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## 1.1 INTRODUCTION

The Hydrogen Energy California Project, also known as HECA, will be a first-of-its-kind, state-of-the-art facility that will produce electricity and other useful products for California, and that will have dramatically lower carbon emissions compared to traditional facilities.

According to the U.S. Department of Energy:

*The project will be among the cleanest of any commercial solid fuel power plant built or under construction and will significantly exceed the emission reduction targets for 2020 established under the Energy Policy Act of 2005. In addition, emissions from the project plant will be well below the California regulation requiring baseload plants to emit less greenhouse gases than comparably-sized natural gas combined cycle power plants (U.S. Department of Energy, HECA Project Facts, November 2011)..*

HECA will achieve these important environmental objectives by capturing carbon from its processes and transporting the carbon dioxide for storage, also known as sequestration, in secure geologic formations within the earth.

The U.S. Department of Energy recognizes HECA's importance in advancing carbon capture and sequestration:

*A need exists to further develop carbon management technologies that capture and store or beneficially reuse carbon dioxide (CO<sub>2</sub>) that would otherwise be emitted into the atmosphere from coal-based electric power generating facilities. Carbon capture and storage (CCS) technologies offer great potential for reducing CO<sub>2</sub> emissions and mitigating global climate change, while minimizing the economic impacts of the solution. Once demonstrated, the technologies can be readily considered in the commercial market-place by the electric power industry (U.S. Department of Energy, HECA Project Facts, November 2011).*

HECA will provide numerous local, state, regional, national, and global benefits, including the following:

- Promoting energy security by converting abundant and inexpensive solid fuels – coal and petroleum coke (petcoke) – to clean hydrogen fuel to produce electricity and other useful products.
- Advancing a hydrogen-based transportation system in California by increasing the supply of available hydrogen.
- Improving the reliability of California's electrical grid by generating a nominal 300 megawatts (MW) of new, low-carbon baseload electricity – enough electricity to power over 160,000 homes.
- Supporting California's agricultural, industrial, and transportation industries by producing over 1 million tons per year of low-carbon fertilizer and other useful products.

- Reducing greenhouse gas (GHG) emissions by capturing approximately 3 million tons of CO<sub>2</sub> per year – equivalent to eliminating 650,000 automobiles from the road – and transporting it for use in enhanced oil recovery (EOR), resulting in permanent sequestration.
- Demonstrating the commercial viability of carbon capture and sequestration as a viable method for reducing the carbon footprint of power generation and manufacturing.
- Promoting energy independence by increasing California’s production of oil through EOR, extracting an otherwise unrecoverable 5 million barrels of oil each year.
- Improving local groundwater quality and agricultural production by extracting, treating, and using degraded groundwater.
- Providing local jobs to an estimated 2,500 construction workers at peak construction, and to 200 fulltime employees during Project operations.
- Boosting the local and California economy through direct investment and the resulting economic activity and tax revenues in the billions of dollars.

## 1.2 PROJECT OVERVIEW

HECA is an Integrated Gasification Combined Cycle (IGCC) electrical power plant with an integrated Manufacturing Complex that will produce fertilizer and other low-carbon nitrogen-based products. HECA uses solid feedstock – coal and petcoke – to produce clean hydrogen fuel. The hydrogen fuel is then used to generate electricity and produce other useful products. Because it produces multiple products, HECA is sometimes referred to as a “polygeneration” project.

HECA will produce:

- 300 MW of low-carbon baseload electrical power
- low-carbon nitrogen-based products, including fertilizer
- CO<sub>2</sub> for use in EOR

The power and products produced by HECA have a lower carbon footprint compared to power and products produced from more traditional fossil fuel facilities. This low-carbon footprint is achieved by capturing more than 90 percent of the CO<sub>2</sub> in the production of the hydrogen fuel and transporting it for use in EOR, which results in simultaneous sequestration (storage) of the CO<sub>2</sub> in a secure geologic formation. CO<sub>2</sub> from HECA will be used in EOR in the adjacent Elk Hills Oil Field (EHOF), which is owned and operated by Occidental of Elk Hills, Inc. (OEHI).

### 1.2.1 Location

HECA will be located on a 453-acre Project Site approximately 7 miles west of the outermost edge of the city of Bakersfield and 1.5 miles northwest of the unincorporated community of Tupman in western Kern County, California. The site is shown in Figure 1-1, Project Vicinity

and Figure 1-2, Project Location Map. Figure 1-3 shows the Project Site as it exists today. The Project Site is near a hydrocarbon-producing area known as the EHOF.

### 1.2.2 Terminology

Terms used throughout this Application for Certification (AFC) Amendment are defined as follows:

- **Project or HECA.** The HECA IGCC electrical generation facility, low-carbon nitrogen-based products Manufacturing Complex, and associated equipment and processes, including its linear facilities.
- **Project Site or HECA Project Site.** The 453-acre parcel of land that would contain the HECA Project. HECA has the option to purchase the Project Site from the property owner.
- **OEHI Project.** The use of CO<sub>2</sub> for EOR at the EHOF and resulting sequestration, including the CO<sub>2</sub> pipeline, EOR processing facility, and associated EOR equipment. OEHI will be installing the approximately 3-mile-long CO<sub>2</sub> pipeline from the Project Site to the EHOF, as well as installing the EOR Processing Facility and any associated wells needed in the EHOF for CO<sub>2</sub> EOR and sequestration.
- **OEHI Project Site.** The portion of land within the EHOF on which the OEHI Project will be located and where the CO<sub>2</sub> produced by HECA will be used for EOR and resulting sequestration.
- **Controlled Area.** The 653 acres of land adjacent to the Project Site over which HECA will control access and future land uses.

### 1.2.3 History

On July 31, 2008, HECA LLC submitted an Application for Certification (AFC) (08-AFC-8) to the California Energy Commission (CEC). A Revised AFC was submitted on May 28, 2009, to reflect a change in the Project Site to an alternative location. In 2011, HECA LLC was acquired by SCS Energy LLC. The Project design has been modified to ensure its economic viability and to better serve market needs, while continuing to adhere to the strictest environmental standards. This AFC Amendment describes and analyzes the changes to the Project design, and supersedes previous application materials in their entirety, unless noted otherwise.

### 1.2.4 U.S. Department of Energy Funding

The United States Department of Energy (DOE) is providing financial assistance to HECA under the Clean Coal Power Initiative (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 technologies that will capture CO<sub>2</sub> 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.

### 1.2.5 Permitting and Environmental Review

The CEC has exclusive permitting authority over thermal power plants of 50 MW or more, and acts as the lead agency for such power plants under the California Environmental Quality Act (CEQA). As a federal agency, DOE must comply with the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. §§ 4321 *et seq.*) by considering potential environmental issues associated with its actions prior to deciding whether to undertake these actions. The DOE will work with the CEC to develop a joint CEQA/NEPA review. As such, this Amended AFC, including the information provided in Appendix B (i.e., Purpose and Need), was prepared to meet the requirements of both CEQA and elements of NEPA. Both CEQA and NEPA require the Applicant to address any potential impacts or effects resulting from the construction and operation of the Project. The OEHI EOR Project will be separately permitted by OEHI through the Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR). However the environmental impacts associated with the OEHI EOR Project will be analyzed in the joint CEQA/NEPA analysis being conducted by the CEC and DOE.

### 1.2.6 Schedule

Construction and commissioning of the Project is expected to take approximately 49 months. Commencement of pre-construction and construction activities is expected to begin in June 2013, with site activities and truck deliveries beginning in August 2013. Construction is expected to be completed by February 2017. Commercial operation is expected to commence in September 2017.

## 1.3 PROJECT DESIGN IMPROVEMENTS

Throughout the Project design and permitting process, HECA has strived continually to improve the design of the Project and to maximize its environmental performance. The Project modifications proposed and analyzed in this AFC Amendment represent a continuation of that effort. For example, Table 1-1 illustrates the success that has been achieved in continually working to reduce the anticipated criteria pollutant emissions from the Project.

The following are some of the notable Project design improvements that are further described and analyzed in this AFC Amendment:

- A Manufacturing Complex to produce approximately 1 million tons per year of low-carbon nitrogen-based products (including urea, urea ammonium nitrate (UAN) and anhydrous ammonia) to be used in agricultural, transportation, and industrial applications has been integrated into the Project design.
- Mitsubishi Heavy Industries (MHI) oxygen-blown dry feed gasification technology has been selected. The gasifier preheaters are no longer needed due to the change in design of the gasifier.

**Table 1-1  
Projected Emissions (tons/yr)**

	<b>NO<sub>x</sub></b>	<b>CO</b>	<b>VOC</b>	<b>SO<sub>2</sub></b>	<b>PM<sub>10</sub></b>	<b>PM<sub>2.5</sub></b>
Amended AFC (April 2012)	163.7	275.2	35.4	29.4	90.3	80.2
San Joaquin Valley Air Pollution Control District (SJVAPCD) Final Determination of Compliance (December 2010)	195.9	407.0	59.1	38.3	91.7	not stated
HECA's Prior Submittal to SJVAPCD (October 2010)	196.1	407.6	59.2	38	91.5	79.4
CEC Preliminary Staff Assessment (August 2010)	194.9	400.9	59.1	38	111.5	99.2
Revised AFC (May 2009)	203.8	350.3	40.7	42.2	141.1	128.9

## Notes:

- AFC = Application for Certification  
 CEC = California Energy Commission  
 CO = Carbon monoxide  
 HECA = Hydrogen Energy California  
 NO<sub>x</sub> = Nitrogen oxide  
 PM<sub>2.5</sub> = particulate matter less than 2.5 microns in diameter  
 PM<sub>10</sub> = particulate matter less than 10 microns in diameter  
 SO<sub>2</sub> = Silicon dioxide  
 VOC = volatile organic compound  
 yr = year

- A MHI 501GAC<sup>®</sup> CT has been selected. The Combined Cycle Power Block will now generate approximately 405 MW of gross power and will provide a nominal 300-megawatt output of low-carbon baseload electricity to the grid.
- The option to purchase an approximately 5-acre parcel adjacent to the Project Site was acquired subsequent to the 2009 Revised AFC. This parcel became part of the Controlled Area and increased its acreage from 628 to 633. Project Site boundaries have changed to include some areas previously within the Controlled Area and to exclude other areas that were previously part of the Project Site. The current Project Site and Controlled Area are now 453 acres and 653 acres, respectively, rather than 473 and 633 acres, respectively.
- There are now two alternatives for transferring coal to the Project Site:
  - Alternative 1, rail transportation. 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. This railroad spur will also be used to transport some HECA products to market.

- Alternative 2, truck transportation. An approximately 27-mile-long truck transport route via existing roads from an existing coal transloading facility northeast of the Project Site. This alternative was presented in the 2009 Revised AFC.
- The routes of the natural gas pipeline, potable water pipeline, and electrical transmission line have been refined as follows:
  - An approximately 13-mile-long natural gas pipeline will interconnect with a Pacific Gas and Electric Company (PG&E) natural gas pipeline located north of the Project Site.
  - Potable water will be delivered via an approximately 1-mile-long pipeline from a new West Kern Water District (WKWD) potable water production site east of the Project Site.
  - An approximately 2-mile-long electrical transmission linear will interconnect with a future PG&E switching station east of the Project Site.

## 1.4 ENVIRONMENTAL CONSIDERATIONS

Impacts that the Project may have on the environment have been evaluated in detail. The analysis included in this AFC Amendment focuses on the HECA Project as well as the CO<sub>2</sub> pipeline associated with the OEHI Project. The analysis of the CO<sub>2</sub> EOR Processing Facility associated with the OEHI Project is included in Appendix A of this AFC Amendment. The Project will avoid or minimize potential environmental impacts through Project siting and design, and through incorporation of mitigation measures. As a result, the Project will not have any significant environmental impacts. The impact evaluations are summarized below and provided in detail in Section 5.0.

### 1.4.1 Air Quality

The Project will generate emissions of criteria pollutants including nitrogen oxide (NO<sub>x</sub>), carbon monoxide (CO), volatile organic compounds (VOCs), sulfur dioxide (SO<sub>2</sub>), and particulates less than or equal to 10 microns in diameter and 2.5 microns in diameter (PM<sub>10</sub> and PM<sub>2.5</sub>) during construction and operations. In the construction phase, emissions will be reduced through the implementation of fugitive dust mitigation and diesel equipment exhaust mitigation. Emissions of NO<sub>x</sub>, VOC, SO<sub>2</sub>, and PM<sub>10</sub> will be fully offset by providing emission reductions from emission reduction credits held by HECA.

In addition, the Project will incorporate state-of-the-art air emission controls that reflect or exceed Best Available Control Technology to reduce emissions, including:

- Selective catalytic reduction (SCR) to reduce NO<sub>x</sub> emissions from the combustion turbine.
- Oxidation catalyst to reduce CO and VOC emissions from the combustion turbine.
- Enclosed conveyors and high-efficiency filtration to limit PM<sub>10</sub> and PM<sub>2.5</sub> emissions from materials handling systems.
- High-efficiency mist eliminators to limit PM<sub>10</sub> and PM<sub>2.5</sub> emissions from cooling tower drift.

- SCR to reduce NO<sub>x</sub> emissions from the auxiliary boiler.
- Tertiary catalytic decomposition and SCR to reduce N<sub>2</sub>O and NO<sub>x</sub> emissions from the nitric acid unit.
- CO<sub>2</sub> capture and sequestration.

The air dispersion modeling analyses conducted for NO<sub>x</sub>, CO, SO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> is presented in Section 5.1 and Appendix E of this AFC Amendment. The results show that the Project, with the planned emission control systems, would neither cause an exceedance of the California and National Ambient Air Quality Standards nor contribute significantly to an existing exceedance. The modeling analyses conducted to demonstrate whether Project emissions exceed applicable air quality standards do not “take credit” for the emission offsets. Therefore, emission offsets provide additional mitigation above and beyond the design features of the Project.

With implementation of these measures, as discussed in further detail in Section 5.1, the Project would not result in significant impacts to air quality.

### 1.4.2 Biological Resources

No threatened or endangered plant species were identified on the Project Site. Three listed plant species have the potential to occur along the linear facilities.

No threatened or endangered wildlife species were identified on the Project Site. Three federally and/or state-listed threatened or endangered wildlife species (blunt-nosed leopard lizard, Tipton kangaroo rat, and San Joaquin kit fox) are likely to occur along the off-site linear facilities. In addition, six non-listed special-status wildlife species (burrowing owl, loggerhead shrike, short-nosed kangaroo rat, Tulare grasshopper mouse, San Joaquin pocket mouse, and American badger) are also likely to occur along the natural gas linear and/or electrical transmission/potable water linears.

To ensure that no threatened or endangered plant or animal species are affected by the Project, avoidance and mitigation measures such as pre-construction surveys and exclusionary fencing will be implemented to reduce impacts on threatened and endangered species.

The Project construction and operation will avoid nearly all of the potential jurisdictional waters in the delineation study area. Horizontal Directional Drilling (HDD) will be used to avoid non-wetland waters of the U.S. crossed by the CO<sub>2</sub> linear, including the California Aqueduct, Kern River Flood Control Channel, and Outlet Canal. Wetland features adjacent to the proposed natural gas linear right-of-way will be avoided. Therefore, the Project would not permanently impact potential jurisdictional waters of the U.S. or potential waters of the state.

With implementation of Project design features as well as proposed avoidance and mitigation measures, the Project will not result in significant impacts on biological resources.

### 1.4.3 Cultural Resources

The California Native American Heritage Commission (NAHC) was contacted on four occasions to date, requesting a records search of the Sacred Lands File and a list of local Native American contacts (individuals and/or organizations) that might have knowledge of cultural resources

within the Project study area and various linear alignments. According to the NAHC, the searches were negative for the presence of Native American cultural resources in the archaeological resource survey areas comprised of the Project Site as well as the various linear alignment alternatives. The responses from the Native American contacts did not contain any information on additional cultural resources.

Pedestrian surveys were performed of the Project Site and linear corridors. Thirty-seven archaeological resource sites were identified in the records search area. Of the archaeological resource sites, one is in the archeological resource study area (ARSA), five others are in close proximity to the ARSA (within 200 feet), and the remainder are only within the records search area. Twenty-four archaeological resources were identified within the archaeological resources area of potential effect (APE), as defined for the Project during the course of the current investigation. Of these, 16 were previously recorded sites, while the remaining 8 sites contained newly discovered resources. All buildings (built environment resources) constructed before 1964 within the study area were recorded and evaluated. No buildings in the study area appear to be significant historic properties.

With implementation of Project design features and proposed mitigation measures, the Project will not result in significant impacts on cultural resources.

#### 1.4.4 Land Use

The majority of the Project Site is currently used for agricultural purposes, and is designated Prime Farmland. The entire Project Site is also under Williamson Act contract. Williamson Act restrictions on the Project Site will need to be cancelled pursuant to California Government Code Section 51280(b).

Operation of the Project is not expected to conflict with existing land uses within the vicinity of the Project Site, which include farming, the Tule Elk State Natural Reserve, and a few scattered single-family dwellings. The Project Site is included in the Intensive Agriculture land use designation; permitted uses in the designation include public utility uses. The Project Site is included in the Exclusive Agriculture (A) zone; electrical power generating plants are permitted under Zoning Ordinance with a Conditional Use Permit. Therefore, the Project is consistent with the Kern County's General Plan and zoning designations.

With implementation of Project design features, the Project will not result in significant impacts on land use.

#### 1.4.5 Noise

Noise impacts on sensitive receptors were evaluated for construction, commissioning, operations, ground-borne vibrations, and vehicle traffic. In addition, worker exposure noise impacts were evaluated.

Given the intermittent and temporary nature of construction activities, potential noise impacts during construction are considered to be less than significant. To ensure compliance with applicable LORS during ongoing Project operations, extensive noise-reduction features were incorporated into the Project design, including low-noise designs for some equipment items and

the application of external treatments such as enclosures or noise control panels on selected equipment. In addition, mitigation measures are proposed to reduce potential noise increases from vehicular traffic to less-than-significant levels.

With implementation of these Project design features and proposed mitigation measures, the Project will not result in significant impacts from noise.

#### **1.4.6 Public Health**

In the construction phase, toxic air contaminant (TAC) emissions will be reduced through the implementation of diesel equipment exhaust mitigation. During operations, the emissions control systems of the Project will minimize potential TAC emissions. The maximum incremental cancer risk from Project emissions during construction and operations is estimated to be below the significance criterion of 10 in one million. The maximum chronic and acute total hazard indices are both estimated to be less than the significance criterion of 1.0. Based on this evaluation and using conservative assumptions, Project emissions are expected to pose no significant cancer or non-cancer health effects. As demonstrated by the air quality analysis, criteria pollutant emissions from the Project would not cause or significantly contribute to violations of California or National Ambient Air Quality Standards, which have been set at levels designed to protect public health.

With implementation of Project design features and proposed mitigation measures, the Project will not result in significant impacts on public health.

#### **1.4.7 Worker Safety and Health**

Worker exposure to physical and chemical hazards would be minimized through adherence to appropriate engineering design criteria, implementation of appropriate safety and administrative procedures, use of personal protective equipment, and compliance with applicable health and safety regulations. With implementation of the Project design features, the Project will not result in significant impacts on worker safety and health.

#### **1.4.8 Socioeconomics**

The Project would have a positive impact on fiscal resources in the local community and region. Construction and commissioning is expected to occur over a 49-month period. The Project's potential impacts on socioeconomics (direct, indirect, and induced effects) and analysis related to environmental justice are summarized below.

##### *Direct Effects*

The average size of the workforce over the 49-month site preparation and construction period will be 1,159 workers (including construction workers and contractor staff). Peak construction employment will represent approximately 20 percent of construction jobs in Kern County. The majority of the workforce (approximately 60 percent) is expected to be hired from within Kern County.

The Applicant estimates that operation and maintenance of the Project will require 200 fulltime employees, including 22 operating technicians on four 12-hour rotating shifts, and 110 administrative, engineering, and maintenance personnel working on a day shift. HECA LLC estimates that annual direct labor income of operations for the Project will be approximately \$30 million. Approximately 30 percent of annual material and supply purchases associated with operations will occur within Kern County. The labor income and materials spending related to the Project will represent a permanent economic benefit to Kern County.

### *Indirect and Induced Effects*

Estimated indirect and induced effects of construction that will occur within Kern County will be more than 6,950 job years, approximately \$1.67 billion in labor income, and approximately \$843 million in increased economic output. Output includes spending for materials and supplies (non-labor costs) plus value-added costs, which are comprised of employee compensation, proprietary income, other property income, and indirect business taxes. These beneficial effects of the Project during construction will be temporary, occurring over the site preparation, construction, and commissioning/start-up period. They will lag behind the direct effects of construction by approximately 6 to 12 months. The labor income and materials spending related to the Project will represent a permanent economic benefit to Kern County. Estimated indirect and induced effects of annual operation in Kern County will be approximately 430 additional job years annually, \$21 million in annual labor income, and \$68 million in annual output. These economic effects will represent a long-term economic benefit to Kern County.

The local fire protection, emergency response, and law enforcement systems are adequately staffed and equipped to serve the additional population associated with Project construction and operation. Consequently, construction and operation impacts are expected to be less than significant on public services.

With implementation of Project design features, the Project will not result in significant adverse impacts on socioeconomics.

### *Environmental Justice*

Four areas of potential environmental justice communities were identified based on a review of U.S. Census data. Low-income populations were identified in Census Tract 37.00 and in the unincorporated community of Tupman, and minority environmental justice communities were identified in Buttonwillow and Wasco; therefore, the Project was evaluated to determine whether or not these communities might experience disproportionately high and adverse effects as a result of the Project.

The Project is designed to employ state-of-the art environmental controls and would employ mitigation measures to reduce any potential impacts to a less-than-significant level. Consequently, no significant and adverse impacts would occur that would result in disproportionately high and adverse impacts on minority or low-income populations.

### 1.4.9 Soils

The surficial soils of the Project Site will likely be excavated and re-compacted or replaced with granular soils within and adjacent to the areas of Project facilities. Preliminary grading plans indicate that approximately 500,000 cubic yards of soil required for construction will be derived from off-site sources. The anticipated borrow site for the Project is located approximately 5 miles west of the Project Site. Additionally, soil removed through grading activities is expected to be reused on site to construct berms at the northern and eastern portions of the Project Site; therefore, no on-site or off-site fill disposal is expected. However, it may be necessary to dispose of vegetative matter and excavated debris.

The soils at the Project Site have a low potential for wind erosion. Project-related soil erosion will be minimized through implementation of erosion control measures. Therefore, no significant impacts from soil erosion are expected.

During construction and installation of the linear facilities, the soil within the alignment for the linear facilities may become more susceptible to erosion. The extent of this construction-related impact on soils and agricultural lands, however, will be temporary; in addition, appropriate best management practices (BMPs) will be implemented to minimize potential impacts. With the implementation of mitigation measures, no significant impacts on native soil, receiving water bodies, or area agricultural lands are anticipated at or near linear facilities.

With implementation of Project design features and proposed mitigation measures, the Project will not result in significant impacts on soils.

### 1.4.10 Traffic and Transportation

Construction of the Project will result in a temporary increase in traffic associated with the movement of construction vehicles, equipment, and personnel on the transportation network serving the study area. Where warranted, the Project will use proper signs and traffic control measures in accordance with Caltrans and Kern County requirements during the construction period. The Project will also coordinate construction activities, including the transport of oversized and overweight loads on state and county roadways, with appropriate Caltrans, California Highway Patrol, and Kern County departments, and with other jurisdictions to maintain traffic flow and safety.

During Project operations, the Project area will experience increases in traffic associated primarily with operation worker commute, feedstock deliveries, and operation and maintenance trips. The first full year of commercial operation will be Year 2017. During the operations of the Project, there will be a fulltime employee workforce of about 200. The traffic mitigation that will be installed for construction impact mitigation will remain during operations. As a result, no significant traffic effects would occur during Project operations.

With implementation of Project design features and proposed mitigation measures, the Project will not result in significant impacts on traffic or transportation.

### 1.4.11 Visual Resources

In general, the Project area is comprised primarily of agricultural lands with farming activities and scattered residences; however, it is also characterized by oilfield extraction, grain storage, fertilizer production activities/industrial facilities, and electrical transmission lines. While the Project will be clearly visible from the west, north, and east, with sporadic visibility from areas located to the south and southeast (within the identified 5-mile radius), the overall landscape is already highly modified by human activity and is considered of low scenic quality.

With implementation of Project design features and proposed mitigation measures, no significant impacts are expected to occur as a result of the construction, operation, maintenance, and long-term presence of the Project.

### 1.4.12 Hazardous Materials Handling

None of the chemicals at the Project Site would be stored in quantities above the federal thresholds, and only aqueous ammonia would be stored on the site in a quantity greater than the California Accidental Release Prevention Program threshold. Based upon the Off-Site Consequence Analysis (OCA), the Project will not result in significant impacts from hazardous materials and handling with implementation of Project design features and proposed mitigation measures.

### 1.4.13 Waste Management

Wastes generated by the Project during construction and operation include nonhazardous and hazardous wastes. Nonhazardous wastes include scrap metal, paper, sanitary waste, some types of spent catalysts, and storm water. Hazardous wastes that will be generated include paint, solvents, cleaners, sludges, oil, batteries, and hazardous spent catalysts.

All waste will be recycled or disposed of in licensed disposal facilities, as appropriate. Based on the remaining capacity and estimated closure dates of the Class I, II, and III landfills in California, the hazardous and nonhazardous wastes that cannot be recycled are not expected to significantly impact the capacity of the landfills. Managed and disposed of properly, these wastes will not cause significant environmental or health and safety impacts.

Wastewater generated during construction of the Project will include sanitary wastes, equipment wash water, hydrotest water, and storm water runoff. During operation, sanitary wastewater will be disposed in an on-site sanitary leach field. Nonhazardous hydrotest water will be tested and then disposed of. There will be no direct surface water discharge of industrial wastewater or storm water from process areas. Process wastewater will be treated on site in a ZLD unit and recycled within the gasification and Project systems.

With implementation of Project design features and proposed mitigation measures, the Project will not result in significant impacts from waste management.

#### 1.4.14 Water Resources

The Project will use approximately 6.6 million gallons a day (mgd) of brackish water on a calendar year average basis, or approximately 7,427 acre-feet per year for process water needs. Water usage in the Project can be divided into six categories: power block cooling tower, process cooling tower, Air Separation Unit cooling tower, Manufacturing Complex, gasification solids, and heat recovery steam generator stack.

The Project will use local brackish groundwater that is treated on site to meet Project standards. The brackish groundwater will be supplied from Buena Vista Water Storage District (BVWSD), as part of BVWSD's Brackish Groundwater Remediation Project (BGRP), which is designed to remediate brackish groundwater that is considered to be unsuitable for agricultural or drinking uses. Implementation of the BGRP, which includes Project-specific pumping, is seen as a benefit to BVWSD in that it remove salts from the aquifer, impedes eastward flow of poor-quality groundwater, and enhances westward flow of good-quality groundwater. Project consumption of these impaired sources will beneficially affect local agriculture. Therefore, the proposed use of the brackish groundwater will beneficially affect local groundwater quality, and the Project's impacts on water supplies and water quality will be less than significant.

Potable water will be supplied by the WKWD. Potable water will be consumed for drinking and sanitary purposes only. The Project will use a small amount of potable water (approximately 2 acre-foot per year), which is a very small amount of water compared to the overall water usage within WKWD's service area. Therefore, the impact on potable water supplies in the area will be less than significant.

During construction, BMPs will be implemented to minimize the potential for erosion and minimize impacts on off-site areas, including the nearby canals. For portions of the CO<sub>2</sub> pipeline that cross the Outlet Canal, the Kern River Flood Control Channel, and the California Aqueduct, the HDD installation method and appropriate BMPs will be implemented; therefore, the Project's impacts on surface waters will be less than significant.

The Project Site is not located in a designated floodplain. Pipelines that cross floodplain areas will be buried or installed using HDD technology at canal crossings; therefore, there will be no impacts on floodplains.

With implementation of Project design features and proposed mitigation measures, the Project will not result in significant impacts on water resources.

#### 1.4.15 Geologic Hazards and Resources

There are no known active or potentially active faults at the Project Site or crossing the Project linears. The closest known major faults classified as active by the California Geological Survey are the San Andreas Fault, located approximately 21 miles to the west; the White Wolf fault, located approximately 23 miles to the southeast; and the Pleito Thrust, located approximately 27 miles south of the Project Site.

The primary geologic hazards at the Project Site and linear facilities include ground motion from a seismic event centered on one of several nearby active faults and the potential for expansive soils due to high clay content in surface soils.

Project facilities will be designed in accordance with applicable building code seismic design criteria. To reduce the potential for adverse differential settlement beneath heavily loaded settlement-sensitive structures, removal of the susceptible soils and replacement with engineered fill have been recommended for structures constructed on shallow foundations. Settlement design criteria can be provided by a design-level geotechnical investigation.

To reduce the potential for adverse differential settlement beneath heavily loaded structures, landsliding, lateral spreading, and adverse expansion, the removal of the susceptible soils and their replacement with engineered fill have been recommended.

With implementation of Project design features and proposed mitigation measures, the Project will not be adversely impacted by geologic hazards and will not result in significant impacts on geologic resources.

#### **1.4.16 Paleontological Resources**

Project construction could impact paleontological resources within the Quaternary alluvium and the Plio-Pleistocene Tulare Formation. Therefore, mitigation measures will be implemented to reduce potential adverse impacts on paleontological resources resulting from Project construction. The paleontological resources impact mitigation program will reduce direct, indirect, and cumulative adverse environmental impacts on paleontological resources that could result from Project construction to a less-than-significant level. The mitigation measures will allow for the salvage of fossil remains and associated specimen data and corresponding geologic and geographic site data that otherwise might be lost to earth-moving and to unauthorized fossil collecting.

With implementation of Project design features and proposed mitigation measures, the Project will not result in significant impacts on paleontological resources.

### **1.5 PROJECT ALTERNATIVES**

The Project will demonstrate a combination of proven technologies at commercial scale that can provide baseload low-carbon power that is fully consistent with California's expressed clean energy policies. The Project will thus make an essential contribution to California's long-term environmental, economic, and energy security objectives. The Project will play a significant role in California's goal of addressing climate change and leading the world in production of low-carbon energy. The Project and its environmental benefits may be implemented elsewhere in the world in an effort to combat climate change.

As required by CEQA and CEC regulations, this AFC Amendment provides a detailed discussion "on the range of reasonable alternatives to the Project, including the no project alternative which would feasibly attain most of the basic objectives of the project, but would avoid or substantially lessen any of the significant effects of the project, and an evaluation of the

comparative merits of the alternatives.” Similarly, NEPA requires that federal agencies identify and analyze a reasonable range of alternatives, including the no action alternative, prior to approving or taking federal action that could have a significant impact on the environment. NEPA also requires a brief explanation of the reasons for eliminating an alternative from detailed study.

An evaluation of alternative site locations, linear facilities, generating technologies and configurations, and water supply sources is presented. These alternatives were evaluated against the following Project objectives:

- Provide dependable, low-carbon electricity to help meet future power needs and to help “back-up” intermittent renewable power sources, such as wind and solar, to support a reliable power grid.
- Enhance the production and availability in California of nitrogen-based products for use in agricultural, transportation, and industrial applications by producing approximately 1 million tons per year of low-carbon products, including urea, UAN, and anhydrous ammonia.
- Conserve domestic energy supplies and enhance energy security by using abundant solid feedstocks, coal and petcoke, to generate electricity and manufacture low-carbon nitrogen-based products.
- Mitigate impacts related to climate change by dramatically reducing average annual GHG emissions relative to those emitted from a conventional power plant and/or nitrogen-based product manufacturing facility by capturing, at a rate of at least 90 percent, and sequestering CO<sub>2</sub>.
- Use captured CO<sub>2</sub> for enhanced oil recovery (EOR) to produce additional oil reserves.
- Demonstrate advanced solid fuel based technologies that can generate clean, reliable, and affordable electricity in the United States and prove out carbon capture and sequestration as a viable method for reducing the carbon footprint of power generation and manufacturing.
- Facilitate and support the development of hydrogen infrastructure in California by supplementing the quantities of hydrogen available for future energy and transportation technologies.
- Help restore local groundwater quality and enhance agricultural production by using brackish groundwater water that currently threatens local agriculture.
- Minimize environmental impacts associated with the construction and operation of the Project through technology selection, Project design, and implementation of feasible mitigation measures, where necessary.
- Site the Project at a location over which HECA LLC will have control, and which offers reasonable access to necessary infrastructure, including natural gas, process water supply,

transmission and rail interconnection, and geologic formations appropriate for CO<sub>2</sub> EOR and sequestration.

- Ensure the economic viability of the Project by integrating electricity production with the manufacture of multiple products to meet market demand.
- Meet all requirements necessary to secure and retain U.S. Department of Energy funding for the Project.

Furthermore, the Purpose and Need of the Proposed Action (i.e., providing limited financial assistance to the Project) is to advance the CCPI objectives as established by Congress: the commercialization of clean coal technologies that advance efficiency, environmental performance, and cost competitiveness well beyond the level of technologies that are currently in commercial service.

The Applicant also used the following additional site evaluation criteria:

- Environmental impacts
- Safety (proximity to residents, schools, daycare 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 carbon dioxide customer for CO<sub>2</sub> EOR and Sequestration
- Minimize impacts on transportation corridors
- Feasibility of land acquisition
- Proximity to infrastructure to minimize impacts from Site access and linear facilities
- Proximity to raw water supply.

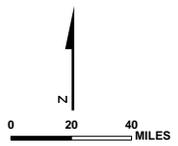
The Applicant has also assessed the “No Project/No Action Alternative.” The details of this analysis are provided in Section 6.0, Alternatives.

In all cases assessed, the Project as presented in this Amended AFC represents the least impact on the environment and the most benefit to the California economy, the best technology to promote California’s GHG and climate change policies, and support the United States’ and California’s goal of energy independence.

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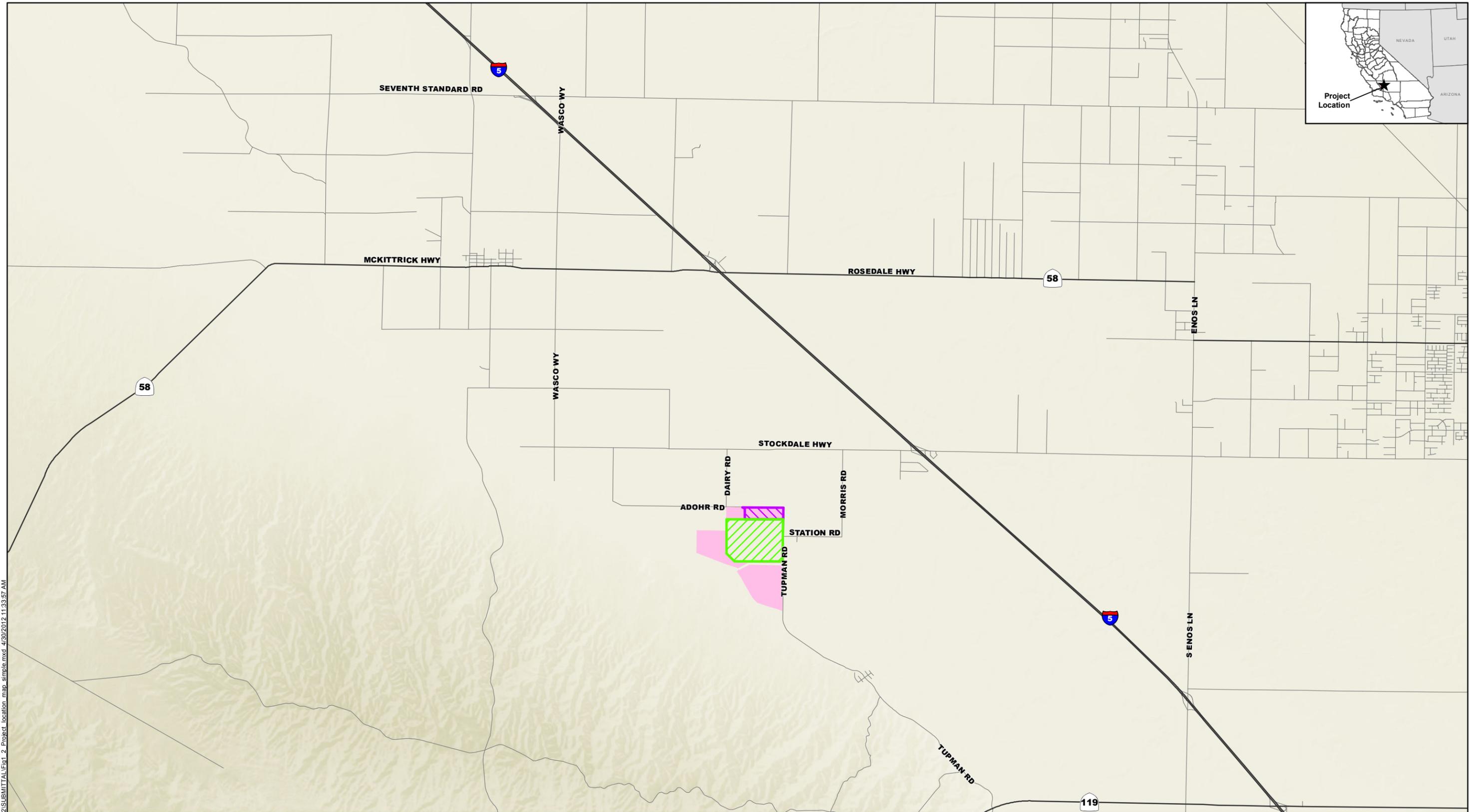
- Major Cities
- Major Highways
- State Boundaries
- County Boundaries



**PROJECT VICINITY MAP**

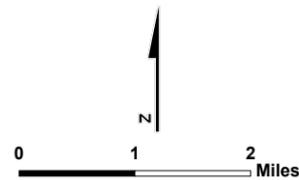
April 2012    Hydrogen Energy California (HECA)  
 28068052    Kern County, California

**URS**    **FIGURE 1-1**



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- Project Site
- Construction Staging Area
- Controlled Area



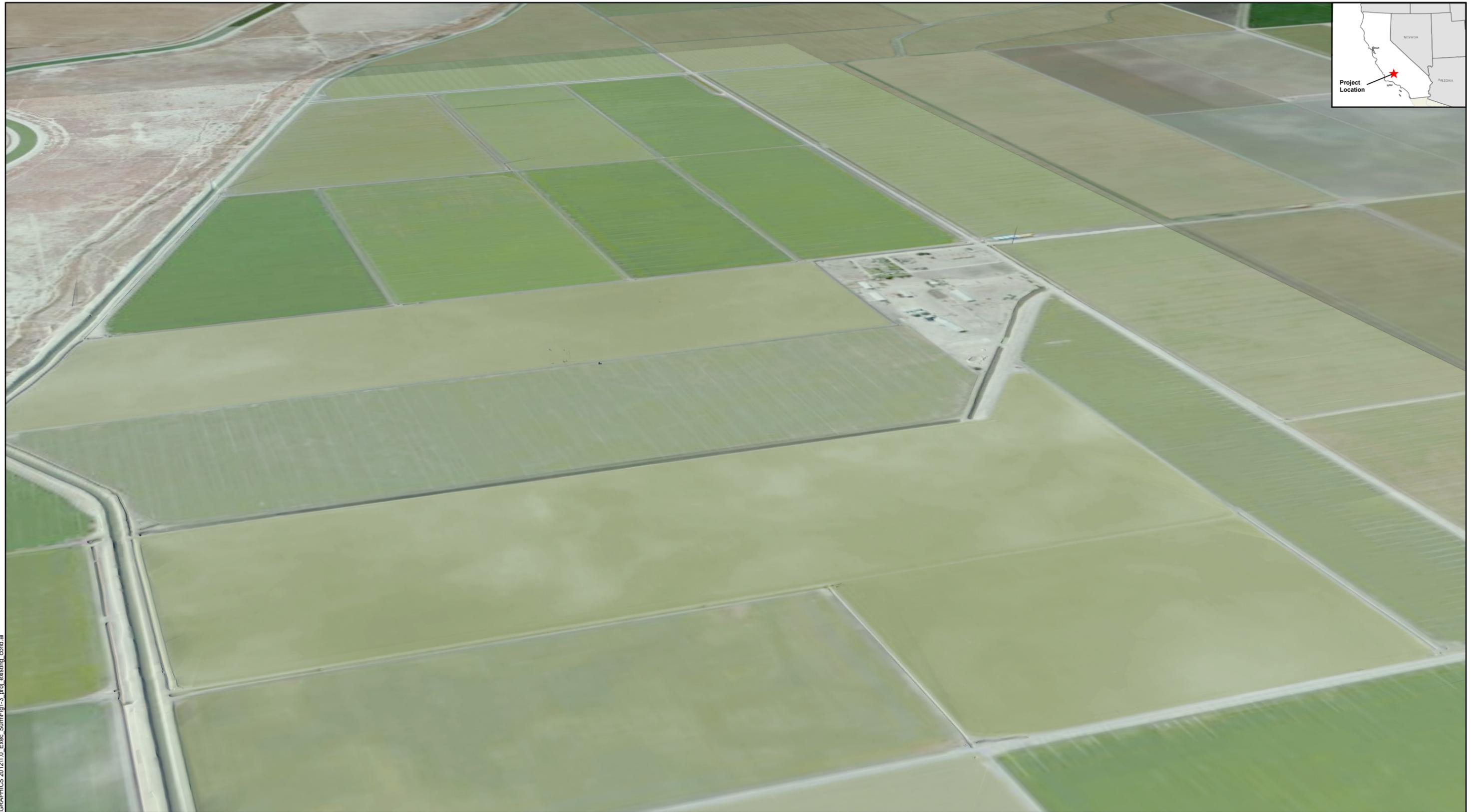
**PROJECT LOCATION MAP**

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 Kern County, California



**FIGURE 1-2**

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



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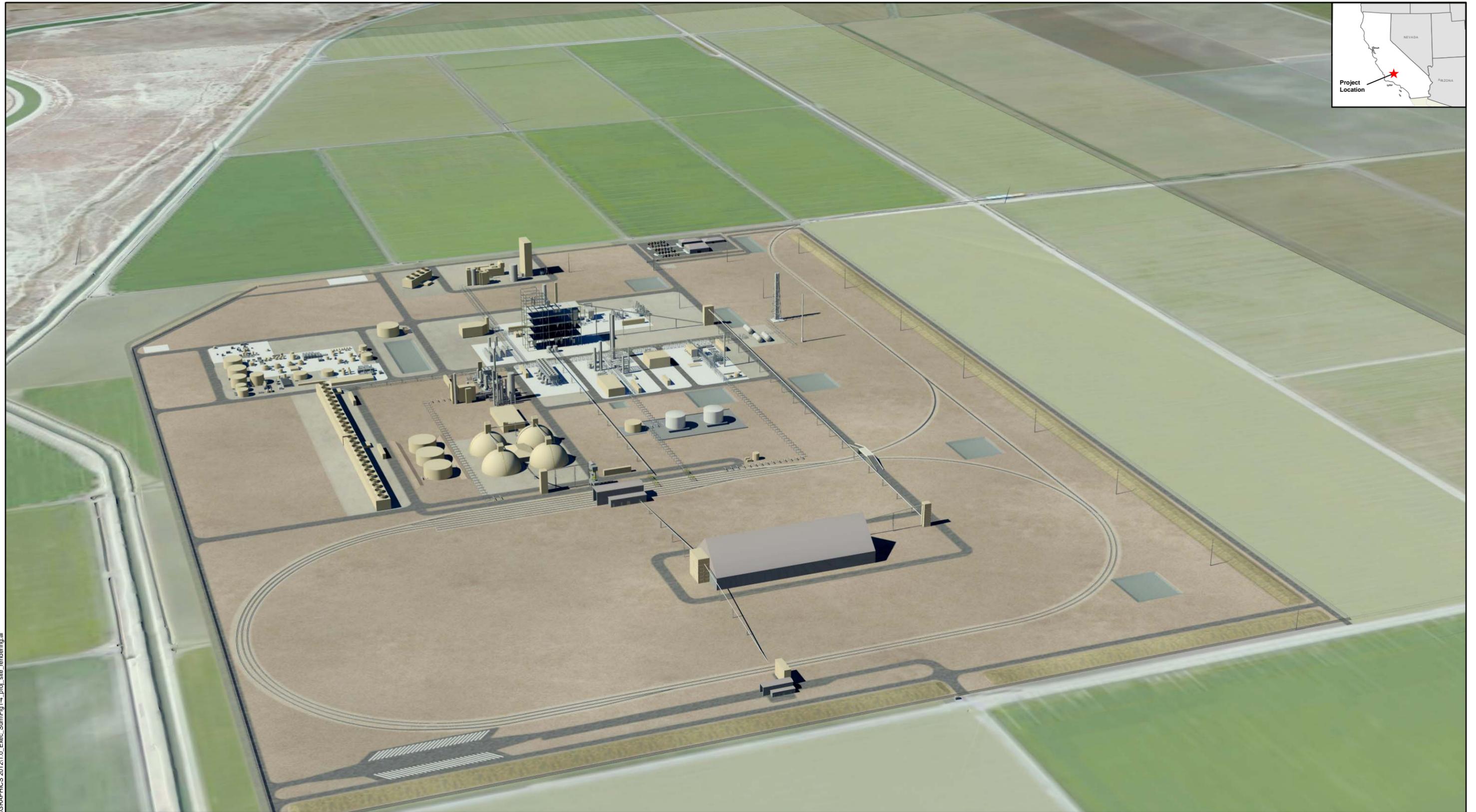
**PROJECT SITE: EXISTING CONDITIONS**

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**FIGURE 1-3**



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**PROJECT SITE: PROJECT RENDERING**

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**FIGURE 1-4**