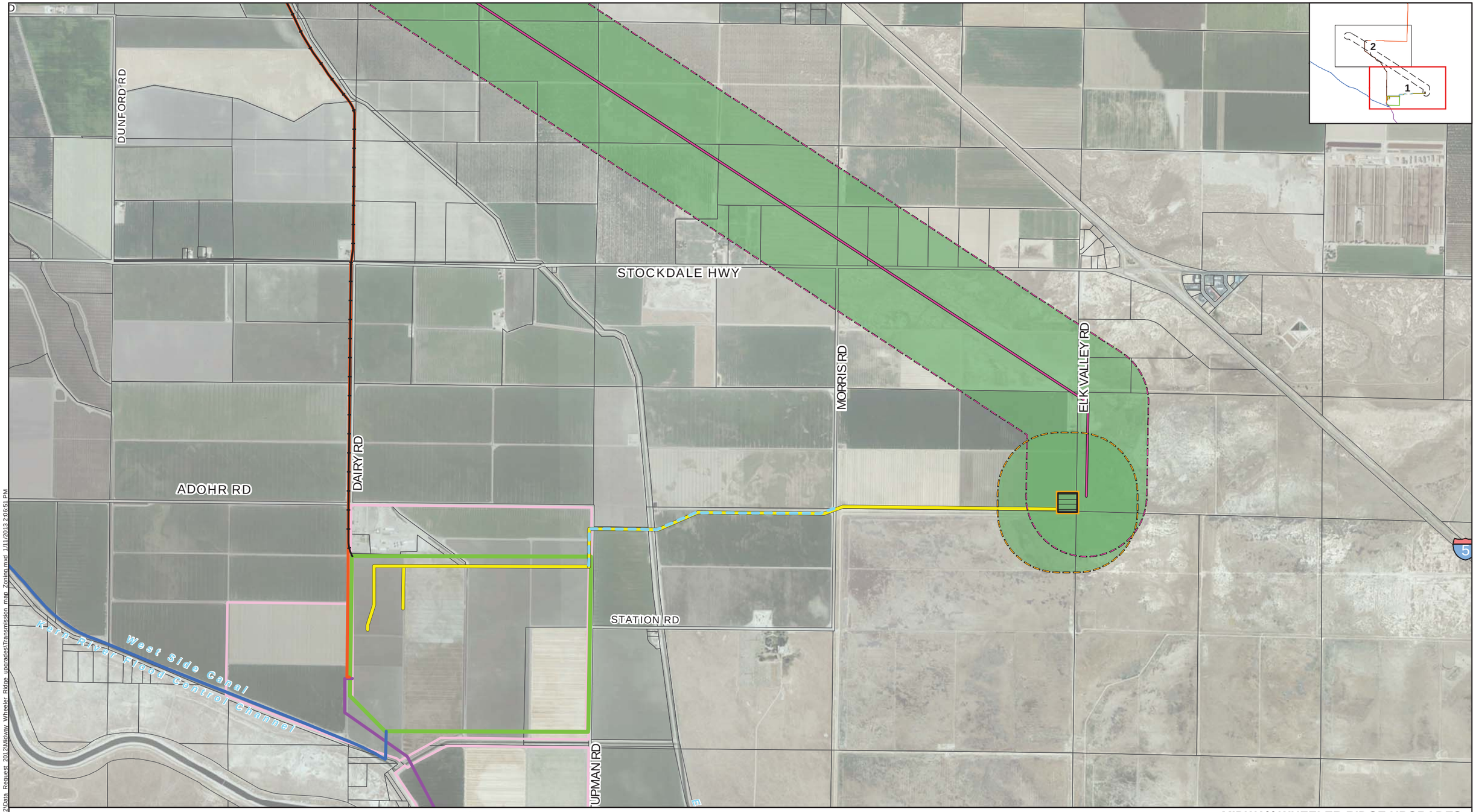
MIDWAY-WHEELER RIDGE UPGRADES
GENERAL AND SPECIFIC PLAN LAND USE DESIGNATIONS

January 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 3.4-3 - SHEET 2



HECA Project

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

Midway-Wheeler Ridge Upgrades

- Existing PG&E 230kV transmission line (to be reconductored)
- 1/4-mile Buffer from Transmission Line Improvement
- Electrical Switching Station
- 1/4-mile Buffer from Electrical Switching Station

Zoning

- EXCLUSIVE AGRICULTURE
- LIMITED AGRICULTURE
- Parcel Boundary

N

0 2,000 4,000 FEET

MIDWAY-WHEELER RIDGE UPGRADES ZONING

January 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 3.4-4 - SHEET 1

Source: Aerial Imagery, Bing Maps, 2009; Existing Land Use: Kern County, 2011

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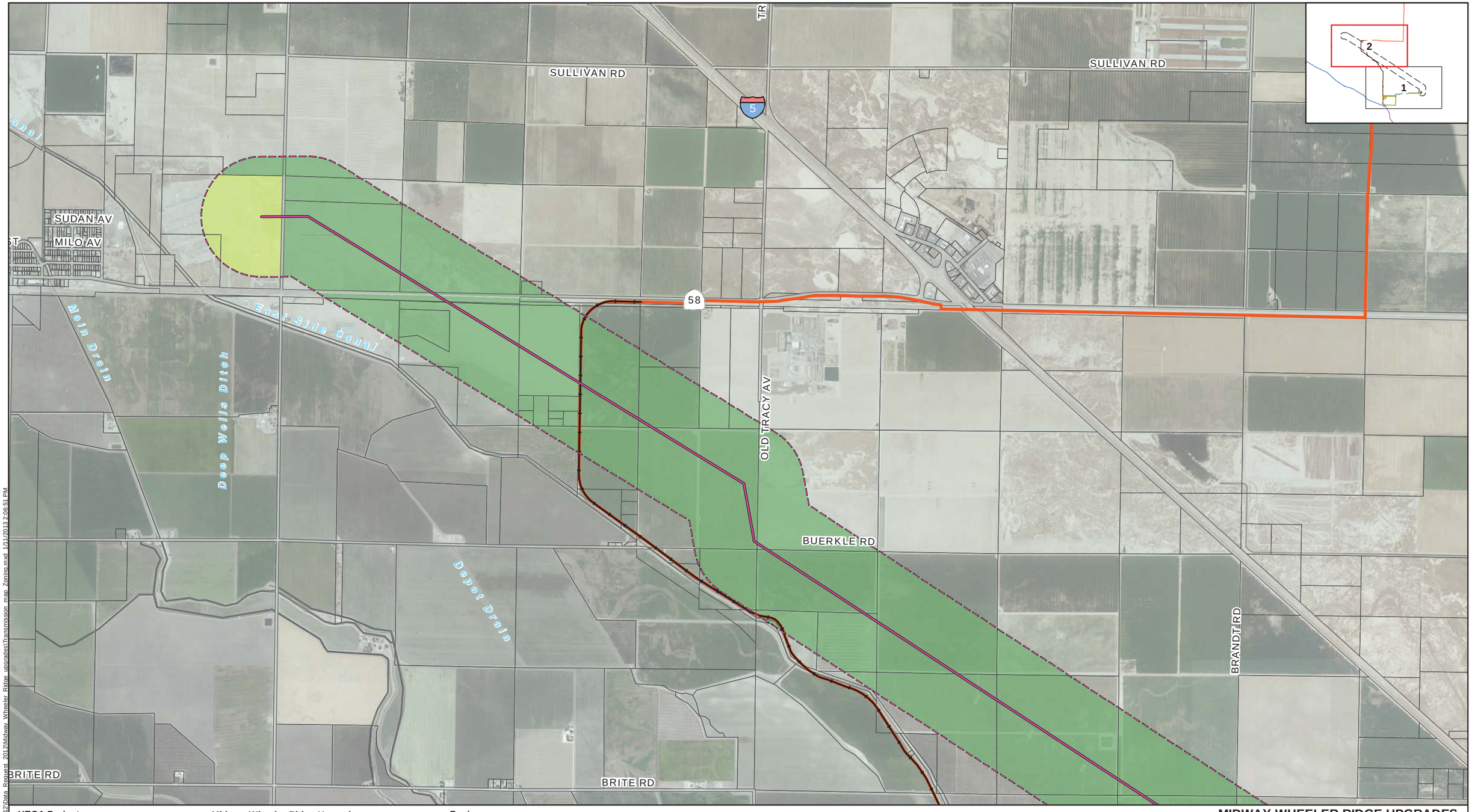

HECA Project

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

Midway-Wheeler Ridge Upgrades

- Existing PG&E 230kV transmission line (to be reconductored)
- 1/4-mile Buffer from Transmission Line Improvement
- Electrical Switching Station
- 1/4-mile Buffer from Electrical Switching Station

Zoning

- EXCLUSIVE AGRICULTURE
- LIMITED AGRICULTURE
- Parcel Boundary

N

0 2,000 4,000 FEET

MIDWAY-WHEELER RIDGE UPGRADES ZONING

January 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 3.4-4 - SHEET 2

Source: Aerial Imagery, Bing Maps, 2009; Existing Land Use: Kern County, 2011

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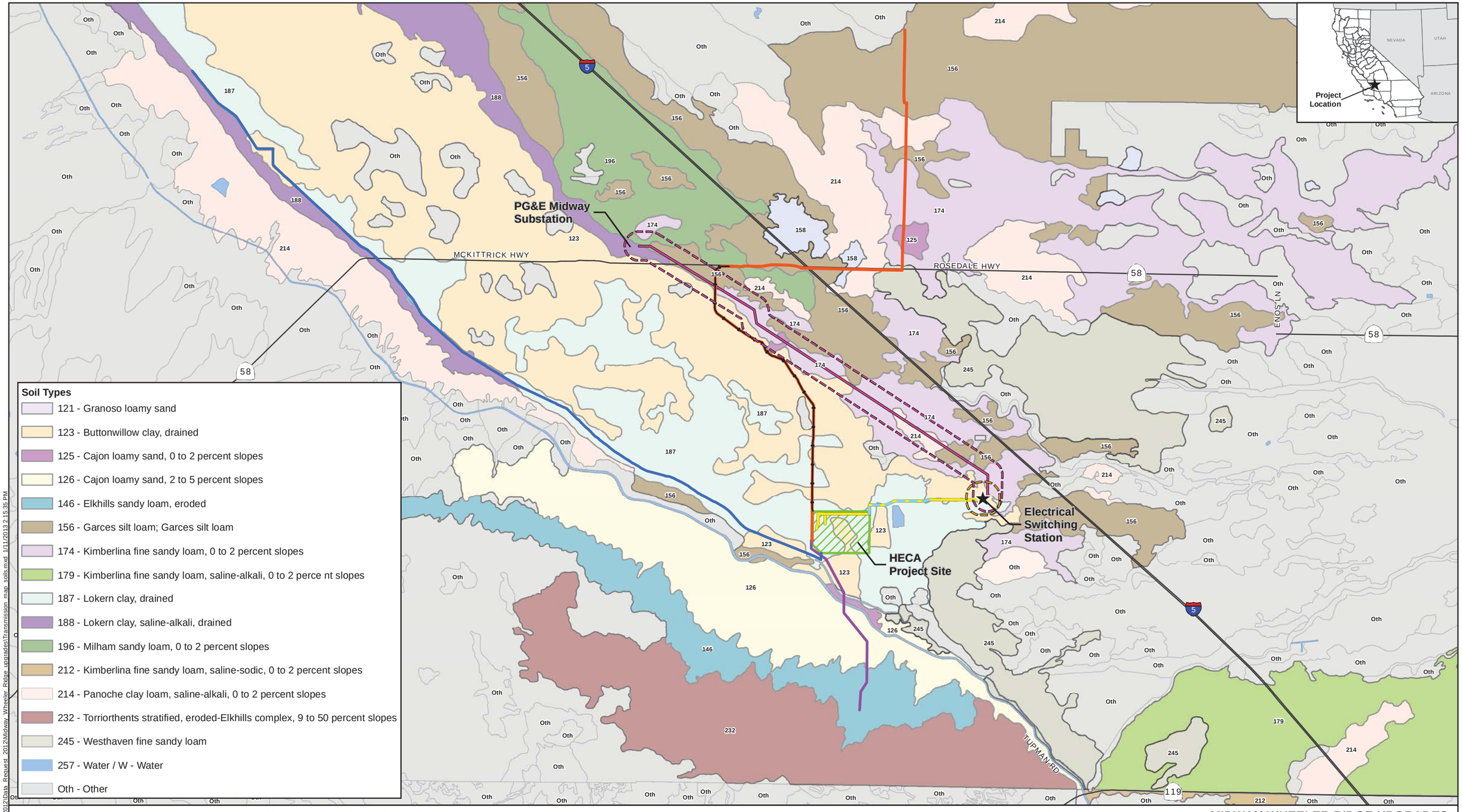

Source: Soils, SSURGO 2009.

MIDWAY-WHEELER RIDGE UPGRADES
SOILS MAP

January 2013
28068052

Hydrogen Energy California (HECA)
Kern County, California

URS

FIGURE 3.9-1

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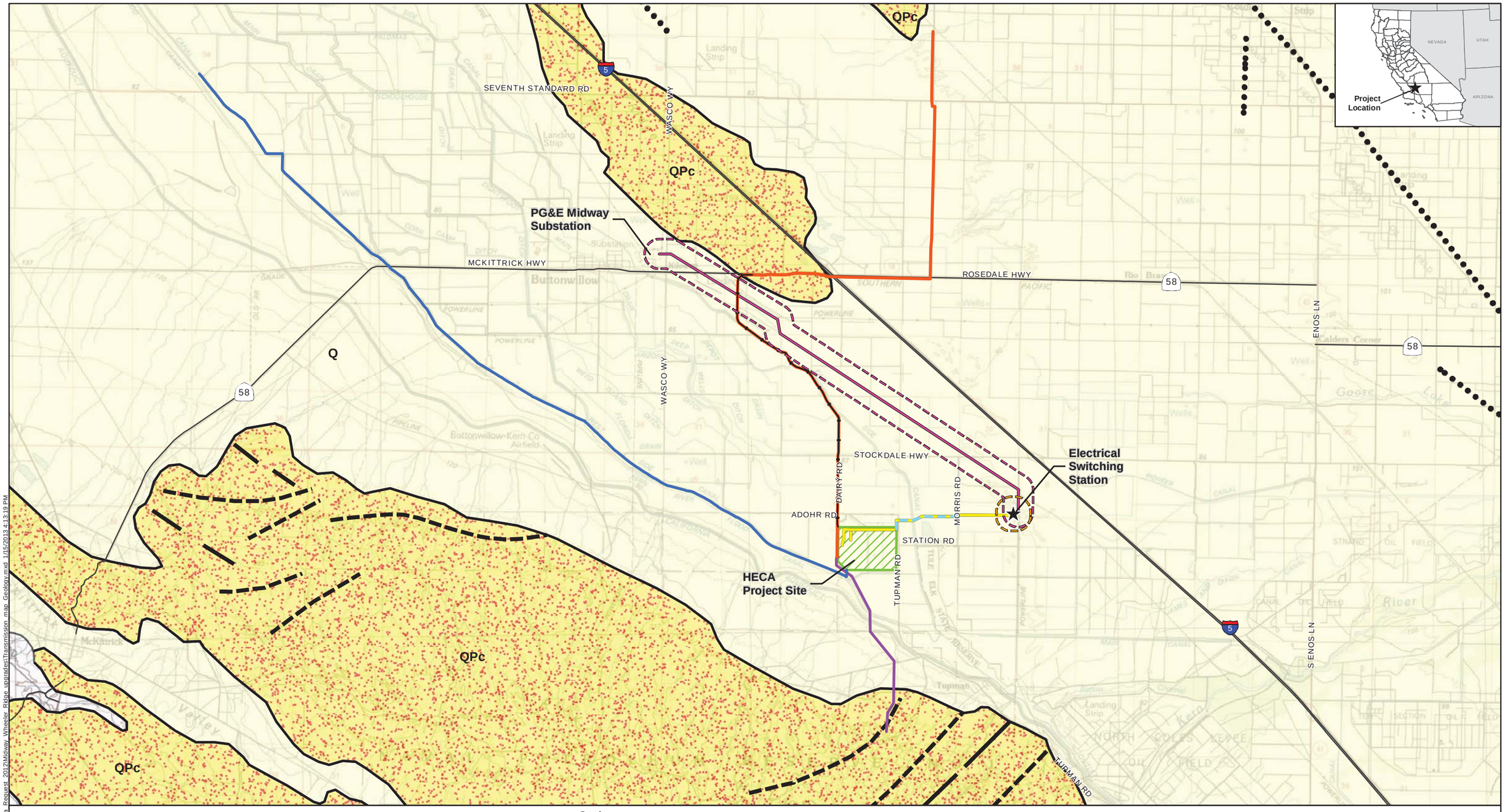

HECA Project

- Project Site
- Carbon Dioxide
- Natural Gas
- Potable Water
- Process Water
- Railroad
- Transmission

Midway-Wheeler Ridge Upgrades

- Existing PG&E 230kV transmission line (to be reconductored)
- 1/4-mile Buffer from Transmission Line Improvement
- Electrical Switching Station
- 1/4-mile Buffer from Electrical Switching Station

Geology

- Fault, Certain
- Fault, Approximately Located
- Fault, Concealed
- Contact, Certain

- Q — *Alluvium, lake, playa, and terrace deposits; unconsolidated and semi-unconsolidated. Mostly nonmarine, but includes marine deposits near the coast.*
- QPc — *Pliocene and/or Pleistocene sandstone, shale, and gravel deposits; mostly loosely consolidated.*

N

0 1 2 Miles

Source: USGS (30'x60' quads: Taft 1982, Delano 1982). Land Use, Kern County 2011.

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MIDWAY-WHEELER RIDGE UPGRADES GEOLOGY

Hydrogen Energy California (HECA)
Kern County, California

January 2013

URS

FIGURE 3.15-1

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 12/24/12)

SERVICE LIST:

APPLICANT
SCS Energy, LLC
Marisa Mascaro
30 Monument Square, Suite 235
Concord, MA 01742
mmascaro@scsenergyllc.com

Tiffany Rau
2629 Manhattan Avenue, PMB# 187
Hermosa Beach, CA 90254
trau@heca.com

Hydrogen Energy California, LLC
George Landman
Director of Finance and
Regulatory Affairs
500 Sansome Street, Suite 750
San Francisco, CA 94111
glandman@heca.com

CONSULTANT FOR APPLICANT
URS Corporation
Dale Shileikis, Vice President
Energy Services Manager
Major Environmental Programs
One Montgomery Street, Suite 900
San Francisco, CA 94104-4538
dale_shileikis@urscorp.com

COUNSEL FOR APPLICANT
Latham & Watkins, LLP
Michael J. Carroll
*Marc T. Campopiano
650 Town Center Drive, 20th Fl.
Costa Mesa, CA 92626-1925
michael.carroll@lw.com
*marc.campopiano@lw.com

INTERESTED AGENCIES
California ISO
e-recipient@caiso.com

Department of Conservation
Office of Governmental and
Environmental Relations
(Department of Oil, Gas &
Geothermal Resources)
Marni Weber
801 K Street, MS 2402
Sacramento, CA 95814-3530
marni.weber@conservation.ca.gov

INTERVENORS
California Unions for Reliable Energy
Thomas A. Enslow
Marc D. Joseph
Adams Broadwell Joseph & Cardozo
520 Capitol Mall, Suite 350
Sacramento, CA 95814
tenslow@adamsbroadwell.com

Association of Irritated Residents
Tom Frantz
30100 Orange Street
Shafter, CA 93263
tfrantz@bak.rr.com

Kern-Kaweah Chapter
of the Sierra Club
Andrea Issod
Matthew Vespa
85 Second Street, 2nd Floor
San Francisco, CA 94105
andrea.issod@sierraclub.org
matt.vespa@sierraclub.org

INTERVENORS (con't.)
Environmental Defense Fund (EDF)
Timothy O'Connor, Esq.
123 Mission Street, 28th Floor
San Francisco, CA 94105
toconnor@edf.org

Natural Resources Defense Council
George Peridas
111 Sutter Street, 20th Fl.
San Francisco, CA 94104
gperidas@nrdc.org

Kern County Farm Bureau, Inc.
Benjamin McFarland
801 South Mt. Vernon Avenue
Bakersfield, CA 93307
bmcfarland@kerncfb.com

HECA Neighbors
c/o Chris Romanini
P.O. Box 786
Buttonwillow, CA 93206
roman93311@aol.com

ENERGY COMMISSION – PUBLIC ADVISER
Jennifer Jennings
Public Adviser
publicadviser@energy.ca.gov

COMMISSION DOCKET UNIT
CALIFORNIA ENERGY
COMMISSION – DOCKET UNIT
Attn: Docket No. 12-CAI-04
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.ca.gov

*Indicates Change

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

Eileen Allen
Commissioners' Technical
Adviser for Facility Siting

Galen Lemei
Adviser to Presiding Member

Jennifer Nelson
Adviser to Presiding Member

David Hungerford
Adviser to Associate Member

Patrick Saxton
Adviser to Associate Member

Robert Worl
Project Manager

John Heiser
Associate Project Manager

Lisa DeCarlo
Staff Counsel

DECLARATION OF SERVICE

I, Dale Shileikis, declare that on January 16, 2013, I served and filed copies of the attached Responses to CEC Data Requests – Set Three (45-Day Extension), dated January, 2013. This document is accompanied by the most recent Proof of Service list, which I copied from the web page for this project at: http://www.energy.ca.gov/sitingcases/hydrogen_energy/index.html.

The document has been sent to the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, as appropriate, in the following manner:

(*Check one*)

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

_X_ 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 parties noted above as "hard copy required"; OR

____ 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: 1/16/13