KERN FAN GROUNDWATER STORAGE PROJECT

Draft Environmental Impact Report – Appendices

Prepared for
Groundwater Banking Joint Powers Authority:
Rosedale-Rio Bravo Water Storage District and
Irvine Ranch Water District

October 2020

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October 2020

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TABLE OF CONTENTS

Kern Fan Groundwater Storage Project
Draft Environmental Impact Report – Appendices

Appendices

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Appendix A

Public Scoping

ESA

ESA 50 YEARS 1969-2019

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Scoping Summary

date	September 11, 2020
to	Dan Bartel, Assistant General Manager/District Engineer, Rosedale-Rio Bravo Water Storage District Jo Ann Corey, Environmental Compliance Specialist, Irvine Ranch Water District Kellie Welch, Water Resources Manager, Irvine Ranch Water District
from	Jennifer Jacobus, CEQA Project Manager, ESA
subject	Kern Fan Groundwater Storage Project California Environmental Quality Act Public Scoping Summary

Introduction

The Authority is proposing to implement the Kern Fan Groundwater Storage Project (proposed project) in western Kern County. The proposed project would involve the construction and operation of water conveyance, recharge and recovery facilities. The proposed recharge and recovery facilities would be constructed in two phases on approximately 1,300 acres of agricultural or vacant land within or near the Rosedale service area. The proposed project would also involve the acquisition of easements for construction, operation and maintenance of proposed Kern Fan Conveyance Facilities that would deliver water to and from the California Aqueduct. Implementation of the proposed facilities would allow the Authority to more effectively manage existing sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin.

Notice of Preparation

The Notice of Preparation (NOP) was prepared pursuant to Section 15082 of the California Environmental Quality Act (CEQA) Guidelines, to notify interested parties that Rosedale and IRWD will be preparing an Environmental Impact Report (EIR) to evaluate potential environmental impacts of the proposed project (see Attachment 1). The NOP was mailed on April 8, 2020 to interested parties, including local, state, and federal agencies; local tribes; and other groups or individuals who had previously expressed interest in the project. The NOP also was posted by the County Clerk in Kern and Orange Counties. A Notice of Completion (NOC) was also prepared by the Authority and sent to the State Clearinghouse. The proposed project was given a State Clearinghouse number of SCH# 2020049019, and the project information was posted in the CEQAnet Database. Copies of the NOP were made available for public review online at Rosedale and IRWD Websites at the following locations:

- https://www.rrbwsd.com/newsletter-notices
- https://www.irwd.com/doing-business/environmental-documents

Scoping Period

The 45-day project scoping period began with the distribution of the NOP on April 8, 2020 and remained open through May 8, 2020 at 4:00 p.m. During the scoping period, one virtual scoping meeting was held on April 29, 2020 via Zoom. Public notices of the virtual scoping meeting were placed in the Orange County Register and Bakersfield Californian newspapers. Public notices of the scoping meeting were also mailed directly to relevant state, Federal, regional and local agencies.

At the scoping meeting, ESA gave a presentation on the proposed project and the CEQA process. Including ESA and Authority staff, approximately 24 meeting participants attended the virtual scoping meeting. The Zoom Chat function was available for participants to ask questions or comment. There were no written comments received in the Zoom Chat during the meeting. Participant questions pertained to the locations of the recharge and recovery facilities and the location of the Aqueduct turnout.

Comments

During the scoping period, the Authority received a total of eight comment letters on the proposed project via mail and e-mail. Table 1 below includes a list of the agencies and individuals that submitted comments during the 30-day project scoping period. CEQA does not require the Authority to formally respond to these comments, but rather to consider these comments during preparation of the EIR.

TABLE 1
LIST OF COMMENTERS

Commenter	Date Received (2020)
Native American Heritage Commission	April 9
Dudley Ridge Water District	April 24
Department of Toxic Substance Control	April 27
California Department of Fish and Wildlife	May 7
City of Bakersfield	May 8
Kern County Water agency	May 8
California Department of Water Resources	May 8
Kern Water Bank Authority	May 8

List of Attachments

This Scoping Summary contains documents pertinent to the scoping process. The following items are included:

- Notice of Preparation
- Notice of Completion
- Public Notice of Scoping Meeting
- Comment Letters Received by the Authority

NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT

DATE: April 8, 2020

TO: Responsible and Trustee Agencies and Interested Parties

SUBJECT: Notice of Preparation of an Environmental Impact Report

PROJECT: Kern Fan Groundwater Storage Project

LEAD AGENCY: Rosedale-Rio Bravo Water Storage District

This Notice of Preparation (NOP) has been prepared to notify agencies and interested parties about the initiation of a California Environmental Quality Act (CEQA) review for the Kern Fan Groundwater Storage Project ("proposed Project") that Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) will jointly carry out through the Groundwater Banking Joint Powers Authority (Authority). Pursuant to CEQA Guidelines section 15051(d), Rosedale will serve as the Lead Agency for the preparation of an Environmental Impact Report (EIR) until the Authority is formed. Rosedale and IRWD have agreed that Rosedale will perform the lead agency role until the Authority is formed, and the Authority will assume the role thereafter. In addition, the EIR will be prepared in accordance with the CEQA-Plus requirements of the U.S. Environmental Protection Agency, to fulfill the requirement of potential federal funding partners to comply with the National Environmental Policy Act (NEPA).

The proposed Project would allow Rosedale and IRWD to more effectively manage sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop a water bank and associated water conveyance facilities in the Kern Fan area of Kern County, California (**Figure 1**). The proposed Project would recharge, store, recover, and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and provide supply reliability for agricultural, municipal and industrial uses. The proposed Project would include construction and operation of water conveyance water recharge and recovery facilities.

PROJECT LOCATION: Rosedale and IRWD would partner to implement the proposed Project through the agreements set forth by the Authority. Up to 1,300 acres of land would be acquired for the proposed Project within or near Rosedale's service area in western Kern County for the construction and operation of the proposed Project. The proposed Project would also involve the acquisition of easements for construction, operation and maintenance of the new Kern Fan Conveyance Facilities that would deliver water to and from the California Aqueduct.

PUBLIC REVIEW AND COMMENTS: Rosedale is soliciting comments from responsible and trustee agencies as well as interested parties as to the scope and content of the environmental information to be included in the EIR. In accordance with CEQA, agencies are requested to review the proposed Project description provided in this NOP (see Attachment A) and to provide comments on environmental issues related to the statutory responsibilities of each responsible or trustee agency. The EIR may be used by Rosedale, IRWD and the Authority when considering approval of the proposed Project as well as any related discretionary approvals.

COMMENT PERIOD: In accordance with the time limits mandated by CEQA, comments on the NOP must be received no later than 30 days after publication of this notice. Please send your comments to the contact person shown below, by 4:00 p.m. on May 8, 2020. Please include a return address and contact name with your comments.

Contact:	Eric Averett General Manager Rosedale-Rio Bravo Water Storage District P.O. Box 20820 Bakersfield, CA 93390-0820
Telephone:	(661) 589-6045
Email:	eaverett@rrbwsd.com

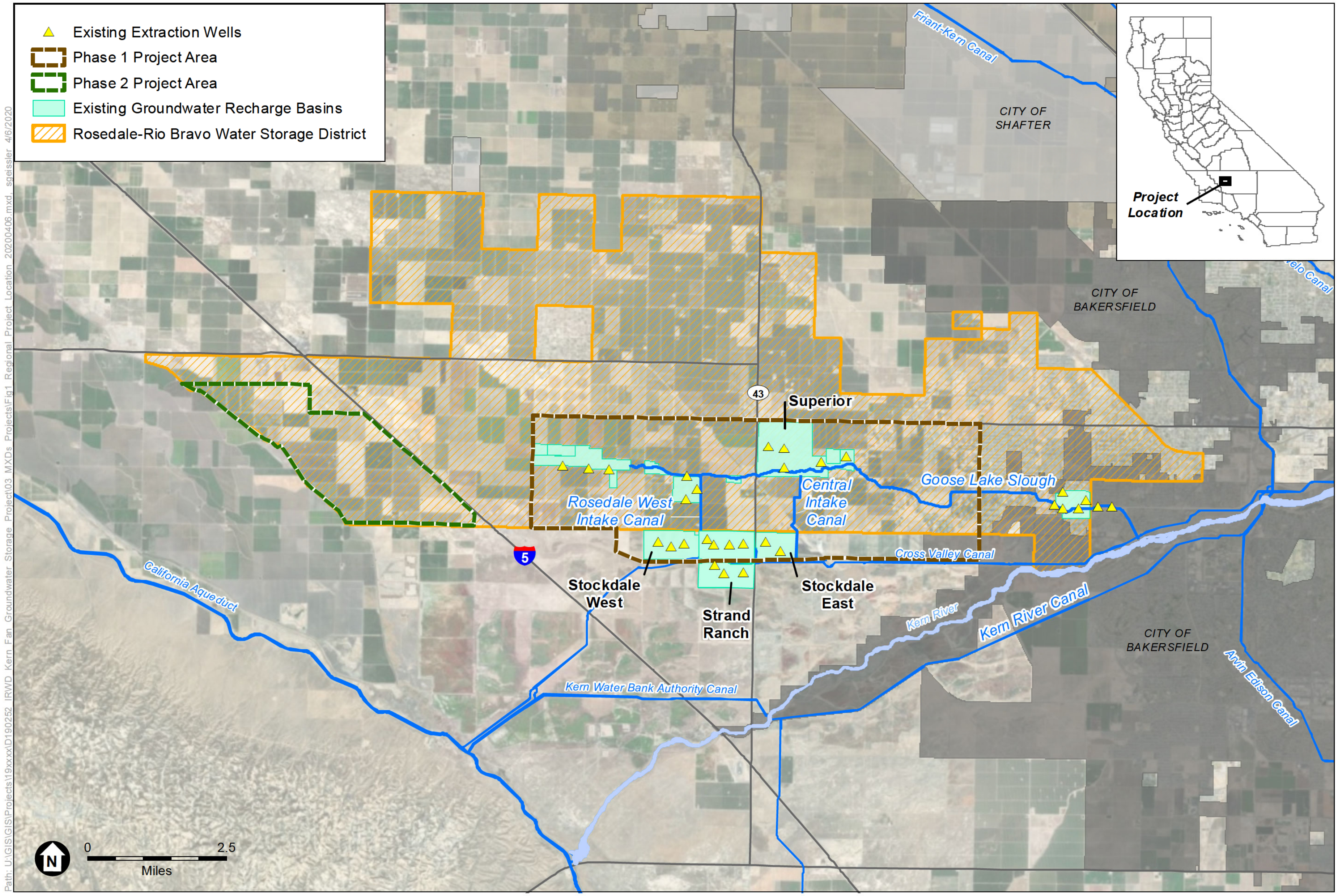
DOCUMENT AVAILABILITY: The NOP may be downloaded from the Rosedale and IRWD Websites at the following locations:

- https://www.rrbwsd.com/newsletter-notices
- https://www.irwd.com/doing-business/environmental-documents

SCOPING MEETINGS: One public meeting will be conducted virtually utilizing Zoom and telephonically to receive comments and suggestions concerning the issues to be included in the EIR. The scoping meeting will include a brief presentation, providing an overview of the proposed Project. After the presentation, public comments will be accepted orally. Written comments also may be submitted anytime during the 30-day NOP review period ending at 4:00 p.m. on May 8, 2020. The scoping meeting will be held as follows:

Virtual Scoping Meeting Details

Date:	April 29, 2020
Time:	9:00 AM
Zoom:	https://zoom.us/join
Telephone Dial-in:	(669) 900-6833
Meeting ID:	646 423 721
Meeting Password:	447 319
Submit Written Comments to:	Eric Averett General Manager Rosedale-Rio Bravo Water Storage District P.O. Box 20820, Bakersfield, CA 93390-0820 eaverett@rrbwsd.com



SOURCE: ESRI; Kern County

Kern Fan Groundwater Storage Project

Figure 1
Regional Project Location

ESA

ATTACHMENT A
Kern Fan Groundwater Storage Project

1. Introduction

This Notice of Preparation (NOP) initiates California Environmental Quality Act (CEQA) review for the Kern Fan Groundwater Storage Project ("proposed Project") that Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) propose to jointly carry out through the Groundwater Banking Joint Powers Authority (Authority). Pursuant to CEQA Guidelines section 15051(d), until the Authority is formed, Rosedale will serve as the Lead Agency under CEQA for the preparation of an Environmental Impact Report (EIR). Rosedale and IRWD have agreed that Rosedale will perform the lead agency role until the Authority is formed, and the Authority will assume the role thereafter. In addition, the EIR will be prepared in accordance with the CEQA-Plus requirements of the U.S. Environmental Protection Agency, to fulfill the requirement of potential federal funding partners to comply with the National Environmental Policy Act (NEPA).

The proposed Project would allow Rosedale and IRWD to more effectively manage sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop water recharge and recovery facilities in the Kern Fan area of Kern County, California (Figure 1). The proposed Project would recharge, store, recover and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and supply reliability benefits for agricultural, and municipal and industrial (M&I) uses. The proposed Project would involve the construction and operation of water conveyance, recharge and recovery facilities.

2. Project Background

Rosedale-Rio Bravo Water Storage District

Rosedale is located west of Bakersfield and encompasses approximately 44,150 acres in Kern County, with 27,500 acres developed as irrigated agriculture and approximately 7,500 acres developed for urban uses. Rosedale's service area overlies the Kern County Sub-basin ("sub-basin") of the larger San Joaquin Valley Groundwater Basin, and was established in 1959 to develop a groundwater recharge program to offset overdraft conditions in the underlying sub-basin. Rosedale currently manages more than 500,000 acre-feet (AF) of stored water in the underlying sub-basin, which has an estimated total storage capacity in excess of 1.7 million AF. Water supplies for Rosedale's programs, including its Conjunctive Use Program, are provided by participating water agencies and include high-flow Kern River water and supplies from the Central Valley Project (CVP) and SWP. Currently, the infrastructure for Rosedale's programs includes over 1,000 acres of recharge basins and several recovery wells (Figure 1). The Conjunctive Use Program and other Rosedale programs provide a maximum annual recharge of more than 250,000 acre-feet per year (AFY), maximum annual recovery of more than 60,000 AFY, and underground storage of more than 1,000,000 AF.

Irvine Ranch Water District

IRWD was established in 1961 as a California Water District pursuant to the California Water District Law (California Water Code, Division 13). IRWD provides drinking water, sewage collection and treatment, recycled water and urban runoff treatment to approximately 422,000 residents encompassing 181 square miles in central Orange County. IRWD has a diverse water supply that includes local groundwater, recycled water, imported water, local surface water, and water banking facilities. Approximately 54 percent of the IRWD water supply comes from 26 local groundwater wells; 18 percent is imported from the Metropolitan Water District of Southern California; and 26 percent from recycled water.

IRWD currently participates in Rosedale’s Conjunctive Use Program through IRWD's Strand Ranch Integrated Banking Project and Stockdale Integrated Banking Project (Stockdale Project) (Figure 1).

State Water Project

The California Department of Water Resources (DWR) delivers water to 29 SWP contractors through the California Aqueduct, including 21 contractors located south of the Sacramento-San Joaquin River Delta. The SWP Water Supply Contract for each contractor includes a "Table A” amount specifying the maximum amount of SWP water that can be requested for delivery each year. DWR's initial Table A water allocation in early winter typically is adjusted through spring to reflect the evolving variable conditions affecting water availability. Rosedale currently receives SWP Table A water through a water supply contract with Kern County Water Agency, an SWP contractor. IRWD is a landowner in the Dudley Ridge Water District, which is also an SWP contractor.

In addition to allocating Table A water, DWR periodically makes water supplies available under Article 21of the SWP contracts. “Article 21” states that DWR will offer to sell and deliver water during a year in which a surplus is available. The proposed Project would increase Kern County’s ability to capture, store and reregulate Article 21 water for beneficial use. In certain circumstances, when the amount of Article 21 water is greater than existing SWP contractor demands (“unallocated”), the proposed Project would increase the overall water within the SWP system, reduce the loss of water to the ocean, and provide ecosystem benefits in accordance with the proposed Project’s funding conditions.

Previous CEQA Documentation

An EIR was prepared, certified, and approved by Rosedale and IRWD in December 2015 for the Stockdale Project. The EIR evaluated the Stockdale East and Stockdale West recharge and recovery sites (Figure 1), and a potential third project site (collectively Stockdale Properties) that would be located within the vicinity of both east and west properties. Because the location of the third project site had not been identified, a program level analysis of impacts was provided in the EIR. All or a portion of the third project site analyzed at a program level in the Stockdale Project's EIR may be designated as Phase 1 under the proposed Project. Phase 2 of the proposed Project would involve construction and operation of additional recharge and recovery facilities within or near the Rosedale service area.

3. Project Objectives

The objectives of the proposed Project are as follows:

- Capture, recharge and store water from the SWP, and other available water supplies for later use.
- Provide ecosystem public benefits, emergency water supply public benefits during extended droughts or a Delta levee failure, and water supply benefits for agricultural and M&I uses.
- Provide operating flexibility for Rosedale’s existing and future conjunctive use programs.
- Assist in achieving groundwater sustainability within the Kern County Sub-basin of the San Joaquin Valley Groundwater Basin through implementation of projects consistent with California Executive Order N-10-19 directing state agencies to develop a “water resilience portfolio.”
- Provide Rosedale and IRWD customers and partners with increased water supply reliability during periods when other supply sources may be reduced or interrupted.

4. Purpose and Need for the Project

California has a Mediterranean climate with a highly variable precipitation and hydrology regime; typically, each year includes a winter wet season when water demand is lowest and a summer dry season when water demand is highest. The result of a highly-variable hydrologic regime is the periodic availability of surface water supplies that exceed demands but cannot be utilized due to insufficient storage capacity. Additionally, during dry years and extreme drought conditions, there are insufficient water supplies to meet demands. To improve availability and reliability of water supplies, additional capture and storage is needed for sustainable water supply management in California. The purpose of the proposed Project is to increase the reliability of water supplies during dry years by capturing and storing surplus surface water that would otherwise be lost.

The proposed Project has received a conditional award of funding through the California Water Commission’s Water Storage Investment Program (WSIP). The WSIP is funded by the Proposition 1 Water Quality, Supply and Infrastructure Act of 2014. The purpose of the WSIP is to fund water storage projects that provide public benefits, improve operation of the state water system, and provide a net improvement in ecosystem and water quality conditions. The proposed Project was analyzed in the Storage Integration Study (2017) prepared by the Association of California Water Agencies. This study defined and quantified the benefits of integrating the operation of new storage projects with existing SWP and CVP operations to help fulfill statewide water supply needs and priorities. Eight projects were described in this study that could provide such benefits, including the proposed Project.

There is approximately 1.7 million AF of storage within the aquifer underlying the Rosedale service area. The purpose of the proposed Project is to augment the recharge, storage, and extraction capabilities of existing programs and provide greater operational flexibility to Rosedale. By storing additional surface water underground in Kern County, the proposed Project would benefit groundwater levels in the Kern County Sub-basin and help support groundwater sustainability efforts required by the Sustainable Groundwater Management Act. In addition, the proposed Project would enhance water supply reliability for IRWD and its partners by augmenting supplies for periods when other sources may be limited or unavailable.

The proposed Project is consistent with water management goals of California. In its Water Resiliency Portfolio (2020), the State renewed its commitment to integrated water management as a means to provide reliable, sustainable and secure water resources and management systems, which includes improving water supply reliability, reducing groundwater overdraft and land subsidence, and protecting water quality and environmental conditions.

5. Project Location

The proposed Project would be located in western Kern County, west of the City of Bakersfield. The proposed recharge and recovery facilities would be constructed in two phases on approximately 1,300 acres of agricultural or vacant land within or near the Rosedale service area (Figure 1).

6. Project Description

The proposed Project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. The Kern Fan Conveyance Facilities would consist of pipelines, pump stations and a new turnout at the California Aqueduct to convey water between the project facilities and the California Aqueduct. Water stored by the proposed Project would be recovered when needed to provide ecosystem and water supply benefits.

The proposed Project would be operated such that surplus surface water from the SWP and other available water sources would be recharged and stored for subsequent recovery. It is estimated that the Project would be able to recharge and store approximately 100,000 AFY. Project capacities are to be allocated as follows:

Up to 25 percent, or up to 25,000 AF, of the “unallocated” Article 21 water would be stored for DWR in an “Ecosystem Account.” Through the implementation of 1-for-1 exchanges, the water stored in the Ecosystem Account would be used by the State of California to alleviate stress on endangered and threatened species in the Sacramento-San Joaquin River Delta during critically dry years.

The remaining 75,000 AF of storage capacity would be divided equally, with 37,500 AF of storage capacity allocated to Rosedale and 37,500 AF of storage capacity allocated to IRWD. Rosedale and IRWD would use the water recharged in their respective accounts for agriculture and M&I uses, improving water supply reliability during droughts and emergencies.

The proposed Project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the project area (Figure 1). Water could be conveyed to and from the Phase 1 and 2 properties through existing facilities and a new turnout and conveyance system (Kern Fan Conveyance Facilities) connecting to the California Aqueduct. Project operations would be coordinated with Rosedale's Conjunctive Use Program. The following sections describe the proposed facilities.

Recharge Facilities

The proposed Project would include the construction of recharge basins of varying shape, size and depth within approximately 1,300 acres. Basins would be formed by excavating and contouring existing soils to form earthen berms. Typical basin berms would be approximately 3 to 6 feet above ground.

Dirt roads approximately 14 to 20 feet wide would run along the perimeter of and in between all basins to provide access to facilities during operation and maintenance activities. Surface water would be delivered to the basins for recharge through the new Kern Fan Conveyance Facilities, and the basins would be connected by check structures to allow recharge water to flow by gravity among basins. The basins would be managed to allow agricultural land uses (e.g., annual farming or grazing) to continue when the basins are empty.

Recharge Water Supplies

The proposed Project would receive, recharge and store SWP Article 21 water, which is a surplus supply managed by DWR, as described above. Other water supplies also may be secured and acquired by Rosedale and IRWD from various sources, that may include federal, state, and local supplies through transfers, balanced and unbalanced water exchange agreements, water purchases or temporary transfers, or other available means. Sources may also include supplies from the CVP, and high-flow Kern River water depending on annual hydrologic availability, water rights and regulatory considerations.

Recovery Facilities

The proposed Project would construct up to 12 extraction wells, with an anticipated annual recovery capacity of up to 50,000 AF. Each well would be designed to pump groundwater at a recovery rate of approximately 5 to 6 cubic feet per second (cfs). Actual recovery rates for each well may be slightly more or less based on aquifer conditions at each well site. If higher production is achieved for the first few wells installed, fewer wells may be needed. Additionally, if any agricultural wells exist on the recharge basin sites, these could potentially be used as production wells or monitoring wells. The proposed recovery facilities would be designed and located to minimize potential effects on wells pumping on adjacent properties, similar to the wells constructed for the Stockdale Project.

Conveyance Facilities

The proposed Project includes a new turnout, additional canals and pipelines, and pump stations (collectively the "Kern Fan Conveyance Facilities") to convey water to and from the California Aqueduct and proposed recharge and recovery facilities. The exact locations of the new conveyance facilities have not yet been determined but would have up to 500 cfs of conveyance capacity. Subject to necessary approvals, water could be conveyed through the SWP, Friant-Kern Canal or the Kern River by exchange through the Goose Lake Channel, or from the Cross Valley Canal (CVC) through the Rosedale Intake Canal.

Groundwater recovered from the Project extraction wells would be conveyed through new pipelines that would be below ground, running along the dirt roads between the recharge basins or buried in the basin bottoms, with exact locations subject to final well placement, similar to existing facilities constructed by Rosedale and IRWD for the Stockdale Project. The recovery pipelines would connect to the new Kern Fan Conveyance Facilities or could connect to the CVC via existing conveyance facilities.

7. Discussion of Environmental Effects

In accordance with Section 15126 of the CEQA Guidelines, the EIR will assess the physical changes to the environment that will likely result from construction and operation of the proposed Project, including direct, indirect and cumulative effects and growth-inducing effects. The EIR will assess the significance of any adverse physical effects from facilities and activities associated with construction and operation of the proposed Project (CEQA Guidelines Section 15161). Recovery operations for the Project will be analyzed at a programmatic level (CEQA Guidelines Section 15168); other Project elements will be analyzed at a project level (CEQA Guidelines Section 15161). The EIR will identify any feasible mitigation measures if necessary to avoid or reduce any significant adverse effects of the proposed Project. The EIR also will assess a no-project alternative and will evaluate a reasonable range of feasible alternatives to the proposed Project, if such alternatives were needed to avoid or reduce any significant adverse effects of the proposed Project. Potential adverse physical effects of the proposed Project are summarized below.

Aesthetics

The existing aesthetic quality of the proposed Project area is dominated by rural agriculture. The proposed Project would alter the visual character of the project sites and their surroundings by converting agricultural land uses to recharge basins and conveyance facilities. The recharge basins would be managed to allow agricultural land uses to continue, such as annual farming or grazing. The EIR will evaluate the potential for the proposed Project to adversely affect aesthetic resources, including visual character and quality, scenic vistas, and new sources of light and glare.

Agriculture and Forestry Resources

The proposed Project would increase the amount and reliability of groundwater supplies available for irrigated agriculture in the region and contribute beneficially to agricultural production. When not being used for groundwater recharge, the proposed recharge facilities could be managed to allow agricultural land uses to continue, such as annual farming or grazing. The EIR will assess whether the proposed Project would adversely affect agriculture and forestry resources, including determining whether the proposed Project would be located on lands designated by the state's Farmland Mapping and Monitoring Program as Prime, Unique, or Important Farmland and if the

Project sites would be located within Kern County agricultural preserves or under Williamson Act contracts. The proposed Project is not located in a forest and would not affect forestry resources.

Air Quality

Construction of the proposed Project would generate emissions from construction equipment exhaust, earth movement, construction workers' commute, and material hauling. The EIR will estimate construction-related emissions as well as long-term operational emissions of the proposed Project. The EIR will also evaluate the proposed Project's consistency with the regional air quality attainment plans. The EIR will develop mitigation measures, if necessary, to reduce impacts associated with the Project.

Biological Resources

The proposed Project would be located on and surrounded by agricultural lands. The EIR will evaluate the potential for the proposed Project to affect biological resources, such as sensitive species and critical habitats, and will evaluate the project's consistency with the Metropolitan Bakersfield Habitat Conservation Plan (HCP), Kern Water Bank HCP, local ordinances, and state and federal regulations governing biological resources. The EIR will also describe how proposed Project operations could provide benefits to threatened and endangered fish species in the Delta, as well as benefits to wetland habitat and wildlife in the Kern Fan area.

Cultural Resources

Although the proposed Project would be located in disturbed areas primarily developed or used for agricultural production, excavation below the top soil for recharge, recovery, or conveyance facilities could uncover previously unknown archaeological resources. Historic resources also exist in the area and may be affected by the proposed Project. The EIR will assess the potential effects of the proposed Project on cultural resources.

Energy

Construction and operation of the proposed Project would result in the consumption of energy resources. The EIR will identify potential effects to local and regional energy supplies and capacity due to construction involving fuels and operation of recovery wells, pumps, and other related infrastructure, which would require energy.

Geology and Soils

The proposed Project is located in a seismically active region. New facilities could be subject to potential seismic hazards including ground shaking. In addition, ground-disturbing construction activities could expose soils to storm water erosion and could uncover previously unknown paleontological resources. The EIR will evaluate geologic hazards and identify known paleontological resources in the region.

Greenhouse Gas Emissions

Construction activities would require operation of equipment and vehicles that emit greenhouse gases (GHGs). The proposed Project facilities would use electric power and potentially other sources of energy, the generation or use of which produces GHGs. The EIR will quantify GHG emissions associated with proposed Project construction and operation in terms of carbon dioxide equivalent (CO2e) emissions and compare Project emissions to regional thresholds of significance. The analysis will consider the collective size of proposed Project facilities with respect to levels of CO2e emissions and the energy efficiency parameters of the proposed Project.

Hazards and Hazardous Materials

Construction of proposed Project facilities would require excavation of the existing ground surface, which could uncover contaminated soils or hazardous substances that pose a substantial hazard to human health or the environment. The EIR will assess the potential for encountering hazardous materials and conditions. The EIR also will assess the potential for the public or the environment to be affected by accidental release of hazardous materials due to proposed Project construction and operation. Groundwater recharge and recovery operations could mobilize existing soil contamination known to exist within the region. The EIR will assess the potential for proposed Project operations to affect the location of contamination plumes and groundwater quality.

Hydrology and Water Quality

The EIR will identify surface water and groundwater resources in the vicinity of the proposed Project and will evaluate potential adverse effects from construction and operation of the proposed facilities. The EIR will describe the recharge and storage capacities of the proposed Project and summarize the potential impacts of proposed groundwater recharge operations on groundwater levels and water quality. A calibrated groundwater model will be used to evaluate impacts associated with recharge operations.

The EIR will include a program-level analysis of the effects associated with operation of the proposed recovery facilities. The EIR will describe the site-specific analysis that will be required once the locations for recovery facilities are ultimately determined, as well as the calibrated groundwater model that will be used to perform and evaluate the project-level impacts associated with the recovery operations.

Cumulative effects of operating the proposed Project will include an assessment of incremental effects to groundwater due to coordinated operation of the proposed Project with Rosedale's existing programs and any other neighboring groundwater recharge or recovery facilities. In addition, the EIR also will describe potential effects associated with storm water runoff and will assess whether construction and operation of the proposed Project will meet regulatory requirements affecting storm water and avoid significant adverse effects to receiving waters.

Land Use

The proposed Project would be located in a rural area of Kern County. The EIR will identify the designated land uses and will evaluate consistency of the proposed Project with existing land uses within the Project area.

Mineral Resources

Petroleum resources and oil production facilities are present in the western portion of Kern County. The EIR will assess effects on mineral resources from implementation of the proposed Project.

Noise

Implementation of the proposed Project would include temporary construction work and ongoing Project operations that generate noise and vibration that could affect nearby residents and other sensitive receptors. The EIR will describe the local noise policies and ordinances. The EIR will assess the significance of noise effects, including quantifying potential noise and vibration levels associated with equipment used to construct and operate the proposed Project in comparison to standards and thresholds established in local noise policies and ordinances.

Population and Housing/Growth

The proposed Project does not include the construction of new housing. As such, the proposed Project would not directly induce population growth. Nevertheless, the EIR will analyze the Project's potential to induce indirect population growth due to the recharge, storage and extraction of surface water stored underground.

Public Services

The proposed Project would construct new water facilities for water recharge, storage, recovery and conveyance and is unlikely to affect demand for other public services or to require other new or expanded public facilities. The EIR will assess the potential for the proposed Project to affect police and fire protection services, schools and parks.

Recreation

The EIR will identify existing recreational areas within the Project area and will analyze potential effects to existing local recreational resources.

Transportation

Construction of the proposed Project would temporarily add additional vehicle trips to local transportation corridors, including material haul trips and construction worker commutes. The EIR will evaluate the effect of the proposed Project on traffic and circulation in the vicinity of the Project site and local and regional roadways.

Tribal Cultural Resources

Both Rosedale and IRWD regularly conduct Assembly Bill (AB) 52 consultation with local area tribes, and tribes will be solicited for information about tribal cultural resources that may be affected by the proposed Project. There is a potential for the proposed Project to affect tribal cultural resources during ground-disturbing activities associated with construction of the proposed Project. The EIR will evaluate potential effects to tribal cultural resources and incorporate the results of any AB 52 consultations into the analysis.

Utilities and Service Systems

The EIR will evaluate whether construction and operation of the proposed Project could result in effects to existing public utilities, such as water or sewage treatment, storm water drainage, and solid waste disposal. Construction and operation of the proposed Project could interfere with electricity systems and other linear utilities, which will be analyzed in the EIR. The EIR also will describe any potential effects on storm water drainage systems and solid waste facilities, including regional landfill capacities and availability to accept construction debris.

Wildfire

The EIR will identify that the proposed Project is located within an agricultural area west of Bakersfield, and is not located within a State Responsibility Area that manages fire hazard severity zones.

Notice of Completion & Environmental Document Transmittal

Mail to: State Clearinghouse, P. O. Box 3044, Sacramento, CA 95812-3044 (916) 445-0613
For Hand Delivery/Street Address: 1400 Tenth Street, Sacramento, CA 95814

SCH # 2020049019

Project Title: Kern Fan Groundwater Storage Project
Lead Agency: Rosedale-Rio Bravo Water Storage District — Contact Person: Eric Averett
Mailing Address: P.O. Box 20820 — Phone: (661) 589-6045
City: Bakersfield, CA — Zip: 93390-0820 — County: Kern

Project Location: County: Kern — City/Nearest Community: Rosedale, CA
Cross Streets: Stockdale Hwy and Enos Lane (Hwy 43) — Zip Code: 93314
Lat. / Long. (degrees, minutes, and seconds): ° 35°21'16" N/ 119°15'8" W — Total Acres: up to 1,280
Assessor's Parcel No.: ______ Section: ______ Twp.: ______ Range: ______ Base: ______
Within 2 Miles: State Hwy #: I-5, 43, 58, 119, 99, 65 — Waterways: Kern River, Rosedale West Intake Canal, Central Intake Canal, Cross Valley Canal, Goose Lake Slough, California Aqueduct — Airports ______ — Railways: San Joaquin Valley Railroad
Schools: Rio Bravo Elementary, Greeley School, Centennial Elementary, Del Rio Elementary

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Document Type:

CEQA: ☒ NOP ☐ Early Cons ☐ Neg Dec ☐ Mit Neg Dec ☐ Draft EIR ☐ Supplement/Subsequent EIR (Prior SCH No.) ______ Other ______

NEPA: ☐ NOI ☐ EA ☐ Draft EIS ☐ FONSI

Other: ☐ Joint Document ☐ Final Document ☐ Other ______

Governor's Office of Planning & Research

APR 08 2020

STATE CLEARINGHOUSE

after 12p

Local Action Type:

☐ General Plan Update ☐ General Plan Amendment ☐ General Plan Element ☐ Community Plan
☐ Specific Plan ☐ Master Plan ☐ Planned Unit Development ☐ Site Plan
☐ Rezone ☐ Prezone ☐ Use Permit ☐ Land Division (Subdivision, etc.)
☐ Annexation ☐ Redevelopment ☐ Coastal Permit ☒ Other : Easement

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Development Type:

☐ Residential: Units ______ Acres ______
☐ Office: Sq.ft. ______ Acres ______ Employees ______
☐ Commercial: Sq.ft. ______ Acres ______ Employees ______
☐ Industrial: Sq.ft. ______ Acres ______ Employees 0
☐ Educational ______
☐ Recreational ______
☒ Water Facilities: Type Conveyance, recharge, and recovery MGD TBD
☐ Transportation: Type ______
☐ Mining: Mineral ______
☐ Power: Type ______ MW ______
☐ Waste Treatment: Type ______ MGD ______
☐ Hazardous Waste: Type ______
☐ Other: ______

Project Issues Discussed in Document:

☒ Aesthetic/Visual
☒ Agricultural Land
☒ Air Quality
☒ Archeological/Historical
☒ Biological Resources
☐ Coastal Zone
☒ Drainage/Absorption
☐ Economic/Jobs
☐ Fiscal
☒ Flood Plain/Flooding
☒ Forest Land/Fire Hazard
☒ Geologic/Seismic
☒ Minerals
☒ Noise
☒ Population/Housing Balance
☒ Public Services/Facilities
☒ Recreation/Parks
☒ Schools/Universities
☐ Septic Systems
☐ Sewer Capacity
☒ Soil Erosion/Compaction/Grading
☒ Solid Waste
☒ Toxic/Hazardous
☒ Traffic/Circulation
☒ Vegetation
☒ Water Quality
☒ Water Supply/Groundwater
☒ Wetland/Riparian
☒ Growth Inducement
☒ Land Use
☒ Cumulative Effects
☐ Other: ______

☒ Other Energy, Greenhouse Gas Emissions

Present Land Use/Zoning/General Plan Designation:

Various

Project Description: *(please use a separate page if necessary)*

This Notice of Preparation (NOP) initiates California Environmental Quality Act (CEQA) review for the Kern Fan Groundwater Storage Project ("proposed Project") that Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) propose to jointly carry out through the Groundwater Banking Joint Powers Authority (Authority). Pursuant to CEQA Guidelines section 15051(d), until the Authority is formed, Rosedale will serve as the Lead Agency under CEQA for the preparation of an Environmental Impact Report (EIR). Rosedale and IRWD have agreed that Rosedale will perform the lead agency role until the Authority is formed, and the Authority will assume the role thereafter. In addition, the

DOC# 4364700

EIR will be prepared in accordance with the CEQA-Plus requirements of the U.S. Environmental Protection Agency, to fulfill the requirement of potential federal funding partners to comply with the National Environmental Policy Act (NEPA).

The proposed Project would allow Rosedale and IRWD to more effectively manage sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop water recharge and recovery facilities in the Kern Fan area of Kern County, California. The proposed Project would recharge, store, recover and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and supply reliability benefits for agricultural, and municipal and industrial (M&I) uses. The proposed Project would involve the construction and operation of water conveyance, recharge and recovery facilities.

Reviewing Agencies Checklist

Lead Agencies may recommend State Clearinghouse distribution by marking agencies below with and "**X**".
If you have already sent your document to the agency please denote that with an "**S**".

Mark	Agency	Mark	Agency
____	Air Resources Board	____	Office of Historic Preservation
____	Boating & Waterways, Department of	____	Office of Public School Construction
____	California Emergency Management Agency	____	Parks & Recreation, Department of
____	California Highway Patrol	____	Pesticide Regulation, Department of
____	Caltrans District # 7	____	Public Utilities Commission
____	Caltrans Division of Aeronautics	____	Regional WQCB # 5
____	Caltrans Planning	____	Resources Agency
____	Central Valley Flood Protection Board	____	Resources Recycling and Recovery, Department of
____	Coachella Valley Mountains Conservancy	____	S.F. Bay Conservation & Development Commission
____	Coastal Commission	____	San Gabriel & Lower L.A. Rivers and Mtns Conservancy
____	Colorado River Board	____	San Joaquin River Conservancy
S	Conservation, Department of	____	Santa Monica Mountains Conservancy
____	Corrections, Department of	____	State Lands Commission
____	Delta Protection Commission	____	SWRCB: Clean Water Grants
____	Education, Department of	____	SWRCB: Water Quality
____	Energy Commission	____	SWRCB: Water Rights
S	Fish & Wildlife Region # 4- Central Region	____	Tahoe Regional Planning Agency
____	Food & Agriculture, Department of	____	Toxic Substances Control, Department of
____	Forestry and Fire Protection, Department of	S	Water Resources, Department of
____	General Services, Department of		
____	Health Services, Department of	____	Other ____________
____	Housing & Community Development	____	Other ____________
____	Native American Heritage Commission		

Local Public Review Period (to be filled in by lead agency)

Starting Date April 8, 2020 | Ending Date May 8, 2020

Lead Agency (Complete if applicable):

Consulting Firm: Environmental Science Associates
Address: 626 Wilshire Boulevard Suite 1100
City/State/Zip: Los Angeles, CA 90017
Contact: Jennifer Jacobus
Phone: (213) 599-4320

Applicant: Rosedale-Rio Bravo Water Storage District
Address: 849 Allen Road
City/State/Zip: Bakersfield, CA 93314
Phone: (661) 589-6045

Signature of Lead Agency Representative: Jennifer Jacobus **Date: 4/7/2020**

Authority cited: Section 21083, Public Resources Code. Reference: Section 21161, Public Resources Code.

DOC# 4364700

PROOF OF PUBLICATION

The BAKERSFIELD CALIFORNIAN
3700 PEGASUS DRIVE
BAKERSFIELD, CA 93308

ESA / Water
626 WILSHIRE BOULEVARD SUITE 1100
LOS ANGELES, CA 90017

Ad Number:	14713155	**PO #:**	
Edition:	CALC	**Run Times**	1
Class Code	Legal Notices		
Start Date	4/10/2020	**Stop Date**	4/10/2020
Billing Lines	56	**Inches**	336.95
Total Cost	$ 509.54	**Account**	73491279
Billing Address	ESA / Water 626 WILSHIRE BOULEVARDSUITE 1100 LOS ANGELES,CA 90017		

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STATE OF CALIFORNIA
COUNTY OF KERN

I AM A CITIZEN OF THE UNITED STATES AND A RESIDENT OF THE COUNTY AFORESAID: I AM OVER THE AGE OF EIGHTEEN YEARS, AND NOT A PARTY TO OR INTERESTED IN THE ABOVE ENTITLED MATTER. I AM THE ASSISTANT PRINCIPAL CLERK OF THE PRINTER OF THE BAKERSFIELD CALIFORNIAN, A NEWSPAPER OF GENERAL CIRCULATION. PRINTED AND PUBLISHED DAILY IN THE CITY OF BAKERSFIELD COUNTY OF KERN,

AND WHICH NEWSPAPER HAS BEEN ADJUDGED A NEWSPAPER OF GENERAL CIRCULATION BY THE SUPERIOR COURT OF THE COUNTY OF KERN, STATE OF CALIFORNIA, UNDER DATE OF FEBRUARY 5, 1952, CASE NUMBER 57610; THAT THE NOTICE, OF WHICH THE ANNEXED IS A PRINTED COPY, HAS BEEN PUBLISHED IN EACH REGULAR AND ENTIRE ISSUE OF SAID NEWSPAPER
AND NOT IN ANY SUPPLEMENT THEREOF ON THE FOLLOWING DATES, TO WIT: 4/10/20

ALL IN YEAR 2020

I CERTIFY (OR DECLARE) UNDER PENALTY OF PERJURY THAT THE FOREGOING IS TRUE AND CORRECT.

DATED AT BAKERSFIELD CALIFORNIA
4·10·2020

Solicitor I.D.: 0

First Text
Notice of Preparation of an Environmenta

Ad Number 14713155

Notice of Preparation of an Environmental Impact Report
for the Kern Fan Groundwater Storage Project

A Notice of Preparation (NOP) has been prepared to notify agencies and interested parties about the initiation of a California Environmental Quality Act (CEQA) review for the Kern Fan Groundwater Storage Project ("proposed Project") that Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) will jointly carry out through the Groundwater Banking Joint Powers Authority (Authority). Pursuant to CEQA Guidelines section 15051(d), Rosedale will serve as the Lead Agency for the preparation of an Environmental Impact Report (EIR) until the Authority is formed. Rosedale and IRWD have agreed that Rosedale will perform the lead agency role until the Authority is formed, and the Authority will assume the role thereafter. In addition, the EIR will be prepared in accordance with the CEQA-Plus requirements of the U.S. Environmental Protection Agency, to fulfill the requirement of potential federal funding partners to comply with the National Environmental Policy Act (NEPA).

The proposed Project would allow Rosedale and IRWD to more effectively manage sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop a water bank and associated water conveyance facilities in the Kern Fan area of Kern County, California. The proposed Project would recharge, store, recover, and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and provide supply reliability for agricultural, municipal and industrial uses. The proposed Project would include construction and operation of water conveyance water recharge and recovery facilities. Up to 1,300 acres of land would be acquired for the proposed Project within or near Rosedale's service area in western Kern County for the construction and operation of the proposed Project. The proposed Project would also involve the acquisition of easements for construction, operation and maintenance of the new Kern Fan Conveyance Facilities that would deliver water to and from the California Aqueduct.

Rosedale is soliciting comments from responsible and trustee agencies as well as interested parties as to the scope and content of the environmental information to be included in the EIR. In accordance with CEQA, agencies are requested to review the proposed Project description provided in the NOP and to provide comments on environmental issues related to the statutory responsibilities of each responsible or trustee agency. The EIR may be used by Rosedale, IRWD and the Authority when considering approval of the proposed Project as well as any related discretionary approvals.

The NOP is available online at the Rosedale website (https://www.rrbwsd.com/newsletter-notices) and the IRWD website (https://www.irwd.com/doing-business/environmental-documents). Please mail your comments to Eric Averett, General Manager, Rosedale-Rio Bravo Water Storage District, P.O. Box 20820, Bakersfield CA 93390-0820, by **4:00 p.m. on May 8, 2020**. Please include a return address and contact name with your comments. Comments may also be emailed to: eaverett@rrbwsd.com

One public meeting will be conducted virtually utilizing Zoom and telephonically to receive comments and suggestions concerning the issues to be included in the EIR. The scoping meeting will include a brief presentation, providing an overview of the proposed Project. After the virtual presentation, public comments will be accepted orally. The scoping meeting will be held on April 29, 2020 at 9:00 AM. Interested parties can join online at https://zoom.us/join , or dial in to (669) 900-6833, and use the meeting I.D. (646 423 721) and password (447 319).

April 10, 2020
14713155

The Orange County Register
2190 S. Towne Centre Place Suite 100
Anaheim, CA 92806
714-796-2209

5267139

ESA - ENVIRONMENTAL SCIENCE ASSOCIATES
626 WILSHIRE BOULEVARD, SUITE 1100
LOS ANGELES, CA 90017

AFFIDAVIT OF PUBLICATION

STATE OF CALIFORNIA, } SS.
County of Orange

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of The Orange County Register, a newspaper of general circulation, published in the city of Santa Ana, County of Orange, and which newspaper has been adjudged to be a newspaper of general circulation by the Superior Court of the County of Orange, State of California, under the date of November 19, 1905, Case No. A-21046, that the notice, of which the annexed is a true printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

04/09/2020

I certify (or declare) under the penalty of perjury under the laws of the State of California that the foregoing is true and correct:

Executed at Anaheim, Orange County, California, on
Date: April 09, 2020.

Christine Gonzal

Signature

PROOF OF PUBLICATION

Legal No. **0011378148**

Notice of Preparation of an Environmental Impact Report for the Kern Fan Groundwater Storage Project

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Published OC Register 9, 2020 11378148

KERN FAN GROUNDWATER STORAGE PROJECT

COMMENT LETTERS RECEIVED DURING PUBLIC SCOPING PERIOD

APRIL 8 TO MAY 8, 2020

Date	Commenting Party
April 9, 2020	Native American Heritage Commission
April 24, 2020	Dudley Ridge Water District
April 27, 2020	Department of Toxic Substance Control
May 7, 2020	California Department of Fish and Wildlife
May 8, 2020	City of Bakersfield
May 8, 2020	Kern County Water Agency
May 8, 2020	California Department of Water Resources
May 8, 2020	Kern Water Bank Authority

NATIVE AMERICAN HERITAGE COMMISSION

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

April 9, 2020

Eric Averett
Rosedale-Rio Bravo Water Storage District
P.O. Box 20820
Bakersfield, CA 93390-0820

Re: 2020049019, Kern Fan Groundwater Storage Project, Kern County

Dear Mr. Averett:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource, is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). **AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements.** If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:

a. A brief description of the project.

b. The lead agency contact information.

c. Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code §21080.3.1 (d)).

d. A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code §21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code §21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or Environmental Impact Report. (Pub. Resources Code §21080.3.1(b)).

a. For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code §65352.4 (SB 18). (Pub. Resources Code §21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:

a. Alternatives to the project.

b. Recommended mitigation measures.

c. Significant effects. (Pub. Resources Code §21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:

a. Type of environmental review necessary.

b. Significance of the tribal cultural resources.

c. Significance of the project's impacts on tribal cultural resources.

d. If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code §21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code §6254 (r) and §6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code §21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:

a. Whether the proposed project has a significant impact on an identified tribal cultural resource.

b. Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code §21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code §21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:

a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or

b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:

a. Avoidance and preservation of the resources in place, including, but not limited to:

i. Planning and construction to avoid the resources and protect the cultural and natural context.

ii. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.

b. Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:

i. Protecting the cultural character and integrity of the resource.
ii. Protecting the traditional use of the resource.
iii. Protecting the confidentiality of the resource.

c. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

d. Protecting the resource. (Pub. Resource Code §21084.3 (b)).

e. Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).

f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:

a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.

b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.

c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code §65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf.

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code §65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code §65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code §5097.9 and §5097.993 that are within the city's or county's jurisdiction. (Gov. Code §65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
   a. The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
   b. Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/.

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (http://ohp.parks.ca.gov/?page_id=1068) for an archaeological records search. The records search will determine:
   a. If part or all of the APE has been previously surveyed for cultural resources.
   b. If any known cultural resources have already been recorded on or adjacent to the APE.
   c. If the probability is low, moderate, or high that cultural resources are located in the APE.
   d. If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
   a. The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
   b. The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:

a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.

b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.

a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, §15064.5(f) (CEQA Guidelines §15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.

b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.

c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address: Nancy.Gonzalez-Lopez@nahc.ca.gov.

Sincerely,

Nancy Gonzalez

Nancy Gonzalez-Lopez
Staff Services Analyst

cc: State Clearinghouse

Jennifer Jacobus

From: Paul Weghorst <Weghorst@irwd.com>
Sent: Monday, April 27, 2020 7:26 AM
To: Jo Ann Corey
Cc: Fiona Sanchez; Jennifer Jacobus; Kellie Welch
Subject: Fw: Dudley Ridge Comments on NOP for Kern Fan Project EIR

Jo Ann,

Please ensure that the following comments on the Kern Fan Project NOP are considered as official comments from Dudley Ridge Water District.

Thanks,

Paul

From: Dale Melville <dmelville@ppeng.com>
Sent: Friday, April 24, 2020 4:32 PM
To: Paul Weghorst <Weghorst@irwd.com>
Cc: Paul Cook <Cook@irwd.com>; Fiona Sanchez <Sanchezf@irwd.com>; Eric Averett <eaverett@rrbwsd.com>
Subject: RE: Dudley Ridge Comments on NOP for Kern Fan Project EIR

Paul W,
Thx for taking the time to put our discussion into formal comments. I made a few edits to your draft; the comments as shown below can be considered DRWD's comments on the NOP. I'll miss the virtual scoping meeting next week due to another conflict, so our conversation this morning was quite helpful.

Enjoy the weekend and stay safe.

Dale Melville
559-355-5880 cell

From: Paul Weghorst <Weghorst@irwd.com>
Sent: Friday, April 24, 2020 3:45 PM
To: Dale Melville <dmelville@ppeng.com>
Cc: Paul Cook <Cook@irwd.com>; Fiona Sanchez <Sanchezf@irwd.com>; Eric Averett <eaverett@rrbwsd.com>
Subject: Dudley Ridge Comments on NOP for Kern Fan Project EIR

Dale,

It was good talking with you this morning about Dudley Ridge's role in and potential benefits from the Kern Fan Groundwater Storage Project as well as your comments on the Notice of Preparation (NOP) of an EIR for the Project. Following is a summary of the NOP comments that you provided. Let me know if you would like to change or add anything. Otherwise we will include these as Dudley Ridge's comments on the document.

Have a safe weekend,

Paul

General Dudley Ridge Comments:

1) The EIR should evaluate benefits and impacts to Dudley Ridge Water District's water supplies and agricultural lands including any impact of the 1-for-1 exchanges needed to generate ecosystem benefits for the Project. The 1-for-1 exchanges will result in Dudley Ridge Table A water being exchanged for Article 21 water stored in the Ecosystem Account. Since Dudley Ridge is located upstream of the Kern Fan Project on the California Aqueduct, the use of Dudley Ridge's Table A stored in the Kern Fan Project will result in the need for operational exchange capacity and the need to account for groundwater pumping costs--- both impacts need to be evaluated in the EIR.

Specific Dudley Ridge Comments:

1) On pages A-1 and A-2, the section on Rosedale-Rio Bravo Water Storage District describes how the infrastructure for Rosedale's programs includes over 1,000 acres of recharge basins and that infers that these programs provide a maximum annual recharge of more then 250,000 AFY, which implies an ability to recharge 250 feet of water per year. The EIR should clarify the accuracy of these statements by noting the recharge capacity, recovery capacity, and storage volume of each of the various existing programs within Rosedale (i.e., Rosedale, IRWD-Stockdale East/West, IRWD-Strand). The EIR should also provide an overview of the relationship between the proposed Kern Fan Groundwater Storage Project and Rosedale's other programs.

2) On page A-2, the NOP provides a description of the State Water Project (SWP) and the periodic availability of Article 21 water. The environmental analysis contained in the EIR should consider the cumulative impacts on the availability of Article 21 water (as well as Table A water) taking into consideration the pending SWP Water Management Amendment (DEIR comments are due May 13, 2020) and the proposed Delta Conveyance Facility (AIP proposed to be finalized the first of May 2020).

3) On page A-4, the NOP states that up to 25 percent, or up to 25,000 AF, of the unallocated Article 21 water would be stored for DWR in an Ecosystem Account. This statement could be interpreted that anytime Article 21 water is diverted to the Kern Fan Project that up to 25,000 AF of water would be stored in the Ecosystem Account. The EIR should clarify that the Ecosystem Account is limited to a total capacity of 25,000 AF and that once this account in full, that no additional Article 21 water would be delivered into the Ecosystem Account.

4) On page A-4, the NOP states that the remaining 75,000 AF of storage capacity would be divided equally between IRWD and Rosedale. However, the text does not state that Article 21 water would be recharged into these accounts. The EIR should make it clear that 75 percent of the Article 21 water would be recharged into the IRWD and Rosedale accounts until the Ecosystem Account is full and then 100 percent of the Article 21 water would be recharged into the IRWD and Rosedale accounts.

5) On page A-6, the NOP states that the Kern Fan Project would increase the amount and reliability of groundwater supplies available for irrigated agriculture in the region and contribute beneficially to agricultural production. The EIR should clarify the Project would also provide benefits to urban areas of IRWD and Rosedale. This clarification should be consistently applied throughout the EIR.

Jared Blumenfeld
Secretary for
Environmental Protection

Department of Toxic Substances Control

Meredith Williams, Ph.D.
Director
8800 Cal Center Drive
Sacramento, California 95826-3200

Gavin Newsom
Governor

April 27, 2020

Mr. Eric Averett
Rosedale-Rio Bravo Water Storage District
P.O. Box 20820
Bakersfield, California 93390-0820
eaverett@rrbwsd.com

NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT FOR KERN FAN GROUNDWATER STORAGE PROJECT – DATED APRIL 8, 2020 (STATE CLEARINGHOUSE NUMBER: 2020049010)

Dear Mr. Averett:

The Department of Toxic Substances Control (DTSC) received a Revised Notice of Preparation of an Environmental Impact Report (EIR) for Kern Fan Groundwater Storage Project. The proposed Project would allow Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to more effectively manage sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop water recharge and recovery facilities in the Kern Fan area of Kern County, California. The proposed Project would recharge, store, recover and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and supply reliability benefits for agricultural, and municipal and industrial (M&I) uses. The proposed Project would involve the construction and operation of water conveyance, recharge and recovery facilities.

DTSC recommends that the following issues be evaluated in the EIR Hazards and Hazardous Materials section:

1. The EIR should acknowledge the potential for historic or future activities on or near the project site to result in the release of hazardous wastes/substances on the project site. In instances in which releases have occurred or may occur, further studies should be carried out to delineate the nature and extent of the contamination, and the potential threat to public health and/or the environment should be evaluated. The EIR should also identify the mechanism(s) to initiate

any required investigation and/or remediation and the government agency who will be responsible for providing appropriate regulatory oversight.

2. Refiners in the United States started adding lead compounds to gasoline in the 1920s in order to boost octane levels and improve engine performance. This practice did not officially end until 1992 when lead was banned as a fuel additive in California. Tailpipe emissions from automobiles using leaded gasoline contained lead and resulted in aerially deposited lead (ADL) being deposited in and along roadways throughout the state. ADL-contaminated soils still exist along roadsides and medians and can also be found underneath some existing road surfaces due to past construction activities. Due to the potential for ADL-contaminated soil DTSC, recommends collecting soil samples for lead analysis prior to performing any intrusive activities for the project described in the EIR.

3. If any sites within the project area or sites located within the vicinity of the project have been used or are suspected of having been used for mining activities, proper investigation for mine waste should be discussed in the EIR. DTSC recommends that any project sites with current and/or former mining operations onsite or in the project site area should be evaluated for mine waste according to DTSC's 1998 Abandoned Mine Land Mines Preliminary Assessment Handbook (https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/11/aml_handbook.pdf).

4. If buildings or other structures are to be demolished on any project sites included in the proposed project, surveys should be conducted for the presence of lead-based paints or products, mercury, asbestos containing materials, and polychlorinated biphenyl caulk. Removal, demolition and disposal of any of the above-mentioned chemicals should be conducted in compliance with California environmental regulations and policies. In addition, sampling near current and/or former buildings should be conducted in accordance with DTSC's 2006 *Interim Guidance Evaluation of School Sites with Potential Contamination from Lead Based Paint, Termiticides, and Electrical Transformers* (https://dtsc.ca.gov/wpcontent/uploads/sites/31/2018/09/Guidance_Lead_Contamination_050118.pdf).

5. If any projects initiated as part of the proposed project require the importation of soil to backfill any excavated areas, proper sampling should be conducted to ensure that the imported soil is free of contamination. DTSC recommends the imported materials be characterized according to *DTSC's 2001 Information Advisory Clean Imported Fill Material* (https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/09/SMP_FS_Cleanfill-Schools.pdf).

6. If any sites included as part of the proposed project have been used for agricultural, weed abatement or related activities, proper investigation for organochlorinated pesticides should be discussed in the EIR. DTSC recommends the current and former agricultural lands be evaluated in accordance with DTSC's 2008 *Interim Guidance for Sampling Agricultural*

Properties (Third Revision) (https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/09/Ag-Guidance-Rev-3-August-7-2008-2.pdf).

DTSC appreciates the opportunity to comment on the project. Should you need any assistance with an environmental investigation, please submit a request for Lead Agency Oversight Application, which can be found at: https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/09/VCP_App-1460.doc. Additional information regarding voluntary agreements with DTSC can be found at: https://dtsc.ca.gov/brownfields/.

If you have any questions, please contact me at (916) 255-3710 or via email at Gavin.McCreary@dtsc.ca.gov.

Sincerely,

Gavin McCreary
Project Manager
Site Evaluation and Remediation Unit
Site Mitigation and Restoration Program
Department of Toxic Substances Control

cc: (via email)

Governor's Office of Planning and Research
State Clearinghouse
State.Clearinghouse@opr.ca.gov

Ms. Lora Jameson, Chief
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Department of Toxic Substances Control
Lora.Jameson@dtsc.ca.gov

Mr. Dave Kereazis
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Dave.Kereazis@dtsc.ca.gov

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Central Region
1234 East Shaw Avenue
Fresno, California 93710
(559) 243-4005
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

May 7, 2020

Eric Averett, General Manager
Rosedale-Rio Bravo Water Storage District
Post Office Box 20820
Bakersfield, California 93390-0820
eaverett@rrbwsd.com

Subject: Kern Fan Groundwater Storage Project (Project)
Notice of Preparation (NOP)
State Clearinghouse (SCH) No. 2020049019

Dear Mr. Averett:

The California Department of Fish and Wildlife (CDFW) received a NOP for an Environmental Impact Report (EIR) from Rosedale-Rio Bravo Water Storage District (Rosedale) for the Project pursuant the California Environmental Quality Act (CEQA) and CEQA Guidelines.[1] Please note that an earlier version of this letter had an incorrect SCH Number and that this letter supersedes the previous version. All other letter content is identical.

Thank you for the opportunity to provide comments and recommendations regarding those activities involved in the Project that may affect California fish and wildlife. Likewise, CDFW appreciates the opportunity to provide comments regarding those aspects of the Project that CDFW, by law, may be required to carry out or approve through the exercise of its own regulatory authority under the Fish and Game Code.

CDFW ROLE

CDFW is California's **Trustee Agency** for fish and wildlife resources and holds those resources in trust by statute for all the people of the State (Fish & G. Code, §§ 711.7, subd. (a) & 1802; Pub. Resources Code, § 21070; CEQA Guidelines § 15386, subd. (a)). CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (*Id.*, § 1802). Similarly, for purposes of CEQA, CDFW is charged by law to provide, as available, biological expertise during public agency environmental review efforts, focusing specifically on projects and related activities that have the potential to adversely affect fish and wildlife resources.

[1] CEQA is codified in the California Public Resources Code in section 21000 et seq. The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

CDFW is also submitting comments as a **Responsible Agency** under CEQA (Pub. Resources Code, § 21069; CEQA Guidelines, § 15381). CDFW expects that it may need to exercise regulatory authority as provided by the Fish and Game Code. As proposed, for example, the Project may be subject to CDFW's lake and streambed alteration regulatory authority (Fish & G. Code, § 1600 et seq.). Likewise, to the extent implementation of the Project as proposed may result in "take" as defined by State law of any species protected under the California Endangered Species Act (CESA) (Fish & G. Code, § 2050 et seq.), related authorization as provided by the Fish and Game Code will be required.

CDFW has jurisdiction over fully protected species of birds, mammals, amphibians and reptiles, and fish, pursuant to Fish and Game Code sections 3511, 4700, 5050, and 5515. Take of any fully protected species is prohibited and CDFW cannot authorize their incidental take.

The use of unallocated stream flows are subject to appropriation and approval by the State Water Resources Control Board (SWRCB) pursuant to Water Code section 1225. CDFW, as Trustee Agency, is consulted by the SWRCB during the water rights process to provide terms and conditions designed to protect fish and wildlife prior to appropriation of the State's water resources. Certain fish and wildlife are reliant upon aquatic ecosystems, which in turn are reliant upon adequate flows of water. CDFW therefore has a material interest in assuring that adequate water flows within streams for the protection, maintenance, and proper stewardship of those resources. CDFW provides, as available, biological expertise to review and comment on environmental documents and impacts arising from project activities.

PROJECT DESCRIPTION SUMMARY

Proponent: Rosedale and Irvine Ranch Water District (IRWD) propose to jointly carry out the Project through the Groundwater Banking Joint Powers Authority (Authority). Pursuant to CEQA Guidelines section 15051(d), until the Authority is formed, Rosedale will serve as the Lead Agency under CEQA for the preparation of an EIR. Rosedale and IRWD have agreed that Rosedale will perform the lead agency role until the Authority is formed, and the Authority will assume the role thereafter.

Objective: The objectives of the proposed Project are as follows:

- Capture, recharge, and store water from the State Water Project (SWP) and other available water supplies for later use.

- Provide ecosystem public benefits, emergency water supply public benefits during extended droughts or a Delta levee failure, and water supply benefits for agricultural and for municipal and industrial uses.

- Provide operating flexibility for Rosedale's existing and future conjunctive use programs.
- Assist in achieving groundwater sustainability within the Kern County Sub-basin of the San Joaquin Valley Groundwater Basin through implementation of projects consistent with California Executive Order N-10-19 directing state agencies to develop a "water resilience portfolio."
- Provide Rosedale and IRWD customers and partners with increased water supply reliability during periods when other supply sources may be reduced or interrupted.

Project Description: The proposed Project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. The Kern Fan Conveyance Facilities would consist of pipelines, pump stations, and a new turnout at the California Aqueduct to convey water between the project facilities and the California Aqueduct. Water stored by the proposed Project would be recovered when needed to provide ecosystem and water supply benefits.

The proposed Project would be operated such that surplus surface water from the SWP and other available water sources would be recharged and stored for subsequent recovery. It is estimated that the Project would be able to recharge and store approximately 100,000 acre-feet per year (AFY). Project capacities are to be allocated as follows:

Up to 25 percent, or up to 25,000 acre-feet (AF), of the "unallocated" SWP Article 21 water would be stored for the California Department of Water Resources (DWR) in an "Ecosystem Account." Through the implementation of 1-for-1 exchanges, the water stored in the Ecosystem Account would be used by the State of California to alleviate stress on endangered and threatened species in the Sacramento-San Joaquin River Delta during critically dry years.

The remaining 75,000 AF of storage capacity would be divided equally, with 37,500 AF of storage capacity allocated to Rosedale and 37,500 AF of storage capacity allocated to IRWD. Rosedale and IRWD would use the water recharged in their respective accounts for agriculture, municipal, and industrial uses, improving water supply reliability during droughts and emergencies.

The proposed Project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the Project area. Water could be conveyed to and from Phase 1 and 2 properties through existing facilities and a new turnout and conveyance system (Kem Fan Conveyance Facilities) connecting to the California Aqueduct. Project operations would be coordinated with Rosedale's Conjunctive Use Program.

Recharge Facilities

The proposed Project would include the construction of recharge basins of varying shape, size, and depth within approximately 1,300 acres. Basins would be formed by excavating and contouring existing soils to form earthen berms. Typical basin berms would be approximately three to six feet above ground.

Dirt roads approximately 14 to 20 feet wide would run along the perimeter of and in between all basins to provide access to facilities during operation and maintenance activities. Surface water would be delivered to the basins for recharge through the new Kem Fan Conveyance Facilities, and the basins would be connected by check structures to allow recharge water to flow by gravity among basins. The basins would be managed to allow agricultural land uses (e.g., annual farming or grazing) to continue when the basins are empty.

Recharge Water Supplies

The proposed Project would receive, recharge, and store SWP Article 21 water, which is a surplus supply managed by DWR. Other water supplies also may be secured and acquired by Rosedale and IRWD from various sources, and may include federal, state, and local supplies through transfers, balanced and unbalanced water exchange agreements, water purchases or temporary transfers, or other available means. Sources may also include supplies from the Central Valley Project, and high-flow Kem River water depending on annual hydrologic availability, water rights, and regulatory considerations.

Recovery Facilities

The proposed Project would construct up to 12 extraction wells, with an anticipated annual recovery capacity of up to 50,000 AF. Each well would be designed to pump groundwater at a recovery rate of approximately five to six cubic feet per second (cfs). Actual recovery rates for each well may be slightly more or less based on aquifer conditions at each well site. If higher production is achieved for the first few wells installed, fewer wells may be needed. Additionally, if any agricultural wells exist on the recharge basin sites, these could potentially be used as production wells or monitoring wells. The proposed recovery facilities would be designed and located to minimize potential effects on wells pumping on adjacent properties.

Conveyance Facilities

The proposed Project includes a new turnout, additional canals and pipelines, and pump stations (collectively the "Kem Fan Conveyance Facilities") to convey water to and from the California Aqueduct and proposed recharge and recovery facilities. The exact locations of the new conveyance facilities have not yet been determined but would have up to 500 cfs of conveyance capacity. Subject to necessary approvals, water could be conveyed through the SWP, Friant-Kern Canal, or the Kern River by exchange through the Goose Lake Channel, or from the Cross Valley Canal (CVC) through the Rosedale Intake Canal.

Groundwater recovered from the Project extraction wells would be conveyed through new pipelines that would be below ground, running along the dirt roads between the recharge basins, or buried in the basin bottoms, with exact locations subject to final well placement. The recovery pipelines would connect to the new Kern Fan Conveyance Facilities or could connect to the CVC via existing conveyance facilities.

Location: The proposed Project boundary would be located within the Rosedale district boundary in western Kem County, west of the City of Bakersfield. The proposed recharge and recovery facilities would be constructed in two phases on approximately 1,300 acres of agricultural or vacant land within or near the Rosedale service area.

Timeframe: Unspecified

COMMENTS AND RECOMMENDATIONS

CDFW offers the comments and recommendations below to assist Rosedale in adequately identifying and/or mitigating the Project's significant, or potentially significant, direct and indirect impacts on fish and wildlife (biological) resources. Editorial comments or other suggestions may also be included to improve the CEQA document.

Aerial imagery of the Project boundary and its surroundings within the Rosedale District boundary show the Goose Lake and Kern River riparian corridors, riparian-lined canal corridors, large trees, Great Valley cottonwood riparian forest, Great Valley mesquite scrub, Valley salt bush scrub, upland grassland, and agricultural habitats. Based on a review of the Project description, a review of California Natural Diversity Database (CNDDB) records, and the surrounding habitat, several special-status species could potentially be impacted by Project activities.

Project-related construction activities within the Project boundary including but not limited to construction and operation of additional water banking facilities and introduction of surface water flows for storage could impact the following special-status plant and wildlife species and habitats known to occur in the area: the State threatened and federally endangered San Joaquin kit fox (*Vulpes macrotis mutica*), the State and federally endangered Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), the State and federally endangered and State fully protected blunt-nosed leopard lizard (*Gambelia sila*), the State threatened Swainson's hawk (*Buteo swainsoni*), Nelson's antelope squirrel (*Ammospermophilus nelsoni*), and tricolored blackbird (*Agelaius tricolor*), the federally endangered and California rare plant rank (CRPR) 1B.2 San Joaquin woollythreads (*Monolopia congdonii*), the federally endangered and CRPR1B.2 Kern mallow (*Eremalche parryi* ssp*. kernensis*), the CRPR 4.2 Hoover's eriastrum (*Eriastrum hooveri*), the CRPR 1B.2 recurved larkspur (*Delphinium recurvatum*) and Munz's tidy-tips (*Layia munzii*), the CRPR 1B.1 Mason's neststraw (Stylocline masonii), and the State species of special concern American badger (*Taxidea taxus*), Tulare grasshopper mouse (*Onychomys torridus tularensis*), burrowing owl (*Athene cunicularia*), San Joaquin coachwhip (*Masticophis flagellum ruddocki*), California glossy snake (*Arizona elegans occidentalis*), western spadefoot (*Spea hammondi*), and coast horned lizard (*Phrynosoma blainvillii*).

Please note that the CNDDB is populated by and records voluntary submissions of species detections. As a result, species may be present in locations not depicted in the CNDDB but where there is suitable habitat and features capable of supporting species. Therefore, a lack of an occurrence record in the CNDDB is not tantamount to a negative species finding. In order to adequately assess any potential Project related impacts to biological resources, surveys conducted by a qualified wildlife biologist/botanist during the appropriate survey period(s) and using the appropriate protocol survey methodology are warranted in order to determine whether or not any special-status species are present at or near the Project area.

CDFW recommends that the following modifications and/or edits be incorporated into the EIR.

I. Mitigation Measure or Alternative and Related Impact Shortcoming

Would the Project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFW or the United States Fish and Wildlife Service (USFWS)?

COMMENT 1: San Joaquin Kit Fox (SJKF)

Issue: SJKF occurrences have been documented within the Project boundary (CDFW 2020a). The Project has the potential to temporarily disturb and permanently alter suitable habitat for SJKF and directly impact individuals if present during construction, recharge, and other activities.

SJKF den in a variety of areas such as right-of-ways, agricultural and fallow/ruderal habitat, dry stream channels, and canal levees, and populations can fluctuate over time. SJKF are also capable of occupying urban environments (Cypher and Frost 1999). SJKF may be attracted to Project areas due to the type and level of ground-disturbing activities and the loose, friable soils resulting from intensive ground disturbance. SJKF will forage in fallow and agricultural fields and utilize streams and canals as dispersal corridors. As a result, there is potential for SJKF to occupy all suitable habitat within the Rosedale boundary and surrounding area.

Specific impact: Without appropriate avoidance and minimization measures for SJKF, potential significant impacts associated with construction include habitat loss, den collapse, inadvertent entrapment, reduced reproductive success, reduction in health and vigor of young, and direct mortality of individuals.

Evidence impact is potentially significant: Habitat loss resulting from land conversion to agricultural, urban, and industrial development is the primary threat to SJKF (Cypher et al. 2013). Western Kern County supports relatively large areas of high suitability habitat and one of the largest remaining populations of SJKF (Cypher et al. 2013). The Project area is within this remaining highly suitable habitat, which is otherwise intensively managed for agriculture. Therefore, subsequent ground-disturbing activities have the potential to significantly impact local SJKF populations.

Recommended Potentially Feasible Mitigation Measure(s)
To evaluate potential impacts to SJKF associated with subsequent land conversion, ground disturbance and construction, CDFW recommends conducting the following evaluation of project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 1: SJKF Habitat Assessment

For all Project-specific components including construction and land conversion, CDFW recommends that a qualified biologist conduct a habitat assessment in advance of Project implementation, to determine if the Project area or its immediate vicinity contains suitable habitat for SJKF.

Recommended Mitigation Measure 2: SJKF Surveys

CDFW recommends assessing presence/absence of SJKF by having qualified biologists conducting surveys of Project areas and a 500-foot buffer of Project areas to detect SJKF and their sign. CDFW also recommends following the USFWS "Standardized recommendations for protection of the San Joaquin kit fox prior to or during ground disturbance" (2011).

Recommended Mitigation Measure 3: SJKF Take Authorization

SJKF detection warrants consultation with CDFW to discuss how to avoid take or, if avoidance is not feasible, to acquire an Incidental Take Permit (ITP) prior to ground-disturbing activities, pursuant to Fish and Game Code section 2081(b).

COMMENT 2: Blunt-nosed Leopard Lizard (BNLL)

Issue: BNLL have been documented in suitable habitat within and adjacent to the Project boundary (CDFW 2020a). Suitable BNLL habitat includes areas of grassland and upland scrub that contain requisite habitat elements, such as small mammal burrows. BNLL also use open space patches between suitable habitats, including disturbed sites, unpaved access roadways, and canals.

Specific impact: Without appropriate avoidance and minimization measures for BNLL, potentially significant impacts associated with ground-disturbing activities include habitat loss, burrow collapse, reduced reproductive success, reduced health and vigor of eggs and/or young, and direct mortality.

Evidence impact is potentially significant: Habitat loss resulting from agricultural, urban, and industrial development is the primary threat to BNLL (ESRP 2020a). The range for BNLL now consists of scattered parcels of undeveloped land within the valley floor and the foothills of the Coast Range (USFWS 1998). Some undeveloped areas with suitable BNLL habitat occur within the Project and surrounding area; therefore, ground disturbance and conversion of suitable habitat has the potential to significantly impact local BNLL populations.

Recommended Potentially Feasible Mitigation Measure(s)
To evaluate potential impacts to BNLL associated with subsequent development, CDFW recommends conducting the following evaluation of Project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 4: BNLL Habitat Assessment

CDFW recommends that a qualified biologist conduct a habitat assessment in advance of project implementation, to determine if the Project area or its immediate vicinity contains suitable habitat for BNLL.

Recommended Mitigation Measure 5: BNLL Surveys

If suitable habitat is present, prior to initiating any vegetation- or ground-disturbance activities, CDFW recommends conducting surveys in accordance with the “Approved Survey Methodology for the Blunt-nosed Leopard Lizard” (CDFG 2019). This survey protocol, designed to optimize BNLL detectability, reasonably assures CDFW that ground disturbance will not result in take of this fully protected species.

CDFW advises that BNLL surveys be completed no more than one year prior to initiation of ground disturbance. Please note that protocol-level surveys must be conducted on multiple dates during late spring, summer, and fall of the same calendar year, and that within these time periods, there are specific protocol-level date, temperature, and time parameters that must be adhered to. As a result, protocol-level surveys for BNLL are not synonymous with 30-day "preconstruction surveys" often recommended for other wildlife species. In addition, the BNLL protocol specifies different survey effort requirements based on whether the disturbance results from maintenance activities or if the disturbance results in habitat removal (CDFG 2019).

Recommended Mitigation Measure 6: BNLL Take Avoidance

BNLL detection during protocol-level surveys warrants consultation with CDFW to discuss whether take of BNLL can be avoided during ground-disturbing Project activities.

COMMENT 3: San Joaquin Antelope Squirrel (SJAS)

Issue: SJAS have been documented to occur within areas of suitable habitat within the Project vicinity (CDFW 2020a). Suitable SJAS habitat includes areas of grassland, upland scrub, and alkali sink habitats that contain requisite habitat elements, such as small mammal burrows.

Specific impact: Without appropriate avoidance and minimization measures for SJAS, potential significant impacts include loss of habitat, burrow collapse, inadvertent entrapment of individuals, reduced reproductive success such as reduced health or vigor of young, and direct mortality of individuals.

Evidence impact is potentially significant: Habitat loss resulting from agricultural, urban, and industrial development is the primary threat to SJAS. Very little suitable habitat for this species remains along the western floor of the San Joaquin Valley (ESRP 2020b). Areas of suitable habitat within the Project represent some of the only remaining undeveloped land in the vicinity, which is otherwise intensively managed for agriculture. As a result, ground-disturbing activities within the Project may have the potential to significantly impact local populations of SJAS.

Recommended Potentially Feasible Mitigation Measure(s)
To evaluate potential impacts to SJAS associated with subsequent development, CDFW recommends conducting the following evaluation of Project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 7: SJAS Habitat Assessment

CDFW recommends that a qualified biologist conduct a habitat assessment in advance of project implementation, to determine if the Project area or its immediate vicinity contains suitable habitat for SJAS.

Recommended Mitigation Measure 8: SJAS Surveys

In areas of suitable habitat, CDFW recommends that a qualified biologist conduct focused daytime visual surveys for SJAS using line transects with 10- to 30-meter spacing of Project areas and a 50-foot buffer around those areas. CDFW further advises that these surveys be conducted between April 1 and September 20, during daytime temperatures between 68° and 86° F (CDFG 1990), to maximize detectability.

Recommended Mitigation Measure 9: SJAS Avoidance

If suitable habitat is present and surveys are not feasible, CDFW advises maintenance of a 50-foot minimum no-disturbance buffer around all small mammal burrow entrances until the completion of Project activities.

Recommended Mitigation Measure 10: SJAS Take Authorization

SJAS detection warrants consultation with CDFW to discuss how to avoid take or, if avoidance is not feasible, to acquire a State ITP prior to ground-disturbing activities, pursuant to Fish and Game Code section 2081(b).

COMMENT 4: Tipton Kangaroo Rat (TKR)

Issue: TKR have been documented to occur within areas of suitable habitat within and adjacent to the Project (CDFW 2020a). Suitable TKR habitat includes areas of grassland, upland scrub, and alkali sink habitats that contain requisite habitat elements, such as small mammal burrows.

Specific impact: Without appropriate avoidance and minimization measures for TKR, potential significant impacts include loss of habitat, burrow collapse, inadvertent entrapment of individuals, reduced reproductive success such as reduced health or vigor of young, and direct mortality of individuals.

Evidence impact is potentially significant: Habitat loss resulting from agricultural, urban, and industrial development is the primary threat to TKR. Very little suitable habitat for this species remains along the western floor of the San Joaquin Valley (ESRP 2020c). Areas of suitable habitat within the Project represent some of the only remaining undeveloped land in the vicinity, which is otherwise intensively managed for agriculture. As a result, ground-disturbing activities within the Project may have the potential to significantly impact local populations of TKR.

Recommended Potentially Feasible Mitigation Measure(s)
To evaluate potential impacts to TKR associated with subsequent development, CDFW recommends conducting the following evaluation of Project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 11: TKR Habitat Assessment

CDFW recommends that a qualified biologist conduct a habitat assessment in advance of Project implementation, to determine if the Project area or its immediate vicinity contains suitable habitat for TKR.

Recommended Mitigation Measure 12: TKR Avoidance

If suitable habitat is present, CDFW advises maintenance of a 50-foot minimum no-disturbance buffer around all small mammal burrow entrances of suitable size for TKR use.

Recommended Mitigation Measure 13: TKR Surveys

If burrow avoidance is not feasible, CDFW recommends that focused protocol-level trapping surveys be conducted by a qualified wildlife biologist that is permitted to do so by both CDFW and USFWS, to determine if TKR occurs in the Project area. CDFW advises that these surveys be conducted in accordance with the USFWS (2013) "Survey Protocol for Determining Presence of San Joaquin Kangaroo Rats," well in advance of ground-disturbing activities in order to determine whether impacts to TKR could occur.

Recommended Mitigation Measure 14: TKR Take Authorization

TKR detection warrants consultation with CDFW to discuss how to avoid take or, if avoidance is not feasible, to acquire an ITP prior to ground-disturbing activities, pursuant to Fish and Game Code section 2081(b).

COMMENT 5: Swainson's Hawk (SWHA)

Issue: SWHA have been documented within the Project area. Review of recent aerial imagery indicates that trees capable of supporting nesting SWHA occur along the Kern River, and within the Project and overall Rosedale boundary. Landscape trees may also provide suitable nesting habitat. In addition, grassland and agricultural land in the surrounding area provide suitable foraging habitat for SWHA, increasing the likelihood of SWHA occurrence within the vicinity.

Specific impact: Without appropriate avoidance and minimization measures for SWHA, potential significant impacts associated with Project activities include loss of forging and/or nesting habitat, nest abandonment, reduced reproductive success, and reduced health and vigor of eggs and/or young.

Evidence impact would be significant: Lack of suitable nesting habitat in the San Joaquin Valley limits the local distribution and abundance of SWHA (CDFW 2016). The trees within the Project represent some of the only remaining suitable nesting habitat in the local vicinity. Depending on the timing of construction, activities including noise, vibration, and movement of workers or equipment could affect nests and have the potential to result in nest abandonment, significantly impacting local nesting SWHA. In addition, agricultural cropping patterns can directly influence distribution and abundance of SWHA. For example, SWHA can forage in grasslands, pasture, hay crops, and low growing irrigated crops; however, other agricultural crops such as orchards and vineyards are incompatible with SWHA foraging (Estep 2009, Swolgaard et al. 2008).

Recommended Potentially Feasible Mitigation Measure(s)
To evaluate potential impacts to SWHA associated with subsequent development, CDFW recommends conducting the following evaluation of Project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 15: Focused SWHA Surveys

To evaluate potential Project-related impacts, CDFW recommends that a qualified wildlife biologist conduct surveys for nesting SWHA following the entire survey methodology developed by the SWHA Technical Advisory Committee (SWHA TAC 2000) prior to Project initiation. SWHA detection during protocol-level surveys warrants consultation with CDFW to discuss how to implement Project activities and avoid take.

Recommended Mitigation Measure 16: SWHA Avoidance

CDFW recommends that if Project-specific activities will take place during the SWHA nesting season (i.e., March 1 through August 31), and active SWHA nests are present, a minimum ½-mile no-disturbance buffer be delineated and maintained around each nest, regardless if when it was detected by surveys or incidentally, until the breeding season has ended or until a qualified biologist has determined that the birds have fledged and are no longer reliant upon the nest or parental care for survival, to prevent nest abandonment and other take of SWHA as a result of Project activities.

Recommended Mitigation Measure 17: Tree Removal

CDFW recommends that the removal of known raptor nest trees, even outside of the nesting season, be replaced with an appropriate native tree species planting at a ratio of 3:1 at or near the Project area or in another area that will be protected in perpetuity. This mitigation would offset the local and temporal impacts of nesting habitat loss.

Recommended Mitigation Measure 18: SWHA Take Authorization

If SWHA are detected and a ½-mile no-disturbance nest buffer is not feasible, consultation with CDFW is warranted to determine if the Project can avoid take. If SWHA take cannot be avoided, issuance of an ITP prior to Project activities is warranted to comply with CESA

COMMENT 6: Tricolored Blackbird (TRBL)

Issue: TRBL are known to occur in the Project vicinity (CDFW 2020a, UC Davis 2020). Review of aerial imagery indicates that the Project boundary includes flood-irrigated agricultural land, which is an increasingly important nesting habitat type for TRBL, particularly in the San Joaquin Valley (Meese et al. 2017).

Specific impact: Without appropriate avoidance and minimization measures for TRBL, potential significant impacts associated subsequent development include nesting habitat loss, nest and/or colony abandonment, reduced reproductive success, and reduced health and vigor of eggs and/or young.

Evidence impact would be significant: As mentioned above, flood-irrigated agricultural land is an increasingly important nesting habitat type for TRBL, particularly in the San Joaquin Valley (Meese et al. 2014). This nesting substrate is present within the Project vicinity. TRBL aggregate and nest colonially, forming colonies of up to 100,000 nests (Meese et al. 2014). Approximately 86% of the global population is found in the San Joaquin Valley (Kelsey 2008, Weintraub et al. 2016). In addition, TRBL have been forming larger colonies that contain progressively larger proportions of the species' total population (Kelsey 2008). In 2008, for example, 55% of the species' global population nested in only two colonies, which were located in silage fields (Kelsey 2008). Nesting can occur synchronously, with all eggs laid within one week (Orians 1961). For these reasons, depending on timing, disturbance to nesting colonies can cause nest entire colony site abandonment and loss of all unfledged nests, significantly impacting TRBL populations (Meese et al. 2014).

Recommended Potentially Feasible Mitigation Measure(s)
To evaluate potential impacts to TRBL associated with subsequent development, CDFW recommends conducting the following evaluation of Project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 19: TRBL Surveys

CDFW recommends that construction be timed to avoid the typical bird-breeding season of February 1 through September 15. If Project activity that could disrupt nesting must take place during that time, CDFW recommends that a qualified wildlife biologist conduct surveys for nesting TRBL no more than 10 days prior to the start of implementation to evaluate presence/absence of TRBL nesting colonies in proximity to Project activities and to evaluate potential Project-related impacts.

Recommended Mitigation Measure 20: TRBL Colony Avoidance

If an active TRBL nesting colony is found during preconstruction surveys, CDFW recommends implementation of a minimum 300-foot no-disturbance buffer, in accordance with CDFW's "Staff Guidance Regarding Avoidance of Impacts to Tricolored Blackbird Breeding Colonies on Agricultural Fields in 2015" (CDFW 2015), until the breeding season has ended or until a qualified biologist has determined that nesting has ceased and the young have fledged and are no longer reliant upon the colony or parental care for survival. It is important to note that TRBL colonies can expand over time and for this reason, CDFW recommends that an active colony be reassessed to determine its extent within 10 days prior to Project initiation.

Recommended Mitigation Measure 21: TRBL Take Authorization

In the event that a TRBL nesting colony is detected during surveys, consultation with CDFW is warranted to discuss whether the Project can avoid take; if take avoidance is not feasible, to acquire an ITP, pursuant to Fish and Game Code section 2081(b), prior to any Project activities.

COMMENT 7: Special-status Plants

Issue: Special-status plant species meeting the definition of rare or endangered under CEQA section 15380 are known to occur within the Project and surrounding area. San Joaquin woollythreads, Kern mallow, Hoover's eriastrum, Masons neststraw, recurved larkspur, and Munz's tidy-tips have been documented within the Project area and Rosedale boundary.

Specific impact: Without appropriate avoidance and minimization measures for special-status plants, potential significant impacts associated with subsequent construction include loss of habitat, loss or reduction of productivity, and direct mortality.

Evidence impact would be significant: San Joaquin woollythreads, Kern mallow, Hoover's eriastrum, Mason's neststraw, recurved larkspur, Munz's tidy-tips, and many other special-status plant species are threatened by grazing and agricultural, urban, and energy development. Many historical occurrences of these species are presumed extirpated (CNPS 2019). Though new populations have recently been discovered, impacts to existing populations have the potential to significantly impact populations of plant species.

Recommended Potentially Feasible Mitigation Measure(s)
To evaluate potential impacts to special-status plants associated with subsequent development, CDFW recommends conducting the following evaluation of Project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 22: Special-Status Plant Surveys

CDFW recommends that individual Project sites be surveyed for special-status plants by a qualified botanist following the "Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities" (CDFG 2018b). This protocol, which is intended to maximize detectability, includes the identification of reference populations to facilitate the likelihood of field investigations occurring during the appropriate floristic period.

Recommended Mitigation Measure 23: Special-Status Plant Avoidance

CDFW recommends that special-status plant species be avoided whenever possible by delineating and observing a no-disturbance buffer of at least 50 feet from the outer edge of the plant population(s) or specific habitat type(s) required by special-status plant species. If buffers cannot be maintained, then consultation with CDFW may be warranted to determine appropriate minimization and mitigation measures for impacts to special-status plant species.

Recommended Mitigation Measure 24: Listed Plant Species Take Authorization

If a State-listed plant species is identified during botanical surveys, consultation with CDFW is warranted to determine if the Project can avoid take. If take cannot be avoided, take authorization is warranted. Take authorization would occur through issuance of an ITP, pursuant to Fish and Game Code section 2081(b).

COMMENT 8: Burrowing Owl (BUOW)

Issue: BUOW occur within and in the vicinity of the Project (CDFW 2020a). BUOW inhabit open grassland containing small mammal burrows, a requisite habitat feature used by BUOW for nesting and cover. Habitat both within and surrounding the Project supports grassland habitat. Therefore, there is potential for BUOW to occupy or colonize the Project.

Specific impact: Potentially significant direct impacts associated with subsequent activities and land conversion include habitat loss, burrow collapse, inadvertent entrapment, nest abandonment, reduced reproductive success, reduction in health and vigor of eggs and/or young, and direct mortality of individuals.

Evidence impact is potentially significant: BUOW rely on burrow habitat year-round for their survival and reproduction. Habitat loss and degradation are considered the greatest threats to BUOW in California's Central Valley (Gervais et al. 2008). The Project and surrounding area contain remnant undeveloped land but is otherwise intensively managed for agriculture; therefore, subsequent ground-disturbing activities associated with subsequent constructions have the potential to significantly impact local BUOW populations. In addition, and as described in CDFW's "Staff Report on Burrowing Owl Mitigation" (CDFG 2012), excluding and/or evicting BUOW from their burrows is considered a potentially significant impact under CEQA.

Recommended Potentially Feasible Mitigation Measure(s) (Regarding Environmental Setting and Related Impact)
To evaluate potential impacts to BUOW associated with subsequent development, CDFW recommends conducting the following evaluation of Project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 25: BUOW Habitat Assessment

CDFW recommends that a qualified biologist conduct a habitat assessment in advance of Project implementation, to determine if the Project area or its vicinity contains suitable habitat for BUOW.

Recommended Mitigation Measure 26: BUOW Surveys

If suitable habitat is present on or in the vicinity of the Project area, CDFW recommends assessing presence/absence of BUOW by having a qualified biologist conduct surveys following the California Burrowing Owl Consortium's "Burrowing Owl Survey Protocol and Mitigation Guidelines" (CBOC 1993) and CDFW's "Staff Report on Burrowing Owl Mitigation" (CDFG 2012). Specifically, CBOC and CDFW's Staff Report suggest three or more surveillance surveys conducted during daylight with each visit occurring at least three weeks apart during the peak breeding season (i.e., April 15 to July 15), when BUOW are most detectable. In addition, CDFW advises that surveys include a minimum 500-foot buffer area around the Project area.

Recommended Mitigation Measure 27: BUOW Avoidance

CDFW recommends that no-disturbance buffers, as outlined in the "Staff Report on Burrowing Owl Mitigation" (CDFG 2012), be implemented prior to and during any ground-disturbing activities. Specifically, CDFW's Staff Report recommends that impacts to occupied burrows be avoided in accordance with the following table unless a qualified biologist approved by CDFW verifies through non-invasive methods that either: 1) the birds have not begun egg laying and incubation; or 2) that juveniles from the occupied burrows are foraging independently and are capable of independent survival.

Location	Time of Year	Level of Disturbance		
		Low	Med	High
Nesting sites	April 1-Aug 15	200 m*	500 m	500 m
Nesting sites	Aug 16-Oct 15	200 m	200 m	500 m
Nesting sites	Oct 16-Mar 31	50 m	100 m	500 m

* meters (m)

Recommended Mitigation Measure 28: BUOW Passive Relocation and Mitigation

If BUOW are found within these recommended buffers and avoidance is not possible, it is important to note that according to the Staff Report (CDFG 2012), excluding birds from burrows is not a take avoidance, minimization, or mitigation method and is instead considered a potentially significant impact under CEQA. If it is necessary for Project implementation, CDFW recommends that burrow exclusion be conducted by qualified biologists and only during the non-breeding season, before breeding behavior is exhibited and after the burrow is confirmed empty through non-invasive methods, such as surveillance. CDFW recommends replacement of occupied burrows with artificial burrows at a ratio of one burrow collapsed to one artificial burrow constructed (1:1) to mitigate for evicting BUOW and the loss of burrows. BUOW may attempt to colonize or re-colonize an area that will be impacted; thus, CDFW recommends ongoing surveillance at a rate that is sufficient to detect BUOW if they return.

COMMENT 9: Other State Species of Special Concern

Issue: Tulare grasshopper mouse*,* San Joaquin coachwhip, western spadefoot, coast horned lizard, California glossy snake, and American badger can inhabit grassland and upland scrub habitats (Shuford and Gardali 2008, Thomson et al. 2016). All the species mentioned above have been documented to occur in the vicinity of the Project, which supports requisite habitat elements for these species (CDFW 2018).

Specific impact: Without appropriate avoidance and minimization measures for these species, potentially significant impacts associated with ground disturbance include habitat loss, nest/den/burrow abandonment, which may result in reduced health or vigor of eggs and/or young, and direct mortality.

Evidence impact is potentially significant: Habitat loss threatens all of the species mentioned above (Shuford and Gardali 2008, Thomson et al. 2016). Habitat within and adjacent to the Project represents some of the only remaining undeveloped land in the vicinity, which is otherwise intensively managed for agriculture. As a result, ground-and vegetation-disturbing activities associated with development of the Project have the potential to significantly impact local populations of these species.

Recommended Potentially Feasible Mitigation Measure(s)
To evaluate potential impacts to special-status species associated with subsequent development, CDFW recommends conducting the following evaluation of project areas and implementing the following mitigation measures.

Recommended Mitigation Measure 29: Habitat Assessment

CDFW recommends that a qualified biologist conduct a habitat assessment in advance of project implementation, to determine if project areas or their immediate vicinity contain suitable habitat for the species mentioned above.

Recommended Mitigation Measure 30: Surveys

If suitable habitat is present, CDFW recommends that a qualified biologist conduct focused surveys for applicable species and their requisite habitat features to evaluate potential impacts resulting from ground and vegetation disturbance.

Recommended Mitigation Measure 31: Avoidance

Avoidance whenever possible is encouraged via delineation and observance a 50-foot no-disturbance buffer around dens of mammals like the American badger as well as the entrances of burrows that can provide refuge for small mammals, reptiles, and amphibians.

Would the Project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by CDFW or USFWS?

COMMENT 10: Wetland and Riparian Habitats

Issue: The Project area contains numerous waterways, riparian and wetland areas. Development within the Project has the potential to involve temporary and permanent impacts to these features.

Specific impact: Project activities have the potential to result in the loss of riparian and wetland vegetation, in addition to the degradation of wetland and riparian areas through grading, fill, and related development.

Evidence impact is potentially significant: The Project area includes stream and wetland features within an agricultural landscape that also maintains undeveloped habitats. Riparian and associated floodplain and wetland areas are valuable for their ecosystem processes such as protecting water quality by filtering pollutants and transforming nutrients; stabilizing stream banks to prevent erosion and sedimentation/siltation; and dissipating flow energy during flood conditions, thereby spreading the volume of surface water, reducing peak flows downstream, and increasing the duration of low flows by slowly releasing stored water into the channel through subsurface flow. Within the San Joaquin Valley, modifications of streams to accommodate human uses has resulted in damming, canalizing, and channelizing of many streams, though some natural stream channels and small wetland or wetted areas remain (Edminster 2002). The Fish and Game Commission policy regarding wetland resources discourages development or conversion of wetlands that results in any net loss of wetland acreage or habitat value. Construction activities within these features also has the potential to impact downstream waters as a result of Project site impacts leading to erosion, scour, and changes in stream morphology.

Recommended Potentially Feasible Mitigation Measure(s)

Recommended Mitigation Measure 32: Stream and Wetland Mapping

CDFW recommends that formal stream mapping and wetland delineation be conducted by a qualified biologist or hydrologist, as warranted, to determine the baseline location, extent, and condition of streams (including any floodplain) and wetlands within and adjacent to the Project area. Please note that while there is overlap, State and Federal definitions of wetlands differ, and complete stream mapping commonly differs from delineations used by the United States (U.S.) Army Corps of Engineers specifically to identify the extent of Waters of the U.S. Therefore, it is advised that the wetland delineation identify both State and Federal wetlands in the Project area as well as the extent of all streams including floodplains, if present, within the Project area. CDFW advises that site map(s) depicting the extent of any activities that may affect wetlands, lakes, or streams be included with any Project site evaluations, to clearly identify areas where stream/riparian and wetland habitats could be impacted from Project activities.

Recommended Mitigation Measure 33: Stream and Wetland Habitat Mitigation

CDFW recommends that the potential direct and indirect impacts to stream/riparian and wetland habitat be analyzed according to each Project activity. Based on those potential impacts, CDFW recommends that the EIR include measures to avoid, minimize, and/or mitigate those impacts. CDFW recommends that impacts to riparian habitat (i.e., biotic and abiotic features) take into account the effects to stream function and hydrology from riparian habitat loss or damage, as well as potential effects from the loss of riparian habitat to special-status species already identified herein. CDFW recommends that losses to stream and wetland habitats be offset with corresponding riparian and wetland habitat restoration incorporating native vegetation to replace the value to fish and wildlife provided by the habitats lost from Project implementation. If on-site restoration to replace habitats is not feasible, CDFW recommends offsite mitigation by restoring or enhancing in-kind riparian or wetland habitat and providing for the long-term management and protection of the mitigation area, to ensure its persistence.

Editorial Comments and/or Suggestions

Federally Listed Species: CDFW recommends consulting with USFWS regarding potential impacts to federally listed species including but not limited to SJKF, BNLL, and San Joaquin woollythreads. Take under the Federal Endangered Species Act (FESA) is more broadly defined than CESA; take under FESA also includes significant habitat modification or degradation that could result in death or injury to a listed species by interfering with essential behavioral patterns such as breeding, foraging, or nesting.

Consultation with the USFWS in order to comply with FESA is advised well in advance of any Project activities.

Lake and Streambed Alteration: Project activities have the potential to substantially change the bed, bank, and channel of lakes, streams, and associated wetlands onsite and/or substantially extract or divert the flow of any such feature that is subject to CDFW's regulatory authority pursuant Fish and Game Code section 1600 et seq. Fish and Game Code section 1602 requires an entity to notify CDFW prior to commencing any activity that may (a) substantially divert or obstruct the natural flow of any river, stream, or lake; (b) substantially change or use any material from the bed, bank, or channel of any river, stream, or lake (including the removal of riparian vegetation): (c) deposit debris, waste or other materials that could pass into any river, stream, or lake. "Any river, stream, or lake" includes those that are ephemeral or intermittent as well as those that are perennial.

CDFW is required to comply with CEQA in the issuance of a Lake or Streambed Alteration Agreement (LSAA); therefore, if the CEQA document approved for the Project does not adequately describe the Project and its impacts to lakes or streams, a subsequent CEQA analysis may be necessary for LSAA issuance. For information on notification requirements, please refer to CDFW's website (https://wildlife.ca.gov/Conservation/LSA) or contact CDFW staff in the Central Region Lake and Streambed Alteration Program at (559) 243-4593.

Surface Water Diversions from outside the Project Boundary: Project-related diversions acquiring surface water from outside of the Project boundary, including the Sacramento-San Joaquin River Delta (Delta); and San Joaquin, Kings, and Kern River watersheds (including South Fork Kern River watershed) may impact additional riparian, wetland, fisheries, and terrestrial (i.e., upland) wildlife species and habitats. Special-status species and habitats located in watersheds outside of the Project area vary depending upon location. They may include, but are not limited to, the Federal threatened Central Valley distinct population segment steelhead (*Oncorhynchus mykiss*), the Federal and State threatened Central Valley spring-run evolutionary significant unit (ESU) Chinook salmon (*O. tshawytscha*), the Federal candidate and State species of special concern Central Valley fall-run and late fall-run ESU Chinook salmon (*O. tshawytscha*), the State species of special concern hardhead (*Mylopharodon conocephalus*), the State and Federal threatened giant garter snake (*Thamnophis gigas*), the State threatened Swainson's hawk and tricolored blackbird, the species of special concern burrowing owl and western pond turtle, and numerous additional special-status species and habitats.

The South Fork Kern River Valley contains the largest contiguous cottonwood-willow riparian woodland in California. Rosedale owns and manages Onyx Ranch in the South Fork Kern River Valley. CDFW owns and manages the 7,200-acre Canebrake

Ecological Reserve located on either side of Onyx Ranch. The National Audubon Society owns and manages the Audubon Kern River Preserve, a 3,275-acre preserve located on several parcels to the west of Onyx Ranch. Both properties are to be protected in perpetuity and portions of them were set aside as mitigation for other projects such as Lake Isabella construction. Project-related activities resulting in surface water diversion could significantly impact habitat on these properties and the following sensitive habitats and special-status plant and wildlife species located in the South Fork Valley: Great Valley Cottonwood Forest, Central Valley Drainage Hardhead /Squawfish Stream, the Federal threatened and State endangered yellow-billed cuckoo (*Coccyzus americanus occidentalis*), the Federal and State endangered southwestern willow flycatcher (*Empidonax trailii extimus*) and least Bell's vireo (*Vireo bellii pusillus*), the State threatened tricolored blackbird, and numerous other special-status species.

CDFW recommends that the draft EIR analyze the proposed acquisition of surface water from all watersheds and any potential direct, indirect, and cumulative biological impacts to fish and wildlife species and their habitats, as well as to properties permanently conserved to protect those resources.

Water Rights: The Project proponents will seek to acquire additional water supplies from various potential sources. CDFW recommends that the draft EIR include a detailed description of the water rights and water entitlements for the points of diversion and places of use that pertain to the proposed Project. CDFW recommends including information on the historic and current water rights and water use agreements/contracts including pre-1914 and appropriative rights, riparian rights, prescriptive rights, and adjudications.

CDFW recommends that the draft EIR address whether Rosedale or IRWD will be filing a change petition or a new application for additional surface water. As stated previously, CDFW, as Trustee Agency, is consulted by the SWRCB during the water rights process to provide terms and conditions designed to protect fish and wildlife prior to appropriation of the State's water resources. Given the potential for impacts to sensitive species and their habitats, it is advised that required consultation with CDFW occur well in advance of the SWRCB water right application process.

Water Storage Investment Program: The proposed Project received a conditional award of funding through the California Water Commission's Water Storage Investment Program (WSIP) (Cal. Code Regs., tit. 23, § 6000 et seq.). The WSIP is funded by the Proposition 1 Water Quality, Supply and Infrastructure Act of 2014. The purpose of the WSIP is to fund water storage projects that provide public benefits, improve operation of the state water system, and provide a net improvement in ecosystem and water quality conditions. "Net Improvement" means the gain or enhancement of a resource condition determined by comparing the with- and without-project future conditions less any negative outcomes of a proposed project, as defined in the WSIP regulations (Cal. Code Regs., tit.23, § 6001 (a)(50)).

"Public benefit(s)" as defined in WSIP are those public benefits associated with water storage projects outlined in Water Code section 79753(a). Ecosystem improvements is a public benefit which includes changing the timing of water diversions, improvement in flow conditions, temperature, or other benefits that contribute to restoration of aquatic ecosystems and native fish and wildlife, including those ecosystems and fish and wildlife in the Delta (Water Code § 79753(a)(1)). Ecosystems include both aquatic and terrestrial habitats and natural communities.

Pursuant to the requirements of Water Code section 79755, any project funded under WSIP shall enter into a contract with CDFW, the SWRCB, and DWR (administering agencies) to administer the public benefits of the project. CDFW is responsible for administering a contract with the Project for the implementation of ecosystem benefits that provide a net improvement.

Two ecosystem benefits proposed by the Project are pulse flow release from Oroville Reservoir and the provision of 1,280 acres of incidental wetland habitat in Kern County. CDFW will be coordinating with the Project to develop an ecosystem benefit contract and adaptive management plan for the Project. CDFW recommends that the draft EIR provide an assessment of the Project, including delivery of the WSIP public benefits. CDFW also recommends the draft EIR discuss CDFW permits or agreements that may potentially be required.

Nesting Birds: CDFW has jurisdiction over actions with potential to result in the disturbance or destruction of active nest sites or the unauthorized take of birds. Fish and Game Code sections that protect birds, their eggs and nests include sections 3503 (regarding unlawful take, possession or needless destruction of the nest or eggs of any bird), 3503.5 (regarding the take, possession or destruction of any birds-of-prey or their nests or eggs), and 3513 (regarding unlawful take of any migratory nongame bird).

CDFW encourages Project implementation to occur during the bird non-nesting season; however, if Project activities must occur during the breeding season (i.e., February through mid-September), the Project applicant is responsible for ensuring that implementation of the Project does not result in violation of the Migratory Bird Treaty Act or relevant Fish and Game Codes as referenced above.

To evaluate Project-related impacts on nesting birds, CDFW recommends that a qualified wildlife biologist conduct pre-activity surveys for active nests no more than 10 days prior to the start of ground disturbance to maximize the probability that nests that could potentially be impacted by the Project are detected. CDFW also recommends that surveys cover a sufficient area around the work site to identify nests and determine their status. A sufficient area means any area potentially affected by a project. In addition to direct impacts (i.e., nest destruction), noise, vibration, and movement of workers or equipment could also affect nests. Prior to initiation of construction activities, CDFW recommends that a qualified biologist conduct a survey to establish a behavioral baseline of all identified nests. Once construction begins, CDFW recommends that a qualified biologist continuously monitor nests to detect behavioral changes resulting from the project. If behavioral changes occur, CDFW recommends that the work causing that change cease and CDFW be consulted for additional avoidance and minimization measures.

If continuous monitoring of identified nests by a qualified wildlife biologist is not feasible, CDFW recommends a minimum no-disturbance buffer of 250 feet around active nests of non-listed bird species and a 500-foot no-disturbance buffer around active nests of non-listed raptors. These buffers are advised to remain in place until the breeding season has ended or until a qualified biologist has determined that the birds have fledged and are no longer reliant upon the nest or parental care for survival. Variance from these no-disturbance buffers is possible when there is compelling biological or ecological reason to do so, such as when the construction area would be concealed from a nest site by topography. CDFW recommends that a qualified wildlife biologist advise and support any variance from these buffers and notify CDFW in advance of implementing a variance.

ENVIRONMENTAL DATA

CEQA requires that information developed in environmental impact reports and negative declarations be incorporated into a database, which may be used to make subsequent or supplemental environmental determinations (Pub. Resources Code, § 21003, subd. (e)). Accordingly, please report any special-status species and natural communities detected during Project surveys to the CNDDB. The CNNDB field survey form can be found at the following link: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/CNDDB_FieldSurveyForm.pdf. The completed form can be mailed electronically to CNDDB at the following email address: CNDDB@wildlife.ca.gov. The types of information reported to CNDDB can be found at the following link: http://www.dfg.ca.gov/biogeodata/cnddb/plants_and_animals.asp.

FILING FEES

The Project, as proposed, would have an impact on fish and/or wildlife, and assessment of filing fees is necessary. Fees are payable upon filing of the Notice of Determination by the Lead Agency and serve to help defray the cost of environmental review by CDFW. Payment of the fee is required in order for the underlying project approval to be operative, vested, and final (Cal. Code Regs, tit. 14, § 753.5; Fish & G. Code, § 711.4; Pub. Resources Code, § 21089).

CONCLUSION

CDFW appreciates the opportunity to comment on the NOP to assist Rosedale in identifying and mitigating Project impacts on biological resources.

If you have questions regarding these comments, please contact Annette Tenneboe, Senior Environmental Scientist (Specialist), at the address on this letterhead, by phone at (559) 243-4014 extension 231, or by email at Annette.Tenneboe@wildlife.ca.gov.

Sincerely,

DocuSigned by:
Julie Vance
FA83F09FE08945A...

Julie A. Vance
Regional Manager

Attachment

ec: Office of Planning and Research
State Clearinghouse
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Josh Grover
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California Department of Fish and Wildlife

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Attachment 1

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
RECOMMENDED MITIGATION MONITORING AND REPORTING PROGRAM (MMRP)

PROJECT: Kern Fan Groundwater Storage Project

RECOMMENDED MITIGATION MEASURES	STATUS/DATE/INITIALS
Before Disturbing Soil or Vegetation	
Recommended Mitigation Measure 1: SJKF Habitat Assessment	
Recommended Mitigation Measure 2: SJKF Surveys	
Recommended Mitigation Measure 3: SJKF Take Authorization	
Recommended Mitigation Measure 4: BNLL Habitat Assessment	
Recommended Mitigation Measure 5: BNLL Surveys	
Recommended Mitigation Measure 7: SJAS Habitat Assessment	
Recommended Mitigation Measure 8: SJAS Surveys	
Recommended Mitigation Measure 9: SJAS Avoidance	
Recommended Mitigation Measure 10: SJAS Take Authorization	
Recommended Mitigation Measure 11: TKR Habitat Assessment	
Recommended Mitigation Measure 13: TKR Surveys	
Recommended Mitigation Measure 14: TKR Take Authorization	
Recommended Mitigation Measure 15: Focused SWHA Surveys	
Recommended Mitigation Measure 17: Tree Removal	
Recommended Mitigation Measure 18: SWHA Take Authorization	
Recommended Mitigation Measure 19: TRBL Surveys	
Recommended Mitigation Measure 21: TRBL Take Authorization	
Recommended Mitigation Measure 22: Special-Status Plant Surveys	
Recommended Mitigation Measure 24: Listed Plant Species Take Authorization	
Recommended Mitigation Measure 25: BUOW Habitat Assessment	
Recommended Mitigation Measure 26: BUOW Surveys	

RECOMMENDED MITIGATION MEASURES	STATUS/DATE/INITIALS
Recommended Mitigation Measure 28: BUOW Passive Relocation and Mitigation	
Recommended Mitigation Measure 29: Habitat Assessment (Other Species of Special Concern)	
Recommended Mitigation Measure 30: Surveys (Other Species of Special Concern)	
Recommended Mitigation Measure 32: Stream and Wetland Mapping	
Recommended Mitigation Measure 33: Stream and Wetland Habitat Mitigation	
During Construction	
Recommended Mitigation Measure 6: BNLL Take Avoidance	
Recommended Mitigation Measure 12: TKR Avoidance	
Recommended Mitigation Measure 16: SWHA Avoidance	
Recommended Mitigation Measure 20: TRBL Colony Avoidance	
Recommended Mitigation Measure 23: Special-Status Plant Avoidance	
Recommended Mitigation Measure 27: BUOW Avoidance	
Recommended Mitigation Measure 31: Avoidance (Other Species of Special Concern)	

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ALLIANCES IN MEXICO
AND SRI LANKA

May 8, 2020

VIA EMAIL eaverett@rrbwsd.com

Eric Averett
General Manager
Rosedale-Rio Bravo Water Storage District
P.O. Box 20820
Bakersfield, CA 93390-0820

Re: City of Bakersfield's Comments to Notice of Preparation of an Environmental Impact Report for Kern Fan Groundwater Storage Project.

Dear Mr. Averett:

On behalf of the City of Bakersfield ("City" or "Bakersfield"), we submit the following comments to the Notice of Preparation ("NOP") of an Environmental Impact Report ("EIR") for the Kern Fan Groundwater Storage Project ("Project") issued by the Rosedale-Rio Bravo Water Storage District ("Rosedale") on April 8, 2020.

1. Potential Transfer of Local Water Supplies Out of Area

The City is concerned that the Project will involve the transfer or sale of local water supplies, including the waters of the Kern River, out of Kern County to the Irvine Ranch Water District ("Irvine").

Irvine is a California Water District that provides water "to approximately 422,000 residents encompassing 181 square miles in central Orange County." (NOP, p. A-2.) The NOP indicates that one of the primary purposes and goals of the Project is to increase Irvine's water supply. Specifically, one of the "Project Objectives" is to provide Irvine's "customers and partners with increased water supply reliability during periods when other supply sources may be reduced or interrupted." (NOP, p. A-3.) The NOP further indicates that up to 37,500 acre-feet of "storage capacity" in the Project will be allocated to Irvine, and that Irvine will use water held in that "account" for "M&I uses." (NOP, p. A-4.)

The NOP also indicates that although the Project will primarily involve the recharge and recovery of State Water Project ("SWP") water supplies, the Project will also utilize other water supplies "from various sources, that may include federal, state, and local supplies." (NOP, p. A-5.) Those sources "may also include supplies from the CVP, and high-flow Kern River water depending on annual hydrologic availability, water rights and regulatory considerations." (Id.)

The City reminds Rosedale that sales and transfers of local water supplies out of the County are directly contrary to the policies and interests of the City. The City has a long standing policy that Kern River water shall not be utilized outside the boundaries of the San Joaquin Valley Portion of Kern County.

The Project would appear to violate the City's policy against transfers of local water supplies out of the County. Development of a water supply for Irvine within Kern County would seem to necessarily and logically involve the transfer of local water supplies out of the County to Orange County. The NOP, moreover, confirms that the Project could involve the storage and eventual transfer of Kern River water out of the County to Irvine.

The City is concerned that the out-of-county water transfers proposed through the Project could cause substantial harm to the local environment, the local groundwater basin, the City's water resources and supplies, the Kern River, and the water resources of the entire southern San Joaquin Valley. The City therefore reserves the right to challenge the Project to prevent harm to the City and local water supplies. The City also urges Rosedale to accurately, honestly and completely review the wide ranging potential impacts of the proposed transfer of local water supplies, including Kern River water, out of the area, to Southern California.

Rosedale, moreover, holds no Kern River water rights, but only receives Kern River water from the City pursuant to a water supply agreement. Rosedale is bound, through that agreement, to only use Kern River water acquired from the City within its boundaries. The City reserves the right to challenge and prevent any effort by Rosedale to violate the place of use restriction in that agreement, through the Project or otherwise.

2. Consistency and Compliance with SGMA

The NOP states "By storing additional surface water underground in Kern County, the proposed Project would benefit groundwater levels in the Kern County Sub-basin and help support groundwater sustainability efforts required by the Sustainable Groundwater Management Act." (NOP, p. A-4.) In the very next sentence, however, Rosedale states that the Project "would enhance water supply reliability for IRWD and its partners by augmenting supplies for periods when other sources may be limited or unavailable." (Id.) That statement indicates that through the Project local groundwater supplies will be transferred out of the basin to Southern California.

Those statements therefore appear contradictory, as transfers of groundwater out of the basin would appear to directly violate and contradict the goals, policies and requirements of the

Sustainable Groundwater Management Act ("SGMA"). The EIR should address and explain that apparent conflict.

The EIR should additionally explore and explain how the Project relates to, supports and impacts SGMA requirements, the Groundwater Sustainability Plan ("GSP") recently submitted to the State of California by Rosedale, and the goal's, programs and obligations set forth in Rosedale's GSP. The EIR should also consider the impact and effect of the Project, including the proposed potential transfer of Kern River water out of the County, on the goals, projects and requirements set forth in the GSPs for the entire basin, including the "master" GSP for the Kern Groundwater Authority GSA and the GSP for the Kern River GSA.

3. Water Supplies for Project

As indicated, the NOP states that the Project will primarily use SWP water supplies, but will also utilize other water supplies "from various sources, that may include federal, state, and local supplies," including Kern River water supplies. (NOP, p. A-5.)

To comply with CEQA, the EIR must identify, explain and analyze in detail the specific sources of water that will be utilized in the Project, and the impacts associated with the use of those water supplies. The EIR must identify the current uses of the water supplies that will be used in the Project, and must review and analyze the impacts arising from the shift of those water supplies to the Project. The EIR must also identify and discuss any uncertainties associated with the proposed use of specific water supplies and sources, as well as legal, regulatory and practical limitations on the use of the water supplies identified and discussed in the EIR. (*Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412, 431; See also *California Oak Foundation v. City of Santa Clarita* (2005) 133 Cal.App.4th 1219 (in which the court rejected an EIR because the water supply analysis relied, without adequate consideration of the uncertainties of SWP supplies, on the party's purchase of 41,000 acre-feet of SWP water).)

With regard to Kern River water, the EIR should identify and review the agreements, judgments, orders, policies and practices which govern and control the conveyance of water through the Kern River channel, and the diversion and use of water from the Kern River. Without that critical information, the EIR cannot properly review the impacts of the Project on the Kern River, other local waters supplies, and entities, such as Bakersfield, that hold Kern River water rights or which use and rely on Kern River water supplies.

The EIR must also identify the extent, source and nature of the Kern River water which may be used in the Project. Rosedale, for example, has filed an application with the State Water Resources Control Board ("SWRCB") to appropriate certain Kern River water supplies. If Rosedale proposes to use water acquired through that application in the Project, the EIR should identify, discuss and review the impacts arising from the use of those Kern River water supplies in the Project, including secondary and associated impacts involving the transfer of those Kern

River water supplies to Rosedale. The EIR should also identify, consider and review the competing applications to appropriate Kern River water in connection with the discussion of alternatives, and cumulative impacts, associated with the Project.

4. Impacts on Bakersfield

The City maintains water banking and spreading facilities in very close proximity to the Project. The City also recharges water in the Kern River channel, and thereafter extracts significant quantities of water through groundwater pumping. The Project would appear to have significant impacts on these activities and operations.

An EIR must consider all impacts of a project on the environment, even if the impacts would be felt by another agency. (*San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal.App.4th 713.) The EIR must therefore thoroughly and properly assess the impact of the Project on the City, the City's water supply, and the City's use of water supplies. The EIR should also review and assess the impacts of the Project on the Kern River in general, and the environment in and around the Kern River.

5. Additional Issues and Questions

The City has the following additional comments, questions, and concerns regarding the NOP and the Project. These comments do not constitute or represent all of the City's concerns with the Project, or to the adequacy of Rosedale's, or Irvine's, compliance with CEQA.

- We understand that Rosedale did not prepare an Initial Study Environmental Checklist for the Project, presumably because it already recognizes that it is necessary to prepare an EIR for the Project. We also recognize that the NOP lists and discusses, at least briefly, all of the Environmental Factors included within an Initial Study Environmental Checklist. The EIR should still provide a detailed discussion and evaluation of all of those Environmental Factors, in at least the detail required in Initial Study Environmental Checklist.

- The EIR must consider reasonable alternatives that would satisfy the purpose and goals of the Project, including the objectives and goals of the Project, including conservation, additional sources of water, alternate storage locations, or other alternatives to the Project. It is particularly imperative that Rosedale, and Irvine, identify and consider alternatives that do not involve the transfer of local water supplies out of the Kern Subbasin.

- The EIR should identify and analyze the cumulative impacts of the Project on other banking and spreading projects in the vicinity of the Project, including banking and recharge projects operated by the City, such as the Kern River channel and the 2800 Acre recharge facility. The EIR should also identify and discuss the cumulative impacts of the planned extraction of groundwater in connection with other groundwater pumping in the vicinity of the Project.

- The NOP indicates that the EIR for the Project will "evaluate the potential for the proposed Project to affect biological resources." (NOP, p. A-7.) The NOP further states that the EIR will review "how proposed Project operations could provide benefits to threatened and endangered fish species in the Delta, as well as benefits to wetland habitat and wildlife in the Kern Fan area." (Id.) The EIR, of course, must review **all** impacts associated with and resulting from the Project, including impacts on biological resources, and not just purported beneficial impacts. The transfer of Kern River water to Southern California, for example, as called for by the Project, could have significant adverse impacts on local biological resources.

- The NOP states that the EIR "will include a program-level analysis of the effects associated with operation of the proposed recovery facilities." (NOP, p. A-8.) The NOP further refers to later additional "site-specific analysis" and review of "project-level impacts associated with the recovery operations," but it is not clear if the EIR will include or incorporate a proper and complete "project level' review of the Project, including "recovery operations." The City maintains that Rosedale cannot approve the Project until and unless it has completely, properly and sufficiently reviewed all impacts arising from the Project, including "project level impacts" associated with the Project, including the "recovery operations" involved with and contemplated by the Project.

- The NOP states that because the Project "does not include the construction of new housing," the Project "would not directly induce population growth." (NOP, p. A-9.) The NOP states that the EIR will still "analyze the Project's potential to induce indirect population growth due to the recharge, storage and extraction of surface water stored underground." (Id.) The City points out that the Project would appear to **directly** induce population growth, and construction of new housing, because the Project will provide a supplemental water source for the "approximately 422,000 residents" within the boundaries of Irvine "in central Orange County." (NOP, p. A-2.) The EIR should therefore completely, properly and sufficiently review the impacts of the Project on population and housing growth, including within Orange County.

- The NOP very generally describes conveyance facilities that will be constructed or utilized in connection with the Project, including "a new turnout, additional canals and pipelines, and pump stations," and "proposed recharge and recovery facilities." (NOP, p. A-5.) The EIR must review and analyze all impacts associated with and resulting from the construction and operation of these conveyance facilities.

- The EIR should identify and discuss "areas of controversy," including any potential opposition to the Project from neighboring water districts, and residents and landowners in the region. (14 Cal. Code Regs. §15123.) That analysis is necessary and relevant, in part, because Rosedale is currently involved in litigation with the City with regard to Kern River water supplies, and Rosedale recently was involved in litigation with neighboring water districts and water banks, including the Kern Water Bank.

- On February 22, 2018, Rosedale issued an NOP for the "Onyx Ranch South Fork Valley Water Project." Bakersfield thereafter submitted detailed comments to the NOP, which comments identified a number of concerns with and objections to that project. The EIR for the present Project should explain the relationship, if any, between the two projects. In particular, the EIR should identify whether any water that would be produced by the Onyx Ranch project would be used in connection with the Project.

The statements and comments in this letter constitute only the City's comments to the NOP. The City reserves the right to comment on and raise appropriate objections and challenges to the Project, the EIR which will be prepared in connection with the Project, and any other efforts or approvals related to the Project.

We thank you for consideration of these comments. Please let us know if you have any questions with regard to these comments.

Sincerely,

Colin L. Pearce

Colin L. Pearce

CLP:bah

cc: Virginia Gennaro, City Attorney, City of Bakersfield
Art Chianello, Water Resources Manager, City of Bakersfield

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DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
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(916) 653-5791

May 8, 2020

Eric Averett
General Manager
Rosedale-Rio Bravo Water Storage District
P.O. Box 20820
Bakersfield, CA 93390-0820

Dear Mr. Averett:

This letter is to respond to the Notice of Preparation (NOP) that has been prepared to notify agencies and interested parties about the initiation of a California Environmental Quality Act (CEQA) review for the Kern Fan Groundwater Storage Project.

We anticipate that the California Department of Water Resources (DWR) could ultimately be a responsible agency, along with the California Department of Fish and Wildlife and the California Water Commission for this project. DWR anticipates agreements would be required with the Groundwater Banking Authority (Authority) and the Kern County Water Agency to implement the project. DWR would also need to coordinate with the Authority on CEQA requirements DWR may have on parts of the Project dealing with releases from Oroville Reservoir and a new turnout. Additionally, project descriptions would need to be developed for DWR discretionary actions in any CEQA document DWR may prepare.

DWR staff has been working with the Authority to review the project and to help analyze potential operational scenarios for consistency with State Water Project (SWP) operations. Through this cooperation we may identify additional issues to be included in the Authority's CEQA document.

For the purposes of this NOP we have identified the following subject areas related to the SWP that will warrant analysis for any potential impacts. These include:

-SWP water delivery operations
-Oroville storage
-Oroville recreation
-Fishery in the Feather River and downstream
-Energy impacts
-SWP water rights
-SWRCB water quality control planning
- Voluntary settlements
-Endangered Species Act compliance
-FERC Licensing requirements
-Construction on or near the California Aqueduct
-Subsidence on California Aqueduct

We also ask you to consider this Project's relationship to other projects under Water Storage Investigation Program for possible cumulative impacts. We note that the Project Description says that pulse flows released from Oroville Reservoir may be released in critically dry years. Initial analysis by DWR shows that releases in critically dry years are likely not possible. We will work with the Authority to further analyze this.

We look forward to working with the Authority on your EIR.

Sincerely,

Ted Craddock
Acting Deputy Director
State Water Project

cc: Holly Melton, Kern County Water Agency

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May 8, 2020 50 Environmental

Mr. Eric Averett
Rosedale-Rio Bravo Water Storage District
P.O. Box 20820
Bakersfield, CA 93390-0820

Re: Notice of Preparation of an Environmental Impact Report for the Kern Fan Groundwater Storage Project

Dear Mr. Averett:

The Kern County Water Agency (Agency) would like to thank you for the opportunity to comment on the Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the Kern Fan Groundwater Storage Project (Project).

The Agency was created by the California State Legislature in 1961 to contract with the California Department of Water Resources for State Water Project (SWP) water. The Agency has contracts with water districts throughout Kern County to deliver SWP water. The Agency also manages and/or is a participant in multiple groundwater banking projects, including the Kern Water Bank, Pioneer Property and Berrenda Mesa banking projects. Additionally, the Agency maintains and operates the Cross Valley Canal (CVC). Therefore, the Agency is uniquely qualified to provide comments.

The Agency is generally supportive of projects that seek to improve the water supply and reliability of Kern County water users. However, the proposed Project has the potential to significantly impact other water users within Kern County. Therefore, the EIR should demonstrate that the Project will not impact the Agency and other Kern County interests.

Comment 1: The EIR should evaluate the proposed Project facilities' impact on the California Aqueduct, nearby wells, existing Kern Fan banking projects and the CVC.

The NOP indicates the proposed Project will construct up to 12 extraction wells to recover up to 50,000 acre-feet (p. A-5). The document further indicates the proposed Project will construct additional facilities including canals, pipelines, pump stations and turnouts (p. A-5) within or nearby Rosedale-Rio Bravo Water

Storage District's (Rosedale) service area. The EIR should discuss and analyze the proposed Project facilities' impacts on the California Aqueduct, nearby wells, existing Kern Fan banking projects and the CVC, including but not limited to, impacts to groundwater levels and water deliveries, water quality and supplies.

Comment 2: The EIR should define and analyze coordinated operations.

The NOP makes multiple references to coordinated operations with Rosedale facilities, but does not describe what the coordination will entail. While the NOP indicates the "incremental" effects of coordinated operations will be analyzed (p. A-8), the EIR must also fully define coordinated operations so a meaningful analysis can be performed.

Comment 3: The proposed Project should ban the use of harmful chemicals in farming practices.

The NOP states the proposed Project "would be managed to allow agricultural land uses (e.g., annual farming or grazing) to continue when the basins are empty" (p. A-5). While the Agency is supportive of grazing operations, farming practices should be prohibited unless the use of pesticides and herbicides in farming practices on the property is banned to avoid water quality impacts from the various chemicals or their degradants during recharge operations.

Agency staff have coordinated and discussed with Rosedale and the California Department of Water Resources various aspects of the Project including the Ecosystem Account, Sacramento-San Joaquin Delta operations and California Aqueduct operations specifically within the Agency's service area and anticipate reviewing the detailed analyses in the EIR.

Agency staff looks forward to continuing to work with Rosedale to ensure the Agency's concerns are adequately addressed. If you have any questions, please contact Monica Tennant of my staff at (661) 634-1400.

Sincerely,

Holly Melton

Holly Melton
Water Resources Manager

May 8, 2020

Mr. Eric Averett
Rosedale – Rio Bravo Water Storage District
849 Allen Road
Bakersfield, CA 93302

Subject: Notice of Preparation of an Environmental Impact Report for the Kern Fan Groundwater Storage Project

Dear Mr. Averett:

The Kern Water Bank Authority (KWBA) appreciates the opportunity to provide comments on the Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the Kern Fan Groundwater Storage Project (Project). The NOP indicates Rosedale – Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (Irvine) plan to develop a Project consisting of up to 1,300 acres of recharge basins and approximately 12 recovery wells capable of recharging approximately 100,000 AFY. Up to 25 percent of the recharge and storage capacity would be available to the Department of Water Resources; the remaining 75 percent would be split evenly between Rosedale and Irvine.

Some of the information that will be necessary for us to evaluate the Project will include:

- A cumulative analysis of all of Rosedale's and Irvine's banking and sales programs, including information regarding the ability of Rosedale to meet both the demands of the district's landowners and banking and sales obligations. This analysis should evaluate a worst-case scenario wherein Rosedale has to meet all its current and expected obligations during a prolonged drought, including the water level changes resulting from landowner groundwater pumping.
- Detailed analysis of the Project's expected impacts to water levels and quality. This analysis should consider the worst-case scenario wherein Rosedale needs to return water stored for all or its programs in consecutive years.
- Information on proposed well locations, screened intervals, expected recovery rates and recovery rate declines. The recovery rate declines will be important in evaluating the programs worst-case recovery scenarios mentioned above.

- Regional studies have indicated the lands in the western Phase 2 Project area are underlain by the Corcoran or equivalent clay which would result in a shallower unconfined aquifer and deeper confined aquifer. How will the project address these conditions? If groundwater recovery is proposed within the confined aquifer, the analysis needs to address the potential for, and mitigation of, subsidence caused by the project.
- Detailed information on water sources for the Project, particularly with respect to water that will be sold or otherwise provided to IRWD by Rosedale.

Finally, and perhaps most importantly, the Department of Water Resources developed mitigation measures to reduce or otherwise mitigate impacts, including cumulative effects, from the Kern Water Bank and other water banking programs on the Kern Fan to less than significant (see attached). KWBA would expect the Project to consider, adopt and implement substantially similar measures for the Project.

Thank you for the opportunity to provide input for your proposed EIR. Please call if you have any questions.

Sincerely,
Kern Water Bank Authority,

Jonathan D. Parker,
General Manager

cc: KWBA Board of Directors and Counsel
Fiona Sanchez, Irvine Ranch Water District
David Okita, Department of Water Resources

KWBA Resolution
Attachment C

Mitigation Measures for KWBA Resolution

7.1-2 *KWBA will establish a program that meets the following requirements in accordance with the Long-Term Project Recovery Operations Plan regarding Kern Water Bank Project (2016 KWB Long-Term Operations Plan, Attachment A):*

A. *Monitor and Report Groundwater Conditions to KWBA's Board of Directors and the Public*

1) *KWBA will monitor groundwater levels monthly, except during periods of no recovery when monitoring will occur at least quarterly. KWBA may rely on monitoring conducted by the Kern Fan Monitoring Committee to meet these requirements.*

2) *KWBA will report current groundwater levels to its Board of Directors at each monthly regular meeting, and will make the reports available to the public on its website (http://www.kwb.org/).*

3) *KWBA will regularly update its Groundwater Model (Model) to actual conditions and use the Model to project future groundwater conditions. KWBA will endeavor to use the best practicable science and latest information available in all modeling and technical matters. KWBA will report the results of its modeling to its Board of Directors and will make the results available to the public on its website (http://www.kwb.org/). Recovery of banked groundwater in any calendar year beyond March 15 of that year shall not commence (or continue) until the Model has been run for projected KWB operations and the results have been reported to* KWBA's Board of Directors and made available to the public*. Model data for a preceding year becomes available at different times in the following year. Modeling at the beginning of any given year will necessitate estimating certain model input data for the preceding year (e.g., Kern River losses). These estimates will be replaced with actual data at regular intervals when the model is updated.*

B. *Implement Proactive Measures (in addition to A above)*

1) *KWBA will use its Model as a tool to evaluate potential groundwater impacts resulting from its project operations. The Model will be periodically run and updated as projected recovery plans become known or changed and the Model will assume such conditions as described in A.3.*

2) *The Model will be used to:*

a) *Forecast groundwater levels.*

b) *Forecast and predict the contribution of KWB Operations to groundwater level declines in the area.*

c) *Determine water level conditions with "Without KWB Operations" for purposes of evaluating the potential impact of "With KWB Operations". The "Without KWB Operations" is the water level that would have been at any particular well location absent "KWB Operations."*

d) *Identify, based upon an analysis of "Without KWB Operations" versus "With KWB Operations," if a* ***negative potential impact ("NPI")*** *has or is likely to occur for which the measures described at D, E, and F may be operative.* ***NPI*** *is determined according to C.1 below.*

e) *Forecast any localized areas for special attention and/or additional monitoring where groundwater levels will decline 30 or more feet below the "Without KWB Operations" groundwater level.*

f) *Identify wells at risk of potential impacts during recovery operations.*

3) *KWBA will provide notification on its website if the Model shows that an* ***NPI*** *has or is likely to occur, including steps that potentially affected landowners must follow if the landowner desires to make a claim to KWBA regarding potential well impacts due to KWBA's recovery operations.*

C. ***Implement Triggers and Actions***

The actions described in sections D, E, and F will be implemented in consultation with affected landowners/well owners that make a claim to KWBA regarding well impacts relating to KWBA's recovery operations and groundwater level declines, subject to the following:

1) *The trigger for mitigation shall be based upon an analysis and comparison of Model generated "Without KWB Operations" versus "With KWB Operations." When "With KWB Operations" are 30 feet deeper than the "Without KWB Operations" at an operative well, and the well has (or is expected to) experience mechanical failure or other operational problems due to declining water levels, a* ***negative potential impact ("NPI")*** *is triggered. If KWBA enters into a joint operations agreement with other water banks in the area, the depth at which a* ***NPI*** *is triggered shall provide an equivalent measure of potential impact as described in the 2016 KWB Long-Term*

Operations Plan.

2) *For a well owner to be eligible for mitigation as provided below, the affected landowner shall submit a claim to KWBA, in accordance with the Government Claims Act, which shall, at a minimum, provide information concerning the condition of the well and casing and pumping equipment of the well, and other information that is relevant to the landowner's claim. Upon receipt of a claim, KWBA shall use the Model (or the results of modeling as reported to the Board and the public) to determine whether an **NPI** exists at the landowner's well and respond with the appropriate action described below.*

3) *KWBA will provide mitigation and/or compensation for the KWB Operations' contribution to the adverse impact. Mitigation and/or compensation is not required for a well owner's lack of well maintenance, normal wear and tear, depreciation, failure of well equipment, well casing degradation, etc., or other reasons not relating to KWB Operations.*

D. ***Implement Action for Agricultural Wells When Well Adjustment Is Needed and Available***

1) *Trigger: When the Model predicts **NPI** for an operational agricultural well outside the current operating range of the pump but within the potential operating range of the well.*

2) *KWBA actions will be completed within 60 days (provided that the land/well owner cooperates) from receipt of a claim as follows:*

   a) *Field verify (with the affected landowner if requested) static depth to groundwater levels within the well and compare to Model values to determine if flow stoppage is due to groundwater level decline due to KWB operations. If needed:*

      - *Obtain right-of-entry permit and well data release from well owner.*
      - *Collect pump manufacturer data, the in-situ pump setting, and casing depth information.*

   b) *Compare pump setting information with Model projected pumping water levels throughout the year to determine pump submergence levels and evaluate the necessity and feasibility of lowering the well pump to meet the landowner's needs to provide the least-cost short and long-term solution.*

c) *Develop a cost estimate to complete the necessary work.*

d) *Develop and submit a report to the landowner informing the landowner of the findings and proposed actions, including denying the claim because groundwater declines are not due to KWB operations.*

3) *At KWBA's option, it may reduce or adjust pumping of its wells as necessary to prevent, avoid, or eliminate the* ***NPI****, using the Model to identify the well or wells that may require reduction or adjustment in pumping.*

4) *If groundwater declines are due to KWB operations, unless D.3 occurs, once agreement is reached between KWBA and the landowner pursuant to D.2.b and all cost estimates have been completed, pay costs associated with the landowner claim (considering C.3 above), including the cost to complete the necessary work.*

E. ***Implement Action for Agricultural Wells When Well Adjustment Is Unavailable***

1) *Trigger: When the Model predicts* ***NPI*** *for an operational agricultural well outside the current and potential operating range of the well.*

2) *KWBA actions will be completed within 60 days (provided that the land/well owner cooperates) from receipt of a claim as follows:*

a) *Field verify (with the affected landowner if requested) static depth to groundwater levels within the well and compare to Model values to determine if flow stoppage is due to groundwater level decline due to KWB operations. If needed:*

- *Obtain right-of-entry permit and well data release from well owner.*

- *Collect pump manufacturer data, the in-situ pump setting, and casing depth information.*

b) *Identify water of an equivalent water quantity and quality suitable for agricultural uses for the affected landowner from an alternate source at no greater cost to the affected landowner or, with the consent of the affected landowner, identify acceptable mitigation (for example, drill and equip a new well) to provide the least-cost short- and long-term solution, including an estimate to complete the necessary work.*

Develop and submit a report to the landowner informing the landowner of the findings and resulting proposed actions, including denying the claim because groundwater declines are not due to KWB operations.

3) *At KWBA's option, it may reduce or adjust pumping of its wells as necessary to prevent, avoid, or eliminate the* ***NPI*** *using the Model to identify the well or wells that may require reduction or adjustment in pumping.*

4) *If groundwater declines are due to KWB operations, unless E.3 occurs, once an agreement is reached between KWBA and the landowner to provide mitigation pursuant to E.2.b and all cost estimates have been completed, pay costs associated with the landowner claim (considering C.3 above), including the cost to complete the necessary work.*

F. *Implement Action for Domestic Wells*

1) *Trigger: When the Model predicts* ***NPI*** *for a domestic well that is outside the current operating range of the pump but within the potential operating range of the well production.*

2) *KWBA's actions will be completed within 60 days (provided that the land/well owner cooperates) from receipt of a claim as follows:*

   a) *Field verify (with the affected landowner if requested) static depth to groundwater levels within the well and compare to Model values to determine if flow stoppage is due to groundwater level decline. If needed:*

      - *Obtain right-of-entry permit and well data release from well owner.*

      - *Collect pump manufacturer data, the in-situ pump setting, and casing depth information.*

   b) *Identify availability and cost of a permanent connection to the nearest water service provider.*

   c) *Identify acceptable mitigation (for example, lower the domestic submersible pump bowl setting sufficient to restore and maintain service or drill and equip a new well that complies with applicable county well standards) to provide the least-cost short- and long-term solution, including an estimate to complete the necessary work.*

d) *Develop and submit a report to the landowner informing the landowner of the findings and resulting proposed actions, including denying the claim because groundwater declines are not due to KWB operations.*

e) *If necessary for emergency health and safety concerns, provide interim in-home water supplies within 14 days after receipt of the claim until a permanent mitigation action is implemented or the claim has been denied because groundwater declines are not due to KWB operations.*

3) *At KWBA's option, it may reduce or adjust pumping of its wells as necessary to prevent, avoid, or eliminate the **NPI** using the Model to identify the well or wells that may require reduction or adjustment in pumping.*

4) *If groundwater declines are due to KWB operations, unless F.3 occurs, once an agreement is reached for KWBA to provide mitigation pursuant to F.2.c above and all cost estimates have been completed, pay costs associated with the landowner claim (considering C.3 above), including the cost to complete the necessary work.*

7.1-7 *KWBA will implement the following measures in accordance with the KCWA and KWBA CVC Agreement (Attachment B):*

a) *KWBA will monitor water levels frequency, evaluating groundwater conditions on a weekly/monthly basis.*

b) *KWBA will coordinate water operations with KCWA*.

c) *KWBA will manage recharge operations to help ensure that groundwater gradient is away from the CVC during shallow groundwater conditions. Should groundwater conditions develop that might induce piping behind the CVC's liner, KWBA will minimize recharge adjacent to the CVC either by reducing inflow to adjacent ponds or increasing the setbacks of adjacent ponds.*

7.2-2 *KWBA will implement the following measures:*

b) *Hazardous waste sites would be subject to the county public health department and/or the CVRWQCB oversight with the responsible parties. KWBA will cooperate with the regulatory agency(s) during the process and provide pertinent groundwater elevations and water quality data the regulatory agencies may request.*

c) *On an annual basis, KWBA shall report the status of shallow groundwater level monitoring activities and water quality analysis in areas of contamination to the Kern Fan Monitoring Committee.*

d) *KWBA will continue to monitor and evaluate the nature and extent of any current and future contamination and remediation within KWB Lands as follows:*

i. *For all evaluation and monitoring activities performed by third parties on KWB Lands, KWBA shall obtain reports and sampling data as soon as they become available. Monitoring and evaluation shall continue until verification by third party documentation, regulatory correspondence, and/or laboratory analysis is obtained that indicates soil or groundwater contamination has been remedied and no longer provides a threat to groundwater quality.*

ii. *On an annual basis, KWBA shall report the status of contamination for each issue and provide water quality data monitoring activities, where available, to the Kern Fan Monitoring Committee. Any newly discovered contamination shall be reported to the Kern Fan Monitoring Committee immediately.*

7.2-3 *KWBA will implement the following measures:*

a) *Prior to construction, identify all plugged and abandoned wells through agency contacts. This includes identification of abandoned wells through the DOGGR website, field verification of an abandoned well prior to construction, notifying DOGGR of intent to construct a recharge pond adjacent to or over an abandoned well.*

b) *Modify excavation and grading activities to ensure the near surface seals and wellhead remain undamaged.*

c) *If the top of an abandoned well or wellhead is damaged during pond construction, appropriate authorities (i.e., DOGGR, CVRWQCB, and/or Kern County Environmental Health) will be notified as to the nature and extent of the damage along with plans to repair the damage, as needed and in accordance with existing regulations.*

7.4-3 *KWBA will implement the following terms required of KWBA as specified in the 1997 Monterey IS and Addendum, in this 2016 KWBA Resolution, and KWB HCP/NCCP, including Appendix A (Kern Water Bank Operations Manual), Appendix C (Kern Water Bank Vegetation Management Plan, and Appendix D (Kern Water Bank Waterbird Management Plan):*

a) *Biological Monitor*

A qualified biologist shall monitor all ground disturbing activities during construction in the Sensitive Habitat Sector and will oversee measures undertaken to reduce the take of listed species.

b) *Construction Practices*

i. *Delineation of Disturbance Areas – During construction, KWBA shall clearly delineate disturbance area boundaries by stakes, flagging, or by reference to terrain features, as provided in the KWB HCP/NCCP ~~directed by CDFG and USFWS~~ to minimize degradation or loss of adjacent wildlife habitats during operation.*

ii. *Signage – During construction, KWBA shall post signs and/or place fencing around construction sites to restrict access of vehicles and equipment unrelated to site operations.*

iii. *Resource Agency Notification – At least 20 working days prior to initiating ground disturbance for project facilities in designated salvage/relocation areas, KWBA shall notify the Fresno Field Office of CDFW~~G~~ and the Sacramento Field Office of USFWS of its intention to begin construction activities at a specific location and on a specific date. The agencies will have ten working days to notify the KWBA of their intention to salvage or relocate listed species in the construction area. If KWBA is notified, it shall wait an additional five days to allow the salvage/relocation to take place.*

iv. *Salvage and Relocation – KWBA shall allow time and access to USFWS and/or CDFW~~G~~, or their designees, to relocated listed species, at the Resource Agencies' expense, from construction areas prior to disturbance of areas that have been identified by the Resource Agencies as having known populations of the listed species they wish to salvage or relocate.*

v. *Construction Site Review – All construction pipes, culverts, or similar structures with a diameter of three inches or greater that are stored at a construction site on the Kern Water Bank for one or more overnight periods shall be thoroughly inspected for trapped kit foxes and other animals before the subject pipe is subsequently buried, capped, or otherwise used or moved in any way. Pipes laid in trenches overnight shall be capped. If during construction a kit fox or other animal is discovered inside a pipe, that section of pipe shall not be moved or, if necessary, shall be moved only once to remove it from the path of construction activity until the animal has escaped.*

vi. *Employee Orientation – An employee orientation program for construction crews, and others who will work on-site during construction, shall be conducted and shall consist of a brief consultation in which persons knowledgeable in endangered species biology and legislative protection explain endangered species concerns. The education program shall include a discussion of the biology of the listed species, the habitat needs of these species, their status under FESA and CESA, and measures being taken for the protection of these species and their habitats as a part of the project. The orientation program shall be conducted on an as needed basis prior to any new employees commencing work* *on the Kern Water Bank. Every two years or at the beginning of construction for the Supply/Recovery canal, a refresher course will be conducted for employees previously trained. A fact sheet conveying this information shall also be prepared for distribution to all employees. Upon completion of the orientation, employees shall sign a form stating that they attended the program and understand all protection measures. These forms shall be filed at KWBA's office and shall be accessible by CDWF~~G~~ and USFWS.*

vii. *Standards for Construction of Canals – Concrete-lined canals will have a side slope of 1.5 to 1 or less and the sides will have a concrete finish which will assist in the escape of animals. If canals are determined by CDFW~~G~~ or USFWS to be substantial impediments to kit fox movement, plank or pipe crossings will be provided across concrete canals in areas identified as having high kit fox activity.*

c) *On-Going Practices*

i. *Equipment Storage - All equipment storage and parking during site development and operation shall be confined to the construction site or to previously disturbed off site areas that are not habitat for listed species.*

ii. *Traffic Control - KWBA's project representative shall establish and issue traffic restraints and signs to minimize temporary disturbances. All construction related vehicle traffic shall be restricted to established roads, construction areas, storage areas, and staging and parking areas. Project related vehicles shall observe a 25 MPH speed limit in all project areas except on county roads and state and federal highways.*

iii. *Food Control - All food-related trash items such as wrappers, cans, bottles, and food scraps generated both during construction and during subsequent facility operation shall be disposed of in closed containers and shall be regularly removed from the site. Food items may attract kit foxes onto a project site, consequently exposing such animals to increased risk of injury or mortality.*

iv. *Dog Control - To prevent harassment or mortality of kit foxes or destruction of kit fox dens or predation on this species; no domestic dogs or cats, other than hunting dogs, shall be permitted on-site.*

v. *Pesticide Use - Use of rodenticides and herbicides on the site shall be permitted in accordance with the Vegetation Management Plan, which incorporates by reference the Interim Measures for Use of Rodenticides in Kern County, and which will incorporate by reference any other applicable laws, rules, and regulations regarding the use of pesticides as they take effect.*

d) *Project Representatives*

KWBA shall designate a specific individual as a contact representative between KWBA, USFWS, and CDFW~~G~~ to oversee compliance with protection measures-detailed herein. KWBA shall provide written notification of the contact representative to CDFW~~G~~ and USFWS within 30 days of issuance of the Permits and the Management Authorizations. Written notification shall also be provided by KWBA to CDFW~~G~~ and USFWS in the event that the designee is changed.

e) *Notification Regarding Dead, Injured or Entrapped Listed Animals*

Any employee or agent of KWBA who kills or injures a San Joaquin kit fox, blunt nosed leopard lizard, Tipton kangaroo rat, San Joaquin antelope squirrel, or other listed species listed as a threatened or endangered animal under FESA or CESA, or who finds any such animal either dead, injured, or entrapped on the Kern Water Bank shall report the incident immediately to KWBA's representative who shall, in turn, report the incident or finding to USFWS and CDFW~~G~~. In the event that such observations are of entrapped animals, escape ramps or structures shall be installed immediately to allow the animal(s) to escape unimpeded. In the event that such, observations are of injured or dead animals, KWBA shall immediately notify USFWS and CDFW~~G~~ by telephone or other expedient means. KWBA shall then provide formal notification to USFWS and CDFW~~G~~, in writing, within three working days of the finding of any such animal(s). Written notification shall include the date, time, location, and circumstances of the incident.

The USFWS contact for this information shall be the Assistant Field Supervisor for Endangered Species, Sacramento Field Office. The CDFW~~G~~ contact shall be the Environmental Services Supervisor at the San Joaquin Valley-Southern Sierra Region Headquarters.

USFWS or CDFW~~G~~ will be notified if any other animal, which is otherwise a listed species, is found dead or injured.

f) *Construction of Supply/Recovery Canal*

Within 60 days prior to the construction of the supply/recovery canal within the zone marked within the Map of the Kern Water Bank, KWBA shall conduct a limited survey within the area of the Kern Water Bank, which will be affected by that construction, with the sole goal of identifying potential San Joaquin kit fox dens. KWBA shall contact USFWS and CDFW~~G~~ pursuant to the salvage procedures set forth above if any kit fox dens are found.

g) *Take Avoidance Protocol for Fully Protected Species*

Although a population of blunt nosed leopard lizards was relocated to the Kern Water Bank, there is no known present occurrence of them. Existing data on the blunt nosed leopard lizard at the Kern Water Bank indicates that populations, if they exist, occur within habitat set asides (either sensitive, compatible, or conservation bank habitat), thus the likelihood of take from project construction, operation, and maintenance is negligible. However, in the future adaptive management measures may expand to areas of suitable habitat.

Three other species, which may be found on the Kern Water Bank, are also state designated fully protected species: American peregrine falcon, Greater sandhill crane, and White-tailed kite. The likelihood of the take of any of these species from project construction, operation, and maintenance is negligible due to their mobility and preferred habitats. ~~However, to avoid any take of these species, the same take avoidance protocol as set out for the blunt nosed leopard lizard shall apply to each of these three species.~~

KWBA will comply with the terms of the NCCP Approval and Take Authorization as it relates to ~~Until such time that the KWBA obtains appropriate authorization for take of the~~ state-designated fully protected species ~~blunt-nosed leopard lizard by the Fish and Game Commission, t~~ The following take avoidance protocol shall apply in any areas that contain suitable habitat for fully protected species not covered by authorization for take of state-designated fully protected species identified in this subsection (g) ~~of the blunt-nosed leopard lizard~~:

i. *A qualified biologist shall survey any areas proposed for project related disturbance that contain suitable habitat for fully protected species ~~the blunt-nosed leopard lizard~~ to determine the likelihood of presence. ~~Suitable habitat consists of valley and foothill grasslands, saltbush scrubland, iodine bush grassland, and alkali flats.~~*

ii. *If these fully protected species ~~blunt nosed leopard lizards~~ are found to occur in areas proposed for project facilities construction or maintenance, ~~consideration of~~ avoidance should take place. ~~first. If avoidance is not practicable, then the blunt nosed leopard lizard will be trapped and relocated prior to disturbance at KWBA's expense in accordance with the applicable annual management plan. This work must be done by or under the direction of USFWS staff by persons with appropriate experience and with their own take for scientific purposes permits. This procedure will avoid any violation of state law~~.*

The use of a biological monitor, and special construction activities and on- going practices will result in a heightened awareness and education regarding sensitive biological resources, which will reduce the potential for impacts on special-status species. In addition, the use of a project representative as a liaison between the KWBA and the resource agencies will expedite notification regarding any take of a listed animal. ~~While take of a fully protected species is not anticipated, this mitigation outlines avoidance protocol to further reduce the likelihood of said take.~~ Together these mitigation measures and the beneficial net increase of habitat for special- status species through implementation of the HCP/NCCP will reduce any potential impact to a less-than-significant level.

7.11-1 *KWBA will implement the following measures:*

c) *Provide a comprehensive Worker Environmental Awareness Program (WEAP) that will include all training requirements identified in Best Management Practices, Worker Site Specific Health and Safety Plan, and mitigation measures, including training for all field personnel (e.g., KWBA employees, agents, and contractors).*

The WEAP shall include protocols and training for responding to and handling of hazardous materials and hazardous waste management, and emergency preparedness, release reporting, and response requirements. KWBA will ensure that all construction workers at risk of inhaling dust shall be provided masks with filters designed to trap spores of the size of Valley Fever fungus.

7.11-4 *KWBA will implement the following measures:*

c) *KWBA shall implement the following measures before and during ground-disturbing activities to reduce health hazards associated with potential exposure to hazardous substances.*

i. *If stained or odorous soil is discovered during project-related construction activities, KWBA shall retain a qualified environmental professional to conduct a Phase II Environmental Site Assessment and/or other appropriate testing. Recommendations in the Phase II Environmental Site Assessment to address any contamination that is found shall be implemented before continuing with ground-disturbing activities in these areas.*

ii. *As required by law, notify the appropriate federal, state, and local agencies if evidence of previously undiscovered soil or groundwater contamination (e.g., stained soil, odorous groundwater) or if unknown or previously undiscovered underground storage tanks are encountered during construction activities.*

7.13-1a *KWBA will implement the following measures to minimize potential adverse impacts on cultural resources:*

a) *Prior to ground disturbance for new pond or well construction and associated facilities, an analysis to identify the potential presence of archaeological resources on the project site shall be conducted. The analysis shall include, at a minimum, a records check and literature survey from the appropriate California Historical Resources Information System (CHRIS) center and a Phase I Cultural Resources Investigation by an archaeologist meeting the Secretary of the Interior's Standards. If resources are known to exist on a project site, the analysis shall include an assessment of the resource and shall include measures for the in-situ protection, or the recovery, preservation, study, and curation of the resource, as appropriate. The analysis and the measures developed shall be consistent with the practices and intent described in Section 21083.2 et seq. of the Public Resources Code, as well as Sections 15064.5 et seq. and 15126.4(b) of the California Code of Regulations, and shall be consistent with current professional archaeological standards. The archaeologist shall prepare a report of the results of any study prepared, following accepted professional practice. Copies of the report shall be submitted to the KWBA and to the appropriate CHRIS information center. KWBA shall also consult, as appropriate, with the Native American Heritage Commission and appropriate Native American tribal representatives to address Native American cultural values with respect to archaeological contexts and places of traditional use or importance.*

b) *As a condition of all contracts for new pond or well construction and associated facilities and prior to ground-disturbing activities, all earth-moving and excavation contractor employees shall attend an orientation session informing them of the potential for inadvertently discovered cultural resources and/or human remains and protection measures to be followed to prevent destruction of any and all cultural resources discovered on site. The applicant's designated project construction manager, a qualified archaeologist, and a qualified cultural resource manager/monitor from a local California Native American tribe shall conduct the orientation (unless the local tribe opts not to participate). The orientation will include information regarding the potential for objects to occur on site, a summary of applicable environmental law, procedures to follow if potential cultural resources are found, and the measures to be taken if cultural resources and/or human remains are unearthed as part of the project.*

c) *Construction areas for new ponds and wells and associated facilities shall be staked prior to earthmoving by a qualified archaeologist in consultation with the contractor to indicate the construction area, construction staging area, and buffer. No earthmoving, parking, or materials storage will be allowed outside the staked areas. Prior to construction, the archaeologist shall survey the area to identify any surface artifacts within the staked area. An archaeologist and qualified cultural resource manager/monitor from a local California Native American tribe (unless the local tribe opts not to participate) shall be present during any grubbing or topsoil grading within the staked area. If previously unknown buried cultural resources, such as flaked or ground stone, historic debris, building foundations, or nonhuman bone (unless determined to be from present day grazing operations), are discovered during ground-disturbing activities, work will stop in that area and within an appropriate buffer area, as determined by the archaeologist. The archaeologist shall assess the significance of the affected cultural resources and, if necessary, develop feasible and appropriate treatment measures in consultation with the project staff, such as avoidance, capping with geotextile and fill, or Phase III data recovery consistent with applicable standards adopted pursuant to the National Historic Preservation Act.*

d) *In the event of the discovery of a burial, human bone, or suspected human bone, all excavation or grading in the vicinity of the find shall halt immediately, the area of the find shall be protected, and KWBA immediately shall notify the County Coroner of the find and comply with the provisions of PRC Section 5097 with respect to Native American involvement, burial treatment, and re-burial, if necessary.*

7.13-1b *KWBA will implement the following measures to minimize potential adverse impact on previously unknown potentially unique, scientifically important paleontological resources:*

a) *Before the start of any well-drilling activities, KWBA shall retain a qualified paleontologist or other qualified individual to train all personnel involved with earthmoving and/or well drilling activities regarding the possibility of encountering fossils, the appearance and types of fossils likely to be seen during construction, and proper notification procedures should fossils be encountered (this training can take place at the same time as the orientation required by 7.13-1a).*

b) *In the event that paleontological resources are discovered, KWBA will notify a qualified paleontologist. The paleontologist will document the discovery as needed, evaluate the potential resource, and assess the significance of the find under the criteria set forth in CEQA Guidelines Section 15064.5. If fossil or fossil bearing deposits are discovered during construction, excavations within 50 feet of the find will be temporarily halted or diverted until the discovery is examined by a qualified paleontologist. The paleontologist will notify the appropriate agencies to determine procedures that would be followed before construction is allowed to resume at the location of the find. If KWBA determines that avoidance is not feasible, the paleontologist will prepare an excavation plan for mitigating the effect of the project on the qualities that make the resource important. The plan will be submitted to KWBA for review and approval prior to implementation. The analysis and measures developed shall be consistent with the Conformable Impact Mitigation Guidelines developed by the Society of Vertebrate Paleontology and current professional paleontological standards.*

12-1 *KWBA will implement the following measures:*

a) ***Pump Efficiency Monitoring**: KWBA will conduct pump efficiency monitoring to ensure that all KWB pumps are monitored and evaluated at regular intervals during recovery periods.*

   i. *Daily Pump Efficiency Monitoring: Pumps shall be monitored daily for their total water volume pumped (acre-feet [AF]) and electricity consumption (kilowatt-hours [kWh]), which will be used to calculate a daily energy efficiency value (i.e., kWh/AF).*

   ii. *Pump Efficiency Software: Metro or an equivalent water system management program will be used to provide up-to-date and streamlined methods to analyze KWB's individual pump and total system efficiency.*

b) ***Pump Rehabilitation, Retrofits, and Replacement**: KWBA shall use data from the Pump Efficiency Monitoring component to strategically and actively rehabilitate, retrofit, and/or replace pumps as needed during recovery periods.*

   i. *Pump Prioritization and Testing: Pump rehabilitation, retrofit, and replacement shall be prioritized by accounting for the relative efficiency of each pump with respect to the total pump system and water volume pumped through each pump. Data obtained from the Pump Efficiency Monitoring component shall be used to prioritize which pumps will be rehabilitated, retrofitted, and/or replaced. In addition efficiency testing by external entities if available (e.g., pump company, Pacific Gas & Electric Company [PG&E]) or other similar analysis will also be used for the prioritization process.*

   ii. *Schedule: KWBA shall rehabilitate, retrofit, and/or replace pumps/wells at the earliest possible time without substantially disturbing ongoing O&M activities, but at a minimum will rehabilitate, retrofit, and/or replace at least an annual average of 5 pumps per year during a prolonged recovery period such as occurred between 2013 and 2016.*

c) ***Reporting****: KWBA will maintain a quarterly and annual reporting program that will be publicly available online. Annual reports will cover calendar years and be posted online by March 30 to cover the previous year. Quarterly reports will be posted online within 30 days of the end of each calendar quarter. The annual and quarterly reports will include, but are not limited to, the following components:*

i. *KWB O&M Totals: Total quarterly electricity consumption for recovery pumping activities along with total acre-feet recovered shall be provided online. A running total of the annual electricity consumption and acre-feet recovered by quarter shall also be provided.*

ii. *Pump Efficiency: A summary of the pump efficiency (kWh/acre-feet) for each of KWB's pumps will be provided quarterly. Similar to the KWB O&M Totals, a running annual average efficiency for each pump shall be provided. These data shall be used to identify the 5 pumps per year that will be rehabilitated, retrofitted, or replaced. If a pump/well is adjusted for depth, notes shall be made within the reports to explain these changes in pump efficiency.*

iii. *Electricity Efficiency Actions: Each report should include actions taken in the previous quarter to rehabilitate, retrofit, and/or replace pumps. Any other energy efficiency measures taken will be reported. When information is available from PG&E's Advanced Pumping Efficiency Program or other similar programs, annual electricity savings from these actions shall be included in the quarterly and annual reports to clearly show the electricity savings associated with rehabilitation, retrofit, and/or replacement actions. If annual energy savings cannot be determined through pre- and post-pump improvement testing, KWBA shall report the empirical annual energy savings (kWh/year) from these improvements in its annual reports.*

iv. *Identifying Next Steps: Each annual report will include the list of 5 or more pumps planned to be evaluated for potential rehabilitation, retrofit, or replacement during that year. If all five of the least efficient pumps are not scheduled for rehabilitation, retrofit, and/or replacement in the coming year, the annual report shall explain what KWB operation requires the pump to remain in service that year.*

d) ***Pump Compliance:*** *KWBA will only purchase new pumps that comply with United States Department of Energy pump efficiency regulations (10 CFR Part 429 and 431) when those regulations become effective in the marketplace in 2020.*

e) ***Future Increases in Technology and Emissions Standards:*** *KWBA shall actively consider replacing older pumps with new pumps with increased efficiency technology. All future requirements for pumps at the federal, state, and/or local level shall be complied with.*

Appendix B
Rosedale Operations Plans

FIRST AMENDED
MEMORANDUM OF UNDERSTANDING
REGARDING OPERATION AND MONITORING
OF THE
ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT
GROUNDWATER BANKING PROGRAM

This Memorandum of Understanding is entered into the Effective Date hereof by and among **ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT**, hereinafter referred to as "Rosedale", and **SEMITROPIC WATER STORAGE DISTRICT, BUENA VISTA WATER STORAGE DISTRICT, HENRY MILLER WATER DISTRICT, KERN COUNTY WATER AGENCY, KERN WATER BANK AUTHORITY, IMPROVEMENT DISTRICT NO. 4 OF THE KERN COUNTY WATER AGENCY**, and **WEST KERN WATER DISTRICT**, collectively referred to as "Adjoining Entities."

RECITALS

WHEREAS, Rosedale expects that certain real property more particularly shown on the map attached hereto as Exhibit A and incorporated herein by this reference ("Project Site"), or portions thereof, will be used in connection with the Project; and

WHEREAS, Rosedale intends to develop and improve the Project Site as necessary to permit the importation, percolation and storage of water in underground aquifers for later recovery, transportation and use for the benefit of Rosedale, all as more fully described in Exhibit B attached hereto and incorporated herein by this reference ("Project"); and

WHEREAS, Adjoining Entities encompass lands and/or operate existing projects lying adjacent to the Project Site as shown on said Exhibit A; and

WHEREAS, in recent years, water banking, recovery and transfer programs in Kern County have become increasingly numerous and complex; and

WHEREAS, it is appropriate and desirable to mitigate or eliminate any short-term and long-term significant adverse impacts of new programs upon potentially affected projects and landowners within the boundaries of Adjoining Entities; and

WHEREAS, Adjoining Entities and Rosedale desire that the design, operation and monitoring of the Project be conducted and coordinated in a manner to insure that the beneficial effects of the Project to Rosedale are maximized but that the Project does not result in significant adverse impacts to water levels, water quality or land subsidence within the boundaries of Adjoining Entities, or otherwise interfere with the existing and ongoing programs of Adjoining Entities; and

WHEREAS, on October 26, 1995, the Kern Water Bank Authority and its Member Entities, as the "Project Participants," and Buena Vista Water Storage District, Rosedale-Rio Bravo Water Storage District, Kern Delta Water District, Henry Miller Water District and West Kern Water District, as the "Adjoining Entities," entered into a Memorandum of Understanding, similar to this Memorandum of Understanding, which provided among other things at Paragraph 8 that for "any future project within the Kern Fan Area, the Parties hereto shall use good faith efforts to negotiate an agreement substantially similar in substance to this MOU," and by entering into this MOU the Adjoining Entities find that this MOU satisfies such requirement for the Project; and

WHEREAS, Rosedale intends to operate its Project such that the same does not cause or contribute to overdraft of the groundwater basin; and

WHEREAS, in connection with its environmental review for the Project, Rosedale commissioned a hydrologic balance study for a period of years, which study shows that the District is not currently operating in a state of overdraft, and, further, Rosedale has projected said hydrologic balance study into the future, assuming completion of the Project, and said projection demonstrates that the District is not expected to operate in state of overdraft following implementation of the Project, which studies have not been independently verified by the Adjoining Entities; and

WHEREAS, in the hydrologic balance studies conducted by Rosedale in connection with the Project, the annual safe yield from the groundwater basin is assumed to be .3 acre-feet per acre times the gross developed acres in the District and no assumption is included with respect to groundwater inflow or outflow; and

WHEREAS, this MOU affects the Project and other similar banking programs operated for the benefit of third parties. Conversely, this MOU does not apply to or permit any project involving the sale by Rosedale of water banked in the name of, and within the boundaries of, Rosedale to third parties for a use outside the boundaries of Rosedale.

NOW, THEREFORE, BE IT RESOLVED that, based upon the mutual covenants contained herein, the parties hereto agree as follows:

1. Project Design and Construction. Rosedale has completed a preliminary Project Description of the Project described in Exhibit B hereto representing the contemplated facilities for the Project. Said preliminary description has been reviewed by the parties hereto. The foregoing shall not be interpreted to imply consent to any aspect of any future project not described in existing approved environmental documentation. Rosedale will construct the Project consistent with such preliminary description. Any major modifications of the facilities and/or significant changes from that described in Exhibit B and in the environmental documentation for the Project will be subject to additional environmental review pursuant to ~~CEQA and will be subject to review of the Monitoring Committee prior to implementation.~~

2. Project Operation. The Project shall be operated to achieve the maximum water storage and withdrawal benefits for Rosedale consistent with avoiding, mitigating or eliminating to the greatest extent practicable, significant adverse impacts resulting from the Project. To that end, the Project shall be operated in accordance with the following Project Objectives and Minimum Operating Criteria:

a. Project Objectives. Consistent with the Project description, Rosedale will make a good faith effort to meet the following objectives, which may or may not be met:

(1) The parties should operate their projects in such manner as to maintain and, when possible, enhance the quality of groundwater within the Project Site and the Kern Fan Area as shown in Exhibit C.

(2) If supplies of acceptable recharge water exceed recharge capacity, all other things being equal, recharge priority should be given to the purest or best quality water.

(3) Each project within the Kern Fan Area should be operated with the objective that the average concentration of total dissolved salts in the recovered water will exceed the average concentration of total dissolved salts in the recharged water, at a minimum, by a percentage equal to or greater than the percentage of surface recharge losses. The average shall be calculated from the start of each project.

(4) To maintain or improve groundwater quality, recovery operations should extract poorer quality groundwater where practicable. Blending may be used to increase recovery of lesser quality groundwater unless doing so will exacerbate problems by generating unfavorable movement of lesser quality groundwater. It is recognized that the extent to which blending can help to resolve groundwater quality problems is limited by regulatory agency rules regarding discharges into conveyance systems used for municipal supplies, which may be changed from time to time.

(5) All groundwater pumpers should attempt to control the migration of poor quality water. Extensive monitoring will be used to identify the migration of poor quality water and give advance notice of developing problems. Problem areas may be dealt with by actions including, but not limited to:

(a) limiting or terminating extractions that tend to draw lesser quality water toward or into the usable water areas;

(b) increasing extractions in areas that might generate a beneficial, reverse gradient;

(c) increasing recharge within the usable water area to promote favorable groundwater gradients.

(6) It is intended that all recovery of recharged water be subject to the so-called "golden rule." In the context of a banking project, the "golden rule" means that, unless acceptable mitigation is provided, the banker may not operate so as to create conditions that are worse than would have prevailed absent the project giving due recognition to the benefits that may result from the project, all as more fully described at paragraph 2(b)12 below.

(7) The Project shall be developed and operated so as to prevent, eliminate or mitigate significant adverse impacts. Thus, the Project shall incorporate mitigation measures as necessary. Mitigation measures to prevent significant adverse impacts from occurring include but are not limited to the following: (i) spread out recovery area; (ii) provide buffer areas between recovery wells and neighboring overlying users; (iii) limit the monthly, seasonal, and/or annual recovery rate; (iv) provide sufficient recovery wells to allow rotation of recovery wells or the use of alternate wells; (v) provide adequate well spacing; (vi) adjust pumping rates or terminate pumping to reduce impacts, if necessary; (vii) impose time restrictions between recharge and recovery to allow for downward percolation of water to the aquifer; and (viii) provide recharge of water that would otherwise not recharge the Kern Fan Basin. Mitigation measures that compensate for unavoidable adverse impacts include but are not limited to the following: (i) with the consent of the affected groundwater pumper, lower the pump bowls or deepen wells as necessary to restore groundwater extraction capability to such pumper; (ii) with the consent of the affected groundwater pumper, provide alternative water supplies to such pumper; and (iii) with the consent of the affected groundwater pumper, provide financial compensation to such pumper.

b. Minimum Operating Criteria.

(1) The Monitoring Committee shall be notified prior to the recharge of potentially unacceptable water, such as "produced water" from oilfield operations, reclaimed water, or the like. The Monitoring Committee shall review the proposed recharge and make recommendations respecting the same as it deems appropriate. Where approval by the Regional Water Quality Control Board is required, the issuance of such approval by said Board shall satisfy this requirement.

(2) Recharge may not occur in, on or near contaminated areas, nor may anyone spread in, on or near an adjoining area if the effect will be to mound water near enough to the contaminated area that the contaminants will be picked up and carried into the uncontaminated groundwater supply. When contaminated areas are identified within or adjacent to the Project, Rosedale shall also:

(a) participate with other groundwater pumpers to investigate the source of the contamination;

(b) work with appropriate authorities to ensure that the entity or individual, if any, responsible for the contamination meets its responsibilities to remove the contamination and thereby return the Project Site to its full recharge and storage capacity;

(c) operate the Project in cooperation with other groundwater pumpers to attempt to eliminate the migration of contaminated water toward or into usable water quality areas.

(3) Operators of projects within the Kern Fan Area will avoid operating such projects in a fashion so as to significantly diminish the natural, normal and unavoidable recharge of water

native to the Kern Fan Area as it existed in pre-project condition. If and to the extent this occurs as determined by the Monitoring Committee, the parties will cooperate to provide equivalent recharge capacity to offset such impact.

(4) The mitigation credit for fallowed Project land shall be .3 acre-feet per acre per year times the amount of fallowed land included in the Project Site in the year of calculation.

(5) The lands shown in Exhibit A may be utilized for any purpose provided, however, the use of said property by Rosedale for the Project shall not cause or contribute to overdraft of the groundwater basin.

(6) Each device proposed to measure recharge water to be subsequently recovered and/or recovery of such water will be initially evaluated and periodically reviewed by the Monitoring Committee. Each measuring device shall be properly installed, calibrated, rated, monitored and maintained by and at the expense of the owner of the measuring device.

(7) It shall be the responsibility of the user to insure that all measuring devices are accurate and that the measurements are provided to the Monitoring Committee at the time and in the manner required by the Monitoring Committee.

(8) A producer's flow deposited into another facility, such as a transportation canal, shall be measured into such facility by the operator thereof and the measurement reported to the Monitoring Committee at the time and in the manner required by such Monitoring Committee.

(9) The Monitoring Committee or its designee will maintain official records of recharge and recovery activities, which records shall be open and available to the public. The Monitoring Committee will have the right to verify the accuracy of reported information by

inspection, observation or access to user records (i.e., P.G.&E. bills). The Monitoring Committee will publish or cause to be published annual reports of operations.

(10) Losses shall be assessed as follows:

(a) Surface recharge losses shall be fixed and assessed at a rate of 3%, which includes a "safety factor" of 1% of water diverted for direct recharge. An additional surface recharge loss of 3% shall be fixed and assessed against water directly recharged which is subsequently extracted for out-of-district use. Such initial 3% loss may be modified in the future if studies acceptable to the parties demonstrate that such modification is appropriate, providing that a 1% "safety factor" shall be maintained and the total loss when directly recharged water is subsequently extracted for out-of-district use shall not exceed 6%. Notwithstanding anything to the contrary provided herein, water banked in Rosedale for or on behalf of third parties (i.e., creating a third party bank account) shall be subject to surface recharge losses calculated at 6% of water diverted for direct recharge.

(b) To account for all other actual or potential losses (including migration losses), a rate of 4% of water placed in a bank account shall be deducted to the extent that Rosedale has been compensated within three (3) years following the end of the calendar year in which the water was designated as banked at the SWP Delta Water Rate charged by DWR at the time of payment; provided further, however, that the water purchased and subtracted from a groundwater bank account pursuant to this provision shall only be used for overdraft correction within the District purchasing the water.

(c) An additional 5% loss shall be assessed against any water diverted to the Project Site for banking by, for, or on behalf of any out-of-County person, entity or organization (except current SWP Agricultural Contractors).

(d) All losses provided for herein represent amounts of water that are non-bankable and non-recoverable by Rosedale.

(11) Recovery of banked water shall be from the Project Site and recovery facilities shall be located therein. Recovery from outside the Project Site may be allowed with the consent of the District or entity having jurisdiction over the area from which the recovery will occur and upon review by the Monitoring Committee.

(12) Recovery of banked water may not be allowed if not otherwise mitigated if it will result in significant adverse impacts to surrounding overlying users. "Adverse impacts" will be evaluated using data applicable in zones including the area which may be affected by the Project of approximately five miles in width from the boundaries of the Project as designated by the Monitoring Committee. In determining "adverse impacts," as provided at this paragraph and elsewhere in this MOU, consideration will be given to the benefits accrued over time during operation of the Project to landowners surrounding the Project Site including higher groundwater levels as a result of operation of the Project. In determining non-Project conditions vs. Project conditions, credit toward mitigation of any otherwise adverse impacts shall be recognized to the extent of the 4% loss and 5% losses recognized under paragraphs 2.b.(10)(b) and (c), for the mitigation credit recognized under paragraph 2.b.(4), if any, and to the extent of recharge on the Project Site for overdraft correction.

(13) To the extent that interference, other than insignificant interference, with the pumping lift of any existing active well as compared to non-Project conditions, is attributable to pumping of any wells on the Project Site, Rosedale will either stop pumping as necessary to mitigate the interference or compensate the owner for such interference, or any combination thereof. The Monitoring Committee will establish the criteria necessary to determine if well interference, other than insignificant interference, is attributable to pumping of Project wells by conducting pumping tests of Project wells following the installation of monitoring wells (if not already completed) and considering hydrogeologic information.

(14) The Kern Fan Element Groundwater Model, with input from Rosedale and the Adjoining Entities, and utilizing data from a comprehensive groundwater monitoring program, may be used by the Monitoring Committee as appropriate to estimate groundwater impacts of the Project.

(15) The parties recognize that the Project shall be operated with a positive balance, i.e., there shall be no "borrowing" of water for recovery from the basin.

3. Project Monitoring. Adjoining Entities agree to participate in a comprehensive monitoring program and as members of a Monitoring Committee, as hereinafter more particularly described, in order to reasonably determine groundwater level and water quality information under Project and non-Project conditions. The monitoring program will more particularly require the following:

a. Monitoring Committee: Rosedale and the Adjoining Entities shall form a Monitoring Committee for the Project upon terms and conditions acceptable to the participants. The Monitoring Committee shall:

(1) Engage the services of a suitable independent professional groundwater specialist who shall, at the direction of the Committee, provide assistance in the performance of the tasks identified below;

(2) Meet and confer monthly or at other intervals deemed to be appropriate in furtherance of the monitoring program;

(3) Establish a groundwater evaluation methodology or methodologies;

(4) Prepare a monitoring plan and two associated maps, "Well Location, Water Quality Network," and "Well Location, Water Level Network," which plan and maps depict the location and types of wells anticipated to be used in the initial phase of groundwater monitoring (said plan and maps are expected to be modified from time to time as the monitoring program is developed and operated);

(5) Specify such additional monitoring wells and ancillary equipment as are deemed to be necessary or desirable for the purposes hereof;

(6) Prepare annual water balance studies and other interpretive studies, which will designate all sources of water and the use thereof within the study area;

(7) Develop criteria for determining whether excessive mounding or withdrawal is occurring or is likely to occur in an area of interest;

(8) Annually or as otherwise needed determine the impacts of the Project on each of the Adjoining Entities by evaluating with and without Project conditions; and

(9) Develop procedures, review data, and recommend Project operational criteria for the purpose of identifying, verifying, avoiding, eliminating or mitigating, to the extent practicable, the creation of significant imbalances or significant adverse impacts.

b. Collection and Sharing of Data. The Adjoining Entities will make available to the Monitoring Committee copies of all relevant groundwater level, groundwater quality, and other monitoring data currently collected and prepared by each. Rosedale shall annually report, by areas of interest, water deliveries for banking and other purposes, groundwater withdrawals from bank accounts, transfers and other changes in account balances.

c. Monitoring Costs.

(1) The cost of constructing monitoring wells and ancillary equipment within Rosedale shall be borne by Rosedale. The cost of any new or additional monitoring wells and ancillary equipment outside the boundaries of Rosedale shall be borne as may be determined by separate agreement of Rosedale and the Adjoining Entities.

(2) Each of the parties shall be responsible for the personnel costs of its representative on the Monitoring Committee. In addition, the Adjoining Entities shall be responsible for all costs of monitoring operations and facilities within their respective boundaries and Rosedale shall be responsible for all costs of monitoring operations and facilities within the Project Site.

(3) All other groundwater monitoring costs, including employment of the professional groundwater specialist, collection, evaluation and analyses of data as adopted by the Monitoring Committee, shall be allocated among and borne by the parties as they shall agree among themselves. Cost sharing among Adjoining Entities shall be as agreed by them. Any additional monitoring costs shall be determined and allocated by separate agreement of those parties requesting such additional monitoring.

4. Modification of Project Operations. The Monitoring Committee may make recommendations to Rosedale, including without limitation recommendations for modifications in Project operations based upon evaluation(s) of data which indicate that excessive mounding or withdrawal is occurring or is likely to occur in an area of interest. The Monitoring Committee and its members shall not act in an arbitrary, capricious or unreasonable manner.

5. Dispute Resolution.

a. Submission to Monitoring Committee. All disputes regarding the operation of the Project or the application of this MOU, or any provision hereof, shall first be submitted to the Monitoring Committee for review and analysis. The Monitoring Committee shall meet and review all relevant data and facts regarding the dispute and, if possible, recommend a fair and equitable resolution of the dispute. The Monitoring Committee and its members shall not act in an arbitrary, capricious or unreasonable manner. In the event that (1) the Monitoring Committee fails to act as herein provided, (2) any party disputes the Monitoring Committee's recommended resolution or (3) any party fails to implement the Monitoring Committee's recommended resolution within the time allowed, any party to this MOU may seek any legal or equitable remedy available as hereinafter provided.

b. Arbitration. If all of the parties agree that a factual dispute exists regarding any recommendation of the Monitoring Committee made pursuant hereto, or implementation thereof, such dispute shall, be submitted to binding arbitration before a single neutral arbitrator appointed by unanimous consent and, in the absence of such consent, appointed by the presiding judge of the Kern County Superior Court. The neutral arbitrator shall be a registered civil engineer, registered geologist, or other person agreeable to the parties, preferably with a background in groundwater hydrology. The arbitration shall be called and conducted in accordance with such rules as the contestants shall agree upon, and, in the absence of such agreement, in accordance with the procedures set forth in California Code of Civil Procedure section 1282, et seq. Any other dispute may be pursued through a court of competent jurisdiction as otherwise provided by law.

c. Burden of Proof. In the event of arbitration or litigation under this MOU, all parties shall enjoy the benefit of such presumptions as are provided by law but, in the absence thereof, neither party shall bear the burden of proof on any contested legal or factual issue.

d. Landowner Remedies. Nothing in this MOU shall prevent any landowner within the boundaries of any party from pursuing any remedy at law or in equity in the event such landowner is damaged as a result of projects within the Kern Fan Area.

6. Term. The Effective Date of this MOU shall be January 1, 2003 regardless of the date of actual execution. This MOU shall continue in force and effect from and after the Effective Date until terminated by (1) operation of law, (2) unanimous consent of the parties, or (3) abandonment of the Project and a determination by the Monitoring Committee that all adverse impacts have been fully eliminated or mitigated as provided in this MOU.

7. Complete Agreement/Incorporation Into Banking Agreements. This MOU constitutes the whole and complete agreement of the parties regarding Project operation, maintenance and monitoring (amending and replacing the original MOU between the parties regarding Rosedale's Groundwater Banking Program). Rosedale shall incorporate this MOU by reference into any further agreement it enters into respecting banking of water in or withdrawal of water from the Project Site.

8. Future Projects. With respect to any future project within the Kern Fan Area, the Parties hereto shall use good faith efforts to negotiate an agreement substantially similar in substance to this MOU.

9. Notice Clause. All notices required by this MOU shall be sent via first class United States mail to the addresses shown on the signature page of this agreement and shall be deemed delivered three days after deposited in the mail. Notice of changes in the representative or address of a party shall be given in the same manner.

10. California Law Clause. All provisions of this MOU and all rights and obligations of the parties hereto shall be interpreted and construed according to the laws of the State of California.

11. Amendments. This MOU may be amended by written instrument executed by all of the parties. In addition, recognizing that the parties may not now be able to contemplate all the implications of the Project, the parties agree that on the tenth anniversary of implementation of the Project, if facts and conditions not envisioned at the time of entering into this MOU are present, the parties will negotiate in good faith amendments to this MOU. If the parties cannot

agree on whether conditions have changed necessitating an amendment and/or upon appropriate amendments to the MOU, such limited issues shall be submitted to an arbitrator or court, as the case may be, as provided above.

12. Successors and Assigns. This MOU shall bind and inure to the benefit of the successors and assigns of the parties.

13. Severability. The rights and privileges set forth in this MOU are severable and the failure or invalidity of any particular provision of this MOU shall not invalidate the other provisions of this MOU; rather all other provisions of this MOU shall continue and remain in full force and effect notwithstanding such partial failure or invalidity.

14. Force Majeure. All obligations of the parties shall be suspended for so long as and to the extent the performance thereof is prevented, directly or indirectly, by earthquakes, fires, tornadoes, facility failures, floods, drownings, strikes, other casualties, acts of God, orders of court or governmental agencies having competent jurisdiction, or other events or causes beyond the control of the parties. In no event shall any liability accrue against a party, or its officers, agents or employees, for any damage arising out of or connected with a suspension of performance pursuant to this paragraph.

15. Counterparts. This MOU, and any amendment or supplement thereto, may be executed in two or more counterparts, and by each party on a separate counterpart, each of which, when executed and delivered, shall be an original and all of which together shall constitute one instrument, with the same force and effect as though all signatures appeared on a single document. In proving this MOU or any such amendment, supplement, document or

instrument, it shall not be necessary to produce or account for more than one counterpart thereof signed by the party against whom enforcement is sought.

IN WITNESS WHEREOF the parties have executed this MOU the day and year first above written at Bakersfield, California.

ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT
P. O. Box 867
Bakersfield, CA 93302-0867

By:____________________

By:____________________

WEST KERN WATER DISTRICT
800 Kern Street
P. O. Box 1105
Taft, CA 93268-1105

By:____________________

By:____________________

SEMITROPIC WATER STORAGE DISTRICT
P. O. Box Z
Wasco, CA 93280-0877

By:____________________

By:____________________

BUENA VISTA WATER STORAGE DISTRICT
P. O. Box 756
Buttonwillow, CA 93206

By:____________________

By:____________________

HENRY MILLER WATER DISTRICT
P. O. Box 9759
Bakersfield, CA 93389-9759

By:____________________

By:____________________

KERN WATER BANK AUTHORITY
P. O. Box 80607
Bakersfield, CA 93380-0607

By:____________________

By:____________________

KERN COUNTY WATER AGENCY
P. O. Box 58
Bakersfield, CA 93302-0058

By:____________________

By:____________________

IMPROVEMENT DISTRICT NO. 4
P. O. Box 58
Bakersfield, CA 93302-0058

By:____________________

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By:______________________

By:______________________

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Bakersfield, CA 93380-0607

By:______________________

By:______________________

KERN COUNTY WATER AGENCY
P. O. Box 58
Bakersfield, CA 93302-0058

By: Peter Frick

By:______________________

IMPROVEMENT DISTRICT NO. 4
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Bakersfield, CA 93302-0058

By: Peter Frick

By:______________________

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P. O. Box 867
Bakersfield, CA 93302-0867

By:________________________

By:________________________

WEST KERN WATER DISTRICT
800 Kern Street
P. O. Box 1105
Taft, CA 93268-1105

By: Stephen [signature]

By: [signature]

SEMITROPIC WATER STORAGE DISTRICT
P. O. Box Z
Wasco, CA 93280-0877

By:________________________

By:________________________

BUENA VISTA WATER STORAGE DISTRICT
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P. O. Box 9759
Bakersfield, CA 93389-9759

By:____________________

By:____________________

KERN WATER BANK AUTHORITY
P. O. Box 80607
Bakersfield, CA 93380-0607

By:____________________

By:____________________

KERN COUNTY WATER AGENCY
P. O. Box 58
Bakersfield, CA 93302-0058

By:____________________

By:____________________

IMPROVEMENT DISTRICT NO. 4
P. O. Box 58
Bakersfield, CA 93302-0058

By:____________________

By:____________________

instrument, it shall not be necessary to produce or account for more than one counterpart thereof signed by the party against whom enforcement is sought.

IN WITNESS WHEREOF the parties have executed this MOU the day and year first above written at Bakersfield, California.

ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT
P. O. Box 867
Bakersfield, CA 93302-0867

By:______________________

By:______________________

WEST KERN WATER DISTRICT
800 Kern Street
P. O. Box 1105
Taft, CA 93268-1105

By:______________________

By:______________________

SEMITROPIC WATER STORAGE DISTRICT
P. O. Box Z
Wasco, CA 93280-0877

By:______________________

By:______________________

BUENA VISTA WATER STORAGE DISTRICT
P. O. Box 756
Buttonwillow, CA 93206

By:______________________

By:______________________

HENRY MILLER WATER DISTRICT
P. O. Box 9759
Bakersfield, CA 93389-9759

By:______________________

By:______________________

KERN WATER BANK AUTHORITY
P. O. Box 80607
Bakersfield, CA 93380-0607

By:______________________

By:______________________

KERN COUNTY WATER AGENCY
P. O. Box 58
Bakersfield, CA 93302-0058

By:______________________

By:______________________

IMPROVEMENT DISTRICT NO. 4
P. O. Box 58
Bakersfield, CA 93302-0058

By:______________________

By:______________________

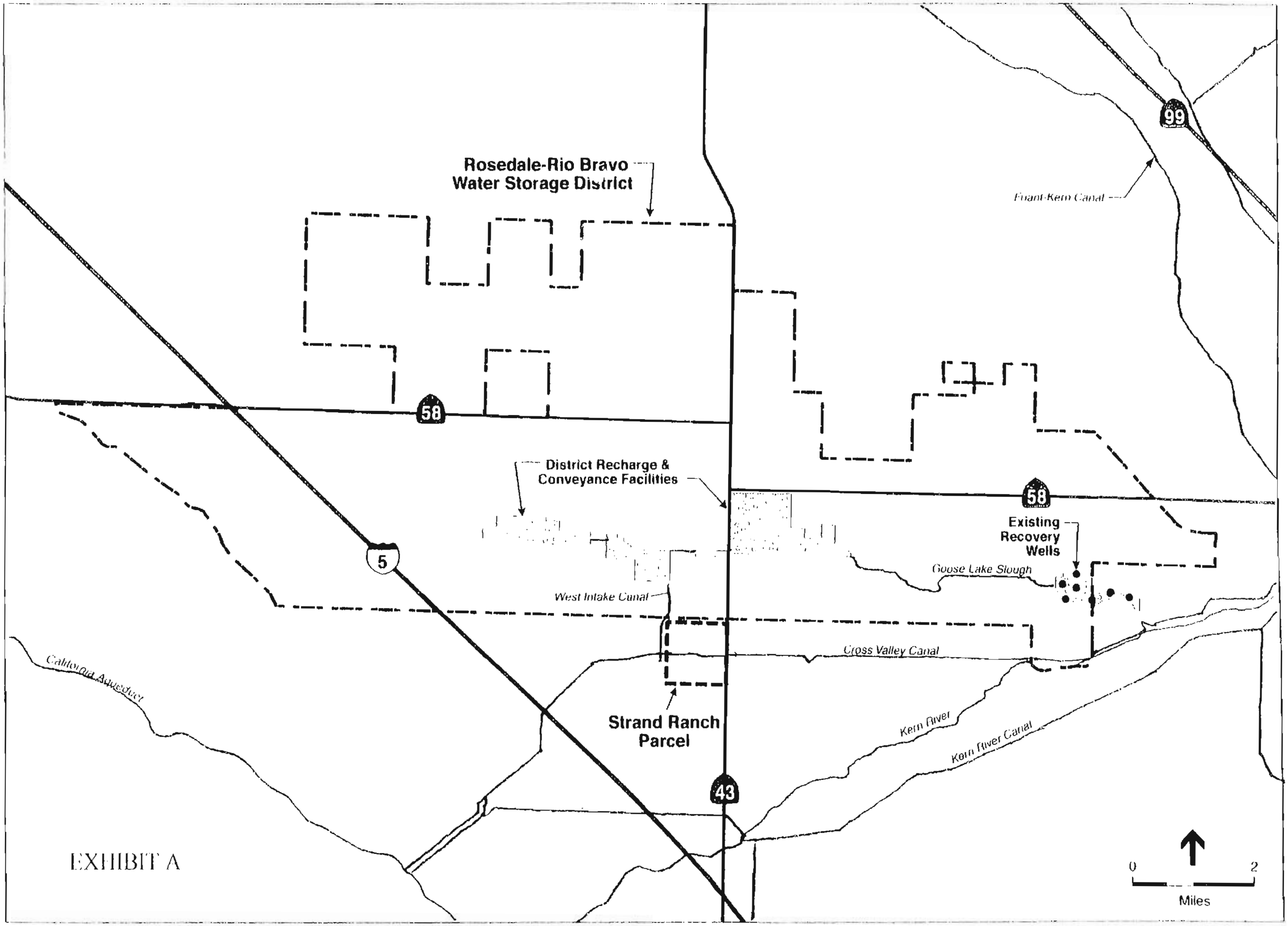

Rosedale-Rio Bravo
Water Storage District
Friant-Kern Canal
99
58
District Recharge &
Conveyance Facilities
58
Existing
Recovery
Wells
Goose Lake Slough
5
West Intake Canal
Cross Valley Canal
California Aqueduct
Strand Ranch
Parcel
Kern River
Kern River Canal
43
EXHIBIT A
0
2
Miles

EXHIBIT B

PROJECT DESCRIPTION

Purposes

The primary water management objective of Rosedale-Rio Bravo Water Storage District is to enhance water supplies for its landowners. One method of attaining this goal is to sponsor third party banking programs. Under such programs surface water will be stored in aquifers during times of surplus and either recovered during times of shortage or remain in the ground to assist with overdraft correction.

Sources of Water

Kern River water, being Rosedale-Rio Bravo WSD's primary supply water right, as well as other sources will be recharged. Such sources include: the Kern River, Friant-Kern, SWP, CVP, flood water and other sources that may be available from time to time.

Facilities

To achieve its water management objectives through third party banking programs, the Rosedale-Rio Bravo Water Storage District may require the construction of recharge ponds, water conveyance facilities, and water wells in addition to its existing facilities.

Of the approximately 43,000 acres that presently constitute Rosedale-Rio Bravo Water Storage District all may be used for in-lieu and/or direct recharge. In addition, adjacent lands within non-districted areas may also be used for in-lieu and direct recharge. It is anticipated that in the wettest of years as much as 300,000 acre-feet can be recharged.

It is proposed that water would be conveyed to and from the property using available capacity in any of the canals and conveyance facilities that may serve the property including: the Cross Valley Canal, the Kern River, the Friant Kern Canal, the California Aqueduct, and the Goose Lake Slough. It is also proposed to build additional conveyance facilities as future projects are developed.

As many as 20 wells may be added within the District boundaries before the project is complete to provide adequate recovery capacity and the necessary operational flexibility to avoid or minimize adverse impacts. District/Landowner programs may include the use of landowner wells by District wide reduction in surface supply allocations or by individual volunteer well lease programs. Once build out of the recovery facilities is complete, the recovery capacity will be maintained by constructing new wells to replace the capacity of older wells as they fail. New District owned wells shall be placed no closer than 880 feet from property and/or District boundaries. Wells inside the District boundaries shall be located and operated so as to prevent significant non-mitigable adverse impacts to neighboring landowners.

Operation

The project shall be managed by the Rosedale-Rio Bravo Water Storage District. Day-to-day operation of portions of the project may be contracted to other parties. Operation of the project shall be coordinated with adjoining projects. The total storage capacity intended to be utilized at any one time for banking project purposes is 300,000 AF and the total recovery capacity intended to be utilized for banking project purposes is 63,250 AF/year.

Banking Projects

The project includes all third party banking programs whether pending or completed. These programs include, without limitation, the following:

ROSEDALE CONJUNCTIVE USE PROGRAM PARTNERSHIP AGREEMENTS

Banking Partner	Type	Annual Recharge (af)	Maximum Return Obligation (afy)	Maximum Storage (af)	Banked Water Source
Arvin-Edison WSD (draft terms)	2:1 Banking	30,000	10,000	90,000	CVP
Kern-Tulare/Rag Gulch WD	2:1 Banking	20,000	7,500	50,000	varies
Castaic Lake Water Agency	Banking	20,000	20,000*	100,000	varies
Buena Vista WSD	Banking	80,000	8,250	200,000	Kern River
Irvine Ranch Water District	Banking	17,500	17,500	50,000	varies
TOTAL			63,250	490,000	

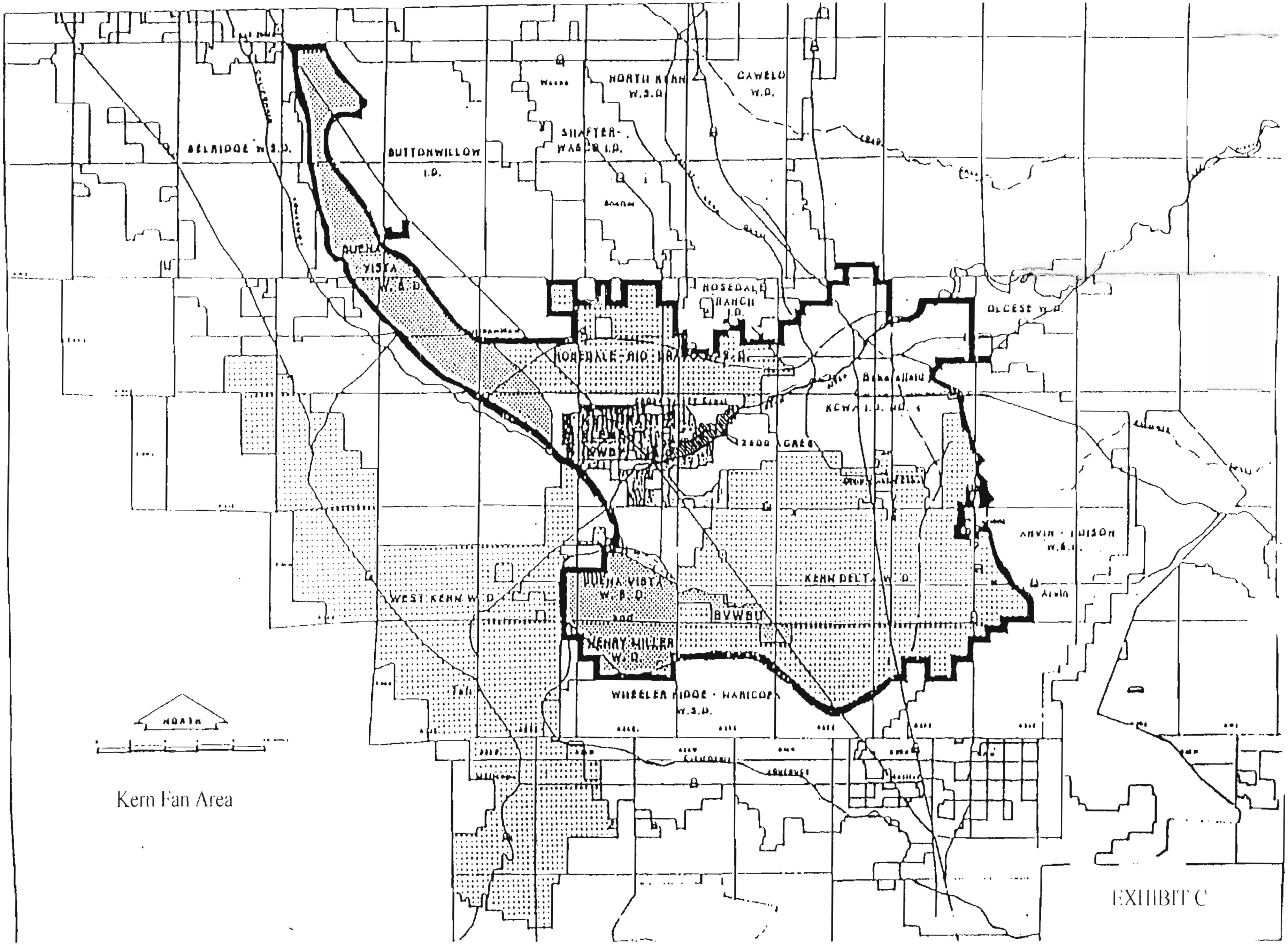
*surplus capacity of existing wells

A detailed description of each program is found in the environmental documentation relating thereto which includes, without limitation, the following: (1) Master EIR for Groundwater Storage, Banking, Exchange, Extraction and Conjunctive Use Program, certified July 17, 2001; (2) Addendum No. 1 to Master EIR, adopted in 2003; (3) FEIR for the BVWSD/RRBWSD Water Banking and Recovery Program, certified October 11, 2002; (4) Negative Declaration for Kern Tulare Program; (5) Negative Declaration for Groundwater Banking - Allen Road Wellfield (AEWSD) Program; and (6) FEIR for the Strand Ranch Integrated Banking Project (IRWD), certified May 27, 2008.

Addenda

(1) Notwithstanding paragraph 2.b.(10)(a) of this agreement, the surface recharge losses for the Strand Ranch property shall be fixed and assessed at a rate of 6% whether the recharge is intended for in-district or out-of-district use; provided, however, such 6% loss may be modified in the future if studies acceptable to the parties demonstrate that such modification is appropriate; provided further, however, that a 1% safety factor shall be maintained and the total loss when directly recharged water is extracted for out-of-district use shall not exceed 6%.

(2) It is understood and agreed by and among all parties that issues involving project operations may be presented to and addressed by the Monitoring Committee whether or not such issues were discussed, reviewed and/or considered during the environmental evaluation of the project.



Kern Fan Area

EXHIBIT C

April 30, 2004

Mr. Hal Crossley, General Manager
Rosedale-Rio Bravo Water Storage District
P.O. Box 867
Bakersfield, CA 93302

Re: Memorandum of Understanding, Rosedale-Rio Bravo Water Storage District Groundwater Banking and Sale Program

Dear Mr. Crossley:

Enclosed please find executed copies of the above-referenced Memorandum of Understanding. It is our understanding that this MOU does not in any way modify or amend our letter agreement regarding the banking and sales programs dated December 1, 2003. Please acknowledge that this is also your understanding by signing the acknowledgement below and returning a copy of this letter.

Sincerely,

Thomas N. Clark
General Manager

Being authorized by the district, we agree to the foregoing.

Hal Crossley

Rosedale-Rio Bravo Water Storage District
By Hal Crossley, General Manager
Dated: May 10, 2004

661/634-1400

lailing Address
P.O. Box 58
Bε ɜld, CA 93302-0058

Street Address
3200 Rio Mirada Dr.
Bakersfield, CA 93308

MEMORANDUM OF UNDERSTANDING

REGARDING OPERATION AND MONITORING
OF THE
ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT
GROUNDWATER BANKING AND SALE PROGRAM

This Memorandum of Understanding is entered into the Effective Date hereof by and among **ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT**, hereinafter referred to as "Rosedale", and **ROSEDALE RANCH I.D. OF NORTH KERN WATER STORAGE DISTRICT, SEMITROPIC WATER STORAGE DISTRICT, BUENA VISTA WATER STORAGE DISTRICT, HENRY MILLER WATER DISTRICT, BERRENDA MESA WATER DISTRICT, KERN COUNTY WATER AGENCY, KERN WATER BANK AUTHORITY, IMPROVEMENT DISTRICT NO. 4 KERN COUNTY WATER AGENCY, and WEST KERN WATER DISTRICT**, collectively referred to as "Adjoining Entities."

R E C I T A L S

WHEREAS, Rosedale expects that certain real property more particularly shown on the map attached hereto as Exhibit A and incorporated herein by this reference ("Project Site"), or portions thereof, will be used in connection with the Project; and

WHEREAS, Rosedale intends to develop and improve the Project Site as necessary to permit the importation, percolation and storage of water in underground aquifers for later recovery, transportation and use for the benefit of Rosedale, all as more fully described in Exhibit B attached hereto and incorporated herein by this reference ("Project"); and

WHEREAS, Adjoining Entities encompass lands and/or operate existing projects lying adjacent to the Project Site as shown on said Exhibit A; and

WHEREAS, in recent years, water banking, recovery and transfer programs in Kern County have become increasingly numerous and complex; and

WHEREAS, it is appropriate and desirable to mitigate or eliminate any short-term and long-term significant adverse impacts of new programs upon potentially affected projects and landowners within the boundaries of Adjoining Entities; and

WHEREAS, Adjoining Entities and Rosedale desire that the design, operation and monitoring of the Project be conducted and coordinated in a manner to insure that the beneficial effects of the Project to Rosedale are maximized but that the Project does not result in significant adverse impacts to water levels, water quality or land subsidence within the boundaries of Adjoining Entities, or otherwise interfere with the existing and ongoing programs of Adjoining Entities; and

WHEREAS, on October 26, 1995, the Kern Water Bank Authority and its Member Entities, as the "Project Participants," and Buena Vista Water Storage District, Rosedale-Rio Bravo Water Storage District, Kern Delta Water District, Henry Miller Water District and West Kern Water District, as the "Adjoining Entities," entered into a Memorandum of Understanding, similar to this Memorandum of Understanding, which provided among other things at Paragraph 8 that for "any future project within the Kern Fan Area, the Parties hereto shall use good faith efforts to negotiate an agreement substantially similar in substance to this MOU," and by entering into this MOU the Adjoining Entities find that this MOU satisfies such requirement for the Project; and

WHEREAS, Rosedale intends to operate its Project such that the same does not cause or contribute to overdraft of the groundwater basin; and

WHEREAS, in connection with its environmental review for the Project, Rosedale commissioned a hydrologic balance study for a period of years, which study shows that the District is not currently operating in a state of overdraft, and, further, Rosedale has projected said hydrologic balance study into the future, assuming completion of the Project, and said projection demonstrates that the District is not expected to operate in state of overdraft following implementation of the Project, which studies have not been independently verified by the Adjoining Entities; and

WHEREAS, in the hydrologic balance studies conducted by Rosedale in connection with the Project, the annual safe yield from the groundwater basin is assumed to be .3 acre-feet per acre times the gross developed acres in the District and no assumption is included with respect to groundwater inflow or outflow; and

WHEREAS, this MOU affects the Project and other similar banking programs operated for the benefit of third parties.

NOW, THEREFORE, BE IT RESOLVED that, based upon the mutual covenants contained herein, the parties hereto agree as follows:

1. Project Design and Construction. Rosedale has completed a preliminary Project Description of the Project described in Exhibit B hereto representing the contemplated facilities for the Project. Said preliminary description has been reviewed by the parties hereto. The foregoing shall not be interpreted to imply consent to any aspect of any future project not described in existing approved environmental documentation. Rosedale will construct the Project consistent with such preliminary description. Any major modifications of the facilities and/or significant changes from that described in Exhibit B and in the environmental documentation for the Project will be subject to

additional environmental review pursuant to CEQA and will be subject to review of the Monitoring Committee prior to implementation.

2. Project Operation. The Project shall be operated to achieve the maximum water storage and withdrawal benefits for Rosedale consistent with avoiding, mitigating or eliminating to the greatest extent practicable, significant adverse impacts resulting from the Project. To that end, the Project shall be operated in accordance with the following Project Objectives and Minimum Operating Criteria:

a. Project Objectives. Consistent with the Project description, Rosedale will make a good faith effort to meet the following objectives, which may or may not be met:

(1) The parties should operate their projects in such manner as to maintain and, when possible, enhance the quality of groundwater within the Project Site and the Kern Fan Area as shown in Exhibit C.

(2) If supplies of acceptable recharge water exceed recharge capacity, all other things being equal, recharge priority should be given to the purest or best quality water.

(3) Each project within the Kern Fan Area should be operated with the objective that the average concentration of total dissolved salts in the recovered water will exceed the average concentration of total dissolved salts in the recharged water, at a minimum, by a percentage equal to or greater than the percentage of surface recharge losses. The average shall be calculated from the start of each project.

(4) To maintain or improve groundwater quality, recovery operations should extract poorer quality groundwater where practicable. Blending may be used to increase recovery of lesser quality groundwater unless doing so will exacerbate problems by generating

unfavorable movement of lesser quality groundwater. It is recognized that the extent to which blending can help to resolve groundwater quality problems is limited by regulatory agency rules regarding discharges into conveyance systems used for municipal supplies, which may be changed from time to time.

(5) All groundwater pumpers should attempt to control the migration of poor quality water. Extensive monitoring will be used to identify the migration of poor quality water and give advance notice of developing problems. Problem areas may be dealt with by actions including, but not limited to:

(a) limiting or terminating extractions that tend to draw lesser quality water toward or into the usable water areas;

(b) increasing extractions in areas that might generate a beneficial, reverse gradient;

(c) increasing recharge within the usable water area to promote favorable groundwater gradients.

(6) It is intended that all recovery of recharged water be subject to the so-called "golden rule." In the context of a banking project, the "golden rule" means that, unless acceptable mitigation is provided, the banker may not operate so as to create conditions that are worse than would have prevailed absent the project giving due recognition to the benefits that may result from the project, all as more fully described at paragraph 2(b)12 below.

(7) The Project shall be developed and operated so as to prevent, eliminate or mitigate significant adverse impacts. Thus, the Project shall incorporate mitigation measures as necessary. Mitigation measures to prevent significant adverse impacts from occurring include but

are not limited to the following: (i) spread out recovery area; (ii) provide buffer areas between recovery wells and neighboring overlying users; (iii) limit the monthly, seasonal, and/or annual recovery rate; (iv) provide sufficient recovery wells to allow rotation of recovery wells or the use of alternate wells; (v) provide adequate well spacing; (vi) adjust pumping rates or terminate pumping to reduce impacts, if necessary; (vii) impose time restrictions between recharge and recovery to allow for downward percolation of water to the aquifer; and (viii) provide recharge of water that would otherwise not recharge the Kern Fan Basin. Mitigation measures that compensate for unavoidable adverse impacts include but are not limited to the following: (i) with the consent of the affected groundwater pumper, lower the pump bowls or deepen wells as necessary to restore groundwater extraction capability to such pumper; (ii) with the consent of the affected groundwater pumper, provide alternative water supplies to such pumper; and (iii) with the consent of the affected groundwater pumper, provide financial compensation to such pumper.

b. <u>Minimum Operating Criteria</u>.

(1) The Monitoring Committee shall be notified prior to the recharge of potentially unacceptable water, such as "produced water" from oilfield operations, reclaimed water, or the like. The Monitoring Committee shall review the proposed recharge and make recommendations respecting the same as it deems appropriate. Where approval by the Regional Water Quality Control Board is required, the issuance of such approval by said Board shall satisfy this requirement.

(2) Recharge may not occur in, on or near contaminated areas, nor may anyone spread in, on or near an adjoining area if the effect will be to mound water near enough to the contaminated area that the contaminants will be picked up and carried into the uncontaminated

groundwater supply. When contaminated areas are identified within or adjacent to ~~the~~ Project, Rosedale shall also:

(a) participate with other groundwater pumpers to investigate the source of the contamination;

(b) work with appropriate authorities to ensure that the entity or individual, if any, responsible for the contamination meets its responsibilities to remove the contamination and thereby return the Project Site to its full recharge and storage capacity;

(c) operate the Project in cooperation with other groundwater pumpers to attempt to eliminate the migration of contaminated water toward or into usable water quality areas.

(3) Operators of projects within the Kern Fan Area will avoid operating such projects in a fashion so as to significantly diminish the natural, normal and unavoidable recharge of water native to the Kern Fan Area as it existed in pre-project condition. If and to the extent this occurs as determined by the Monitoring Committee, the parties will cooperate to provide equivalent recharge capacity to offset such impact.

(4) The mitigation credit for fallowed Project land shall be .3 acre-feet per acre per year times the amount of fallowed land included in the Project Site in the year of calculation.

(5) The lands shown in Exhibit A may be utilized for any purpose provided, however, the use of said property by Rosedale for the Project shall not cause or contribute to overdraft of the groundwater basin.

(6) Each device proposed to measure recharge water to be subsequently recovered and/or recovery of such water will be initially evaluated and periodically reviewed by the

Monitoring Committee. Each measuring device shall be properly installed, calibrated, rated, monitored and maintained by and at the expense of the owner of the measuring device.

(7) It shall be the responsibility of the user to insure that all measuring devices are accurate and that the measurements are provided to the Monitoring Committee at the time and in the manner required by the Monitoring Committee.

(8) A producer's flow deposited into another facility, such as a transportation canal, shall be measured into such facility by the operator thereof and the measurement reported to the Monitoring Committee at the time and in the manner required by such Monitoring Committee.

(9) The Monitoring Committee or its designee will maintain official records of recharge and recovery activities, which records shall be open and available to the public. The Monitoring Committee will have the right to verify the accuracy of reported information by inspection, observation or access to user records (i.e., P.G.&E. bills). The Monitoring Committee will publish or cause to be published annual reports of operations.

(10) Losses shall be assessed as follows:

(a) Surface recharge losses shall be fixed and assessed at a rate of 3%, which includes a "safety factor" of 1% of water diverted for direct recharge. An additional surface recharge loss of 3% shall be fixed and assessed against water directly recharged which is subsequently extracted for out-of-district use. Such initial 3% loss may be modified in the future if studies acceptable to the parties demonstrate that such modification is appropriate, providing that a 1% "safety factor" shall be maintained and the total loss when directly recharged water is subsequently extracted for out-of-district use shall not exceed 6%. Notwithstanding anything to the contrary provided herein, water banked in Rosedale for or on behalf of third parties ~~(i.e.~~, creating a third party bank account) shall be subject to surface recharge losses calculated at 6% of water diverted for direct recharge.

(b) To account for all other actual or potential losses (including migration losses), a rate of 4% of water placed in a bank account shall be deducted to the extent that Rosedale has been compensated within three (3) years following the end of the calendar year in which the water was designated as banked at the SWP Delta Water Rate charged by DWR at the time of payment; provided further, however, that the water purchased and subtracted from a groundwater bank account pursuant to this provision shall only be used for overdraft correction within the District purchasing the water.

(c) An additional 5% loss shall be assessed against any water diverted to the Project Site for banking by, for, or on behalf of any out-of-County person, entity or organization (except current SWP Agricultural Contractors).

(d) All losses provided for herein represent amounts of water that are non-bankable and non-recoverable by Rosedale.

(11) Recovery of banked water shall be from the Project Site and recovery facilities shall be located therein. Recovery from outside the Project Site may be allowed with the consent of the District or entity having jurisdiction over the area from which the recovery will occur and upon review by the Monitoring Committee.

(12) Recovery of banked water may not be allowed if not otherwise mitigated if it will result in significant adverse impacts to surrounding overlying users. "Adverse impacts" will be evaluated using data applicable in zones including the area which may be affected

by the Project of approximately five miles in width from the boundaries of the Project as designated by the Monitoring Committee. In determining "adverse impacts," as provided at this paragraph and elsewhere in this MOU, consideration will be given to the benefits accrued over time during operation of the Project to landowners surrounding the Project Site including higher groundwater levels as a result of operation of the Project. In determining non-Project conditions vs. Project conditions, credit toward mitigation of any otherwise adverse impacts shall be recognized to the extent of the 4% loss and 5% losses recognized under paragraphs 2.b.(10)(b) and (c), for the mitigation credit recognized under paragraph 2.b.(4), if any, and to the extent of recharge on the Project Site for overdraft correction.

(13) To the extent that interference, other than insignificant interference, with the pumping lift of any existing active well as compared to non-Project conditions, is attributable to pumping of any wells on the Project Site, Rosedale will either stop pumping as necessary to mitigate the interference or compensate the owner for such interference, or any combination thereof. The Monitoring Committee will establish the criteria necessary to determine if well interference, other than insignificant interference, is attributable to pumping of Project wells by conducting pumping tests of Project wells following the installation of monitoring wells (if not already completed) and considering hydrogeologic information.

(14) The Kern Fan Element Groundwater Model, with input from Rosedale and the Adjoining Entities, and utilizing data from a comprehensive groundwater monitoring program, may be used by the Monitoring Committee as appropriate to estimate groundwater impacts of the Project.

(15) The parties recognize that the Project shall be operated with a positive balance, i.e., there shall be no "borrowing" of water for recovery from the basin.

3. <u>Project Monitoring</u>. Adjoining Entities agree to participate in a comprehensive monitoring program and as members of a Monitoring Committee, as hereinafter more particularly described, in order to reasonably determine groundwater level and water quality information under Project and non-Project conditions. The monitoring program will more particularly require the following:

a. <u>Monitoring Committee</u>: Rosedale and the Adjoining Entities shall form a Monitoring Committee for the Project upon terms and conditions acceptable to the participants. The Monitoring Committee shall:

(1) Engage the services of a suitable independent professional groundwater specialist who shall, at the direction of the Committee, provide assistance in the performance of the tasks identified below;

(2) Meet and confer monthly or at other intervals deemed to be appropriate in furtherance of the monitoring program;

(3) Establish a groundwater evaluation methodology or methodologies;

(4) Prepare a monitoring plan and two associated maps, "Well Location, Water Quality Network," and "Well Location, Water Level Network," which plan and maps depict the location and types of wells anticipated to be used in the initial phase of groundwater monitoring (said plan and maps are expected to be modified from time to time as the monitoring program is developed and operated);

(5) Specify such additional monitoring wells and ancillary equipment as are deemed to be necessary or desirable for the purposes hereof;

(6) Prepare annual water balance studies and other interpretive studies, which will designate all sources of water and the use thereof within the study area;

(7) Develop criteria for determining whether excessive mounding or withdrawal is occurring or is likely to occur in an area of interest;

(8) Annually or as otherwise needed determine the impacts of the Project on each of the Adjoining Entities by evaluating with and without Project conditions; and

(9) Develop procedures, review data, and recommend Project operational criteria for the purpose of identifying, verifying, avoiding, eliminating or mitigating, to the extent practicable, the creation of significant imbalances or significant adverse impacts.

b. Collection and Sharing of Data. The Adjoining Entities will make available to the Monitoring Committee copies of all relevant groundwater level, groundwater quality, and other monitoring data currently collected and prepared by each. Rosedale shall annually report, by areas of interest, water deliveries for banking and other purposes, groundwater withdrawals from bank accounts, transfers and other changes in account balances.

c. Monitoring Costs.

(1) The cost of constructing monitoring wells and ancillary equipment within Rosedale shall be borne by Rosedale. The cost of any new or additional monitoring wells and ancillary equipment outside the boundaries of Rosedale shall be borne as may be determined by separate agreement of Rosedale and Adjoining Entities.

(2) Each of the parties shall be responsible for the personnel costs of its representative on the Monitoring Committee. In addition, the Adjoining Entities shall be responsible for all costs of monitoring operations and facilities within their respective boundaries and Rosedale shall be responsible for all costs of monitoring operations and facilities within the Project Site.

(3) All other groundwater monitoring costs, including employment of the professional groundwater specialist, collection, evaluation and analyses of data as adopted by the Monitoring Committee, shall be allocated among and borne by the parties as they shall agree among themselves. Cost sharing among Adjoining Entities shall be as agreed by them. Any additional monitoring costs shall be determined and allocated by separate agreement of those parties requesting such additional monitoring.

4. Modification of Project Operations. The Monitoring Committee may make recommendations to Rosedale, including without limitation recommendations for modifications in Project operations based upon evaluation(s) of data which indicate that excessive mounding or withdrawal is occurring or is likely to occur in an area of interest. The Monitoring Committee and its members shall not act in an arbitrary, capricious or unreasonable manner.

5. Dispute Resolution.

a. Submission to Monitoring Committee. All disputes regarding the operation of the Project or the application of this MOU, or any provision hereof, shall first be submitted to the Monitoring Committee for review and analysis. The Monitoring Committee shall meet and review all relevant data and facts regarding the dispute and, if possible, recommend a fair and equitable resolution of the dispute. The Monitoring Committee and its members shall not act in an arbitrary, capricious or unreasonable manner. In the event that (1) the Monitoring Committee fails to act as herein provided, (2) any party disputes the Monitoring Committee's recommended resolution or (3) any party fails to implement the Monitoring Committee's recommended resolution within the time allowed, any party to this MOU may seek any legal or equitable remedy available as hereinafter provided.

b. Arbitration. If all of the parties agree that a factual dispute exists regarding any recommendation of the Monitoring Committee made pursuant hereto, or implementation thereof, such dispute shall, be submitted to binding arbitration before a single neutral arbitrator appointed by unanimous consent and, in the absence of such consent, appointed by the presiding judge of the Kern County Superior Court. The neutral arbitrator shall be a registered civil engineer, registered geologist, or other person agreeable to the parties, preferably with a background in groundwater hydrology. The arbitration shall be called and conducted in accordance with such rules as the contestants shall agree upon, and, in the absence of such agreement, in accordance with the procedures set forth in California Code of Civil Procedure section 1282, et seq. Any other dispute may be pursued through a court of competent jurisdiction as otherwise provided by law.

c. Burden of Proof. In the event of arbitration or litigation under this MOU, all parties shall enjoy the benefit of such presumptions as are provided by law but, in the absence thereof, neither party shall bear the burden of proof on any contested legal or factual issue.

d. Landowner Remedies. Nothing in this MOU shall prevent any landowner within the boundaries of any party from pursuing any remedy at law or in equity in the event such landowner is damaged as a result of projects within the Kern Fan Area.

6. Term. The Effective Date of this MOU shall be January 1, 2003 regardless of the date of actual execution. This MOU shall continue in force and effect from and after the Effective Date

until terminated by (1) operation of law, (2) unanimous consent of the parties, or (3) abandonment of the Project and a determination by the Monitoring Committee that all adverse impacts have been fully eliminated or mitigated as provided in this MOU.

7. Complete Agreement/Incorporation Into Banking Agreements. This MOU constitutes the whole and complete agreement of the parties regarding Project operation, maintenance and monitoring. Rosedale shall incorporate this MOU by reference into any further agreement it enters into respecting banking of water in or withdrawal of water from the Project Site.

8. Future Projects. With respect to any future project within the Kern Fan Area, the Parties hereto shall use good faith efforts to negotiate an agreement substantially similar in substance to this MOU.

9. Notice Clause. All notices required by this MOU shall be sent via first class United States mail to the addresses shown on the signature page of this agreement and shall be deemed delivered three days after deposited in the mail. Notice of changes in the representative or address of a party shall be given in the same manner.

10. California Law Clause. All provisions of this MOU and all rights and obligations of the parties hereto shall be interpreted and construed according to the laws of the State of California.

11. Amendments. This MOU may be amended by written instrument executed by all of the parties. In addition, recognizing that the parties may not now be able to contemplate all the implications of the Project, the parties agree that on the tenth anniversary of implementation of the Project, if facts and conditions not envisioned at the time of entering into this MOU are present, the parties will negotiate in good faith amendments to this MOU. If the parties cannot agree on whether conditions have changed necessitating an amendment and/or upon appropriate amendments to the

MOU, such limited issues shall be submitted to an arbitrator or court, as the case may be, as provided above.

12. Successors and Assigns. This MOU shall bind and inure to the benefit of the successors and assigns of the parties.

13. Severability. The rights and privileges set forth in this MOU are severable and the failure or invalidity of any particular provision of this MOU shall not invalidate the other provisions of this MOU; rather all other provisions of this MOU shall continue and remain in full force and effect notwithstanding such partial failure or invalidity.

14. Force Majeure. All obligations of the parties shall be suspended for so long as and to the extent the performance thereof is prevented, directly or indirectly, by earthquakes, fires, tornadoes, facility failures, floods, drownings, strikes, other casualties, acts of God, orders of court or governmental agencies having competent jurisdiction, or other events or causes beyond the control of the parties. In no event shall any liability accrue against a party, or its officers, agents or employees, for any damage arising out of or connected with a suspension of performance pursuant to this paragraph.

15. Counterparts. This MOU, and any amendment or supplement thereto, may be executed in two or more counterparts, and by each party on a separate counterpart, each of which, when executed and delivered, shall be an original and all of which together shall constitute one instrument, with the same force and effect as though all signatures appeared on a single document. In proving this MOU or any such amendment, supplement, document or instrument, it shall not be necessary to produce or account for more than one counterpart thereof signed by the party against whom enforcement is sought.

IN WITNESS WHEREOF the parties have executed this MOU as of ________________,

2004 (Effective Date) at Bakersfield, California.

ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT
P. O. Box 867
Bakersfield, CA 93302-0867

By: Hal Crossley

By: Wes Delvige

ROSEDALE RANCH I.D.
NORTH KERN WATER STORAGE DISTRICT
P. O. Box 81435
Bakersfield, CA 93380-1435

By:________________________________

By:________________________________

SEMITROPIC WATER STORAGE DISTRICT
P. O. Box Z
Wasco, CA 93280-0877

By:________________________________

By:________________________________

BUENA VISTA WATER STORAGE DISTRICT
P. O. Box 756
Buttonwillow, CA

By:________________________________

By:________________________________

HENRY MILLER WATER DISTRICT
P. O. Box 9759
Bakersfield, CA 93389-9759

By:______________________________

By:______________________________

BERRENDA MESA WATER DISTRICT
2100 F Street, Suite 100
Bakersfield, CA 93301

By:______________________________

By:______________________________

KERN COUNTY WATER AGENCY
P. O. Box 58
Bakersfield, CA 93302-0058

By: Gene A. Lundquist

By: President

KERN WATER BANK AUTHORITY
P. O. Box 80607
Bakersfield, CA 93380-0607

By:______________________________

By:______________________________

IMPROVEMENT DISTRICT NO. 4
KERN COUNTY WATER AGENCY
P. O. Box 58
Bakersfield, CA 93302-0058

By: Gene A. Lundquist

By: President

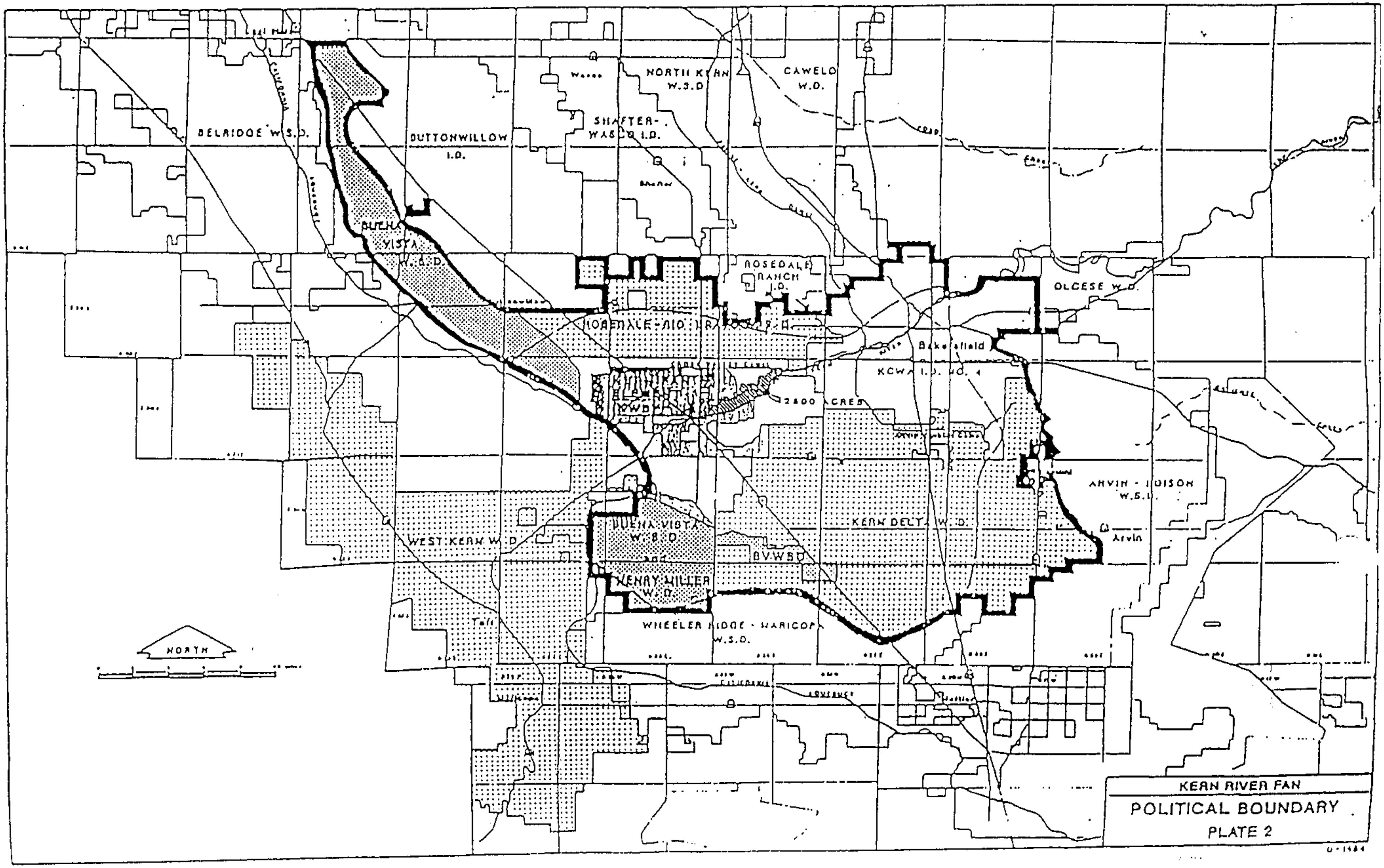
WEST KERN WATER DISTRICT
P. O. Box 1105
Taft, CA 93268-1105

By:______________________________

By:______________________________

RRB banking MOU - sales included - final.wpd

EXHIBIT 'A'



KERN RIVER FAN

POLITICAL BOUNDARY

PLATE 2

EXHIBIT 'B'

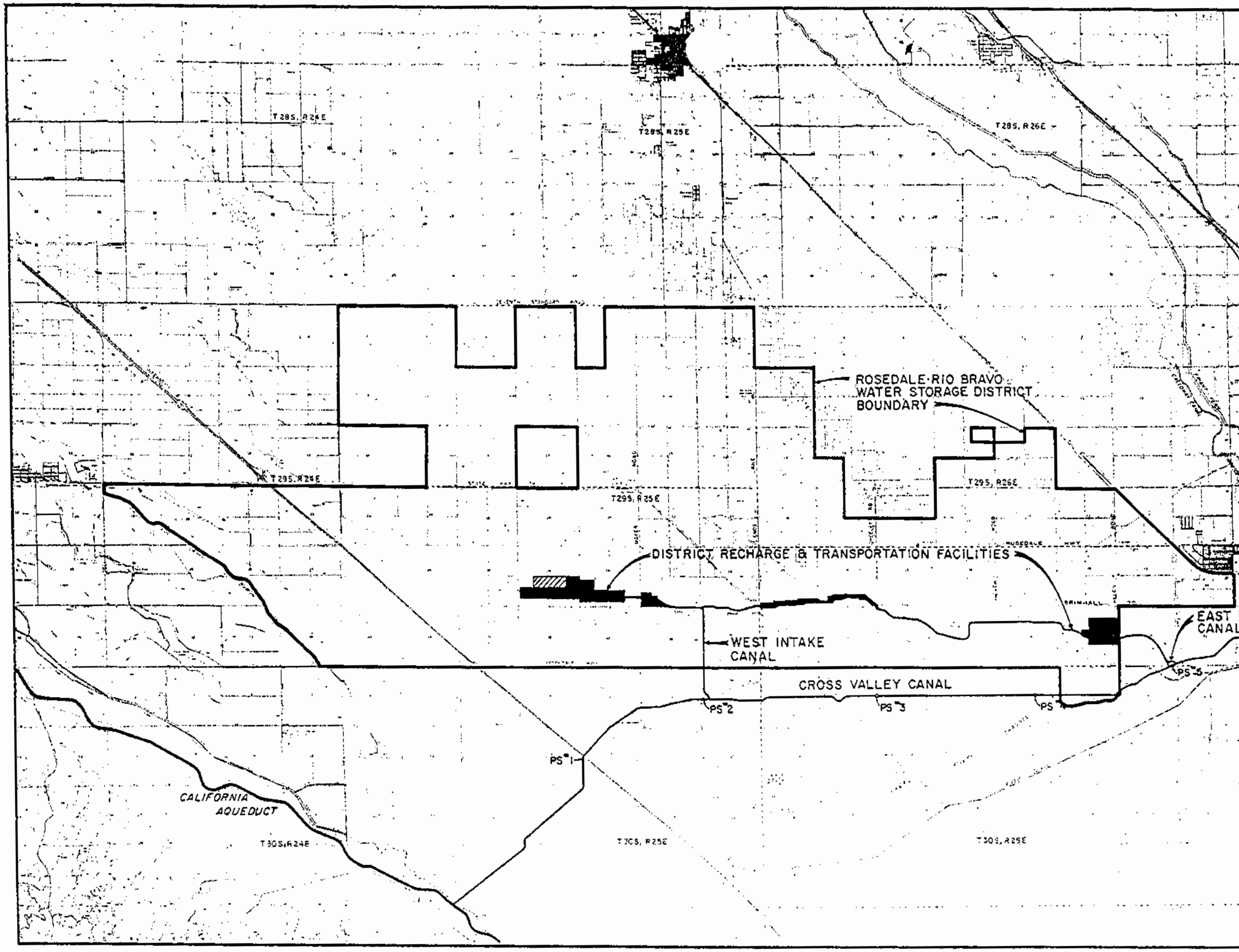
PROJECT DESCRIPTION

The Project involves the recharge, groundwater banking, recovery and sale of water by Rosedale-Rio Bravo Water Storage District (RRBWSD). Kern-Tulare Water District, Arvin-Edison Water Storage District (AEWSD) and other acquired waters will be captured and recharged within the RRBWSD service area. These recharged waters will be banked along with water previously recharged within the Kern River Fan Area by RRBWSD. Waters included in the banking program will originate from imported supplies that RRBWSD is able to put to beneficial use through direct or in-lieu recharge, or from captured local supplies that would have historically left Kern County, percolated into areas of poor quality or unusable groundwater, flooded agricultural land, or would otherwise not have been put to beneficial use within the groundwater basin.

RRBWSD has tentative agreement with Glorious Land Company (GLC). Said agreement calls for the sale and delivery of a total 220,000 acre-feet of water to GLC by RRBWSD over an initial term of 33 years (average 6,667 acre-feet per year). The maximum annual delivery at full build-out will not exceed 9,500 acre-feet. RRBWSD is negotiating a further agreement with The Metropolitan Water District of Southern California (MWD), which is expected to provide that MWD make actual annual deliveries to GLC and RRBWSD provide its water to MWD by way of exchange. Under the terms of the proposed MWD agreement, MWD may take direct delivery of water from RRBWSD annually or may choose to store water in RRBWSD. If and to the extent that the storage option is exercised, MWD will be limited to 60,000 acre-feet maximum storage at any one time and 20,000 acre-feet maximum annual delivery (which amount is inclusive of and not in addition to the 9,500 acre-feet maximum annual delivery provided in the letter of intent).

RRBWSD will improve District-owned lands in the South 1/2 of Section 25, T29S, R25E, MDB&M to add approximately 80 net acres of additional recharge ponds for project purposes. RRBWSD will construct approximately 10 additional extraction wells (8 new and 2 replacement wells) in RRBWSD's west-side well field. A pipeline will be constructed to connect the wells to the District's system and the Cross Valley Canal. RRBWSD will acquire and improve additional lands to increase the District's recharge capacity to 600 cfs.

EXHIBIT ‘C’



ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT

PLATE I
DISTRICT MAP

LONG TERM PROJECT RECOVERY
OPERATIONS PLAN
REGARDING ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT PROJECTS

Purpose.

Consistent with Rosedale-Rio Bravo Water Storage District's (Rosedale) Memorandums of Understanding governing its banking projects (MOUs), this Long Term Operations Plan Regarding Rosedale-Rio Bravo Water Storage District Projects ("Plan") designates specific measures to be employed to "*... prevent, eliminate or mitigate significant adverse impacts*" resulting from project operations within areas of concern (AOC's). All Rosedale projects which are subject to an MOU with adjoining entities shall be subject to and operated consistent with this Plan. Rosedale will carry out its duties and responsibilities under this Plan in good faith and in cooperation with its landowners, to the end that the objectives and purposes of this Plan will be achieved and/or carried out to the greatest extent practicable.

Plan Components:

A. Establish a Protocol for Monitoring and Reporting Groundwater Conditions to the Board of Directors and the Public.

1. During years when Rosedale is recovering (or is expected to recover) groundwater from a Rosedale project, Rosedale will conduct monitoring of groundwater conditions, as necessary, in addition to the monitoring conducted by the Kern Fan Monitoring Committee (pursuant to the MOUs), and provide reports on groundwater levels as described below.
2. Rosedale will report current groundwater levels to its Board of Directors at each monthly regular meeting, and will make the reports available to the public on its website (http://www.rrbwsd.com/).
3. Rosedale will regularly update its Groundwater Model (Model) to actual conditions and use the Model to project future groundwater conditions. Rosedale will endeavor to use the best and latest science and information available in all modeling and technical matters. Rosedale will report the results of its modeling to its Board of Directors and will make the results available to the public on its website (http://www.rrbwsd.com/). Recovery in any calendar year shall not commence until the Model has been run for projected operations and the results have been reported to the Board and made available to the public.

B. Implement Proactive Measures (in addition to A. above).

1. Rosedale will be obligated to collect and/or contribute funds to meet mitigation obligations hereunder (**"Action Fund")**, which shall be initially set at $2.00/AF

of recovered water from all prospective project operations (actually pumped, not exchanged), until the Action Fund balance reaches $_______. If the Action Fund balance drops below $____________ contributions shall be resumed until the Action Fund balance again reaches $___________. In addition, Rosedale shall initially provide $50,000 to the Action Fund. Rosedale shall maintain an accounting of funds and shall serve as fiscal agent for the Action Fund; Rosedale shall report the balance of the fund to its Board of Directors at its regular monthly meetings.

2. Rosedale will use its Model as a tool to evaluate groundwater impacts resulting from its project operations. The Model will be periodically run and updated as projected recovery plans become known or change and the Model will assume such conditions.
3. The Model has been and will be used to:
   (a) Forecast groundwater levels.
   (b) Forecast and predict the contribution of Rosedale's projects to groundwater level declines in the area.
   (c) Determine water level conditions in the "No Project" Condition for purposes of evaluating the impact of project operations. The "No Project" condition is the water level that would have been at any particular well location absent the Rosedale project.
   (d) Identify, based upon an analysis of "No Project" and Project conditions, if a **negative project impact ("NPI")** has or is likely to occur for which the measures described at D, E, F and G may be operative. NPI is determined according to C., 2., below.
   (e) Forecast any localized areas for special attention and/or monitoring, i.e., AOC's.
   (f) Identify wells at risk of impacts during recovery operations.

C. Establish Triggers and Actions within any identified AOC.

As described below at sections D, E, F, and G, these actions will be implemented in consultation with affected landowners that make a claim to Rosedale of well impacts relating to Rosedale's recovery operations and groundwater level declines. The triggers and actions below are for wells within any identified AOC, subject to the following:

.

1. These actions would not occur in years when average water levels (measured at the following wells: 29S/25E-27N1&2, 29S/25E-25M1&2, 29S/26E-31H1&2, and 29S/25E-35G01) are less than 140 feet from the surface as measured on March 31 of each year because it is expected that water levels will not decline during such year to an extent resulting in adverse impacts to wells.
2. The trigger for whether mitigation is warranted shall be based upon an analysis

and comparison of Model generated "No Project" conditions to Model generated "Project" conditions. When the Project conditions are 30 feet deeper than the No Project conditions at an operative well, and the well has (or is expected to) experience mechanical failure or other operational problems due to declining water levels, a negative project impact ("NPI") is triggered.

3. It is the intent of Rosedale to mitigate and/or compensate for legitimate Project impacts; it is not the intent of the Rosedale or the Plan to generate a windfall for landowners. Accordingly, reasonable adjustments in the form or level of mitigation and/or compensation may be made where it can be demonstrated that the affected well requires remediation for reasons other than temporary groundwater level declines resulting from Project operations (i.e., general overdraft conditions, lack of well maintenance, normal wear and tear, failure of well equipment, casing degradation, etc.).

4. For a well owner to be eligible for mitigation as provided below, the affected landowner shall submit a claim to Rosedale, which shall, at a minimum, provide information concerning the condition of the well and casing and pumping equipment of the well, and other information that is relevant to the landowner's claim. Upon receipt of a claim, Rosedale shall use the Model (or the results of modelling as reported to the Board and the public) to determine whether an NPI exists at the landowner's well and respond with the appropriate action described below.

D. Action for Ag Wells – Well Adjustment Needed and Available

1. Trigger: When the Model predicts NPI for an operational ag well outside the current operating range of the pump but within the potential operating range of the well.
2. Actions:
   (a) Field verify (with the affected landowner if requested) static depth to groundwater levels within the well and compare to Model values.
   (b) Compare pump setting information with Model projected pumping water levels throughout the year to determine pump submergence levels and evaluate the necessity and feasibility of lowering the well pump to meet the landowner's needs.
   (c) Secure an estimate to complete the necessary work.
   (d) Using the Action Fund, pay all costs associated with the landowner claim, including the cost to complete the necessary work (less negotiated offsets), upon the landowner executing a release.

E. Action for Ag Wells – Well Adjustment Unavailable

1. Trigger: When the Model predicts NPI for an operational ag well outside the current and potential operating range of the well.
2. Action:
   (a) Field verify (with the affected landowner if requested) static depth to groundwater levels within the well and compare to Model values.
   (b) Supply equivalent water supply to the affected landowner from an alternate source at no greater cost to the affected landowner; or
   (c) With the consent of the affected landowner, provide other acceptable mitigation; or
   (d) Reduce or adjust pumping as necessary to prevent, avoid or eliminate the NPI. Use the Model(s) to identify the well or wells that may require reduction or adjustment in pumping.

F. Action for Domestic Wells.

1. Trigger: Emergency health and safety concerns exist because a domestic well production ceases or is likely to cease as a result of pumping by Rosedale's project.
2. Actions:
   (a) Field verify (with the affected landowner if requested) if flow stoppage is due to groundwater level decline.
   (b) Obtain right-of-entry permit and well data release from well owner.
   (c) Collect pump manufacture data, the in-situ pump setting and the casing depth information.
   (d) If it is determined that no NPI exists at the well, or if flow stoppage is due to causes unrelated to groundwater level decline (i.e., pump failure, casing degradation, etc.) repairs are the responsibility of the landowner.
   (d) If flow stoppage is due to groundwater level decline in the aquifer proximate to the impacted well and an NPI exists at the well, offer to fund from the Action Fund one of the following in order to provide the least cost short and long term solution:
      (1) Lower the domestic submersible pump bowl setting sufficient to restore and maintain service.
      (2) Provide a one-time permanent connection to the nearest water service provider.
      (3) Drill and equip a new domestic well, the cost of which may be subject to offset by the landowner based on betterment.
      (4) If necessary, provide interim in-home water supplies until action (1), (2) or (3) above is completed.
   (e) Using the Action Fund, pay all costs associated with the landowner claim, including the cost to complete the necessary work (less negotiated offsets), upon the landowner executing a release.

G. Action for Other Landowner Claims.

1. Trigger: A landowner makes a claim of impact on his groundwater use (which could be due to Rosedale's projects, adjacent landowners, or a combination) that does not relate to the actual (or likely) cessation of production at a well.
2. Actions:
   (a) Refer claim to the Board of Directors to evaluate and respond to landowner claim at its next regularly scheduled meeting.
   (b) Process claim according to agreed upon dispute resolution process (e.g., mediation, arbitration, etc.) in the event the affected landowner does not agree with the Board of Directors' response.

H. Release; Rosedale's Rights Against Others

In all instances when Rosedale takes action to mitigate the effects of declining groundwater levels under this Plan, the affected landowner shall be required to execute an appropriate release in favor of Rosedale. Nothing in this Plan or any action taken by Rosedale hereunder shall affect Rosedale's rights or remedies against any other person or entity (e.g., adjacent landowners, other recovery projects in the area and participants in such projects, etc.) which may have caused or contributed to the effects for which Rosedale has mitigated; if appropriate, an affected landowner that receives assistance from Rosedale hereunder shall assign its rights against such other person(s) or entity(ies) to Rosedale.

PROJECT RECOVERY OPERATIONS PLAN REGARDING PIONEER PROJECT, ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT, AND KERN WATER BANK AUTHORITY PROJECTS

Purpose:

The Kern County Water Agency, on behalf of itself and the Pioneer Project Recovery Participants, Rosedale- Rio Bravo Water Storage District, and the Kern Water Bank Authority (the Parties) have developed this Operating Plan to designate measures, consistent with the MOUs[1] governing their respective projects, to *"... prevent, eliminate or mitigate significant adverse impacts"* resulting from project recovery operations. This plan applies to all recovery programs undertaken by any of the Parties' projects that are governed by MOUs. Pioneer mitigation includes the Pioneer Project, Berrenda Mesa Banking Project and Improvement District No. 4's Allen Road well field. This plan applies to landowners using groundwater for overlying agricultural or domestic uses as of the date this plan is executed. It does not apply to wells installed after the date of this plan that are installed to unsuitable depths based on historic water level fluctuations.

Plan Components:

1. **Establish a Joint Operations Committee (JOC):**

   a. Representatives from each of the Parties will participate in the JOC. Each Party will have equal representation on the JOC and an equal voice in its determinations, except that with respect to claims made to the JOC, only those parties contributing to mitigation will have a vote in determinations made on such claims.

   b. The JOC will meet as needed during years in which recovery operations are occurring (or expected to occur) to evaluate groundwater conditions, model results, landowner claims, and any other topics of concern. It is expected that the JOC will meet at least monthly during years when recovery operations are occurring.

   c. The JOC may establish a technical subcommittee to assist with compiling information to use in evaluating claims.

   d. The JOC will evaluate all claims with respect to model results and other appropriate information and the triggers established in Section 3, and approve or reject such claims. If claims are approved, appropriate mitigation will be determined as further described in Section 3. If mitigation is provided, the JOC will fund and/or contribute to the actions as described in Section 4.

[1] MOU refers to all of those MOUs executed by the parties that contain terms substantially similar to the *Memorandum of Understanding Regarding Operation and Monitoring of the Kern Water Bank Groundwater Banking Program* (dated October 26, 1995).

2. Evaluate Groundwater Conditions

a. The Parties have developed groundwater models (AMEC and Harder) as a tool to evaluate With Project versus Without Project groundwater levels and predict potential groundwater impacts. The Parties shall mutually agree on the assumptions used for Without Project conditions, and for purposes of making determinations hereunder an average of the output for the two models shall be utilized. The Pioneer Without Project condition shall assume farming is continued on its footprint.

b. The models will be updated regularly (at least annually) and compared to actual conditions during years in which recovery occurs. The Parties shall mutually cooperate to attain all data necessary for such updates. The Parties will utilize the water quality and water level monitoring data collected by the Kern Fan Monitoring Committee, and may conduct additional monitoring as needed. The Parties will report the results of the modeling to their respective Boards of Directors and shall publish on their respective websites maps and data showing current and projected water level information in the general area of the projects. As a matter of practice, the Parties will use the best and latest science and information available in all modeling and technical matters.

c. Absent unanimous approval of the JOC, recovery in any calendar year beyond March 15 of that year shall not commence (or continue) until the Models have been run for the projected operations and the Committee has met to review the results.[2]

d. The Models will be used to:
   i. Forecast With Project and Without Project groundwater levels at the outset of recovery programs.
   ii. Forecast any localized areas for special attention and/or monitoring.
   iii. Attempt to identify domestic wells at risk of impacts.
   iv. Determine if mitigation triggers have been met (See Section 3b).

e. The Parties may, based on experience gained, select a mutually agreeable groundwater model capable of accurately predicting groundwater impacts resulting from project operations.

f. In case of a dispute concerning a technical issue with a model, such as data inputs or the results based thereon, the Parties shall consult with a third party to resolve the matter.

3. Triggers and Actions

a. These actions will not occur in years when average water levels (measured at the following wells: 29S/25E-25M1&2, 29S/26E-31H1&2, 29S/26E-34M1, and 29S/26E-35H) are less than 140 feet from the surface as measured on March 31 of a given year

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[2] Model data for a preceding year becomes available at different times in the following year. Modeling at the beginning of any given year will necessitate estimating certain model input data for the preceding year (e.g. Kern River losses). These estimates will be replaced with actual data at regular intervals when the model is updated.

because it is expected that water levels will not decline during such year to an extent resulting in a mitigatable impact.

b. The trigger for whether mitigation is considered shall be based upon an analysis and comparison of Model generated Without Project conditions to Model generated With Project conditions. When the With Project conditions are fifteen (15) or forty-five (45) feet deeper than the Without Project conditions at any operative domestic or agricultural well, respectively, and mechanical failure or other operational problems have occurred or are reasonably likely to occur due to declining water levels, mitigation will be provided as described below.

c. To be eligible for mitigation as provided below, the affected landowner shall allow the JOC (or representatives thereof) to perform a field inspection as described in 3.d. below, and provide claim information concerning the condition of the well and casing and pumping equipment, as determined appropriate by the JOC. The JOC shall evaluate all submitted claims within forty-five (45) days of receipt, provided that the landowner cooperates with the collection of necessary information. All mitigation actions are contingent upon the claimant executing an appropriate release, the terms of which will depend upon the nature of the mitigation provided.

d. For all claims, a field inspection will be conducted with the consent and coordination of the landowner to determine static depth to groundwater levels within the well and verify well construction information and pump setting information, if possible.

e. Well construction information and pump setting information will be compared to Model projected pumping water levels to determine pump submergence levels and evaluate the necessity and feasibility of mitigation measures. Mitigation measures, if warranted, will include one or more of the following:
   i. Providing a short-term emergency water supply to domestic well owners. Short-term emergency supplies shall be provided as soon as reasonably possible, but in all cases within 14 days of notification to the JOC of such needs;
   ii. Providing funds to lower a well pump;
   iii. Providing funds to complete a connection to an M&I water provider;
   iv. Supplying an equivalent water supply from an alternate source;
   v. Providing funds to replace the affected well with a deeper well that meets Kern County well ordinance standards;
   vi. Reducing or adjusting recovery pumping as necessary to avoid the impact; or
   vii. With the consent of the affected landowner, providing other acceptable mitigation.

f. Mitigation will not be provided where it can be demonstrated that the affected well requires remediation for reasons other than temporary groundwater level declines resulting from Project operations (i.e., general overdraft conditions, lack of well maintenance, normal wear and tear, failure of well equipment, etc.).

4. Mitigation Funding

a. It is the intent of the Parties to mitigate and/or compensate for legitimate Project impacts; it is not the intent of the Parties or the Plan to generate a windfall for landowners. Accordingly, adjustments will be made for depreciation of existing equipment and landowner contributions based on betterment for all mitigation measures. See Exhibit A for an example of such adjustments.

b. All costs paid, water supplies provided, and/or pumping reductions used by the Parties to prevent, eliminate or mitigate claimed impacts at a well site shall be initially allocated among the parties according to their respective projects' proportionate contributions to the With Project water level as compared to Without Project water level, as determined by using an average of the most recent versions of the models. After years end, the models shall be updated with the actual operations data for that year and recalibrated, and the average of the results of such modeling shall be used for a final allocation of the projects' proportionate contributions levels. If appropriate, the parties shall exchange funds and/or water supplies among them in accordance with the final allocation. For administrative ease, only an initial and final allocation for a given year shall be required. This procedure shall apply to mitigation for both domestic and agricultural wells.

c. All costs expended by any Party for equipment, water supplies or labor that is/are purchased or provided to address emergency health and safety concerns at domestic wells (exclusive of the costs described in 4.b. above) shall initially be allocated equally between the Parties. These costs shall be reallocated among the parties after years end per the procedure described in 4.b. above, provided that only those domestic wells for which emergency health and safety costs were incurred by a party shall be included in such reallocation, and further provided that the projects' proportionate contribution levels shall be based on the melded average of the results of the reallocation at all of the wells included in the reallocation.

d. All costs expended by any JOC participant in the administration of the JOC on behalf of all participants (e.g., processing claim response letters, calls from claimants, postage, notary public services, etc.) shall initially be allocated equally between the Parties. These costs shall be reallocated after years end per the procedure described in 4.b. above.

5. Additional Actions and Miscellaneous.

a. The term of this Operations Plan shall commence on February 1, 2017, and shall terminate on January 31, 2019. The Parties may agree to extend this Operations Plan and will meet starting October 1, 2018 to discuss any extension.

b. Modification language - This Operations Plan may not be altered, amended, or modified in any respect, except by unanimous consent of the Parties. Any modification to this Operations Plan must be made in writing and executed by all the Parties.

c. Except as set forth below, in the event the Joint Operations Committee cannot agree on (1) the implementation of this agreement, or (2) the proper action in response to a landowner claim, such dispute shall be submitted to binding arbitration before a single neutral arbitrator appointed by the Parties, and in absence of such consent, appointed by the presiding judge of the Kern County Superior Court. Any arbitrator selected by the parties shall have experience arbitrating groundwater disputes. The arbitration shall be called and conducted in accordance with such rules as the Parties shall agree upon, and in the absence of such agreement, in accordance with the procedures set forth in California Code of Civil Procedure section 1282, et seq. Notwithstanding the foregoing, in any arbitration the Parties agree that discovery will be allowed pursuant to Code of Civil Procedure section 1283.05. The Parties shall attempt to jointly appoint the neutral arbitrator within ten (10) days after a dispute arises, and in the event the Parties cannot agree to a neutral arbitrator within said ten-day period, either Party may make a request to the presiding judge of the Kern County Superior Court immediately thereafter. In the event a landowner submits a claim and the Joint Operations Committee cannot agree on the proper action in response, the arbitration requirement shall be contingent upon the landowner's express written consent to proceed and be bound by arbitration and to pay his/her/its proportionate share of arbitrator fees and related costs. Absent such landowner consent, there shall be no obligation on the part of either Party to arbitrate any such dispute.

d. With respect to the interpretation and enforcement of this Plan, and with respect to the resolution of any matter left for future determination or implementation, the Parties agree to carry out such duties and responsibilities in good faith and in cooperation with one another, to the end that the objectives and purposes of this agreement will be achieved and/or carried out to the greatest extent practicable.

APPROVED this ___ day of ___________, 2017

"PARTIES"

KERN COUNTY WATER AGENCY, on behalf of itself and the Pioneer Project Recovery Participants

By: ______________________________

KERN WATER BANK AUTHORITY

By: ______________________________

ROSEDALE-RIO BRAVO WATER STORAGE DISTRICT

By:____________________________________

Exhibit A

Joint Operations Committee
Well Cost Alternatives Worksheet

Date:	**October 13, 2015**
Case No.	**15-017**
Name:	**Ross Johnson**

A. Notes:

1. Pump was lowered in 2015.
2. Pump was pulled in October 2015 and found to be sanded up. (ME Beggs Invoice)
3. Bottom of well was tagged in October 2015 at 288 ft or 6 ft shallower than a year ago. (ME Beggs Invoice)
4. Casing is flaking off (ME Beggs Invoice)

B. Exhibit A Analysis:

i. Pump Capacity Analysis:

Required Pump Flow Rate (Estimated)		10 GPM
Measured Pump Flow Rate (Estimated)		0 GPM
Difference		10 GPM
Adequate Capacity	Yes ____ No __X__	

ii. Pump Setting Analysis:

Depth of Casing		288 Ft
Depth to Water (Static)		222 Ft
Depth to Pumping Water Level (Estimated)		231.5 Ft
Drawdown		9.5 Ft
Pump Setting		284 Ft
Pump Submergence		52.5 Ft
Adequate Submergence	Yes __X__ No ____	
Projected static depth to water level (From Study)		250 Ft
Drawdown		9.5
Required Submergence		50
Projected 10 Year Casing Setting		175
Modified Pump Setting		485 Ft
Existing Casing Depth		288 Ft
Modified Pump Setting		485 Ft
15 feet minimum pump clearance.		15 Ft
Required casing depth in ten years.		500 Ft
Existing Casing Depth below Required Casing Depth		(212) Ft
Adequate Clearance	Yes ____ No __X__	

C. Well Replacement Analysis

Well Replacement Depreciation Analysis:

Existing well casing - Expected Life	50 Years
Existing well casing - Age	38
Existing well casing - Expected Remaining Life (Casing has failed)	0
Existing pump -- Expected Life	15 Years
Existing pump - (Pump replaced in July 2015)	0
Existing pump - Expected Remaining Life	15

Note: In some cases, existing column, tube, shaft and motor should also be evaluated, or included with Existing pump.

Facility Remaining Replacement Cost Analysis:

	Cost	Cont. Amount	Total
Drilling and casing cost for new well.	90,000	9,000	$99,000
Purchase and installation of new pumping equipment.	5,000	500	$5,500
Salvage Value			$0
Total:			$104,500

Unit Well Replacement Cost	$99,000	/	500 FT =	$198 /FT
Existing Well - Replace Cost	$198	/FT x	288 FT =	57,024
Existing Well - Depreciated Value				57,024
Existing Well - Remaining Value				0
New Well - Incremental Cost	$198 /FT x		212 FT =	41,976
Action Fund Mitigation Cost				$41,976
Unit Pump Replacement Cost	$5,500	/	485 FT =	$11 /FT
Existing Pump - Replace Cost	$11	/FT x	284 FT =	3,224
Existing Pump - Depreciated Value				0
Existing Pump - Remaining Value				3,224
New Pump - Incremental Cost	$11 /FT x		201 FT =	2,276
Action Fund Mitigation Cost				$5,500

Facility Replacement Cost Summary:

Owner Cost for Facility Replacement	**$57,024**
Action Fund Cost for Facility Replacement	**$47,476**
Total Replacement Cost	**$104,500**

D. Cost Alternative Summary:

1) Cost to drill new well to a depth of 495 ft.	$99,000
2) Incremental cost to drill new well from 288 ft down to 495 ft.	$41,976
3) Drill New Well & Provide Pump (Full Cost)	$104,500

E. Action Fund Cost

Exhibit A - Incremental cost to drill new well from 288 ft down to 495 ft and lower pump from 284 ft to 485 ft.	**$47,476**

Appendix C

Air Quality and Greenhouse Gas Emissions Calculations

ESA

IRWD Fan Groundwater Assumptions

Project Land Uses

	Land Use Type	CalEEMod LandUse Type	CalEEMod LandUse Subtype	Acres	Amount	Unit	Linear Length feet, Depth/Volume,
Per Phase	Recharge Facilities					Acres	
	Basins + Site Restoration	Parking	Other Non-Asphalt Lot	640	640	Acres	640
	Pipelines	Parking	Other Non-Asphalt Lot	covered in recharge basin acreage	0.375	1000sqft	375
Per Well	Recovery Wells						
	Well	Parking	Other Non-Asphalt Lot	0.07	3.000	1000sqft	3,000
	Well head				6	1000sqft	0.50
	Pipelines				2.500	1000sqft	2,500
Total	Conveyance Facilities	Parking	Other Non-Asphalt Lot	21.50		Acres	936,737
	Earth Lined Canal	Parking	Other Non-Asphalt Lot	21.30	21.3	Acres	928000.0
	Turnout	Parking	Other Non-Asphalt Lot	0.06	0.1	Acres	2,450
	Pipelines	Parking	Other Non-Asphalt Lot	0.14	6.3	1000sqft	6,287
Per	Pump Stations	Parking	Other Non-Asphalt Lot	0.07	3.00	1000sqft	3,000

Construction Data

From Construction schedule of Feasibility Study

	Construction Phase	CalEEMod Phase Type	Start Date	End Date	Total Calendar Days	Workdays (5 days/week)	Total Worker Trips	Total Vendor Trips (Water+Concrete)	Total Haul Trips
Phase 1	Recharge Facilities								
	Demolition/Site Clearing	Demolition	7/2/2021	9/30/2021	90	65	650	260	642
	Pipelines	Trenching	7/2/2021	9/30/2021	90	65	650	260	30
	Basins	Grading	7/2/2021	4/30/2022	302	216	4320	864	37500
	2021		7/2/2021	12/31/2021	182	131	2620	524	22743
	2022		1/1/2022	4/30/2022	119	85	1700	340	8950
	Restoration	Grading	4/1/2022	4/30/2022	29	21	126	84	
Per Well	Recovery Wells								
	Well Drilling (per construction team)	Grading	5/2/2022	6/30/2022	59	44	440	176	8
	Well Construction	Construction	4/3/2023	6/10/2023	68	50	500	202	
	Pipelines	Trenching	4/3/2023	6/30/2023	88	65	650	260	122
Total	Conveyance Facilities								
	Turnout, Pipelines, Canal	Grading	4/26/2023	5/19/2026	1119	800	16000	7614	76252
	2023		4/26/2023	12/31/2023	249	178	3560	1717	16967
	2024		1/1/2024	12/31/2024	365	262	5240	2484	24973
	2025		1/1/2025	12/31/2025	364	261	5220	2474	24877
	2026		1/1/2026	5/19/2026	138	99	1980	939	9436
Per Station	Conveyance Facilities								
	Pumpstations	Construction	4/26/2023	2/28/2024	308	221	2652	896	
	2023		4/26/2023	12/31/2023	249	178	2136	724	154
	2024		1/1/2024	2/28/2024	58	43	516	172	
Phase 2	Recharge Facilities								
	Demolition/Site Clearing	Demolition	2/28/2022	5/31/2022	92	67	670	368	642
	Pipelines	Trenching	2/28/2022	5/31/2022	92	67	670	368	30
	Basins	Grading	2/28/2022	12/31/2022	306	220	4400	1224	37500
	Restoration	Grading	12/1/2022	12/31/2022	30	22	132	120	
Per Well	Recovery Wells								
	Well Drilling (per construction team)	Grading	1/2/2023	2/28/2023	57	42	420	168	8
	Well Construction	Construction	12/4/2023	2/11/2024	69	50	500	202	
	2023		12/4/2023	12/31/2023	27	20	200	82	
	2024		1/1/2024	2/11/2024	41	30	300	120	
	Pipelines	Trenching	12/4/2023	2/28/2024	86	63	630	252	122
	2023		12/4/2023	12/31/2023	27	20	200	80	39
	2024		1/1/2024	2/28/2024	58	43	430	172	83
Total	Start Up/Testing+Float Day		5/20/2026	8/12/2026	84	61	610		

Per Construction Phase

Demolition

Piping	
Piping Length (ft)	13,200
Diameter (ft)	1.5
Excavation Depth (ft)	7.00
Hardscape Debris Volume (CY)	5,133
Debris weight (lb):Volume (CY)[1]	2,400
Piping Debris Weight (tons)	6,160
Total Debris Weight (tons)	6,160
Total Demolition Debris (CY)	**5,133**
Haul Truck Capacity (CY)	16
Total Haul Trucks Required	321
Total Haul Truck Trips (In/Out)	**642**
Miles Per Trip	20

Per Well

Concrete Pad - Concrete Trucks

Parameters	**Amount**
Concrete Pad Size (ft2)	500.00
Thickness (ft)	0.50
Concrete Volume (ft^3)	250.0
Concrete Volume (CY)	**9**
Concrete Truck Capacity (CY)	10
Total Haul Trucks Required	1
Total Haul Truck Trips (In/Out)	**2**
Phase 1-Miles Per Trip	25.0
Phase 2-Miles Per Trip	25.0

Excavation Quantities Per Well - Well Drilling

Parameters	**Amount**
Radius (ft)	1.00
Depth (ft)	900
Excavation Volume (ft^3) - Per Well	2,827
Total Excavation Volume	2,827
Excavation Volume (Export) (CY)	**105**
Assume 50% Excavation moved onsite without trucks	52
Haul Truck Capacity (CY)	16
Total Haul Trucks Required	4
Total Haul Truck Trips (one-way trips, around site)	**8**
Phase 1-Miles Per Trip	4.0
Phase 2-Miles Per Trip	2.6

Per Construction Phase

Excavation Quantities - Recharge Basins

Parameters	**Amount**
Site Area (acres)	640.00
Site Area (ft^2)	27,878,400
Excavation Depth (ft)	1
Excavation Volume (Export) (CY)	**600,000**
Assume 50% Excavation moved onsite without trucks	**300,000**
Haul Truck Capacity (CY)	16
Total Haul Trucks Required	18,750
Total Haul Truck Trips (one-way trips, around site)	**37,500**
Phase 1-Miles Per Trip	4.0
Phase 2-Miles Per Trip	2.6

Recharge Basin Pipeline Grading

Parameters	**Amount**
Piping length (ft)	350
Diameter (ft)	6
Excavation Depth (ft)	6
Excavation Volume (ft^3)	12,600
Excavation Volume (Export) (CY)[4]	**467**
Assume 50% Excavation moved onsite without trucks	**233**
Haul Truck Capacity (CY)	16
Total Haul Trucks Required	15
Total Haul Truck Trips (one-way trips, around site)	**30**
Phase 1-Miles Per Trip	4.0
Phase 2-Miles Per Trip	2.6

Conveyance Facilities

Excavation Quantities - Conveyance Canal

Parameters	**Amount**
Cut (CY)	244,227
Fill (CY)	716,381
Subgrade Preparation (CY)	226,189
Excavation Volume (Export) (CY)[5]	**1,186,797**
Assume 50% Excavation moved onsite without trucks	**593,399**
Haul Truck Capacity (CY)	16
Total Haul Trucks Required	37,088
Total Haul Truck Trips (one-way trips, around site)	**74,176**
Phase 1-Miles Per Trip	4.0
Phase 2-Miles Per Trip	2.6

Excavation Quantities - Conveyance Facilities Piping

Parameters	**Amount**
Piping length (ft)	6,287
Diameter (ft)	6
Excavation Depth (ft)	22
Excavation Volume (ft^3)	829,818
Excavation Volume (Export) (CY)[4]	**30,734**
Assume 50% Excavation moved onsite without trucks	**15,367**
Haul Truck Capacity (CY)	16
Total Haul Trucks Required	961
Total Haul Truck Trips (one-way trips, around site)	**1,922**
Phase 1-Miles Per Trip	4.0
Phase 2-Miles Per Trip	2.6

Excavation Quantities - Turnout

Parameters	**Amount**
Excavation Volume (Export) (CY)[5]	**2,450**
Assume 50% Excavation moved onsite without trucks	**1,225**
Haul Truck Capacity (CY)	16
Total Haul Trucks Required	77
Total Haul Truck Trips (one-way trips, around site)	**154**
Phase 1-Miles Per Trip	4.0
Phase 2-Miles Per Trip	2.6

Notes:

CalRecycle Weights and Volumes

1 Haul truck capacity based on CalEEMod default of 16 CY per truck

3 Concrete truck capacity assumed to be 10 CY per truck.

4 Phase 1 and 2 Trip lengths for hauling excavation materials is based on measurements taken in google earth from center point of Phase 1 and Phase 2 site areas to the furthest diagonal direction for both sites.

Excavation Quantities - Recovery Well Pipeline Grading

Parameters	Amount
Piping length (ft)	2,500
Diameter (ft)	3
Excavation Depth (ft)	7
Excavation Volume (ft^3)	52,500
Excavation Volume (Export) (CY)[4]	**1,944**
Assume 50% Excavation moved onsite without trucks	972
Haul Truck Capacity (CY)	16
Total Haul Trucks Required	61
Total Haul Truck Trips (one-way trips, around site)	**122**
Phase 1-Miles Per Trip	4.0
Phase 2-Miles Per Trip	2.6

Concrete Quantities - Conveyance Canal

Parameters	Amount
Concrete Volume (Import) (CY)[5]	**21,911**
Haul Truck Capacity (CY)	10
Total Haul Trucks Required	2,192
Total Haul Truck Trips (In/Out)	**4,384**
Phase 1-Miles Per Trip	25.0
Phase 2-Miles Per Trip	25.0

Per Pump Station

Concrete Quantities - Pump Station

Parameters	Amount
Concrete Pad Size (ft2)	3,000.00
Thickness (ft)	0.50
Concrete Volume (ft^3)	1,500.0
Concrete Volume (CY)	**56**
Concrete Truck Capacity (CY)	10
Total Haul Trucks Required	6
Total Haul Truck Trips (In/Out)	**12**
Phase 1-Miles Per Trip	25.0
Phase 2-Miles Per Trip	25.0

Excavation Quantities - Pump Station

Parameters	Amount
Pad Size (ft2)	3,000
Excavation Depth (ft)	22
Excavation Volume (ft^3)	66,000
Excavation Volume (Export) (CY)[4]	**2,444**
Assume 50% Excavation moved onsite without trucks	1,222
Haul Truck Capacity (CY)	16
Total Haul Trucks Required	77
Total Haul Truck Trips (one-way trips, around site)	**154**
Phase 1-Miles Per Trip	4.0
Phase 2-Miles Per Trip	2.6

Concrete Quantities - Turnout

Parameters	Amount
Concrete Volume (Export) (CY)[5]	**150**
Haul Truck Capacity (CY)	10
Total Haul Trucks Required	15
Total Haul Truck Trips (In/Out)	**30**
Phase 1-Miles Per Trip	4.0
Phase 2-Miles Per Trip	2.6

IRWD Fan Groundwater Assumptions

Operational Activities

Operational Activity	Description	Notes	Frequency/unit
Energy Consumption			
Recharge Facilities			
	Electricity required for booster pumps operating in per pump station	30 kwh/AF	Annual
	100,000 AF/year	900000.00	kwh/yr
Recovery Wells			
	Electricity required for recovery well	600 kwh/AF	Annual
	50,000 AF/year	30,000,000.00	kwh/yr

Weed and Pest Control

Workers	2	
Frequency	4	per year
	20	days per occurrence
	80	max days/per year
Equpment	1	crawler tractor
	1	Backhoe
	1	Water Truck
	1	spray rig - modeled as other construction equipment

Earthwork

Workers	4	
Frequency	1	Every 3 years
	90	days per occurrence
Equpment	2	Graders
	2	Rubber Tired Loader
	2	crawler tractor

Earthwork- Grading Amount

Parameters	Amount
Site Area (acres)	1,300.00
Site Area (ft^2)	56,628,000
Excavation Depth (ft)	0.08
Excavation Volume (ft^3)	4,719,000
Excavation Volume (CY)	**174,778**
Assume 50% Excavation moved onsite without trucks	87389
Haul Truck Capacity (CY)	16
Total Haul Trucks Required	5,462
Total Haul Truck Trips (In/Out)	**10,924**
Total Haul Truck Trips (In/Out) per day	122
Miles Per Trip	3.3

Operational Trip lengths for hauling excavation materials is based on measurements taken in google earth from center point of Phase 1 and Phase 2 site areas to the furthest diagonal direction and averaged across both sites.

IRWD Fan Groundwater Assumptions

Construction Equipment

Recharge Facilities

Subphase	CalEEMod Phase Type	Equipment Type	# of Equipment
Demolition/Site Clearing	Demolition	Excavators	2
Demolition/Site Clearing	Demolition	Grader	1
Demolition/Site Clearing	Demolition	Rubber Tired Loader	1
Pipelines	Trenching	Back hoes	1
Pipelines	Trenching	Crane	1
Pipelines	Trenching	Excavators	1
Pipelines	Trenching	Grader	1
Pipelines	Trenching	Rubber Tired Loader	1
Basins	Grading	Excavators	2
Basins	Grading	Graders	4
Basins	Grading	Rubber Tired Loader	1
Restoration	Grading	Back hoes	1
Restoration	Grading	Grader	1

Recovery Wells

Subphase	CalEEMod Phase Type	Equipment Type	# of Equipment
Well Drilling (per construction team)	Grading	Back hoes	1
Well Drilling (per construction team)	Grading	Bore/Drill Rig	1
Well Drilling (per construction team)	Grading	Rubber Tired Loader	1
Well Construction	Construction	Back hoes	1
Well Construction	Construction	Crane	1
Well Construction	Construction	Concrete and Mortar Mixer	1
Pipelines	Trenching	Back hoes	1
Pipelines	Trenching	Crane	1
Pipelines	Trenching	Excavator	1
Pipelines	Trenching	Grader	1
Pipelines	Trenching	Rubber Tired Loader	1

Conveyance Facilities

Subphase	CalEEMod Phase Type	Equipment Type	# of Equipment
Turnout, Pipelines, Canal	Grading	Back hoes	1
Turnout, Pipelines, Canal	Grading	Crane	1
Turnout, Pipelines, Canal	Grading	Excavator	2
Turnout, Pipelines, Canal	Grading	Grader	1
Turnout, Pipelines, Canal	Grading	Rubber Tired Loader	1
Turnout, Pipelines, Canal	Grading	Concrete and Mortar Mixer	1
Pumpstations	Construction	Back hoes	1
Pumpstations	Construction	Crane	1
Pumpstations	Construction	Excavator	1
Pumpstations	Construction	Rubber Tired Loader	1
Pumpstations	Construction	Concrete and Mortar Mixer	1

Note: dump trucks modeled as haul trucks and water trucks modeled as vendor trucks

Utility Provider CO2 Intensity Factor.

PG&E

Year	**RPS Mandate[2,3]**	**Electricity Emission Factor (lbs CO2/MWh)**
Base	0.00%	337.70
2018[1]	39.00%	206.00

Year	**% Renewable**	**Electricity Emission Factor (lbs CO2/MWh)**
2018	39.00%	206.00
2019	39.83%	203.19
2020	40.67%	200.37
2021	41.50%	197.56
2022	42.33%	194.74
2023	43.17%	191.93
2024	44.00%	189.11
2025	47.00%	178.98
2026	50.00%	168.85
2027	52.00%	162.10
2028	54.67%	153.09
2029	57.33%	144.09
2030	60.00%	135.08
2031	62.67%	126.08
2032	65.33%	117.07
2033	68.00%	108.07
2034	70.67%	99.06
2035	73.33%	90.05
2036	76.00%	81.05
2037	78.67%	72.04
2038	81.33%	63.04
2039	84.00%	54.03
2040	86.67%	45.03
2041	89.33%	36.02
2042	92.00%	27.02
2043	94.67%	18.01
2044	97.33%	9.01
2045	100.00%	0.00
2046	100.00%	0.00
2047	100.00%	0.00
2048	100.00%	0.00
2049	100.00%	0.00
2050	100.00%	0.00
2051	100.00%	0.00
2052	100.00%	0.00
2053	100.00%	0.00
2054	100.00%	0.00

[1] PG&E, Fighting Climate Change, https://www.pge.com/en_US/about-pge/environment/what-we-are-doing/fighting-climate-change/fighting-climate-change.page

2 https://www.pge.com/pge_global/common/pdfs/your-account/your-bill/understand-your-bill/bill-inserts/2019/1019-Power-Content-Label.pdf

https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180

Project Construction Emissions

Kern Fan Groundwater

Unmitigated AQ Emissions Summary of Construction

Unmitigated Construction Emissions in Tons/Year

YEAR	EMISSIONS (TONS/YEAR)					
	VOC	NOx	CO	SO_x	PM_{10}	$PM_{2.5}$
2021	0.38	4.91	3.12	0.01	0.37	0.16
2022	0.76	9.52	6.77	0.02	1.12	0.30
2023	1.00	10.78	9.29	0.03	0.63	0.41
2024	0.61	6.73	6.20	0.02	0.37	0.23
2025	0.35	3.86	3.95	0.01	0.21	0.12
2026	0.11	1.24	1.32	0.003	0.05	0.03
Maximum	**1.00**	**10.78**	**9.29**	**0.03**	**1.12**	**0.41**
De Minimis Thresholds	10	10	100	27	15	15
Exceeds De Minimis?	**NO**	**YES**	**NO**	**NO**	**NO**	**NO**

Kern Fan Groundwater

Mitigated AQ Emissions Summary of Construction

Mitigated Construction Emissions in Tons/Year

YEAR	EMISSIONS (TONS/YEAR)					
	VOC	**NOx**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
2021	0.19	3.16	4.10	0.01	0.27	0.06
2022	0.39	6.70	9.27	0.02	0.82	0.12
2023	0.44	7.86	13.05	0.03	0.30	0.11
2024	0.30	5.30	8.23	0.02	0.20	0.07
2025	0.21	3.47	5.02	0.01	0.13	0.05
2026	0.07	1.17	1.65	0.003	0.05	0.005
Maximum	**0.44**	**7.86**	**13.05**	**0.03**	**0.82**	**0.12**
De Minimis Thresholds	10	10	100	27	15	15
Exceeds De Minimis?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Kern Fan Groudwater

GHG Emissions Summary of Construction

Construction Emissions in Metric Tons/Year

YEAR	EMISSIONS (METRIC TONS/YEAR)
	CO2e
2021	832.15
2022	1849.35
2023	2311.57
2024	1495.93
2025	943.31
2026	312.30
Maximum	**2311.57**
Total	**7744.61**
Amortized (30 year)	**258.15**
Significance Threshold	10000.00
Exceeds De Minimis?	**NO**

Recharge Facilities - Phase 1

Kern-San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	640.00	Acre	640.00	27,878,400.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	32
Climate Zone	3			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Grading - see construction assumptions

Demolition -

Trips and VMT - construction mobile emissions calculated outside of CalEEMod

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	1,085.00	21.00
tblConstructionPhase	NumDays	700.00	65.00
tblConstructionPhase	NumDays	1,085.00	216.00
tblConstructionPhase	PhaseEndDate	6/10/2077	4/30/2022
tblConstructionPhase	PhaseEndDate	3/7/2024	9/30/2021
tblConstructionPhase	PhaseEndDate	12/13/2029	4/30/2022
tblConstructionPhase	PhaseEndDate	10/16/2025	9/30/2021
tblConstructionPhase	PhaseStartDate	6/29/2074	4/1/2022
tblConstructionPhase	PhaseStartDate	10/17/2025	7/2/2021
tblConstructionPhase	PhaseStartDate	3/8/2024	7/2/2021
tblGrading	AcresOfGrading	432.00	590.00
tblGrading	AcresOfGrading	10.50	50.00
tblOffRoadEquipment	LoadFactor	0.41	0.41
tblOffRoadEquipment	LoadFactor	0.36	0.36
tblOffRoadEquipment	LoadFactor	0.29	0.29
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.41	0.41
tblOffRoadEquipment	LoadFactor	0.36	0.36
tblOffRoadEquipment	LoadFactor	0.36	0.36
tblOffRoadEquipment	OffRoadEquipmentType		Graders
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Graders
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	HaulingTripNumber	609.00	0.00
tblTripsAndVMT	WorkerTripNumber	10.00	0.00
tblTripsAndVMT	WorkerTripNumber	13.00	0.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00
tblTripsAndVMT	WorkerTripNumber	5.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.2648	3.1534	1.6728	4.4500e-003	0.3798	0.1121	0.4919	0.0439	0.1031	0.1471	0.0000	391.2414	391.2414	0.1265	0.0000	394.4048
2022	0.1063	1.2468	0.6764	1.9300e-003	0.3394	0.0428	0.3821	0.0366	0.0393	0.0760	0.0000	169.9017	169.9017	0.0550	0.0000	171.2755
Maximum	**0.2648**	**3.1534**	**1.6728**	**4.4500e-003**	**0.3798**	**0.1121**	**0.4919**	**0.0439**	**0.1031**	**0.1471**	**0.0000**	**391.2414**	**391.2414**	**0.1265**	**0.0000**	**394.4048**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.2648	3.1534	1.6728	4.4500e-003	0.1709	0.1121	0.2830	0.0198	0.1031	0.1229	0.0000	391.2409	391.2409	0.1265	0.0000	394.4043
2022	0.1063	1.2468	0.6764	1.9300e-003	0.1527	0.0428	0.1955	0.0165	0.0393	0.0558	0.0000	169.9015	169.9015	0.0550	0.0000	171.2753
Maximum	**0.2648**	**3.1534**	**1.6728**	**4.4500e-003**	**0.1709**	**0.1121**	**0.2830**	**0.0198**	**0.1031**	**0.1229**	**0.0000**	**391.2409**	**391.2409**	**0.1265**	**0.0000**	**394.4043**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**55.00**	**0.00**	**45.25**	**55.00**	**0.00**	**19.87**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**7-2-2021**	**10-1-2021**	2.2920	2.2920
2	**10-2-2021**	**1-1-2022**	1.1321	1.1321
3	**1-2-2022**	**4-1-2022**	0.9664	0.9664
4	**4-2-2022**	**7-1-2022**	0.3883	0.3883
		Highest	2.2920	2.2920

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	7/2/2021	9/30/2021	5	65	
2	Pipelines	Trenching	7/2/2021	9/30/2021	5	65	
3	Basins	Grading	7/2/2021	4/30/2022	5	216	
4	Restoration	Grading	4/1/2022	4/30/2022	5	21	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 640

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Restoration	Air Compressors	0	6.00	78	0.48
Demolition	Excavators	2	8.00	158	0.38
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Basins	Excavators	2	8.00	158	0.38
Restoration	Excavators	0	8.00	158	0.38
Restoration	Graders	1	8.00	187	0.41
Restoration	Rubber Tired Dozers	0	8.00	247	0.40
Restoration	Scrapers	0	8.00	367	0.48
Restoration	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Demolition	Rubber Tired Dozers	0	8.00	247	0.40
Basins	Rubber Tired Dozers	0	8.00	247	0.40
Demolition	Graders	1	8.00	187	0.41
Basins	Graders	4	8.00	187	0.41
Basins	Tractors/Loaders/Backhoes	0	8.00	97	0.37

Demolition	Rubber Tired Loaders	1	8.00	203	0.36
Pipelines	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Pipelines	Rubber Tired Dozers	0	8.00	247	0.40
Basins	Scrapers	0	8.00	367	0.48
Pipelines	Cranes	1	8.00	231	0.29
Pipelines	Excavators	1	8.00	158	0.38
Pipelines	Graders	1	8.00	187	0.41
Pipelines	Rubber Tired Loaders	1	8.00	203	0.36
Basins	Rubber Tired Loaders	1	8.00	203	0.36

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	4	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Pipelines	5	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Basins	7	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Restoration	2	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Demolition - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0669	0.0000	0.0669	0.0101	0.0000	0.0101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0408	0.4581	0.3221	7.5000e-004		0.0171	0.0171		0.0157	0.0157	0.0000	66.2873	66.2873	0.0214	0.0000	66.8233
Total	**0.0408**	**0.4581**	**0.3221**	**7.5000e-004**	**0.0669**	**0.0171**	**0.0840**	**0.0101**	**0.0157**	**0.0259**	**0.0000**	**66.2873**	**66.2873**	**0.0214**	**0.0000**	**66.8233**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0301	0.0000	0.0301	4.5600e-003	0.0000	4.5600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0408	0.4581	0.3221	7.5000e-004		0.0171	0.0171		0.0157	0.0157	0.0000	66.2873	66.2873	0.0214	0.0000	66.8232
Total	**0.0408**	**0.4581**	**0.3221**	**7.5000e-004**	**0.0301**	**0.0171**	**0.0472**	**4.5600e-003**	**0.0157**	**0.0203**	**0.0000**	**66.2873**	**66.2873**	**0.0214**	**0.0000**	**66.8232**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Pipelines - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0528	0.6067	0.3538	8.7000e-004		0.0237	0.0237		0.0218	0.0218	0.0000	76.8509	76.8509	0.0249	0.0000	77.4723
Total	**0.0528**	**0.6067**	**0.3538**	**8.7000e-004**		**0.0237**	**0.0237**		**0.0218**	**0.0218**	**0.0000**	**76.8509**	**76.8509**	**0.0249**	**0.0000**	**77.4723**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0528	0.6067	0.3538	8.7000e-004		0.0237	0.0237		0.0218	0.0218	0.0000	76.8508	76.8508	0.0249	0.0000	77.4722
Total	**0.0528**	**0.6067**	**0.3538**	**8.7000e-004**		**0.0237**	**0.0237**		**0.0218**	**0.0218**	**0.0000**	**76.8508**	**76.8508**	**0.0249**	**0.0000**	**77.4722**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Basins - 2021

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Fugitive Dust					0.3129	0.0000	0.3129	0.0338	0.0000	0.0338	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1713	2.0887	0.9969	2.8200e-003		0.0713	0.0713		0.0656	0.0656	0.0000	248.1032	248.1032	0.0802	0.0000	250.1092
Total	**0.1713**	**2.0887**	**0.9969**	**2.8200e-003**	**0.3129**	**0.0713**	**0.3842**	**0.0338**	**0.0656**	**0.0994**	**0.0000**	**248.1032**	**248.1032**	**0.0802**	**0.0000**	**250.1092**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Fugitive Dust					0.1408	0.0000	0.1408	0.0152	0.0000	0.0152	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1713	2.0887	0.9969	2.8200e-003		0.0713	0.0713		0.0656	0.0656	0.0000	248.1029	248.1029	0.0802	0.0000	250.1089
Total	**0.1713**	**2.0887**	**0.9969**	**2.8200e-003**	**0.1408**	**0.0713**	**0.2121**	**0.0152**	**0.0656**	**0.0808**	**0.0000**	**248.1029**	**248.1029**	**0.0802**	**0.0000**	**250.1089**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Basins - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.3129	0.0000	0.3129	0.0338	0.0000	0.0338	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1002	1.1740	0.6348	1.8300e-003		0.0401	0.0401		0.0369	0.0369	0.0000	160.9238	160.9238	0.0521	0.0000	162.2250
Total	**0.1002**	**1.1740**	**0.6348**	**1.8300e-003**	**0.3129**	**0.0401**	**0.3529**	**0.0338**	**0.0369**	**0.0706**	**0.0000**	**160.9238**	**160.9238**	**0.0521**	**0.0000**	**162.2250**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1408	0.0000	0.1408	0.0152	0.0000	0.0152	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1002	1.1740	0.6348	1.8300e-003		0.0401	0.0401		0.0369	0.0369	0.0000	160.9236	160.9236	0.0521	0.0000	162.2248
Total	**0.1002**	**1.1740**	**0.6348**	**1.8300e-003**	**0.1408**	**0.0401**	**0.1808**	**0.0152**	**0.0369**	**0.0521**	**0.0000**	**160.9236**	**160.9236**	**0.0521**	**0.0000**	**162.2248**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Restoration - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0265	0.0000	0.0265	2.8600e-003	0.0000	2.8600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.0900e-003	0.0728	0.0416	1.0000e-004		2.7000e-003	2.7000e-003		2.4900e-003	2.4900e-003	0.0000	8.9779	8.9779	2.9000e-003	0.0000	9.0505
Total	**6.0900e-003**	**0.0728**	**0.0416**	**1.0000e-004**	**0.0265**	**2.7000e-003**	**0.0292**	**2.8600e-003**	**2.4900e-003**	**5.3500e-003**	**0.0000**	**8.9779**	**8.9779**	**2.9000e-003**	**0.0000**	**9.0505**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0119	0.0000	0.0119	1.2900e-003	0.0000	1.2900e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.0900e-003	0.0728	0.0416	1.0000e-004		2.7000e-003	2.7000e-003		2.4900e-003	2.4900e-003	0.0000	8.9779	8.9779	2.9000e-003	0.0000	9.0505
Total	**6.0900e-003**	**0.0728**	**0.0416**	**1.0000e-004**	**0.0119**	**2.7000e-003**	**0.0146**	**1.2900e-003**	**2.4900e-003**	**3.7800e-003**	**0.0000**	**8.9779**	**8.9779**	**2.9000e-003**	**0.0000**	**9.0505**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Recharge Facilities - Phase 2
Kern-San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	640.00	Acre	640.00	27,878,400.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	32
Climate Zone	3			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Grading - see construction assumptions

Demolition -

Trips and VMT - construction mobile emissions calculated outside of CalEEMod.

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	1,085.00	22.00
tblConstructionPhase	NumDays	700.00	67.00
tblConstructionPhase	NumDays	1,085.00	220.00
tblConstructionPhase	PhaseEndDate	2/4/2078	12/31/2022
tblConstructionPhase	PhaseEndDate	11/1/2024	5/31/2022
tblConstructionPhase	PhaseEndDate	8/9/2030	12/31/2022
tblConstructionPhase	PhaseEndDate	6/12/2026	5/31/2022
tblConstructionPhase	PhaseStartDate	2/23/2075	12/1/2022
tblConstructionPhase	PhaseStartDate	6/13/2026	2/28/2022
tblConstructionPhase	PhaseStartDate	11/2/2024	2/28/2022
tblGrading	AcresOfGrading	440.00	590.00
tblGrading	AcresOfGrading	11.00	50.00
tblOffRoadEquipment	LoadFactor	0.41	0.41
tblOffRoadEquipment	LoadFactor	0.36	0.36
tblOffRoadEquipment	LoadFactor	0.29	0.29
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.41	0.41
tblOffRoadEquipment	LoadFactor	0.36	0.36
tblOffRoadEquipment	LoadFactor	0.36	0.36
tblOffRoadEquipment	OffRoadEquipmentType		Graders
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Graders
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	HaulingTripNumber	609.00	0.00
tblTripsAndVMT	WorkerTripNumber	10.00	0.00
tblTripsAndVMT	WorkerTripNumber	13.00	0.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00
tblTripsAndVMT	WorkerTripNumber	5.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.3514	4.0441	2.3703	6.5300e-003	0.4063	0.1420	0.5483	0.0468	0.1306	0.1774	0.0000	573.4558	573.4558	0.1855	0.0000	578.0925
Maximum	**0.3514**	**4.0441**	**2.3703**	**6.5300e-003**	**0.4063**	**0.1420**	**0.5483**	**0.0468**	**0.1306**	**0.1774**	**0.0000**	**573.4558**	**573.4558**	**0.1855**	**0.0000**	**578.0925**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.3514	4.0441	2.3703	6.5300e-003	0.1828	0.1420	0.3248	0.0211	0.1306	0.1517	0.0000	573.4551	573.4551	0.1855	0.0000	578.0918
Maximum	**0.3514**	**4.0441**	**2.3703**	**6.5300e-003**	**0.1828**	**0.1420**	**0.3248**	**0.0211**	**0.1306**	**0.1517**	**0.0000**	**573.4551**	**573.4551**	**0.1855**	**0.0000**	**578.0918**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**55.00**	**0.00**	**40.76**	**55.00**	**0.00**	**14.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	**Start Date**	**End Date**	**Maximum Unmitigated ROG + NOX (tons/quarter)**	**Maximum Mitigated ROG + NOX (tons/quarter)**
1	**2-28-2022**	**5-27-2022**	1.9158	1.9158
2	**5-28-2022**	**8-27-2022**	1.0284	1.0284
3	**8-28-2022**	**9-30-2022**	0.3641	0.3641
		Highest	1.9158	1.9158

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	2/28/2022	5/31/2022	5	67	
2	Pipelines	Trenching	2/28/2022	5/31/2022	5	67	
3	Basins	Grading	2/28/2022	12/31/2022	5	220	
4	Restoration	Grading	12/1/2022	12/31/2022	5	22	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 640

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Restoration	Air Compressors	0	6.00	78	0.48
Demolition	Excavators	2	8.00	158	0.38
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Basins	Excavators	2	8.00	158	0.38
Restoration	Excavators	0	8.00	158	0.38
Restoration	Graders	1	8.00	187	0.41
Restoration	Rubber Tired Dozers	0	8.00	247	0.40
Restoration	Scrapers	0	8.00	367	0.48
Restoration	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Demolition	Rubber Tired Dozers	0	8.00	247	0.40
Basins	Rubber Tired Dozers	0	8.00	247	0.40
Demolition	Graders	1	8.00	187	0.41
Basins	Graders	4	8.00	187	0.41
Basins	Tractors/Loaders/Backhoes	0	8.00	97	0.37

Demolition	Rubber Tired Loaders	1	8.00	203	0.36
Pipelines	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Pipelines	Rubber Tired Dozers	0	8.00	247	0.40
Basins	Scrapers	0	8.00	367	0.48
Pipelines	Cranes	1	8.00	231	0.29
Pipelines	Excavators	1	8.00	158	0.38
Pipelines	Graders	1	8.00	187	0.41
Pipelines	Rubber Tired Loaders	1	8.00	203	0.36
Basins	Rubber Tired Loaders	1	8.00	203	0.36

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	4	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Pipelines	5	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Basins	7	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Restoration	2	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Demolition - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0669	0.0000	0.0669	0.0101	0.0000	0.0101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0372	0.3965	0.3271	7.8000e-004		0.0148	0.0148		0.0136	0.0136	0.0000	68.3173	68.3173	0.0221	0.0000	68.8697
Total	**0.0372**	**0.3965**	**0.3271**	**7.8000e-004**	**0.0669**	**0.0148**	**0.0817**	**0.0101**	**0.0136**	**0.0237**	**0.0000**	**68.3173**	**68.3173**	**0.0221**	**0.0000**	**68.8697**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0301	0.0000	0.0301	4.5600e-003	0.0000	4.5600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0372	0.3965	0.3271	7.8000e-004		0.0148	0.0148		0.0136	0.0136	0.0000	68.3172	68.3172	0.0221	0.0000	68.8696
Total	**0.0372**	**0.3965**	**0.3271**	**7.8000e-004**	**0.0301**	**0.0148**	**0.0449**	**4.5600e-003**	**0.0136**	**0.0181**	**0.0000**	**68.3172**	**68.3172**	**0.0221**	**0.0000**	**68.8696**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Pipelines - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0484	0.5326	0.3566	9.0000e-004		0.0207	0.0207		0.0190	0.0190	0.0000	79.2243	79.2243	0.0256	0.0000	79.8649
Total	**0.0484**	**0.5326**	**0.3566**	**9.0000e-004**		**0.0207**	**0.0207**		**0.0190**	**0.0190**	**0.0000**	**79.2243**	**79.2243**	**0.0256**	**0.0000**	**79.8649**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0484	0.5326	0.3566	9.0000e-004		0.0207	0.0207		0.0190	0.0190	0.0000	79.2242	79.2242	0.0256	0.0000	79.8648
Total	**0.0484**	**0.5326**	**0.3566**	**9.0000e-004**		**0.0207**	**0.0207**		**0.0190**	**0.0190**	**0.0000**	**79.2242**	**79.2242**	**0.0256**	**0.0000**	**79.8648**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Basins - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.3129	0.0000	0.3129	0.0338	0.0000	0.0338	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2593	3.0387	1.6430	4.7400e-003		0.1037	0.1037		0.0954	0.0954	0.0000	416.5087	416.5087	0.1347	0.0000	419.8764
Total	**0.2593**	**3.0387**	**1.6430**	**4.7400e-003**	**0.3129**	**0.1037**	**0.4165**	**0.0338**	**0.0954**	**0.1292**	**0.0000**	**416.5087**	**416.5087**	**0.1347**	**0.0000**	**419.8764**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1408	0.0000	0.1408	0.0152	0.0000	0.0152	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2593	3.0387	1.6430	4.7400e-003		0.1037	0.1037		0.0954	0.0954	0.0000	416.5082	416.5082	0.1347	0.0000	419.8759
Total	**0.2593**	**3.0387**	**1.6430**	**4.7400e-003**	**0.1408**	**0.1037**	**0.2445**	**0.0152**	**0.0954**	**0.1106**	**0.0000**	**416.5082**	**416.5082**	**0.1347**	**0.0000**	**419.8759**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Restoration - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0265	0.0000	0.0265	2.8600e-003	0.0000	2.8600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.3800e-003	0.0763	0.0436	1.1000e-004		2.8300e-003	2.8300e-003		2.6000e-003	2.6000e-003	0.0000	9.4054	9.4054	3.0400e-003	0.0000	9.4815
Total	**6.3800e-003**	**0.0763**	**0.0436**	**1.1000e-004**	**0.0265**	**2.8300e-003**	**0.0293**	**2.8600e-003**	**2.6000e-003**	**5.4600e-003**	**0.0000**	**9.4054**	**9.4054**	**3.0400e-003**	**0.0000**	**9.4815**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0119	0.0000	0.0119	1.2900e-003	0.0000	1.2900e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.3800e-003	0.0763	0.0436	1.1000e-004		2.8300e-003	2.8300e-003		2.6000e-003	2.6000e-003	0.0000	9.4054	9.4054	3.0400e-003	0.0000	9.4815
Total	**6.3800e-003**	**0.0763**	**0.0436**	**1.1000e-004**	**0.0119**	**2.8300e-003**	**0.0148**	**1.2900e-003**	**2.6000e-003**	**3.8900e-003**	**0.0000**	**9.4054**	**9.4054**	**3.0400e-003**	**0.0000**	**9.4815**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Recovery Wells - Phase 1

Kern-San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	3.00	1000sqft	0.07	3,000.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	32
Climate Zone	3			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Grading - see construction assumptions

Trips and VMT - construction mobile emissions calculated outside of CalEEMod

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	100.00	50.00
tblConstructionPhase	NumDays	2.00	44.00
tblConstructionPhase	PhaseEndDate	10/5/2022	6/10/2023
tblConstructionPhase	PhaseEndDate	5/18/2022	6/30/2022
tblConstructionPhase	PhaseEndDate	10/12/2022	6/30/2023
tblConstructionPhase	PhaseStartDate	5/19/2022	4/3/2023
tblConstructionPhase	PhaseStartDate	5/17/2022	5/2/2022
tblConstructionPhase	PhaseStartDate	10/6/2022	4/3/2023
tblGrading	AcresOfGrading	0.00	0.07
tblOffRoadEquipment	LoadFactor	0.50	0.50
tblOffRoadEquipment	LoadFactor	0.36	0.36
tblOffRoadEquipment	LoadFactor	0.29	0.29
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.41	0.41
tblOffRoadEquipment	LoadFactor	0.36	0.36
tblOffRoadEquipment	OffRoadEquipmentType		Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Graders
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	UsageHours	4.00	8.00

tblOffRoadEquipment	UsageHours	6.00	8.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	8.00	0.00
tblTripsAndVMT	WorkerTripNumber	1.00	0.00
tblTripsAndVMT	WorkerTripNumber	13.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.0150	0.1539	0.1282	4.2000e-004	4.0000e-005	5.8300e-003	5.8700e-003	0.0000	5.3700e-003	5.3700e-003	0.0000	36.4845	36.4845	0.0118	0.0000	36.7795
2023	0.0577	0.6041	0.4517	1.1100e-003	0.0000	0.0241	0.0241	0.0000	0.0222	0.0222	0.0000	97.5153	97.5153	0.0313	0.0000	98.2975
Maximum	**0.0577**	**0.6041**	**0.4517**	**1.1100e-003**	**4.0000e-005**	**0.0241**	**0.0241**	**0.0000**	**0.0222**	**0.0222**	**0.0000**	**97.5153**	**97.5153**	**0.0313**	**0.0000**	**98.2975**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.0150	0.1539	0.1282	4.2000e-004	2.0000e-005	5.8300e-003	5.8500e-003	0.0000	5.3700e-003	5.3700e-003	0.0000	36.4845	36.4845	0.0118	0.0000	36.7795
2023	0.0577	0.6041	0.4517	1.1100e-003	0.0000	0.0241	0.0241	0.0000	0.0222	0.0222	0.0000	97.5152	97.5152	0.0313	0.0000	98.2974
Maximum	**0.0577**	**0.6041**	**0.4517**	**1.1100e-003**	**2.0000e-005**	**0.0241**	**0.0241**	**0.0000**	**0.0222**	**0.0222**	**0.0000**	**97.5152**	**97.5152**	**0.0313**	**0.0000**	**98.2974**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	50.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	5-2-2022	8-1-2022	0.1645	0.1645
4	2-2-2023	5-1-2023	0.2259	0.2259
5	5-2-2023	8-1-2023	0.4226	0.4226
		Highest	0.4226	0.4226

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Drilling	Grading	5/2/2022	6/30/2022	5	44	
2	Construction	Building Construction	4/3/2023	6/10/2023	5	50	
3	Pipelines	Trenching	4/3/2023	6/30/2023	5	65	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.07

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Drilling	Bore/Drill Rigs	1	8.00	221	0.50
Pipelines	Cement and Mortar Mixers	0	6.00	9	0.56
Drilling	Rubber Tired Loaders	1	8.00	203	0.36
Drilling	Concrete/Industrial Saws	0	8.00	81	0.73
Construction	Cranes	1	8.00	231	0.29

Construction	Forklifts	0	6.00	89	0.20
Construction	Cement and Mortar Mixers	1	8.00	9	0.56
Pipelines	Pavers	0	7.00	130	0.42
Pipelines	Rollers	0	7.00	80	0.38
Pipelines	Cranes	1	8.00	231	0.29
Drilling	Rubber Tired Dozers	0	1.00	247	0.40
Construction	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Pipelines	Excavators	1	8.00	158	0.38
Drilling	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Pipelines	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Pipelines	Graders	1	8.00	187	0.41
Pipelines	Rubber Tired Loaders	1	8.00	203	0.36

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Drilling	3	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Construction	3	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Pipelines	5	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Drilling - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					4.0000e-005	0.0000	4.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0150	0.1539	0.1282	4.2000e-004		5.8300e-003	5.8300e-003		5.3700e-003	5.3700e-003	0.0000	36.4845	36.4845	0.0118	0.0000	36.7795
Total	**0.0150**	**0.1539**	**0.1282**	**4.2000e-004**	**4.0000e-005**	**5.8300e-003**	**5.8700e-003**	**0.0000**	**5.3700e-003**	**5.3700e-003**	**0.0000**	**36.4845**	**36.4845**	**0.0118**	**0.0000**	**36.7795**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.0000e-005	0.0000	2.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0150	0.1539	0.1282	4.2000e-004		5.8300e-003	5.8300e-003		5.3700e-003	5.3700e-003	0.0000	36.4845	36.4845	0.0118	0.0000	36.7795
Total	**0.0150**	**0.1539**	**0.1282**	**4.2000e-004**	**2.0000e-005**	**5.8300e-003**	**5.8500e-003**	**0.0000**	**5.3700e-003**	**5.3700e-003**	**0.0000**	**36.4845**	**36.4845**	**0.0118**	**0.0000**	**36.7795**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0140	0.1430	0.1094	2.4000e-004		6.2400e-003	6.2400e-003		5.7700e-003	5.7700e-003	0.0000	20.6591	20.6591	6.4300e-003	0.0000	20.8199
Total	**0.0140**	**0.1430**	**0.1094**	**2.4000e-004**		**6.2400e-003**	**6.2400e-003**		**5.7700e-003**	**5.7700e-003**	**0.0000**	**20.6591**	**20.6591**	**6.4300e-003**	**0.0000**	**20.8199**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0140	0.1430	0.1094	2.4000e-004		6.2400e-003	6.2400e-003		5.7700e-003	5.7700e-003	0.0000	20.6591	20.6591	6.4300e-003	0.0000	20.8199
Total	**0.0140**	**0.1430**	**0.1094**	**2.4000e-004**		**6.2400e-003**	**6.2400e-003**		**5.7700e-003**	**5.7700e-003**	**0.0000**	**20.6591**	**20.6591**	**6.4300e-003**	**0.0000**	**20.8199**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Pipelines - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0437	0.4611	0.3423	8.8000e-004		0.0179	0.0179		0.0164	0.0164	0.0000	76.8562	76.8562	0.0249	0.0000	77.4776
Total	**0.0437**	**0.4611**	**0.3423**	**8.8000e-004**		**0.0179**	**0.0179**		**0.0164**	**0.0164**	**0.0000**	**76.8562**	**76.8562**	**0.0249**	**0.0000**	**77.4776**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0437	0.4611	0.3423	8.8000e-004		0.0179	0.0179		0.0164	0.0164	0.0000	76.8561	76.8561	0.0249	0.0000	77.4775
Total	**0.0437**	**0.4611**	**0.3423**	**8.8000e-004**		**0.0179**	**0.0179**		**0.0164**	**0.0164**	**0.0000**	**76.8561**	**76.8561**	**0.0249**	**0.0000**	**77.4775**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Recovery Wells - Phase 2

Kern-San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	3.00	1000sqft	0.07	3,000.00	0

1.2 Other Project Characteristics

Urbanization Rural **Wind Speed (m/s)** 2.7 **Precipitation Freq (Days)** 32

Climate Zone 3 **Operational Year** 2024

Utility Company Pacific Gas & Electric Company

CO2 Intensity (lb/MWhr) 641.35 **CH4 Intensity (lb/MWhr)** 0.029 **N2O Intensity (lb/MWhr)** 0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Grading - see construction assumptions

Trips and VMT - construction mobile emissions calculated outside of CalEEMod

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	100.00	50.00
tblConstructionPhase	NumDays	2.00	42.00
tblConstructionPhase	PhaseEndDate	6/7/2023	2/11/2024
tblConstructionPhase	PhaseEndDate	1/18/2023	2/28/2023
tblConstructionPhase	PhaseEndDate	6/14/2023	2/28/2024
tblConstructionPhase	PhaseStartDate	1/19/2023	12/4/2023
tblConstructionPhase	PhaseStartDate	1/17/2023	1/2/2023
tblConstructionPhase	PhaseStartDate	6/8/2023	12/4/2023
tblGrading	AcresOfGrading	0.00	0.07
tblOffRoadEquipment	LoadFactor	0.50	0.50
tblOffRoadEquipment	LoadFactor	0.36	0.36
tblOffRoadEquipment	LoadFactor	0.29	0.29
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.41	0.41
tblOffRoadEquipment	LoadFactor	0.36	0.36
tblOffRoadEquipment	OffRoadEquipmentType		Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Graders
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	UsageHours	4.00	8.00

tblOffRoadEquipment	UsageHours	6.00	8.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	8.00	0.00
tblTripsAndVMT	WorkerTripNumber	1.00	0.00
tblTripsAndVMT	WorkerTripNumber	13.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.0325	0.3304	0.2707	7.6000e-004	4.0000e-005	0.0129	0.0129	0.0000	0.0118	0.0118	0.0000	66.7776	66.7776	0.0215	0.0000	67.3150
2024	0.0352	0.3555	0.2891	7.2000e-004	0.0000	0.0140	0.0140	0.0000	0.0129	0.0129	0.0000	63.2402	63.2402	0.0203	0.0000	63.7477
Maximum	**0.0352**	**0.3555**	**0.2891**	**7.6000e-004**	**4.0000e-005**	**0.0140**	**0.0140**	**0.0000**	**0.0129**	**0.0129**	**0.0000**	**66.7776**	**66.7776**	**0.0215**	**0.0000**	**67.3150**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.0325	0.3304	0.2707	7.6000e-004	2.0000e-005	0.0129	0.0129	0.0000	0.0118	0.0118	0.0000	66.7775	66.7775	0.0215	0.0000	67.3149
2024	0.0352	0.3555	0.2891	7.2000e-004	0.0000	0.0140	0.0140	0.0000	0.0129	0.0129	0.0000	63.2401	63.2401	0.0203	0.0000	63.7477
Maximum	**0.0352**	**0.3555**	**0.2891**	**7.6000e-004**	**2.0000e-005**	**0.0140**	**0.0140**	**0.0000**	**0.0129**	**0.0129**	**0.0000**	**66.7775**	**66.7775**	**0.0215**	**0.0000**	**67.3149**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	50.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	1-1-2023	3-31-2023	0.1428	0.1428
4	10-1-2023	12-31-2023	0.2181	0.2181
5	1-1-2024	3-31-2024	0.3846	0.3846
		Highest	0.3846	0.3846

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Drilling	Grading	1/2/2023	2/28/2023	5	42	
2	Construction	Building Construction	12/4/2023	2/11/2024	5	50	
3	Pipelines	Trenching	12/4/2023	2/28/2024	5	63	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.07

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Drilling	Bore/Drill Rigs	1	8.00	221	0.50
Pipelines	Cement and Mortar Mixers	0	6.00	9	0.56
Drilling	Rubber Tired Loaders	1	8.00	203	0.36
Drilling	Concrete/Industrial Saws	0	8.00	81	0.73
Construction	Cranes	1	8.00	231	0.29

Construction	Forklifts	0	6.00	89	0.20
Construction	Cement and Mortar Mixers	1	8.00	9	0.56
Pipelines	Pavers	0	7.00	130	0.42
Pipelines	Rollers	0	7.00	80	0.38
Pipelines	Cranes	1	8.00	231	0.29
Drilling	Rubber Tired Dozers	0	1.00	247	0.40
Construction	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Pipelines	Excavators	1	8.00	158	0.38
Drilling	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Pipelines	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Pipelines	Graders	1	8.00	187	0.41
Pipelines	Rubber Tired Loaders	1	8.00	203	0.36

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Drilling	3	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Construction	3	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Pipelines	5	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Drilling - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					4.0000e-005	0.0000	4.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0134	0.1313	0.1216	4.0000e-004		4.8600e-003	4.8600e-003		4.4700e-003	4.4700e-003	0.0000	34.8659	34.8659	0.0113	0.0000	35.1478
Total	**0.0134**	**0.1313**	**0.1216**	**4.0000e-004**	**4.0000e-005**	**4.8600e-003**	**4.9000e-003**	**0.0000**	**4.4700e-003**	**4.4700e-003**	**0.0000**	**34.8659**	**34.8659**	**0.0113**	**0.0000**	**35.1478**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.0000e-005	0.0000	2.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0134	0.1313	0.1216	4.0000e-004		4.8600e-003	4.8600e-003		4.4700e-003	4.4700e-003	0.0000	34.8658	34.8658	0.0113	0.0000	35.1478
Total	**0.0134**	**0.1313**	**0.1216**	**4.0000e-004**	**2.0000e-005**	**4.8600e-003**	**4.8800e-003**	**0.0000**	**4.4700e-003**	**4.4700e-003**	**0.0000**	**34.8658**	**34.8658**	**0.0113**	**0.0000**	**35.1478**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	5.6200e-003	0.0572	0.0437	1.0000e-004		2.4900e-003	2.4900e-003		2.3100e-003	2.3100e-003	0.0000	8.2637	8.2637	2.5700e-003	0.0000	8.3280
Total	**5.6200e-003**	**0.0572**	**0.0437**	**1.0000e-004**		**2.4900e-003**	**2.4900e-003**		**2.3100e-003**	**2.3100e-003**	**0.0000**	**8.2637**	**8.2637**	**2.5700e-003**	**0.0000**	**8.3280**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Off-Road	5.6200e-003	0.0572	0.0437	1.0000e-004		2.4900e-003	2.4900e-003		2.3100e-003	2.3100e-003	0.0000	8.2637	8.2637	2.5700e-003	0.0000	8.3280
Total	**5.6200e-003**	**0.0572**	**0.0437**	**1.0000e-004**		**2.4900e-003**	**2.4900e-003**		**2.3100e-003**	**2.3100e-003**	**0.0000**	**8.2637**	**8.2637**	**2.5700e-003**	**0.0000**	**8.3280**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	8.0200e-003	0.0798	0.0648	1.4000e-004		3.4000e-003	3.4000e-003		3.1400e-003	3.1400e-003	0.0000	12.3979	12.3979	3.8600e-003	0.0000	12.4944
Total	**8.0200e-003**	**0.0798**	**0.0648**	**1.4000e-004**		**3.4000e-003**	**3.4000e-003**		**3.1400e-003**	**3.1400e-003**	**0.0000**	**12.3979**	**12.3979**	**3.8600e-003**	**0.0000**	**12.4944**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	8.0200e-003	0.0798	0.0648	1.4000e-004		3.4000e-003	3.4000e-003		3.1400e-003	3.1400e-003	0.0000	12.3979	12.3979	3.8600e-003	0.0000	12.4944
Total	**8.0200e-003**	**0.0798**	**0.0648**	**1.4000e-004**		**3.4000e-003**	**3.4000e-003**		**3.1400e-003**	**3.1400e-003**	**0.0000**	**12.3979**	**12.3979**	**3.8600e-003**	**0.0000**	**12.4944**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Pipelines - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0134	0.1419	0.1053	2.7000e-004		5.5000e-003	5.5000e-003		5.0600e-003	5.0600e-003	0.0000	23.6481	23.6481	7.6500e-003	0.0000	23.8393
Total	**0.0134**	**0.1419**	**0.1053**	**2.7000e-004**		**5.5000e-003**	**5.5000e-003**		**5.0600e-003**	**5.0600e-003**	**0.0000**	**23.6481**	**23.6481**	**7.6500e-003**	**0.0000**	**23.8393**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0134	0.1419	0.1053	2.7000e-004		5.5000e-003	5.5000e-003		5.0600e-003	5.0600e-003	0.0000	23.6480	23.6480	7.6500e-003	0.0000	23.8392
Total	**0.0134**	**0.1419**	**0.1053**	**2.7000e-004**		**5.5000e-003**	**5.5000e-003**		**5.0600e-003**	**5.0600e-003**	**0.0000**	**23.6480**	**23.6480**	**7.6500e-003**	**0.0000**	**23.8392**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Pipelines - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0272	0.2757	0.2244	5.8000e-004		0.0106	0.0106		9.7600e-003	9.7600e-003	0.0000	50.8423	50.8423	0.0164	0.0000	51.2534
Total	**0.0272**	**0.2757**	**0.2244**	**5.8000e-004**		**0.0106**	**0.0106**		**9.7600e-003**	**9.7600e-003**	**0.0000**	**50.8423**	**50.8423**	**0.0164**	**0.0000**	**51.2534**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Off-Road	0.0272	0.2757	0.2244	5.8000e-004		0.0106	0.0106		9.7600e-003	9.7600e-003	0.0000	50.8422	50.8422	0.0164	0.0000	51.2533
Total	**0.0272**	**0.2757**	**0.2244**	**5.8000e-004**		**0.0106**	**0.0106**		**9.7600e-003**	**9.7600e-003**	**0.0000**	**50.8422**	**50.8422**	**0.0164**	**0.0000**	**51.2533**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Conveyance Facilities
Kern-San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	21.50	Acre	21.50	936,737.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	32
Climate Zone	3			**Operational Year**	2026
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - see construction assumptions

Construction Phase - see construction assumptions

Off-road Equipment - see construction assumptions

Grading - see construction assumptions

Trips and VMT - construction mobile emissions calculated outside of CalEEMod

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value

tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	35.00	800.00
tblConstructionPhase	PhaseEndDate	7/25/2023	5/19/2026
tblConstructionPhase	PhaseStartDate	6/7/2023	4/26/2023
tblGrading	AcresOfGrading	400.00	21.50
tblLandUse	LandUseSquareFeet	936,540.00	936,737.00
tblOffRoadEquipment	LoadFactor	0.29	0.29
tblOffRoadEquipment	LoadFactor	0.36	0.36
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	18.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.1417	1.4340	1.2538	2.9200e-003	0.0114	0.0570	0.0684	1.2300e-003	0.0525	0.0538	0.0000	254.8868	254.8868	0.0815	0.0000	256.9253
2024	0.1968	1.9124	1.8336	4.3000e-003	0.0114	0.0756	0.0870	1.2300e-003	0.0697	0.0709	0.0000	375.1828	375.1828	0.1200	0.0000	378.1833
2025	0.1797	1.6467	1.8081	4.2800e-003	0.0114	0.0647	0.0761	1.2300e-003	0.0597	0.0609	0.0000	373.7855	373.7855	0.1196	0.0000	376.7749
2026	0.0682	0.6246	0.6858	1.6200e-003	0.0114	0.0246	0.0360	1.2300e-003	0.0226	0.0239	0.0000	141.7807	141.7807	0.0454	0.0000	142.9146
Maximum	**0.1968**	**1.9124**	**1.8336**	**4.3000e-003**	**0.0114**	**0.0756**	**0.0870**	**1.2300e-003**	**0.0697**	**0.0709**	**0.0000**	**375.1828**	**375.1828**	**0.1200**	**0.0000**	**378.1833**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.1417	1.4340	1.2538	2.9200e-003	5.1300e-003	0.0570	0.0621	5.5000e-004	0.0525	0.0531	0.0000	254.8865	254.8865	0.0815	0.0000	256.9250
2024	0.1968	1.9124	1.8336	4.3000e-003	5.1300e-003	0.0756	0.0807	5.5000e-004	0.0697	0.0702	0.0000	375.1823	375.1823	0.1200	0.0000	378.1829
2025	0.1797	1.6467	1.8081	4.2800e-003	5.1300e-003	0.0647	0.0699	5.5000e-004	0.0597	0.0603	0.0000	373.7850	373.7850	0.1196	0.0000	376.7745
2026	0.0682	0.6246	0.6858	1.6200e-003	5.1300e-003	0.0246	0.0297	5.5000e-004	0.0226	0.0232	0.0000	141.7805	141.7805	0.0454	0.0000	142.9145
Maximum	**0.1968**	**1.9124**	**1.8336**	**4.3000e-003**	**5.1300e-003**	**0.0756**	**0.0807**	**5.5000e-004**	**0.0697**	**0.0702**	**0.0000**	**375.1823**	**375.1823**	**0.1200**	**0.0000**	**378.1829**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**55.00**	**0.00**	**9.38**	**55.28**	**0.00**	**1.29**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**4-26-2023**	**7-25-2023**	0.5754	0.5754
2	**7-26-2023**	**10-25-2023**	0.5817	0.5817
3	**10-26-2023**	**1-25-2024**	0.5674	0.5674
4	**1-26-2024**	**4-25-2024**	0.5233	0.5233
5	**4-26-2024**	**7-25-2024**	0.5233	0.5233
6	**7-26-2024**	**10-25-2024**	0.5290	0.5290
7	**10-26-2024**	**1-25-2025**	0.5102	0.5102
8	**1-26-2025**	**4-25-2025**	0.4498	0.4498
9	**4-26-2025**	**7-25-2025**	0.4548	0.4548
10	**7-26-2025**	**10-25-2025**	0.4598	0.4598
11	**10-26-2025**	**1-25-2026**	0.4598	0.4598
12	**1-26-2026**	**4-25-2026**	0.4498	0.4498
13	**4-26-2026**	**7-25-2026**	0.1200	0.1200
		Highest	0.5817	0.5817

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Canal,Turnout,Pipelines	Grading	4/26/2023	5/19/2026	5	800	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 21.5

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Canal,Turnout,Pipelines	Cement and Mortar Mixers	1	8.00	9	0.56
Canal,Turnout,Pipelines	Cranes	1	8.00	231	0.29
Canal,Turnout,Pipelines	Rubber Tired Loaders	1	8.00	203	0.36
Canal,Turnout,Pipelines	Excavators	2	8.00	158	0.38
Canal,Turnout,Pipelines	Rubber Tired Dozers	0	8.00	247	0.40
Canal,Turnout,Pipelines	Graders	1	8.00	187	0.41
Canal,Turnout,Pipelines	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Canal,Turnout,Pipelines	Scrapers	0	8.00	367	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Canal,Turnout,Pipelines	7	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Canal,Turnout,Pipelines - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0114	0.0000	0.0114	1.2300e-003	0.0000	1.2300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1417	1.4340	1.2538	2.9200e-003		0.0570	0.0570		0.0525	0.0525	0.0000	254.8868	254.8868	0.0815	0.0000	256.9253
Total	**0.1417**	**1.4340**	**1.2538**	**2.9200e-003**	**0.0114**	**0.0570**	**0.0684**	**1.2300e-003**	**0.0525**	**0.0537**	**0.0000**	**254.8868**	**254.8868**	**0.0815**	**0.0000**	**256.9253**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.1300e-003	0.0000	5.1300e-003	5.5000e-004	0.0000	5.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1417	1.4340	1.2538	2.9200e-003		0.0570	0.0570		0.0525	0.0525	0.0000	254.8865	254.8865	0.0815	0.0000	256.9250
Total	**0.1417**	**1.4340**	**1.2538**	**2.9200e-003**	**5.1300e-003**	**0.0570**	**0.0621**	**5.5000e-004**	**0.0525**	**0.0531**	**0.0000**	**254.8865**	**254.8865**	**0.0815**	**0.0000**	**256.9250**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Canal,Turnout,Pipelines - 2024

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Fugitive Dust					0.0114	0.0000	0.0114	1.2300e-003	0.0000	1.2300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1968	1.9124	1.8336	4.3000e-003		0.0756	0.0756		0.0697	0.0697	0.0000	375.1828	375.1828	0.1200	0.0000	378.1833
Total	**0.1968**	**1.9124**	**1.8336**	**4.3000e-003**	**0.0114**	**0.0756**	**0.0870**	**1.2300e-003**	**0.0697**	**0.0709**	**0.0000**	**375.1828**	**375.1828**	**0.1200**	**0.0000**	**378.1833**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.1300e-003	0.0000	5.1300e-003	5.5000e-004	0.0000	5.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1968	1.9124	1.8336	4.3000e-003		0.0756	0.0756		0.0697	0.0697	0.0000	375.1823	375.1823	0.1200	0.0000	378.1829
Total	**0.1968**	**1.9124**	**1.8336**	**4.3000e-003**	**5.1300e-003**	**0.0756**	**0.0807**	**5.5000e-004**	**0.0697**	**0.0702**	**0.0000**	**375.1823**	**375.1823**	**0.1200**	**0.0000**	**378.1829**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Canal,Turnout,Pipelines - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0114	0.0000	0.0114	1.2300e-003	0.0000	1.2300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1797	1.6467	1.8081	4.2800e-003		0.0647	0.0647		0.0597	0.0597	0.0000	373.7855	373.7855	0.1196	0.0000	376.7749
Total	**0.1797**	**1.6467**	**1.8081**	**4.2800e-003**	**0.0114**	**0.0647**	**0.0761**	**1.2300e-003**	**0.0597**	**0.0609**	**0.0000**	**373.7855**	**373.7855**	**0.1196**	**0.0000**	**376.7749**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.1300e-003	0.0000	5.1300e-003	5.5000e-004	0.0000	5.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1797	1.6467	1.8081	4.2800e-003		0.0647	0.0647		0.0597	0.0597	0.0000	373.7850	373.7850	0.1196	0.0000	376.7745
Total	**0.1797**	**1.6467**	**1.8081**	**4.2800e-003**	**5.1300e-003**	**0.0647**	**0.0699**	**5.5000e-004**	**0.0597**	**0.0603**	**0.0000**	**373.7850**	**373.7850**	**0.1196**	**0.0000**	**376.7745**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Canal,Turnout,Pipelines - 2026

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0114	0.0000	0.0114	1.2300e-003	0.0000	1.2300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0682	0.6246	0.6858	1.6200e-003		0.0246	0.0246		0.0226	0.0226	0.0000	141.7807	141.7807	0.0454	0.0000	142.9146
Total	**0.0682**	**0.6246**	**0.6858**	**1.6200e-003**	**0.0114**	**0.0246**	**0.0360**	**1.2300e-003**	**0.0226**	**0.0239**	**0.0000**	**141.7807**	**141.7807**	**0.0454**	**0.0000**	**142.9146**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.1300e-003	0.0000	5.1300e-003	5.5000e-004	0.0000	5.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0682	0.6246	0.6858	1.6200e-003		0.0246	0.0246		0.0226	0.0226	0.0000	141.7805	141.7805	0.0454	0.0000	142.9145
Total	**0.0682**	**0.6246**	**0.6858**	**1.6200e-003**	**5.1300e-003**	**0.0246**	**0.0297**	**5.5000e-004**	**0.0226**	**0.0232**	**0.0000**	**141.7805**	**141.7805**	**0.0454**	**0.0000**	**142.9145**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Conveyance - Pump Station

Kern-San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	3.00	1000sqft	0.07	3,000.00	0

1.2 Other Project Characteristics

Urbanization Rural **Wind Speed (m/s)** 2.7 **Precipitation Freq (Days)** 32

Climate Zone 3 **Operational Year** 2024

Utility Company Pacific Gas & Electric Company

CO2 Intensity (lb/MWhr) 641.35 **CH4 Intensity (lb/MWhr)** 0.029 **N2O Intensity (lb/MWhr)** 0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - see construction assumptions

Off-road Equipment - see construction assumptions

Trips and VMT - construction mobile emissions calculated outside of CalEEMod

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	100.00	221.00

tblConstructionPhase	PhaseEndDate	9/29/2023	2/28/2024
tblConstructionPhase	PhaseStartDate	5/13/2023	4/26/2023
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.36	0.36
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	UsageHours	4.00	8.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	1.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.0911	0.8850	0.8157	1.8800e-003	0.0000	0.0369	0.0369	0.0000	0.0341	0.0341	0.0000	163.2638	163.2638	0.0519	0.0000	164.5615
2024	0.0209	0.1950	0.1957	4.5000e-004	0.0000	8.0500e-003	8.0500e-003	0.0000	7.4300e-003	7.4300e-003	0.0000	39.4458	39.4458	0.0125	0.0000	39.7594
Maximum	**0.0911**	**0.8850**	**0.8157**	**1.8800e-003**	**0.0000**	**0.0369**	**0.0369**	**0.0000**	**0.0341**	**0.0341**	**0.0000**	**163.2638**	**163.2638**	**0.0519**	**0.0000**	**164.5615**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.0911	0.8850	0.8157	1.8800e-003	0.0000	0.0369	0.0369	0.0000	0.0341	0.0341	0.0000	163.2636	163.2636	0.0519	0.0000	164.5613
2024	0.0209	0.1950	0.1957	4.5000e-004	0.0000	8.0500e-003	8.0500e-003	0.0000	7.4300e-003	7.4300e-003	0.0000	39.4458	39.4458	0.0125	0.0000	39.7593
Maximum	**0.0911**	**0.8850**	**0.8157**	**1.8800e-003**	**0.0000**	**0.0369**	**0.0369**	**0.0000**	**0.0341**	**0.0341**	**0.0000**	**163.2636**	**163.2636**	**0.0519**	**0.0000**	**164.5613**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	**Start Date**	**End Date**	**Maximum Unmitigated ROG + NOX (tons/quarter)**	**Maximum Mitigated ROG + NOX (tons/quarter)**
1	**4-26-2023**	**7-25-2023**	0.3564	0.3564
2	**7-26-2023**	**10-25-2023**	0.3603	0.3603
3	**10-26-2023**	**1-25-2024**	0.3521	0.3521
4	**1-26-2024**	**4-25-2024**	0.1219	0.1219
		Highest	0.3603	0.3603

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Building Construction	Building Construction	4/26/2023	2/28/2024	5	221	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.07

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Building Construction	Cement and Mortar Mixers	1	8.00	9	0.56
Building Construction	Excavators	1	8.00	158	0.38
Building Construction	Rubber Tired Loaders	1	8.00	203	0.36
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	0	6.00	89	0.20
Building Construction	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Building Construction	5	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0911	0.8850	0.8157	1.8800e-003		0.0369	0.0369		0.0341	0.0341	0.0000	163.2638	163.2638	0.0519	0.0000	164.5615
Total	**0.0911**	**0.8850**	**0.8157**	**1.8800e-003**		**0.0369**	**0.0369**		**0.0341**	**0.0341**	**0.0000**	**163.2638**	**163.2638**	**0.0519**	**0.0000**	**164.5615**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Off-Road	0.0911	0.8850	0.8157	1.8800e-003		0.0369	0.0369		0.0341	0.0341	0.0000	163.2636	163.2636	0.0519	0.0000	164.5613
Total	**0.0911**	**0.8850**	**0.8157**	**1.8800e-003**		**0.0369**	**0.0369**		**0.0341**	**0.0341**	**0.0000**	**163.2636**	**163.2636**	**0.0519**	**0.0000**	**164.5613**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0209	0.1950	0.1957	4.5000e-004		8.0500e-003	8.0500e-003		7.4300e-003	7.4300e-003	0.0000	39.4458	39.4458	0.0125	0.0000	39.7594
Total	**0.0209**	**0.1950**	**0.1957**	**4.5000e-004**		**8.0500e-003**	**8.0500e-003**		**7.4300e-003**	**7.4300e-003**	**0.0000**	**39.4458**	**39.4458**	**0.0125**	**0.0000**	**39.7594**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Off-Road	0.0209	0.1950	0.1957	4.5000e-004		8.0500e-003	8.0500e-003		7.4300e-003	7.4300e-003	0.0000	39.4458	39.4458	0.0125	0.0000	39.7593
Total	**0.0209**	**0.1950**	**0.1957**	**4.5000e-004**		**8.0500e-003**	**8.0500e-003**		**7.4300e-003**	**7.4300e-003**	**0.0000**	**39.4458**	**39.4458**	**0.0125**	**0.0000**	**39.7593**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Recharge Facilities - Phase 1

Kern-San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	640.00	Acre	640.00	27,878,400.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	32
Climate Zone	3			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Trips and VMT - construction mobile emissions calculated outside of CalEEMod

Demolition -

Grading - see construction assumptions

Construction Off-road Equipment Mitigation - see construction assumptions

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	5.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	7.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstructionPhase	NumDays	700.00	65.00
tblConstructionPhase	NumDays	1,085.00	216.00
tblConstructionPhase	NumDays	1,085.00	21.00
tblGrading	AcresOfGrading	432.00	590.00
tblGrading	AcresOfGrading	10.50	50.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00

tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	HaulingTripNumber	609.00	0.00
tblTripsAndVMT	WorkerTripNumber	10.00	0.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00
tblTripsAndVMT	WorkerTripNumber	13.00	0.00
tblTripsAndVMT	WorkerTripNumber	5.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.2648	3.1528	1.6720	4.4500e-003	0.3798	0.1121	0.4919	0.0439	0.1031	0.1470	0.0000	391.0373	391.0373	0.1265	0.0000	394.1991
2022	0.1062	1.2462	0.6760	1.9300e-003	0.3394	0.0427	0.3821	0.0366	0.0393	0.0760	0.0000	169.7850	169.7850	0.0549	0.0000	171.1578
Maximum	**0.2648**	**3.1528**	**1.6720**	**4.4500e-003**	**0.3798**	**0.1121**	**0.4919**	**0.0439**	**0.1031**	**0.1470**	**0.0000**	**391.0373**	**391.0373**	**0.1265**	**0.0000**	**394.1991**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.0687	1.4012	2.6582	4.4500e-003	0.1709	7.2900e-003	0.1782	0.0198	7.2900e-003	0.0271	0.0000	391.0369	391.0369	0.1265	0.0000	394.1986
2022	0.0300	0.5933	1.1347	1.9300e-003	0.1527	3.1600e-003	0.1559	0.0165	3.1600e-003	0.0197	0.0000	169.7848	169.7848	0.0549	0.0000	171.1576
Maximum	**0.0687**	**1.4012**	**2.6582**	**4.4500e-003**	**0.1709**	**7.2900e-003**	**0.1782**	**0.0198**	**7.2900e-003**	**0.0271**	**0.0000**	**391.0369**	**391.0369**	**0.1265**	**0.0000**	**394.1986**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	73.39	54.66	-61.53	0.00	55.00	93.25	61.77	55.00	92.66	79.06	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	7-2-2021	10-1-2021	2.2920	1.0175
2	10-2-2021	1-1-2022	1.1314	0.4553
3	1-2-2022	4-1-2022	0.9659	0.4466
4	4-2-2022	7-1-2022	0.3882	0.1775
		Highest	2.2920	1.0175

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	7/2/2021	9/30/2021	5	65	
2	Basins	Grading	7/2/2021	4/30/2022	5	216	
3	Pipelines	Trenching	7/2/2021	9/30/2021	5	65	
4	Restoration	Grading	4/1/2022	4/30/2022	5	21	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 640

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	2	8.00	158	0.38
Demolition	Graders	1	8.00	187	0.41

Demolition	Rubber Tired Dozers	0	8.00	247	0.40
Demolition	Rubber Tired Loaders	1	8.00	203	0.36
Pipelines	Cranes	1	8.00	231	0.29
Pipelines	Excavators	1	8.00	158	0.38
Pipelines	Graders	1	8.00	187	0.41
Pipelines	Rubber Tired Dozers	0	8.00	247	0.40
Pipelines	Rubber Tired Loaders	1	8.00	203	0.36
Pipelines	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Basins	Excavators	2	8.00	158	0.38
Basins	Graders	4	8.00	187	0.41
Basins	Rubber Tired Dozers	0	8.00	247	0.40
Basins	Rubber Tired Loaders	1	8.00	203	0.36
Basins	Scrapers	0	8.00	367	0.48
Basins	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Restoration	Air Compressors	0	6.00	78	0.48
Restoration	Excavators	0	8.00	158	0.38
Restoration	Graders	1	8.00	187	0.41
Restoration	Rubber Tired Dozers	0	8.00	247	0.40
Restoration	Scrapers	0	8.00	367	0.48
Restoration	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	4	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Pipelines	5	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Basins	7	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Restoration	2	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Demolition - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0669	0.0000	0.0669	0.0101	0.0000	0.0101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0408	0.4581	0.3221	7.5000e-004		0.0171	0.0171		0.0157	0.0157	0.0000	66.2581	66.2581	0.0214	0.0000	66.7938
Total	**0.0408**	**0.4581**	**0.3221**	**7.5000e-004**	**0.0669**	**0.0171**	**0.0840**	**0.0101**	**0.0157**	**0.0259**	**0.0000**	**66.2581**	**66.2581**	**0.0214**	**0.0000**	**66.7938**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0301	0.0000	0.0301	4.5600e-003	0.0000	4.5600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0110	0.2587	0.4779	7.5000e-004		1.2400e-003	1.2400e-003		1.2400e-003	1.2400e-003	0.0000	66.2580	66.2580	0.0214	0.0000	66.7938
Total	**0.0110**	**0.2587**	**0.4779**	**7.5000e-004**	**0.0301**	**1.2400e-003**	**0.0314**	**4.5600e-003**	**1.2400e-003**	**5.8000e-003**	**0.0000**	**66.2580**	**66.2580**	**0.0214**	**0.0000**	**66.7938**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Basins - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.3129	0.0000	0.3129	0.0338	0.0000	0.0338	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1712	2.0874	0.9963	2.8200e-003		0.0713	0.0713		0.0656	0.0656	0.0000	247.9233	247.9233	0.0802	0.0000	249.9279
Total	**0.1712**	**2.0874**	**0.9963**	**2.8200e-003**	**0.3129**	**0.0713**	**0.3842**	**0.0338**	**0.0656**	**0.0994**	**0.0000**	**247.9233**	**247.9233**	**0.0802**	**0.0000**	**249.9279**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1408	0.0000	0.1408	0.0152	0.0000	0.0152	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0434	0.8642	1.6539	2.8200e-003		4.6200e-003	4.6200e-003		4.6200e-003	4.6200e-003	0.0000	247.9231	247.9231	0.0802	0.0000	249.9276
Total	**0.0434**	**0.8642**	**1.6539**	**2.8200e-003**	**0.1408**	**4.6200e-003**	**0.1454**	**0.0152**	**4.6200e-003**	**0.0198**	**0.0000**	**247.9231**	**247.9231**	**0.0802**	**0.0000**	**249.9276**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Basins - 2022

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Fugitive Dust					0.3129	0.0000	0.3129	0.0338	0.0000	0.0338	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1001	1.1734	0.6345	1.8300e-003		0.0400	0.0400		0.0368	0.0368	0.0000	160.8071	160.8071	0.0520	0.0000	162.1073
Total	**0.1001**	**1.1734**	**0.6345**	**1.8300e-003**	**0.3129**	**0.0400**	**0.3529**	**0.0338**	**0.0368**	**0.0706**	**0.0000**	**160.8071**	**160.8071**	**0.0520**	**0.0000**	**162.1073**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1408	0.0000	0.1408	0.0152	0.0000	0.0152	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0282	0.5607	1.0731	1.8300e-003		3.0000e-003	3.0000e-003		3.0000e-003	3.0000e-003	0.0000	160.8069	160.8069	0.0520	0.0000	162.1071
Total	**0.0282**	**0.5607**	**1.0731**	**1.8300e-003**	**0.1408**	**3.0000e-003**	**0.1438**	**0.0152**	**3.0000e-003**	**0.0182**	**0.0000**	**160.8069**	**160.8069**	**0.0520**	**0.0000**	**162.1071**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Pipelines - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0528	0.6073	0.3536	8.7000e-004		0.0237	0.0237		0.0218	0.0218	0.0000	76.8559	76.8559	0.0249	0.0000	77.4773
Total	**0.0528**	**0.6073**	**0.3536**	**8.7000e-004**		**0.0237**	**0.0237**		**0.0218**	**0.0218**	**0.0000**	**76.8559**	**76.8559**	**0.0249**	**0.0000**	**77.4773**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0143	0.2783	0.5265	8.7000e-004		1.4300e-003	1.4300e-003		1.4300e-003	1.4300e-003	0.0000	76.8558	76.8558	0.0249	0.0000	77.4772
Total	**0.0143**	**0.2783**	**0.5265**	**8.7000e-004**		**1.4300e-003**	**1.4300e-003**		**1.4300e-003**	**1.4300e-003**	**0.0000**	**76.8558**	**76.8558**	**0.0249**	**0.0000**	**77.4772**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Restoration - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0265	0.0000	0.0265	2.8600e-003	0.0000	2.8600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.0900e-003	0.0728	0.0416	1.0000e-004		2.7000e-003	2.7000e-003		2.4900e-003	2.4900e-003	0.0000	8.9779	8.9779	2.9000e-003	0.0000	9.0505
Total	**6.0900e-003**	**0.0728**	**0.0416**	**1.0000e-004**	**0.0265**	**2.7000e-003**	**0.0292**	**2.8600e-003**	**2.4900e-003**	**5.3500e-003**	**0.0000**	**8.9779**	**8.9779**	**2.9000e-003**	**0.0000**	**9.0505**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0119	0.0000	0.0119	1.2900e-003	0.0000	1.2900e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.8700e-003	0.0325	0.0615	1.0000e-004		1.7000e-004	1.7000e-004		1.7000e-004	1.7000e-004	0.0000	8.9779	8.9779	2.9000e-003	0.0000	9.0505
Total	**1.8700e-003**	**0.0325**	**0.0615**	**1.0000e-004**	**0.0119**	**1.7000e-004**	**0.0121**	**1.2900e-003**	**1.7000e-004**	**1.4600e-003**	**0.0000**	**8.9779**	**8.9779**	**2.9000e-003**	**0.0000**	**9.0505**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Recharge Facilities - Phase 2

Kern-San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	640.00	Acre	640.00	27,878,400.00	0

1.2 Other Project Characteristics

Urbanization Rural **Wind Speed (m/s)** 2.7 **Precipitation Freq (Days)** 32

Climate Zone 3 **Operational Year** 2023

Utility Company Pacific Gas & Electric Company

CO2 Intensity (lb/MWhr) 641.35 **CH4 Intensity (lb/MWhr)** 0.029 **N2O Intensity (lb/MWhr)** 0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Trips and VMT - construction mobile emissions calculated outside of CalEEMod.

Demolition -

Grading - see construction assumptions

Construction Off-road Equipment Mitigation - see construction assumptions

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	5.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	7.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstructionPhase	NumDays	700.00	67.00
tblConstructionPhase	NumDays	1,085.00	220.00
tblConstructionPhase	NumDays	1,085.00	22.00
tblGrading	AcresOfGrading	440.00	590.00
tblGrading	AcresOfGrading	11.00	50.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00

tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	HaulingTripNumber	609.00	0.00
tblTripsAndVMT	WorkerTripNumber	10.00	0.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00
tblTripsAndVMT	WorkerTripNumber	13.00	0.00
tblTripsAndVMT	WorkerTripNumber	5.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.3512	4.0431	2.3692	6.5200e-003	0.4063	0.1419	0.5482	0.0468	0.1306	0.1774	0.0000	573.1284	573.1284	0.1854	0.0000	577.7624
Maximum	**0.3512**	**4.0431**	**2.3692**	**6.5200e-003**	**0.4063**	**0.1419**	**0.5482**	**0.0468**	**0.1306**	**0.1774**	**0.0000**	**573.1284**	**573.1284**	**0.1854**	**0.0000**	**577.7624**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.1009	2.0389	3.8772	6.5200e-003	0.1828	0.0107	0.1935	0.0211	0.0107	0.0317	0.0000	573.1277	573.1277	0.1854	0.0000	577.7618
Maximum	**0.1009**	**2.0389**	**3.8772**	**6.5200e-003**	**0.1828**	**0.0107**	**0.1935**	**0.0211**	**0.0107**	**0.0317**	**0.0000**	**573.1277**	**573.1277**	**0.1854**	**0.0000**	**577.7618**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	71.27	49.57	-63.65	0.00	55.00	92.47	64.70	55.00	91.81	82.10	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	2-28-2022	5-27-2022	1.9160	0.9903
2	5-28-2022	8-27-2022	1.0279	0.4800
3	8-28-2022	9-30-2022	0.3639	0.1683
		Highest	1.9160	0.9903

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	2/28/2022	5/31/2022	5	67	
2	Basins	Grading	2/28/2022	12/31/2022	5	220	
3	Pipelines	Trenching	2/28/2022	5/31/2022	5	67	
4	Restoration	Grading	12/1/2022	12/31/2022	5	22	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 640

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	2	8.00	158	0.38
Demolition	Graders	1	8.00	187	0.41

Demolition	Rubber Tired Dozers	0	8.00	247	0.40
Demolition	Rubber Tired Loaders	1	8.00	203	0.36
Pipelines	Cranes	1	8.00	231	0.29
Pipelines	Excavators	1	8.00	158	0.38
Pipelines	Graders	1	8.00	187	0.41
Pipelines	Rubber Tired Dozers	0	8.00	247	0.40
Pipelines	Rubber Tired Loaders	1	8.00	203	0.36
Pipelines	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Basins	Excavators	2	8.00	158	0.38
Basins	Graders	4	8.00	187	0.41
Basins	Rubber Tired Dozers	0	8.00	247	0.40
Basins	Rubber Tired Loaders	1	8.00	203	0.36
Basins	Scrapers	0	8.00	367	0.48
Basins	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Restoration	Air Compressors	0	6.00	78	0.48
Restoration	Excavators	0	8.00	158	0.38
Restoration	Graders	1	8.00	187	0.41
Restoration	Rubber Tired Dozers	0	8.00	247	0.40
Restoration	Scrapers	0	8.00	367	0.48
Restoration	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	4	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Pipelines	5	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Basins	7	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Restoration	2	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Demolition - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0669	0.0000	0.0669	0.0101	0.0000	0.0101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0372	0.3965	0.3271	7.8000e-004		0.0148	0.0148		0.0136	0.0136	0.0000	68.2871	68.2871	0.0221	0.0000	68.8392
Total	**0.0372**	**0.3965**	**0.3271**	**7.8000e-004**	**0.0669**	**0.0148**	**0.0817**	**0.0101**	**0.0136**	**0.0237**	**0.0000**	**68.2871**	**68.2871**	**0.0221**	**0.0000**	**68.8392**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0301	0.0000	0.0301	4.5600e-003	0.0000	4.5600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0113	0.2667	0.4926	7.8000e-004		1.2800e-003	1.2800e-003		1.2800e-003	1.2800e-003	0.0000	68.2870	68.2870	0.0221	0.0000	68.8391
Total	**0.0113**	**0.2667**	**0.4926**	**7.8000e-004**	**0.0301**	**1.2800e-003**	**0.0314**	**4.5600e-003**	**1.2800e-003**	**5.8400e-003**	**0.0000**	**68.2870**	**68.2870**	**0.0221**	**0.0000**	**68.8391**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Basins - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.3129	0.0000	0.3129	0.0338	0.0000	0.0338	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2592	3.0370	1.6421	4.7400e-003		0.1036	0.1036		0.0953	0.0953	0.0000	416.2065	416.2065	0.1346	0.0000	419.5718
Total	**0.2592**	**3.0370**	**1.6421**	**4.7400e-003**	**0.3129**	**0.1036**	**0.4165**	**0.0338**	**0.0953**	**0.1291**	**0.0000**	**416.2065**	**416.2065**	**0.1346**	**0.0000**	**419.5718**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1408	0.0000	0.1408	0.0152	0.0000	0.0152	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0729	1.4513	2.7775	4.7400e-003		7.7600e-003	7.7600e-003		7.7600e-003	7.7600e-003	0.0000	416.2060	416.2060	0.1346	0.0000	419.5713
Total	**0.0729**	**1.4513**	**2.7775**	**4.7400e-003**	**0.1408**	**7.7600e-003**	**0.1485**	**0.0152**	**7.7600e-003**	**0.0230**	**0.0000**	**416.2060**	**416.2060**	**0.1346**	**0.0000**	**419.5713**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Pipelines - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0485	0.5333	0.3564	9.0000e-004		0.0207	0.0207		0.0191	0.0191	0.0000	79.2294	79.2294	0.0256	0.0000	79.8700
Total	**0.0485**	**0.5333**	**0.3564**	**9.0000e-004**		**0.0207**	**0.0207**		**0.0191**	**0.0191**	**0.0000**	**79.2294**	**79.2294**	**0.0256**	**0.0000**	**79.8700**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0147	0.2868	0.5427	9.0000e-004		1.4800e-003	1.4800e-003		1.4800e-003	1.4800e-003	0.0000	79.2293	79.2293	0.0256	0.0000	79.8699
Total	**0.0147**	**0.2868**	**0.5427**	**9.0000e-004**		**1.4800e-003**	**1.4800e-003**		**1.4800e-003**	**1.4800e-003**	**0.0000**	**79.2293**	**79.2293**	**0.0256**	**0.0000**	**79.8699**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Restoration - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0265	0.0000	0.0265	2.8600e-003	0.0000	2.8600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.3800e-003	0.0763	0.0436	1.1000e-004		2.8300e-003	2.8300e-003		2.6000e-003	2.6000e-003	0.0000	9.4054	9.4054	3.0400e-003	0.0000	9.4815
Total	**6.3800e-003**	**0.0763**	**0.0436**	**1.1000e-004**	**0.0265**	**2.8300e-003**	**0.0293**	**2.8600e-003**	**2.6000e-003**	**5.4600e-003**	**0.0000**	**9.4054**	**9.4054**	**3.0400e-003**	**0.0000**	**9.4815**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Fugitive Dust					0.0119	0.0000	0.0119	1.2900e-003	0.0000	1.2900e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.9600e-003	0.0341	0.0644	1.1000e-004		1.7000e-004	1.7000e-004		1.7000e-004	1.7000e-004	0.0000	9.4054	9.4054	3.0400e-003	0.0000	9.4815
Total	**1.9600e-003**	**0.0341**	**0.0644**	**1.1000e-004**	**0.0119**	**1.7000e-004**	**0.0121**	**1.2900e-003**	**1.7000e-004**	**1.4600e-003**	**0.0000**	**9.4054**	**9.4054**	**3.0400e-003**	**0.0000**	**9.4815**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Recovery Wells - Phase 1

Kern-San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	3.00	1000sqft	0.07	3,000.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	32
Climate Zone	3			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Trips and VMT - construction mobile emissions calculated outside of CalEEMod

Grading - see construction assumptions

Construction Off-road Equipment Mitigation - see construction assumptions

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstructionPhase	NumDays	100.00	50.00
tblConstructionPhase	NumDays	2.00	44.00
tblGrading	AcresOfGrading	0.00	0.07
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	UsageHours	4.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	8.00	0.00
tblTripsAndVMT	WorkerTripNumber	13.00	0.00
tblTripsAndVMT	WorkerTripNumber	1.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.0150	0.1533	0.1278	4.1000e-004	4.0000e-005	5.8200e-003	5.8500e-003	0.0000	5.3500e-003	5.3500e-003	0.0000	36.3329	36.3329	0.0118	0.0000	36.6267
2023	0.0578	0.6047	0.4514	1.1200e-003	0.0000	0.0241	0.0241	0.0000	0.0222	0.0222	0.0000	97.5202	97.5202	0.0313	0.0000	98.3024
Maximum	**0.0578**	**0.6047**	**0.4514**	**1.1200e-003**	**4.0000e-005**	**0.0241**	**0.0241**	**0.0000**	**0.0222**	**0.0222**	**0.0000**	**97.5202**	**97.5202**	**0.0313**	**0.0000**	**98.3024**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	7.2300e-003	0.1217	0.2367	4.1000e-004	2.0000e-005	6.8000e-004	7.0000e-004	0.0000	6.8000e-004	6.8000e-004	0.0000	36.3329	36.3329	0.0118	0.0000	36.6267
2023	0.0198	0.3595	0.6695	1.1200e-003	0.0000	2.1500e-003	2.1500e-003	0.0000	2.1500e-003	2.1500e-003	0.0000	97.5201	97.5201	0.0313	0.0000	98.3023
Maximum	**0.0198**	**0.3595**	**0.6695**	**1.1200e-003**	**2.0000e-005**	**2.1500e-003**	**2.1500e-003**	**0.0000**	**2.1500e-003**	**2.1500e-003**	**0.0000**	**97.5201**	**97.5201**	**0.0313**	**0.0000**	**98.3023**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**62.78**	**36.53**	**-56.45**	**0.00**	**50.00**	**90.55**	**90.49**	**0.00**	**89.74**	**89.74**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	**Start Date**	**End Date**	**Maximum Unmitigated ROG + NOX (tons/quarter)**	**Maximum Mitigated ROG + NOX (tons/quarter)**

1	**5-2-2022**	**8-1-2022**	0.1639	0.1256
4	**2-2-2023**	**5-1-2023**	0.2261	0.1292
5	**5-2-2023**	**8-1-2023**	0.4230	0.2425
		Highest	0.4230	0.2425

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Drilling	Grading	5/2/2022	6/30/2022	5	44	
2	Pipelines	Trenching	4/3/2023	6/30/2023	5	65	
3	Construction	Building Construction	4/3/2023	6/10/2023	5	50	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.07

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Drilling	Bore/Drill Rigs	1	8.00	221	0.50
Drilling	Concrete/Industrial Saws	0	8.00	81	0.73
Drilling	Rubber Tired Dozers	0	1.00	247	0.40
Drilling	Rubber Tired Loaders	1	8.00	203	0.36
Drilling	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Construction	Cement and Mortar Mixers	1	8.00	9	0.56
Construction	Cranes	1	8.00	231	0.29
Construction	Forklifts	0	6.00	89	0.20
Construction	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Pipelines	Cement and Mortar Mixers	0	6.00	9	0.56
Pipelines	Cranes	1	8.00	231	0.29
Pipelines	Excavators	1	8.00	158	0.38
Pipelines	Graders	1	8.00	187	0.41
Pipelines	Pavers	0	7.00	130	0.42
Pipelines	Rollers	0	7.00	80	0.38
Pipelines	Rubber Tired Loaders	1	8.00	203	0.36
Pipelines	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Drilling	3	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Construction	3	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Pipelines	5	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Drilling - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					4.0000e-005	0.0000	4.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0150	0.1533	0.1278	4.1000e-004		5.8200e-003	5.8200e-003		5.3500e-003	5.3500e-003	0.0000	36.3329	36.3329	0.0118	0.0000	36.6267
Total	**0.0150**	**0.1533**	**0.1278**	**4.1000e-004**	**4.0000e-005**	**5.8200e-003**	**5.8600e-003**	**0.0000**	**5.3500e-003**	**5.3500e-003**	**0.0000**	**36.3329**	**36.3329**	**0.0118**	**0.0000**	**36.6267**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.0000e-005	0.0000	2.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.2300e-003	0.1217	0.2367	4.1000e-004		6.8000e-004	6.8000e-004		6.8000e-004	6.8000e-004	0.0000	36.3329	36.3329	0.0118	0.0000	36.6267
Total	**7.2300e-003**	**0.1217**	**0.2367**	**4.1000e-004**	**2.0000e-005**	**6.8000e-004**	**7.0000e-004**	**0.0000**	**6.8000e-004**	**6.8000e-004**	**0.0000**	**36.3329**	**36.3329**	**0.0118**	**0.0000**	**36.6267**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Pipelines - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0437	0.4617	0.3421	8.8000e-004		0.0179	0.0179		0.0165	0.0165	0.0000	76.8611	76.8611	0.0249	0.0000	77.4825
Total	**0.0437**	**0.4617**	**0.3421**	**8.8000e-004**		**0.0179**	**0.0179**		**0.0165**	**0.0165**	**0.0000**	**76.8611**	**76.8611**	**0.0249**	**0.0000**	**77.4825**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0143	0.2783	0.5265	8.8000e-004		1.4300e-003	1.4300e-003		1.4300e-003	1.4300e-003	0.0000	76.8610	76.8610	0.0249	0.0000	77.4824
Total	**0.0143**	**0.2783**	**0.5265**	**8.8000e-004**		**1.4300e-003**	**1.4300e-003**		**1.4300e-003**	**1.4300e-003**	**0.0000**	**76.8610**	**76.8610**	**0.0249**	**0.0000**	**77.4824**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0140	0.1430	0.1094	2.4000e-004		6.2400e-003	6.2400e-003		5.7700e-003	5.7700e-003	0.0000	20.6591	20.6591	6.4300e-003	0.0000	20.8199
Total	**0.0140**	**0.1430**	**0.1094**	**2.4000e-004**		**6.2400e-003**	**6.2400e-003**		**5.7700e-003**	**5.7700e-003**	**0.0000**	**20.6591**	**20.6591**	**6.4300e-003**	**0.0000**	**20.8199**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	5.5700e-003	0.0812	0.1431	2.4000e-004		7.2000e-004	7.2000e-004		7.2000e-004	7.2000e-004	0.0000	20.6591	20.6591	6.4300e-003	0.0000	20.8199
Total	**5.5700e-003**	**0.0812**	**0.1431**	**2.4000e-004**		**7.2000e-004**	**7.2000e-004**		**7.2000e-004**	**7.2000e-004**	**0.0000**	**20.6591**	**20.6591**	**6.4300e-003**	**0.0000**	**20.8199**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Recovery Wells - Phase 2

Kern-San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	3.00	1000sqft	0.07	3,000.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	32
Climate Zone	3			**Operational Year**	2024
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Off-road Equipment - see construction assumptions

Trips and VMT - construction mobile emissions calculated outside of CalEEMod

Grading - see construction assumptions

Construction Off-road Equipment Mitigation - see construction assumptions

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstructionPhase	NumDays	100.00	50.00
tblConstructionPhase	NumDays	2.00	42.00
tblGrading	AcresOfGrading	0.00	0.07
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	UsageHours	4.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	8.00	0.00
tblTripsAndVMT	WorkerTripNumber	13.00	0.00
tblTripsAndVMT	WorkerTripNumber	1.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.0325	0.3301	0.2703	7.6000e-004	4.0000e-005	0.0129	0.0129	0.0000	0.0118	0.0118	0.0000	66.6342	66.6342	0.0215	0.0000	67.1705
2024	0.0352	0.3559	0.2890	7.2000e-004	0.0000	0.0140	0.0140	0.0000	0.0129	0.0129	0.0000	63.2434	63.2434	0.0203	0.0000	63.7509
Maximum	**0.0352**	**0.3559**	**0.2890**	**7.6000e-004**	**4.0000e-005**	**0.0140**	**0.0140**	**0.0000**	**0.0129**	**0.0129**	**0.0000**	**66.6342**	**66.6342**	**0.0215**	**0.0000**	**67.1705**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.0135	0.2343	0.4452	7.6000e-004	2.0000e-005	1.3800e-003	1.4000e-003	0.0000	1.3800e-003	1.3800e-003	0.0000	66.6341	66.6341	0.0215	0.0000	67.1704
2024	0.0128	0.2328	0.4341	7.2000e-004	0.0000	1.3800e-003	1.3800e-003	0.0000	1.3800e-003	1.3800e-003	0.0000	63.2433	63.2433	0.0203	0.0000	63.7509
Maximum	**0.0135**	**0.2343**	**0.4452**	**7.6000e-004**	**2.0000e-005**	**1.3800e-003**	**1.4000e-003**	**0.0000**	**1.3800e-003**	**1.3800e-003**	**0.0000**	**66.6341**	**66.6341**	**0.0215**	**0.0000**	**67.1704**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**61.12**	**31.91**	**-57.23**	**0.00**	**50.00**	**89.73**	**89.67**	**0.00**	**88.85**	**88.85**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	**Start Date**	**End Date**	**Maximum Unmitigated ROG + NOX (tons/quarter)**	**Maximum Mitigated ROG + NOX (tons/quarter)**

1	**1-1-2023**	**3-31-2023**	0.1422	0.1214
4	**10-1-2023**	**12-31-2023**	0.2183	0.1247
5	**1-1-2024**	**3-31-2024**	0.3850	0.2417
		Highest	0.3850	0.2417

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Drilling	Grading	1/2/2023	2/28/2023	5	42	
2	Pipelines	Trenching	12/4/2023	2/28/2024	5	63	
3	Construction	Building Construction	12/4/2023	2/11/2024	5	50	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.07

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Drilling	Bore/Drill Rigs	1	8.00	221	0.50
Drilling	Concrete/Industrial Saws	0	8.00	81	0.73
Drilling	Rubber Tired Dozers	0	1.00	247	0.40
Drilling	Rubber Tired Loaders	1	8.00	203	0.36
Drilling	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Construction	Cement and Mortar Mixers	1	8.00	9	0.56
Construction	Cranes	1	8.00	231	0.29
Construction	Forklifts	0	6.00	89	0.20
Construction	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Pipelines	Cement and Mortar Mixers	0	6.00	9	0.56
Pipelines	Cranes	1	8.00	231	0.29
Pipelines	Excavators	1	8.00	158	0.38
Pipelines	Graders	1	8.00	187	0.41
Pipelines	Pavers	0	7.00	130	0.42
Pipelines	Rollers	0	7.00	80	0.38
Pipelines	Rubber Tired Loaders	1	8.00	203	0.36
Pipelines	Tractors/Loaders/Backhoes	1	8.00	97	0.37

<u>Trips and VMT</u>

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Drilling	3	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Construction	3	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Pipelines	5	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Drilling - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					4.0000e-005	0.0000	4.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0134	0.1308	0.1213	4.0000e-004		4.8500e-003	4.8500e-003		4.4600e-003	4.4600e-003	0.0000	34.7210	34.7210	0.0112	0.0000	35.0017
Total	**0.0134**	**0.1308**	**0.1213**	**4.0000e-004**	**4.0000e-005**	**4.8500e-003**	**4.8900e-003**	**0.0000**	**4.4600e-003**	**4.4600e-003**	**0.0000**	**34.7210**	**34.7210**	**0.0112**	**0.0000**	**35.0017**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.0000e-005	0.0000	2.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.9000e-003	0.1162	0.2260	4.0000e-004		6.5000e-004	6.5000e-004		6.5000e-004	6.5000e-004	0.0000	34.7210	34.7210	0.0112	0.0000	35.0017
Total	**6.9000e-003**	**0.1162**	**0.2260**	**4.0000e-004**	**2.0000e-005**	**6.5000e-004**	**6.7000e-004**	**0.0000**	**6.5000e-004**	**6.5000e-004**	**0.0000**	**34.7210**	**34.7210**	**0.0112**	**0.0000**	**35.0017**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Pipelines - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0135	0.1421	0.1053	2.7000e-004		5.5100e-003	5.5100e-003		5.0700e-003	5.0700e-003	0.0000	23.6496	23.6496	7.6500e-003	0.0000	23.8408
Total	**0.0135**	**0.1421**	**0.1053**	**2.7000e-004**		**5.5100e-003**	**5.5100e-003**		**5.0700e-003**	**5.0700e-003**	**0.0000**	**23.6496**	**23.6496**	**7.6500e-003**	**0.0000**	**23.8408**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.3900e-003	0.0856	0.1620	2.7000e-004		4.4000e-004	4.4000e-004		4.4000e-004	4.4000e-004	0.0000	23.6495	23.6495	7.6500e-003	0.0000	23.8408
Total	**4.3900e-003**	**0.0856**	**0.1620**	**2.7000e-004**		**4.4000e-004**	**4.4000e-004**		**4.4000e-004**	**4.4000e-004**	**0.0000**	**23.6495**	**23.6495**	**7.6500e-003**	**0.0000**	**23.8408**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Pipelines - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0272	0.2760	0.2242	5.8000e-004		0.0106	0.0106		9.7700e-003	9.7700e-003	0.0000	50.8455	50.8455	0.0164	0.0000	51.2566
Total	**0.0272**	**0.2760**	**0.2242**	**5.8000e-004**		**0.0106**	**0.0106**		**9.7700e-003**	**9.7700e-003**	**0.0000**	**50.8455**	**50.8455**	**0.0164**	**0.0000**	**51.2566**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	9.4400e-003	0.1841	0.3483	5.8000e-004		9.5000e-004	9.5000e-004		9.5000e-004	9.5000e-004	0.0000	50.8454	50.8454	0.0164	0.0000	51.2565
Total	**9.4400e-003**	**0.1841**	**0.3483**	**5.8000e-004**		**9.5000e-004**	**9.5000e-004**		**9.5000e-004**	**9.5000e-004**	**0.0000**	**50.8454**	**50.8454**	**0.0164**	**0.0000**	**51.2565**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	5.6200e-003	0.0572	0.0437	1.0000e-004		2.4900e-003	2.4900e-003		2.3100e-003	2.3100e-003	0.0000	8.2637	8.2637	2.5700e-003	0.0000	8.3280
Total	**5.6200e-003**	**0.0572**	**0.0437**	**1.0000e-004**		**2.4900e-003**	**2.4900e-003**		**2.3100e-003**	**2.3100e-003**	**0.0000**	**8.2637**	**8.2637**	**2.5700e-003**	**0.0000**	**8.3280**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.2300e-003	0.0325	0.0572	1.0000e-004		2.9000e-004	2.9000e-004		2.9000e-004	2.9000e-004	0.0000	8.2637	8.2637	2.5700e-003	0.0000	8.3280
Total	**2.2300e-003**	**0.0325**	**0.0572**	**1.0000e-004**		**2.9000e-004**	**2.9000e-004**		**2.9000e-004**	**2.9000e-004**	**0.0000**	**8.2637**	**8.2637**	**2.5700e-003**	**0.0000**	**8.3280**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	8.0200e-003	0.0798	0.0648	1.4000e-004		3.4000e-003	3.4000e-003		3.1400e-003	3.1400e-003	0.0000	12.3979	12.3979	3.8600e-003	0.0000	12.4944
Total	**8.0200e-003**	**0.0798**	**0.0648**	**1.4000e-004**		**3.4000e-003**	**3.4000e-003**		**3.1400e-003**	**3.1400e-003**	**0.0000**	**12.3979**	**12.3979**	**3.8600e-003**	**0.0000**	**12.4944**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	3.3400e-003	0.0487	0.0858	1.4000e-004		4.3000e-004	4.3000e-004		4.3000e-004	4.3000e-004	0.0000	12.3979	12.3979	3.8600e-003	0.0000	12.4944
Total	**3.3400e-003**	**0.0487**	**0.0858**	**1.4000e-004**		**4.3000e-004**	**4.3000e-004**		**4.3000e-004**	**4.3000e-004**	**0.0000**	**12.3979**	**12.3979**	**3.8600e-003**	**0.0000**	**12.4944**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Conveyance Facilities

Kern-San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	21.50	Acre	21.50	936,737.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	32
Climate Zone	3			**Operational Year**	2026
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - see construction assumptions

Construction Phase - see construction assumptions

Off-road Equipment - see construction assumptions

Trips and VMT - construction mobile emissions calculated outside of CalEEMod

Grading - see construction assumptions

Construction Off-road Equipment Mitigation - see construction assumptions

Table Name	Column Name	Default Value	New Value

tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstructionPhase	NumDays	35.00	800.00
tblGrading	AcresOfGrading	400.00	21.50
tblLandUse	LandUseSquareFeet	936,540.00	936,737.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	18.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.1418	1.4351	1.2542	2.9200e-003	0.0114	0.0570	0.0684	1.2300e-003	0.0526	0.0538	0.0000	254.9380	254.9380	0.0816	0.0000	256.9769
2024	0.1970	1.9139	1.8342	4.3000e-003	0.0114	0.0756	0.0870	1.2300e-003	0.0697	0.0710	0.0000	375.2581	375.2581	0.1201	0.0000	378.2593
2025	0.1798	1.6482	1.8086	4.2800e-003	0.0114	0.0648	0.0762	1.2300e-003	0.0598	0.0610	0.0000	373.8605	373.8605	0.1196	0.0000	376.8505
2026	0.0682	0.6252	0.6860	1.6200e-003	0.0114	0.0246	0.0360	1.2300e-003	0.0227	0.0239	0.0000	141.8091	141.8091	0.0454	0.0000	142.9433
Maximum	**0.1970**	**1.9139**	**1.8342**	**4.3000e-003**	**0.0114**	**0.0756**	**0.0870**	**1.2300e-003**	**0.0697**	**0.0710**	**0.0000**	**375.2581**	**375.2581**	**0.1201**	**0.0000**	**378.2593**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.0500	0.9975	1.8179	2.9200e-003	5.1300e-003	5.9500e-003	0.0111	5.5000e-004	5.9500e-003	6.5100e-003	0.0000	254.9377	254.9377	0.0816	0.0000	256.9766
2024	0.0735	1.4682	2.6757	4.3000e-003	5.1300e-003	8.7600e-003	0.0139	5.5000e-004	8.7600e-003	9.3200e-003	0.0000	375.2576	375.2576	0.1201	0.0000	378.2588
2025	0.0733	1.4626	2.6655	4.2800e-003	5.1300e-003	8.7300e-003	0.0139	5.5000e-004	8.7300e-003	9.2800e-003	0.0000	373.8600	373.8600	0.1196	0.0000	376.8500
2026	0.0278	0.5548	1.0111	1.6200e-003	5.1300e-003	3.3100e-003	8.4400e-003	5.5000e-004	3.3100e-003	3.8700e-003	0.0000	141.8090	141.8090	0.0454	0.0000	142.9431
Maximum	**0.0735**	**1.4682**	**2.6757**	**4.3000e-003**	**5.1300e-003**	**8.7600e-003**	**0.0139**	**5.5000e-004**	**8.7600e-003**	**9.3200e-003**	**0.0000**	**375.2576**	**375.2576**	**0.1201**	**0.0000**	**378.2588**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**61.73**	**20.27**	**-46.34**	**0.00**	**55.00**	**87.95**	**82.34**	**55.28**	**86.93**	**86.18**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	4-26-2023	7-25-2023	0.5758	0.3825
2	7-26-2023	10-25-2023	0.5821	0.3867
3	10-26-2023	1-25-2024	0.5678	0.3867
4	1-26-2024	4-25-2024	0.5237	0.3825
5	4-26-2024	7-25-2024	0.5237	0.3825
6	7-26-2024	10-25-2024	0.5294	0.3867
7	10-26-2024	1-25-2025	0.5106	0.3867
8	1-26-2025	4-25-2025	0.4502	0.3783
9	4-26-2025	7-25-2025	0.4552	0.3825
10	7-26-2025	10-25-2025	0.4602	0.3867
11	10-26-2025	1-25-2026	0.4602	0.3867
12	1-26-2026	4-25-2026	0.4502	0.3783
13	4-26-2026	7-25-2026	0.1201	0.1009
		Highest	0.5821	0.3867

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Canal,Turnout,Pipelines	Grading	4/26/2023	5/19/2026	5	800	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 21.5

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Canal,Turnout,Pipelines	Cement and Mortar Mixers	1	8.00	9	0.56
Canal,Turnout,Pipelines	Cranes	1	8.00	231	0.29
Canal,Turnout,Pipelines	Excavators	2	8.00	158	0.38
Canal,Turnout,Pipelines	Graders	1	8.00	187	0.41
Canal,Turnout,Pipelines	Rubber Tired Dozers	0	8.00	247	0.40
Canal,Turnout,Pipelines	Rubber Tired Loaders	1	8.00	203	0.36
Canal,Turnout,Pipelines	Scrapers	0	8.00	367	0.48
Canal,Turnout,Pipelines	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Canal,Turnout,Pipelines	7	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Canal,Turnout,Pipelines - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0114	0.0000	0.0114	1.2300e-003	0.0000	1.2300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1418	1.4351	1.2542	2.9200e-003		0.0570	0.0570		0.0526	0.0526	0.0000	254.9380	254.9380	0.0816	0.0000	256.9769
Total	**0.1418**	**1.4351**	**1.2542**	**2.9200e-003**	**0.0114**	**0.0570**	**0.0684**	**1.2300e-003**	**0.0526**	**0.0538**	**0.0000**	**254.9380**	**254.9380**	**0.0816**	**0.0000**	**256.9769**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.1300e-003	0.0000	5.1300e-003	5.5000e-004	0.0000	5.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0500	0.9975	1.8179	2.9200e-003		5.9500e-003	5.9500e-003		5.9500e-003	5.9500e-003	0.0000	254.9377	254.9377	0.0816	0.0000	256.9766
Total	**0.0500**	**0.9975**	**1.8179**	**2.9200e-003**	**5.1300e-003**	**5.9500e-003**	**0.0111**	**5.5000e-004**	**5.9500e-003**	**6.5000e-003**	**0.0000**	**254.9377**	**254.9377**	**0.0816**	**0.0000**	**256.9766**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Canal,Turnout,Pipelines - 2024

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Fugitive Dust					0.0114	0.0000	0.0114	1.2300e-003	0.0000	1.2300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1970	1.9139	1.8342	4.3000e-003		0.0756	0.0756		0.0697	0.0697	0.0000	375.2581	375.2581	0.1201	0.0000	378.2593
Total	**0.1970**	**1.9139**	**1.8342**	**4.3000e-003**	**0.0114**	**0.0756**	**0.0870**	**1.2300e-003**	**0.0697**	**0.0710**	**0.0000**	**375.2581**	**375.2581**	**0.1201**	**0.0000**	**378.2593**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Fugitive Dust					5.1300e-003	0.0000	5.1300e-003	5.5000e-004	0.0000	5.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0735	1.4682	2.6757	4.3000e-003		8.7600e-003	8.7600e-003		8.7600e-003	8.7600e-003	0.0000	375.2576	375.2576	0.1201	0.0000	378.2588
Total	**0.0735**	**1.4682**	**2.6757**	**4.3000e-003**	**5.1300e-003**	**8.7600e-003**	**0.0139**	**5.5000e-004**	**8.7600e-003**	**9.3100e-003**	**0.0000**	**375.2576**	**375.2576**	**0.1201**	**0.0000**	**378.2588**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Canal,Turnout,Pipelines - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0114	0.0000	0.0114	1.2300e-003	0.0000	1.2300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1798	1.6482	1.8086	4.2800e-003		0.0648	0.0648		0.0598	0.0598	0.0000	373.8605	373.8605	0.1196	0.0000	376.8505
Total	**0.1798**	**1.6482**	**1.8086**	**4.2800e-003**	**0.0114**	**0.0648**	**0.0762**	**1.2300e-003**	**0.0598**	**0.0610**	**0.0000**	**373.8605**	**373.8605**	**0.1196**	**0.0000**	**376.8505**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.1300e-003	0.0000	5.1300e-003	5.5000e-004	0.0000	5.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0733	1.4626	2.6655	4.2800e-003		8.7300e-003	8.7300e-003		8.7300e-003	8.7300e-003	0.0000	373.8600	373.8600	0.1196	0.0000	376.8500
Total	**0.0733**	**1.4626**	**2.6655**	**4.2800e-003**	**5.1300e-003**	**8.7300e-003**	**0.0139**	**5.5000e-004**	**8.7300e-003**	**9.2800e-003**	**0.0000**	**373.8600**	**373.8600**	**0.1196**	**0.0000**	**376.8500**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Canal,Turnout,Pipelines - 2026

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0114	0.0000	0.0114	1.2300e-003	0.0000	1.2300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0682	0.6252	0.6860	1.6200e-003		0.0246	0.0246		0.0227	0.0227	0.0000	141.8091	141.8091	0.0454	0.0000	142.9433
Total	**0.0682**	**0.6252**	**0.6860**	**1.6200e-003**	**0.0114**	**0.0246**	**0.0360**	**1.2300e-003**	**0.0227**	**0.0239**	**0.0000**	**141.8091**	**141.8091**	**0.0454**	**0.0000**	**142.9433**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.1300e-003	0.0000	5.1300e-003	5.5000e-004	0.0000	5.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0278	0.5548	1.0111	1.6200e-003		3.3100e-003	3.3100e-003		3.3100e-003	3.3100e-003	0.0000	141.8090	141.8090	0.0454	0.0000	142.9431
Total	**0.0278**	**0.5548**	**1.0111**	**1.6200e-003**	**5.1300e-003**	**3.3100e-003**	**8.4400e-003**	**5.5000e-004**	**3.3100e-003**	**3.8600e-003**	**0.0000**	**141.8090**	**141.8090**	**0.0454**	**0.0000**	**142.9431**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Conveyance - Pump Station
Kern-San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	3.00	1000sqft	0.07	3,000.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	32
Climate Zone	3			**Operational Year**	2024
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - see construction assumptions

Off-road Equipment - see construction assumptions

Trips and VMT - construction mobile emissions calculated outside of CalEEMod

Construction Off-road Equipment Mitigation - see construction assumptions

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15

tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstEquipMitigation	Tier	No Change	Tier 4 Interim
tblConstructionPhase	NumDays	100.00	221.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	UsageHours	4.00	8.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	1.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.0908	0.8831	0.8136	1.8700e-003	0.0000	0.0369	0.0369	0.0000	0.0340	0.0340	0.0000	162.8175	162.8175	0.0518	0.0000	164.1115
2024	0.0208	0.1946	0.1952	4.5000e-004	0.0000	8.0300e-003	8.0300e-003	0.0000	7.4100e-003	7.4100e-003	0.0000	39.3380	39.3380	0.0125	0.0000	39.6506
Maximum	**0.0908**	**0.8831**	**0.8136**	**1.8700e-003**	**0.0000**	**0.0369**	**0.0369**	**0.0000**	**0.0340**	**0.0340**	**0.0000**	**162.8175**	**162.8175**	**0.0518**	**0.0000**	**164.1115**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.0347	0.6396	1.1562	1.8700e-003	0.0000	4.2400e-003	4.2400e-003	0.0000	4.2400e-003	4.2400e-003	0.0000	162.8173	162.8173	0.0518	0.0000	164.1113
2024	8.3800e-003	0.1545	0.2793	4.5000e-004	0.0000	1.0200e-003	1.0200e-003	0.0000	1.0200e-003	1.0200e-003	0.0000	39.3379	39.3379	0.0125	0.0000	39.6506
Maximum	**0.0347**	**0.6396**	**1.1562**	**1.8700e-003**	**0.0000**	**4.2400e-003**	**4.2400e-003**	**0.0000**	**4.2400e-003**	**4.2400e-003**	**0.0000**	**162.8173**	**162.8173**	**0.0518**	**0.0000**	**164.1113**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**61.45**	**26.32**	**-42.30**	**0.00**	**0.00**	**88.28**	**88.28**	**0.00**	**87.30**	**87.30**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	**Start Date**	**End Date**	**Maximum Unmitigated ROG + NOX (tons/quarter)**	**Maximum Mitigated ROG + NOX (tons/quarter)**
1	**4-26-2023**	**7-25-2023**	0.3557	0.2462
2	**7-26-2023**	**10-25-2023**	0.3596	0.2489
3	**10-26-2023**	**1-25-2024**	0.3513	0.2489
4	**1-26-2024**	**4-25-2024**	0.1217	0.0920
		Highest	0.3596	0.2489

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Building Construction	Building Construction	4/26/2023	2/28/2024	5	221	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.07

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Building Construction	Cement and Mortar Mixers	1	8.00	9	0.56
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Excavators	1	8.00	158	0.38
Building Construction	Forklifts	0	6.00	89	0.20
Building Construction	Rubber Tired Loaders	1	8.00	203	0.36
Building Construction	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Building Construction	5	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0908	0.8831	0.8136	1.8700e-003		0.0369	0.0369		0.0340	0.0340	0.0000	162.8175	162.8175	0.0518	0.0000	164.1115
Total	**0.0908**	**0.8831**	**0.8136**	**1.8700e-003**		**0.0369**	**0.0369**		**0.0340**	**0.0340**	**0.0000**	**162.8175**	**162.8175**	**0.0518**	**0.0000**	**164.1115**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0347	0.6396	1.1562	1.8700e-003		4.2400e-003	4.2400e-003		4.2400e-003	4.2400e-003	0.0000	162.8173	162.8173	0.0518	0.0000	164.1113
Total	**0.0347**	**0.6396**	**1.1562**	**1.8700e-003**		**4.2400e-003**	**4.2400e-003**		**4.2400e-003**	**4.2400e-003**	**0.0000**	**162.8173**	**162.8173**	**0.0518**	**0.0000**	**164.1113**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0208	0.1946	0.1952	4.5000e-004		8.0300e-003	8.0300e-003		7.4100e-003	7.4100e-003	0.0000	39.3380	39.3380	0.0125	0.0000	39.6506
Total	**0.0208**	**0.1946**	**0.1952**	**4.5000e-004**		**8.0300e-003**	**8.0300e-003**		**7.4100e-003**	**7.4100e-003**	**0.0000**	**39.3380**	**39.3380**	**0.0125**	**0.0000**	**39.6506**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	8.3800e-003	0.1545	0.2793	4.5000e-004		1.0200e-003	1.0200e-003		1.0200e-003	1.0200e-003	0.0000	39.3379	39.3379	0.0125	0.0000	39.6506
Total	**8.3800e-003**	**0.1545**	**0.2793**	**4.5000e-004**		**1.0200e-003**	**1.0200e-003**		**1.0200e-003**	**1.0200e-003**	**0.0000**	**39.3379**	**39.3379**	**0.0125**	**0.0000**	**39.6506**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Kern Fan Groundwater - Recharge Facilities and Recovery Wells Construction

Total On-Road Emissions

Kern Fan Groundwater - Recharge Facilities and Recovery Wells

Total On-Road Emissions

260 Max construction days per year

	Construction Phase	Annual One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Idling per Day (minutes)	Regional Emissions (pounds/year) ROG	NOX	CO	SO2	PM10 Dust	PM10 Exh	Total PM10	PM2.5 Dust	PM2.5 Exh	Total PM2.5	(MT/yr) Total CO2e
Phase 1																	
Recharge Facilities	Demolition/Site Clearing	2021															
	Hauling	642	65	10	20	15	8.42	167.73	82.75	0.50	11.24	1.77	13.01	3.08	1.69	4.77	25.38
	Vendor	260	65	10	25	15	3.59	63.68	23.96	0.20	6.01	1.07	7.09	1.73	1.03	2.76	10.19
	Worker	650	65	10	16.8	0	0.49	2.04	23.21	0.07	8.30	0.05	8.34	2.20	0.04	2.24	3.46
						Tons/year	0.0062	0.1167	0.065	0.0004	0.0128	0.0014	0.0142	0.0035	0.0014	0.0049	39.03
	Pipelines	2021															
	Hauling	30	65	10	4	15	0.28	4.10	3.40	0.01	0.11	0.02	0.13	0.03	0.02	0.05	0.47
	Vendor	130	65	10	25	15	1.79	31.84	11.98	0.10	3.01	0.54	3.54	0.86	0.51	1.38	5.10
	Worker	650	65	10	16.8	0	0.49	2.04	23.21	0.07	8.30	0.05	8.34	2.20	0.04	2.24	3.46
						Tons/year	0.0013	0.019	0.0193	9E-05	0.0057	0.0003	0.006	0.0015	0.0003	0.0018	9.03
	Basins-2021	2021															
	Hauling	22,743	131	10	4	15	212.44	3106.05	2580.05	7.07	79.66	15.39	95.05	21.84	14.72	36.57	355.18
	Vendor	524	131	10	25	15	7.24	128.35	48.29	0.41	12.12	2.16	14.29	3.49	2.07	5.56	20.54
	Worker	2620	131	10	16.8	0	1.97	8.22	93.55	0.30	33.44	0.19	33.63	8.86	0.17	9.04	13.96
						Tons/year	0.1108	1.6213	1.3609	0.0039	0.0626	0.0089	0.0715	0.0171	0.0085	0.0256	389.68
	Basins-2022	2022															
	Hauling	8,950	85	10	4	15	78.56	1177.46	1055.31	2.78	31.35	3.17	34.52	8.60	3.03	11.63	139.50
	Vendor	340	85	10	25	15	3.08	69.26	28.10	0.26	7.86	0.73	8.60	2.26	0.70	2.96	13.03
	Worker	1700	85	10	16.8	0	1.09	4.59	54.51	0.19	21.70	0.11	21.81	5.75	0.10	5.86	8.81
						Tons/year	0.0414	0.6257	0.569	0.0016	0.0305	0.002	0.0325	0.0083	0.0019	0.0102	161.34
	Restoration	2022															
	Hauling	0	21	10	4	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	84	21	10	25	15	0.76	17.11	6.94	0.06	1.94	0.18	2.12	0.56	0.17	0.73	3.22
	Worker	126	21	10	16.8	0	0.08	0.34	4.04	0.01	1.61	0.01	1.62	0.43	0.01	0.43	0.65
						Tons/year	0.0004	0.0087	0.0055	4E-05	0.0018	9E-05	0.0019	0.0005	9E-05	0.0006	3.87
Recovery Wells	Well Drilling	2022															
	Hauling	8	44	10	4	15	0.07	1.05	0.94	0.00	0.03	0.00	0.03	0.01	0.00	0.01	0.12
	Vendor	176	44	10	25	15	1.59	35.85	14.55	0.13	4.07	0.38	4.45	1.17	0.36	1.53	6.75
	Worker	440	44	10	16.8	0	0.28	1.19	14.11	0.05	5.62	0.03	5.65	1.49	0.03	1.52	2.28
						Tons/year	0.001	0.019	0.0148	9E-05	0.0049	0.0002	0.0051	0.0013	0.0002	0.0015	9.15
	Well Construction	2023															
	Hauling	0	50	10	4	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	202	50	10	25	15	1.08	32.61	15.45	0.15	4.67	0.20	4.87	1.34	0.19	1.53	7.45
	Worker	500	50	10	16.8	0	0.27	1.17	14.52	0.05	6.38	0.03	6.41	1.69	0.03	1.72	2.52
						Tons/year	0.0007	0.0169	0.015	0.0001	0.0055	0.0001	0.0056	0.0015	0.0001	0.0016	9.97
	Pipelines	2023															
		0															
	Hauling	122	65	10	4	15	1.03	14.51	15.04	0.04	0.43	0.03	0.46	0.12	0.03	0.15	1.83
	Vendor	260	65	10	25	15	1.39	41.97	19.88	0.19	6.01	0.26	6.27	1.73	0.24	1.97	9.59
	Worker	650	65	10	16.8	0	0.36	1.52	18.87	0.07	8.30	0.04	8.34	2.20	0.04	2.24	3.28
						Tons/year	0.0014	0.029	0.0269	0.0001	0.0074	0.0002	0.0075	0.002	0.0002	0.0022	14.70

Kern Fan Groundwater - Recharge Facilities and Recovery Wells Construction

Total On-Road Emissions

Kern Fan Groundwater - Recharge Facilities and Recovery Wells

Total On-Road Emissions

260 Max construction days per year

	Construction Phase	Annual One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Idling per Day (minutes)	Regional Emissions (pounds/year) ROG	NOX	CO	SO2	PM10 Dust	PM10 Exh	Total PM10	PM2.5 Dust	PM2.5 Exh	Total PM2.5	(MT/yr) Total CO2e
Phase 2																	
Recharge Facilities	Demolition/Site Clearing	2022															
	Hauling	642	67	10	4	15	5.64	84.46	75.70	0.20	2.25	0.23	2.48	0.62	0.22	0.83	10.01
	Vendor	368	67	10	25	15	3.33	74.96	30.41	0.28	8.51	0.79	9.30	2.45	0.76	3.21	14.11
	Worker	670	67	10	16.8	0	0.43	1.81	21.48	0.07	8.55	0.04	8.60	2.27	0.04	2.31	3.47
						Tons/year	0.0047	0.0806	0.0638	0.0003	0.0097	0.0005	0.0102	0.0027	0.0005	0.0032	27.59
	Pipelines	2022															
		0															
	Hauling	30	67	10	4	15	0.26	3.95	3.54	0.01	0.11	0.01	0.12	0.03	0.01	0.04	0.47
	Vendor	368	67	10	25	15	3.33	74.96	30.41	0.28	8.51	0.79	9.30	2.45	0.76	3.21	14.11
	Worker	670	67	10	16.8	0	0.43	1.81	21.48	0.07	8.55	0.04	8.60	2.27	0.04	2.31	3.47
						Tons/year	0.002	0.0404	0.0277	0.0002	0.0086	0.0004	0.009	0.0024	0.0004	0.0028	18.05
	Basins	2022															
		0															
	Hauling	37,500	220	10	4	15	329.17	4933.48	4421.69	11.63	131.35	13.28	144.63	36.02	12.71	48.72	584.48
	Vendor	1224	220	10	25	15	11.09	249.34	101.16	0.94	28.31	2.63	30.95	8.14	2.52	10.66	46.92
	Worker	4400	220	10	16.8	0	2.83	11.87	141.09	0.49	56.16	0.29	56.45	14.89	0.27	15.16	22.80
						Tons/year	0.1715	2.5973	2.332	0.0065	0.1079	0.0081	0.116	0.0295	0.0077	0.0373	654.21
	Restoration	2022															
		0															
	Hauling	0	22	10	4	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	120	22	10	25	15	1.09	24.44	9.92	0.09	2.78	0.26	3.03	0.80	0.25	1.05	4.60
	Worker	132	22	10	16.8	0	0.08	0.36	4.23	0.01	1.68	0.01	1.69	0.45	0.01	0.45	0.68
						Tons/year	0.0006	0.0124	0.0071	5E-05	0.0022	0.0001	0.0024	0.0006	0.0001	0.0007	5.28
Recovery Wells	Well Drilling	2023															
		0															
	Hauling	8	42	10	4	15	0.07	0.95	0.99	0.00	0.03	0.00	0.03	0.01	0.00	0.01	0.12
	Vendor	168	42	10	25	15	0.90	27.12	12.85	0.12	3.89	0.17	4.05	1.12	0.16	1.28	6.20
	Worker	420	42	10	16.8	0	0.23	0.98	12.19	0.05	5.36	0.03	5.39	1.42	0.02	1.45	2.12
						Tons/year	0.0006	0.0145	0.013	9E-05	0.0046	1E-04	0.0047	0.0013	9E-05	0.0014	8.43
	Well Construction-2023	2023															
		0															
	Hauling	0	20	10	4	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	82	20	10	25	15	0.44	13.24	6.27	0.06	1.90	0.08	1.98	0.55	0.08	0.62	3.02
	Worker	200	20	10	16.8	0	0.11	0.47	5.81	0.02	2.55	0.01	2.57	0.68	0.01	0.69	1.01
						Tons/year	0.0003	0.0069	0.006	4E-05	0.0022	5E-05	0.0023	0.0006	4E-05	0.0007	4.03
	Well Construction-2024	2024															
		0															
	Hauling	0	30	10	4	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	120	30	10	25	15	0.63	19.38	9.06	0.09	2.78	0.12	2.90	0.80	0.11	0.91	4.36
	Worker	300	30	10	16.8	0	0.14	0.61	8.00	0.03	3.83	0.02	3.85	1.02	0.02	1.03	1.48
						Tons/year	0.0004	0.01	0.0085	6E-05	0.0033	7E-05	0.0034	0.0009	7E-05	0.001	5.83
	Pipelines-2023	2023															
		0															
	Hauling	0	20	10	4	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	80	20	10	25	15	0.43	12.91	6.12	0.06	1.85	0.08	1.93	0.53	0.08	0.61	2.95
	Worker	200	20	10	16.8	0	0.11	0.47	5.81	0.02	2.55	0.01	2.57	0.68	0.01	0.69	1.01
						Tons/year	0.0003	0.0067	0.006	4E-05	0.0022	5E-05	0.0022	0.0006	4E-05	0.0006	3.96
	Pipelines-2024	2024															
	Hauling	0	43	10	4	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	172	43	10	25	15	0.91	27.78	12.99	0.12	3.98	0.17	4.15	1.14	0.16	1.31	6.24
	Worker	430	43	10	16.8	0	0.20	0.87	11.46	0.04	5.49	0.03	5.51	1.45	0.02	1.48	2.12
						Tons/year	0.0006	0.0143	0.0122	8E-05	0.0047	1E-04	0.0048	0.0013	9E-05	0.0014	8.36

Kern Fan Groundwater - Recharge Facilities and Recovery Wells Construction
Running Emissions

	Running Emissions Factor (grams/mile)						Running Emissions Factor (grams/mile)		
	ROG	NOX	CO	SO2	PM10	PM2.5	CO2	CH4	N2O
2021Hauling Hauling	0.10696086	3.534903329	0.43803629	0.01348928	0.05882401	0.05627931	1429.29628	0.00777247	0.22472164
2021Vendor Vendor	0.17184375	3.399914463	0.63393245	0.01239341	0.07321182	0.07004226	1308.41359	0.01014741	0.19334544
2021Worker Worker	0.0203387	0.084722974	0.96407181	0.00310873	0.0019162	0.00176455	314.892214	0.00479042	0.00720626
2022Hauling Hauling	0.05933716	2.989992345	0.29498919	0.01311703	0.03459656	0.03309993	1389.8695	0.00540484	0.21852274
2022Vendor Vendor	0.08728332	2.667682914	0.40947458	0.01205833	0.03841758	0.03675328	1272.99738	0.0060091	0.1878071
2022Worker Worker	0.01733768	0.072850581	0.86577548	0.00301225	0.00179691	0.00165456	306.464267	0.00414701	0.00650031
2023Hauling Hauling	0.02198962	2.363271751	0.21367131	0.01256686	0.0269086	0.02574454	1331.61178	0.00352949	0.20936386
2023Vendor Vendor	0.02026207	1.984551578	0.2405087	0.01159916	0.01746971	0.01671165	1224.43577	0.00271829	0.18019917
2023Worker Worker	0.01481303	0.062981334	0.78380387	0.00291567	0.00169095	0.00155684	298.534417	0.00360237	0.00590441
2024Hauling Hauling	0.02200281	2.362231096	0.21554256	0.01234083	0.02713796	0.02596398	1307.659	0.00340126	0.20559713
2024Vendor Vendor	0.01968046	1.993048637	0.22899882	0.01142225	0.01764369	0.01687812	1205.77103	0.00254427	0.17739062
2024Worker Worker	0.012774	0.054929894	0.71985943	0.00282046	0.00160389	0.0014765	291.229262	0.00315696	0.00540934
GWP	N/A	N/A	N/A	N/A	N/A	N/A	1	25	290

	Construction Phase	Annual One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Regional Emissions (pounds/year) ROG	NOX	CO	SO2	PM10	PM2.5	Regional Emissions (MT/year) CO2	CH4	N2O	CO2e
Phase 1															
Recharge Facilities	Demolition/Site Clearing	2021													
	Hauling	642	65	10	20	3.03	100.06	12.40	0.38	1.67	1.59	18.35	0.00	0.84	19.19
	Vendor	260	65	10	25	2.46	48.72	9.08	0.18	1.05	1.00	8.50	0.00	0.36	8.87
	Worker	650	65	10	16.8	0.49	2.04	23.21	0.07	0.05	0.04	3.44	0.00	0.02	3.46
	Pipelines	2021													
	Hauling	30	65	10	4	0.03	0.94	0.12	0.00	0.02	0.01	0.17	0.00	0.01	0.18
	Vendor	130	65	10	25	1.23	24.36	4.54	0.09	0.52	0.50	4.25	0.00	0.18	4.44
	Worker	650	65	10	16.8	0.49	2.04	23.21	0.07	0.05	0.04	3.44	0.00	0.02	3.46
	Basins-2021	2021													
	Hauling	22743	131	10	4	21.45	708.96	87.85	2.71	11.80	11.29	130.03	0.02	5.93	135.97
	Vendor	524	131	10	25	4.96	98.19	18.31	0.36	2.11	2.02	17.14	0.00	0.73	17.88
	Worker	2620	131	10	16.8	1.97	8.22	93.55	0.30	0.19	0.17	13.86	0.01	0.09	13.96
	Basins-2022	2022													
	Hauling	8950	85	10	4	4.68	235.99	23.28	1.04	2.73	2.61	49.76	0.00	2.27	52.03
	Vendor	340	85	10	25	1.64	49.99	7.67	0.23	0.72	0.69	10.82	0.00	0.46	11.28
	Worker	1700	85	10	16.8	1.09	4.59	54.51	0.19	0.11	0.10	8.75	0.00	0.05	8.81
	Restoration	2022													
	Hauling	0	21	10	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	84	21	10	25	0.40	12.35	1.90	0.06	0.18	0.17	2.67	0.00	0.11	2.79
	Worker	126	21	10	16.8	0.08	0.34	4.04	0.01	0.01	0.01	0.65	0.00	0.00	0.65
Recovery Wells	Well Drilling	2022													
	Hauling	8	44	10	4	0.00	0.21	0.02	0.00	0.00	0.00	0.04	0.00	0.00	0.05
	Vendor	176	44	10	25	0.85	25.88	3.97	0.12	0.37	0.36	5.60	0.00	0.24	5.84
	Worker	440	44	10	16.8	0.28	1.19	14.11	0.05	0.03	0.03	2.27	0.00	0.01	2.28
	Well Construction	2023													
	Hauling	0	50	10	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	202	50	10	25	0.23	22.09	2.68	0.13	0.19	0.19	6.18	0.00	0.26	6.45
	Worker	500	50	10	16.8	0.27	1.17	14.52	0.05	0.03	0.03	2.51	0.00	0.01	2.52
	Pipelines	2023													
	Hauling	122	65	10	4	0.02	2.54	0.23	0.01	0.03	0.03	0.65	0.00	0.03	0.68
	Vendor	260	65	10	25	0.29	28.44	3.45	0.17	0.25	0.24	7.96	0.00	0.34	8.30
	Worker	650	65	10	16.8	0.36	1.52	18.87	0.07	0.04	0.04	3.26	0.00	0.02	3.28

Kern Fan Groundwater - Recharge Facilities and Recovery Wells Construction
Running Emissions

	Running Emissions Factor (grams/mile)						Running Emissions Factor (grams/mile)		
	ROG	NOX	CO	SO2	PM10	PM2.5	CO2	CH4	N2O
2021Hauling Hauling	0.10696086	3.534903329	0.43803629	0.01348928	0.05882401	0.05627931	1429.29628	0.00777247	0.22472164
2021Vendor Vendor	0.17184375	3.399914463	0.63393245	0.01239341	0.07321182	0.07004226	1308.41359	0.01014741	0.19334544
2021Worker Worker	0.0203387	0.084722974	0.96407181	0.00310873	0.0019162	0.00176455	314.892214	0.00479042	0.00720626
2022Hauling Hauling	0.05933716	2.989992345	0.29498919	0.01311703	0.03459656	0.03309993	1389.8695	0.00540484	0.21852274
2022Vendor Vendor	0.08728332	2.667682914	0.40947458	0.01205833	0.03841758	0.03675328	1272.99738	0.0060091	0.1878071
2022Worker Worker	0.01733768	0.072850581	0.86577548	0.00301225	0.00179691	0.00165456	306.464267	0.00414701	0.00650031
2023Hauling Hauling	0.02198962	2.363271751	0.21367131	0.01256686	0.0269086	0.02574454	1331.61178	0.00352949	0.20936386
2023Vendor Vendor	0.02026207	1.984551578	0.2405087	0.01159916	0.01746971	0.01671165	1224.43577	0.00271829	0.18019917
2023Worker Worker	0.01481303	0.062981334	0.78380387	0.00291567	0.00169095	0.00155684	298.534417	0.00360237	0.00590441
2024Hauling Hauling	0.02200281	2.362231096	0.21554256	0.01234083	0.02713796	0.02596398	1307.659	0.00340126	0.20559713
2024Vendor Vendor	0.01968046	1.993048637	0.22899882	0.01142225	0.01764369	0.01687812	1205.77103	0.00254427	0.17739062
2024Worker Worker	0.012774	0.054929894	0.71985943	0.00282046	0.00160389	0.0014765	291.229262	0.00315696	0.00540934
GWP	N/A	N/A	N/A	N/A	N/A	N/A	1	25	290

	Construction Phase	Annual One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Regional Emissions (pounds/year)						Regional Emissions (MT/year)			
						ROG	NOX	CO	SO2	PM10	PM2.5	CO2	CH4	N2O	CO2e
Phase 2															
Recharge Facilities	Demolition/Site Clearing	2022													
	Hauling	642	67	10	4	0.34	16.93	1.67	0.07	0.20	0.19	3.57	0.00	0.16	3.73
	Vendor	368	67	10	25	1.77	54.11	8.31	0.24	0.78	0.75	11.71	0.00	0.50	12.21
	Worker	670	67	10	16.8	0.43	1.81	21.48	0.07	0.04	0.04	3.45	0.00	0.02	3.47
	Pipelines	2022													
	Hauling	30	67	10	4	0.02	0.79	0.08	0.00	0.01	0.01	0.17	0.00	0.01	0.17
	Vendor	368	67	10	25	1.77	54.11	8.31	0.24	0.78	0.75	11.71	0.00	0.50	12.21
	Worker	670	67	10	16.8	0.43	1.81	21.48	0.07	0.04	0.04	3.45	0.00	0.02	3.47
	Basins	2022													
	Hauling	37500	220	10	4	19.62	988.77	97.55	4.34	11.44	10.95	208.48	0.02	9.51	218.01
	Vendor	1224	220	10	25	5.89	179.97	27.62	0.81	2.59	2.48	38.95	0.00	1.67	40.62
	Worker	4400	220	10	16.8	2.83	11.87	141.09	0.49	0.29	0.27	22.65	0.01	0.14	22.80
	Restoration	2022													
	Hauling	0	22	10	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	120	22	10	25	0.58	17.64	2.71	0.08	0.25	0.24	3.82	0.00	0.16	3.98
	Worker	132	22	10	16.8	0.08	0.36	4.23	0.01	0.01	0.01	0.68	0.00	0.00	0.68
Recovery Wells	Well Drilling	2023													
	Hauling	8	42	10	4	0.00	0.17	0.02	0.00	0.00	0.00	0.04	0.00	0.00	0.04
	Vendor	168	42	10	25	0.19	18.38	2.23	0.11	0.16	0.15	5.14	0.00	0.22	5.36
	Worker	420	42	10	16.8	0.23	0.98	12.19	0.05	0.03	0.02	2.11	0.00	0.01	2.12
	Well Construction-2023	2023													
	Hauling	0	20	10	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	82	20	10	25	0.09	8.97	1.09	0.05	0.08	0.08	2.51	0.00	0.11	2.62
	Worker	200	20	10	16.8	0.11	0.47	5.81	0.02	0.01	0.01	1.00	0.00	0.01	1.01
	Well Construction-2024	2024													
	Hauling	0	30	10	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	120	30	10	25	0.13	13.18	1.51	0.08	0.12	0.11	3.62	0.00	0.15	3.77
	Worker	300	30	10	16.8	0.14	0.61	8.00	0.03	0.02	0.02	1.47	0.00	0.01	1.48
	Pipelines-2023	2023													
	Hauling	0	20	10	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	80	20	10	25	0.09	8.75	1.06	0.05	0.08	0.07	2.45	0.00	0.10	2.55
	Worker	200	20	10	16.8	0.11	0.47	5.81	0.02	0.01	0.01	1.00	0.00	0.01	1.01
	Pipelines-2024	2024													
	Hauling	0	43	10	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	172	43	10	25	0.19	18.89	2.17	0.11	0.17	0.16	5.18	0.00	0.22	5.41
	Worker	430	43	10	16.8	0.20	0.87	11.46	0.04	0.03	0.02	2.10	0.00	0.01	2.12

Kern Fan Groundwater - Recharge Facilities and Recovery Wells Construction
Idling Emissions

	Idling Emissions Factor (grams/minute)						Idling Emissions Factor (grams/minute)		
	ROG	NOX	CO	SO2	PM10	PM2.5	CO2	CH4	N2O
2021Hauling Hauling	0.25394012	3.1872147	3.31366486	0.00580066	0.00477227	0.00456582	614.27015	0.01191359	0.09656787
2021Vendor Vendor	0.13113069	1.740355284	1.73020195	0.00305824	0.00288895	0.00276398	323.799494	0.00656608	0.05075199
2021Worker Worker	0	0	0	0	0	0	0	0	0
2022Hauling Hauling	0.24961514	3.180958636	3.48692535	0.00588157	0.00148277	0.00141863	622.828215	0.01170744	0.09791278
2022Vendor Vendor	0.12855133	1.713823628	1.81678197	0.00309624	0.00104451	0.00099933	327.818632	0.00645225	0.05138502
2022Worker Worker	0	0	0	0	0	0	0	0	0
2023Hauling Hauling	0.24881098	2.966139031	3.67141608	0.00566727	0.00113581	0.00108668	600.141499	0.01166629	0.09434656
2023Vendor Vendor	0.12770334	1.573650273	1.91148519	0.00298408	0.00065322	0.00062497	315.944859	0.00642698	0.04951708
2023Worker Worker	0	0	0	0	0	0	0	0	0
2024Hauling Hauling	0.2474886	2.947744283	3.65262255	0.00556258	0.00111983	0.00107139	589.049555	0.01159906	0.09260258
2024Vendor Vendor	0.12696582	1.56188622	1.9017452	0.00292987	0.00063348	0.00060608	310.203523	0.00638239	0.04862085
2024Worker Worker	0	0	0	0	0	0	0	0	0
GWP	N/A	N/A	N/A	N/A	N/A	N/A	1	25	290

	Construction Phase	Annual One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	Idling minutes per Day (miles)	Regional Emissions (pounds/year)						Regional Emissions (MT/year)			
						ROG	NOX	CO	SO2	PM10	PM2.5	CO2	CH4	N2O	CO2e
Phase 1															
Recharge Facilities	Demolition/Site Clearing	2021													
	Hauling	642	65	10	15	5.39	67.67	70.35	0.12	0.10	0.10	5.92	0.00	0.27	6.19
	Vendor	260	65	10	15	1.13	14.96	14.88	0.03	0.02	0.02	1.26	0.00	0.06	1.32
	Worker	650	65	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Pipelines	2021													
	Hauling	30	65	10	15	0.25	3.16	3.29	0.01	0.00	0.00	0.28	0.00	0.01	0.29
	Vendor	130	65	10	15	0.56	7.48	7.44	0.01	0.01	0.01	0.63	0.00	0.03	0.66
	Worker	650	65	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Basins-2021	2021													
	Hauling	22743	131	10	15	190.99	2397.09	2492.19	4.36	3.59	3.43	209.56	0.10	9.55	219.21
	Vendor	524	131	10	15	2.27	30.16	29.98	0.05	0.05	0.05	2.55	0.00	0.12	2.66
	Worker	2620	131	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Basins-2022	2022													
	Hauling	8950	85	10	15	73.88	941.47	1032.03	1.74	0.44	0.42	83.61	0.04	3.81	87.47
	Vendor	340	85	10	15	1.45	19.27	20.43	0.03	0.01	0.01	1.67	0.00	0.08	1.75
	Worker	1700	85	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Restoration	2022													
	Hauling	0	21	10	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	84	21	10	15	0.36	4.76	5.05	0.01	0.00	0.00	0.41	0.00	0.02	0.43
	Worker	126	21	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recovery Wells	Well Drilling	2022													
	Hauling	8	44	10	15	0.07	0.84	0.92	0.00	0.00	0.00	0.07	0.00	0.00	0.08
	Vendor	176	44	10	15	0.75	9.97	10.57	0.02	0.01	0.01	0.87	0.00	0.04	0.91
	Worker	440	44	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Well Construction	2023													
	Hauling	0	50	10	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	202	50	10	15	0.85	10.51	12.77	0.02	0.00	0.00	0.96	0.00	0.04	1.00
	Worker	500	50	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Pipelines	2023													
	Hauling	122	65	10	15	1.00	11.97	14.81	0.02	0.00	0.00	1.10	0.00	0.05	1.15
	Vendor	260	65	10	15	1.10	13.53	16.44	0.03	0.01	0.01	1.23	0.00	0.06	1.29
	Worker	650	65	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Kern Fan Groundwater - Recharge Facilities and Recovery Wells Construction
Idling Emissions

	Idling Emissions Factor (grams/minute)						Idling Emissions Factor (grams/minute)		
	ROG	NOX	CO	SO2	PM10	PM2.5	CO2	CH4	N2O
2021Hauling Hauling	0.25394012	3.1872147	3.31366486	0.00580066	0.00477227	0.00456582	614.27015	0.01191359	0.09656787
2021Vendor Vendor	0.13113069	1.740355284	1.73020195	0.00305824	0.00288895	0.00276398	323.799494	0.00656608	0.05075199
2021Worker Worker	0	0	0	0	0	0	0	0	0
2022Hauling Hauling	0.24961514	3.180958636	3.48692535	0.00588157	0.00148277	0.00141863	622.828215	0.01170744	0.09791278
2022Vendor Vendor	0.12855133	1.713823628	1.81678197	0.00309624	0.00104451	0.00099933	327.818632	0.00645225	0.05138502
2022Worker Worker	0	0	0	0	0	0	0	0	0
2023Hauling Hauling	0.24881098	2.966139031	3.67141608	0.00566727	0.00113581	0.00108668	600.141499	0.01166629	0.09434656
2023Vendor Vendor	0.12770334	1.573650273	1.91148519	0.00298408	0.00065322	0.00062497	315.944859	0.00642698	0.04951708
2023Worker Worker	0	0	0	0	0	0	0	0	0
2024Hauling Hauling	0.2474886	2.947744283	3.65262255	0.00556258	0.00111983	0.00107139	589.049555	0.01159906	0.09260258
2024Vendor Vendor	0.12696582	1.56188622	1.9017452	0.00292987	0.00063348	0.00060608	310.203523	0.00638239	0.04862085
2024Worker Worker	0	0	0	0	0	0	0	0	0
GWP	N/A	N/A	N/A	N/A	N/A	N/A	1	25	290

	Construction Phase	Annual One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	Idling minutes per Day (miles)	Regional Emissions (pounds/year)						Regional Emissions (MT/year)			
						ROG	NOX	CO	SO2	PM10	PM2.5	CO2	CH4	N2O	CO2e
Phase 2															
Recharge Facilities	Demolition/Site Clearing	2022													
	Hauling	642	67	10	15	5.30	67.53	74.03	0.12	0.03	0.03	6.00	0.00	0.27	6.27
	Vendor	368	67	10	15	1.56	20.86	22.11	0.04	0.01	0.01	1.81	0.00	0.08	1.89
	Worker	670	67	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Pipelines	2022													
	Hauling	30	67	10	15	0.25	3.16	3.46	0.01	0.00	0.00	0.28	0.00	0.01	0.29
	Vendor	368	67	10	15	1.56	20.86	22.11	0.04	0.01	0.01	1.81	0.00	0.08	1.89
	Worker	670	67	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Basins	2022													
	Hauling	37500	220	10	15	309.55	3944.71	4324.14	7.29	1.84	1.76	350.34	0.16	15.97	366.48
	Vendor	1224	220	10	15	5.20	69.37	73.54	0.13	0.04	0.04	6.02	0.00	0.27	6.30
	Worker	4400	220	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Restoration	2022													
	Hauling	0	22	10	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	120	22	10	15	0.51	6.80	7.21	0.01	0.00	0.00	0.59	0.00	0.03	0.62
	Worker	132	22	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recovery Wells	Well Drilling	2023													
	Hauling	8	42	10	15	0.07	0.78	0.97	0.00	0.00	0.00	0.07	0.00	0.00	0.08
	Vendor	168	42	10	15	0.71	8.74	10.62	0.02	0.00	0.00	0.80	0.00	0.04	0.83
	Worker	420	42	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Well Construction-2023	2023													
	Hauling	0	20	10	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	82	20	10	15	0.35	4.27	5.18	0.01	0.00	0.00	0.39	0.00	0.02	0.41
	Worker	200	20	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Well Construction-2024	2024													
	Hauling	0	30	10	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	120	30	10	15	0.50	6.20	7.55	0.01	0.00	0.00	0.56	0.00	0.03	0.58
	Worker	300	30	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Pipelines-2023	2023													
	Hauling	0	20	10	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	80	20	10	15	0.34	4.16	5.06	0.01	0.00	0.00	0.38	0.00	0.02	0.40
	Worker	200	20	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Pipelines-2024	2024													
	Hauling	0	43	10	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	172	43	10	15	0.72	8.88	10.82	0.02	0.00	0.00	0.80	0.00	0.04	0.84
	Worker	430	43	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Kern Fan Groundwater - Recharge Facilities and Recovery Wells Construction
Road Dust, Break Wear, and Tire wear Emissions

	Emission Factors (grams/mile)					
	PM10			PM2.5		
	RD	BW	TW	RD	BW	TW
2021Hauling Hauling	3.00E-01	0.061489012	0.03585244	7.36E-02	0.02635243	0.00896311
2021Vendor Vendor	3.00E-01	0.095914524	0.02392622	7.36E-02	0.04110622	0.00598155
2021Worker Worker	3.00E-01	0.036750011	0.008	7.36E-02	0.01575	0.002
2022Hauling Hauling	3.00E-01	0.06149938	0.03585844	7.36E-02	0.02635688	0.00896461
2022Vendor Vendor	3.00E-01	0.095919709	0.02392922	7.36E-02	0.04110845	0.00598231
2022Worker Worker	3.00E-01	0.036750011	0.008	7.36E-02	0.01575	0.002
2023Hauling Hauling	3.00E-01	0.061509934	0.03586453	7.36E-02	0.0263614	0.00896613
2023Vendor Vendor	3.00E-01	0.095924986	0.02393227	7.36E-02	0.04111071	0.00598307
2023Worker Worker	3.00E-01	0.036750011	0.008	7.36E-02	0.01575	0.002
2024Hauling Hauling	3.00E-01	0.061520383	0.03587055	7.36E-02	0.02636588	0.00896764
2024Vendor Vendor	3.00E-01	0.09593021	0.02393527	7.36E-02	0.04111295	0.00598382
2024Worker Worker	3.00E-01	0.036750011	0.008	7.36E-02	0.01575	0.002

	Construction Phase	Daily One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Regional Emissions (pounds/year) PM10 RD	PM10 BW	PM10 TW	PM2.5 RD	PM2.5 BW	PM2.5 TW
Phase 1											
Recharge Facilities	Demolition/Site Clearing	2021									
	Hauling	642	65	10	20	8.49	1.74	1.01	2.08	0.75	0.25
	Vendor	260	65	10	25	4.30	1.37	0.34	1.05	0.59	0.09
	Worker	650	65	10	16.8	7.22	0.88	0.19	1.77	0.38	0.05
	Pipelines	2021									
	Hauling	30	65	10	4	0.08	0.02	0.01	0.02	0.01	0.00
	Vendor	130	65	10	25	2.15	0.69	0.17	0.53	0.29	0.04
	Worker	650	65	10	16.8	7.22	0.88	0.19	1.77	0.38	0.05
	Basins-2021	2021									
	Hauling	22743	131	10	4	60.14	12.33	7.19	14.76	5.29	1.80
	Vendor	524	131	10	25	8.66	2.77	0.69	2.13	1.19	0.17
	Worker	2620	131	10	16.8	29.10	3.57	0.78	7.14	1.53	0.19
	Basins-2022	2022									
	Hauling	8950	85	10	4	23.67	4.85	2.83	5.81	2.08	0.71
	Vendor	340	85	10	25	5.62	1.80	0.45	1.38	0.77	0.11
	Worker	1700	85	10	16.8	18.88	2.31	0.50	4.63	0.99	0.13
	Restoration	2022									
	Hauling	0	21	10	4	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	84	21	10	25	1.39	0.44	0.11	0.34	0.19	0.03
	Worker	126	21	10	16.8	1.40	0.17	0.04	0.34	0.07	0.01
Recovery Wells	Well Drilling	2022									
	Hauling	8	44	10	4	0.02	0.00	0.00	0.01	0.00	0.00
	Vendor	176	44	10	25	2.91	0.93	0.23	0.71	0.40	0.06
	Worker	440	44	10	16.8	4.89	0.60	0.13	1.20	0.26	0.03
	Well Construction	2023									
	Hauling	0	50	10	4	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	202	50	10	25	3.34	1.07	0.27	0.82	0.46	0.07
	Worker	500	50	10	16.8	5.55	0.68	0.15	1.36	0.29	0.04
	Pipelines	2023									
	Hauling	122	65	10	4	0.32	0.07	0.04	0.08	0.03	0.01
	Vendor	260	65	10	25	4.30	1.37	0.34	1.05	0.59	0.09
	Worker	650	65	10	16.8	7.22	0.88	0.19	1.77	0.38	0.05

Kern Fan Groundwater - Recharge Facilities and Recovery Wells Construction
Road Dust, Break Wear, and Tire wear Emissions

	Emission Factors (grams/mile)					
	PM10			PM2.5		
	RD	BW	TW	RD	BW	TW
2021Hauling Hauling	3.00E-01	0.061489012	0.03585244	7.36E-02	0.02635243	0.00896311
2021Vendor Vendor	3.00E-01	0.095914524	0.02392622	7.36E-02	0.04110622	0.00598155
2021Worker Worker	3.00E-01	0.036750011	0.008	7.36E-02	0.01575	0.002
2022Hauling Hauling	3.00E-01	0.06149938	0.03585844	7.36E-02	0.02635688	0.00896461
2022Vendor Vendor	3.00E-01	0.095919709	0.02392922	7.36E-02	0.04110845	0.00598231
2022Worker Worker	3.00E-01	0.036750011	0.008	7.36E-02	0.01575	0.002
2023Hauling Hauling	3.00E-01	0.061509934	0.03586453	7.36E-02	0.0263614	0.00896613
2023Vendor Vendor	3.00E-01	0.095924986	0.02393227	7.36E-02	0.04111071	0.00598307
2023Worker Worker	3.00E-01	0.036750011	0.008	7.36E-02	0.01575	0.002
2024Hauling Hauling	3.00E-01	0.061520383	0.03587055	7.36E-02	0.02636588	0.00896764
2024Vendor Vendor	3.00E-01	0.09593021	0.02393527	7.36E-02	0.04111295	0.00598382
2024Worker Worker	3.00E-01	0.036750011	0.008	7.36E-02	0.01575	0.002

	Construction Phase	Daily One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Regional Emissions (pounds/year)					
						PM10			PM2.5		
						RD	BW	TW	RD	BW	TW
Phase 2											
Recharge Facilities	<u>Demolition/Site Clearing</u>	2022									
	Hauling	642	67	10	4	1.70	0.35	0.20	0.42	0.15	0.05
	Vendor	368	67	10	25	6.08	1.95	0.49	1.49	0.83	0.12
	Worker	670	67	10	16.8	7.44	0.91	0.20	1.83	0.39	0.05
	<u>Pipelines</u>	2022									
	Hauling	30	67	10	4	0.08	0.02	0.01	0.02	0.01	0.00
	Vendor	368	67	10	25	6.08	1.95	0.49	1.49	0.83	0.12
	Worker	670	67	10	16.8	7.44	0.91	0.20	1.83	0.39	0.05
	<u>Basins</u>	2022									
	Hauling	37500	220	10	4	99.16	20.34	11.86	24.34	8.72	2.96
	Vendor	1224	220	10	25	20.23	6.47	1.61	4.97	2.77	0.40
	Worker	4400	220	10	16.8	48.87	5.99	1.30	11.99	2.57	0.33
	<u>Restoration</u>	2022									
	Hauling	0	22	10	4	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	120	22	10	25	1.98	0.63	0.16	0.49	0.27	0.04
	Worker	132	22	10	16.8	1.47	0.18	0.04	0.36	0.08	0.01
Recovery Wells	<u>Well Drilling</u>	2023									
	Hauling	8	42	10	4	0.02	0.00	0.00	0.01	0.00	0.00
	Vendor	168	42	10	25	2.78	0.89	0.22	0.68	0.38	0.06
	Worker	420	42	10	16.8	4.66	0.57	0.12	1.14	0.25	0.03
	<u>Well Construction-2023</u>	2023									
	Hauling	0	20	10	4	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	82	20	10	25	1.36	0.43	0.11	0.33	0.19	0.03
	Worker	200	20	10	16.8	2.22	0.27	0.06	0.55	0.12	0.01
	<u>Well Construction-2024</u>	2024									
	Hauling	0	30	10	4	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	120	30	10	25	1.98	0.63	0.16	0.49	0.27	0.04
	Worker	300	30	10	16.8	3.33	0.41	0.09	0.82	0.18	0.02
	<u>Pipelines-2023</u>	2023									
	Hauling	0	20	10	4	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	80	20	10	25	1.32	0.42	0.11	0.32	0.18	0.03
	Worker	200	20	10	16.8	2.22	0.27	0.06	0.55	0.12	0.01
	<u>Pipelines-2024</u>	2024									
	Hauling	0	43	10	4	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	172	43	10	25	2.84	0.91	0.23	0.70	0.39	0.06
	Worker	430	43	10	16.8	4.78	0.59	0.13	1.17	0.25	0.03

Kern Fan Groundwater Project - Conveyance Facilities Construction

Total On-Road Emissions

Kern Fan Groundwater Project - Conveyance Facilities Construction

Total On-Road Emissions

260 Max construction days per year

	Construction Phase	Annual One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Idling per Day (minutes)	Regional Emissions (pounds/year) ROG	NOX	CO	SO2	PM10 Dust	PM10 Exh	Total PM10	PM2.5 Dust	PM2.5 Exh	Total PM2.5	(MT/yr) Total CO2e
Conveyance Facilities	Turnout, Pipelines, Canal-2023	2023															
	Hauling	16,967	178	10	3.3	15	142.32	1955.98	2086.36	4.73	49.03	3.96	52.99	13.45	3.79	17.23	237.74
	Vendor	1,717	178	10	25	15	9.17	277.16	131.29	1.27	39.72	1.69	41.41	11.42	1.62	13.04	63.32
	Worker	3560	178	10	16.8	0	1.95	8.30	103.35	0.38	45.44	0.22	45.66	12.04	0.21	12.25	17.96
						Tons/year	0.07672	1.12072	1.1605	0.00319	0.06709	0.00294	0.07003	0.01846	0.0028	0.02126	319.02
	Turnout, Pipelines, Canal-2024	2024															
	Hauling	24,973	262	10	3.3	15	208.38	2863.55	3055.64	6.84	72.17	5.86	78.03	19.79	5.60	25.39	343.51
	Vendor	2,484	262	10	25	15	13.12	401.16	187.57	1.80	57.46	2.47	59.93	16.52	2.36	18.88	90.17
	Worker	5240	262	10	16.8	0	2.48	10.66	139.71	0.55	66.88	0.31	67.19	17.73	0.29	18.02	25.78
						Tons/year	0.11199	1.63769	1.69146	0.00459	0.09826	0.00432	0.10257	0.02702	0.00412	0.03115	459.46
	Turnout, Pipelines, Canal-2025	2025															
	Hauling	24,877	261	10	3.3	15	206.60	2835.95	3030.15	6.67	71.90	5.82	77.71	19.72	5.56	25.28	335.16
	Vendor	2474	261	10	25	15	12.94	398.25	184.76	1.77	57.23	2.46	59.69	16.46	2.35	18.81	88.20
	Worker	5220	261	10	16.8	0	2.14	9.36	128.58	0.53	66.62	0.29	66.92	17.66	0.27	17.93	25.07
						Tons/year	0.11084	1.62178	1.67174	0.00448	0.09788	0.00428	0.10216	0.02692	0.00409	0.03101	448.44
	Turnout, Pipelines, Canal-2026	2026															
	Hauling	9,436	99	10	3.3	15	78.03	1069.63	1144.79	2.48	27.27	2.19	29.46	7.48	2.10	9.57	124.41
	Vendor	939	99	10	25	15	4.87	150.40	69.48	0.66	21.72	0.93	22.65	6.25	0.89	7.14	32.86
	Worker	1980	99	10	16.8	0	0.70	3.15	45.45	0.19	25.27	0.11	25.38	6.70	0.10	6.80	9.26
						Tons/year	0.0418	0.61159	0.62986	0.00166	0.03713	0.00161	0.03875	0.01021	0.00154	0.01175	166.53
Pumpstations	Pumpstations-2023	2023															
	Hauling	154	178	10	3.3	15	1.29	17.75	18.94	0.04	0.45	0.04	0.48	0.12	0.03	0.16	2.16
	Vendor	724	178	10	25	15	3.87	116.87	55.36	0.53	16.75	0.71	17.46	4.82	0.68	5.50	26.70
	Worker	2136	178	10	16.8	0	1.17	4.98	62.01	0.23	27.26	0.13	27.40	7.23	0.12	7.35	10.78
						Tons/year	0.00316	0.0698	0.06815	0.0004	0.02223	0.00044	0.02267	0.00608	0.00042	0.0065	39.63
	Pumpstations-2024	2024															
	Hauling	0	43	10	3.3	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	172	43	10	25	15	0.91	27.78	12.99	0.12	3.98	0.17	4.15	1.14	0.16	1.31	6.24
	Worker	516	43	10	16.8	0	0.24	1.05	13.76	0.05	6.59	0.03	6.62	1.75	0.03	1.77	2.54
						Tons/year	0.00058	0.01441	0.01337	8.9E-05	0.00528	0.0001	0.00538	0.00145	9.6E-05	0.00154	8.78
Start Up/Testing+Float Day	Construction Phase	2026															
	Hauling	0	61	10	3.3	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	0	61	10	25	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	610	61	10	16.8	0	0.22	0.97	14.00	0.06	7.79	0.03	7.82	2.06	0.03	2.09	2.85
						Tons/year	0.00011	0.00049	0.007	3E-05	0.00389	1.6E-05	0.00391	0.00103	1.5E-05	0.00105	2.85

Kern Fan Groundwater Project - Conveyance Facilities Construction
Running Emissions

		Running Emissions Factor (grams/mile)						Running Emissions Factor (grams/mile)		
		ROG	NOX	CO	SO2	PM10	PM2.5	CO2	CH4	N2O
2023Hauling	Hauling	0.02198962	2.363271751	0.21367131	0.01256686	0.0269086	0.02574454	1331.61178	0.00352949	0.20936386
2023Vendor	Vendor	0.02026207	1.984551578	0.2405087	0.01159916	0.01746971	0.01671165	1224.43577	0.00271829	0.18019917
2023Worker	Worker	0.01481303	0.062981334	0.78380387	0.00291567	0.00169095	0.00155684	298.534417	0.00360237	0.00590441
2024Hauling	Hauling	0.02200281	2.362231096	0.21554256	0.01234083	0.02713796	0.02596398	1307.659	0.00340126	0.20559713
2024Vendor	Vendor	0.01968046	1.993048637	0.22899882	0.01142225	0.01764369	0.01687812	1205.77103	0.00254427	0.17739062
2024Worker	Worker	0.012774	0.054929894	0.71985943	0.00282046	0.00160389	0.0014765	291.229262	0.00315696	0.00540934
2025Hauling	Hauling	0.02189736	2.344554894	0.21601156	0.01207935	0.02709653	0.02592434	1279.95547	0.00328471	0.20124099
2025Vendor	Vendor	0.0191153	1.989793325	0.21907094	0.01122296	0.01765924	0.01689299	1184.71014	0.00239636	0.17413897
2025Worker	Worker	0.01106212	0.048399985	0.66506232	0.00272486	0.00152568	0.00140436	284.338459	0.00277483	0.00499903
2026Hauling	Hauling	0.02174724	2.320544005	0.21592856	0.01181059	0.02692296	0.02575828	1251.48626	0.00317822	0.1967646
2026Vendor	Vendor	0.0186222	1.980579878	0.21104259	0.01102051	0.01758966	0.01682639	1163.30375	0.00227294	0.17081054
2026Worker	Worker	0.00957884	0.042985803	0.61979769	0.00263263	0.00143617	0.00132181	276.978811	0.00244062	0.00465892
	GWP	N/A	N/A	N/A	N/A	N/A	N/A	1	25	290

	Construction Phase	Annual One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Regional Emissions (pounds/year) ROG	NOX	CO	SO2	PM10	PM2.5	Regional Emissions (MT/year) CO2	CH4	N2O	CO2e
Conveyance Facilitie	Turnout, Pipelines, Canal-2	2023													
	Hauling	16967	178	10	3.3	2.71	291.72	26.38	1.55	3.32	3.18	74.56	0.00	3.40	77.96
	Vendor	1717	178	10	25	1.92	187.80	22.76	1.10	1.65	1.58	52.56	0.00	2.24	54.80
	Worker	3560	178	10	16.8	1.95	8.30	103.35	0.38	0.22	0.21	17.85	0.01	0.10	17.96
	Turnout, Pipelines, Canal-2	2024													
	Hauling	24973	262	10	3.3	4.00	429.18	39.16	2.24	4.93	4.72	107.77	0.01	4.91	112.69
	Vendor	2484	262	10	25	2.69	272.86	31.35	1.56	2.42	2.31	74.88	0.00	3.19	78.08
	Worker	5240	262	10	16.8	2.48	10.66	139.71	0.55	0.31	0.29	25.64	0.01	0.14	25.78
	Turnout, Pipelines, Canal-2	2025													
	Hauling	24877	261	10	3.3	3.96	424.33	39.10	2.19	4.90	4.69	105.08	0.01	4.79	109.87
	Vendor	2474	261	10	25	2.61	271.32	29.87	1.53	2.41	2.30	73.27	0.00	3.12	76.40
	Worker	5220	261	10	16.8	2.14	9.36	128.58	0.53	0.29	0.27	24.94	0.01	0.13	25.07
	Turnout, Pipelines, Canal-2	2026													
	Hauling	9436	99	10	3.3	1.49	159.30	14.82	0.81	1.85	1.77	38.97	0.00	1.78	40.75
	Vendor	939	99	10	25	0.96	102.50	10.92	0.57	0.91	0.87	27.31	0.00	1.16	28.47
	Worker	1980	99	10	16.8	0.70	3.15	45.45	0.19	0.11	0.10	9.21	0.00	0.04	9.26
Pumpstations	Pumpstations-2023	2023													
	Hauling	154	178	10	3.3	0.02	2.65	0.24	0.01	0.03	0.03	0.68	0.00	0.03	0.71
	Vendor	724	178	10	25	0.81	79.19	9.60	0.46	0.70	0.67	22.16	0.00	0.95	23.11
	Worker	2136	178	10	16.8	1.17	4.98	62.01	0.23	0.13	0.12	10.71	0.00	0.06	10.78
	Pumpstations-2024	2024													
	Hauling	0	43	10	3.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	172	43	10	25	0.19	18.89	2.17	0.11	0.17	0.16	5.18	0.00	0.22	5.41
	Worker	516	43	10	16.8	0.24	1.05	13.76	0.05	0.03	0.03	2.52	0.00	0.01	2.54

Kern Fan Groundwater Project - Conveyance Facilities Construction
Idling Emissions

	Idling Emissions Factor (grams/minute)						Idling Emissions Factor (grams/minute)		
	ROG	NOX	CO	SO2	PM10	PM2.5	CO2	CH4	N2O
2023Hauling Hauling	0.24881098	2.966139031	3.67141608	0.00566727	0.00113581	0.00108668	600.141499	0.01166629	0.09434656
2023Vendor Vendor	0.12770334	1.573650273	1.91148519	0.00298408	0.00065322	0.00062497	315.944859	0.00642698	0.04951708
2023Worker Worker	0	0	0	0	0	0	0	0	0
2024Hauling Hauling	0.2474886	2.947744283	3.65262255	0.00556258	0.00111983	0.00107139	589.049555	0.01159906	0.09260258
2024Vendor Vendor	0.12696582	1.56188622	1.9017452	0.00292987	0.00063348	0.00060608	310.203523	0.00638239	0.04862085
2024Worker Worker	0	0	0	0	0	0	0	0	0
2025Hauling Hauling	0.24631251	2.931467726	3.63580204	0.00545014	0.00110753	0.00105962	577.139295	0.01153985	0.09073007
2025Vendor Vendor	0.12631593	1.551432344	1.89314954	0.00287185	0.00061653	0.00058986	304.059561	0.00634451	0.04766028
2025Worker Worker	0	0	0	0	0	0	0	0	0
2026Hauling Hauling	0.24528733	2.917319783	3.62118238	0.00533591	0.00109632	0.00104889	565.042075	0.0114887	0.08882826
2026Vendor Vendor	0.12575766	1.542364388	1.88581954	0.00281312	0.00060188	0.00057584	297.840818	0.0063133	0.046687
2026Worker Worker	0	0	0	0	0	0	0	0	0
GWP	N/A	N/A	N/A	N/A	N/A	N/A	1	25	290

	Construction Phase	Annual One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	Idling minutes per Day (miles)	Regional Emissions (pounds/year)						Regional Emissions (MT/year)			
						ROG	NOX	CO	SO2	PM10	PM2.5	CO2	CH4	N2O	CO2e
Conveyance Facilitie	Turnout, Pipelines, Canal-2	2023													
	Hauling	16967	178	10	15	139.60	1664.26	2059.99	3.18	0.64	0.61	152.74	0.07	6.96	159.78
	Vendor	1717	178	10	15	7.25	89.35	108.53	0.17	0.04	0.04	8.14	0.00	0.37	8.51
	Worker	3560	178	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Turnout, Pipelines, Canal-2	2024													
	Hauling	24973	262	10	15	204.39	2434.37	3016.48	4.59	0.92	0.88	220.66	0.11	10.06	230.82
	Vendor	2484	262	10	15	10.43	128.30	156.22	0.24	0.05	0.05	11.56	0.01	0.53	12.09
	Worker	5240	262	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Turnout, Pipelines, Canal-2	2025													
	Hauling	24877	261	10	15	202.63	2411.62	2991.05	4.48	0.91	0.87	215.36	0.11	9.82	225.29
	Vendor	2474	261	10	15	10.33	126.93	154.89	0.23	0.05	0.05	11.28	0.01	0.51	11.80
	Worker	5220	261	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Turnout, Pipelines, Canal-2	2026													
	Hauling	9436	99	10	15	76.54	910.33	1129.96	1.67	0.34	0.33	79.98	0.04	3.65	83.66
	Vendor	939	99	10	15	3.91	47.89	58.56	0.09	0.02	0.02	4.20	0.00	0.19	4.39
	Worker	1980	99	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pumpstations	Pumpstations-2023	2023													
	Hauling	154	178	10	15	1.27	15.11	18.70	0.03	0.01	0.01	1.39	0.00	0.06	1.45
	Vendor	724	178	10	15	3.06	37.68	45.77	0.07	0.02	0.01	3.43	0.00	0.16	3.59
	Worker	2136	178	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Pumpstations-2024	2024													
	Hauling	0	43	10	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	172	43	10	15	0.72	8.88	10.82	0.02	0.00	0.00	0.80	0.00	0.04	0.84
	Worker	516	43	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Kern Fan Groundwater Project - Conveyance Facilities Construction
Road Dust, Break Wear, and Tire wear Emissions

	Emission Factors (grams/mile)					
	PM10			PM2.5		
	RD	BW	TW	RD	BW	TW
2023Hauling Hauling	3.00E-01	0.061509934	0.03586453	7.36E-02	0.0263614	0.00896613
2023Vendor Vendor	3.00E-01	0.095924986	0.02393227	7.36E-02	0.04111071	0.00598307
2023Worker Worker	3.00E-01	0.036750011	0.008	7.36E-02	0.01575	0.002
2024Hauling Hauling	3.00E-01	0.061520383	0.03587055	7.36E-02	0.02636588	0.00896764
2024Vendor Vendor	3.00E-01	0.09593021	0.02393527	7.36E-02	0.04111295	0.00598382
2024Worker Worker	3.00E-01	0.036750011	0.008	7.36E-02	0.01575	0.002
2025Hauling Hauling	3.00E-01	0.061530018	0.03587608	7.36E-02	0.02637001	0.00896902
2025Vendor Vendor	3.00E-01	0.095935028	0.02393804	7.36E-02	0.04111501	0.00598451
2025Worker Worker	3.00E-01	0.036750011	0.008	7.36E-02	0.01575	0.002
2026Hauling Hauling	3.00E-01	0.061539607	0.03588159	7.36E-02	0.02637412	0.0089704
2026Vendor Vendor	3.00E-01	0.095939822	0.0239408	7.36E-02	0.04111707	0.0059852
2026Worker Worker	3.00E-01	0.036750011	0.008	7.36E-02	0.01575	0.002

	Construction Phase	Annual One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Regional Emissions (pounds/year) PM10 RD	PM10 BW	PM10 TW	PM2.5 RD	PM2.5 BW	PM2.5 TW
Conveyance Facilitie	Turnout, Pipelines, Canal-2	2023									
	Hauling	16967	178	10	3.3	37.01	7.59	4.43	9.09	3.25	1.11
	Vendor	1717	178	10	25	28.38	9.08	2.26	6.96	3.89	0.57
	Worker	3560	178	10	16.8	39.54	4.85	1.05	9.70	2.08	0.26
	Turnout, Pipelines, Canal-2	2024									
	Hauling	24973	262	10	3.3	54.48	11.18	6.52	13.37	4.79	1.63
	Vendor	2484	262	10	25	41.05	13.13	3.28	10.08	5.63	0.82
	Worker	5240	262	10	16.8	58.19	7.13	1.55	14.28	3.06	0.39
	Turnout, Pipelines, Canal-2	2025									
	Hauling	24877	261	10	3.3	54.27	11.14	6.49	13.32	4.77	1.62
	Vendor	2474	261	10	25	40.89	13.08	3.26	10.04	5.61	0.82
	Worker	5220	261	10	16.8	57.97	7.11	1.55	14.23	3.05	0.39
	Turnout, Pipelines, Canal-2	2026									
	Hauling	9436	99	10	3.3	20.58	4.22	2.46	5.05	1.81	0.62
	Vendor	939	99	10	25	15.52	4.97	1.24	3.81	2.13	0.31
	Worker	1980	99	10	16.8	21.99	2.70	0.59	5.40	1.16	0.15
Pumpstations	Pumpstations-2023	2023									
	Hauling	154	178	10	3.3	0.34	0.07	0.04	0.08	0.03	0.01
	Vendor	724	178	10	25	11.97	3.83	0.95	2.94	1.64	0.24
	Worker	2136	178	10	16.8	23.72	2.91	0.63	5.82	1.25	0.16
	Pumpstations-2024	2024									
	Hauling	0	43	10	3.3	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	172	43	10	25	2.84	0.91	0.23	0.70	0.39	0.06
	Worker	516	43	10	16.8	5.73	0.70	0.15	1.41	0.30	0.04

Project Operational Emissions

Kern Fan Groundwater

Unmitigated AQ Emissions Summary of Operations

Unitigated Construction and Umitigated Operational Emissions During Year 2026 and Unmitigated Operational Emissions For the First Full Year of Operations In Year 2027 in Tons/Year

YEAR	EMISSIONS (TONS/YEAR)					
	VOC	**NOx**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Construction						
2026	0.11	1.24	1.32	0.003	0.05	0.03
Operations						
2026	0.16	1.79	1.48	0.004	0.38	0.08
Total	0.27	3.02	2.80	0.01	0.43	0.11
Operations						
2027	0.16	1.78	1.47	0.004	0.38	0.08
Maximum	**0.27**	**3.02**	**2.80**	**0.01**	**0.43**	**0.11**
De Minimis Thresholds	10	10	100	100	100	70
Exceeds De Minimis?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Kern Fan Groundwater

Unmitigated AQ Emissions Summary of Operations

Mitigated Construction and Umitigated Operational Emissions During Year 2026 and Unmitigated Operational Emissions For the First Full Year of Operations In Year 2027 in Tons/Year

YEAR	EMISSIONS (TONS/YEAR)					
	VOC	NOx	CO	SO_x	PM_{10}	$PM_{2.5}$
Construction						
2026	0.07	1.17	1.65	0.003	0.05	0.005
Operations						
2026	0.16	1.79	1.48	0.004	0.38	0.08
Total	0.23	2.95	3.13	0.01	0.43	0.09
Operations						
2027	0.16	1.78	1.47	0.004	0.38	0.08
Maximum	**0.23**	**2.95**	**3.13**	**0.01**	**0.43**	**0.09**
De Minimis Thresholds	10	10	100	100	100	70
Exceeds De Minimis?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Kern Fan Groudwater

GHG Emissions Summary of Operations

Construction and Operational Emissions During Year 2026 and Operational Emissions For the First Full Year of Operations In Year 2027 in Tons/Year

YEAR	EMISSIONS (METRIC TONS/YEAR)
	CO2e
Construction	
2026	312.30
Operations	
2026	1545.83
Total	1858.13
Amortized Construction	
2027	258.15
Operations	
2027	3269.11
Total	3527.27
Maximum	**3527.27**
Significance Threshold	10000.00
Exceeds De Minimis?	**NO**

Kern Fan Groudwater
Energy Consumption - GHG Emissions
Wells and Pump Stations

Estimated GHG Emissiosn from Electricity demand from Wells and Pump Stations

Land Use Type		Number of Wells	AF/Year	Average Consumption (kWh/AF) [c]	Days/Year	Electricity Demand (kWh/yr)
	Well Energy Consumption	12	50,000	600.00	365	30,000,000
	Pump Station Energy Consumption	3	100000.00	90.00	365	9,000,000
						39,000,000

Notes:
a. AF/year for well and pump station from PD
b. Number of wells and pump stations from PD
c. Electricity consumption kwh/AF based on values from PD

Year	Source	Electricity Demand (million kWh)	CO2	CH4	N20	CO2e	MTCO2e (MT/yr)
		GHG Emissions (lbs/yr)					
2026	Total Energy Consumption	15.0000	2,532,750	435.00	90.00	2,570,445	1,165.9
		Electricity Demand (million kWh)	**CO2**	**CH4**	**N20**	**CO2e**	**MTCO2e (MT/yr)**
2027	Total Energy Consumption	39.0000	6,321,900.00	1,131.00	90.00	6,376,995	2,892.6

d. Project assumed to be operational by 8/13/2026, therefore 2026 energy consumption adjusted to account for partial year of operations for wells and pump stations

	Year 2026	Year 2027
GHG	**Intensity factor (lbs/MWh)**	**Intensity factor (lbs/MWh)**
CO2	168.85	162.1
CH4	0.029	0.029
N2O	0.006	0.006

Operations-Weed+Pest

Kern-San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	1,300.00	Acre	1,300.00	56,628,000.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	32
Climate Zone	3			**Operational Year**	2027
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	168.85	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2 intensity factor linearly adjusted to account for RPS standard by year 2026

Land Use -

Construction Phase - see operational assumptions

Off-road Equipment - see operational assumptions. other construction equipment accounts for spray rig

Trips and VMT - operational mobile emissions calculated outside of CalEEMod

Energy Use -

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value

tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	6,000.00	20.00
tblConstructionPhase	PhaseEndDate	12/10/2087	9/9/2026
tblConstructionPhase	PhaseStartDate	12/11/2064	8/13/2026
tblGrading	AcresOfGrading	10.00	0.00
tblOffRoadEquipment	LoadFactor	0.43	0.43
tblOffRoadEquipment	LoadFactor	0.42	0.42
tblOffRoadEquipment	OffRoadEquipmentType		Crawler Tractors
tblOffRoadEquipment	OffRoadEquipmentType		Other Construction Equipment
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	168.85
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	8.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2026	8.0100e-003	0.0801	0.0828	1.7000e-004	0.0000	3.4900e-003	3.4900e-003	0.0000	3.2100e-003	3.2100e-003	0.0000	14.9711	14.9711	4.8400e-003	0.0000	15.0921
Maximum	**8.0100e-003**	**0.0801**	**0.0828**	**1.7000e-004**	**0.0000**	**3.4900e-003**	**3.4900e-003**	**0.0000**	**3.2100e-003**	**3.2100e-003**	**0.0000**	**14.9711**	**14.9711**	**4.8400e-003**	**0.0000**	**15.0921**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2026	8.0100e-003	0.0801	0.0828	1.7000e-004	0.0000	3.4900e-003	3.4900e-003	0.0000	3.2100e-003	3.2100e-003	0.0000	14.9710	14.9710	4.8400e-003	0.0000	15.0921
Maximum	**8.0100e-003**	**0.0801**	**0.0828**	**1.7000e-004**	**0.0000**	**3.4900e-003**	**3.4900e-003**	**0.0000**	**3.2100e-003**	**3.2100e-003**	**0.0000**	**14.9710**	**14.9710**	**4.8400e-003**	**0.0000**	**15.0921**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	**Start Date**	**End Date**	**Maximum Unmitigated ROG + NOX (tons/quarter)**	**Maximum Mitigated ROG + NOX (tons/quarter)**
1	**8-13-2026**	**9-30-2026**	0.0881	0.0881
		Highest	0.0881	0.0881

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	8/13/2026	9/9/2026	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 1300

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Crawler Tractors	1	8.00	212	0.43
Site Preparation	Other Construction Equipment	1	8.00	172	0.42
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	0	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	3	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Site Preparation - 2026

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	8.0100e-003	0.0801	0.0828	1.7000e-004		3.4900e-003	3.4900e-003		3.2100e-003	3.2100e-003	0.0000	14.9711	14.9711	4.8400e-003	0.0000	15.0921
Total	**8.0100e-003**	**0.0801**	**0.0828**	**1.7000e-004**	**0.0000**	**3.4900e-003**	**3.4900e-003**	**0.0000**	**3.2100e-003**	**3.2100e-003**	**0.0000**	**14.9711**	**14.9711**	**4.8400e-003**	**0.0000**	**15.0921**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	8.0100e-003	0.0801	0.0828	1.7000e-004		3.4900e-003	3.4900e-003		3.2100e-003	3.2100e-003	0.0000	14.9710	14.9710	4.8400e-003	0.0000	15.0921
Total	**8.0100e-003**	**0.0801**	**0.0828**	**1.7000e-004**	**0.0000**	**3.4900e-003**	**3.4900e-003**	**0.0000**	**3.2100e-003**	**3.2100e-003**	**0.0000**	**14.9710**	**14.9710**	**4.8400e-003**	**0.0000**	**15.0921**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Operations-Earthwork

Kern-San Joaquin County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	1,300.00	Acre	1,300.00	56,628,000.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	32
Climate Zone	3			**Operational Year**	2027
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	168.85	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2 intensity factor linearly adjusted to account for RPS standard by year 2026

Land Use -

Construction Phase - see operational assumptions

Off-road Equipment - see operational assumptions

Grading - see operational assumptions

Trips and VMT - operational mobile emissions calculated outside of CalEEMod

Energy Use -

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	15,500.00	90.00
tblConstructionPhase	PhaseEndDate	5/10/2147	12/16/2026
tblConstructionPhase	PhaseStartDate	12/11/2087	8/13/2026
tblGrading	AcresOfGrading	180.00	1,300.00
tblOffRoadEquipment	LoadFactor	0.43	0.43
tblOffRoadEquipment	LoadFactor	0.36	0.36
tblOffRoadEquipment	OffRoadEquipmentType		Crawler Tractors
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	168.85
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	15.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2026	0.0822	0.8344	0.4654	1.8600e-003	0.6893	0.0295	0.7189	0.0744	0.0272	0.1016	0.0000	163.7049	163.7049	0.0530	0.0000	165.0285
Maximum	**0.0822**	**0.8344**	**0.4654**	**1.8600e-003**	**0.6893**	**0.0295**	**0.7189**	**0.0744**	**0.0272**	**0.1016**	**0.0000**	**163.7049**	**163.7049**	**0.0530**	**0.0000**	**165.0285**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2026	0.0822	0.8344	0.4654	1.8600e-003	0.3102	0.0295	0.3397	0.0335	0.0272	0.0607	0.0000	163.7047	163.7047	0.0530	0.0000	165.0284
Maximum	**0.0822**	**0.8344**	**0.4654**	**1.8600e-003**	**0.3102**	**0.0295**	**0.3397**	**0.0335**	**0.0272**	**0.0607**	**0.0000**	**163.7047**	**163.7047**	**0.0530**	**0.0000**	**165.0284**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	55.00	0.00	52.74	55.00	0.00	40.29	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	8-13-2026	9-30-2026	0.3565	0.3565
		Highest	0.3565	0.3565

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	8/13/2026	12/16/2026	5	90	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 1300

Acres of Paving: 1300

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Crawler Tractors	2	8.00	212	0.43
Grading	Rubber Tired Loaders	2	8.00	203	0.36
Grading	Excavators	0	8.00	158	0.38
Grading	Rubber Tired Dozers	0	8.00	247	0.40
Grading	Graders	2	8.00	187	0.41
Grading	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Grading	Scrapers	0	8.00	367	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	6	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Grading - 2026

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.6893	0.0000	0.6893	0.0744	0.0000	0.0744	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0822	0.8344	0.4654	1.8600e-003		0.0295	0.0295		0.0272	0.0272	0.0000	163.7049	163.7049	0.0530	0.0000	165.0285
Total	**0.0822**	**0.8344**	**0.4654**	**1.8600e-003**	**0.6893**	**0.0295**	**0.7189**	**0.0744**	**0.0272**	**0.1016**	**0.0000**	**163.7049**	**163.7049**	**0.0530**	**0.0000**	**165.0285**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.3102	0.0000	0.3102	0.0335	0.0000	0.0335	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0822	0.8344	0.4654	1.8600e-003		0.0295	0.0295		0.0272	0.0272	0.0000	163.7047	163.7047	0.0530	0.0000	165.0284
Total	**0.0822**	**0.8344**	**0.4654**	**1.8600e-003**	**0.3102**	**0.0295**	**0.3397**	**0.0335**	**0.0272**	**0.0607**	**0.0000**	**163.7047**	**163.7047**	**0.0530**	**0.0000**	**165.0284**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Kern Fan Groundwater Project - Operations
Total On-Road Emissions

Kern Fan Groundwater Project - Operations
Total On-Road Emissions

260 Max construction days per year

	Construction Phase	Annual One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Idling per Day (minutes)	Regional Emissions (pounds/year) ROG	NOX	CO	SO2	PM10 Dust	PM10 Exh	Total PM10	PM2.5 Dust	PM2.5 Exh	Total PM2.5	(MT/yr) Total CO2e
Weed+Pest	Weed+Pest	2026															
		0															
	Hauling	0	20	10	3.3	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	40	20	10	25	15	0.21	6.41	2.96	0.03	0.93	0.04	0.96	0.27	0.04	0.30	1.40
	Worker	80	20	10	16.8	0	0.03	0.13	1.84	0.01	1.02	0.00	1.03	0.27	0.00	0.27	0.37
						Tons/year	0.00012	0.00327	0.0024	1.8E-05	0.00097	2.2E-05	0.001	0.00027	2.1E-05	0.00029	1.77
Weed+Pest	Weed+Pest	2027															
		0															
	Hauling	0	20	10	3.3	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	40	20	10	25	15	0.21	6.37	2.94	0.03	0.93	0.04	0.96	0.27	0.04	0.30	1.37
	Worker	80	20	10	16.8	0	0.02	0.11	1.72	0.01	1.02	0.00	1.03	0.27	0.00	0.27	0.37
						Tons/year	0.00012	0.00324	0.00233	1.8E-05	0.00097	2.2E-05	0.00099	0.00027	2.1E-05	0.00029	1.74
Earthwork	Earthwork	2026															
		0															
	Hauling	10,924	90	10	3.3	15	90.34	1238.31	1325.31	2.87	31.57	2.54	34.11	8.66	2.43	11.08	144.03
	Vendor	0	90	10	25	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	720	90	10	16.8	0	0.26	1.15	16.53	0.07	9.19	0.04	9.23	2.44	0.04	2.47	3.37
						Tons/year	0.0453	0.61973	0.67092	0.00147	0.02038	0.00129	0.02167	0.00555	0.00123	0.00678	147.40
Earthwork	Earthwork	2027															
		0															
	Hauling	10,924	90	10	3.3	15	90.09	1232.70	1321.92	2.80	31.57	2.52	34.09	8.66	2.41	11.07	140.91
	Vendor	0	90	10	25	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	720	90	10	16.8	0	0.22	1.03	15.51	0.07	9.19	0.04	9.23	2.44	0.03	2.47	3.29
						Tons/year	0.04516	0.61687	0.66872	0.00144	0.02038	0.00128	0.02166	0.00555	0.00122	0.00677	144.20

Kern Fan Groundwater Project - Operations
Running Emissions

	Running Emissions Factor (grams/mile)						Running Emissions Factor (grams/mile)		
	ROG	NOX	CO	SO2	PM10	PM2.5	CO2	CH4	N2O
2024Hauling Hauling	0.02200281	2.362231096	0.21554256	0.01234083	0.02713796	0.02596398	1307.659	0.00340126	0.20559713
2024Vendor Vendor	0.01968046	1.993048637	0.22899882	0.01142225	0.01764369	0.01687812	1205.77103	0.00254427	0.17739062
2024Worker Worker	0.012774	0.054929894	0.71985943	0.00282046	0.00160389	0.0014765	291.229262	0.00315696	0.00540934
2025Hauling Hauling	0.02189736	2.344554894	0.21601156	0.01207935	0.02709653	0.02592434	1279.95547	0.00328471	0.20124099
2025Vendor Vendor	0.0191153	1.989793325	0.21907094	0.01122296	0.01765924	0.01689299	1184.71014	0.00239636	0.17413897
2025Worker Worker	0.01106212	0.048399985	0.66506232	0.00272486	0.00152568	0.00140436	284.338459	0.00277483	0.00499903
2026Hauling Hauling	0.02174724	2.320544005	0.21592856	0.01181059	0.02692296	0.02575828	1251.48626	0.00317822	0.1967646
2026Vendor Vendor	0.0186222	1.980579878	0.21104259	0.01102051	0.01758966	0.01682639	1163.30375	0.00227294	0.17081054
2026Worker Worker	0.00957884	0.042985803	0.61979769	0.00263263	0.00143617	0.00132181	276.978811	0.00244062	0.00465892
2027Hauling Hauling	0.02158374	2.293702597	0.21549832	0.01152377	0.02670689	0.02555156	1221.09694	0.00306749	0.19198619
2027Vendor Vendor	0.01819467	1.967422529	0.2043867	0.0108012	0.01748213	0.01672348	1140.1201	0.0021616	0.16725563
2027Worker Worker	0.00840532	0.038581433	0.5815609	0.00255585	0.00134997	0.00124228	270.979245	0.00217589	0.00438489
GWP	N/A	N/A	N/A	N/A	N/A	N/A	1	25	290

Construction Phase	Annual One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Regional Emissions (pounds/year) ROG	NOX	CO	SO2	PM10	PM2.5	Regional Emissions (MT/year) CO2	CH4	N2O	CO2e
Weed+Pest	2026													
Hauling	0	20	10	3.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	40	20	10	25	0.04	4.37	0.47	0.02	0.04	0.04	1.16	0.00	0.05	1.21
Worker	80	20	10	16.8	0.03	0.13	1.84	0.01	0.00	0.00	0.37	0.00	0.00	0.37
Weed+Pest	2027													
Hauling	0	20	10	3.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	40	20	10	25	0.04	4.34	0.45	0.02	0.04	0.04	1.14	0.00	0.05	1.19
Worker	80	20	10	16.8	0.02	0.11	1.72	0.01	0.00	0.00	0.36	0.00	0.00	0.37
Earthwork	2026													
Hauling	10924	90	10	3.3	1.73	184.42	17.16	0.94	2.14	2.05	45.12	0.00	2.06	47.17
Vendor	0	90	10	25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	720	90	10	16.8	0.26	1.15	16.53	0.07	0.04	0.04	3.35	0.00	0.02	3.37
Earthwork	2027													
Hauling	10924	90	10	3.3	1.72	182.29	17.13	0.92	2.12	2.03	44.02	0.00	2.01	46.03
Vendor	0	90	10	25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	720	90	10	16.8	0.22	1.03	15.51	0.07	0.04	0.03	3.28	0.00	0.02	3.29

Kern Fan Groundwater Project - Operations
Idling Emissions

	Idling Emissions Factor (grams/minute)						Idling Emissions Factor (grams/minute)		
	ROG	NOX	CO	SO2	PM10	PM2.5	CO2	CH4	N2O
2024Hauling Hauling	0.2474886	2.947744283	3.65262255	0.00556258	0.00111983	0.00107139	589.049555	0.01159906	0.09260258
2024Vendor Vendor	0.12696582	1.56188622	1.9017452	0.00292987	0.00063348	0.00060608	310.203523	0.00638239	0.04862085
2024Worker Worker	0	0	0	0	0	0	0	0	0
2025Hauling Hauling	0.24631251	2.931467726	3.63580204	0.00545014	0.00110753	0.00105962	577.139295	0.01153985	0.09073007
2025Vendor Vendor	0.12631593	1.551432344	1.89314954	0.00287185	0.00061653	0.00058986	304.059561	0.00634451	0.04766028
2025Worker Worker	0	0	0	0	0	0	0	0	0
2026Hauling Hauling	0.24528733	2.917319783	3.62118238	0.00533591	0.00109632	0.00104889	565.042075	0.0114887	0.08882826
2026Vendor Vendor	0.12575766	1.542364388	1.88581954	0.00281312	0.00060188	0.00057584	297.840818	0.0063133	0.046687
2026Worker Worker	0	0	0	0	0	0	0	0	0
2027Hauling Hauling	0.24462766	2.907717924	3.61190339	0.00522706	0.00108746	0.00104042	553.514608	0.01145472	0.087016
2027Vendor Vendor	0.12538853	1.535733329	1.88116181	0.00275696	0.00058996	0.00056444	291.895179	0.00629092	0.04575641
2027Worker Worker	0	0	0	0	0	0	0	0	0
GWP	N/A	N/A	N/A	N/A	N/A	N/A	1	25	290

Construction Phase	Annual One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	Idling minutes per Day (miles)	Regional Emissions (pounds/year) ROG	NOX	CO	SO2	PM10	PM2.5	Regional Emissions (MT/year) CO2	CH4	N2O	CO2e
Weed+Pest	2026													
Hauling	0	20	10	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	40	20	10	15	0.17	2.04	2.49	0.00	0.00	0.00	0.18	0.00	0.01	0.19
Worker	80	20	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weed+Pest	2027													
Hauling	0	20	10	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	40	20	10	15	0.17	2.03	2.49	0.00	0.00	0.00	0.18	0.00	0.01	0.18
Worker	80	20	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Earthwork	2026													
Hauling	10924	90	10	15	88.61	1053.88	1308.15	1.93	0.40	0.38	92.59	0.05	4.22	96.86
Vendor	0	90	10	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	720	90	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Earthwork	2027													
Hauling	10924	90	10	15	88.37	1050.41	1304.80	1.89	0.39	0.38	90.70	0.05	4.13	94.88
Vendor	0	90	10	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker	720	90	10	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Kern Fan Groundwater Project - Operations
Road Dust, Break Wear, and Tire wear Emissions

	Emission Factors (grams/mile)					
	PM10			PM2.5		
	RD	BW	TW	RD	BW	TW
2024Hauling Hauling	3.00E-01	0.061520383	0.03587055	7.36E-02	0.02636588	0.00896764
2024Vendor Vendor	3.00E-01	0.09593021	0.02393527	7.36E-02	0.04111295	0.00598382
2024Worker Worker	3.00E-01	0.036750011	0.008	7.36E-02	0.01575	0.002
2025Hauling Hauling	3.00E-01	0.061530018	0.03587608	7.36E-02	0.02637001	0.00896902
2025Vendor Vendor	3.00E-01	0.095935028	0.02393804	7.36E-02	0.04111501	0.00598451
2025Worker Worker	3.00E-01	0.036750011	0.008	7.36E-02	0.01575	0.002
2026Hauling Hauling	3.00E-01	0.061539607	0.03588159	7.36E-02	0.02637412	0.0089704
2026Vendor Vendor	3.00E-01	0.095939822	0.0239408	7.36E-02	0.04111707	0.0059852
2026Worker Worker	3.00E-01	0.036750011	0.008	7.36E-02	0.01575	0.002
2027Hauling Hauling	3.00E-01	0.061548634	0.03588678	7.36E-02	0.02637799	0.00897169
2027Vendor Vendor	3.00E-01	0.095944336	0.02394339	7.36E-02	0.041119	0.00598585
2027Worker Worker	3.00E-01	0.036750011	0.008	7.36E-02	0.01575	0.002

Construction Phase	Annual One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Regional Emissions (pounds/year) PM10 RD	PM10 BW	PM10 TW	PM2.5 RD	PM2.5 BW	PM2.5 TW
<u>Weed+Pest</u>	2026									
Hauling	0	20	10	3.3	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	40	20	10	25	0.66	0.21	0.05	0.16	0.09	0.01
Worker	80	20	10	16.8	0.89	0.11	0.02	0.22	0.05	0.01
<u>Weed+Pest</u>	2027									
Hauling	0	20	10	3.3	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	40	20	10	25	0.66	0.21	0.05	0.16	0.09	0.01
Worker	80	20	10	16.8	0.89	0.11	0.02	0.22	0.05	0.01
<u>Earthwork</u>	2026									
Hauling	10924	90	10	3.3	23.83	4.89	2.85	5.85	2.10	0.71
Vendor	0	90	10	25	0.00	0.00	0.00	0.00	0.00	0.00
Worker	720	90	10	16.8	8.00	0.98	0.21	1.96	0.42	0.05
<u>Earthwork</u>	2027									
Hauling	10924	90	10	3.3	23.83	4.89	2.85	5.85	2.10	0.71
Vendor	0	90	10	25	0.00	0.00	0.00	0.00	0.00	0.00
Worker	720	90	10	16.8	8.00	0.98	0.21	1.96	0.42	0.05

Appendix D
Biological Resources Technical Report

ESA

Draft

KERN FAN GROUNDWATER STORAGE PROJECT

Biological Resources Technical Report

Prepared for
Irvine Ranch Water District and
Rosedale-Rio Bravo Water Storage District

October 2020

ESA

Draft

KERN FAN GROUNDWATER STORAGE PROJECT

Biological Resources Technical Report

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October 2020

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TABLE OF CONTENTS

Biological Resources Technical Report

Page

Appendices

Page

List of Figures

List of Tables

EXECUTIVE SUMMARY

IRWD Kern Fan Groundwater Storage Project Biological Resources Technical Report

A literature review, desktop GIS analysis, and field reconnaissance were conducted for the Kern Fan Groundwater Storage Project (proposed project). The proposed project would convert agricultural lands into water recharge basins and construct conveyance facility infrastructure. A background investigation of the proposed project sites (project sites) was conducted that included queries of the California Natural Diversity Database (CNDDB) and California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants. A biological resource reconnaissance was conducted in July 2020 for the proposed project to gather baseline biological resources data prior to project commencement. Results of the reconnaissance, in combination with the findings of the background investigation, were used to assess the potential for project sites to support special-status plant and wildlife species and sensitive natural communities and to investigate the potential for jurisdictional resources to occur on the proposed project sites. Also provided is an analysis of the potential impacts to these biological resources that may result from implementing the proposed project.

The project sites are mostly developed or disturbed; however, several vegetation communities were observed or documented during the field and desktop reconnaissance. The project sites currently support 13 vegetation communities and four land cover types. The project sites are largely developed (residential) and disturbed (agricultural fields and recharge basins). Five sensitive natural communities were identified within the project sites during the reconnaissance.

The project sites currently support a diversity of common and special-status wildlife and plant species that may be impacted during construction, operations and maintenance. Special-status wildlife species that have a medium to high potential to occur on site and to be potentially impacted by the proposed project include burrowing owl, tricolored blackbird, Tipton kangaroo rat, blunt-nosed leopard lizard, Nelson’s antelope squirrel, and San Joaquin kit fox. Biologists observed two individual Swainson’s hawks, one California horned lark (audio detection), and one deceased American badger during the reconnaissance on July 6 and 7, 2020. No special-status plant species were observed or detected; however, seven species have a medium potential to occur based on dispersal of vegetation communities on site. These species include: California jewelflower, Hoover’s eriastrum, Kern mallow, recurved larkspur, San Joaquin woollythreads, slough thistle, and subtle orache.

The proposed project is expected to result in both adverse and beneficial impacts to biological resources during project construction, operations, and maintenance. Impact mechanisms include habitat modification (adverse and beneficial), pesticide use (adverse), exterior lighting (adverse), and vehicle collisions (adverse). These impact mechanisms were evaluated in terms of the CEQA thresholds of significance for biological resources. For those thresholds for which the proposed project would result in significant adverse impacts, mitigation measures were proposed. This included the potential for significant impacts to special-status plants and wildlife, nesting birds, sensitive natural communities, wetland and jurisdiction resources, local ordinances, and an adopted NCCP/HCP. Mitigation measures were designed to reduce these potentially significant impacts to less than significant. For all potential impacts, implementation of mitigation measures would reduce impacts to a level that is less than significant.

CHAPTER 1
Introduction

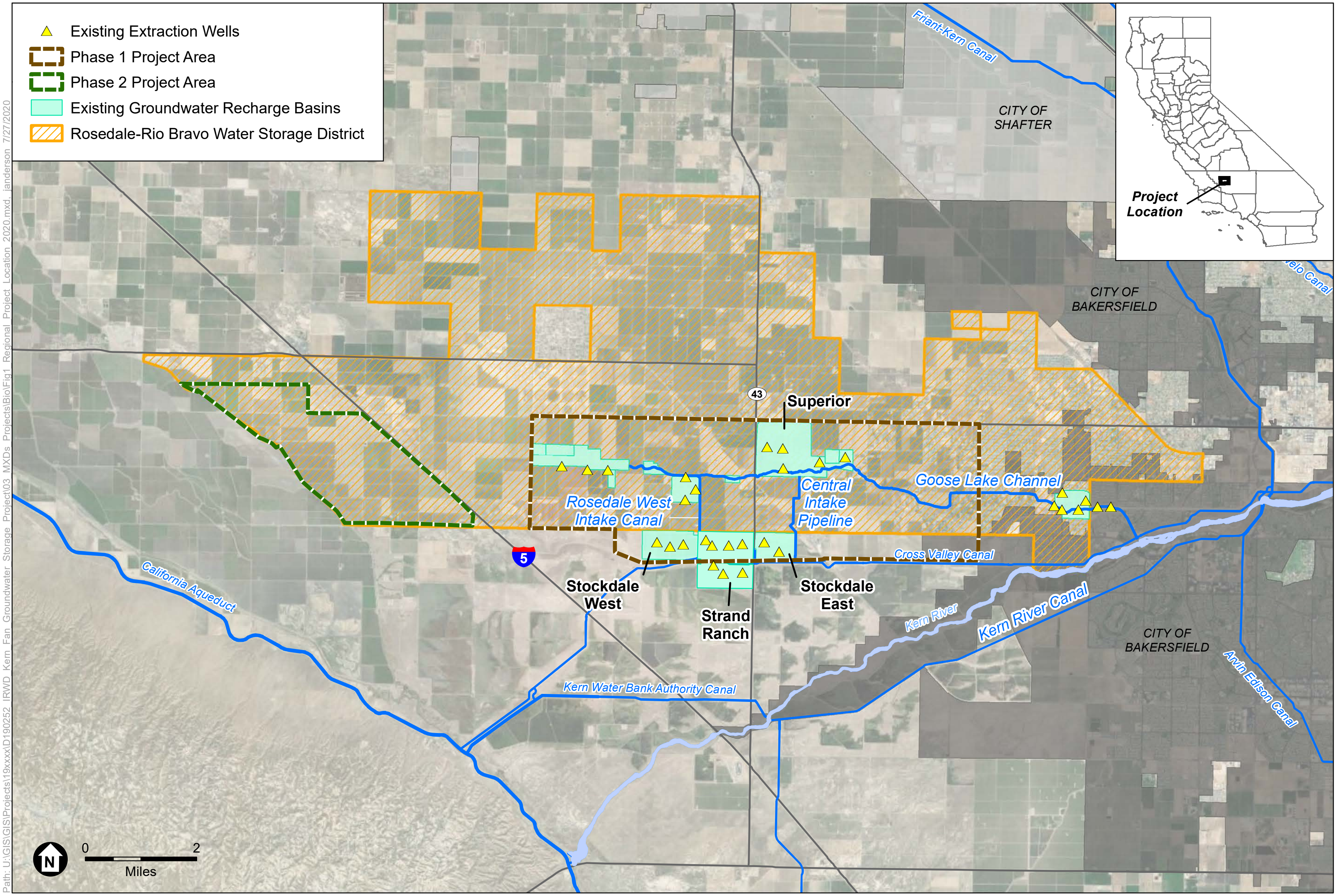
1.1 Project Location and Background

The proposed project would be located in western Kern County, west of the City of Bakersfield. The proposed recharge and recovery facilities would be constructed in two phases on approximately 1,300 acres of agricultural or vacant land within or near the Rosedale-Rio Bravo Water Storage District (Rosedale) service area (**Figure 1**). The proposed project would also involve the acquisition of easements for construction, operation and maintenance of proposed Kern Fan Conveyance Facilities that would deliver water to and from the California Aqueduct. The proposed project would allow the Rosedale and Irvine Ranch Water District (IRWD) to more effectively manage sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop water recharge and recovery facilities in the Kern Fan area of Kern County, California. The proposed project would recharge, store, recover and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and supply reliability benefits for agricultural, and municipal and industrial (M&I) uses. The proposed project would involve the construction and operation of water conveyance, recharge and recovery facilities.

This Biological Resources Technical Report (BRTR) assesses the Phase 1, Phase 2, and the Kern Fan Conveyance Facilities (conveyance facilities) project sites. All three sites are depicted on **Figure 2** and are collectively referred to as the “project sites.” The Phase 1 and Phase 2 project sites bound the area within which the proposed recharge and recovery facilities would be located. They are approximately 640 acres each and mainly consist of agricultural lands that contain alfalfa, cotton, potatoes, grapes, and pistachio. The conveyance facilities project site bounds the area within the proposed conveyance facilities would be located. It is approximately 11,954 acres and consists of numerous native vegetation communities as well as non-native grasslands and agriculture lands.

1.2 Project Description

The proposed project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. The Kern Fan Conveyance Facilities would consist of pipelines, pump stations, and a new turnout at the California Aqueduct to convey water between the project facilities and the California Aqueduct. Water stored by the proposed project would be recovered when needed to provide ecosystem and water supply benefits.

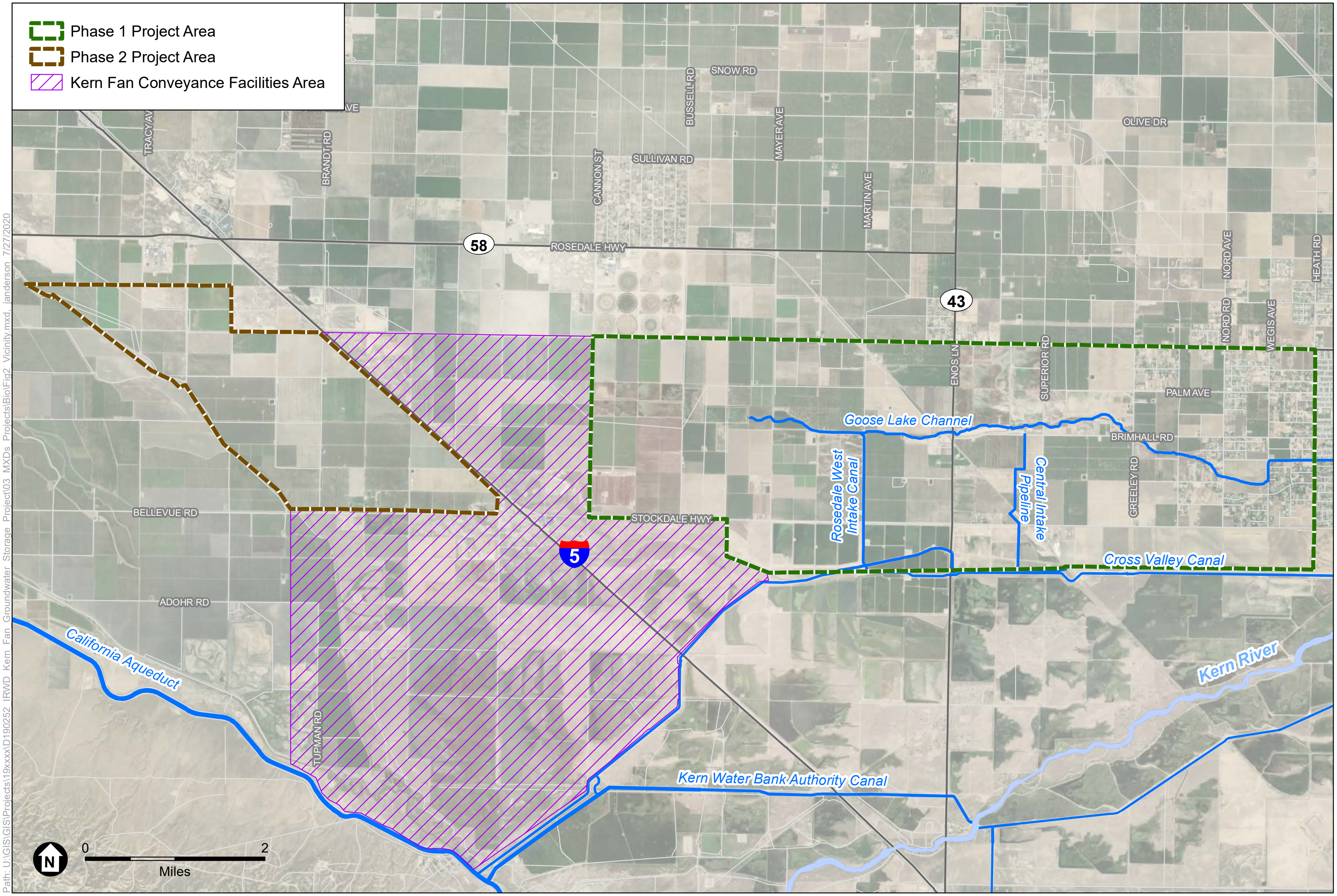


SOURCE: ESRI; Kern County

Kern Fan Groundwater Storage Project

Figure 1
Regional Project Location

ESA



SOURCE: ESRI; Kern County

Kern Fan Groundwater Storage Project

Figure 2
Vicinity Map

ESA

The proposed project would be operated such that surplus surface water from the SWP and other available water sources would be recharged and stored for subsequent recovery. It is estimated that the proposed project would be able to recharge and store approximately 100,000 acre-feet per year (AFY). Proposed project capacities are to be allocated as follows:

- Up to 25,000 acre-feet (AF), of State Water Project (SWP) Article 21 water and Central Valley Project (CVP) water, including Friant 215 water, would be stored for the California Department of Water Resources (DWR) in an "Ecosystem Account." Through the implementation of 1-for-1 exchanges, the water stored in the Ecosystem Account would be used by the State of California to alleviate stress on endangered and threatened species in the Sacramento-San Joaquin River Delta during dry or critically dry years. The stored CVP water would be used to provide operational flexibility benefits to the CVP and incremental supplies to Federal wildlife refuges.
- The remaining 75,000 AF of storage capacity would be divided equally, with 37,500 AF of storage capacity allocated to Rosedale and 37,500 AF of storage capacity allocated to IRWD. Rosedale and IRWD would use the water recharged in their respective accounts for agriculture, municipal, and industrial uses, improving water supply reliability during droughts and emergencies.
- The proposed project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the project sites. Water could be conveyed to and from Phase 1 and 2 project sites through existing facilities and a new turnout and conveyance system (Kern Fan Conveyance Facilities) connecting to the California Aqueduct.

Recharge Facilities

The proposed project would include the construction of recharge basins of varying shape, size, and depth within approximately 1,300 acres. Basins would be formed by excavating and contouring existing soils to form earthen berms. Typical basin berms would be approximately three to six feet above ground. Dirt roads approximately 14 to 20 feet wide would run along the perimeter of and in between all basins to provide access to facilities during operation and maintenance activities. Surface water would be delivered to the basins for recharge through the new Kern Fan Conveyance Facilities, and the basins would be connected by check structures to allow recharge water to flow by gravity among basins. The basins would be managed to allow agricultural land uses (e.g., annual farming or grazing) to continue when the basins are empty.

Recharge Water Supplies

The proposed project would receive, recharge, and store SWP Article 21 water, which is a surplus supply managed by DWR. Other water supplies also may be secured and acquired by Rosedale and IRWD from various sources, and may include federal, state, and local supplies through transfers, balanced and unbalanced water exchange agreements, water purchases or temporary transfers, or other available means. Sources may also include supplies from the Central Valley Project, and high-flow Kern River water depending on annual hydrologic availability, water rights, and regulatory considerations.

Recovery Facilities

The proposed project would construct up to 12 extraction wells, with an anticipated annual recovery capacity of up to 50,000 AF. Each well would be designed to pump groundwater at a recovery rate of approximately five to six cubic feet per second (cfs). Actual recovery rates for each well may be slightly more or less based on aquifer conditions at each well site. If higher production is achieved for the first few wells installed, fewer wells may be needed. Additionally, if any agricultural wells exist on the recharge basin sites, these could potentially be used as production wells or monitoring wells. The proposed recovery facilities would be designed and located to minimize potential effects on wells pumping on adjacent properties.

Conveyance Facilities

The proposed project includes a new turnout, additional canals and pipelines, and pump stations (collectively the "Kern Fan Conveyance Facilities") to convey water to and from the California Aqueduct and proposed recharge and recovery facilities. The exact locations of the new conveyance facilities have not yet been determined but would have up to 500 cfs of conveyance capacity. Subject to necessary approvals, water could be conveyed through the SWP, Friant-Kern Canal, or the Kern River by exchange through the Goose Lake Channel, or from the Cross Valley Canal (CVC) through the Rosedale Intake Canal. Groundwater recovered from the proposed project extraction wells would be conveyed through new pipelines that would be below ground, running along the dirt roads between the recharge basins, or buried in the basin bottoms, with exact locations subject to final well placement. The recovery pipelines would connect to the new Kern Fan Conveyance Facilities or could connect to the CVC via existing conveyance facilities.

Recharge Basin Design and Operation for Wetland Benefits

Since the recharge basins will be intermittently flooded with captured stream flows that are diverted into the California Aqueduct, through the proposed project canal and into man-made impoundments, the wetlands that will be incidentally created by the constructed recharge basins will most closely resemble a classification of *Intermittent Flooded Riverine Wetlands with Unconsolidated Sandy Bottoms*. Accordingly, the recharge basins constructed for the proposed project will be designed to meet intermittent wetland requirements during recharge operations (IRWD 2020).

As described in the Project Feasibility Report (Dee Jasper 2017), the proposed project will establish intermittent wetland habitat through intermittent recharge events. The primary purpose of the proposed project is to construct and operate recharge basins that allow water to infiltrate and recharge into the underlying aquifer for storage until it is needed. During the years that the proposed project takes and recharges water into storage, the basins will be inundated with water and will provide intermittent wetland habitat to support waterfowl, shorebirds, raptors and other migratory birds along the Pacific Flyway (described in further detail in Section 4.9). The wetlands to be established by the proposed project are considered intermittent because the water supply delivered for recharge may not be available for recharge year-round or during periods of drought (IRWD 2020).

The Kern Water Bank is located to the south of the proposed project and represents a reference site for the future conditions of the recharge basins and the intermittent wetland establishment. The Kern Water Bank spans 20,000 acres of water recharge and recovery infrastructure. Through 2018, over 206 species of birds have been identified on Kern Water Bank lands (Kern Water Bank Authority 2019). It is anticipated that the proposed project will result in similar habitat conditions at a smaller scale within the 1,300 acres of recharge basins.

CHAPTER 2
Methodology

2.1 Existing Literature and Database Review

The private ownership of the project sites required a combination of a desktop analysis and field-based biological resource reconnaissance (reconnaissance) to assess the biological resources. Prior to conducting the reconnaissance, Environmental Science Associates (ESA) conducted a thorough review of available information regarding the present biological conditions of the project sites and vicinity. The following resources were referenced for the analyses of this report:

- California Department of Fish and Wildlife (CDFW) California Natural Diversity Data Base (CNDDB) was queried for special status species records within the Stevens United States Geological Survey (USGS) topographic quadrangle and surrounding eight quadrangles. These eight quadrangles include: East Elk Hills, Tupman, Rosedale, Millux, Mouth of Kern, Taft, and Buttonwillow (CDFW 2020).
- California Native Plant Society (CNPS), Inventory of Rare and Endangered Vascular Plants of California was queried for special status species records within the Stevens USGS topographic quadrangle and surrounding eight quadrangles. These eight quadrangles include: East Elk Hills, Tupman, Rosedale, Millux, Mouth of Kern, Taft, and Buttonwillow (CNPS 2020).
- United States Fish and Wildlife Service (USFWS) Environmental Conservation Online System for Critical Habitat.
- Historical aerial imagery (Google Earth Pro. 2020).
- United States Department of Agriculture (USDA) Soil Survey Geographic Data Base (USDA 2020).
- Biological Technical Report for the Stockdale Integrated Banking Project (ESA 2013).
- Technical Memorandum for Ecosystem Benefits from Kern Fan Groundwater Storage Project (Cramer Fish Sciences 2020).
- Metropolitan Bakersfield Habitat Conservation Plan (City of Bakersfield and Kern County 2002).
- Final Kern Water Bank Habitat Conservation Plan/Natural Community Conservation Plan (KWBA 1997).

2.2 Biological Resource Reconnaissance

Field reconnaissance was conducted by ESA senior biologists Travis Marella and Karl Fairchild on July 6 and 7, 2020. Weather conditions at the time of the reconnaissance consisted of temperatures averaging 100 degrees Fahrenheit (ºF), clear skies and wind speeds ranging from zero to five miles per hour (mph). The purpose of the reconnaissance was to identify, map and characterize natural resources present or with potential to occur on and adjacent to the project sites.

The Phase 1 and Phase 2 project sites were surveyed by foot and by vehicle to determine if the sites and immediately adjacent areas have the potential to support any special-status plant or wildlife species, or sensitive natural communities. The Phase 1 and Phase 2 project sites surveys were mainly conducted by driving around the perimeter on access roads and surveying as much as the interior areas as possible using 10x42 binoculars. Key locations (e.g., Tule Elk State Reserve) with possible sensitive resources were visited in the conveyance facilities project site.

The Phase 1 and Phase 2 project sites were surveyed with a 500-foot buffer to assess the adjacent areas where special-status species and sensitive natural communities could potentially occur. All incidental observations of flora and fauna, including sign of wildlife presence (e.g., scat, tracks, burrows, vocalizations) were noted during the assessment. Photos within each project area were taken and are provided in **Appendix A** of this report.

2.3 Special-Status Species Habitat Assessment

The reconnaissance included a preliminary assessment of habitat for the special-status species that, based on available data, have known occurrences in the vicinity of the project sites. The CDFW CNDDB California Natural Diversity Data Base (CNDDB) (CDFW 2020) and CNPS Rare Plant Inventory (CNPS 2020) were queried prior to the reconnaissance to identify special-status plant and wildlife species that have been previously recorded in the region. The search area for these database queries included the Stevens United States Geological Survey (USGS) 7.5-minute quadrangle map in which the proposed project is located, as well as the surrounding eight USGS quadrangles: East Elk Hills, Tupman, Rosedale, Millux, Mouth of Kern, Taft, and Buttonwillow. In addition, the USFWS Environmental Conservation Online System was queried to assess whether the proposed project is located within or near designated critical habitat for listed species. These resources were used to establish a list of special-status species and sensitive natural plant communities that have been recorded in the area of the proposed project. Special-status species were also queried within a three-mile radius of the proposed project. During the reconnaissance, areas of suitable habitat was surveyed to determine if special-status species have a potential to occur within the area for the proposed project.

2.4 Jurisdictional Waters and Wetlands Investigation

A formal jurisdictional delineation was not conducted; however, an investigation of potential jurisdictional waters and wetlands was conducted via desktop and during reconnaissance to determine the location and size of the areas that could be defined as waters of the U.S. (WoUS), waters of the State (WoS), wetlands, or riparian habitat. Preliminary identification of potential jurisdictional areas within the project sites was based on a review of U.S. Geological Survey (USGS) 7.5-minute topographical maps, United States Department of Agriculture (USDA) Soil Survey Geographic Data Base and State Soil Geographic Data Base soil maps, National Wetlands Inventory data, Federal Emergency Management Agency (FEMA) flood zone data, and previous U.S. Army Corps of Engineers (USACE) jurisdictional determinations in the area. During the reconnaissance, the biologists visually estimated the structure and composition of onsite streambeds and vegetation in order to identify all areas potentially under USACE, Central Valley Regional Water Quality Control Board (RWQCB), or California Department of Fish and Wildlife (CDFW) jurisdiction. Active floodplains were identified using recent aerial photography and by identifying changes in the characteristics of vegetation and substrate composition. Several potential jurisdictional features were observed onsite and will be discussed in further detail in Section 4.4.

CHAPTER 3
Regulatory Framework

This section provides a summary of the federal, state, and local environmental regulations that govern the biological resources applicable to the study area. This section also provides a summary of other state and local environmental guidelines or listings that evaluate the rarity of species or the habitats they depend on.

3.1 Federal

Federal Endangered Species Act

The United States Congress passed the Federal Endangered Species Act (FESA) in 1973 to protect those species that are endangered or threatened with extinction. FESA is intended to operate in conjunction with the National Environmental Policy Act to help protect the ecosystems upon which endangered and threatened species depend. FESA prohibits the "take" of endangered or threatened wildlife species. "Take" is defined to include harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting wildlife species or any attempt to engage in such conduct (FESA Section 3 [(3)(19)]). Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns (50 Code of Federal Regulations [CFR] Section 17.3). "Harass" is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns (50 CFR Section 17.3). Actions that result in take can result in civil or criminal penalties.

Migratory Bird Treaty Act

The MBTA generally prohibits the killing, possessing, or trading of migratory birds, bird parts, eggs, and nests, except as provided by the statute. The MBTA authorizes the Secretary of the Interior to regulate the taking of migratory birds. It further provides that it is unlawful, except as permitted by regulations, "to pursue, take, or kill any migratory bird, or any part, nest or egg of any such bird…" (16 United States Code [USC] Section 703). As amended by U.S. Department of the Interior Solicitor's Opinion M-37050 in December 22, 2017 and subsequently by USFWS guidance issued on April 11, 2018, the accidental or incidental take of birds resulting from an activity is not prohibited by the MBTA when the underlying purpose is not to take birds. If the purpose of the action is not to take birds, Opinion M-37050 allows both the direct take of birds and their nests and indirect or incidental take that results in the direct loss of birds, nests, or eggs (USDOI 2017; USFWS 2018). Thus, the federal MBTA definition of "take" does not prohibit or penalize the incidental take of migratory birds that results from actions that are performed without motivation to harm birds. This interpretation differs from the prior federal interpretation of "take", which prohibited all incidental take of migratory birds, whether intentional or incidental.

The MBTA, first enacted in 1916, prohibits any person, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention…for the protection of migratory birds…or any part, nest, or egg of any such bird" (16 U.S. Code 703).

Fish and Wildlife Conservation Act

The Fish and Wildlife Conservation Act declares that fish and wildlife are of ecological, educational, aesthetic, cultural, recreational, economic, and scientific value to the United States. The purposes of this Act are to encourage all federal departments and agencies to utilize their statutory and administrative authority, to the maximum extent practicable and consistent with each agency's statutory responsibilities and to conserve and to promote conservation of non-game fish and wildlife and their habitats. Another purpose is to provide financial and technical assistance to the states for the development, revision, and implementation of conservation plans and programs for nongame fish and wildlife.

Clean Water Act

Section 404 and Wetlands

In accordance with Section 404 of the federal Clean Water Act (CWA), the USACE regulates discharge of dredged or fill material into waters of the United States. Waters of the United States and their lateral limits are defined in Title 33, Part 328.3(a) of the Code of Federal Regulations to include navigable waters of the United States, interstate waters, all other waters subject to the ebb and flow of the tide, and all other waters where the use or degradation or destruction of the waters could affect interstate or foreign commerce, tributaries to any of these waters, and wetlands that meet any of these criteria or that are adjacent to any of these waters or their tributaries. Waters of the United States are often categorized as "jurisdictional wetlands" (i.e., wetlands over which USACE exercises jurisdiction under Section 404) and "other waters of the United States" when habitat values and characteristics are being described. "Fill" is defined as any material that replaces any portion of a water of the United States with dry land or that changes the bottom elevation of any portion of a water of the United States. Any activity resulting in the placement of dredged or fill material within waters of the United States requires a permit from USACE.

Wetlands are a subset of "waters of the United States" and receive protection under Section 404 of the CWA. Wetlands are defined by the federal government as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR Section 328.3(c)(16)) . Waters of the U.S. do not include prior converted cropland (33 CFR Section 328.3(b)(6)) . Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with U.S. Environmental Protection Agency (EPA) ((33 CFR Section 328.3(a)(8) added 58 FR 45035, August 25, 1993).

Section 401

Under Section 401 of the federal CWA, the Central Valley RWQCB must certify that actions receiving authorization under Section 404 of the CWA also meet state water quality standards.

3.2 State

Porter-Cologne Water Quality Control Act

Under the Porter-Cologne Water Quality Control Act, waters of the state fall under the jurisdiction of the appropriate RWQCB. Under the act, the RWQCB must prepare and periodically update water quality control basin plans. Each basin plan sets forth water quality standards for surface water and groundwater, as well as actions to control nonpoint and point sources of pollution to achieve and maintain these standards. Projects that affect wetlands or waters must meet waste discharge requirements of the RWQCB, which may be issued in addition to a water quality certification or waiver under Section 401 of the CWA. The RWQCB requires projects to avoid impacts to wetlands if feasible and requires that projects do not result in a net loss of wetland acreage or a net loss of wetland function and values. The RWQCB typically requires compensatory mitigation for impacts to wetlands and/or waters of the state. The RWQCB also has jurisdiction over waters deemed 'isolated' or not subject to Section 404 jurisdiction under *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers* (SWANCC). Dredging, filling, or excavation of isolated waters constitutes a discharge of waste to waters of the state and prospective dischargers are required obtain authorization through an Order of Waste Discharge or waiver thereof from the RWQCB and comply with other requirements of Porter-Cologne Act.

CEQA Guidelines Section 15380

Although threatened and endangered species are protected by specific federal and state statutes, *CEQA Guidelines* Section 15380(b) provides that a species not listed on the federal or state list of protected species may be considered rare or endangered if the species can be shown to meet certain specified criteria. These criteria have been modeled after the definition in FESA and the section of the California Fish and Game Code dealing with rare or endangered plants or animals. This section was included in the *CEQA Guidelines* primarily to deal with situations in which a public agency is reviewing a project that may have a significant effect on, for example, a candidate species that has not been listed by either USFWS or CDFW. Thus, CEQA provides an agency with the ability to protect a species from the potential impacts of a project until the respective government agencies have an opportunity to designate the species as protected, if warranted. CEQA also calls for the protection of other locally or regionally significant resources, including natural communities. Although natural communities do not at present have legal protection of any kind, CEQA calls for an assessment of whether any such resources would be affected, and requires findings of significance if there would be substantial losses. Natural communities listed by CNDDB as sensitive are considered by CDFW to be significant resources and fall under the *CEQA Guidelines* for addressing impacts. Local planning documents such as general plans often identify these resources as well.

California Endangered Species Act (CESA)

Under CESA, the CDFW is responsible for maintaining a list of threatened and endangered species (California Fish and Game Code 2007), candidate species, and species of special concern. Pursuant to the requirements of CESA, an agency reviewing a project within its jurisdiction must determine whether any state listed endangered or threatened species may be present on the project region and determine whether the project would have a potentially significant impact on such species. In addition, the CDFW encourages informal consultation on any project that may impact a candidate species. If there were project-related impacts to species on the CESA threatened and endangered list, they would be considered "significant." Impacts to "species of concern" would be considered "significant" under certain circumstances, discussed below.

California Fish and Game Code

Section 2080 - Threatened and Endangered Species

Section 2080 of the California Fish and Game Code states, "No person shall import into this state [California], export out of this state, or take, possess, purchase, or sell within this state, any species, or any part or product thereof, that the [California Fish and Game] commission determines to be an endangered species or threatened species, or attempt any of those acts, except as otherwise provided in this chapter, or the Native Plant Protection Act, or the California Desert Native Plants Act." Pursuant to Section 2081, CDFW may authorize individuals or public agencies to import, export, take, or possess, any state-listed endangered, threatened, or candidate species. These otherwise prohibited acts may be authorized through permits or Memoranda of Understanding if: (1) the take is incidental to an otherwise lawful activity; (2) impacts of the authorized take are minimized and fully mitigated; (3) the permit is consistent with any regulations adopted pursuant to any recovery plan for the species; and (4) the applicant ensures adequate funding to implement the measures required by CDFW. CDFW makes this determination based on available scientific information and considers the ability of the species to survive and reproduce.

Section 3503 – Nesting Birds and Raptors

Section 3503 of the California Fish and Game Code states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 specifically states that it is unlawful to take, possess, or destroy any raptors (i.e., species in the orders Falconiformes and Strigiformes), including their nests or eggs. Typical violations of these codes include destruction of active nests resulting from removal of vegetation in which the nests are located. Violation of Section 3503.5 could also include failure of active raptor nests resulting from disturbance of nesting pairs by nearby project construction. This statute does not provide for the issuance of any type of incidental take permit.

Section 1600 – Lake and Streambed Alteration

CDFW regulates activities that would interfere with the natural flow of, or substantially alter, a channel, bed, or bank of a lake, river, or stream. These activities are regulated under the California Fish and Game Code Sections 1600-1616. Under Section 1602, it is unlawful for any person, governmental agency, or public utility to do the following without first notifying CDFW: substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of any river, stream, or lake, or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake. Requirements to protect the integrity of biological resources and water quality are often conditions of streambed alteration agreements. Requirements may include avoidance or minimization of the use of heavy equipment, limitations on work periods to avoid impacts on wildlife and fisheries resources, and measures to restore degraded sites or compensate for permanent habitat losses. A Streambed Alteration Agreement may be required by CDFW for construction activities that could result in an accidental release into a jurisdictional area.

A stream is defined as a body of water that flows at least periodically or intermittently through a bed or channel that has banks and supports fish or other aquatic life. This definition includes watercourses with a surface or subsurface flow that supports or has supported riparian vegetation. CDFW's jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife. A CDFW streambed alteration agreement must be obtained for any project that would result in an impact on a river, stream, or lake.

Unlike the federal government, California has adopted the Cowardin, et al. (1979) definition of wetlands. For purposes of this classification, wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes (at least 50 percent of the aerial vegetative cover); (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.

Under normal circumstances, the federal definition of wetlands requires all three wetland identification parameters to be met, whereas the Cowardin definition requires the presence of at least one of these parameters. For this reason, identification of wetlands by state agencies consists of the union of all areas that are periodically inundated or saturated, or in which at least seasonal dominance by hydrophytes may be documented, or in which hydric soils are present.

Both state and federal wetland laws require that the biological and hydrological functions, which are lost when a wetland or water is altered or filled, be replaced as part of the respective permit processes. Compensatory actions include replacement of lost wetland acreage, usually in amounts substantially greater than the amount lost.

Sections 3511, 4700, 5050 and 5515 – Fully Protected Species

Protection of fully protected species is described in Sections 3511, 4700, 5050, and 5515 of the California Fish and Game Code. These statutes prohibit take or possession of fully protected species. CDFW is unable to authorize incidental take of fully protected species when activities are proposed in areas inhabited by those species. CDFW has informed nonfederal agencies and private parties that they must avoid take of any fully protected species in carrying out projects.

Native Plant Protection Act

The Native Plant Protection Act (California Fish and Game Code Sections 1900 et seq.) includes measures to preserve, protect, and enhance rare and endangered native plants. The list of native plants afforded protection pursuant to the Native Plant Protection Act includes those listed as rare and endangered under the CESA. The Native Plant Protection Act provides limitations on take as follows: "No person will import into this State, or take, possess, or sell within this State" any rare or endangered native plant, except in compliance with provisions of the act. Individual landowners are required to notify the CDFW at least 10 days in advance of changing land uses to allow the CDFW to salvage any rare or endangered native plant material.

3.3 Regional or Local

Kern County General Plan

This regulatory framework identifies the federal, state, and local statutes, ordinances, or policies that govern the conservation and protection of biological resources that must be considered by the County during the decision-making process for projects that have the potential to affect biological resources. The Kern County General Plan includes the following goals related to biological resources:

1.10.5 Threatened and Endangered Species

Policies

Policy 27: Threatened or endangered plant and wildlife species should be protected in accordance with State and federal laws.

Policy 28: County should work closely with State and federal agencies to assure that discretionary projects avoid or minimize impacts on fish, wildlife, and botanical resources.

Policy 29: County will seek cooperative efforts with local, State, and federal agencies to protect listed threatened and endangered plant and wildlife species through the use of conservation plans and other methods promoting management and conservation of habitat lands.

Policy 32: Riparian areas will be managed in accordance with the USACE and the CDFG rules and regulations to enhance the drainage, flood control, biological, recreational, and other beneficial uses while acknowledging existing land use patterns.

Implementation Measures

> **Q:** Discretionary projects shall consider effects to biological resources as required by CEQA.
>
> **R:** Consult and consider the comments from responsible and trustee wildlife agencies when reviewing a discretionary project subject to CEQA.
>
> **S:** Pursue the development and implementation of conservation programs with State and federal wildlife agencies for property owners desiring streamlined endangered species mitigation programs.

Bakersfield General Plan

The project sites are also located within the area governed by the *Metropolitan Bakersfield General Plan* (City of Bakersfield and Kern County 2002). Within the Conservation Element Biological Resources Section of the Bakersfield General Plan, there are goals, policies, and an implementation measure that are applicable to the proposed project:

> **Goal 1:** Conserve and enhance Bakersfield's biological resources in a manner which facilitates orderly development and reflect the sensitivities and constraints of these resources.
>
> **Goal 2:** To conserve and enhance habitat areas for designated "sensitive" animal and plant species.
>
> > ***Policy 1:*** Direct development away from "sensitive biological resource" areas, unless effective mitigation can be implemented.
> >
> > ***Policy 2:*** Preserve areas of riparian vegetation and wildlife habitat within floodways and along rivers and streams, in accordance with the Kern River Plan Element and channel maintenance programs designed to maintain flood flow discharge capacity.
> >
> > > *Implementation 3:* Preserve habitat and avoid "take" of protected species as required in the Metropolitan Bakersfield Habitat Conservation Plan.

Metropolitan Bakersfield Habitat Conservation Plan

The Metropolitan Bakersfield Habitat Conservation Plan (MBHCP) addresses the effect of urban growth on federally and State protected plant and animal species within the Metropolitan Bakersfield 2010 General Plan area. The MBHCP is a joint program of the City of Bakersfield and Kern County that was undertaken to assist urban development applicants in complying with State and federal endangered species laws. The MBHCP utilizes a mitigation fee paid by applicants for grading or building permits to fund the purchase and maintenance of habitat land to compensate for the effects of urban development on endangered species habitat. Approximately 60% of Phase 1 project site falls within the MBHCP area. However, the MBHCP finds that "commercial agricultural" activities are exempt from the requirements of the plan. Therefore, the proposed project would not be subject to MBHCP requirements.

Kern Water Bank Habitat Conservation Plan (HCP)/Natural Community Conservation Plan (NCCP)

The project sites are also located within the area governed by the Kern Water Bank HCP/NCCP. The Kern Water Bank HCP/NCCP goal is to accomplish both water conservation and environmental objectives. Only the Kern Water Bank Authority is authorized to implement covered activities within the HCP/NCCP area that may result in take of covered species (KWBA 1997). The HCP/NCCP area is within the conveyance facilities project site.

CHAPTER 4
Existing Conditions

The project sites are located in the San Joaquin Valley and in Kern County near the city of Bakersfield and the communities of Buttonwillow and Tupman. These areas are also located within the California Floristic Province (CA-FP), Great Central Valley Region, San Joaquin Valley (SnJV) Subregion (Hickman 1993). The CA-FP is the largest geographic unit in California and comprises much of the state west of the dry regions of the Great Basin (GB) and Desert (D) Provinces in northern and southern California (Hickman 1993). The Great Central Valley (GV) Region is entirely contained within the CA-FP, is roughly the same area as the California Central Valley, and was once comprised of grassland (California prairie), marshes, extensive riparian woodlands, and islands of valley-oak savanna, but is now predominantly agricultural (Hickman 1993). The GV Region is divided into two subregions: the Sacramento Valley (ScV) Subregion to the north and the SnJV Subregion to the south (Hickman 1993). The SnJV Subregion is the larger subregion and is hotter and drier than the ScV Subregion with desert elements in the south (Hickman, 1993). Land use within the vicinity of the proposed project is primarily agriculture.

Phase 1 Project Site

The Phase 1 project site consists of non-native grassland, agriculture fields, recharge basins, and areas where residential and business development has occurred. Residential and business developments are mainly in the far north-eastern portion of the Phase 1 project site. The recharge basins that currently exist within the Phase 1 project site consist of a mix of non-native and native vegetation species such as Russian thistle (*Kali tragus*, non-native), shortpod mustard (*Hirschfeldia incana*, non-native), annual burrweed (*Ambrosia acanthicarpa*, native), horseweed (*Erigeron canadensis*, native), and allscale saltbush (*Atriplex polycarpa*, native). The recharge basins are also intentionally planted with safflower (*Carthamus tinctorius*) and rye (*Secale cereal*) as "cover."

The recharge basins within the Phase 1 project site are separated by elevated roads with culverts installed underneath each road, allowing water to flow between the basins. Adjacent lands north and west of the property are comprised mainly of agricultural fields. The area east of the Phase 1 project site consists of residential neighborhoods, while the area to the south is owned by the Kern Water Bank (south of Stockdale Highway).

Phase 2 Project Site

The entire Phase 2 project site is currently used for agriculture, supporting crops such as alfalfa (*Medicago sativa*), cotton (*Gossypium* sp.), potato (*Solanum tuberosum*), grape (*Vitis* sp.), and pistachio (*Pistacia* sp.). Several small structures and open storage areas comprised of bare ground have been developed for the operation and maintenance of the fields. One residential house and buildings associated with surrounding agricultural land uses occur to south of the site, along Stockdale Highway. The soft-bottomed East Side Canal directly abuts the eastern boundary and is regularly used to irrigate the nearby agricultural fields and orchards. The land south, north, east, and west of the Phase 2 project site is currently used for agricultural purposes.

Conveyance Facilities Project Site

The conveyance facilities project site consists of numerous vegetation communities; including but not limited to bush seepweed scrub, quailbrush scrub, smartweed-cocklebur patches, and spinescale scrub. Additionally, active agriculture lands exist on the western and northern portions of the site. Interstate 5 intersects diagonally through the site and is the east-west boundary that separates the site to the Phase 2 project site. Detailed descriptions of vegetation communities are described in Section 4.3, below.

The Tule Elk State Reserve is located within a section of the western and southern portion of the site. The Tule Elk State Reserve protects a small herd of tule elk (*Cervus canadensis nannodes*), which were once in danger of extinction in California. Some vegetation communities on the Tule Elk State Preserve include non-native grassland, annual grassland, and cattail marsh.

The Kern Water Bank is located on the eastern and southern portion of the site. Developed recharge basins were observed within this section of the site, as well as an access road that runs along the chain-link fence that separates from the Tule Elk State Reserve.

The northern portion of the site consists of mainly active agriculture lands interspersed with native vegetation communities such as bush seepweed scrub, annual grassland, allscale scrub, and quailbrush scrub. Additionally, a small area of urban development (gas station and other buildings), is located approximately in the central portion of the site.

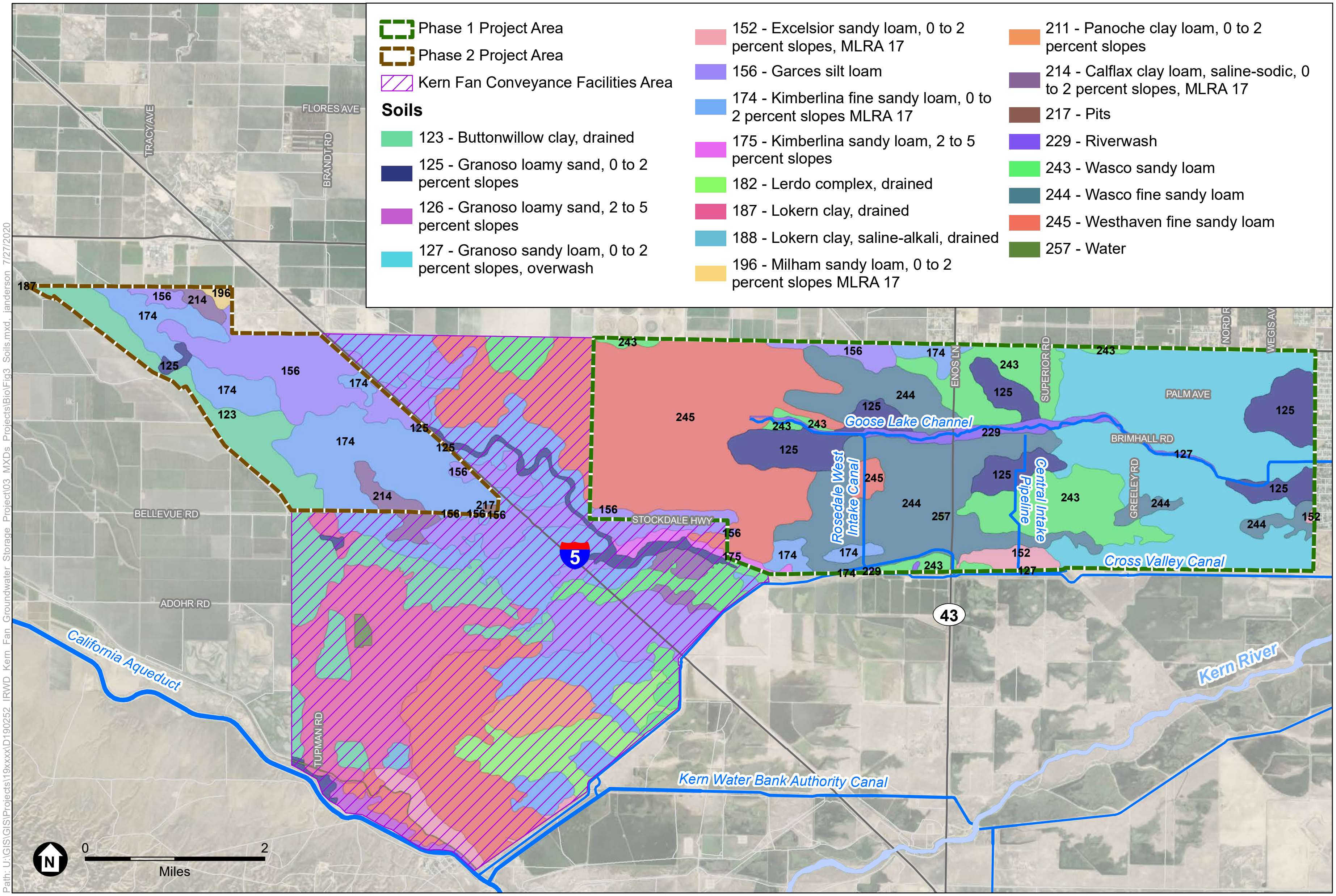
Two jurisdictional features are located on site, the East Side Canal and the Outlet Canal. These features are described in further detail in Section 4.4.

4.1 Climate

The climate of the proposed project is characterized by hot, dry summers with daytime temperatures frequently above 100 degrees Fahrenheit (NOAA 2020). The winter months are cool and foggy with temperatures seldom below freezing and, on average, there are between 250 and 300 frost-free days per year. Average rainfall is less than 10 inches per year with the heaviest rains occurring between January and March (NOAA 2020).

4.2 Soils and Topography

In general, the topography of the project sites is flat at approximately 310 feet above mean sea level (amsl). Soils on the project sites are deep to very deep, well drained, with slow to moderately rapid permeability (NRCS 2020). Descriptions of the 19 soil types found are discussed below and depicted on **Figure 3**.



SOURCE: ESRI; Kern County; USDA, 2020

Kern Fan Groundwater Storage Project

Figure 3
Soils

ESA

Buttonwillow clay, drained

The Buttonwillow clay, drained soil consists of deep, somewhat poorly drained soils formed in alluvium weathered mainly from granite. Buttonwillow soils are in basins and have slopes of 0 to 2 percent. The mean annual precipitation is approximately 5 inches and the mean annual temperature is 63 degrees F.

Granoso loamy sand, 0 to 2 percent slopes and Granoso loamy sand, 0 to 2 percent slopes, overwash, Granoso loamy sand, 2 to 5 percent slopes

The Granoso series consists of very deep, somewhat excessively drained soils that formed in alluvium derived from rocks of mixed mineralogy. The Granoso soils are on alluvial fans and flood plains and have slopes of 0 to 5 percent. The average annual precipitation is approximately 6 inches and the mean annual temperature is about approximately 64 degrees F.

Excelsior sandy loam, 0 to 2 percent slopes, MLRA 17

The Excelsior series consists of very deep, well drained soils on alluvial fans, bars and channels on flood plains. These soils are formed in mixed alluvium dominantly from igneous and calcareous sedimentary rocks. The slope is 0 to 2 percent, mean annual temperature is approximately 63 degrees F. and the mean annual precipitation is approximately 7 inches.

Garces silt loam

The Garces series consists of very deep, well drained saline-sodic soils that formed in granitic alluvium. Garces soils are on alluvial fans, terraces, and basin rims and have slopes of 0 to 2 percent. The mean annual precipitation is approximately 6 inches and the mean annual temperature is approximately 64 degrees F.

Kimberlina fine sandy loam, 0 to 2 percent slopes MLRA 17 and Kimberlina sandy loam, 2 to 5 percent slopes

The Kimberlina series consists of very deep, well drained soils on flood plains and recent alluvial fans. These soils are formed in mixed alluvium derived dominantly from igneous and/or sedimentary rock sources. The slope is 0 to 9 percent, mean annual precipitation is approximately 6 inches and the mean annual temperature is approximately about 64 degrees F.

Lerdo complex, drained

The Lerdo series consists of deep, somewhat poorly drained soils formed in granitic or sedimentary alluvium. Lerdo soils are located on alluvial plains and saline-alkali basins and have slopes of 0 to 2 percent. The mean annual precipitation is approximately 5 inches and the mean annual temperature is approximately 64 degrees F.

Lokern clay, drained, Lokern clay, saline-alkali drained

The Lokern series consists of deep, somewhat poorly drained clayey soils formed from mixed but predominantly granitic alluvium. Lokern soils are located on basins and have slopes of 0 to 2 percent. The mean annual precipitation is approximately 5 inches and the mean annual temperature is approximately 63 degrees F.

Milham sandy loam, 0 to 2 percent slopes MLRA 17

The Milham series consists of very deep, well drained soils on alluvial fans, plains, low terraces and fan remnants. These soils formed in mixed calcareous alluvium weathered from granitic and sedimentary rock. The slope is 0 to 9 percent, average annual precipitation is approximately 7 inches and the mean annual temperature is approximately 64 degrees F.

Panoche clay loam, 0 to 2 percent slopes

The Panoche series consists of very deep, well drained soils on alluvial fans and flood plains. These soils formed in loamy calcareous alluvium from sedimentary rock and slope is 0 to 15 percent. The mean annual precipitation is approximately 6 inches and the mean annual temperature is approximately 63 degrees F.

Calflax clay loam, saline-sodic, 0 to 2 percent slopes, MLRA 17

The Calflax series consists of very deep, moderately well drained soils on fan skirts These soils are formed in alluvium derived from calcareous sedimentary rock. The slope is 0 to 2 percent, mean. The mean annual precipitation is about 7 inches and the mean annual temperature is about 63 degrees F.

Pits

These soils consist of areas that have been excavated for sand or gravel. The areas are mostly on broad outwash plains and terraces of stream valleys and generally range from 3 to 30 acres. These areas have sparse vegetation consisting of drought-resistant plants. Slopes range mostly from 0 to 25 percent and steep escarpments are along the edges of the pits.

Riverwash

This soil is found on barren alluvial areas, usually coarse-textured, exposed along streams at low water and subject to shifting during normal high water.

Wasco sandy loam and Wasco fine sandy loam

The Wasco series consists of very deep, well drained soils on recent alluvial fans and flood plains. These soils formed in mixed alluvium derived mainly from igneous and/or sedimentary rock sources. The slope is 0 to 5 percent slopes, mean annual precipitation is approximately 6 inches and the mean annual temperature is approximately 64 degrees F.

Westhaven fine sandy loam

The Westhaven series consists of very deep, well drained soils that formed in stratified mixed alluvium weathered from sedimentary and/or igneous rocks. Westhaven soils are on alluvial fans and flood plains. The slope is 0 to 5 percent, mean approximately precipitation is about 7 inches and the mean annual temperature is approximately 64 degrees F.

4.3 Vegetation Communities and Land Cover Types

All vegetation communities and land cover types were characterized and delineated on aerial photographs during the field survey, and then digitized on aerial maps using a Geographic Information System software (ArcGIS). The nomenclature used to describe the vegetation is based on *A Manual of California Vegetation,* Second Edition (Sawyer 2009), or characterized based on species dominance when not recognized in the *Manual*. Vegetation communities and land cover types located on the project sites are described in detail below and are depicted on **Figure 4**. It should be noted that the majority of the conveyance facilities project site is located on private property and biologists were unable to access to map vegetation communities and land cover types. The entire conveyance facilities project site was previously mapped and provided on a dataset by the Geographical Information Center at California State University, Chico (CSU Chico 2018). The entirety of these communities cannot be described at this time, as access was not allowed; however, the vegetation community classification locations and acreages are listed below.

Vegetation Communities

Non-Native Grassland

This vegetation community was characterized and mapped in several areas within the Phase 1 and within the eastern and western areas of the conveyance facilities site. The areas adjacent to this community comprise of private residences, recharge basins, roadways, agricultural fields and saltscale scrub. Species observed within this community included Russian thistle and shortpod mustard. This vegetation community consists approximately 2,434.60 acres.

Annual Grassland – Alkali Desert Scrub

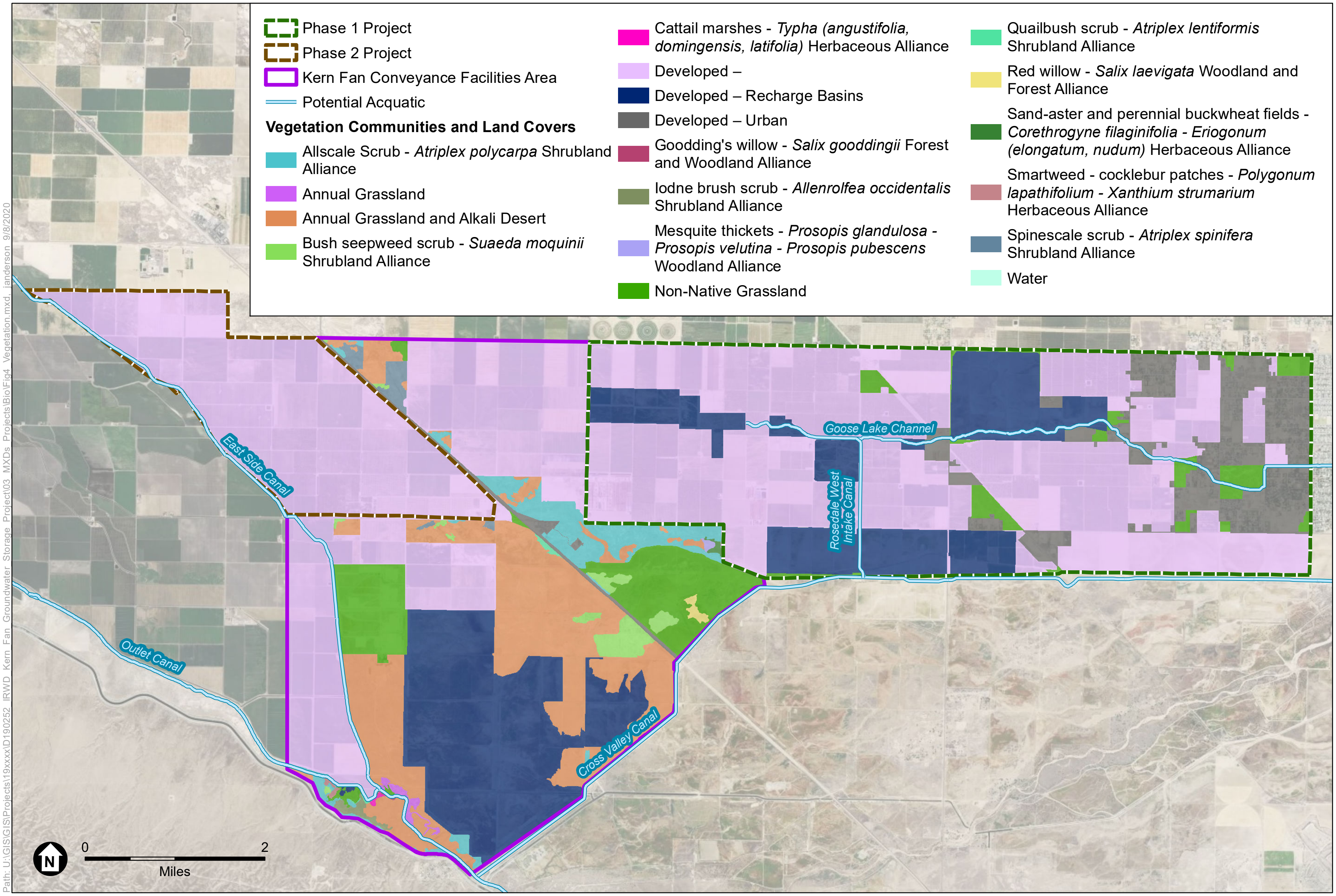
This vegetation community is located in numerous areas, mainly in central and western portions of the conveyance facilities site, and comprises collectively of approximately 2,771acres.

Annual Grassland Scrub

This vegetation community is located in the southern portion of the conveyance facilities site and comprises collectively of approximately 44 acres.

Allscale Scrub – *Atriplex polycarpa* Shrubland Alliance

This vegetation community is located almost exclusively in the central portion of the of the conveyance facilities site and comprises collectively of approximately 662 acres.



SOURCE: ESRI; Kern County; CDFW; ESA.

Kern Fan Groundwater Storage Project

Figure 4
Vegetation Communities and Land Covers

ESA

Spinescale scrub – Atriplex spinifera Shrubland Alliance

This vegetation community is located almost exclusively in the northern portion of the of the conveyance facilities site and comprises collectively of approximately 115 acres. Additionally, several small patches are located in the middle portion of the conveyance facilities site.

Iodine brush scrub – *Allenrolfea occidentalis* Shrubland Alliance

This vegetation community is located in the southeastern portion of the conveyance facilities site and comprises collectively of approximately 39 acres. This community is considered sensitive with a State ranking of S3.2.

Sand-aster and perennial buckwheat fields - *Corethrogyne filaginifolia – Eriogonum (elongatum, nudum*) Herbaceous Alliance

This vegetation community is located within the northern portion of the conveyance facilities site and comprises collectively of approximately 10 acres.

Bush seepweed scrub – *Suaeda moquinii* Shrubland Alliance

This vegetation community is located primarily within the eastern portion of the conveyance facilities site, with a couple small patches located in the northern porton. This community comprises collectively of approximately 220 acres and is considered sensitive with a State ranking of S3.

Smartweed – cocklebur patches – *Polygonum lapathifolium – Xanthium strumarium* Herbaceous Alliance

This vegetation community is located within the southwestern portion of the conveyance facilities site and comprises collectively of approximately 8 acres.

Quailbush scrub – *Atriplex lentiformis* Shrubland Alliance

This vegetation community is located within the northern portion of the conveyance facilities site and comprises collectively of approximately 15 acres.

Goodding's willow - *Salix gooddingii* Forest & Woodland Alliance

This vegetation community is located within southwestern portion of the conveyance facilities site and comprises collectively of approximately 7 acres. This community is considered sensitive with a State ranking of S3.

Red willow – *Salix laevigata* Woodland and Forest Alliance

This vegetation community is located in a small area of the western portion of the conveyance facilities site and comprises collectively of approximately 23 acres. This community is considered sensitive with a State ranking of S3.

Cattail marshes – *Typha* (*angustifolia, domingensis, latifolia*) Herbaceous Alliance

This vegetation community is located in the southwestern portion of the conveyance facilities site and comprises collectively of approximately 5 acres.

Mesquite thickets – Prosopis glandulosa – Prosopis velutina – Prosopis pubescens Woodland Alliance

This vegetation community is located in a small patch in the western portion of the conveyance facilities site and comprises collectively of approximately 5 acres. This community is considered sensitive with a State ranking of S3.

Land Cover Types

Developed – Agriculture

The majority of the Phase 1 project site and entire Phase 2 project site consists of this land cover type. The agricultural land supports orchards and row crops. Crops found within this land cover type include alfalfa, cotton, potato, grape, and pistachio divided by dirt access roads. Additionally, much of the conveyance facilities project site consists of this land cover type, located in the northern and western portions.

Several small areas of bare ground occur along the edges of the access roads where equipment and materials are stored. This land cover type consists approximately 15,375 acres.

Developed – Urban

Several areas within the Phase 1 project site, mainly the eastern portion of the site, contain this land cover type that consists of private residences, businesses, storage yards, and buildings. A small area within the central portion of the conveyance facilities site consists of this land cover type. This land cover type consists approximately 1,905 acres.

Developed – Recharge Basins

Numerous recharge basins reside within the Phase 1 and conveyance facilities project sites. These recharge basins have been converted from previously used agricultural fields. Raised access roads run between the basins with large culverts under each road to connect the basins. As previously discussed, the recharge basins consist of a mix of non-native and native vegetation species such as Russian thistle, shortpod mustard, annual burrweed, horseweed, and allscale saltbush. The recharge basins are also intentionally planted with safflower and rye. This land cover type consists approximately 5,015 acres.

Open Water

The Outlet Canal runs through a small southwestern portion of the conveyance facilities project site and totals approximately 14 acres.

4.4 Aquatic Resources

A formal wetland/jurisdiction delineation was not conducted at the time of the reconnaissance; however, several aquatic resources are located within and immediately adjacent to the project sites could potentially be subject to the regulatory authority of the USACE, CDFW, and/or RWQCB (Figure 4). These jurisdictional features are described below.

Rosedale West Intake Canal

The Rosedale West Intake Canal is a manmade, soft-bottomed channel that pulls water from the California Aqueduct to irrigate the adjacent agriculture fields and recharge basins. The canal lies in a north-south direction and connects with the Goose Lake Channel to the north and the California Aqueduct to the south.

Goose Lake Channel

Goose Lake Channel is a natural, soft bottom channel comprised of dirt and sandy soils dominated by weedy plant species, such as Russian thistle and shortpod mustard. In the western portion of the channel, a small area of bulrush (*Scirpus* sp.) exists within the channel. The eastern portion of Goose Lake Channel, within Phase 1 project site has several Fremont's cottonwood (*Populus fremontii*) interspersed on the south side of the channel. The channel is gravity fed from the Kern River (when water is present) and flows from east to west and eventually settles into a small pond in the western portion of Phase 1. At the time of the reconnaissance, no water was present within Goose Lake Channel. Goose Lake Channel is considered a wildlife corridor, which will be described in more detail in Section 4.8.

East Side Canal

The East Side Canal is a soft-bottomed irrigation canal that originates from a common diversion at Manor Street in Bakersfield. From the common diversion, the canal travels south, where it ties in with the Outlet Canal, located on the Tule Elk State Reserve. The East Side Canal also abuts to the western boundary of the Phase 2 project site.

Outlet Canal

A portion of the Outlet Canal is located in the southwestern portion of the conveyance facilities site, within the Tule Elk State Reserve. At the time of the reconnaissance, the biologists were unable to distinguish features (vegetation species and if water was present) due to access restrictions.

Cross Valley Canal (off-site)

The CVC is a paved canal with consistent, year-round flow that is located just south of the southern boundary of Phase 1 project site. The water in the CVC feeds the adjacent recharge basins.

4.5 Sensitive Natural Communities

Sensitive natural communities are listed by CDFW on their List of Vegetation Alliances and Associations (CDFG 2010). Communities on this list are given a Global (G) and State (S) rarity ranking on a scale of 1 to 5, where communities with a ranking of 5 are the most common and communities with a ranking of 1 are the rarest and of the highest priority to preserve. For the purpose of this report, Sensitive natural communities are those communities that have a state ranking of S3 or rarer, and are generally those that are considered by the CDFW to be imperiled due to their decline in the region and/or the habitat they provide to rare and endemic wildlife species. Continued degradation and destruction of these ecologically important communities could threaten the regional distribution and viability of the community and possibly the sensitive species they support.

A review of the most recent CNDDB records revealed five sensitive natural communities have been recorded in the vicinity of the proposed project that include Great Valley Cottonwood Riparian Forest, Great Valley Mesquite Scrub, Valley Sacaton Grassland, Valley Saltbush, and Valley Sink Scrub; however, none of these communities occur within the project sites.

After reviewing the vegetation communities mapped by California State University, Chico (described in Section 4.3 above), there are five native vegetation communities that are considered sensitive within the conveyance facilities project site, including: Bush seepweed scrub - *Suaeda moquinii* Shrubland Alliance, Goodding's willow - *Salix gooddingii* Forest & Woodland Alliance, Red willow - *Salix laevigata* Woodland and Forest Alliance, Iodine brush scrub - *Allenrolfea occidentalis* Shrubland Alliance, and Mesquite thickets - *Prosopis glandulosa* - *Prosopis velutina* - *Prosopis pubescens* Woodland Alliance, all with an S3 ranking.

4.6 Special-Status Plants

Special-status plants are defined as those plants that, because of their recognized rarity or vulnerability to various causes of habitat loss or population decline, are recognized by federal, state, or other agencies as under threat from human-associated developments. Some of these species receive specific protection that is defined by federal or state endangered species legislation. Others have been designated as special-status on the basis of adopted policies and expertise of state resource agencies or organizations with acknowledged expertise, or policies adopted by local governmental agencies such as counties, cities, and special districts to meet local conservation objectives. Special-status plants are defined as follows:

- Plants listed or proposed for listing as threatened or endangered, or are candidates for possible future listing as threatened or endangered, under the federal Endangered Species Act or the California Endangered Species Act;
- Plants that meet the definitions of rare or endangered under State CEQA Guidelines Section 15380;
- Plants considered by the California Native Plant Society (CNPS) to be rare, threatened, or endangered (Rank 1A, 1B, 2A and 2B plants) in California;

- Plants listed by the CNPS as plants in which more information is needed to determine their status and plants of limited distribution (List 3 and 4 plants); and
- Plants listed as rare under the California Native Plant Protection Act (Fish and Game Code 1900 et seq.)

A review of the CNDDB (CDFW 2020) and the CNPS Inventory of Rare and Endangered Plants (CNPS 2020) revealed a total of 23 special-status plant species recorded within the nine USGS quadrangles that were searched. The potential for special-status plant species to occur on the project sites is based on vegetation and habitat quality, topography, elevation, soils, surrounding land uses, habitat preferences, geographic ranges and visual observations made during the focused sensitive plant surveys. The 23 special-status plant species listed in **Table 1** below were determined to have varying levels of potential to occur within the project sites based on the following criteria:

- **Unlikely:** The project sites and/or immediate area do not support suitable habitat for a particular species, and therefore the proposed project is unlikely to impact this species.
- **Low Potential:** The project sites only provides limited habitat for a particular species. In addition, the known range for a particular species may be outside of the survey area.
- **Medium Potential:** The project sites provide marginal habitat for a particular species.
- **High Potential:** The project sites provide suitable habitat conditions for a particular species and/or known populations occur in the immediate area.
- **Present**: The species has been observed or previously recorded (within the last 10 years) within the project sites.

Special-status plant species with records of occurrences in the region from the CNDDB are listed below in **Table 1 Special-Status Plant Species**.

TABLE 1
SPECIAL-STATUS PLANT SPECIES POTENTIAL TO OCCUR WITHIN PROJECT SITES

Common Name	Scientific Name	Status (Federal/State/CNPS)	Habitat	Potential to Occur
Plants				
Horn's milk vetch	*Astragalus hornii var. hornii*	--/--/1B.1	Meadows and seeps, Playas/lake margins in alkaline soils.	**Unlikely**. Suitable habitat for this species is not present on the project sites.
heartscale	*Atriplex cordulata var. cordulata*	--/--/1B.2	Chenopod scrub, Meadows and seeps, Valley and foothill grassland in sandy/saline or alkaline soils.	**Low**. Suitable soils for this species exist on portions of the project sites but the habitat on site is marginal at best.
Earlimart orache	*Atriplex cordulata var. erecticaulis*	--/--/1B.2	Valley and foothill grassland	**Low.** Suitable soils for this species exist on portions of the project sites but the habitat on site is marginal at best.

Common Name	Scientific Name	Status (Federal/State/CNPS)	Habitat	Potential to Occur
Crownscale	*Atriplex coronata var. coronata*	--/--/4.2	Alkaline and clay soils. Chenopod scrub, valley and foothill grassland, and vernal pools	**Low**. Suitable habitat for this species occurs in the non-native grassland within project sites but is marginal at best.
Lost hills crownscale	*Atriplex coronata var. vallicola*	--/--/1B.2	Chenopod scrub, Valley and foothill grassland, Vernal pools in alkaline soils.	**Low**. Suitable habitat for this species occurs in the non-native grassland within project sites but is marginal at best.
Lesser saltscale	*Atriplex minuscula*	--/--1B.1	Chenopod scrub, Playas, Valley and foothill grassland in alkaline or sandy soils.	**Low**. Suitable habitat for this species occurs in the non-native grassland within project sites but is marginal at best.
Subtle orache	*Atriplex subtilis*	--/--/1B.2	Valley and foothill grassland.	**Medium**. Suitable habitat for this species occurs within the conveyance facilities project site.
Mexican mosquito fern	*Azolla microphylla*	--/--/4.2	Marshes and swamps	**Unlikely**. Habitat requirements are not present on site.
Alkali mariposa lily	*Calochortus striatus*	--/--/1B.2	Chaparral, Chenopod scrub, Mojavean desert scrub, Meadows and seeps in alkaline/ mesic soils.	**Unlikely**. Habitat requirements are not present on project sites.
California jewelflower	*Caulanthus californicus*	FE/CE/1B.1	Sandy soils, chenopod scrub, pinyon and juniper woodland, and valley and foothill grassland	**Medium**. Suitable habitat for this species occurs within conveyance facilities project site.
Slough thistle	*Cirsium crassicaule*	--/--/1B.1	Chenopod scrub, Marshes and swamps (sloughs), and Riparian scrub.	**Medium.** Suitable habitat occurs within conveyance facilities project site.
Recurved larkspur	*Delphinium recurvatum*	--/--/1B.2	Chenopod scrub, Cismontane woodland, and Valley and foothill grassland in alkaline soils.	**Medium**. Suitable habitat for this species occurs in annual grassland within conveyance facilities project site.
Kern mallow	*Eremalche kernensis*	FE/--	Chenopod scrub and Valley and foothill grassland.	**Medium.** Species has been observed within Phase 1 project site; however, occurrences are very old and site is completely disturbed (agriculture fields) where occurrences were documented. Suitable habitat exists within conveyance facilities project site.

Common Name	Scientific Name	Status (Federal/State/CNPS)	Habitat	Potential to Occur
Hoover's eriastrum	*Eriastrum hooveri*	--/--/4.2	Gravelly soils supporting Chenopod scrub, Pinyon and juniper woodland, and Valley and foothill grassland.	**Medium.** Species has been observed within Phase 1 project site; however, occurrences are very old and site is completely disturbed (agriculture fields) where occurrences were documented. Suitable habitat occurs within conveyance facilities project site.
Cottony buckwheat	*Eriogonum gossypinum*	--/--/4.2	Clay soils. Chenopod scrub and valley and foothill grassland.	**Unlikely**. Habitat requirements are not present on project sites.
Tejon poppy	*Eschscholzia lemmonii ssp. kernensis*	--/--/1B.1	Chenopod scrub and Valley and foothill grassland.	**Low**. Suitable habitat for this species occurs in the non-native grassland within project sites but is marginal at best.
Golden goodmania	*Goodmania luteola*	--/--/4.2	Alkaline or clay soils. Mojavean desert scrub, meadows and seeps, playas, and valley and foothill grassland.	**Unlikely**. Habitat requirements are not present on project sites.
Vernal barley	*Hordeum intercedens*	--/--/3.2	Coastal dunes, coastal scrub, valley and foothill grassland (saline flats and depressions), and vernal pools.	**Unlikely**. Habitat requirements not present on project sites.
Coulter's goldfields	*Lasthenia glabrata ssp. coulteri*	--/--/1B.1	Marshes and swamps (coastal salt), Playas, and Vernal pools.	**Unlikely.** Habitat requirements not present on project sites.
San Joaquin woolythreads	*Monolopia congdonii*	FE/--/1B.2	Chenopod scrub and Valley and foothill grassland in sandy soils.	**Medium.** Suitable habitat for this species occurs within conveyance facilities project site.
Oil neststraw	*Stylocline citroleum*	--/--/1B.1	Chenopod scrub, Coastal scrub, valley and Foothill grassland in clay soils.	**Low**. Suitable habitat for this species occurs in the non-native grassland within project sites but is marginal at best.
Mason's neststraw	*Stylocline masonii*	--/--/1B.1	Chenopod scrub and pinyon and juniper woodland	**Low**. Suitable habitat for this species occurs in the non-native grassland within project sites but is marginal at best.
San Joaquin bluecurls	*Trichostema ovatum*	--/--/4.2	Chenopod scrub and valley and foothill grassland	**Low**. Suitable habitat for this species occurs in the non-native grassland within project sites.

Key:

Status (Federal/State): FE-federally endangered; SE-state endangered

Status (CNPS): List 1B = Plants Rare, Threatened, endangered in California and elsewhere, List 2 = Plants Rare, Threatened, or, Endangered in California, But More Common Elsewhere, List 4 = Plants of Limited Distribution - A Watch List. Threat ranks .1 = seriously Endangered in California, .2 = fairly Endangered in California, .3 = Not very threatened in California (low degree/immediacy of threats or no current threats known).

4.7 Wildlife

Numerous wildlife species were observed during the reconnaissance that are common to the region. Nomenclature for wildlife species observed or expected to occur within the project sites follow Jameson & Peeters (2004) for mammals, Jennings & Hayes (1994) and Stebbins (1985) for amphibians and reptiles, and Sibley (2013) for birds.

Avian species observed included killdeer (*Charadrius vociferous*), house finch (*Haemorhous mexicanus*), song sparrow (*Melospiza melodia*), Eurasian collared dove (*Streptopelia dec*aocto), California scrub jay (*Aphelocoma californica*), brown-headed cowbird (*Molothrus ater*), red-tailed hawk (*Buteo jamaicensis*), common raven (*Corvus corax*), western kingbird (*Tyrannus verticalis*), northern mockingbird (*Mimus polyglottos*), greater yellow legs (*Tringa melanoleuca*), great egret (*Ardea alb*a), great blue heron (*Ardea Herodias*), and cliff swallow (*Petrochelidon pyrrhonota*). Mammal species observed included desert cottontail (*Sylvilagus audubonii*), California ground squirrel (*Otospermophilus beecheyi*), coyote (*Canis latrans*), and tule elk (*Cervus canadensis nannodes*). One reptile species was observed, western fence lizard (*Sceloporus occidentalis*). No amphibians were observed.

Three special-status wildlife species were observed during the reconnaissance. Two separate Swainson's hawks (*Buteo swainsoni*) were observed flying overhead the Phase 2 project site. One California horned lark (*Eremophila alpestris actia*) was heard vocalizing within the interior orchards of Phase 2 project site. One deceased American badger (*Taxidea taxus*) was observed along the southern boundary of the Phase 1 project site. The badger was most likely struck by a passing vehicle on Stockdale Highway, south of the southern boundary.

Numerous other common wildlife species are expected to forage and/or breed within the habitats that occur within the Phase 1 and Phase 2 project sites that include, but not limited to, deer mice (*Peromyscus* sp,), side-blotched lizard (*Uta* sp.), and red-shouldered hawk (*Buteo lineatus*).

4.8 Special-Status Wildlife

Special-status wildlife species are defined as those animals that, because of their recognized rarity or vulnerability to various forms of habitat loss or population decline, are recognized by federal, state, or other agencies as under threat from human-associated developments. Some of these species receive specific protection that is defined by federal or state endangered species legislation. Others have been designated as special-status on the basis of adopted policies and expertise of state resource agencies or organizations with acknowledged expertise, or policies adopted by local governmental agencies such as counties, cities, and special districts to meet local conservation objectives. Special-status wildlife species evaluated in this BRTR include:

- Wildlife listed or proposed for listing as threatened or endangered, or are candidates for possible future listing as threatened or endangered, under the federal Endangered Species Act or the California Endangered Species Act;
- Wildlife that meet the definitions of rare or endangered under State CEQA Guidelines Section 15380.

- Wildlife covered under an adopted NCCP/HCP;
- Wildlife designated by CDFW as species of special concern, included on the Watch List or are considered Special Animals;
- Wildlife "fully protected" in California (Fish and Game Code Sections 3511, 4700, and 5050); and
- Avian species protected by the MBTA

A review of the most recent CNDDB (CDFW, 2020) records for the project sites revealed 32 special-status wildlife species previously recorded within the project sites. The 32 special-status wildlife species listed in **Table 2** below were determined to have varying levels of potential to occur within the project sites based on the following criteria:

- **Unlikely:** The project sites and/or immediate area do not support suitable habitat for a particular species, and therefore the proposed project is unlikely to impact this species.
- **Low Potential:** The project sites only provides limited habitat for a particular species. In addition, the known range for a particular species may be outside of the survey area.
- **Medium Potential:** The project sites provide marginal habitat for a particular species.
- **High Potential:** The project sites provide suitable habitat conditions for a particular species and/or known populations occur in the immediate area.
- **Present**: The species has been observed or previously recorded (within the last 10 years) within the project sites.

Special-status wildlife species with records of occurrences in the region from the CNDDB are listed below in **Table 2 Special-Status Wildlife Species**. Records of special-status wildlife species detected within three miles of the project sites are depicted on **Figure 5**, while special-status wildlife species detected during the reconnaissance are depicted on **Figure 6**.

TABLE 2
POTENTIALLY OCCURRING SPECIAL-STATUS WILDLIFE SPECIES WITHIN PROJECT SITES

Common Name	Scientific Name	Status (Federal/ State)	Habitat	Potential to Occur
Birds				
tricolored blackbird	*Agelaius tricolor*	--/ST	Tricolored blackbirds have three basic requirements for selecting their breeding colony sites: open, accessible water; a protected nesting substrate, including flooded, thorny, or spiny vegetation; and a suitable foraging space providing adequate insect prey within a few miles of the nesting colony.	**Medium**. The open water canals on and adjacent to the Phase 1 and Phase 2 project sites can support this species. Species has been previously observed within Phase 1 and adjacent to Phase 2 project sites, where the species could potentially nest in the water canals.

Common Name	Scientific Name	Status (Federal/ State)	Habitat	Potential to Occur
burrowing owl	*Athene cunicularia*	--/SSC	Found in open, dry grasslands, agricultural and range lands, and desert habitats often associated with burrowing animals, particularly prairie dogs, ground squirrels and badgers.	**High**. The non-native grasslands present within Phase 1 project site contains suitable habitat. Species has been observed to the north and northeast of Phase 1 project site.
Swainson's hawk	*Buteo swainsoni*	--/ST	Forages in a wide variety of open habitats, ranging from prairie and shrublands to desert and intensive agricultural systems. Within California, the species is strongly associated with riparian areas within desert, shrubsteppe, grassland, and agricultural habitats.	**Present**. Two adults were observed flying overheard the Phase 2 project site. The project sites contain suitable nesting habitat.
western snowy plover (inland)	*Charadrius alexandrines nivosus*	--/SSC	Nests and forages near playas and inland lakes.	**Unlikely.** The species is believed to be extirpated from the region. The species' only occurrence record in the vicinity of the project sites was recorded in 1912 (ESA 2013).
mountain plover	*Charadrius montanus*	--/SSC	Favored habitats include prairie dog towns, areas heavily grazed by domestic livestock or wild herbivores, bare ground areas near artificial watering structures, recently burned or mowed areas, and recently fallowed or tilled crop fields. Found in grasslands, freshly plowed and newly sprouting grain fields, and sod farms. Prefers grazed areas and areas with burrowing rodents.	**Low.** The project sites provide suitable habitat for the species; however, the only occurrence for the species was within the conveyance facilities project site in 1990.
western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	FT/SE	Prefers open woodlands with clearings and a dense shrub layer. They are often found in woodlands near streams, rivers or lakes.	**Unlikely**. Habitat requirements not present on project sites.
fulvous whistling-duck	*Dendrocygna bicolor*	--/SSC	Rice fields, swamplands, marshes with lots of reeds and swamp vegetation.	**Unlikely**. Habitat requirements not present on project sites.
white-tailed kite	*Elanus leucurus*	--/FP	Found in rolling foothills, and valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodlands. Foraging habitat includes open grasslands, meadows, or marshes close to dense topped trees for nesting and perching	**Low**. Habitat requirements not present on site. One detection was made approximately half-mile south of Phase 1 project site in 1992.
California horned lark	*Eremophila alpestris actia*	--/WL	Species frequents open ground, farmland, prairies, and deserts.	**Present**. A single adult was heard vocalizing within Phase 2 project site.
white-faced ibis (nesting colony)	*Plegadis chihi*	--/WL	Frequents marshes, swamps, ponds and rivers.	**Unlikely**. Nesting habitat requirements not present on project site. Likely to occur foraging as this species utilizes agricultural fields such as alfalfa for foraging.

Common Name	Scientific Name	Status (Federal/ State)	Habitat	Potential to Occur
Le Conte's thrasher	*Toxostoma lecontei*	--/SSC	Generally, found in open desert scrub, alkali desert scrub, and desert succulent scrub. In the San Joaquin Valley, the species is found primarily in habitats dominated by saltbush, and often frequents desert washes and flats with scattered saltbush.	**Low.** The species may occur in the vicinity of the project sites, but is unlikely to occur within the project sites due to the low quality and minimal availability of suitable habitat.
least Bell's vireo	*Vireo belli pusillus*	FE/SE	Dense, low, shrubby vegetation, generally early successional stages in riparian areas, brushy fields, woodland, scrub oak, coastal chaparral, and often near water in arid regions.	**Unlikely**. Habitat requirements not present on project sites.
Mammals				
Nelson's antelope squirrel	*Ammospermophilus nelsoni*	--/FT	In the southern and western San Joaquin Valley, San Joaquin antelope squirrels are associated with open, gently sloping land with shrubs. Typical vegetation includes saltbushes and *Ephedra* sp. and sparsely vegetated, loamy soils.	**Medium**. Several CNDDB detections have been made within or adjacent to the project sites.
giant kangaroo rat	*Dipodomys ingens*	FT/ST	Prefer annual grassland on gentle slopes of generally less than 10 degrees, with friable, sandy-loam soils in the San Joaquin Valley.	**Low.** The species may occur in the vicinity of the project, but is unlikely to occur within Phase 1 and Phase 2 project sites. The non-native grassland within Phase 1 project site provides minimal suitable habitat for the species. There has been one record of the species located approximately three miles southwest of Phase 2 project site in 1990.
short-nosed kangaroo rat	*Dipodomys nitratoides brevinasus*	--/SSC	Found in the western San Joaquin Valley; mostly on flat and gently sloping terrain and on hilltops in desert-shrub associations, primarily saltbushes and California ephedra.	**Low.** The species may occur in the vicinity of the project, but is unlikely to occur within Phase 1 and Phase 2. The non-native grassland within Phase 1 project site provides minimal suitable habitat for the species. There has been one records of the species; located approximately three miles southwest of Phase 2.
Tipton kangaroo rat	*Dipodomys nitratoides nitratiodes*	FE/SE	Limited to arid-land communities occupying the Valley floor of the Tulare Basin of the San Joaquin Valley, on level or nearly level terrain.	**Medium**. Habitat exists on Phase 1 and Phase 2 project sites and species has been detected twice (1990 and 2002) within Phase 1. Additionally, numerous detections have been made within three miles.

Common Name	Scientific Name	Status (Federal/ State)	Habitat	Potential to Occur
western mastiff bat	*Eumops perotis californicus*	--/SSC	Found in open, semi-arid to arid habitats including conifer and deciduous woodlands, coastal scrub, grasslands, chaparral, etc. Roosts in crevices in cliff faces, high buildings, trees and tunnels.	**Unlikely**. Habitat requirements not present on project sites.
Tulare grasshopper mouse	*Onychomys torridus tularensis*	--/SSC	Tulare grasshopper mice typically inhabit arid shrubland communities in hot, arid grassland and shrubland associations.	**Low.** The species may occur in the vicinity of the project, but is unlikely to occur within project sites. The non-native grassland within the project sites provide minimal suitable habitat for the species.
San Joaquin pocket mouse	*Perognathus inornatus*	--/SSC	Occurs in dry, open grasslands or scrub areas on fine-textured soils.	**Low.** The species may occur in the vicinity of the project, but is unlikely to occur within project sites The non-native grassland within the project sites provide minimal suitable habitat for the species.
Buena Vista Lake ornate shrew	*Sorex ornatus relictus*	FE/SSC	Occupies the marshlands of the San Joaquin Valley and the Tulare Basin.	**Unlikely**. Habitat requirements not present on project sites.
American badger	*Taxidea taxus*	--/SSC	Prefers to live in dry, open grasslands, farmlands, fields, and pastures	**Present**. A deceased adult was observed on the southern border of the Phase 1 project site. Was most likely struck by a vehicle on Stockdale Highway.
San Joaquin kit fox	*Vulpes macrotis mutica*	FE/ST	Include grasslands and scrublands with active oil fields, wind turbines, and an agricultural matrix of row crops, irrigated pasture, orchards, vineyards, and grazed annual grasslands (non-irrigated pasture).	**High**. Species was not detected during reconnaissance; however, numerous observations on Phase 1 and Phase 2 project sites and immediately adjacent have been documented. The observations were made over 30 years ago; however, suitable habitat is present.
Reptiles				
Bakersfield legless lizard	*Anniella grinnelli*	--/SSC	Occurs in moist, loose soil and sparsely vegetated areas.	**Low**. Suitable habitat is very minimal; however, one observation was made within Phase 1 project site in 2006.
California glossy snake	*Arizona elegans occidentalis*	--/SSC	Inhabits arid scrub, rocky washes, grasslands, and chaparral.	**Unlikely**. Habitat requirements not present on project sites.
western pond turtle	*Emys marmorata*	--/SSC	Ponds and small lakes with abundant vegetation. Also seen in marshes, slow-moving streams, reservoirs, and occasionally in brackish water.	**Low.** Species has been detected within the conveyance facilities project site; however, this detection was in 1990.Goose Lake Channel could potentially support this species when inundated with water.

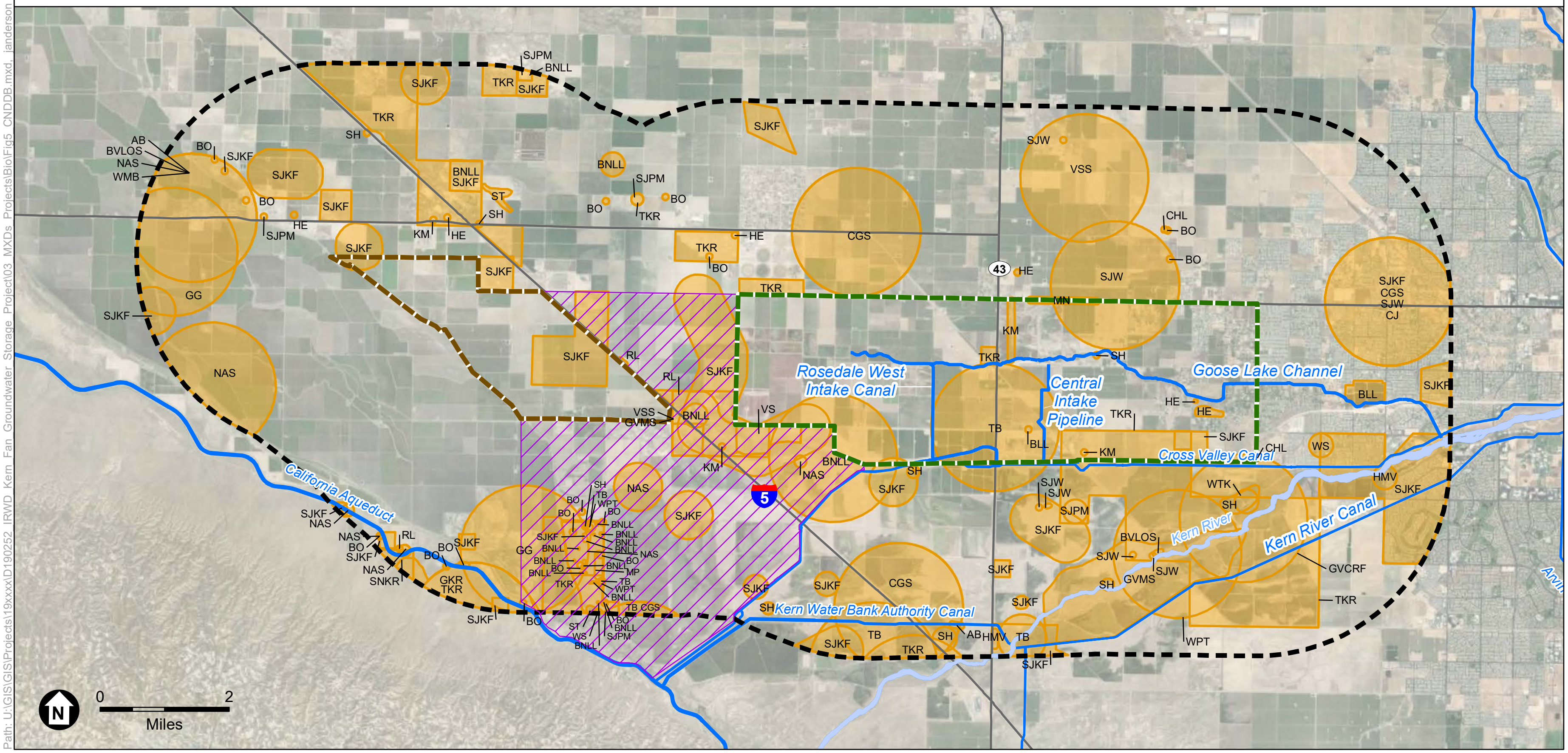
Common Name	Scientific Name	Status (Federal/ State)	Habitat	Potential to Occur
blunt-nosed leopard lizard	*Gambelia sila*	FE/SE	Blunt-nosed leopard lizards live in the San Joaquin Valley region in expansive, arid areas with scattered vegetation. Today they inhabit non-native grassland and alkali sink scrub communities of the Valley floor marked by poorly drained, alkaline, and saline soils, mainly because remaining natural land is of this type. Use small mammal burrows for permanent shelter and dormancy.	**Medium**. One detection of species documented in Phase 1 project site in 2012, as well as several observations within three miles. Suitable habitat on Phase 1 project site (non-native grassland) provides marginal habitat for the species; however, the community is unlikely to support a population of the species.
San Joaquin coachwhip	*Masticophis flagellum ruddocki*	--/SSC	Associated with open, dry habitats, with little to no tree cover; found in valley grassland and saltbush scrub in the San Joaquin valley. Species needs mammal burrows for refuge and ovipositor sites.	**Low**. Habitat requirements are minimal on project sites and no CNDDB detections have been made.
coast horned lizard	*Phrynosoma blainvillii*	--/SSC	Found in a wide variety of vegetation types including coastal sage scrub, annual grassland, chaparral, oak woodland, riparian woodland and coniferous forest.	**Low.** Minimal suitable habitat for the species exists within the project sites.
western spadefoot	*Spea hammondii*	--/SSC	Prefers open areas with sandy or gravelly soils, in a variety of habitats including mixed woodlands, grasslands, chaparral, sandy washes, lowlands, river floodplains, alluvial fans, playas, alkali flats, foothills, and mountains. Rainpools which do not contain bullfrogs, fish, or crayfish are necessary for breeding.	**Low**. Project sites provide very minimal habitat. One CNDDB detection was made within the southwestern corner of the conveyance facilities site in 1996.
giant gartersnake	*Thamnophis gigas*	FE/SE	Ideal habitat would be characterized as having dense emergent vegetation for escape from predation, deep and shallow pools of water (which persist throughout the seasonal cycle of activity) in which to forage and seek cover, open areas along the margins to allow for basking, and upland habitat with access to structures suitable for hibernation and escape from flooding.	**Low.** Species has not been detected within project sites (CNDDB 2020) and project sites provide minimal suitable habitat.
Invertebrates				
Crotch bumble bee	*Bombua crotchii*	--/CE	Inhabits grassland and scrub areas, requiring hot weather.	**Low.** Minimal suitable habitat occurs within project sites and no CNDDB detections have been made.
Hopping's blister beetle	*Lytta hoppingi*	--/SSC	Species is found on flowers.	**Unlikely**. Habitat requirements not present on project sites.

<u>Status</u>

Federal: FE-federally endangered, FT – federally threatened

State: SE – state endangered; state threatened; FP – State Fully Protected, SSC – State Species of Special Concern, CE-Candidate for listing as Endangered

Phase 1 Project Area
Phase 2 Project Area
Kern Fan Conveyance Facilities Area
3-mile Buffer
CNDDB Occurrences
AB - American badger
BLL - Bakersfield legless lizard
BNLL - blunt-nosed leopard lizard
BO - burrowing owl
BVLOS - Buena Vista Lake ornate shrew
CGS - California glossy snake
CHL - California horned lark
CJ - California jewelflower
GG - giant gartersnake
GKR - giant kangaroo rat
GVCRF - Great Valley Cottonwood Riparian Forest
GVMS - Great Valley Mesquite Scrub
HE - Hoover's eriastrum
HMV - Horn's milk-vetch
KM - Kern mallow
MN - Mason's neststraw
MP - mountain plover
NAS - Nelson's antelope squirrel
RL - recurved larkspur
SH - Swainson's hawk
SJKF - San Joaquin kit fox
SJPM - San Joaquin Pocket Mouse
SJW - San Joaquin woollythreads
SNKR - short-nosed kangaroo rat
ST - slough thistle
ST - subtle orache
TB - tricolored blackbird
TKR - Tipton kangaroo rat
VS - Valley Sink Scrub
VSS - Valley Saltbush Scrub
WMB - western mastiff bat
WPT - western pond turtle
WS - western spadefoot
WTK - white-tailed kite



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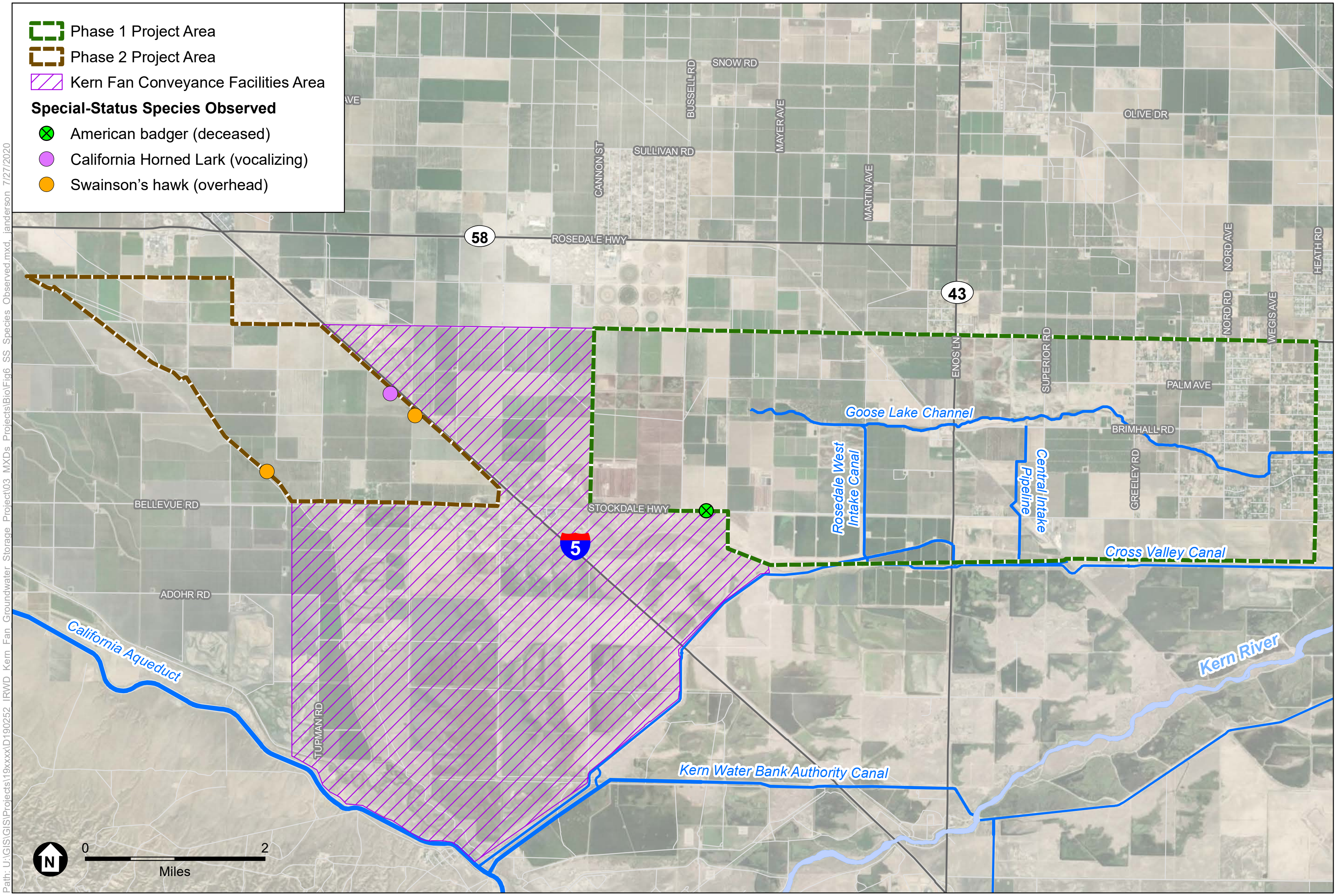
SOURCE: ESRI; Kern County; CDFW

Kern Fan Groundwater Storage Project
Figure 5
CNDDB

ESA



SOURCE: ESRI; Kern County

Kern Fan Groundwater Storage Project

Figure 6
Special-Status Species Observed

ESA

4.9 Wildlife Movement Corridors

Wildlife movement corridors are areas where regional wildlife populations regularly and predictably move during dispersal or migration. Movement corridors in California are typically associated with ridgelines, valleys, rivers and creeks supporting riparian vegetation. Movement corridors link together areas of suitable wildlife habitat that are otherwise separated by rugged terrain, changes in vegetation, by human disturbance, or by the encroachment of urban development. Movement corridors are important as the combination of topography and other natural factors, in addition to urbanization, has fragmented or separated large open space areas. Several wildlife corridors are present within or adjacent to the project sites and are described below.

The Central Valley as a whole, is a wildlife corridor and resting stop for migrating birds along the Pacific Flyway. The Pacific Flyway is a major north-south flyway for migratory birds in America, extending from Alaska to Patagonia. Every year, migratory birds travel some or all of this distance both in spring and in fall, following food sources, heading to breeding grounds, or travelling to overwintering sites. Birds that are migrating along the Pacific Flyway may stop to rest within the recharge basins, Goose Lake Channel or numerous canals in the area to feed and/or rest before continuing their migration. Some species may remain locally for the entire season, but most stay a few days before moving on (Wilson 2010).

Goose Lake Channel, situated within the Phase 1 project site, is considered a wildlife corridor. Goose Lake Channel is a natural channel that flows in an east to west direction and originates from the Kern River. Water is fed from the Kern River by gravity into the channel, which provides water for the recharge basins within the Phase 1 project site. In an on-site discussion with Rosedale Engineer Technician Markus Nygren, he related that Goose Lake Channel provides habitat for aquatic species such as largemouth bass (*Micropterus salmoides*) that come from the Kern River. Additionally, Mr. Nygren has observed waterfowl species such as mallard (*Anas platyrhynchos*) and northern shoveler (*Spatula clypeata*) using the channel, when water is present, for foraging (M. Nygren, personal communication, July 7, 2020).

The Kern Water Bank is located within the conveyance facilities project site. This area is relatively flat and potentially create a corridor to both the Phase 1 and Phase 2 project sites. The habitat value of the Kern Water Bank is deemed high, as the many of the native vegetation communities and habitats have not been disturbed or altered. Migratory and common birds use the recharge basins at the Kern Water Bank as habitat. The American badger that was observed deceased at the southern boundary of the Phase 1 project site during the reconnaissance was most likely traveling from the Phase 1 project site to the Kern Water Bank property, or vice versa.

CHAPTER 5

Project Impacts and Avoidance, Minimization, and Mitigation

5.1 Approach to the Analysis

The proposed project is expected to result in both adverse and beneficial impacts—direct, indirect, and cumulative—to biological resources. There are construction, operational, and maintenance impacts that could result in adverse impacts. Beneficial impacts could occur from the operation and maintenance of the proposed project and include the creation of intermediate wetlands and bird habitat and the provision of water for fisheries. In this section, we examine and describe both impact types.

Under the stipulations of CEQA, potential impacts to biological resources could be considered significant if actions associated with the proposed project are not mitigated. In this section, the impact mechanisms for the potential impacts are described. In Section *5.2, Thresholds of Significance,* the CEQA thresholds for biological resources are provided. In Section 5.3, *Impact Analysis,* the potential impacts of the proposed project are evaluated in terms of the thresholds of significance—both beneficial and adverse impacts. For potential adverse impacts deemed significant to biological resources, avoidance, minimization, and mitigation measures were developed and are provided in Section 5.4, *Avoidance, Minimization, and Mitigation Measures.* Implementation of the proposed measures would result in a less than significant impact determination for biological resources from the proposed project.

Impact mechanisms from construction, operations, and maintenance activities used to evaluate the adverse and beneficial impacts are as follows:

- **Habitat modification (adverse).** Direct or indirect impacts could result from habitat modification during construction, operations, and maintenance. Impacts to biological resources would result primarily during earth and vegetation/orchard removal, grading, digging, and equipment movement during construction. Vegetation and facility maintenance during operations and maintenance could also result in impacts. More mobile species like birds and larger mammals are expected to disperse into nearby habitat areas during activities. Active nesting birds and active burrows for species such as blunt-nosed leopard lizard and Tipton kangaroo rat could potentially be impacted by grading and vegetation removal and maintenance activities. These activities could result in the direct mortality from the crushing of occupied burrows or destruction of occupied nests. Special-status plant species with potential to occur on site could also be impacted by construction and maintenance activities. This includes known occurrences and species with a potential to occur within the conveyance facilities project site. Direct impacts include trampling or destruction of the plants from construction equipment or removal during maintenance activities. Direct impacts include trampling or destruction of the plants from construction equipment or removal during maintenance activities.

- **Habitat modification (beneficial).** Intermittent wetlands will be established during recharge events in the recharge basins during proposed project operation. During the years that the proposed project takes and recharges water into storage, the basins will be inundated with water and will provide intermittent wetland habitat to support waterfowl, shorebirds, raptors and other migratory birds along the Pacific Flyway. The fishery ecosystem and special-status fish species associated with the Sacramento-San Joaquin River Delta (Delta) could be beneficially affected by habitat modifications during operations of the proposed project. The fishery ecosystem and special-status fish species benefits are detailed in Appendix C and summarized in the impact analysis below.
- **Pesticide use (adverse)**. Direct or indirect impacts could result from pesticide use during operations and maintenance. Use of pesticides and rodenticides is proposed for use to control weeds and rodents. Special-status wildlife and animal species in the project sites could potentially be impact from pesticide use.
- **Exterior lighting (adverse).** Use of nighttime lighting on the project sites could affect the level of use by wildlife. Nighttime lighting could potentially expose special-status species trying to evade predators within their habitats.
- **Vehicle collisions (adverse)**. The use of access roads by construction/maintenance vehicles could result in accidental road-mortality if these species occur on roads during construction and operations and maintenance activities. Vehicles could cause direct mortality or injury to wildlife that are unable to move out of the way of vehicle traffic. Vehicle and equipment travel on dirt access roads during operation and maintenance may disturb special-status wildlife and plant species. Vehicle collisions with San Joaquin kit fox, American badger, burrowing owl and other medium-large species could occur.

5.2 Thresholds of Significance

Based on Appendix G of the CEQA Guidelines, the proposed project would result in a significant impact on biological resources if it would:

1. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.
2. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service.
3. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.
4. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

5. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.
6. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

5.3 Impacts Analysis

Issue 1: Would the proposed project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Special Status Plant and Wildlife

Special-Status Plants

Special-status plants have the potential to be present in the conveyance facilities project site and could be affected by the proposed project. Numerous native vegetation communities are present within the conveyance facilities project site that could support seven special-status plant species, with medium potential to occur. These species are California jewelflower, Hoover's eriastrum, Kern mallow, recurved larkspur, San Joaquin woollythreads, slough thistle, and subtle orache. These species could be adversely affected by habitat modification or pesticide use. Mitigation measures are recommended to be implemented prior to the commencement of construction activities (described below in Section 5.4).

Based on the lack of suitable habitat and previous disturbance from agriculture and residential development, no special-status plant species are expected to occur on the Phase 1 or Phase 2 project sites, though several CNDDB detections have been made. Based on the date of documentation of CNDDB occurrences and current habitat conditions and site use, these occurrences are expected to be extirpated.

Special-Status Wildlife

Species-status wildlife species have the potential to be present in the project sites and could be affected by the proposed project. Based on the presence of suitable habitat within the project sites, there is a medium or high potential for six special-status wildlife species to occur in the project sites: burrowing owl, tricolored blackbird, Tipton kangaroo rat, blunt-nosed leopard lizard, Nelson's antelope squirrel, and San Joaquin kit fox. Additionally, three special-status wildlife species were detected during the reconnaissance: Swainson's hawk, California horned lark, and American badger. Numerous other special-status wildlife species have been detected within or adjacent to the project sites including: western pond turtle, and mountain plover; however, almost all of these detections are between 30 and 75 years old (CNDDB 2020) and are not expected on site.

These species could be adversely affected by habitat modification, pesticide use, exterior lighting, and vehicle collisions during construction. Post-construction habitat modification is expected to improve or maintain habitat conditions for all special-status species. The intermittent wetland habitat could improve foraging conditions for all special-status species by increasing prey availability. Upland vegetation and agricultural lands could maintain habitat value for all special-status species. The berms could provide burrow locations for the special-status mammals, burrowing owl, and blunt-nosed leopard lizard. Installation of raptor boxes and perches could attract Swainson's hawk. If special-status species become established on site post-construction, avoidance and minimization measures would be required during operations and maintenance. Mitigation measures are recommended to be implemented (described below in Section 5.4).

Nesting Birds

Nesting birds have the potential to be present in the project sites and could be affected by the proposed project. Migratory and common bird species may utilize all habitats within the project sites, including but not limited to, trees, vegetation, and building structures for foraging and breeding purposes. These species could be adversely affected by habitat modification, pesticide use, exterior lighting, and vehicle collisions during construction. Post-construction habitat modification is expected to improve habitat conditions. If nesting birds become established on site post-construction, avoidance and minimization measures would be required during operations and maintenance. Mitigation measures are recommended to be implemented (described below in Section 5.4).

Fishery Ecosystem and Special-Status Fish

The fishery ecosystem and special-status fish species associated with the Sacramento-San Joaquin River Delta (Delta) could be beneficially affected by habitat modifications during operations of the proposed project. The California Water Commission (CWC) has administered the Water Storage Investment Program (WSIP) to fund public benefits of eight water storage projects, one of them being the Kern Fan Groundwater Storage Project (CWC 2020). The WSIP identifies 16 priorities for ecosystem benefits to the fishery ecosystem. These 16 ecosystem benefits include:

- Priority 1: Provide cold water at times and locations to increase the survival of salmonid eggs and fry.
- Priority 2: Provide flows to improve habitat conditions for in-river rearing and downstream migration of juvenile salmonids.
- Priority 3: Maintain flows and appropriate ramping rates at times and locations that will minimize dewatering of salmonid redds and prevent stranding of juvenile salmonids in side channel habitat.
- Priority 4: Improve ecosystem water quality.
- Priority 5: Provide flows that increase dissolved oxygen and lower water temperatures to support anadromous fish passage.
- Priority 6: Increase attraction flows during upstream migration to reduce straying of anadromous species into non-natal tributaries.

- Priority 7: Increase Delta outflow to provide low salinity habitat for Delta smelt, longfin smelt, and other estuarine fishes in the Delta, Suisun Bay, and Suisun Marsh.
- Priority 8: Maintain or restore groundwater and surface water interconnection to support instream benefits and groundwater dependent ecosystems.
- Priority 9: Enhance flow regimes or groundwater conditions to improve the quantity and quality of riparian and floodplain habitats for aquatic and terrestrial species.
- Priority 10: Enhance the frequency, magnitude, and duration of floodplain inundation to enhance primary and secondary productivity and the growth and survival of fish.
- Priority 11: Enhance the temporal and spatial distribution and diversity of habitats to support all life stages of fish and wildlife species.
- Priority 12: Enhance access to fish spawning, rearing, and holding habitat by eliminating barriers to migration.
- Priority 13: Remediate unscreened or poorly screened diversions to reduce entrainment of fish.
- Priority 14: Provide water to enhance seasonal wetlands, permanent wetlands, and riparian habitat for aquatic and terrestrial species on State and Federal wildlife refuges and on other public and private lands.
- Priority 15: Develop and implement invasive species management plans utilizing techniques that are supported by best available science to enhance habitat and increase the survival of native species.
- Priority 16: Enhance habitat for native species that have commercial, recreational, scientific, or educational uses.

Ecosystem Priority 2 and 12 are the primary beneficiaries of an April flow pulse on the Feather River (CFS 2020). Both priorities seek to enhance the access to spawning grounds and flows to improve habitat conditions for in-river rearing and downstream migration of juvenile salmonids, respectively. Species that would see these benefits to their migration and spawning patterns include Central Valley juvenile spring-run Chinook salmon (*Oncorhynchus tshawytscha*), Central Valley juvenile winter-run Chinook salmon, juvenile steelhead (*Oncorhynchus mykiss*), and green sturgeon (*Acipenser medirostris*).

Cramer Fish Sciences (CFS) (2020, **Appendix C**) consulted with MBK Engineers and IRWD to determine how an additional water supply of 18 thousand acre-feet (TAF) made available by the proposed project could be used to provide the greatest benefit to ecosystem priorities for fisheries. Monthly flow data (1922 through 2003) representing two future conditions (2030 and 2070) and two scenarios (Project and no project) were provided by MBK Engineers. A total of four different CALSIM[1] scenarios were analyzed. Under existing conditions, the Feather River's baseflow is less than 3,000 cfs in dry years and could be as low as 1,000 cfs (the minimum flow required). CFS recommended a pulse released from Lake Oroville in the month of April, which would occur in dry or critically dry years.

[1] CALSIM is a water resources planning model that simulates operations of the SWP and the Central Valley Project and much of the water resources infrastructure in the Central Valley and the Delta.

Lake Oroville, a reservoir located in Butte County, California, is a very important fixture within the SWP. The reservoir, impounding the Feather River, stores water for the state of California, provides flood control, recreation, protects fish and wildlife, and assists in freshwater releases controlling salinity intrusion of the Delta (USGS 2013). The Thermalito Afterbay is an off-stream reservoir that provides storage for the water required by the pumpback operation to Lake Oroville, helps regulate the power system, produces controlled flow in the Feather River downstream from the Oroville-Thermalito facilities, and provides recreation. It also serves as a warming basin for agricultural water delivered to farms east of the Thermalito Afterbay (NCWA 2020). The Thermalito Afterbay Outlet (TAO) is an outlet pipe that releases water from Thermalito Afterbay to the Feather River.

CFS assumed the 18,000 AF would be applied as a 3.75 day, 2,400 cfs increase in Feather River flows released from the TAO. Releasing this water from the TAO is important because the Feather River downstream of TAO has no ramping criteria for flows greater than 2,500 cfs (CFS 2020, NMFS 2016a). CALSIM analysis indicated the proposed project could provide April flow pulses (18 TAF) for seven dry or critically dry years under 2030 future condition, and for five dry years under 2070 future condition (CFS 2020). Flow pulses produced by the proposed project occurred exclusively in dry years, with Feather River base flows at less than 3,000 cfs.

CFS's quantitative analysis focused on the benefits to outmigrating juvenile spring-run and winter-run Chinook salmon. The Feather River supports both natural and hatchery origin spring-run Chinook salmon. The National Marine Fisheries Service (NMFS) considers Feather River spring-run Chinook salmon as part of the listed Central Valley spring-run Chinook Salmon Evolutionary Significant Unit (ESU) (CFS 2020, NMFS 2018b). The estimated monthly number of hatchery origin spring-run smolts (the stage when a young salmonid migrates from freshwater to the ocean) entering the Sacramento River, the estimated monthly number of natural origin spring-runs smolts entering the Sacramento River from the Feather River, and the survival for both hatchery and natural origin smolts are modeled as a function of monthly Feather River flows provided from CALSIM by MBK Engineers (CFS 2020).

While winter-run Chinook salmon do not occur in the Feather River, a flow pulse that reaches the Sacramento River has the potential to benefit juvenile winter-run chinook during outmigration downstream of the Feather River and through the Delta.

Survival rates for migrating juvenile Chinook salmon from the Sacramento River to San Francisco Bay were estimated using the Delta Passage Model (DPM) with four different CALSIM flow scenarios (CFS 2020, CWF 2016). The DPM was developed by CFS to integrate study findings related to how water project operations influence the survival of juvenile Chinook salmon. Although the DPM is based primarily on studies of winter-run Chinook salmon smolt surrogates (late fall–run Chinook salmon), it was applied for this analysis to winter-run and spring-run Chinook salmon by adjusting emigration timing and assuming that all migrating Chinook salmon smolts will respond similarly to Delta conditions.

Benefits for Chinook salmon would occur in years when the proposed project allows for a Feather River flow pulse. On average, proposed project flow pulses were estimated to improve survival relative to the base flow condition by approximately 4.6%. For spring-run Chinook salmon, years with flow pulses would produce 121 to 354 additional adult Chinook salmon from each of the seven proposed project flow pulses occurring in the 2030 estimated condition, and 168 to 375 additional adults for each of the five flow pulses occurring in the 2070 estimated condition (Figure 10 in Appendix C). For winter-run Chinook salmon, benefits would range from 26 to 57 additional adult Chinook winter-run occurring with the seven pulses for the 2030 condition, and with the five pulses for the 2070 estimated condition (Figure 11 in Appendix C). Losses due to Delta diversions could occur for both spring-run and winter-run Chinook salmon, but these losses would be outweighed by larger benefits which accumulate across all years (depicted on Figures 10 and 11 in Appendix C**)**.

For green sturgeon, April pulse flows would be expected to enhance upstream passage for spawning adults. Assuming that the Feather River has sufficient habitat to accommodate an increased spawning population (currently 25 or fewer spawners) similar to the Sacramento River spawning population (364 spawners), the annualized benefit attributable to the proposed project would be approximately 13 and 10 adult additional spawners accessing the Feather River per year for the 2030 and 2070 future conditions.

For steelhead, an additional 63 to 127 adults would be benefited for the 2030 future condition and an additional 42 to 83 adults would be benefited for the 2070 future condition (see Tables 13 and 14 in Appendix C).

Waterfowl and Migratory Birds

Waterfowl and migratory birds could be beneficially affected by habitat modifications during operations and maintenance of the proposed project. The proposed project is situated within the Pacific Flyway, a major north-south flyway for migratory birds in America, extending from Alaska to Patagonia. Each year, a billion birds migrate along the Pacific Flyway. Habitat loss, water shortages, diminishing food sources, and climate change all threaten birds that use the Pacific Flyway (National Audubon Society 2020).

The recharge basins that would be created as a result of the proposed will be designed to establish intermittent wetland habitat through intermittent recharge events. The intermittent wetland habitat can support waterfowl, shorebirds, raptors and other migratory birds along the Pacific Flyway. The nearby recharge basins at the Kern Water Bank are re-establishing a thriving intermittent wetland habitat along the recharge basins, where marsh-like environments are established during recharge periods and create ideal habitat for waterfowl, shorebirds, raptors, and other native and migrating birds (KWBA 2020).

Willow (*Salix* sp.), cottonwood (*Populus* sp.), sedge (*Carex* sp.) and other wetland vegetation have re-emerged along the edges of the Kern Water Bank recharge basins and earthen canals. These protected areas provide critical nesting and foraging habitat for more than 40 species of waterfowl and other birds (KWBA 2020). Some of these species include but are not limited to: Caspian tern (*Hydroprogne caspia*), double-crested cormorant (*Phalacrocorax auritus*), American white pelican (*Pelecanus erythrorhynchos*), and tri-colored blackbird.

The Kern Audubon Society conducts bird counts often to educate, inform and study trends and migration of waterfowl species, as well as common bird species. In 2009, the Kern Audubon Society conducted a three-day survey at the Kern River Preserve and detected 246 different species of birds, many of which were waterfowl and/or migratory birds (Kern Audubon Society 2010). Some of these species include: American widgeon (*Mareca Americana*), gadwall (*Mareca strepera*), snow goose (*Chen caerulescens*), Canada goose (*Branta Canadensis*), and cinnamon teal (*Anas cyanoptera*). Needless to say, migratory waterfowl and resident species will seek to use the recharge basins as grounds for resting, foraging and breeding. Other waterbodies in the vicinity of the proposed project that migratory waterfowl use include Lake Buena Vista, Kern National Wildlife Refuge, Pixley National Wildlife Refuge, Kern River, Kern River Preserve, Tule Elk State Reserve, and Lokern Ecological Reserve.

Issue 2: Would the proposed project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or US Fish and Wildlife Service?

Sensitive natural communities have the potential to be present in the conveyance facilities project site and could be affected by the proposed project. After review of the vegetation communities mapped by California State University, Chico (described in Section 4.3 above), there are five native vegetation communities that are considered sensitive in the conveyance facilities project site, including: Bush seepweed scrub - *Suaeda moquinii* Shrubland Alliance and Goodding's willow - *Salix gooddingii* Forest & Woodland Alliance, Red willow - *Salix laevigata* Woodland and Forest Alliance, Iodine brush scrub - *Allenrolfea occidentalis* Shrubland Alliance, and Mesquite thickets - *Prosopis glandulosa* - *Prosopis velutina* - *Prosopis pubescens* Woodland Alliance, all with an S3 ranking. If these sensitive vegetation communities are anticipated to be impacted by the proposed project, mitigation measures are recommended to be implemented prior to the commencement of construction activities (described below in Section 5.4).

Issue 3: Would the proposed project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

There are potentially several wetlands and jurisdictional features in the project sites that may be impacted by habitat modification during construction. The hydrophytic vegetation within the Rosedale West Intake Canal are being maintained only by a man-made source of water and hydrology. Should these sources of water (i.e., irrigation for crops) be terminated, the vegetation would no longer exist and, therefore the areas are not considered wetlands. The canal is a man-made water supply conveyance facility and thus not considered Waters of the United States or Waters of the State. This features would not be considered under the jurisdiction of (or subject to regulation by) the USACE (per Section 404 of the CWA), the CDFW (per Section 1600 of the Fish and Game Code), or the RWQCB (per Section 401 of the CWA). The riparian vegetation and conditions found in Goose Lake Channel and on the conveyance facilities project site could potentially meet the requirements of a wetland as defined by the USACE and RWQCB.

Mitigation measures are recommended to be implemented prior to the commencement of construction activities (described below in Section 5.4).

Wetlands resources could be beneficially affected by habitat modifications during operations and maintenance of the proposed project via creation. The recharge basin design is intended to create intermittent wetlands and bird habitat. Per the recommendation of the Environmental Defense Fund (IRWD 2020, **Appendix D**), recharge basins will be constructed at multiple water depths to benefit both shorebirds and waterfowl. Shorebirds prefer mudflats to a depth of up to 6” with sparse vegetation (<40%) while waterfowl prefer depths of 6” to above 18” with a combination of open water and wetland cover. Dry land (berms or islands) are important for resting areas with dense vegetation (IRWD 2020).

Issue 4: Would the proposed project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Wildlife corridors are present in the project sites and proposed project affects have the potential to be neutral or positive. Though several wildlife corridors exist on or adjacent to the project sites, including Goose Lake Channel, Kern Water Bank, Tule Elk State Reserve, and the Pacific Flyway, configuration of the recharge basins or conveyance facilities would not impede or restrict wildlife movement. The majority of the project sites are currently used for agricultural purposes and heavy disturbance still occurs (i.e. vehicles traveling in and out of the orchards, transportation of agriculture equipment and regular pumping and use of the canals for crop irrigation). Species are most likely used to the level of disturbance at these locations and aware of the travel routes needed to access other adjacent open areas and corridors. Current wildlife movement will not be impacted or restricted; therefore, no mitigation measures are recommended.

The proposed project is also expected to benefit the fishery ecosystem downstream of Lake Oroville, in the Feather River and then into the Delta. The proposed project will benefit Central Valley salmonids with flows to improve habitat conditions for in-river rearing and downstream migration of juvenile salmonids. Salmonid species that would see these benefits to their migration patterns include Central Valley juvenile spring-run Chinook salmon, Central Valley juvenile winter-run Chinook salmon and juvenile steelhead. In addition, green sturgeon will also benefit from the proposed project due to increased adult access into the Feather River when pulse flows occur. An expanded description of proposed project benefits to the fishery ecosystem is detailed in the subsection titled “Fishery Ecosystem and Special-Status Fish Species,” in Section 5.3 above.

Issue 5: Would the proposed project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

There are local policies and ordinances protecting biological resources that the proposed project has the potential to conflict with. The proposed project is within the jurisdiction of the Kern County General Plan and the Metropolitan Bakersfield General Plan. Several biological resource ordinances and policies are required for implementation to protect special-status species.

Mitigation measures recommended for special-status wildlife species associated with "Issue 1" above, will also cover protecting the ordinances and policies implemented in the Kern County General Plan and the Metropolitan Bakersfield General Plan.

Issue 6: Would the proposed project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

The proposed project has the potential to conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. Approximately 60% of the Phase 1 project site falls within the MBHCP area. The MBHCP's primary focus is on lands converted to urban uses (MBHCP 1994, ESA 2013). The MBHCP sets forth a program for the preservation and protection of habitat for several rare or endangered species found in the HCP area in exchange for the loss of some existing habitat from urban development. The MBHCP permit only applies to City or County actions, or actions by others, which involve City or County permits. Special agencies, such as Rosedale, that are exempt from local permitting have other options with regard to endangered species issues, including resolving endangered species issues directly with USFWS and CDFW (MBHCP 1994, ESA 2013). The proposed project would not result in the conversion of land to urban uses. Mitigation measures recommended for special-status wildlife species associated with "Issue 1" above, will reduce proposed project impacts to threatened and endangered species to less than significant levels. No additional mitigation would be required to be consistent with the MBHCP.

The Kern Water Bank HCP/NCCP is a plan to accomplish both water conservation and environmental objectives. The primary water conservation objective is the storage of water in aquifers during times of surplus for later recovery during times of shortage (KWBA 1997). In addition, conservation areas are established within the HCP/NCCP area. Mitigation measures are recommended to ensure that the proposed project does not adversely impact biological resource mitigation within the HCP/NCCP.

5.4 Avoidance, Minimization, and Mitigation Measures

Special-Status Plants

Construction, operations, and maintenance activities could result in impacts to special-status plants. The following measure is recommended to be implemented to avoid potentially significant impacts to special-status plants.

> **BIO-1. Impacts to Special-Status Plant Species.** Prior to the start of construction activities that could affect special-status plant species, a qualified botanist shall conduct a focused survey within the Conveyance Facilities project area for California jewelflower, Hoover's eriastrum, Kern mallow, recurved larkspur, San Joaquin woollythreads, slough thistle, and subtle orache. Focused rare plant surveys shall occur during the typical blooming periods of special-status plants with the potential to occur. If a special-status plant species is found to be present, and avoidance of the species and/or habitat is not

feasible, the Authority shall prepare and implement a Revegetation/Restoration Mitigation Plan. The Revegetation/Restoration Mitigation Plan will guide activities during construction and operations and maintenance to avoid and minimize impacts to special-status plant species.

Special-Status Wildlife

Construction, operations, and maintenance activities could result in impacts to special-status wildlife. The following measures are recommended to be implemented to avoid potentially significant impacts to special-status wildlife.

BIO-2: **Pesticide Use Plan**. If pesticides will be applied to any areas within the project areas, the Authority shall develop a Pesticide Use Plan that will detail how pesticides, rodenticides, and/or herbicides will be used and how application will not impact special-status plant and wildlife species, nesting birds, wetlands and jurisdictional features, and sensitive natural communities.

BIO-3: **Impacts to Swainson's Hawk**. If construction activities are scheduled to take place outside of the Swainson's hawk nesting season (which runs from March 1 – September 15), then no preconstruction clearance surveys or subsequent avoidance buffers are required. If construction activities are initiated within the nesting season then preconstruction nesting surveys shall be conducted by a qualified biologist prior to ground disturbance, in accordance with the guidance provided in the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (Swainson's Hawk Technical Advisory Committee, 2000). The required windshield surveys shall cover a one-half mile radius around the project sites. If a nest site is found, the qualified biologist shall determine the appropriate buffer zone around the nest within which project-related construction activities would be avoided.

BIO-4: Impacts to Burrowing Owl. A pre-construction survey shall be conducted for burrowing owls 14 to 30 days prior to clearing of the site by a qualified biologist in accordance with the most recent CDFW protocol, currently the *Staff Report on Burrowing Owl Mitigation* (CDFW 2012). Surveys shall cover suitable burrowing owl habitat disturbed by construction including a 500-foot buffer. The survey would identify adult and juvenile burrowing owls and signs of burrowing owl occupation. This survey shall include two early morning surveys and two evening surveys to ensure that all owl pairs have been located. If occupied burrowing owl habitat is detected on the proposed project site, measures to avoid, minimize, or mitigate impacts shall be incorporated into the proposed project and shall include, but not be limited to, the following:

- If owls are identified on or adjacent to the site, a qualified biologist shall provide a pre-construction Worker's Environmental Awareness Program to contractors and their employees that describes the life history and species protection measures that are in effect to avoid impacts to burrowing owls. Construction monitoring will also occur throughout the duration of ground-disturbing construction activities to ensure no impacts occur to burrowing owl.
- Construction exclusion areas shall be established around the occupied burrows in which no disturbance shall be allowed to occur while the burrows are occupied. Buffer areas shall be determined by a qualified biologist based on the

recommendations outlined in the most recent *Staff Report on Burrowing Owl Mitigation* (CDFW 2012).

- If occupied burrows cannot be avoided, a qualified biologist shall develop and implement a Burrowing Owl Management Plan.

BIO-5: **Impacts to San Joaquin Kit Fox**. Prior to commencement of project activities, a qualified biologist shall conduct a USFWS-approved "early evaluation" of the project area to determine if the project sites represent San Joaquin kit fox habitat. If the evaluation shows that the San Joaquin kit fox does not utilize the project sites, and the project will not result in take, then no further mitigation shall be required for this endangered species. If the "early evaluation" finds the presence of kit fox, a San Joaquin kit fox survey to be conducted by a qualified biologist, in accordance with the most recent USFWS San Joaquin Kit Fox Survey Protocol. If it is determined that the San Joaquin kit fox utilizes the property then the following measures are required to avoid potential adverse effects to this species:

- The Authority shall determine appropriate project modifications to protect kit fox, including avoidance, minimization, restoration, preservation, or compensation.
- If evidence of active or potentially active San Joaquin kit fox dens is found within the area to be impacted by the proposed project, appropriate compensation for the habitat loss shall be determined and provided.

BIO-6: Impacts to Blunt-Nosed Leopard Lizard. Prior to commencement of project ground disturbing construction, a qualified biologist shall survey for blunt-nosed leopard lizard, in accordance with the most recent CDFW *Approved Survey Methodology for the Blunt-Nosed Leopard Lizard*. If it is determined that blunt-nosed leopard lizard is present on the project areasThe Authority shall initiate the appropriate project modifications to protect blunt-nosed leopard lizard, including avoidance, minimization, restoration, preservation, or compensation.

BIO-7: Impacts to Tipton Kangaroo Rat. Prior to commencement of project activities, a qualified biologist shall survey for Tipton kangaroo rat, in accordance with the most USFWS *Survey Protocol for Determining* Presence *of San Joaquin Kangaroo Rats*. If it is determined that Tipton kangaroo rat has the potential to utilize the project areas, then the following measures are required to avoid potential adverse effects to this species:

- The Authority shall have a qualified biologist conduct trapping to determine if there is a presence of the Tipton kangaroo rat.
- If there is presence, the Authority shall determine appropriate project modifications to protect Tipton kangaroo rat, including avoidance, minimization, restoration, preservation, or compensation.

BIO-8: Impacts to American Badger. Prior to commencement of project activities, a qualified biologist shall survey for American badger. Though there isn't a specific survey protocol for this species, American badger share similar habitat as burrowing owl and San Joaquin kit fox. Surveys shall be conducted for American badger concurrently with either burrowing owl or San Joaquin kit fox. If it is determined that American badger are detected on the project areas, then the following measures are required to avoid potential adverse effects to this species:

- The Authority shall determine appropriate project modifications to protect American badger, including avoidance, minimization, restoration, preservation, or compensation.

BIO-9: Impacts to Nelson's Antelope Squirrel. Prior to commencement of project activities, a qualified biologist shall survey for Nelson's antelope squirrel. If it is determined that Nelson's antelope squirrel is detected on the project areas, then the following measures are required to avoid potential adverse effects to this species:

- The Authority shall determine appropriate project modifications to protect Nelson's antelope squirrel, including avoidance, minimization, restoration, preservation, or compensation.

BIO-10: Operations and Maintenance Plan. Prior to commencement of project operations and maintenance activities, the Authority shall develop an Operations and Maintenance Plan that details how special-status plant and wildlife species, nesting birds and sensitive natural communities will not be impacted by operations and maintenance activities. Vehicle collisions with special-status wildlife or vehicle trampling of special-status plant species or sensitive natural communities is one example of how operations and maintenance activities could potentially impact biological resources. Some operations and maintenance activities may include pump and facility maintenance and vehicle operation on access roads.

Nesting Birds

Construction activities could result in impacts to nesting birds and active nests. The following mitigation measure is recommended to be implemented to avoid potentially significant impacts to nesting birds or active nests during project construction activities.

BIO-11: Impacts to Nesting Birds and Active Nests. If the nesting bird season cannot be avoided and construction or vegetation removal occurs between March 1 – September 15 (January 1 to July 31 for raptors), the following measures would reduce potential impacts to nesting and migratory birds and raptors to less than significant levels:

- Within 15 days of site clearing, a qualified biologist shall conduct a preconstruction, migratory bird and raptor nesting survey. The biologist must be qualified to determine the status and stage of nesting by migratory birds and all locally breeding raptor species without causing intrusive disturbance. This survey shall include species protected under the Migratory Bird Treaty Act including California horned lark, which was detected during the July 2020 reconnaissance and tri-colored blackbird, which has a medium potential to occur on-site. The survey shall cover all reasonably potential nesting locations for the relevant species on or closely adjacent to the proposed project site.
- The preconstruction survey shall cover all reasonably potential nesting locations on and within 300 feet of the proposed removal areas, and areas that would be occupied by ground-nesting species such as killdeer. A 500-foot radius shall be

surveyed in areas containing suitable habitat for nesting raptors, such as trees, utility poles and buildings.

- Nesting habitat should be removed prior to the bird breeding season (March 1 – September 15).
- If an active nest is confirmed by the biologist, no construction activities shall occur within 250 feet of the nesting site for migratory birds and within 500 feet of the nesting site for raptors. The buffer zones around any nest within which project-related construction activities would be avoided can be reduced as determined acceptable by a qualified biologist. Construction activities may resume once the breeding season ends (March 1 – September 15), or the nest has either failed or the birds have fledged.

Sensitive Natural Communities

Construction activities could result in impacts to sensitive natural communities. The following measure is recommended to be implemented to avoid potentially significant impacts to sensitive natural communities during construction activities.

BIO-12: Impacts to Sensitive Natural Communities. If sensitive natural communities will be impacted from construction activities, a focused survey by a qualified botanist shall be conducted to assess and delineate the potential impacts. If evidence of impacts to these sensitive natural communities are observed or anticipated, compensation for the habitat loss shall be provided.

Wetlands and Jurisdictional Resources

Construction activities could result in impacts to potential wetlands and jurisdictional resources. The following measure is recommended to be implemented to avoid potentially significant impacts to wetlands or jurisdictional resources during project construction activities.

BIO-13: Impacts to Wetlands and Jurisdictional Resources. Prior to any disturbance of potential jurisdictional resources within the project areas, a jurisdictional delineation of water courses shall be conducted for the purposes of identifying features or habitats that would be impacted by project activities and subject to the jurisdiction of the USACE, RWQCB, and CDFW. The findings shall be included in a jurisdictional delineation report suitable for submittal to these agencies for obtaining a Section 404 permit and/or CDFW Streambed Alteration Agreement.

Prior to project activities that would result in the discharge of fill or dredged material within waters of the U.S., a Section 404 CWA permit shall be obtained from the USACE and a Section 401 Water Quality Certification shall be obtained from the RWQCB. Prior to activities within streams, ponds, seeps or riparian habitat, or use of material from a streambed, the project applicant shall obtain Waste Discharge Requirements for impacts to waters not subject to the CWA, provide written notification to CDFW pursuant to Section 1602 of the Fish and Game Code, ensure the notification is complete as provided in Section 1602, and comply with the terms of conditions of any agreement CDFW may issue in response to the notification.

Habitat Conservation Plan/Natural Community Conservation Plan

Construction, operations and maintenance activities could result in conflicts to the Kern Water Bank HCP/NCCP. The following measure is recommended to be implemented to avoid potentially significant impacts to biological resources during project construction, operation and maintenance activities.

> **BIO-14: Conflictions with Kern Water Bank HCP/NCCP**. Should facilities be located on the Kern Water Bank the Authority shall initiate discussions with the Kern Water Bank Authority to ensure Conveyance Facilities located in the Kern Water Bank HCP/NCCP avoid impacts to covered species within the HCP/NCCP area during construction, operations, and maintenance.

CHAPTER 6
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Appendix A
Representative Site Photos

Photo 1. Facing northwest. Photo depicts pistachio orchard within Phase 1 project site (7/7/20).

Photo 2. Facing north. Photo depicts pistachio orchard within Phase 1 project site (7/7/20).

Photo 3. Facing west. Photo depicts non-native grassland within northeast corner of Phase 1 project site (7/7/20).

Photo 4. Facing south. Photo depicts non-native grassland within northeast corner of Phase 1 project site (7/7/20).

Photo 5. Facing south. Photo depicts active orchard within Phase 1 project site (7/7/20).

Photo 6. Facing north. Photo depicts a previously completed Rosedale Groundwater Basin within Phase 1 project site (7/7/20).

Photo 7. Facing west. Photo depicts a previously completed Rosedale Groundwater Basin within Phase 1 project site (7/7/20).

Photo 8. Facing north. Photo depicts a previously completed Rosedale Groundwater Basin within Phase 1 project site (7/7/20).

Photo 9. Facing north. Photo depicts an active orchard within the southern boundary of Phase 2 project site (7/6/20).

Photo 10. Facing west. Photo depicts an active orchard within the southern boundary of Phase 2 project site (7/6/20).

Photo 11. Facing northwest. Photo depicts the East Side Canal, which is situated just outside of the western boundary of Phase 2 project site (7/6/20).

Photo 12. Facing north. Photo depicts fallow agriculture lands on the right side and the East Side Canal on the left side, of the western access road within Phase 2 project site (7/6/20).

Photo 13. Facing south. Photo depicts alfalfa fields located adjacent to the eastern access road within Phase 2 project site (7/6/20).

Photo 14. Facing east. Photo depicts a deceased American badger. Badger was most likely struck by a passing vehicle on Stockdale Highway, southern boundary of Phase 1 project site (7/7/20).

Photo 15. Facing east. Photo depicts access road on Kern Water Bank property, within the conveyance facilities project site (7/6/20).

Photo 16. Facing northeast. Photo depicts access road on Kern Water Bank property, within the conveyance facilities project site (7/6/20).

Photo 17. Facing southeast. Photo depicts annual grassland located on the Tule Elk State Reserve, within the conveyance facilities project site (7/6/20).

Photo 18. Facing northeast. Photo depicts annual grassland located on the Tule Elk State Reserve, within the conveyance facilities project site (7/6/20).

Appendix B
CNDDB and CNPS Search Results

Selected Elements by Common Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (Buttonwillow (3511944) OR Rio Bravo (3511943) OR East Elk Hills (3511934) OR Tupman (3511933) OR Rosedale (3511942) OR Stevens (3511932) OR Millux (3511922) OR Mouth of Kern (3511923) OR Taft (3511924))
 AND Taxonomic Group IS (Dune OR Scrub OR Herbaceous OR Marsh OR Riparian OR Woodland OR Forest OR Alpine OR Inland Waters OR Marine OR Estuarine OR Riverine OR Palustrine OR Fish OR Amphibians OR Reptiles OR Birds OR Mammals OR Mollusks OR Arachnids OR Crustaceans OR Insects)

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
American badger *Taxidea taxus*	AMAJF04010	None	None	G5	S3	SSC
Bakersfield legless lizard *Anniella grinnelli*	ARACC01050	None	None	G2G3	S2S3	SSC
blunt-nosed leopard lizard *Gambelia sila*	ARACF07010	Endangered	Endangered	G1	S1	FP
Buena Vista Lake ornate shrew *Sorex ornatus relictus*	AMABA01102	Endangered	None	G5T1	S1	SSC
burrowing owl *Athene cunicularia*	ABNSB10010	None	None	G4	S3	SSC
California glossy snake *Arizona elegans occidentalis*	ARADB01017	None	None	G5T2	S2	SSC
California horned lark *Eremophila alpestris actia*	ABPAT02011	None	None	G5T4Q	S4	WL
coast horned lizard *Phrynosoma blainvillii*	ARACF12100	None	None	G3G4	S3S4	SSC
Crotch bumble bee *Bombus crotchii*	IIHYM24480	None	Candidate Endangered	G3G4	S1S2	
fulvous whistling-duck *Dendrocygna bicolor*	ABNJB01010	None	None	G5	S1	SSC
giant gartersnake *Thamnophis gigas*	ARADB36150	Threatened	Threatened	G2	S2	
giant kangaroo rat *Dipodomys ingens*	AMAFD03080	Endangered	Endangered	G1G2	S1S2	
Great Valley Cottonwood Riparian Forest *Great Valley Cottonwood Riparian Forest*	CTT61410CA	None	None	G2	S2.1	
Great Valley Mesquite Scrub *Great Valley Mesquite Scrub*	CTT63420CA	None	None	G1	S1.1	
Hopping's blister beetle *Lytta hoppingi*	IICOL4C010	None	None	G1G2	S1S2	
Le Conte's thrasher *Toxostoma lecontei*	ABPBK06100	None	None	G4	S3	SSC

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
least Bell's vireo *Vireo bellii pusillus*	ABPBW01114	Endangered	Endangered	G5T2	S2	
mountain plover *Charadrius montanus*	ABNNB03100	None	None	G3	S2S3	SSC
Nelson's antelope squirrel *Ammospermophilus nelsoni*	AMAFB04040	None	Threatened	G2	S2S3	
San Joaquin coachwhip *Masticophis flagellum ruddocki*	ARADB21021	None	None	G5T2T3	S2?	SSC
San Joaquin kit fox *Vulpes macrotis mutica*	AMAJA03041	Endangered	Threatened	G4T2	S2	
San Joaquin Pocket Mouse *Perognathus inornatus*	AMAFD01060	None	None	G2G3	S2S3	
short-nosed kangaroo rat *Dipodomys nitratoides brevinasus*	AMAFD03153	None	None	G3T1T2	S1S2	SSC
Swainson's hawk *Buteo swainsoni*	ABNKC19070	None	Threatened	G5	S3	
Tipton kangaroo rat *Dipodomys nitratoides nitratoides*	AMAFD03152	Endangered	Endangered	G3T1T2	S1S2	
tricolored blackbird *Agelaius tricolor*	ABPBXB0020	None	Threatened	G2G3	S1S2	SSC
Tulare grasshopper mouse *Onychomys torridus tularensis*	AMAFF06021	None	None	G5T1T2	S1S2	SSC
Valley Sacaton Grassland *Valley Sacaton Grassland*	CTT42120CA	None	None	G1	S1.1	
Valley Saltbush Scrub *Valley Saltbush Scrub*	CTT36220CA	None	None	G2	S2.1	
Valley Sink Scrub *Valley Sink Scrub*	CTT36210CA	None	None	G1	S1.1	
western mastiff bat *Eumops perotis californicus*	AMACD02011	None	None	G5T4	S3S4	SSC
western pond turtle *Emys marmorata*	ARAAD02030	None	None	G3G4	S3	SSC
western snowy plover *Charadrius alexandrinus nivosus*	ABNNB03031	Threatened	None	G3T3	S2S3	SSC
western spadefoot *Spea hammondii*	AAABF02020	None	None	G3	S3	SSC
western yellow-billed cuckoo *Coccyzus americanus occidentalis*	ABNRB02022	Threatened	Endangered	G5T2T3	S1	
white-faced ibis *Plegadis chihi*	ABNGE02020	None	None	G5	S3S4	WL
white-tailed kite *Elanus leucurus*	ABNKC06010	None	None	G5	S3S4	FP

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
yellow-headed blackbird *Xanthocephalus xanthocephalus*	ABPBXB3010	None	None	G5	S3	SSC

Record Count: 38

CNPS California Native Plant Society

Inventory of Rare and Endangered Plants

*The database used to provide updates to the Online Inventory is under construction. View updates and changes made since May 2019 here.

Plant List

23 matches found. *Click on scientific name for details*

Search Criteria

California Rare Plant Rank is one of [1A, 1B, 2A, 2B, 3, 4],
FESA is one of [Endangered, Threatened, Candidate, Not Listed],
CESA is one of [Endangered, Threatened, Rare, Not Listed], Found in Quads 3511944, 3511943, 3511934, 3511933, 3511942, 3511932, 3511922 3511923 and 3511924;

Modify Search Criteria Export to Excel Modify Columns Modify Sort Display Photos

Scientific Name	Common Name	Family	Lifeform	Blooming Period	CA Rare Plant Rank	State Rank	Global Rank
Astragalus hornii var. hornii	Horn's milk-vetch	Fabaceae	annual herb	May-Oct	1B.1	S1	G4G5T1T2
Atriplex cordulata var. cordulata	heartscale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G3T2
Atriplex cordulata var. erecticaulis	Earlimart orache	Chenopodiaceae	annual herb	Aug-Sep(Nov)	1B.2	S1	G3T1
Atriplex coronata var. coronata	crownscale	Chenopodiaceae	annual herb	Mar-Oct	4.2	S3	G4T3
Atriplex coronata var. vallicola	Lost Hills crownscale	Chenopodiaceae	annual herb	Apr-Sep	1B.2	S2	G4T2
Atriplex minuscula	lesser saltscale	Chenopodiaceae	annual herb	May-Oct	1B.1	S2	G2
Atriplex subtilis	subtle orache	Chenopodiaceae	annual herb	Jun,Aug,Sep(Oct)	1B.2	S1	G1
Azolla microphylla	Mexican mosquito fern	Azollaceae	annual / perennial herb	Aug	4.2	S4	G5
Calochortus striatus	alkali mariposa lily	Liliaceae	perennial bulbiferous herb	Apr-Jun	1B.2	S2S3	G3?
Caulanthus californicus	California jewelflower	Brassicaceae	annual herb	Feb-May	1B.1	S1	G1
Cirsium crassicaule	slough thistle	Asteraceae	annual / perennial herb	May-Aug	1B.1	S1	G1

Delphinium recurvatum	recurved larkspur	Ranunculaceae	perennial herb	Mar-Jun	1B.2	S2?	G2?
Eremalche parryi ssp. kernensis	Kern mallow	Malvaceae	annual herb	Jan,Mar,Apr,May (Feb)	1B.2	S3	G3G4T3
Eriastrum hooveri	Hoover's eriastrum	Polemoniaceae	annual herb	(Feb)Mar-Jul	4.2	S3	G3
Eriogonum gossypinum	cottony buckwheat	Polygonaceae	annual herb	Mar-Sep	4.2	S3S4	G3G4
Eschscholzia lemmonii ssp. kernensis	Tejon poppy	Papaveraceae	annual herb	(Feb)Mar-May	1B.1	S2	G5T2
Goodmania luteola	golden goodmania	Polygonaceae	annual herb	Apr-Aug	4.2	S3	G3
Hordeum intercedens	vernal barley	Poaceae	annual herb	Mar-Jun	3.2	S3S4	G3G4
Lasthenia glabrata ssp. coulteri	Coulter's goldfields	Asteraceae	annual herb	Feb-Jun	1B.1	S2	G4T2
Monolopia congdonii	San Joaquin woollythreads	Asteraceae	annual herb	(Jan)Feb-May	1B.2	S2	G2
Stylocline citroleum	oil neststraw	Asteraceae	annual herb	Mar-Apr	1B.1	S3	G3
Stylocline masonii	Mason's neststraw	Asteraceae	annual herb	Mar-May	1B.1	S1	G1
Trichostema ovatum	San Joaquin bluecurls	Lamiaceae	annual herb	Jul-Oct	4.2	S3	G3

Suggested Citation

California Native Plant Society, Rare Plant Program. 2020. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website http://www.rareplants.cnps.org [accessed 01 July 2020].

Appendix C

Ecosystem Benefits from Kern Fan Groundwater Storage Project – Cramer Fish Sciences

Kern Fan Groundwater Storage Project

FEASIBILITY REPORT

Appendix H: Ecosystem Benefit in the Delta Technical Report

October 21, 2019
Updated April 13, 2020

Irvine Ranch Water District

Rosedale-Rio Bravo Water Storage District

CRAMER FISH SCIENCES®
An Employee Owned Consulting Company

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October 17th, 2019

TECHNICAL MEMORANDUM

Subject: Chinook Salmon, Steelhead and Green Sturgeon Benefits from Kern Fan Groundwater Storage Project

Prepared for: Irvine Ranch Water District

Prepared by: Brad Cavallo

This technical memorandum provides a description of background, methodology, assumptions and results for an assessment of anadromous fish benefits resulting from the Kern Fan Groundwater Storage Project (Project). Anadromous fish species evaluated included four endangered species, three occurring in the Feather River (Central Valley Spring-run Chinook, Central Valley Steelhead, and the Southern Distinct Population of Green Sturgeon) and one occurring only in the Sacramento River mainstem (Sacramento Winter-run Chinook).

1. Project operations for ecosystem benefits

Cramer Fish Sciences (CFS) consulted with MBK Engineers and Irvine Ranch Water District to recommend how 18 thousand acre-feet (TAF) of additional water supply made available by the proposed Project could be used to provide the greatest benefit to endangered anadromous fish species occurring in the Feather River. CFS recommended a pulse released from Lake Oroville in the month of April. CALSIM analysis provided by MBK Engineers indicated the Project could, with 1922-2003 hydrology under a 2030 future condition, provide for seven April flow pulses (of 18 TAF) in dry or critically dry years. Under a 2070 future condition, the Project can provide for five April flow pulses (of 18 TAF) in dry or critically dry years.

CFS recommended and assumed the 18TAF would be applied as a 3.75 day, 2,400cfs increase in Feather River flows released from the Thermalito Afterbay Outlet (TAO). Releasing this water from the TAO is important because the Feather River downstream of TAO has no ramping criteria for flows greater than 2,500 cfs (NMFS 2016a).

2. Methods for assessing anadromous fish benefits

2.1. Chinook salmon

Our quantitative analysis focuses on assessing benefits to outmigrating juvenile spring-run Chinook originating from the Feather River. Effects of the Feather River flow pulse downstream of the confluence with the Sacramento River and through the Delta were analyzed for Feather River origin spring-run Chinook, and also for Sacramento River basin juvenile spring-run Chinook and juvenile winter-run Chinook.

2.1.1. Feather River Analysis

The Feather River hosts natural and hatchery origin spring-run Chinook. NMFS considers both in-river and hatchery spawning Feather River spring-run Chinook salmon to be part of the listed CV spring-run Chinook salmon ESU (NMFS 2016b). NMFS, in their most recent five-year review of CV spring-run, assigned a recovery priority for spring-run Chinook salmon in the Feather River of 5 (with 1 being the highest priority, 12 being the lowest priority) (NMFS 2016b). These determinations are based upon the evolutionary legacy the Feather River spring-run stock represents, because the stock continues to exhibit a CV spring-run Chinook salmon migration timing, and because of habitat and management improvements required as part of the Oroville Facilities FERC Relicensing Settlement Agreement.

Name	Value	Description	Source
SmH	2 million	Annual spring-run hatchery smolts released at Gridley.	FRH Spring Chinook HGMP
SmN	2 million	Annual natural origin spring-run juvenile production reaching apprxoimately Gridley on the Feather River.	Natural origin spring-run Chinook are produced on the Feather River, but abundance is uncertain. This value is approximated based on likely in-river spawning coupled with expected enhancements identified in the FRH Spring Chinook HGMP and FERC Reclicensing Biological Opinion (NMFS 2016a)
MIGm	0.62	Fraction of natural smolts emigrating in April	NMFS (2016a)
MIGp	0.125	Fraction of days in month with flow pulse	Duration of flow pulse (3.75 days) divided by 30
relm	0.5	Fraction of FRH smolts released in April	FRH Spring Chinook HGMP
relf	0.5	Fraction of FRH smolt release which be coordinated to coincide with flow pulse	Jason Kindopp (CDWR), personal communication
B0	-2.1	Smolt survival in the Feather River (untransformed value)	See text
B1	1.47	Flow survival effect (untransformed value)	NMFS (2017), Table B1. See text for more details.
Qm	variable	Standardized Feather River flow by month	CALSIM output
SmS	3.2 million	Annual natural origin spring-run smolts from the Sacramento River basin excluding the Feather River basin (estimated from spawning escapement, fecundity, egg-fry survival data)	See Table 2
SmW	2.1 million	Annual winter-run smolts from the Sacramento River (estimated from spawning escapement, fecundity, egg-fry survival data)	See Table 2
Sa	0.0144	Mean survival rate for smolts to return as adults	Zeug et al. (2012). See text for more details.
Sa max	0.0192	Maximum survival rate for smolts to return as adults	Zeug et al. (2012). See text for more details.
Sa min	0.0096	Miimum survival rate for smolts to return as adults	Zeug et al. (2012). See text for more details.

Table 1. Values, descriptions and sources for inputs and parameters used for the quantification of Project ecosystem benefits.

There are two components of the Feather River spring-run Chinook salmon analysis: 1) smolts released by FRH, and 2) juvenile spring-run Chinook salmon naturally produced in the Feather River. FRH annually produces 2 million spring-run Chinook smolts released into the Feather River. Natural origin spring-run Chinook are certainly produced in the Feather River, but their abundance is currently unknown (NMFS 2016a). Given expected habitat enhancements of the Feather River and the requirement to segregate spring and fall-run in the immediate future (see NMFS 2016a), we conservatively assume an average of 2 million natural origin spring-run smolts will be produced naturally by the Feather River by the time the Project is completed. Additionally, we assume all FRH spring-run Chinook releases will occur at Gridley. Though future FRH release locations are unknown, the California Hatchery Scientific Review Group has recommended all hatchery production be released as close to the source hatchery as possible (CA HSRG 2012). Given this recommendation and concerns about straying Feather River Hatchery spring-run Chinook (see NMFS 2016a), future spring-run Chinook releases downstream of the Yuba River confluence (e.g. Boyd's Pump) are unlikely.

Other data and sources used to evaluate effects of the proposed Project on the survival of Feather River spring-run Chinook salmon are summarized in Table 1. Related source flow data and calculations are available upon request in an Excel spreadsheet "FR_analysis_v3".

The monthly number of FRH produced spring-run smolts entering the Sacramento River (Sm_{FRH}) from the Feather River is estimated by

(eq1) $$Sm_H * rel_m * relf * surv_m$$

and the monthly number of natural origin spring-run smolts entering the Sacramento River from the Feather River (Sm_{FRW})is estimated by

(eq2) $$Sm_N * MIG_m * MIG_p * surv_m.$$

Survival for both hatchery and natural origin smolts are modeled as a function of monthly Feather River flows

(eq3) $$logit(surv_m) = B0 + B1 * Q_m$$

where B0 and B1 are model parameters (Table 1), and where Q_m is monthly Feather River flows standardized relative to all monthly Feather River flow observations (provided by CALSIM). Monthly flow data (1922 through 2003) representing two future conditions (2030 and 2070) and two scenarios (Project and no project) were provided by MBK Engineers (see MBK 2018). A total of four different CALSIM scenarios were analyzed.

	Sacramento Basin Spring-run		***Winter-run***	
Data Type	**Reference**	**Data**	**Reference**	**Data**
Total In-river Escapement	GrandTab (March 2010), 10 yr Avg	8,924	GrandTab (March 2010), 10 yr Avg	7,634
Pre-spawning mortality	Garman & McReynolds 2005-08	5.53%	Poytress & Carillo 2010	5%
Percent Female	Garman & McReynolds 2005-08	55%	Killam 2009	54%
Fecundity	DWR 2009	5300	Poytress & Carillo 2010	3859
Egg to Fry Survival	Poytress & Carillo 2010	33%	Poytress & Carillo 2010	33%
Fry to Delta Survival	USFWS, unpublished data	53%	USFWS, unpublished data	53%
Total Juveniles Reaching Delta		**4,200,000**		**2,600,000**
Percent smolts entering delta	USFWS Sacramento Trawls	86%	USFWS Sacramento Trawls	82%
Total Smolts Reaching Delta		**3,600,000**		**2,100,000**

Table 2. Values, descriptions and data sources used to estimate average Sacramento River basin spring-run and winter-run Chinook smolt production reaching the Delta (i.e. inputs for the Delta Passage Model).

The flow survival relationship (eq3) was developed by the NMFS Southwest Fishery Science Center as part of a life cycle modeling effort for winter-run Chinook salmon (NMFS 2017). The NMFS LCM is under continuous development, but the model (including this flow-survival function) were used in the NMFS Biological Opinion for California Water Fix (http://www.westcoast.fisheries.noaa.gov/central_valley/CAWaterFix.html). Of course, survival differences between the Sacramento and the Feather River are likely to occur. To address these expected differences, we utilized available Feather River spring-run Chinook acoustic tagging data to estimate B0, but relied upon the estimate of B1 from NMFS (2017). Survival per river kilometer data from Figure 2-30 (NMFS 2016a) were converted to a reach-specific survival estimate of 0.11, representing survival from Gridley to the confluence with the Sacramento River. Transforming 0.11 as necessary for the logit scale shown in eq3 yields a value of -2.1 for B0. The resulting relationship between Feather River flow and spring-run Chinook survival is depicted in Figure 1. Ideally, a Feather River flow-survival relationship would be based solely upon observations from the Feather River. However, since few observations of Feather River survival were available, we combined available Feather River information with findings from the NMFS winter-run Chinook life cycle modeling effort. Though there is uncertainty about the Feather River flow-survival relationship depicted in Figure 1, scientific literature from Central Valley tributaries affirms a positive relationship between Feather River flow and juvenile salmon survival is likely. Investigations into the relationship between river discharge and juvenile salmon survival in the Central Valley have primarily focused on the Sacramento-San Joaquin Delta and several studies have reported significant positive relationships (Newman 2003, Perry 2010). Less attention has been focused on the Feather River or other upstream tributaries. However, there are multiple lines of evidence to suggest a positive flow-survival relationship operates in the Feather River. Within the Central Valley, Zeug et al. (2014) reported a significant positive relationship between river discharge (and discharge variability) and survival for juvenile Chinook salmon in the Stanislaus River. Additionally, Perry et al. (2018) found that survival increased in Delta reaches when high levels of discharge resulted in a switch from bi-directional to unidirectional flow. A positive flow survival relationship for Chinook salmon during spring in the Snake River was reported by Smith et al. (2003). However, flow was correlated with turbidity and temperature complicating attempts to separate out effects. Regardless of the causal mechanism it is clear that increases in flow result in more favorable conditions for juvenile Chinook survival during migration.

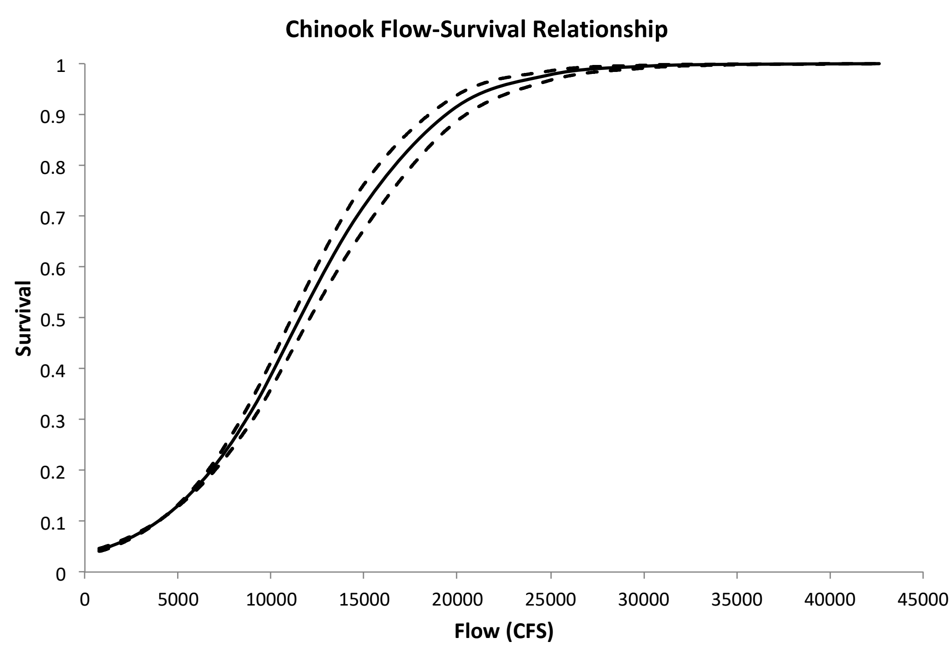


Figure 1. Estimated flow-survival relationship for juvenile Feather River spring-run Chinook salmon. Dashed lines indicate standard deviation associated with parameter B1 as estimated by NMFS (2017).

Flow pulses produced by the Project occurred exclusively in dry years, with Feather River base flows at less than 3,000cfs. The estimated survival under these conditions occurs at the left side of the curve depicted in Figure 1. On average, we estimate Project flow pulses improve survival relative to the base flow condition by approximately 4.6%

Date	Survvial w/o Pulse	Survvial w/ Pulse	Difference
04/30/1939	0.052	0.097	0.046
04/30/1944	0.060	0.112	0.052
04/30/1960	0.074	0.137	0.063
04/30/1976	0.046	0.088	0.042
04/30/1981	0.046	0.088	0.042
04/30/1985	0.046	0.088	0.042
04/30/1988	0.043	0.082	0.039
		Average:	**0.046**

Table 3. Estimated survival rates for Feather River Chinook salmon with and without the 2,400cfs flow pulse provided by the Project. Source data and calculations visible in the Excel spreadsheet "FR_analysis_v3".

2.1.2. Delta Analysis

Survival rates for Feather River spring-run Chinook, Sacramento River basin spring-run Chinook, and Sacramento River winter-run Chinook from Verona (Sacramento River) to San Francisco Bay were estimated for each flow scenario (with and without the proposed project) using the Delta Passage Model (DPM).

Sm_{FRH} and Sm_{FRW} provided inputs to the Delta Passage Model (DPM) representing Feather River Hatchery origin spring-run Chinook and Feather River natural origin spring-run Chinook, respectively. The number of spring-run (Sm_{SSRC}) and winter-run (Sm_{SWRC}) Chinook smolts entering from the Sacramento River basin are indicated in Table 2. DPM produced annual survival rates for winter and spring Chinook (weighted by monthly emigration timing) are shown in the Excel spreadsheet "Smolt_Surv_to_Bay_V2". A detailed description of the DPM is provided below.

The DPM simulates migration of Chinook salmon smolts entering the Sacramento River at Verona and estimates survival to Chipps Island. The DPM uses available time-series data and values taken from empirical studies or other sources to parameterize model relationships and inform uncertainty, thereby using the greatest amount of data available to dynamically simulate responses of smolt survival to changes in water management. Although the DPM is based primarily on studies of late fall–run Chinook salmon, it is applied here for winter-run and spring-run by adjusting emigration timing and assuming that all migrating Chinook salmon smolts will respond similarly to Delta conditions. The DPM results presented here reflect the current version of the model, which continues to be reviewed and refined, and for which a sensitivity analysis has been completed to examine various aspects of uncertainty related to the model's inputs and parameters.

Although studies have shown considerable variation in emigrant size, with Central Valley Chinook salmon migrating as fry, parr, or smolts (Brandes and McLain 2001; Williams 2001), the DPM relies predominantly on data from acoustic-tagging studies of large (>140 mm) smolts, and therefore should be applied cautiously to pre-smolt migrants. Salmon juveniles less than 80 mm are more likely to exhibit rearing behavior in the Delta (Moyle 2002) and thus likely will be represented poorly by the DPM. It has been assumed that the downstream emigration of fry, when spawning grounds are well upstream, is probably a dispersal mechanism that helps distribute fry among suitable rearing habitats. However, even when rearing habitat does not appear to be a limiting factor, downstream movement of fry still may be observed, suggesting that fry emigration is a viable alternative life-history strategy (Healey 1980; Healey and Jordan 1982; Miller et al. 2010). Unfortunately, survival data are lacking for small (fry-sized) juvenile emigrants because of the difficulty of tagging such small individuals. Therefore, the DPM should be viewed as a smolt survival model only, with its survival relationships generally having been derived from larger smolts (>140 mm), with the fate of pre-smolt emigrants not incorporated into model results.

The DPM has undergone substantial revisions based on comments received through the preliminary proposal anadromous team meetings and in particular through feedback received during a workshop held on August 24, 2010, a 2-day workshop held June 23–24, 2011, and various meetings of a workgroup consisting of agency biologists and consultants. This comparison of survival among Project and baseline alternatives uses the most recent version of the DPM as of July 2015 with several additional modifications described below. The DPM is viewed as a simulation framework that can be changed as more data or new hypotheses regarding smolt migration and survival become available. The results are based on these revisions.

Survival and abundance estimates generated by the DPM are not intended to predict future observed survival. Instead, the DPM provides a simulation tool that compares the effects of different water management options on smolt migration survival, with accompanying estimates of uncertainty. The DPM was used to evaluate overall through-Delta survival for baseline and Project scenarios using CALSIM flow data as inputs for Sacramento River and Delta water conditions. The DPM produced annual survival rates weighted by monthly emigration timing for spring-run and winter-run Chinook salmon.

Model Overview

The DPM is based on a detailed accounting of migratory pathways and reach-specific mortality as Chinook salmon smolts travel through a simplified network of reaches and junctions (Figure 2). The biological functionality of the DPM is based on the foundation provided by Perry et al. (2010) as well as other acoustic tagging–based studies (San Joaquin River Group Authority 2008, 2010; Holbrook et al. 2009) and coded wire tag (CWT)–based studies (Newman and Brandes 2010; Newman 2008). Uncertainty is explicitly modeled in the DPM by incorporating environmental stochasticity and estimation error whenever available.

The major model functions in the DPM are as follows.

1. Delta Entry Timing, which models the temporal distribution of smolts entering the Sacramento River at Verona for each race of Chinook salmon.
2. Fish Behavior at Junctions, which models fish movement as they approach river junctions.
3. Migration Speed, which models reach-specific smolt migration speed and travel time.
4. Route-Specific Survival, which models route-specific survival response to non-flow factors.
5. Flow-Dependent Survival, which models reach-specific survival response to flow.
6. Export-Dependent Survival, which models survival response to water export levels in the Interior Delta reach.

Functional relationships are described in detail in the *Model Functions* section below.

Model Time Step

The DPM operates on a daily time step using simulated flow data and Delta exports as model inputs. The DPM does not attempt to represent sub-daily flows or diel salmon smolt behavior in response to the interaction of tides, flows, and specific channel features. The DPM is intended to represent the net outcome of migration and mortality occurring over one day, not three-dimensional movements occurring over minutes or hours (e.g., Blake and Horn 2003).

Spatial Framework

The DPM version used for this Project is composed of eight reaches and two junctions (Figure 2; Table 4) selected to represent primary salmonid migration corridors where high-quality data were available for fish and hydrodynamics. For simplification, Sutter Slough and Steamboat Slough are combined as the reach SS; and Georgiana Slough, the Delta Cross Channel (DCC), and the forks of the Mokelumne River to which the DCC leads are combined as Geo/DCC. The Geo/DCC reach can be entered by Sacramento Chinook salmon runs through the combined junction of Georgiana Slough and DCC (Junction C). The Interior Delta reach can only be entered from Geo/DCC. Because of the lack of data informing specific routes through the Interior Delta, or tributary-specific survival, the entire Interior Delta region is treated as a single model reach. The four distributary junctions (channel splits) depicted in the DPM are (A) Sacramento River at Fremont Weir (not used for this Project), (B) Sacramento River at head of Sutter and Steamboat Sloughs, (C) Sacramento River at the combined junction with Georgiana Slough and DCC, and (D) San Joaquin River at the head of Old River (not used for this Project). The proportion of fish entering Yolo was set to zero for this Project because the confluence of the Feather River is downstream of this junction. Additionally, survival was not estimated for San Joaquin or Mokelumne rivers because the proposed Project would not affect these systems.

Table 4. Description of Modeled Reaches and Junctions in the Delta Passage Model

Reach/ Junction	Description	Reach Length (km)
Sac1	Sacramento River from Freeport to junction with Sutter/Steamboat Sloughs	19.33
Sac2	Sacramento River from Sutter/Steamboat Sloughs junction to junction with Delta Cross Channel/Georgiana Slough	10.78
Sac3	Sacramento River from Delta Cross Channel junction to Rio Vista, California	22.37
Sac4	Sacramento River from Rio Vista, California to Chipps Island	23.98
Verona	Fremont Weir to Freeport	57
SS	Combined reach of Sutter Slough and Steamboat Slough ending at Rio Vista, California	26.72
Geo/DCC	Combined reach of Georgiana Slough, Delta Cross Channel, and South and North Forks of the Mokelumne River ending at confluence with the San Joaquin River in the Interior Delta	25.59
Interior Delta	Begins at end of reach Geo/DCC, San Joaquin River via Junction D, or Old River via Junction D, and ends at Chipps Island	NA[a]
B	Combined junction of Sutter Slough and Steamboat Slough with the Sacramento River	NA

Reach/ Junction	Description	Reach Length (km)
C	Combined junction of the Delta Cross Channel and Georgiana Slough with the Sacramento River	NA
[a] Reach length for the Interior Delta is undefined because salmon can take multiple pathways. Also, timing through the Interior Delta does not affect Delta survival because there are no Delta reaches located downstream of the Interior Delta.		

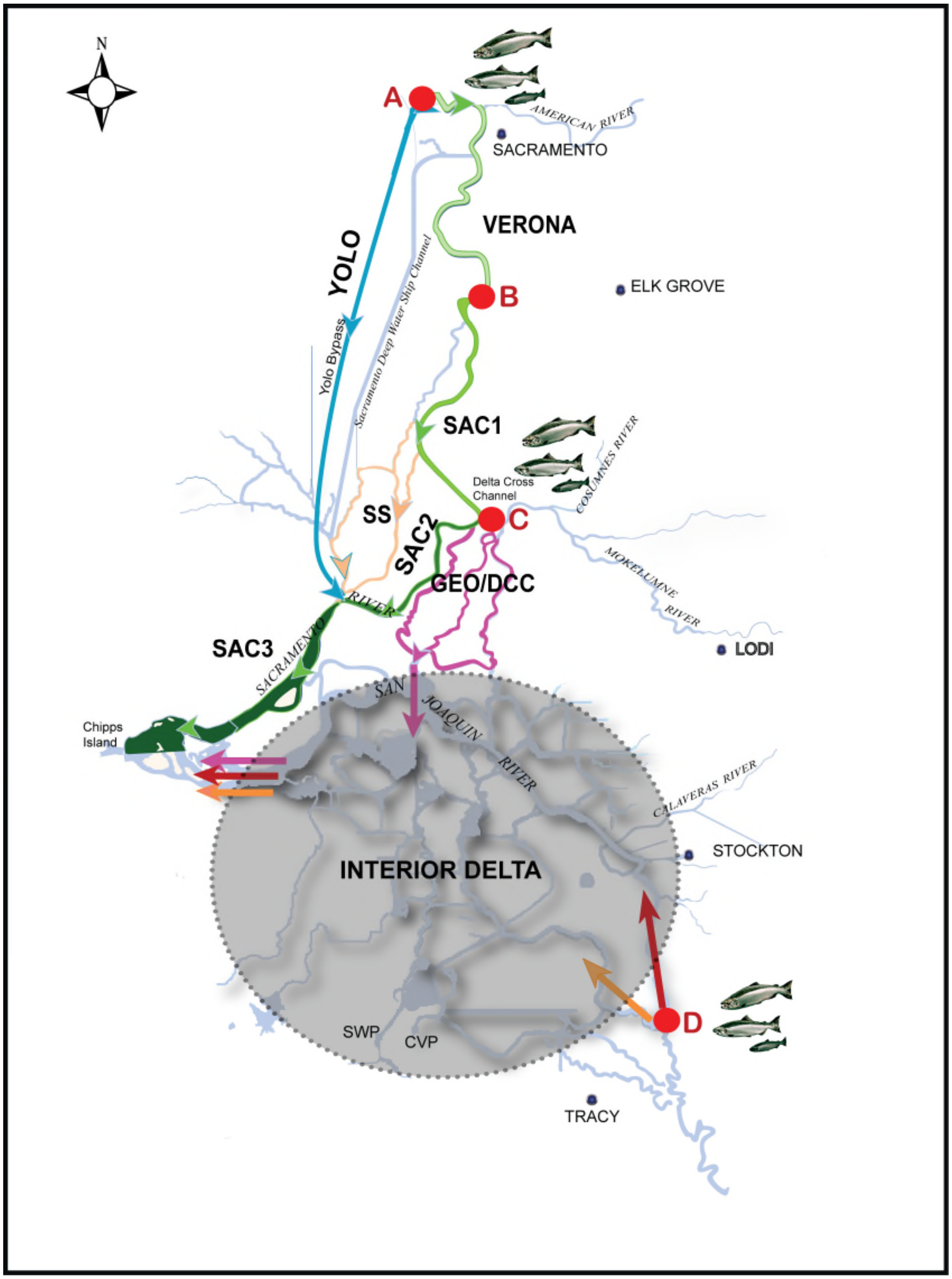


Figure 2. Map of the Sacramento–San Joaquin River Delta Showing the Modeled Reaches and Junctions of the Delta applied in the Delta Passage Model. Bold headings label modeled reaches, and red circles indicate model junctions. Salmonid icons indicate locations where smolts enter the Delta in the DPM. The Yolo reach and junction was not included in this analysis. Smolts enter the Interior Delta from the Geo/DCC reach or from Junction D via Old River or from the San Joaquin River. The San Joaquin and Mokelumne rivers were not modeled in the current Project because the proposed Project would not affect flow in those systems. Because of the lack of data informing specific routes through the Interior Delta, and tributary-specific survival, the entire Interior Delta region is treated as a single model reach.

Flow Input Data

Water movement through the Delta as input to the DPM is derived from monthly (tidally averaged) flow output produced by CALSIM-II. The nodes in CALSIM II that were used to provide flow for specific reaches in the DPM are shown in Table 5.

Table 5. Delta Passage Model Reaches and Associated Output Locations from CALSIM II.

DPM Reach or Model Component	CALSIM Node
Sac1	C169
Sac2	C400
Sac3	C401A
Sac4	C402A
Verona	NA
SS	-1811.574+(Sac1*0.3608831)
Geo/DCC	C401B
South Delta Export Flow	Delta Exports

Model Functions

Delta Entry Timing

Recent sampling data on Delta entry timing of emigrating juvenile smolts for three Central Valley Chinook salmon runs were used to inform the daily proportion of juveniles entering the Delta for each run (Table 6). Because the DPM models the survival of smolt-sized juvenile salmon, pre-smolts were removed from catch data before creating entry timing distributions. The lower 95th percentile of the range of salmon fork lengths visually identified as smolts by the USFWS in Sacramento trawls was used to determine the lower length cutoff for smolts. A lower fork length cutoff of 70 mm for smolts was applied, and all catch data of fish smaller than 70 mm were eliminated. To isolate wild production, all fish identified as having an adipose-fin clip (hatchery production) were eliminated, recognizing that most of the fall-run hatchery fish released upstream of Sacramento are not marked. Daily catch data for each brood year were divided by total annual catch to determine the daily proportion of smolts entering the Delta for each brood year. Sampling was not conducted daily at most stations and catch was not expanded for fish caught but not measured. Finally, the daily proportions for all brood years were plotted for each race, and a normal distribution was visually approximated to obtain the daily proportion of smolts entering the DPM for each run (Figure 3). Because a bi-modal distribution appeared evident for winter-run entry timing, a generic probability density function was fit to the winter-run daily proportion data using the package "sm" in R software (R Core Team 2012). The R fitting procedure estimated the best-fit probability distribution of the daily proportion of fish entering the DPM for winter-run. Timing of Delta entry was backed up to Verona for each run based on estimates of travel time in the reach between Verona and Sacramento calculated from acoustic tag data (Michel 2010).

Table 6. Sampling Gear Used to Create Juvenile Delta Entry Timing Distributions for Each Central Valley Run of Chinook Salmon

Chinook Salmon Run	Gear	Agency	Brood Years
Sacramento River Winter Run	Trawls at Sacramento	USFWS	1995–2009
Sacramento River Spring Run	Trawls at Sacramento	USFWS	1995–2005
Sacramento River Fall Run	Trawls at Sacramento	USFWS	1995–2005

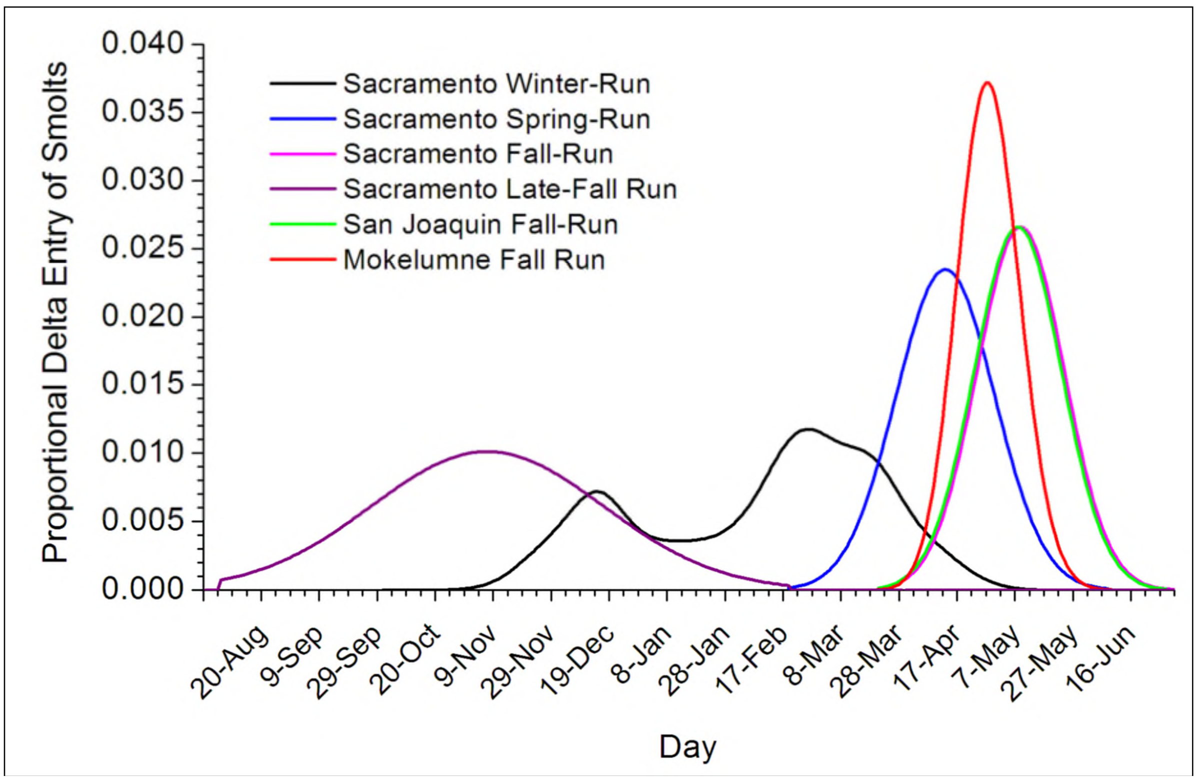


Figure 3. Delta Entry Distributions for Chinook Salmon Smolts Applied in the Delta Passage Model for Sacramento River Winter-Run, Sacramento River Spring-Run, Sacramento River Fall-Run, Sacramento River Late Fall–Run, San Joaquin River Fall-Run, and Mokelumne River Fall-Run Chinook Salmon. For this Project, only spring-winter and fall run in the Sacramento River were modeled.

Migration Speed

The DPM assumes a net daily movement of smolts in the downstream direction. The rate of smolt movement in the DPM affects the timing of arrival at Delta junctions and reaches, which can affect route selection and survival as flow conditions or water project operations change.

Smolt movement in all reaches except the Interior Delta is a function of reach-specific length and migration speed as observed from acoustic-tagging results. Reach-specific length (kilometers

[km]) (Table 4) is divided by reach migration speed (km/day) the day smolts enter the reach to calculate the number of days smolts will take to travel through the reach.

For north Delta reaches Verona, Sac1, Sac2, SS, and Geo/DCC, mean migration speed through the reach is predicted as a function of flow. Many studies have found a positive relationship between juvenile Chinook salmon migration rate and flow in the Columbia River Basin (Raymond 1968; Berggren and Filardo 1993; Schreck et al. 1994), with Berggren and Filardo (1993) finding a logarithmic relationship for Snake River yearling Chinook salmon. Ordinary least squares regression was used to test for a logarithmic relationship between reach-specific migration speed (km/day) and average daily reach-specific flow (cubic meters per second [m^3/sec]) for the first day smolts entered a particular reach for reaches where acoustic-tagging data was available (Sac1, Sac2, Sac3, Sac4, Geo/DCC, and SS):

$$Speed = \beta_0 \ln(flow) + \beta_1;$$

Where β_0 is the slope parameter and β_1 is the intercept.

Individual smolt reach-specific travel times were calculated from detection histories of releases of acoustically-tagged smolts conducted in December and January for three consecutive winters (2006/2007, 2007/2008, and 2008/2009) (Perry 2010). Reach-specific migration speed (km/day) for each smolt was calculated by dividing reach length by travel days (Table 7). Flow data was queried from the DWR's California Data Exchange website (<http://cdec.water.ca.gov/>).

Table 7. Reach-Specific Migration Speed and Sample Size of Acoustically-Tagged Smolts Released during December and January for Three Consecutive Winters (2006/2007, 2007/2008, and 2008/2009)

Reach	Gauging Station ID	Release Dates	Sample Size	Speed (km/day)			
				Avg	Min	Max	SD
Sac1	FPT	12/05/06–12/06/06, 1/17/07–1/18/07, 12/04/07–12/07/07, 1/15/08–1/18/08, 11/30/08–12/06/08, 1/13/09–1/19/09	452	13.32	0.54	41.04	9.29
Sac2	SDC	1/17/07–1/18/07, 1/15/08–1/18/08, 11/30/08–12/06/08, 1/13/09–1/19/09	294	9.29	0.34	10.78	3.09
Sac3	GES	12/05/06–12/06/06, 1/17/07–1/18/07, 12/04/07–12/07/07, 1/15/08–1/18/08, 11/30/08–12/06/08, 1/13/09–1/19/09	102	9.24	0.37	22.37	7.33
Sac4	GES[a]	12/05/06–12/06/06, 1/17/07–1/18/07, 12/04/07–12/07/07, 1/15/08–1/18/08, 11/30/08–12/06/08, 1/13/09–1/19/09	62	8.60	0.36	23.98	6.79

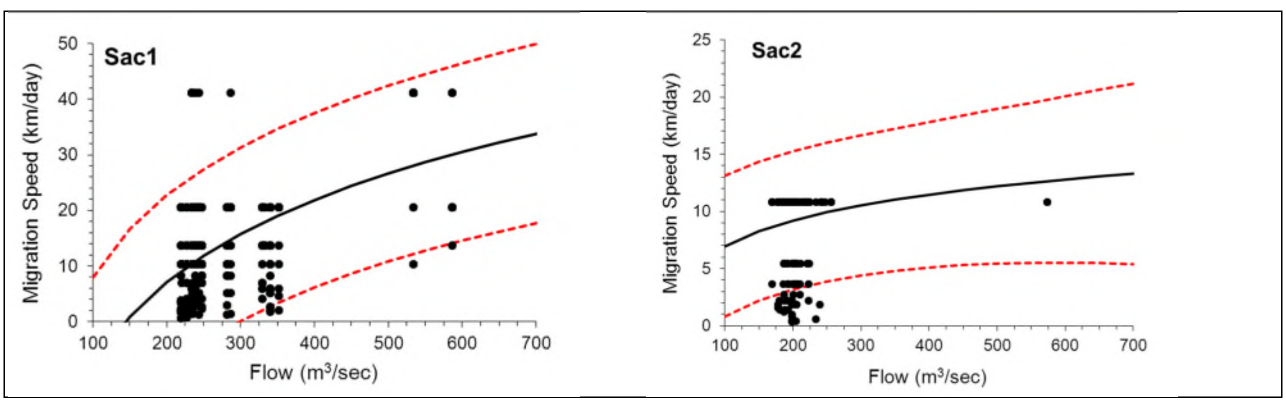
Reach	Gauging Station ID	Release Dates	Sample Size	Speed (km/day)			
				Avg	Min	Max	SD
Geo/DCC	GSS	12/05/06–12/06/06, 1/17/07–1/18/07, 12/04/07–12/07/07, 1/15/08–1/18/08, 11/30/08–12/06/08, 1/13/09–1/19/09	86	14.20	0.34	25.59	8.66
SS	FPT-SDC[b]	12/05/06–12/06/06, 12/04/07–12/07/07, 1/15/08–1/18/08, 11/30/08–12/06/08, 1/13/09–1/19/09	30	9.41	0.56	26.72	7.42

[a] Sac3 flow is used for Sac4 because no flow gauging station is available for Sac4.
[b] SS flow is calculated by subtracting Sac2 flow (SDC) from Sac1 flow (FPT).

Migration speed was significantly related to flow for reaches Sac1 (df = 450, F = 164.36, P < 0.001), Sac2 (df = 292, F = 4.17, P = 0.042), and Geo/DCC (df = 84, F = 13.74, P <0.001). Migration speed increased as flow increased for all three reaches (Figure 4). Therefore, for reaches Sac1, Sac2, and Geo/DCC, the regression coefficients shown in Table 8 are used to calculate the expected average migration rate given the input flow for the reach and the associated standard error of the regressions is used to inform a normal probability distribution that is sampled from the day smolts enter the reach to determine their migration speed throughout the reach. The minimum migration speed for each reach is set at the minimum reach-specific migration speed observed from the acoustic-tagging data (Table 7). The flow-migration rate relationship that was used for Sac1 also was applied for the Verona reach.

Table 8. Sample Size and Slope (β0) and Intercept (β1) Parameter Estimates with Associated Standard Error (in Parenthesis) for the Relationship between Migration Speed and Flow for Reaches Sac1, Sac2, and Geo/DCC.

Reach	N	β_0	β_1
Sac1	452	21.34 (1.66)	-105.98 (9.31)
Sac2	294	3.25 (1.59)	-8.00 (8.46)
Geo/DCC	86	11.08 (2.99)	-33.52 (12.90)



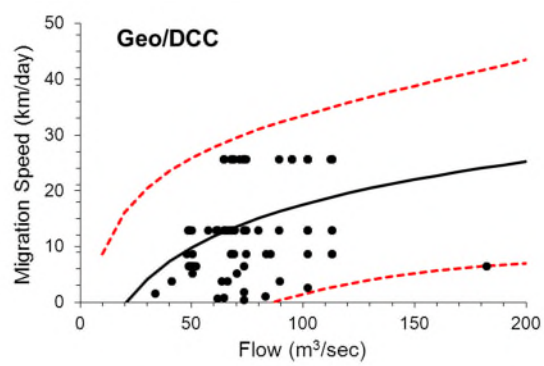


Figure 4. Reach-Specific Migration Speed (km/day) as a Function of Flow (m3/sec) Applied in Reaches Sac1, Sac2, and Geo/DCC. Circles are observed migration speeds of acoustically-tagged smolts from acoustic-tagging studies from Perry (2010), solid lines are predicted mean reach survival curves, and dotted lines are 95% prediction intervals used to inform uncertainty.

No significant relationship between migration speed and flow was found for reaches Sac3 (df = 100, F = 1.13, P =0.29), Sac4 (df = 60, F = 0.33, P = 0.57), and SS (df = 28, F = 0.86, P = 0.36). Therefore, for these reaches the observed mean migration speed and associated standard deviation (Table 7) is used to inform a normal probability distribution that is sampled from the day smolts enter the reach to determine their migration speed throughout the reach. As applied for reaches Sac1, Sac2, and Geo/DCC, the minimum migration speed for reaches Sac3, Sac4, and SS is set at the minimum reach-specific migration speed observed from the acoustic-tagging data (Table 7).

The travel time of smolts migrating through the Interior Delta in the DPM is informed by observed mean travel time (7.95 days) and associated standard deviation (6.74) from North Delta acoustic-tagging studies (Perry 2010). However, the timing of smolt passage through the Interior Delta does not affect Delta survival because there are no Delta reaches located downstream of the Interior Delta.

Fish Behavior at Junctions (Channel Splits)

Perry et al. (2010) found that acoustically-tagged smolts arriving at Delta junctions exhibited inconsistent movement patterns in relation to the flow being diverted. For Junction B (Sacramento River-Sutter/Steamboat Sloughs), Perry et al. (2010) found that smolts consistently entered downstream reaches in proportion to the flow being diverted. Therefore, smolts arriving at Junction B in the model move proportionally with flow. For Junction C (Sacramento River–Georgiana Slough/DCC), Perry (2010) found a linear, nonproportional relationship between flow and fish movement. His relationship for Junction C was applied in the DPM:

$$y = 0.22 + 0.47x;$$

where y is the proportion of fish diverted into Geo/DCC and x is the proportion of flow diverted into Geo/DCC (Figure 5).

In the DPM, this linear function is applied to predict the daily proportion of fish movement into Geo/DCC as a function of the proportion of flow into Geo/DCC.

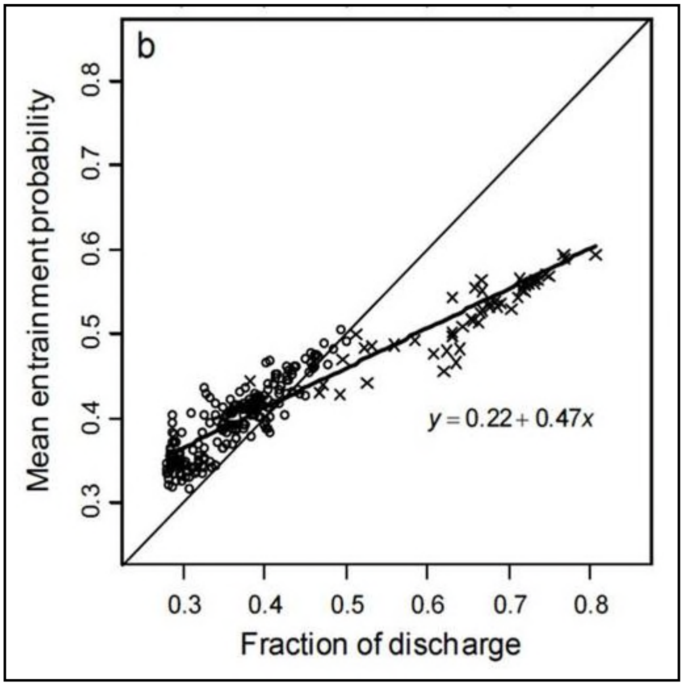


Figure 5. Figure from Perry (2010) Depicting the Mean Entrainment Probability (Proportion of Fish Being Diverted into Reach Geo/DCC) as a Function of Fraction of Discharge (Proportion of Flow Entering Reach Geo/DCC). Circles Depict DCC Gates Closed, Crosses Depict DCC Gates Open.

Route-Specific Survival

Survival through a given route (individual reach or several reaches combined) is calculated and applied the first day smolts enter the reach. For reaches where literature showed support for reach-level responses to environmental variables, survival is influenced by flow (Sac1, Sac2, Sac3 and Sac4 combined, SS and Sac 4 combined, Interior Delta via San Joaquin River, and Interior Delta via Old River) or south Delta water exports (Interior Delta via Geo/DCC). For these reaches, daily flow or exports occurring the day of reach entry are used to predict reach survival during the entire migration period through the reach (Table 9). For Geo/DCC, reach survival is assumed to be unaffected by Delta conditions and is informed by the mean and standard deviation of survival from acoustic-tagging studies.

Table 9. Route-Specific Survival and Parameters Defining Functional Relationships or Probability Distributions for Each Chinook Salmon Run and Methods Section Where Relationship is Described.

Route	**Chinook Salmon Run**	**Survival**	**Methods Section Description**
Verona	All Sacramento runs	0.931 (0.02)	This section
Sac1	All Sacramento runs	Function of flow	Flow-Dependent Survival
Sac2	All Sacramento runs	Function of flow	Flow-Dependent Survival

Sac3 and Sac4 combined	All Sacramento runs	Function of flow	Flow-Dependent Survival
SS and Sac4 combined	All Sacramento runs	Function of flow	Flow-Dependent Survival
Geo/DCC	All Sacramento runs	0.65 (0.126)	This section
Interior Delta	All Sacramento runs	Function of exports	Export-Dependent Survival

For reach Geo/DCC, no empirical data were available to support a relationship between survival and Delta flow conditions (channel flow, exports). Therefore, for these reaches mean reach survival is used along with reach-specific standard deviation to define a normal probability distribution that is sampled from when smolts enter the reach to determine reach survival (Table 9).

Mean reach survival and associated standard deviation for Geo/DCC are informed by survival data from smolt acoustic-tagging studies from Perry (2010). Smolts migrating down the Sacramento River during the acoustic-tagging studies could enter the DCC or Georgiana Slough when the DCC was open (December releases), therefore, group survivals for both routes are used to inform the mean survival and associated standard deviation for the Geo/DCC reach for Sacramento River runs (Table 10).

Mean survival and associated standard deviation for the Verona reach between Fremont Weir and Yolo Bypass were derived from the 2007–2009 acoustic-tag study reported by Michel (2010), who did not find a flow-survival relationship for that reach.

Table 10. Individual Release-Group Survival Estimates, Release Dates, Data Sources, and Associated Calculations Used to Inform Reach-Specific Mean Survivals and Standard Deviations Used in the Delta Passage Model for Reaches Where Survival Is Uninfluenced by Delta Conditions.

DPM Reach	Survival	Release Dates	Survival Calculation	Mean	Standard Deviation
Geo/DCC via Sacramento River	0.648	12/05/06	S_{D1}	0.559	0.194
	0.600	12/04/07–12/06/07	$S_{D1,SAC}*S_{D2}$		
	0.762	1/15/08–1/17/08	$S_{D1,SAC}*S_{D2}$		
	0.774	11/31/08–12/06/08	$S_{D1,SAC}*S_{D2}$		
	0.467	1/13/08–1/19/09	$S_{D1,SAC}*S_{D2}$		
	0.648	12/05/06	$S_{C1}*S_{C2}$		
	0.286	12/04/07–12/06/07	S_{C1}		
	0.286	11/31/08–12/06/08	S_{C1}		

DPM Reach	Survival	Release Dates	Survival Calculation	Mean	Standard Deviation
Source: Perry 2010.					

Flow-Dependent Survival

For reaches Sac1, Sac2, Sac3 and Sac4 combined and SS and Sac4 combined, flow values on the day of route entry are used to predict route survival. Perry (2010) evaluated the relationship between survival among acoustically-tagged Sacramento River smolts and Sacramento River flow measured below Georgiana Slough (DPM reach Sac3) and found a significant relationship between survival and flow during the migration period for smolts that migrated through Sutter and Steamboat Sloughs to Chipps Island (Sutter and Steamboat route; SS and Sac4 combined) and smolts that migrated from the junction with Georgiana Slough to Chipps Island (Sacramento River route; Sac3 and Sac4 combined). Therefore, for route Sac3 and Sac4 combined and route SS and Sac4 combined, the logit survival function from Perry (2010) was used to predict mean reach survival (*S*) from reach flow (*flow*):

$$S = \frac{e^{(\beta_0 + \beta_1 flow)}}{1 + e^{(\beta_0 + \beta_1 flow)}}$$

where β_0 (SS and Sac4 = -0.175, Sac3 and Sac4 = -0.121) is the reach coefficient and β_1 (0.26) is the flow coefficient, and *flow* is average Sacramento River flow in reach Sac3 during the experiment standardized to a mean of 0 and standard deviation of 1.

Perry (2010) estimated the global flow coefficient for the Sutter Steamboat route and Sacramento River route as 0.52. For the Sac3 and Sac4 combined route and the SS and Sac4 combined route, mean survival and associated standard error predicted from each flow-survival relationship is used to inform a normal probability distribution that is sampled from the day smolts enter the route to determine their route survival.

With a flow-survival relationship appearing evident for group survival data of acoustically-tagged smolts in reaches Sac1 and Sac2, Perry's (2010) relationship was applied to Sac1 and Sac2 while adjusting for the mean reach-specific survivals for Sac1 and Sac2 observed during the acoustic-tagging studies (Figure 6; Table 11). The flow coefficient was held constant at 0.52 and the residual sum of squares of the logit model was minimized about the observed Sac1 and Sac2 group survivals, respectively, while varying the reach coefficient. The resulting reach coefficients for Sac1 and Sac2 were 1.27 and 2.16, respectively. Mean survival and associated standard error predicted from the flow-survival relationship is used to inform a normal probability distribution that is sampled from the day smolts enter the reach to determining Sac1 and Sac2 reach survival.

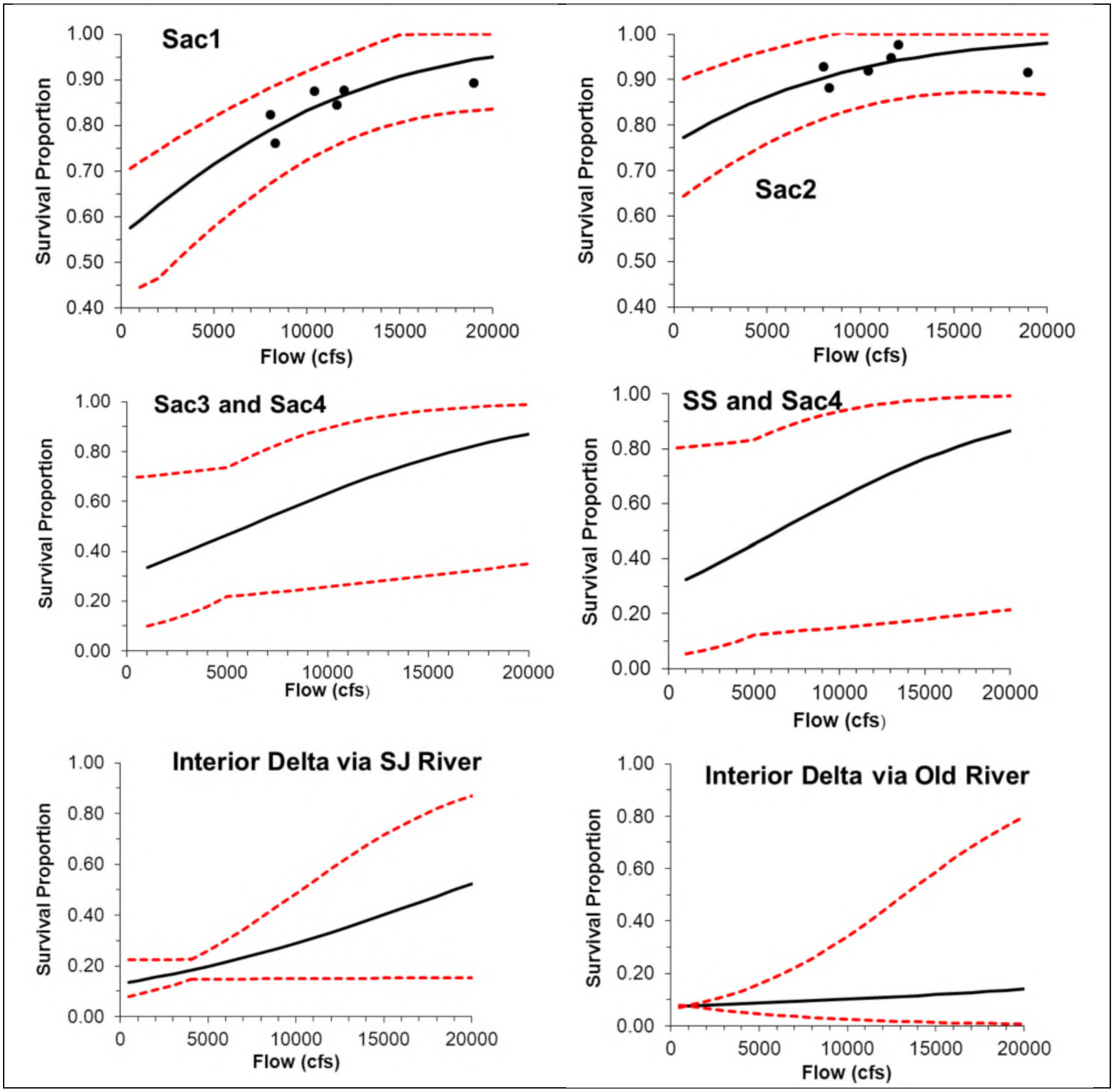


Figure 6. Route Survival as a Function of Flow Applied in Reaches Sac1, Sac2, Sac3 and Sac4 combined, SS and Sac4 combined, Interior Delta via the San Joaquin River, and Interior Delta via Old River For Sac1, Sac2, Sac3, and Sac4, circles are observed group survivals from acoustic-tagging studies from Perry (2010). Raw data are not available from Newman (2010) for Interior Delta via San Joaquin River and Interior Delta via Old River from Newman (2010). Solid lines are predicted mean route survival curves, and dotted lines are 95% confidence bands used to inform uncertainty. Survival of smolts through the Interior Delta via the San Joaquin and Old River were not modeled in the current Project.

Table 11. Group Survival Estimates of Acoustically-Tagged Chinook Salmon Smolts from Perry (2010) and Associated Calculations Used to Inform Flow-Dependent Survival Relationships for Reaches Sac1 and Sac2.

DPM Reach	Survival	Release Dates	Source	Survival Calculation
Sac1	0.844	12/5/06	Perry 2010	$S_{A1} * S_{A2}$
Sac1	0.876	1/17/07	Perry 2010	$S_{A1} * S_{A2}$
Sac1	0.874	12/4/07-12/6/07	Perry 2010	$S_{A1} * S_{A2}$
Sac1	0.892	1/15/08-1/17/08	Perry 2010	$S_{A1} * S_{A2}$

Sac1	0.822	11/31/08-12/06/08	Perry 2010	S_{A1} *S_{A2}
Sac1	0.760	1/13/09-1/19/09	Perry 2010	S_{A1} *S_{A2}
Sac2	0.947	12/5/06	Perry 2010	S_{A3}
Sac2	0.976	1/17/07	Perry 2010	S_{A3}
Sac2	0.919	12/4/07-12/6/07	Perry 2010	S_{A3}
Sac2	0.915	1/15/08-1/17/08	Perry 2010	S_{A3}
Sac2	0.928	11/31/08-12/06/08	Perry 2010	S_{A3}
Sac2	0.881	1/13/09-1/19/09	Perry 2010	S_{A3}

Exports are standardized as described for flow. Uncertainty in these parameters is accounted for by using model-averaged estimates for the intercept, flow coefficient and export coefficient. The model-averaged estimates and their standard deviations are used to define a normal probability distribution that is resampled each day in the model. San Joaquin River flows downstream of the head of Old River that were modeled by Newman (2010) ranged from -49 cfs to 10,756 cfs, with a median of 3,180 cfs. Exports modeled by Newman (2010) ranged from 805 cfs to 10,295 cfs, with a median of 2,238 cfs.

Export-Dependent Survival

As migratory juvenile salmon enter the Interior Delta from Geo/DCC for Sacramento races they transition to an area strongly influenced by tides and where south Delta water exports may influence survival. The export–survival relationship described by Newman and Brandes (2010) was applied as follows:

$$\theta = 0.5948 * e^{(-0.000065 * Total\_Exports)}$$

where θ is the ratio of survival between coded wire tagged smolts released into Georgiana Slough and smolts released into the Sacramento River and Total_Exports is the flow of water (cfs) pumped from the Delta from the State and Federal facilities.

θ is a ratio and ranges from just under 0.6 at zero south Delta exports to ~0.27 at 12,000-cfs south Delta exports (Figure 7).

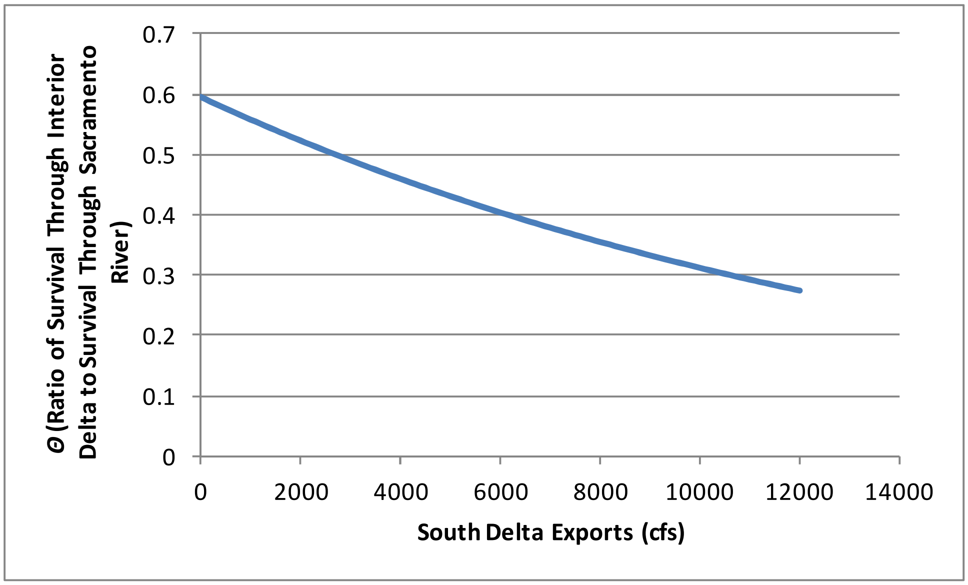


Figure 7. Relationship between θ (Ratio of Survival through the Interior Delta to Survival through Sacramento River) and South Delta Export Flows. Source: Newman and Brandes 2010.

θ was converted from a ratio into a value of survival through the Interior Delta using the equation:

$$S_{ID} = \frac{\theta}{S_{Geo/DCC}} * (S_{Sac3} * S_{Sac4});$$

where S_{ID} is survival through the Interior Delta, θ is the ratio of survival between Georgiana Slough and Sacramento River smolt releases, $S_{Geo/DCC}$ is the survival of smolts in the Georgiana Slough/Delta Cross Channel reach, $S_{Sac3} * S_{Sac4}$ is the combined survival in reaches Sac 3 and Sac 4 (Figure 8).

Uncertainty is represented in this relationship by using the estimated value of θ and the standard error of the equation to define a normal distribution bounded by the 95% prediction interval of the model that is then re-sampled each day to determine the value of θ.

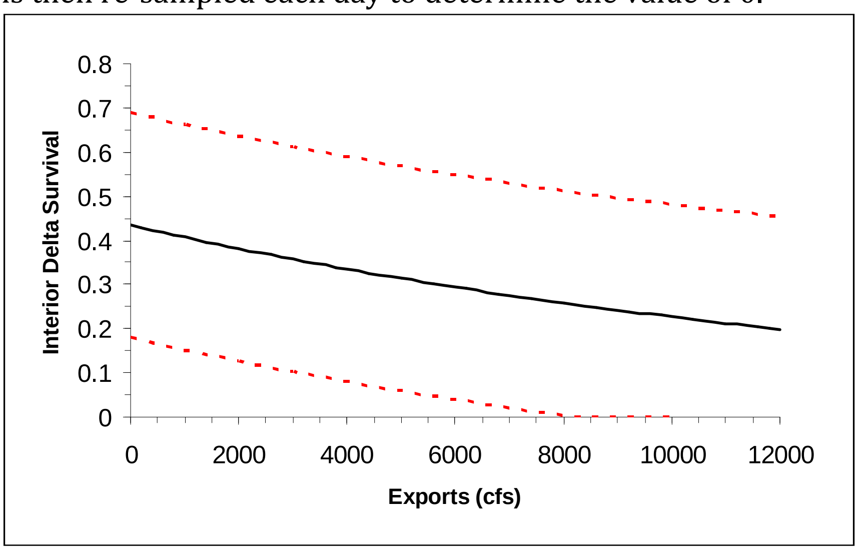


Figure 8. Interior Delta Survival as a Function of Delta Exports (Newman and Brandes 2010) as Applied for Sacramento Races of Chinook Salmon Smolts Migrating through the Interior Delta via Reach Geo/DCCSurvival values in reaches Sac3, Sac4, and Geo/DCC were held at mean values observed during acoustic-tag studies (Perry 2010) to depict export effect on Interior Delta survival in this plot. Dashed lines are 95% prediction bands used to inform uncertainty in the relationship.

2.1.3. Bay Smolt to Adult Return Analysis

Total annual adult returns of spring-run Chinook salmon were calculated as

$$(Sm_{FRH}+Sm_{FRW}+Sm_{SSRC})*S_{DPM\_SRC} * S_a$$

and total annual adult returns of winter-run Chinook salmon were calculated as

$$Sm_{SWRC}*S_{DPM\_WRC} * S_a$$

Where…
S_{DPM_SRC} is the DPM-based estimate of survival for spring-run Chinook smolts to Delta exit;

S_{DPM_WRC} is the DPM-based estimate of survival for winter-run Chinook smolts to Delta exit; and where S_a is survival rate for smolts exiting the Delta to return as adults.

As discussed by Zeug et al. (2012), O'Farrell et al. (2012), Winship et al. (2014), Araujo et al. (2015), and others, smolt to adult survival is a function of factors including age and year specific natural mortality, age and year specific harvest mortality, and age at maturity. Since variation in these factors would not be influenced by the Project, we simplified by assuming all salmon matured at age-3 and that no harvest occurred until age-3. With these assumptions, smolt to adult mortality (S_a) was calculated as

$$M_2 * M_W * H_3$$

where M_2 is the survival of smolts to age-2, where M_w is overwinter survival of age-2 fish and where H_3 represents the fraction of fish surviving harvest and returning to spawn. Based upon Zeug et al. (2012) we fixed parameter values at 0.64 for M_w and at 0.75 for H_3. Since smolt to adult mortality is known to vary widely from year-to-year and among salmon populations (see Bradford et al. 1995), consistent with Zeug et al. (2012) we allowed M_2 to vary from a mean of 0.03, to a maximum value of 0.04 and to a minimum value of 0.02. The resulting range of values for S_a are shown in Table 2 and also reflected in the summary of results shown in Table 12. The estimated range for S_a are consistent with findings reported by Bradford et al. (1995), Araujo et al. (2015), Winship et al. (2014), O'Farrell et al. (2012), and are therefore considered appropriate for their application to evaluating the proposed Project.

2.2. Green sturgeon

Green sturgeon are a species of ancient fish, highly adapted to benthic environments. Though primarily marine oriented (including bays, estuaries and near coastal environments), adult green sturgeon enter freshwater to spawn. Green sturgeon migrate to freshwater spawning habitats in March-April and spawn from April through June (NMFS 2016). Green sturgeon are broken into two distinct population segments (DPSs): a northern DPS (nDPS) and a southern DPS (sDPS). Currently only the sDPS is listed under the Federal Endangered Species Act. In its 2006 final rule listing the sDPS green sturgeon as threatened, the National Marine Fisheries Services (NMFS) identified the loss of historical spawning habitat restricting spawning to a single river (the Sacramento) as a primary factor in the decline of the species.

Information on the abundance of Green Sturgeon in Central Rivers is limited. Available data suggest an average of 364 adult fish spawn in the Sacramento River, while 25 or fewer sDPS green sturgeon utilize the Feather River each year (NMFS 2016). Under current conditions, spawning in the Feather River is infrequent and consists of few fish relative to the Sacramento River. About Feather River green sturgeon, NMFS (2016) states:

> *"…we can tentatively say that the Feather River accounts for perhaps 2 to 9 percent of the sDPS green sturgeon population. While these numbers may seem low and perhaps insignificant, it is important to realize that the Feather River is highly valuable from a sDPS green sturgeon conservation perspective because the Feather River is the **only** place outside the Sacramento River where sDPS green sturgeon spawning has been documented, giving the Feather River a prominent role in the recovery of the species."*

The magnitude, duration and frequency of river flow during adult immigration and spawning is thought to be a key constraint on spawning success and adult abundance. On the Sacramento River, spring flow pulses are thought to be necessary for successful immigration and spawning (NMFS 2016). According to NMFS, the number of green sturgeon in the Feather River is likely dependent on flow and associated passage conditions. Green sturgeon in the Feather River are currently exposed to a simplified hydrograph that curtails flows in favor of reservoir storage during spring months. High spring flows associated with the natural hydrograph do not occur within the sections of the Feather River expected to be used by sDPS green sturgeon for spawning.

Flows can also be important for successful upstream passage. The Sunset Pumps diversion is thought to delay or block upstream passage during dry or critically dry water year types. DWR green sturgeon scientists have indicated flows ranging from 2,500 to 3,000cfs would be needed for adult sDPS green sturgeon passage at Sunset Pumps. The Feather River also provides an essential migration corridor for sDPS green sturgeon to access the Yuba River. Thus, Feather River spring flows can influence the migration of sDPS in both the Feather and Yuba Rivers.

Suitable water temperatures and spawning substrates are also important for successful spawning for sDPS green sturgeon. The NMFS indicates the Feather River provides 164,500 m^2 of deep pool habitat likely suitable for spawning. Similarly, water temperatures within potential spawning areas are optimal during the majority of the spawning and early rearing period (NMFS 2016). Thus, the absence of spring flow pulses is thought to be a key factor limiting green sturgeon in the Feather River.

2.2.1. Green Sturgeon Analysis

Spring flow pulse benefits to sDPS green sturgeon are difficult to quantify because empirical evidence specific to the Feather River is lacking. We therefore base our analysis upon observations available for sDPS green sturgeon on the Sacramento River. Specifically, we assume:

1. With a spring flow regime that effectively ameliorates passage problems and allows for successful immigration and spawning, the Feather River, like the Sacramento River, would support an average annual spawning population of 364 adult green sturgeon.
2. Base flows in the lower Feather River in April during dry or critically dry years will be 1,000 cfs (i.e. minimum required flows).

3. A two-week April flow pulse consisting of an additional 1,500 cfs (providing a total river flow of 2,500 cfs) in dry or critically dry years will be necessary (along with appropriate flows in other water year types) to achieve an average annual spawner abundance of 364 adult sDPS green sturgeon in the Feather River.
4. Providing an additional 1,500 cfs for two weeks requires 42 TAF of water to be released from the Oroville Facilities.
5. The annualized benefit to the sDPS green sturgeon population due to the spring flow pulse in (3) would be determined by the recurrence interval of the flow pulse. For example, a flow pulse that occurred in 1 out of every 10 years, would be credited for 10% of population benefit; an additional 36 adult green sturgeon for each year.
6. The annualized benefit to green sturgeon from (5) would be attributed to the Project based on the proportional contribution of the Project to the 42 TAF of water required for the flow pulse. Since the Project will yield 18 TAF toward each flow pulse, this value if 0.43.

2.3. Steelhead

Feather River natural and hatchery produced steelhead are designated as part of the California Central Valley (CCV) Distinct Population Segment (NMFS 2016b). Though natural origin CCV streelhead smolts occur in the Feather River, information on their abundance and emigration timing is highly uncertain (NMFS 2016b). In contrast, annual production of steelhead smolts by Feather River Hatchery (FRH) is well understood. FRH annually releases roughly 450,000 yearling CCV steelhead. FRH steelhead are released into the Feather River in late winter/early spring. For purposes of this analysis we assume all FRH steelhead releases will occur at Boyd's Pump. Boyd's pump is appropriate because it is a commonly used release site, and because it is the only Feather River location where releases have been intensively studied via acoustic tagging. Though future FRH release locations are unknown, the California Hatchery Scientific Review Group has recommended all hatchery production be released as close to the source hatchery as possible (CA HSRG 2012). Boyd's pump would appear the most downstream location that may satisfy CA HSRG recommendations. If future releases are instead made at locations upstream of Boyd's Pump, then this analysis would be underestimating (rather than overestimating) survival benefits associated with a flow pulse.

2.3.1. Feather River through Delta Analysis

Data and sources used to evaluate effects of the proposed Project on the survival of Feather River steelhead are summarized in Table 12. Related source flow data and calculations are available upon request in the Excel spreadsheet "FR_analysis_steelhead".

Table 32. Values, descriptions and sources for inputs and parameters used for the quantification of Project ecosystem benefits.

Name	Value	Description	Source
St_{FRH}	450,000	Annual FRH steelhead production.	NMFS 2016(a)
relf	0.25	Fraction of FRH steelhead smolts expected to be coordinated to coincide with flow pulse	NA
B0	-0.85	FRH steelhead survival to the Golden Gate (log base e scale)	See text
B1	1.47	Flow survival effect (log base e scale)	NMFS (2017), Table B1. See text for more details.
Qm	variable	Standardized Feather River flow by month	CALSIM output
Sa	0.0144	Mean survival rate for smolts to return as adults	Zeug et al. (2012). See text for more details.
Sa max	0.0192	Maximum survival rate for smolts to return as adults	Zeug et al. (2012). See text for more details.
Sa min	0.0096	Miimum survival rate for smolts to return as adults	Zeug et al. (2012). See text for more details.

The annual number of FRH steelhead smolts reaching the Golden Gate Bridge entering the (St_B) is estimated by

(eq4) $$St_{FRH} * relf * surv_m$$

where survival for hatchery steelhead ($surv_m$) is modeled as a function of monthly Feather River flows

(eq5) $$logit(surv_m) = B0 + B1 * Q_m$$

where B0 and B1 are model parameters (Table 1), and where Q_m is monthly Feather River flows standardized relative to all monthly Feather River flow observations (provided by CALSIM). Monthly flow data (1922 through 2003) representing two future conditions (2030 and 2070) and two scenarios (Project and no project) were provided by MBK Engineers (see MBK 2018). A total of four different CALSIM scenarios were analyzed.

The flow survival relationship (eq4) was developed by the NMFS Southwest Fishery Science Center as part of a life cycle modeling effort for winter-run Chinook salmon (NMFS 2017). The NMFS LCM is under continuous development, but the model (including this flow-survival function) were used in the NMFS Biological Opinion for California Water Fix (http://www.westcoast.fisheries.noaa.gov/central_valley/CAWaterFix.html). Of course, survival differences between the Sacramento-Feather Rivers and between winter-run Chinook and steelhead are expected. To address these expected differences, we utilized available steelhead acoustic tagging data to estimate B0, but relied upon the estimate of B1 from NMFS (2017). We utilized FRH steelhead survival estimates provided by Kurth and Hampton (2017) who estimated an average survival rate of 0.30 from Boyd's Pump to Verona (Feather River confluence with the Sacramento River). Zeug et al. (2016) estimated survival of 0.45 for acoustically tagged hatchery steelhead smolts from the Sacramento River to the Golden Gate Bridge. The combined survival for these two reaches is 0.13 (i.e. 0.30*0.45) representing survival from Boyd's Pump on the Feather River to ocean entry at the Golden Gate Bridge. Transforming 0.13 as necessary for the logit scale shown in eq2 yields a value of -0.85 for B0 (see Table 12). The resulting relationship between Feather River flow and steelhead survival is depicted in Figure 9. It is important to note that this relationship assumes the Feather River flow pulse provides benefits in both the Sacramento and Feather River, but also does not credit (or discount) the effects of Sacramento River flow changes- effectively assuming Sacramento River flows during FRH steelhead emigration are effectively neutral between Project and Non-Project conditions. CALSIM results reported by MBK indicate this is a reasonable assumption. The Delta Passage Model (DPM) was used to assess Delta effects for spring-run and winter-run Chinook salmon, but was not used for steelhead because of insufficient information from Delta acoustic tagging studies for this species.

Ideally, a Feather River flow-survival relationship would be based solely upon observations from the Feather River. However, since few observations of Feather River survival were available, we combined available Feather River information with findings from the NMFS winter-run Chinook life cycle modeling effort. Though there is uncertainty about the Feather River flow-survival relationship depicted in Figure 9, scientific literature Central Valley tributaries affirms a positive relationship between Feather River flow and juvenile salmon survival is likely. Investigations into the relationship between river discharge and juvenile salmon survival in the Central Valley have primarily focused on the Sacramento-San Joaquin Delta and several studies have reported significant positive relationships (Newman 2003, Perry 2010). Less attention has been focused on the Feather River or other upstream tributaries. However, there are multiple lines of evidence to suggest a positive flow-survival relationship operates in the Feather River. Within the Central Valley, Zeug et al. (2014) reported a significant positive relationship between river discharge (and discharge variability) and survival for juvenile Chinook salmon in the Stanislaus River. Additionally, Perry et al. (2018) found that survival increased in delta reaches when high levels of discharge resulted in a switch from bi-directional to unidirectional flow. A positive flow survival relationship for Chinook salmon during spring in the Snake River was reported by Smith et al. (2003). However, flow was correlated with turbidity and temperature complicating attempts to separate out effects. Regardless of the causal mechanism it is clear that increases in flow result in more favorable conditions for juvenile Chinook survival during migration.

Flow pulses produced by the Project occurred exclusively in dry years, with Feather River base flows at less than 3,000cfs. The estimated survival under these conditions occurs at the left side of the curve depicted in Figure 9.

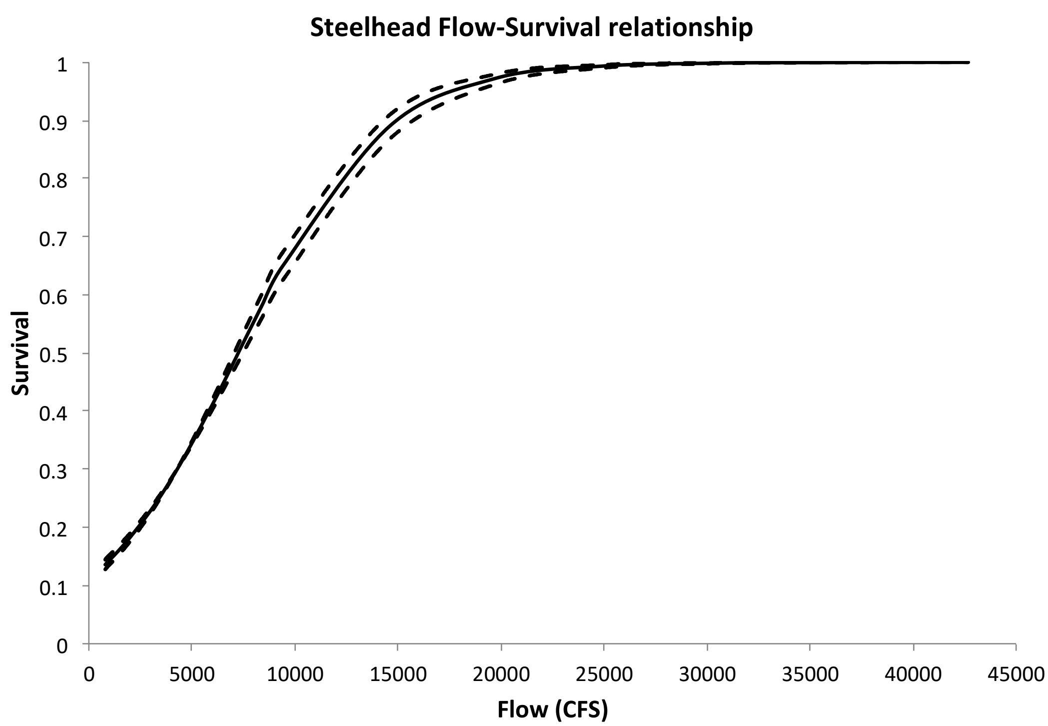


Figure 9. Estimated flow-survival relationship for juvenile Feather River Hatchery steelhead. Plotted flows are for the Feather River only- Sacramento River flows are not included in this relationship. Dashed lines indicate standard deviation associated with parameter B1 as estimated by NMFS (2017).

2.3.2. Bay Smolt to Adult Return Analysis

Total annual adult returns of steelhead were calculated as

$$St_B * S_a$$

where S_a is survival rate for steelhead smolts from Bay exit to return as adults.

Survival probabilities for smolts returning to freshwater as adults are relatively well understood for Chinook salmon (see Zeug et al. 2012, Araujo et al. 2015, Winship et al. 2014, O'Farrell et al. 2012), but are less documented for steelhead. Unlike salmon, steelhead are iteroparous spawners and exhibit other complex life histories which complicate estimation of survival from ocean entry to adult return. Given the lack of steelhead specific estimates, we rely upon available Chinook salmon information.

For Chinook salmon, smolt to adult survival is a function of factors including age and year specific natural mortality, age and year specific harvest mortality, and age at maturity. Since variation in these factors would not be influenced by the Project, we simplified by assuming all steelhead matured at age-3 and that no harvest occurred until age-3. With these assumptions, smolt to adult mortality (S_a) was calculated as

$$M_2 * M_W * H_3$$

where M_2 is the survival of smolts to age-2, where M_w is overwinter survival of age-2 fish and where H_3 represents the fraction of fish surviving harvest and returning to spawn. Based upon Zeug et al. (2012) we fixed parameter values at 0.64 for M_w and at 0.75 for H_3. Since smolt to adult mortality is known to vary widely from year-to-year and among salmon populations (see Bradford et al. 1995), consistent with Zeug et al. (2012) we allowed M_2 to vary from a mean of 0.03, to a maximum value of 0.04 and to a minimum value of 0.02. The resulting range of values for S_a are shown in Table 12 and also reflected in the summary of results shown in Table 14.

3. Results from quantifying anadromous fish benefits

3.1. Chinook results

Using simulated flows and water project operations, our analysis shows substantial net benefits to spring-run and winter-run Chinook (Table 13). The range of estimates shown in Table 13 demonstrated the influence of parameter uncertainty on estimated benefits. Though the magnitude of benefits are variable, our quantitative analyses demonstrates a consistent, strongly positive effect on adult abundance for spring-run and winter-run Chinook salmon.

Table 13. Estimated net change in adult Chinook salmon resulting from 50 years of proposed Project operations under four future conditions relative to no project.

	Spring-run		Winter-run	
Future Condition	Mean	Range	Mean	Range
2030	1011	(674-1348)	109	(73-145)
2070	715	(476-953)	73	(48-97)

As expected, benefits for Chinook salmon occur in years when the Project allows for a Feather River flow pulse. In most years, Chinook salmon are not affected positively or negatively by the Project. For spring-run Chinook, years with flow pulses produce 121 to 354 additional adult Chinook from each of the seven Project flow pulses occurring in the 2030 future condition (Figure 10). The 2070 future condition allowed for five Project flow pulses producing from 168 to 375 additional spring-run adults for each flow pulse event (Figure 10).

Reductions in estimated annual adult Chinook occur in some years as a result of increased Delta diversions associated with the Project, but these losses are outweighed by much larger benefits which accumulate across all years (Table 13).

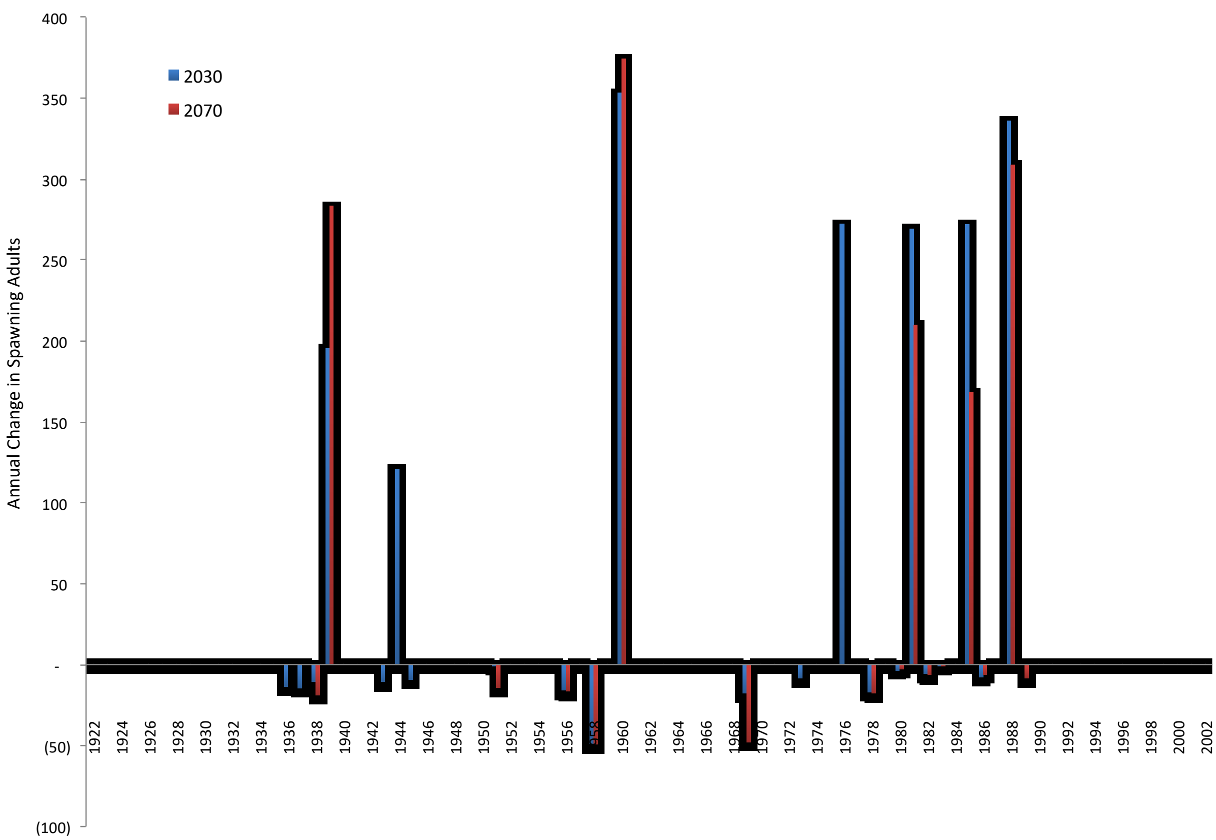


Figure 10. Annual change in adult spring-run Chinook spawners returns associated with the under 2030 and 2070 future conditions.

Benefits from the Project are also apparent for winter-run Chinook salmon. Though winter-run Chinook salmon are not present in the Feather River, the flow pulse originating from the Feather River reaches the Sacramento River and provides benefits from Verona to Delta exit. In most years, winter-run Chinook salmon are not affected positively or negatively by the Project. Benefits ranging from 26 to 57 additional adult Chinook winter-run occur with the seven Project flow pulses associated with the 2030 condition, and with the five Project flow pulses for the 2070 condition (Figure 11). Most winter-run Chinook smolts emigrate through Delta prior to April and are thus are sometimes exposed to increased winter exports associated with the Project. As with spring-run Chinook, Delta losses for winter-run Chinook occur but are outweighed by larger benefits which accumulate across all years (Table 13).

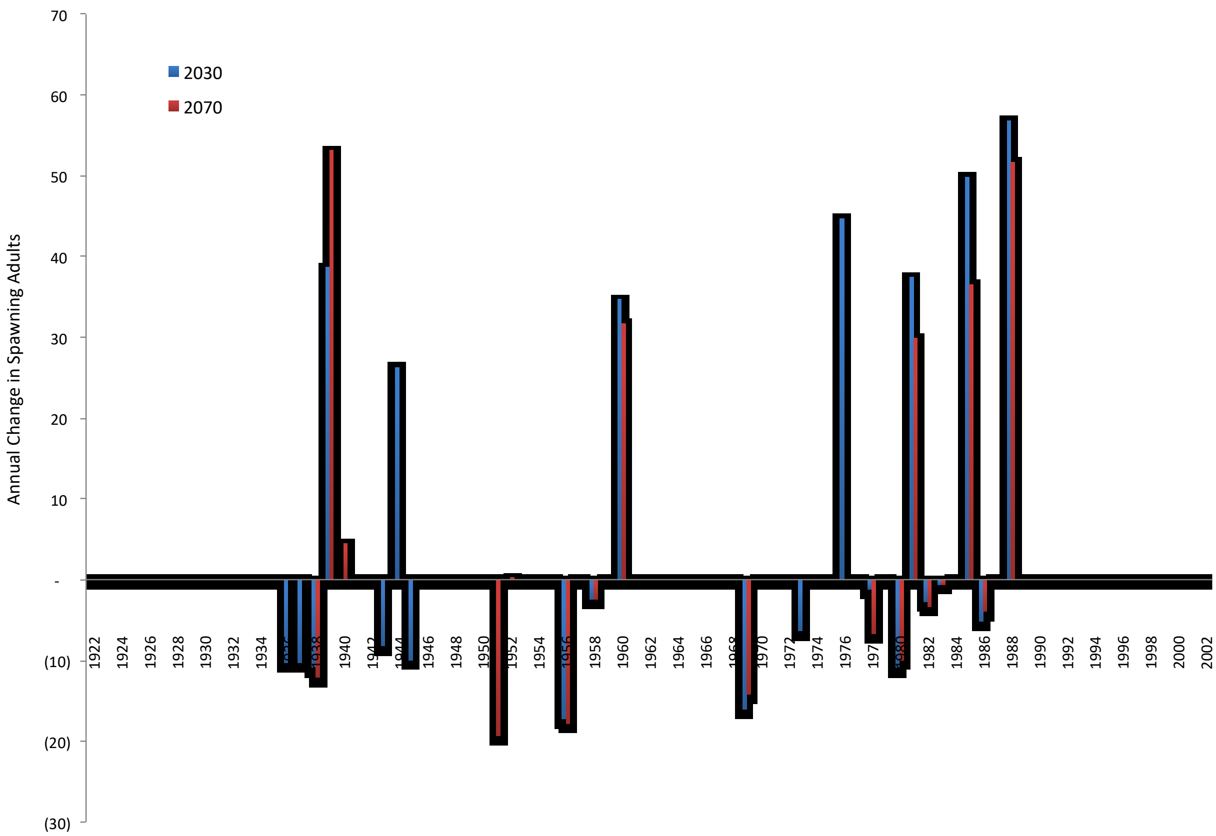


Figure 11. Annual change in adult winter-run Chinook spawning returns associated with the Project under 2030 and 2070 future conditions.

It is important to note that these abundance estimates do not represent a prediction of future spawning escapements. Rather these results reflect a comparison between water project operations using historic hydrologic conditions. The DPM and smolt-to-adult survival (S_a) components of the model analysis represent some major sources of uncertainty, but no practical modeling effort can adequately represent future real-world variation introduced by factors such as changing climate, changing habitat, changing harvest management, changing hatchery management, and shifting ocean productivity. Our modeling application here is consistent with other analytical efforts providing a standardized basis for comparing outcomes between alternative water management while controlling for unknown or uncontrollable future variation in environmental conditions.

3.2. Green sturgeon results

Using simulated flows and water project operations, our analysis shows benefits to green sturgeon abunance. Under the 2030 future condition, April flow pulses with a recurrence interval of once every twelve years are expected. Using the methods described previously, the annualized benefit from this flow pulse attributable to the Project would be approximately 13 additional adult green sturgeon per year.

Under the 2070 future condition, April flow pulses with a recurrence interval of once every sixteen years are expected. Using the methods described previously, the annualized benefit from this flow pulse attributable to the Project would be approximately 10 additional adult green sturgeon per year.

3.3. Steelhead results

Using simulated flows and water project operations, our analysis shows a substantnial net benefits to Central Valley steelhead (Table 14). The range of estimates shown in Table 14 demonstrate the influence of parameter uncertainty on estimated benefits. Though the magnitude of benefits are variable, our quantitative analyses demonstrates a consistent, positive effect on adult abundance of the CCV steelhead DSP.

Table 14. Estimated net change in adult CCV steelhead resulting from 50 years of proposed Project operations under four future conditions relative to no project.

Change in Adult Steelhead Abundance from 50 years with Project

Future Condition	Mean	Range
2030	95	(63-127)
2070	62	(42-83)

It is important to note that these abundance estimates do not represent a prediction of future steelhead spawning abundance. Rather, these results reflect a comparison between water project operations using historic hydrologic conditions. The smolt-to-adult survival (S_a) component of the model analysis represent some major sources of uncertainty, but no practical modeling effort can adequately represent future real-world variation introduced by factors such as changing climate, changing habitat, changing harvest management, changing hatchery management, and shifting ocean productivity. Our modeling application here is consistent with other analytical efforts providing a standardized basis for comparing outcomes between alternative water management while controlling for unknown or uncontrollable future variation in environmental conditions.

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Appendix D

Recharge Basin Design and Operation for Intermittent Wetland Benefits

Addendum No. 2

Recharge Basin Design and Operation for Intermittent Wetland Benefits

Finding #4:

Feasibility Study:

a. *As currently designed the recharge basins may not meet the requirements for classification as an intermittent wetland.*
b. *Determine requirements for creation of intermittent wetlands, and update design and cost estimate to include these features.*

Response to Finding #4:

- The wetlands that will be incidentally created by the constructed recharge basins will most closely resemble a classification of *Intermittent Flooded Riverine Wetlands with Unconsolidated Sandy Bottoms*.
- The Project will create incidental intermittent during recharge for periods of upward to 12 months. Specific features are incorporated into the design, operation and maintenance of the wetlands, so that during the recharge periods hydric soils conditions will form allowing for the development of hydrophytes and the establishment of habitat for shorebirds and migratory birds.
- Project recharge basins will typically hold water from 1 month upwards to 12 months which allow for the development of hydric soils during the growing season. Hydric soils typically form within existing recharge basins by the third or fourth week of flooding due to gradual saturation of the soils.
- Project berm and island banks will be built at a 4:1 slope with a minimum 1.5' freeboard which will result in at least a 6 to 10-foot-wide vegetative strip above the water line with vegetation extending into shallow water areas.
- Recharge basins will be designed to provide bird habitat in the intermittent wetlands created in the Project recharge ponds. Per the recommendation of the Environmental Defense Fund, recharge basins will be constructed at multiple water depths to benefit both shorebirds and waterfowl. Shorebirds prefer mudflats to a depth of up to 6" with sparse vegetation (<40%) while waterfowl prefer depths of 6" to above 18" with a combination of open water and wetland cover. Dry land (berms or islands) are important for resting areas with dense vegetation.
- The project costs include the design features for the intermittent wetlands such as dry land berms or islands and raptor boxes. The costs for dry land berms or islands are included in the line item for levee embankment fill. The costs for raptor boxes are included in the interbasin structure line item for miscellaneous steel and weir boards.
- The operations and maintenance costs associated with these design features have already been anticipated and therefore does not result in any changes to the project operations cost estimates.

More detailed information is provided below.

Wetland Classifications

The United States Fish and Wildlife Service maintains important documents related to the classification of wetlands in the United States. The most current is the Second Edition – Classification of Wetlands and

Deepwater Habitats of the United States[1]. Based on this document, wetlands are classified as Marine, Estuarine, Riverine, Lacustrine, and Palustrine. A Riverine System has four subsystems: Tidal, Lower Perennial, Upper Perennial, and Intermittent. Wetland classes are further defined based on bottom substrate and flooding regime as well as dominant vegetation types.

Project Recharge Basins as Intermittent Wetlands

Since the Project recharge basins will be intermittently flooded with captured stream flows that are diverted into the California Aqueduct, through the Project canal and into man-made impoundments, the wetlands that will be incidentally created by the constructed recharge basins will most closely resemble a classification of *Intermittent Flooded Riverine Wetlands with Unconsolidated Sandy Bottoms*. Accordingly, the recharge basins constructed for the Project will be designed to meet intermittent wetland requirements during recharge operations. The following explains the application of design criteria used to meet the project goals of establishing intermittent wetlands and providing bird habitat in the recharge basins.

As described in the Project Feasibility Report (Sections 1.4.3, 2.1.3, 4.1.4.2 and 5.1.3.2), the Project will establish intermittent wetland habitat through intermittent recharge events. The primary purpose of the Project lands is to construct and operated recharge basins that allow water to infiltrate and recharge into the underlying aquifer for storage until it is needed. During the years that the Project takes and recharges water into storage, the basins will be inundated with water and will provide intermittent wetland habitat to support waterfowl, shorebirds, raptors and other migratory birds along the Pacific Flyway. The wetlands to be established by the Project are considered intermittent because the water supply delivered for recharge may not be available for recharge year-round or during periods of drought. The term "incidental" is also used to describe these intermittent wetlands because they are incidentally created as a result of water recharging in the Project basins.

In addition to Rosedale-Rio Bravo Water Storage District (RRBWSD) and Irvine Ranch Water District's (IRWD) existing recharge basins, which support similar intermittent wetland habitat, the Kern Water Bank, located south of the Project, represents a larger reference site for the future conditions of the Project recharge basins and the intermittent wetland establishment. The Kern Water Bank spans 20,000 acres of water recharge and recovery infrastructure. Their recharge basins were established and are operated and managed as a habitat matrix of upland and intermittent wetland habitat. Through 2018, over 206 species of birds have been identified on Kern Water Bank lands (Kern Water Bank Authority 2019). It is anticipated that the Project will result in similar habitat conditions as established through the existing RRBWSD and IRWD basins and within the Kern Water Bank.

[1] Wetlands Subcommittee of the Federal Geographic Data Committee, August 2013. "Classification of Wetland and Deepwater habitats for the United States", Adapted from Cowardin, Carter, Golet and LaRoe (1979). Available at: https://www.fws.gov/wetlands/data/wetland-codes.html

<u>Intermittent Wetland Requirements</u>

Project recharge basin design and operation will align with the ecological requirements of intermittent wetlands. Intermittent wetland ecological features include:

(1) The intermittent presence of water at the surface or within the root zone;
(2) Saturated soil conditions that result in anaerobic conditions in the upper part (i.e., hydric soil);
(3) Water tolerant (i.e., hydrophytic) vegetation; and
(4) Establishing habitat for waterfowl and shorebirds.

For intermittent wetlands, the presence of water is variable and spans a variety of wetland types. For example, vernal pools, pond or lake fringes, and seasonal riverine wetlands are all considered intermittent wetlands.

<u>Recharge Basin Design and Operation Criteria to Create Intermittent Wetlands</u>

The design, construction and operation of the Project recharge basins fulfill the requirements of Intermittent Wetlands described above. Since the Project recharge basins will be intermittently flooded with captured stream flows diverted into the California Aqueduct, through the Project canal and into man-made impoundments, the wetlands that will be incidentally formed by the constructed recharge basins will be intermittent wetlands. The Project recharge basins include design features that will function as intermittent wetlands to support and benefit water birds and wetland-dependent upland birds and wildlife. The variable presence of water, soil, and vegetation, as well as bird habitat features, were considered in the design and operation criteria for the recharge basins as described in the following.

Design Criteria #1: Allow water to be maintained on site during recharge operations -- Recharge basins use man-made berms to maintain water on site. Several thousand acres of groundwater recharge basins have been constructed on the Kern River Fan over the past 30 years. Some are in the primary flood plain that was not previously developed, but most are on previously farmed and leveled properties. Typical construction matches the existing field boundaries as they neighbor existing agricultural production.

<u>Slope and Berm Construction:</u> The Project area has a predominate land slope of 2 feet per mile which will remain after recharge basin construction. Project recharge basin berms will be constructed with compacted earth from the project site at approximately two to six feet in height. Berms may also serve as roadways. Project recharge basin water depths will range from 0 up to 24 inches.

<u>Ponding duration and timing:</u> Project water will provide wetland habitat during the winter months of wet, above normal and normal water years when recharge activity occurs. Water is expected to be in the recharge basins for an average duration of 1.5 months during years in which active recharge of Article 21 water occurs in the winter months. Based on historical availability of other water supplies during normal and wet years, the benefits from the intermittent wetland habitat could be extended by upwards of 12 operating months.

Design Criteria #2: Develop hydric soils during recharge operations -- The United States Department of Agriculture defines hydric soil as a soil that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part[2]. Soils that are sufficiently wet because of artificial measures, such as operations of recharge basins, are included in the concept of hydric soils.

Presence of Hydric Soils: Project recharge basins will typically hold water from 1 month to upwards of 12 months which allow for the development of hydric soils during the growing season. RRBWSD finds that hydric soils typically form within existing recharge basins by the third or fourth week of flooding due to gradual saturation of the soils. This is expected to occur at the Project recharge basins. During this period, typical recharge rates within the basins are expected to slow from an initial infiltration rate of up to 1 acre-foot per day to a maintenance rate of about 0.4 acre-feet per day.

Design Criteria #3: Establish hydrophytic vegetation during recharge operations -- Hydric soils result in sufficiently wet conditions to support the natural growth and regeneration of hydrophytic vegetation. Recharge basin design, operation, and maintenance also allow for the planting and establishment of hydrophytic vegetation.

Project Berms and Islands: Project berm and island banks will be built at a 4:1 slope with a minimum 1.5' freeboard which will result in at least a 6 to 10 foot wide vegetative strip above the water line with vegetation extending into shallow water areas. Each basin would include 1-2 islands with similar gradual sloped banks and freeboard requirements. During recharge periods mowing of the berms and islands is limited to support growth of significant vegetation ranging from 6 to 36 inches tall. Shallow water areas would also experience vegetation growth of variable height. Established hydrophytic vegetation is expected to include common spikerush (*Eleocharis macrostachya*), Baltic rush (*Juncus balticus*), common knotweed (*Polygonum lapathifolium*), annual beard grass (*Polypogon monspeliensis*), broadleaf cattail (*Typha latifolia*) Fremont cottonwood (*Populus fremontii*), and Goodding's black willow (*Salix gooddingii*).

Design Criteria #4: Establish habitat for birds during recharge operations – RRBWSD has been working with the Environmental Defense Fund (EDF) in an effort to construct and operate recharge facilities that have multi-benefits, including intermittent wetlands and bird habitat. EDF partnered with Point Blue Conservation Science, Audubon California and Sustainable Conservation to develop a guide on how to build this kind of preferred recharge basin that provides operational benefits to basin management while also creating valuable water bird habitat. Figure 9, included at the end of this addendum, is the guide prepared by EDF. This guide describes the wildlife benefits associated with the multi-uses of recharge basins as intermittent wetlands.

Basin Design: The Project basins are designed to improve recharge and are less likely to plug with fine sediments while also incidentally creating habitat through the formation of hydric soils. Additional recharge basin design considerations are included to provide bird habitat in the intermittent wetlands created in the Project recharge ponds. Per EDF's recommendation, recharge basins will be constructed at multiple water depths to benefit both shorebirds and waterfowl. Shorebirds prefer mudflats to a depth of up to 6" with sparse vegetation (<40%) while waterfowl prefer depths of 6" to above 18" with a combination of open water

[2] US Department Agriculture, Natural Resources Conservation Service: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/use/hydric/?cid=nrcs142p2_053961

and wetland cover (see Figures 1, 2 and 3). Dry land (berms or islands) are important for resting areas with dense vegetation (see Figures 4, 5 and 6).

Basin Depths: Each typical basin would yield 1/3 of the depths suitable for shorebird mudflats and 2/3 suitable for waterfowl preferred depths (see Figures 2, 3 and 7).

Ponding Duration: The project is expected to provide wetland habitat to migratory birds whenever recharge activity occurs on the project sites. Based on historical availability of all water supplies, the duration of incidental wetland habitat from water ponding could range from 1.5 months to upwards of 12 operating months, which allows for the development of hydric soils during the growing season (see Figure 1).

Berms and Islands: Earthen berms and islands will also provide necessary resting areas on the banks. During recharge periods, mowing is limited on the berms and islands to support vegetation growth from 6 to 36 inches tall (see Figures 4, 5 and 6). The costs for dry land berms and islands are included in the Project cost line item for levee embankment fill. These costs are included in the earthwork quantities in the recharge basin construction costs. The cost of maintaining the berms and islands, including occasionally mowing, are included in the Project's operations and maintenance (O&M) costs.

Raptor Boxes: Burrowing rodents can cause structural damage to earthen berms. To offset harmful effects of rodenticides on wildlife --- owl and hawk boxes and perching structures will be installed every 0.25 mile of berm. The Project will rely on raptor boxes and perches and use of rodenticides only as necessary to protect berm stability and to thus protect the intermittent wetlands created by the operation of the Project recharge basins. The costs for installing raptor boxes are included in the interbasin structure line item for miscellaneous steel and weir boards. The estimated cost of occasionally maintenance or repair of raptor boxes is included in the Project's O&M costs.

Managing Basins During Non-Recharge

The Project recharge basins will allow native vegetation (non-noxious weeds) and seeded forage crops to provide dry cover crop and wildlife cover and forage during non-recharge periods (see photos in Figure 8). In order to promote future cover crops or natural vegetation growth each year, basins would be grazed by sheep or cattle or mowed as necessary. No-till planting methods, rather than disking, would be used to seed forage crops. Disking operations promotes noxious weed growth and would be avoided. The cost of the seeding and mowing activities is included in the Project's O&M costs.

Managing sediments: RRBWSD's managed recharge basins have not experienced recharge impacts from settlement of fine sediments or bacterial fowling. Sediment is typically settled prior to reaching this portion of the service area. To the extent that this does occur, these materials would be scraped and placed on islands. The estimated cost of occasional scraping of the basins is included in the Project's O&M costs.

Adaptive Management of Intermittent Wetlands

Land and wildlife management is dynamic. As weather and climatic patterns change -- landscapes, including intermittent wetlands, will react. Plants and wildlife will adapt to these changes on a variable basis, so it is recognized that recharge basin management will need to adapt as well to optimize wetland benefits. To meet the demands of the environment and Project an adaptive management plan will be developed and implemented for the management of the Project recharge basins as well as the management of the intermittent wetlands created during the operation of the basins. This plan will include annual biota reports including adaptive management recommendations to be considered and implemented, as appropriate to optimize project water management and wildlife goals.

Figure 1. Example of a RRBWSD recharge basin with ponded water during the growing season that allows for the establishment of hydric soils and vegetation.

Figure 2. Typical RRBWSD Recharge Basin with mix of mudflats and open water

Figure 3. Mudflats with shorebirds on Strand Recharge Basins

Figure 4. Upland vegetation on recharge basin berm provides habitat for birds.

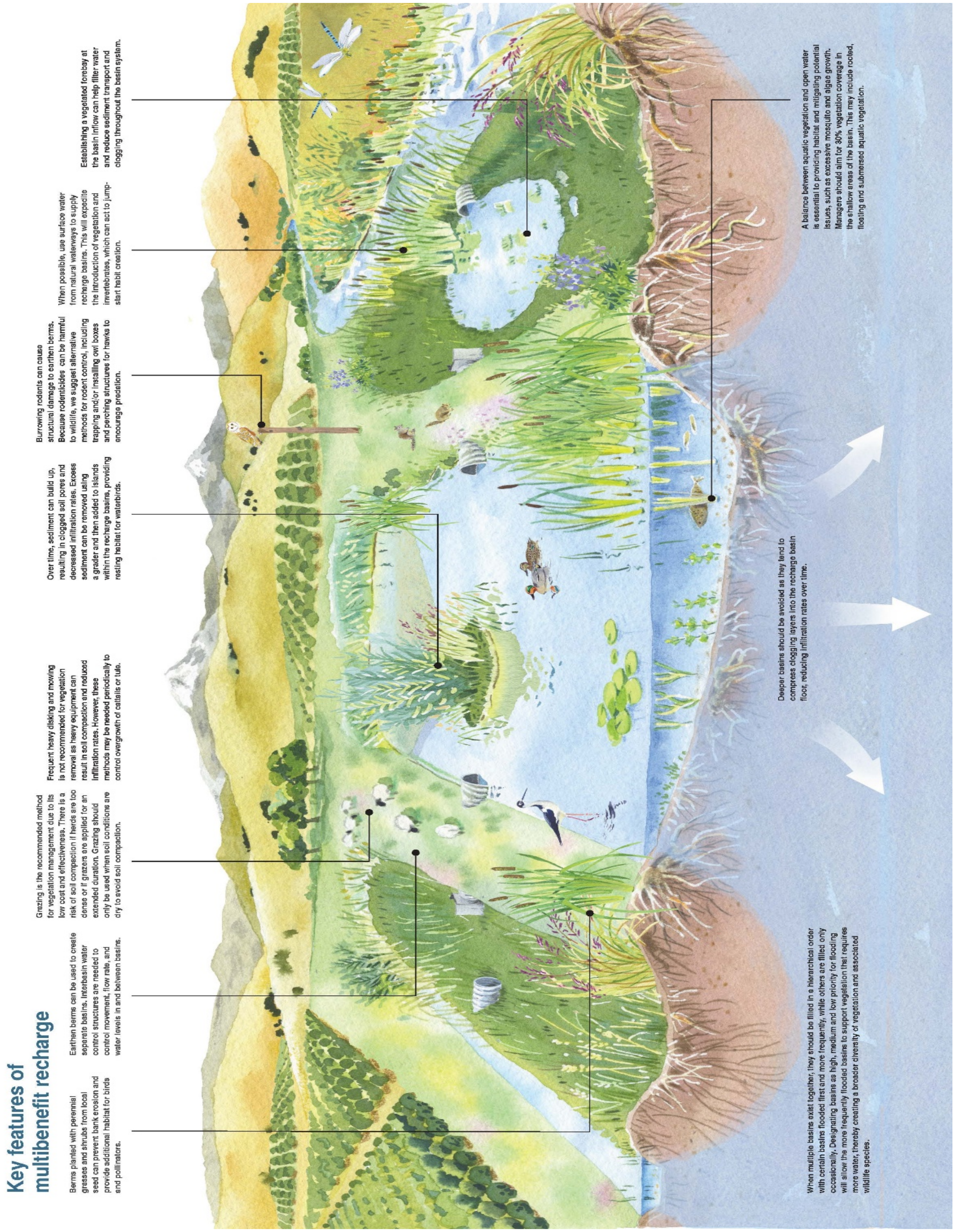
Figure 5. Typical RRBWSD Recharge Basin Berm Water Line Habitat

Figure 6. Typical RRBWSD Recharge Basin Island

Figure 7. Three Photos of typical waterfowl in Strand Recharge Basins during Recharge Periods

Figure 8. Three Photos of typical RRBWSD Recharge Basins During Non-Recharge Periods

Figure 9. Environmental Defense Fund Guide on Building Multi-Benefit Basins



Building multibenefit recharge basins

Audubon CALIFORNIA · EDF ENVIRONMENTAL DEFENSE FUND Finding the ways that work · Point Blue Conservation Science · Sustainable Conservation

As California faces an unpredictable water future, policy makers and water managers across the state are seeking solutions to build resilience into our water supply system. Groundwater recharge is an excellent tool to replenish depleted aquifers and bank water for future use. In addition to helping water managers balance their water budget, groundwater recharge also provides an opportunity to create habitat for wildlife. This guide highlights recharge basin management strategies that create wildlife habitat and provide operational benefits to basin managers.

Operational Benefits

Reduce sediment and clogging

Sediment buildup and pore clogging can greatly diminish the efficiency of basin recharge. Creating multiple subbasins within a series can allow for the first receiving basin to act as a settling area, enabling the successive basins to recharge more efficiently over time. Settling basins filter fine sediment in the water and minimize clogging of successive recharge ponds. Creating basins with a sloped floor will result in sediment accumulation in a smaller area, reducing the operational cost of removing sediment buildup.

Planting vegetation on basin bottoms during dry spells can also help maintain recharge rates over time as roots create channels for water to infiltrate the soil.

Stabilize basins

Planting vegetation along the sides of basins will help prevent erosion and stabilize berms. These plantings can also inhibit the establishment of nuisance weeds such as Russian thistle. Installing perching structures for hawks can help control burrowing rodents that can compromise berms.

Funding Sources

Potential federal, state and local funding sources for multibenefit recharge projects that create waterbird habitat include:

- Wildlife Conservation Board Pacific Flyway Program
- U.S. Fish and Wildlife Service Partners for Fish and Wildlife Program
- Natural Resources Conservation Service Environmental Quality Incentives Program
- California Department of Fish and Wildlife California Waterfowl Habitat Program

WILDLIFE TARGET

Shorebirds

- Legs are often long and thin.
- Bills thin. If long, then used to probe in the soil. If short, then used to peck food off the surface of the ground.
- Eat various bugs, worms and other invertebrates.
- 13 species use the Central Valley regularly.
- Some populations are declining; others are stable.

Waterfowl

- Ducks, geese and swans
- Most have flat bills that filter plants, seeds and invertebrates from the water and mud for food.
- Webbed feet make them strong swimmers.
- Some populations are declining; others are stable.

Pollinators

- More than 1,000 species of honey bees, native bees, butterflies and beetles.
- Wide range of sizes and colors, from tiny sweat bees less than ¼" long to monarch butterflies larger than 3".
- Nearly all populations are declining.

HABITAT CHARACTERISTICS

Shorebirds

- Open mudflats or shallowly flooded environments.
- Some short, sparse vegetation is OK.
- Less than 40% vegetation cover is recommended.
- Remaining vegetation should be smashed or incorporated.

Waterfowl

- Open water is generally preferred for feeding.
- Some species like vegetation (cattails/tules) to hide in.
- Some dry land (berms or islands) is important for resting areas.
- Vegetation on resting areas should not be very dense. However, some species that breed in Central Valley would use denser vegetation for nesting.
- Forage plants for waterfowl (watergrass, smartweed and swamp timothy) will provide food during winter.

Pollinators

- Prefer a diversity of native vegetation that flowers (providing food and cover) throughout the year.
- Plant vegetation along the sides and throughout the basin bottom.
- Drier areas should remain undisturbed (no disking) to provide nesting habitat in soil.

WATER MANAGEMENT

Shorebirds

Timing

- Shorebirds are present in the Central Valley year-round.
- Migration is a critical period when habitat is needed: spring (March to May) and fall (July to September).

Depth

- Saturated mudflat to 6 inches deep.
- Variable water depth is ideal and will benefit a wider diversity of shorebirds and other waterbirds

Waterfowl

Timing

- Winter (October to March) is the most important time to provide habitat for waterfowl in the Central Valley.
- Some species breed in the Central Valley from March to mid-July.

Depth

- Water depths from 6 inches to 18 inches are recommended.
- Some species will use depths greater than 18 inches.
- Forage plants may require additional irrigation in dry periods.

Pollinators

Timing

- Water should not inundate vegetation for long periods in areas designated as a dry zone because it can kill the plants and drowns the burrowing insects

Depth

- Plant in zones related to how much water each will likely receive. Some will only get winter rain, some flooded only occasionally, others flooded regularly.

This document highlights best practices as understood by wildlife experts and practitioners as of February 2020.
If you are interested in participating in a pilot project or providing feedback, please contact **recharge@pointblue.org**

Appendix E
Energy Calculations

ESA

Summary of Energy Use During Project Construction

Energy Type	Annual Average Quantity During Construction [b]	
Gasoline		
On-Road Construction Equipment	9,423	gallons
Off-Road Construction Equipment	0	gallons
Total Gasoline	**9,423**	gallons
Diesel		
On-Road Construction Equipment	41,265	gallons
Off-Road Construction Equipment	141,519	gallons
Total Diesel	**182,784**	gallons

Kern Fan Groundwater

Total On-Road Fuel Consumption

		gal/mile	gal/min
2021Hauling	Hauling	0.15067657	3.86551E-05
2021Vendor	Vendor	0.13112558	6.0643E-05
2021Worker	Worker	0.03788532	7.74256E-07
2022Hauling	Hauling	0.1469647	3.80972E-05
2022Vendor	Vendor	0.12767732	6.03275E-05
2022Worker	Worker	0.0368183	7.52449E-07
2023Hauling	Hauling	0.14080239	3.68642E-05
2023Vendor	Vendor	0.1225625	5.92463E-05
2023Worker	Worker	0.03575646	7.30749E-07
2024Hauling	Hauling	0.13842029	3.65691E-05
2024Vendor	Vendor	0.12081632	5.96695E-05
2024Worker	Worker	0.03471743	9.2758E-07

Trip Type	Fuel Use (gal)	Fuel Type
Hauling	43,849	Diesel
Vendor	34,214	Diesel
Worker	18,545	Gasoline
Annual Average Fuel Consumption		
Hauling	12,573	Diesel
Vendor	9,810	Diesel
Worker	5,317	Gasoline

3.5	years

Construction Phase	Annual One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Idling per Day (minutes)	Regional Emissions (gallons) gal/mile	gal/min	gal/year	
Demolition/Site Clearing	2021								
Total Haul Trips	0								
Hauling	642	65	10	20	15	0.15	3.87E-05	1,935	
Vendor	260	65	10	25	15	0.13	6.06E-05	852	
Worker	650	65	10	16.8	0	0.04	7.74E-07	414	
Pipelines	2021								
Total Haul Trips	0								
Hauling	30	65	10	4	15	0.15	3.87E-05	18	
Vendor	130	65	10	25	15	0.13	6.06E-05	426	
Worker	650	65	10	16.8	0	0.04	7.74E-07	414	
Basins-2021	2021								
Total Haul Trips	0								
Hauling	22743	131	10	4	15	0.15	3.87E-05	13,714	
Vendor	524	131	10	25	15	0.13	6.06E-05	1,718	
Worker	2620	131	10	16.8	0	0.04	7.74E-07	1,668	
Basins-2022	2022								
Total Haul Trips	0								
Hauling	8950	85	10	4	15	0.15	3.81E-05	5,264	
Vendor	340	85	10	25	15	0.13	6.03E-05	1,085	
Worker	1700	85	10	16.8	0	0.04	7.52E-07	1,052	
Restoration	2022								
Total Haul Trips	0								
Hauling	0	21	10	4	15	0.15	3.81E-05	0	
Vendor	84	21	10	25	15	0.13	6.03E-05	268	
Worker	126	21	10	16.8	0	0.04	7.52E-07	78	
Well Drilling	2022								
Total Haul Trips	0								
Hauling	8	44	10	4	15	0.15	3.81E-05	28	
Vendor	176	44	10	25	15	0.13	6.03E-05	3,371	
Worker	440	44	10	16.8	0	0.04	7.52E-07	1,633	

Kern Fan Groundwater

Total On-Road Fuel Consumption

		gal/mile	gal/min
2021Hauling	Hauling	0.15067657	3.86551E-05
2021Vendor	Vendor	0.13112558	6.0643E-05
2021Worker	Worker	0.03788532	7.74256E-07
2022Hauling	Hauling	0.1469647	3.80972E-05
2022Vendor	Vendor	0.12767732	6.03275E-05
2022Worker	Worker	0.0368183	7.52449E-07
2023Hauling	Hauling	0.14080239	3.68642E-05
2023Vendor	Vendor	0.1225625	5.92463E-05
2023Worker	Worker	0.03575646	7.30749E-07
2024Hauling	Hauling	0.13842029	3.65691E-05
2024Vendor	Vendor	0.12081632	5.96695E-05
2024Worker	Worker	0.03471743	9.2758E-07

Trip Type	Fuel Use (gal)	Fuel Type
Hauling	43,849	Diesel
Vendor	34,214	Diesel
Worker	18,545	Gasoline
Annual Average Fuel Consumption		
Hauling	12,573	Diesel
Vendor	9,810	Diesel
Worker	5,317	Gasoline

3.5	years

Construction Phase	Annual One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Idling per Day (minutes)	Regional Emissions (gallons) gal/mile	gal/min	gal/year
Well Construction	2023							
Total Haul Trips	0							
Hauling	0	50	10	4	15	0.14	3.69E-05	0
Vendor	202	50	10	25	15	0.12	5.92E-05	3,714
Worker	500	50	10	16.8	0	0.04	7.31E-07	1,802
Pipelines	2023							
Total Haul Trips	0							
Hauling	122	65	10	4	15	0.14	3.69E-05	412
Vendor	260	65	10	25	15	0.12	5.92E-05	4,780
Worker	650	65	10	16.8	0	0.04	7.31E-07	2,343
Demolition/Site Clearing	2022							
Total Haul Trips	0							
Hauling	642	67	10	4	15	0.15	3.81E-05	378
Vendor	368	67	10	25	15	0.13	6.03E-05	1,175
Worker	670	67	10	16.8	0	0.04	7.52E-07	414
Pipelines	2022							
Total Haul Trips	0							
Hauling	30	67	10	4	15	0.15	3.81E-05	18
Vendor	368	67	10	25	15	0.13	6.03E-05	1,175
Worker	670	67	10	16.8	0	0.04	7.52E-07	414
Basins	2022							
Total Haul Trips	0							
Hauling	37500	220	10	4	15	0.15	3.81E-05	22,055
Vendor	1224	220	10	25	15	0.13	6.03E-05	3,907
Worker	4400	220	10	16.8	0	0.04	7.52E-07	2,722
Restoration	2022							
Total Haul Trips	0							
Hauling	0	22	10	4	15	0.15	3.81E-05	0
Vendor	120	22	10	25	15	0.13	6.03E-05	383
Worker	132	22	10	16.8	0	0.04	7.52E-07	82

Kern Fan Groundwater

Total On-Road Fuel Consumption

		gal/mile	gal/min
2021Hauling	Hauling	0.15067657	3.86551E-05
2021Vendor	Vendor	0.13112558	6.0643E-05
2021Worker	Worker	0.03788532	7.74256E-07
2022Hauling	Hauling	0.1469647	3.80972E-05
2022Vendor	Vendor	0.12767732	6.03275E-05
2022Worker	Worker	0.0368183	7.52449E-07
2023Hauling	Hauling	0.14080239	3.68642E-05
2023Vendor	Vendor	0.1225625	5.92463E-05
2023Worker	Worker	0.03575646	7.30749E-07
2024Hauling	Hauling	0.13842029	3.65691E-05
2024Vendor	Vendor	0.12081632	5.96695E-05
2024Worker	Worker	0.03471743	9.2758E-07

Trip Type	Fuel Use (gal)	Fuel Type
Hauling	43,849	Diesel
Vendor	34,214	Diesel
Worker	18,545	Gasoline
Annual Average Fuel Consumption		
Hauling	12,573	Diesel
Vendor	9,810	Diesel
Worker	5,317	Gasoline

3.5	years

Construction Phase	Annual One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Idling per Day (minutes)	Regional Emissions (gallons) gal/mile	gal/min	gal/year	
Well Drilling	2023								
Total Haul Trips	0								
Hauling	8	42	10	4	15	0.14	3.69E-05	27	
Vendor	168	42	10	25	15	0.12	5.92E-05	3,089	
Worker	420	42	10	16.8	0	0.04	7.31E-07	1,514	
Well Construction-2023	2023								
Total Haul Trips	0								
Hauling	0	20	10	4	15	0.14	3.69E-05	0	
Vendor	82	20	10	25	15	0.12	5.92E-05	1,508	
Worker	200	20	10	16.8	0	0.04	7.31E-07	721	
Well Construction-2024	2024								
Total Haul Trips	0								
Hauling	0	30	10	4	15	0.14	3.66E-05	0	
Vendor	120	30	10	25	15	0.12	5.97E-05	2,175	
Worker	300	30	10	16.8	0	0.03	9.28E-07	1,050	
Pipelines-2023	2023								
Total Haul Trips	0								
Hauling	0	20	10	4	15	0.14	3.69E-05	0	
Vendor	80	20	10	25	15	0.12	5.92E-05	1,471	
Worker	200	20	10	16.8	0	0.04	7.31E-07	721	
Pipelines-2024	2024								
Total Haul Trips	0								
Hauling	0	43	10	4	15	0.14	3.66E-05	0	
Vendor	172	43	10	25	15	0.12	5.97E-05	3,117	
Worker	430	43	10	16.8	0	0.03	9.28E-07	1,505	

Kern Fan Groundwater Project

Total On-Road Fuel Consumption

		gal/mile	gal/min
2023Hauling	Hauling	0.14080239	3.68642E-05
2023Vendor	Vendor	0.1225625	5.92463E-05
2023Worker	Worker	0.03575646	7.30749E-07
2024Hauling	Hauling	0.13842029	3.65691E-05
2024Vendor	Vendor	0.12081632	5.96695E-05
2024Worker	Worker	0.03471743	9.2758E-07
2025Hauling	Hauling	0.13560219	3.58876E-05
2025Vendor	Vendor	0.11876987	5.94547E-05
2025Worker	Worker	0.03367746	8.99794E-07
2026Hauling	Hauling	0.13265382	3.5116E-05
2026Vendor	Vendor	0.11664401	5.90612E-05
2026Worker	Worker	0.0326492	4.20695E-07

Trip Type	Fuel Use (gal)	Fuel Type
Hauling	34,789	Diesel
Vendor	31,065	Diesel
Worker	14,321	Gasoline
Annual Average Fuel Consumption		
Hauling	9,975	Diesel
Vendor	8,907	Diesel
Worker	4,106	Gasoline

3.5	years

Construction Phase	Annual One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Idling per Day (minutes)	gal/mile	gal/min	Regional Emissions (gallons) gal/year
Turnout, Pipelines, Canal-2023	2023							
Total Haul Trips	0							
Hauling	16967	178	10	3.3	15	0.14	3.69E-05	7,888
Vendor	1717	178	10	25	15	0.12	5.92E-05	5,262
Worker	3560	178	10	16.8	0	0.04	7.31E-07	2,139
Turnout, Pipelines, Canal-2024	2024							
Total Haul Trips	0							
Hauling	24973	262	10	3.3	15	0.14	3.66E-05	11,414
Vendor	2484	262	10	25	15	0.12	5.97E-05	7,504
Worker	5240	262	10	16.8	0	0.03	9.28E-07	3,056
Turnout, Pipelines, Canal-2025	2025							
Total Haul Trips	0							
Hauling	24877	261	10	3.3	15	0.14	3.59E-05	11,139
Vendor	2474	261	10	25	15	0.12	5.95E-05	7,347
Worker	5220	261	10	16.8	0	0.03	9.00E-07	2,953
Turnout, Pipelines, Canal-2026	2026							
Total Haul Trips	0							
Hauling	9436	99	10	3.3	15	0.13	3.51E-05	4,133
Vendor	939	99	10	25	15	0.12	5.91E-05	2,739
Worker	1980	99	10	16.8	0	0.03	4.21E-07	1,086
Pumpstations-2023	2023							
Total Haul Trips	0							
Hauling	154	178	10	3.3	15	0.14	3.69E-05	215
Vendor	724	178	10	25	15	0.12	5.92E-05	6,655
Worker	2136	178	10	16.8	0	0.04	7.31E-07	3,849
Pumpstations-2024	2024							
Total Haul Trips	23							
Hauling	0	43	10	3.3	15	0.14	3.66E-05	0
Vendor	172	43	10	25	15	0.12	5.97E-05	1,559
Worker	516	43	10	16.8	0	0.03	9.28E-07	903
Construction Phase	2026							
Total Haul Trips	0							
Hauling	0	61	10	3.3	15	0.13	3.51E-05	0
Vendor	0	61	10	25	15	0.12	5.91E-05	0
Worker	610	61	10	16.8	0	0.03	4.21E-07	335

Construction Energy Analysis
Off-Road Equipment - Diesel

Equipment ≤ 100 hp		
esel fuel/hp-hr (lb/hp-hr):[1]	0.408	lb/hp-hr
diesel density (lb/gal):[1]	7.11	lb/gal
diesel gallons/hp-hr:	0.0574	gal/hp-hr
ss than or equal to 100 HP:	1,094,417	hp-hr
Total diesel gallons:	62,812	gal
Equipment > 100 hp		
esel fuel/hp-hr (lb/hp-hr):[1]	0.367	lb/hp-hr
diesel density (lb/gal):[1]	7.11	lb/gal
diesel gallons/hp-hr:	0.0516	gal/hp-hr
Greater than 100 HP:	8,343,975	hp-hr
Total diesel gallons:	430,761	gal
lons (off-road equipment):	493,573	gal
	3.5	years
	141,519	**average annual gallons**

Phase	Phase Name	Equipment	Number	Hours/Day	Number of Phases	HP	Load	Days	Total hp-hr
Conveyance	Canal,Turnout,Pipelines	Cement and Mortar Mixers	1	8	1	9	0.56	800	32,256
Conveyance	Canal,Turnout,Pipelines	Cranes	1	8	1	231	0.29	800	428,736
Conveyance	Canal,Turnout,Pipelines	Excavators	2	8	1	158	0.38	800	768,512
Conveyance	Canal,Turnout,Pipelines	Graders	1	8	1	187	0.41	800	490,688
Conveyance	Canal,Turnout,Pipelines	Rubber Tired Loaders	1	8	1	203	0.36	800	467,712
Conveyance	Canal,Turnout,Pipelines	Tractors/Loaders/Backhoes	1	8	1	97	0.37	800	229,696
Pump Stations	Building Construction	Cement and Mortar Mixers	1	8	3	9	0.56	221	26,732
Pump Stations	Building Construction	Cranes	1	8	3	231	0.29	221	355,315
Pump Stations	Building Construction	Excavators	1	8	3	158	0.38	221	318,452
Pump Stations	Building Construction	Rubber Tired Loaders	1	8	3	203	0.36	221	387,616
Pump Stations	Building Construction	Tractors/Loaders/Backhoes	1	8	3	97	0.37	221	190,361
Recharge - Phase 1	Demolition	Excavators	2	8	1	158	0.38	65	62,442
Recharge - Phase 1	Demolition	Graders	1	8	1	187	0.41	65	39,868
Recharge - Phase 1	Demolition	Rubber Tired Loaders	1	8	1	203	0.36	65	38,002
Recharge - Phase 1	Pipelines	Cranes	1	8	1	231	0.29	65	34,835
Recharge - Phase 1	Pipelines	Excavators	1	8	1	158	0.38	65	31,221
Recharge - Phase 1	Pipelines	Graders	1	8	1	187	0.41	65	39,868
Recharge - Phase 1	Pipelines	Rubber Tired Loaders	1	8	1	203	0.36	65	38,002
Recharge - Phase 1	Pipelines	Tractors/Loaders/Backhoes	1	8	1	97	0.37	65	18,663
Recharge - Phase 1	Basins	Excavators	2	8	1	158	0.38	216	207,498
Recharge - Phase 1	Basins	Graders	4	8	1	187	0.41	216	529,943
Recharge - Phase 1	Basins	Rubber Tired Loaders	1	8	1	203	0.36	216	126,282
Recharge - Phase 1	Restoration	Graders	1	8	1	187	0.41	21	12,881
Recharge - Phase 1	Restoration	Tractors/Loaders/Backhoes	1	8	1	97	0.37	21	6,030
Recharge - Phase 2	Demolition	Excavators	2	8	1	158	0.38	67	64,363
Recharge - Phase 2	Demolition	Graders	1	8	1	187	0.41	67	41,095
Recharge - Phase 2	Demolition	Rubber Tired Loaders	1	8	1	203	0.36	67	39,171
Recharge - Phase 2	Pipelines	Cranes	1	8	1	231	0.29	67	35,907
Recharge - Phase 2	Pipelines	Excavators	1	8	1	158	0	67	32,181
Recharge - Phase 2	Pipelines	Graders	1	8	1	187	0	67	41,095
Recharge - Phase 2	Pipelines	Rubber Tired Loaders	1	8	1	203	0	67	39,171
Recharge - Phase 2	Pipelines	Tractors/Loaders/Backhoes	1	8	1	97	0	67	19,237
Recharge - Phase 2	Basins	Excavators	2	8	1	158	0	220	211,341
Recharge - Phase 2	Basins	Graders	4	8	1	187	0	220	539,757
Recharge - Phase 2	Basins	Rubber Tired Loaders	1	8	1	203	0	220	128,621
Recharge - Phase 2	Restoration	Graders	1	8	1	187	0	22	13,494
Recharge - Phase 2	Restoration	Tractors/Loaders/Backhoes	1	8	1	97	0	22	6,317
Recovery Well - Phase 1	Drilling	Bore/Drill Rigs	1	8	6	221	1	44	233,376
Recovery Well - Phase 1	Drilling	Rubber Tired Loaders	1	8	6	203	0	44	154,345
Recovery Well - Phase 1	Drilling	Tractors/Loaders/Backhoes	1	8	6	97	0	44	75,800
Recovery Well - Phase 1	Construction	Cement and Mortar Mixers	1	8	6	9	1	50	12,096
Recovery Well - Phase 1	Construction	Cranes	1	8	6	231	0	50	160,776
Recovery Well - Phase 1	Construction	Tractors/Loaders/Backhoes	1	8	6	97	0	50	86,136
Recovery Well - Phase 1	Pipelines	Cranes	1	8	6	231	0	65	209,009
Recovery Well - Phase 1	Pipelines	Excavators	1	8	6	158	0.38	65	187,325
Recovery Well - Phase 1	Pipelines	Graders	1	8	6	187	0	65	239,210
Recovery Well - Phase 1	Pipelines	Rubber Tired Loaders	1	8	6	203	0	65	228,010
Recovery Well - Phase 1	Pipelines	Tractors/Loaders/Backhoes	1	8	6	97	0	65	111,977
Recovery Well - Phase 2	Drilling	Bore/Drill Rigs	1	8	6	221	1	42	222,768
Recovery Well - Phase 2	Drilling	Rubber Tired Loaders	1	8	6	203	0	42	147,329
Recovery Well - Phase 2	Drilling	Tractors/Loaders/Backhoes	1	8	6	97	0	42	72,354
Recovery Well - Phase 2	Construction	Cement and Mortar Mixers	1	8	6	9	1	50	12,096
Recovery Well - Phase 2	Construction	Cranes	1	8	6	231	0	50	160,776
Recovery Well - Phase 2	Construction	Tractors/Loaders/Backhoes	1	8	6	97	0	50	86,136
Recovery Well - Phase 2	Pipelines	Cranes	1	8	6	231	0	63	202,578
Recovery Well - Phase 2	Pipelines	Excavators	1	8	6	158	0	63	181,561
Recovery Well - Phase 2	Pipelines	Graders	1	8	6	187	0	63	231,850
Recovery Well - Phase 2	Pipelines	Rubber Tired Loaders	1	8	6	203	0	63	220,994
Recovery Well - Phase 2	Pipelines	Tractors/Loaders/Backhoes	1	8	6	97	0	63	108,531
							Greater than 100 HP:		8,343,975
							Less than or equal to 100 HP:		1,094,417

Summary of Operational Energy Consumption

Electricity Use and Water Energy Intensity

Operational Activity	Number	Annual Water Throughput (AF/year)	Energy Intensity (kWh/AF)	Electricity Use(kWh/year)	Electricity Use(MWh/year)	State Electricity Use in 2018 (MWh)	% of State
Electricity							
Pump Stations	3	100,000	30	9,000,000	9,000		
Recovery Wells	12	4,167	600	30,000,000	30,000		
Total Electricity	-	-	-	**39,000,000**	**39,000**	**284,436,262**	**0.01%**

Operational Fuel Use

Operational Activity	Annual Fuel Use (gal/year)
Gasoline	
On-Road Vehicles	555
Diesel	
On-Road Vehicles	5,128
Off-Road Vehicles	24,626
Diesel Total	**29,754**

Kern Fan Groundwater Project

Total On-Road Fuel Consumption

		gal/mile	gal/min
2024Hauling	Hauling	0.13842029	3.65691E-05
2024Vendor	Vendor	0.12081632	5.96695E-05
2024Worker	Worker	0.03471743	9.2758E-07
2025Hauling	Hauling	0.13560219	3.58876E-05
2025Vendor	Vendor	0.11876987	5.94547E-05
2025Worker	Worker	0.03367746	8.99794E-07
2026Hauling	Hauling	0.13265382	3.5116E-05
2026Vendor	Vendor	0.11664401	5.90612E-05
2026Worker	Worker	0.0326492	4.20695E-07
2027Hauling	Hauling	0.12947848	3.42391E-05
2027Vendor	Vendor	0.11433083	5.84617E-05
2027Worker	Worker	0.03179334	4.09667E-07

Source	Fuel Use (gal)
Hauling	4,670
Vendor	457
Worker	555
Diesel Total	**5,128**
Gas Total	**555**

Construction Phase	Annual One-Way Trips	Haul Days per Phase (days)	Work Hours per Day (hours/day)	One-Way Trip Distance per Day (miles)	Idling per Day (minutes)	Regional Emissions (gallons) gal/mile	gal/min	gal/year
Weed+Pest	2026							
Total Haul Trips	0							
Hauling	0	20	10	3.3	15	0.13	3.51E-05	0
Vendor	40	20	10	25	15	0.12	5.91E-05	117
Worker	80	20	10	16.8	0	0.03	4.21E-07	44
Weed+Pest	2027							
Total Haul Trips	0							
Hauling	0	20	10	3.3	15	0.13	3.42E-05	0
Vendor	40	20	10	25	15	0.11	5.85E-05	457
Worker	80	20	10	16.8	0	0.03	4.10E-07	171
Earthwork	2026							
Total Haul Trips	0							
Hauling	10924	90	10	3.3	15	0.13	3.51E-05	4,785
Vendor	0	90	10	25	15	0.12	5.91E-05	0
Worker	720	90	10	16.8	0	0.03	4.21E-07	395
Earthwork	2027							
Total Haul Trips	0							
Hauling	10924	90	10	3.3	15	0.13	3.42E-05	4,670
Vendor	0	90	10	25	15	0.11	5.85E-05	0
Worker	720	90	10	16.8	0	0.03	4.10E-07	385
Pumpstations-2023	2026							
Total Haul Trips	0							
Hauling	154	178	10	3.3	15	0.13	3.51E-05	67
Vendor	724	178	10	25	15	0.12	5.91E-05	2,112
Worker	2136	178	10	16.8	0	0.03	4.21E-07	1,172
Pumpstations-2024	2024							
Total Haul Trips	23							
Hauling	0	43	10	3.3	15	0.14	3.66E-05	0
Vendor	172	43	10	25	15	0.12	5.97E-05	520
Worker	516	43	10	16.8	0	0.03	9.28E-07	301
Construction Phase	2026							
Total Haul Trips	0							
Hauling	0	61	10	3.3	15	0.13	3.51E-05	0
Vendor	0	61	10	25	15	0.12	5.91E-05	0
Worker	610	61	10	16.8	0	0.03	4.21E-07	335

Construction Energy Analysis
Off-Road Equipment - Diesel

Equipment ≤ 100 hp		
iesel fuel/hp-hr (lb/hp-hr):[1]	0.408	lb/hp-hr
diesel density (lb/gal):[1]	7.11	lb/gal
diesel gallons/hp-hr:	0.0574	gal/hp-hr
ess than or equal to 100 HP:	22,970	hp-hr
Total diesel gallons:	1,318	gal
Equipment > 100 hp		
iesel fuel/hp-hr (lb/hp-hr):[1]	0.367	lb/hp-hr
diesel density (lb/gal):[1]	7.11	lb/gal
diesel gallons/hp-hr:	0.0516	gal/hp-hr
Greater than 100 HP:	451,486	hp-hr
Total diesel gallons:	23,308	gal
llons (off-road equipment):	24,626	gal
	1.00	years
	24,626	**average annual gallons**

Phase	Phase Name	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Earthwork	Grading	Crawler Tractors	2	8	212	0.43	90	131,270
Earthwork	Grading	Graders	2	8	187	0.41	90	110,405
Earthwork	Grading	Rubber Tired Loaders	2	8	203	0.36	90	105,235
Weed and Pest Control	Site Preparation	Crawler Tractors	1	8	212	0.43	20	58,342
Weed and Pest Control	Site Preparation	Other Construction Equipment	1	8	172	0.42	20	46,234
Weed and Pest Control	Site Preparation	Tractors/Loaders/Backhoes	1	8	97	0.37	20	22,970
							Greater than 100 HP:	451,486
							Less than or equal to 100 HP:	22,970

Appendix F

Noise Emissions Calculations

ESA

Project: IRWD Groundwater Storage

Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

				R1				
Construction Phase **Equipment Type**	**No. of Equip.**	**Reference Noise Level at 50ft, Lmax**	**Acoustical Usage Factor**	**Distance (ft)**	**Lmax**	**Leq**	**L10**	**Estimated Noise Shielding, dBA**
Recharge Facilities						**90**		
Demolition/Site Clearing					**85**	***84***		
Excavator	2	81	40%	50	84	80	83	0
Graders	1	85	40%	50	85	81	84	0
Rubber Tired Loader	1	79	40%	150	69	65	68	0
Pipelines					**81**	***78***		
Tractor/Loader/Backhoe	1	80	25%	50	80	74	77	0
Cranes	1	81	16%	50	81	73	76	0
Excavator	1	81	40%	150	71	67	70	0
Graders	1	85	40%	150	75	71	74	0
Rubber Tired Loader	1	79	40%	150	69	65	68	0
Basins					**91**	***88***		
Excavator	2	81	40%	50	84	80	83	0
Graders	4	85	40%	50	91	87	90	0
Rubber Tired Loader	1	79	40%	150	69	65	68	0
Restoration					**85**	***82***		
Tractor/Loader/Backhoe	1	80	25%	50	80	74	77	0
Graders	1	85	40%	50	85	81	84	0
Recovery Wells						**87**		
Well Drilling					**86**	***85***		
Tractor/Loader/Backhoe	4	80	25%	50	86	80	83	0
Bore/Drill Rig Truck	4	79	20%	50	85	78	81	0
Rubber Tired Loader	4	79	40%	50	85	81	84	0
Well Construction					**87**	***83***		
Tractor/Loader/Backhoe	4	80	25%	50	86	80	83	0
Cranes	4	81	16%	50	87	79	82	0
Cement and Mortar Mixers	4	79	40%	150	75	71	74	0
Pipelines					**87**	***84***		
Tractor/Loader/Backhoe	4	80	25%	50	86	80	83	0
Cranes	4	81	16%	50	87	79	82	0
Excavator	4	81	40%	150	77	73	76	0
Graders	4	85	40%	150	81	77	80	0
Rubber Tired Loader	4	79	40%	150	75	71	74	0
Conveyance Facilities						**83**		
Turnout, Pipelines, Canal					**81**	***79***		
Tractor/Loader/Backhoe	1	80	25%	50	80	74	77	0
Cranes	1	81	16%	50	81	73	76	0
Excavator	2	81	40%	150	74	70	73	0
Graders	1	85	40%	150	75	71	74	0
Rubber Tired Loader	1	79	40%	150	69	65	68	0
Cement and Mortar Mixers	1	79	40%	150	69	65	68	0
Pumpstation - Grading					**81**	***78***		
Tractor/Loader/Backhoe	1	80	25%	50	80	74	77	0
Cranes	1	81	16%	50	81	73	76	0
Excavator	1	81	40%	150	71	67	70	0
Rubber Tired Loader	1	79	40%	150	69	65	68	0
Cement and Mortar Mixers	1	79	40%	150	69	65	68	0
Pumpstation - Construction					**81**	***78***		
Tractor/Loader/Backhoe	1	80	25%	50	80	74	77	0
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Excavator	1	81	40%	150	71	67	70	0
Rubber Tired Loader	1	79	40%	150	69	65	68	0
Cement and Mortar Mixers	1	79	40%	150	69	65	68	0
Maximum Noise Level (Overlapping Phases)								
Recharge Facilities, Conveyance Facilities, and 4 Recovery Wells						***92***		

Source for Ref. Noise Levels: LA CEQA Guides, 2006 & FHWA RCNM, 2005

TRAFFIC NOISE ANALYSIS TOOL

Project Name: IRWD Kern Fan Groundwater Storage
Analysis Scenario: Construction
Source of Traffic Volumes: Construction Assumptions

Roadway Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Construction Traffic	Hard	50	35	35	35	20	2	13	57.9	58.2

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
For hard ground, the propagation rate is 3 dB per doubling the distance.
For soft ground, the propagation rate is 4.5 dB per doubling the distance.
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
CNEL levels were obtained based on Figure 2-19, on page 2-58 Caltran's TeNS 2013.

IRWD Kern Fan Groundwater Storage Project

Vibration Level Calculations

Based on Federal Transit Administration, Office of Planning and Environment

N =	1.5

Construction Equipment	Project Equipment	Equipment Peak Particle Velocity @ 25 Feet* (inches/second)	Distance to Receptor for < 0.5 PPV (Feet)	Estimated Velocity Decibels @ Distance** (VdB)	Estimated Peak Particle Velocity @ Distance*** (inches/second)
Unmitigated Vibration Levels					
R1					
Large Bulldozer or Bore/Drill Rig	Yes	0.089	50	77.9	0.031
Loaded Trucks	Yes	0.076	50	76.5	0.027
Jackhammer	Yes	0.035	50	69.8	0.012
Small Bulldozer	Yes	0.003	50	48.5	0.001

Source:

Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual,* 2018.

Notes:

* Values taken from Table 7-4.

** Based on the formula VdB = 20 x LOG10 (v/v_{ref}), where v_{ref} is equal to 1×10^{-6} in/sec (see page 111).
The approximate rms vibration velocity level (v) is calculated from PPV using a crest factor of 4 (see page 184).

*** Based on the formula PPV(D) = PPV(25 ft) x $(25/D)^N$, where D is equal to the distance (see page 185).
N = soil type classification factor (typically ranges from 1 to 1.5)

Appendix G
Tribal Correspondence

626 Wilshire Boulevard
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Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Delia Dominguez, Chairperson
Kitanemuk & Yowlumne Tejon Indians
115 Radio Street
Bakersfield, CA 93305

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Chairperson Dominguez:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

The proposed project would allow Rosedale and IRWD to more effectively manage existing sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop water recharge and recovery facilities in the Kern Fan area of Kern County. The proposed project would recharge, store, recover and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and supply reliability benefits for agricultural, and municipal and industrial uses.

The proposed project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. In addition, the Kern Fan Conveyance Facilities would consist of pipelines, pump stations and a new turnout at the California Aqueduct to convey water between the recharge and recovery facilities and the California Aqueduct. The proposed project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the project area. Water could be conveyed to and from the Phase 1 and 2 properties through existing facilities and the proposed Kern Fan Conveyance Facilities connecting to the California Aqueduct. The proposed project would be located in western Kern County, west of the City of Bakersfield. Project facilities have yet to be sited, but would be located within the areas shown on the attached maps (Figures 1 through 3). There are three areas identified: Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area.

A cultural resources records search for the proposed project was conducted through the California Historical Resources Information System (CHRIS) Southern San Joaquin Valley Information Center (SSJVIC) on May 5, 2020. A total of five prehistoric or multicomponent resources have been recorded within the Phase I Project Area (four prehistoric isolates and one multicomponent archaeological site). No prehistoric resources have been recorded within the Phase II Project Area. A total of 38 prehistoric or multicomponent resources have been recorded within the Kern Fan Conveyance Facilities Area (29 prehistoric archaeological sites, two multicomponent archaeological sites, and seven prehistoric isolates).

A search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was conducted on May 6, 2020. The results were negative, indicating that the NAHC does not have any sacred sites or Native American cultural resources on file within the proposed project areas (Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area).

In an effort to address any potential impacts to archaeological or Native American resources, we are seeking comments and information from Native American representatives, and your name was supplied to us by the NAHC as a contact for this area. We would appreciate your comments identifying any sensitive sites in or near the proposed project areas that you may be aware of, any concerns or issues pertinent to the proposed project.

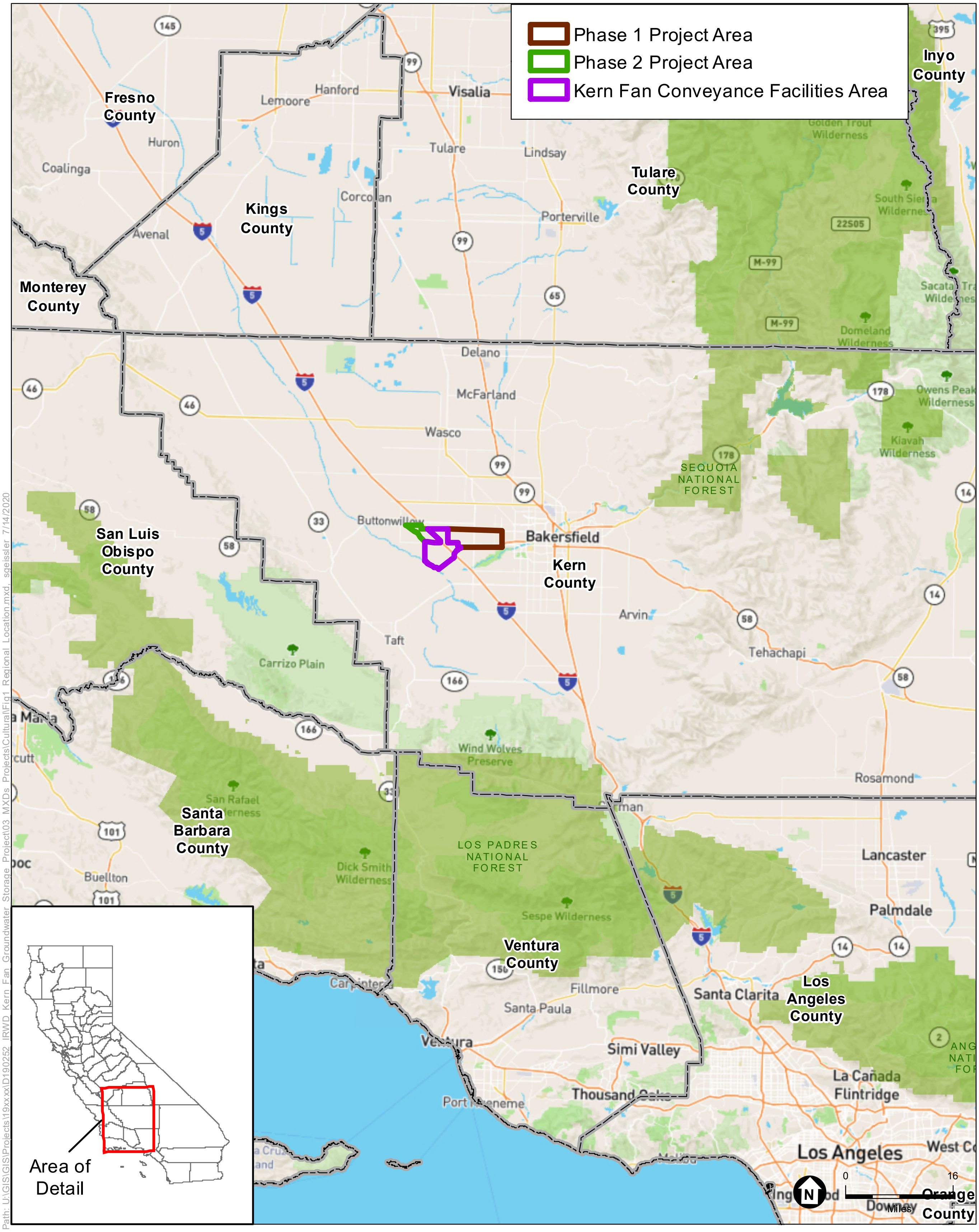
If you have any questions or comments, please contact me by phone at (831) 737-7438 or by email at cehringer@esassoc.com. We kindly request a response to this letter by July 24, 2020 to ensure that any concerns are adequately addressed in the EIR. Thank you for your cooperation on this matter.

Sincerely,

Candace Ehr

Candace Ehringer
Cultural Resources Program Manager

Enclosures: Figure 1 – Regional Location
Figure 2 – Project Location
Figure 3 – Project Detail

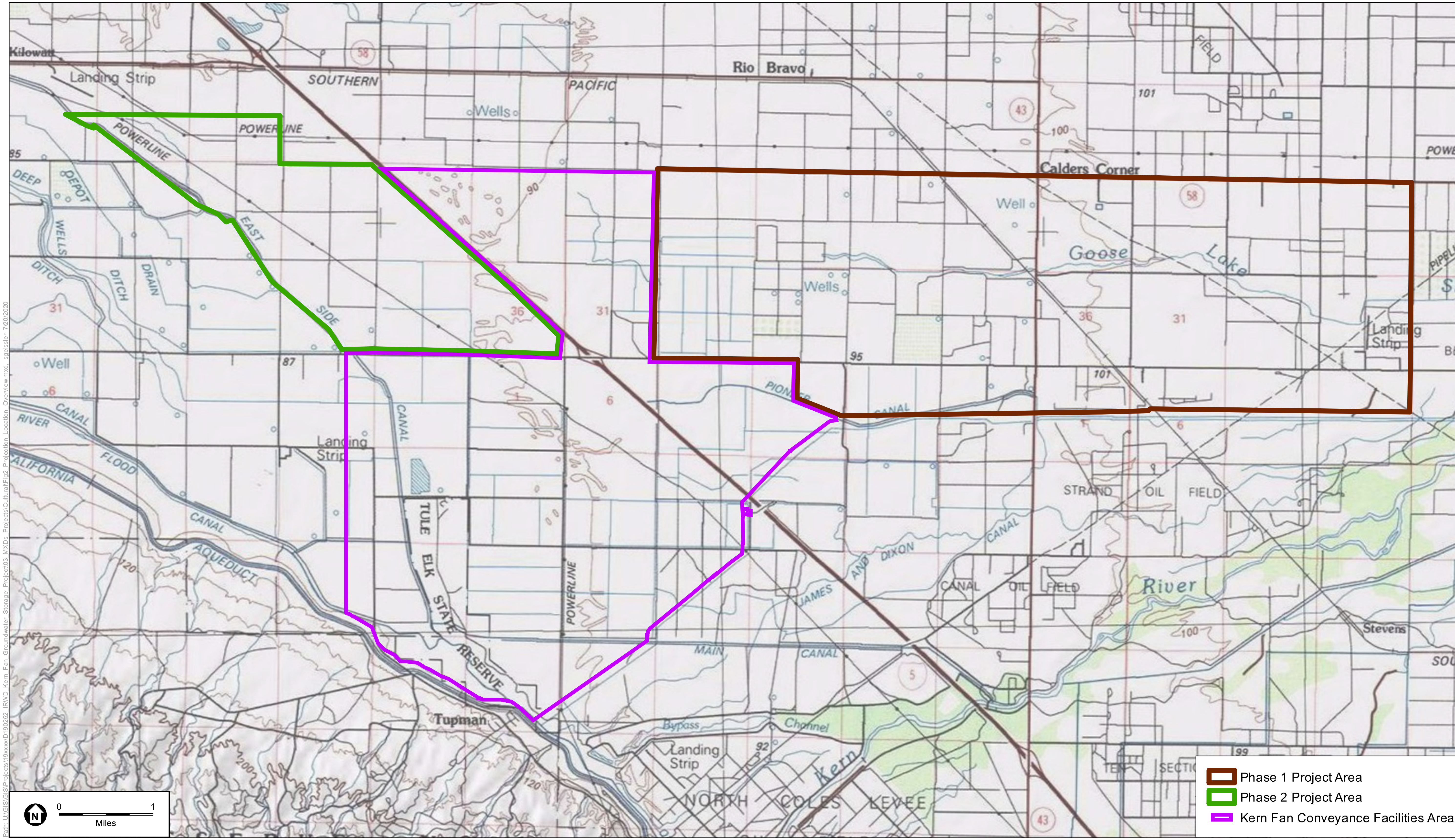


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA

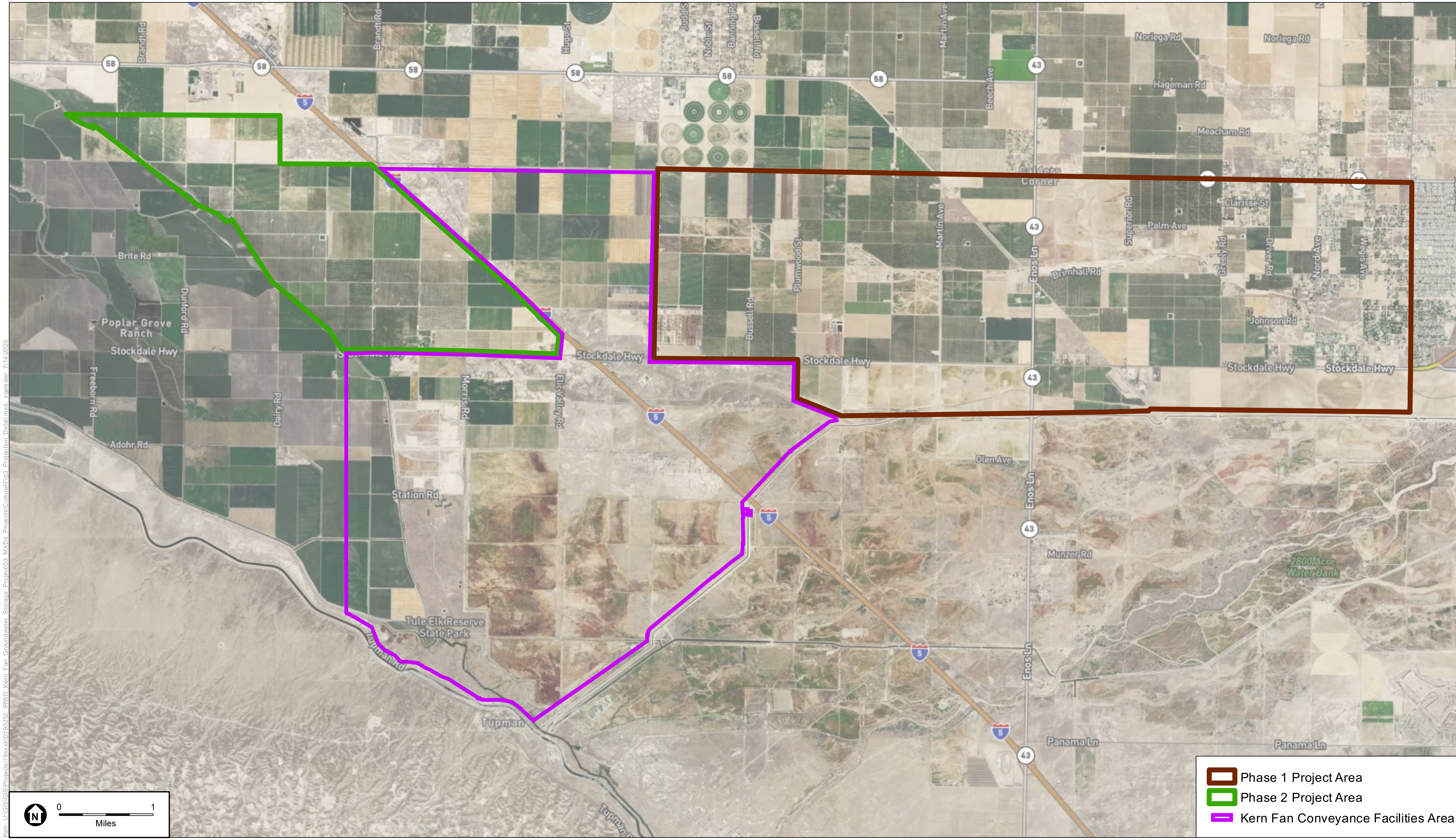


SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
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213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Octavio Escobedo III, Chairpeson
Tejon Indian Tribe
P.O. Box 640
Arvin, CA 93203

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Chairperson Escobedo:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

The proposed project would allow Rosedale and IRWD to more effectively manage existing sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop water recharge and recovery facilities in the Kern Fan area of Kern County. The proposed project would recharge, store, recover and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and supply reliability benefits for agricultural, and municipal and industrial uses.

The proposed project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. In addition, the Kern Fan Conveyance Facilities would consist of pipelines, pump stations and a new turnout at the California Aqueduct to convey water between the recharge and recovery facilities and the California Aqueduct. The proposed project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the project area. Water could be conveyed to and from the Phase 1 and 2 properties through existing facilities and the proposed Kern Fan Conveyance Facilities connecting to the California Aqueduct. The proposed project would be located in western Kern County, west of the City of Bakersfield. Project facilities have yet to be sited, but would be located within the areas shown on the attached maps (Figures 1 through 3). There are three areas identified: Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area.

A cultural resources records search for the proposed project was conducted through the California Historical Resources Information System (CHRIS) Southern San Joaquin Valley Information Center (SSJVIC) on May 5, 2020. A total of five prehistoric or multicomponent resources have been recorded within the Phase I Project Area (four prehistoric isolates and one multicomponent archaeological site). No prehistoric resources have been recorded within the Phase II Project Area. A total of 38 prehistoric or multicomponent resources have been recorded within the Kern Fan Conveyance Facilities Area (29 prehistoric archaeological sites, two multicomponent archaeological sites, and seven prehistoric isolates).

A search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was conducted on May 6, 2020. The results were negative, indicating that the NAHC does not have any sacred sites or Native American cultural resources on file within the proposed project areas (Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area).

In an effort to address any potential impacts to archaeological or Native American resources, we are seeking comments and information from Native American representatives, and your name was supplied to us by the NAHC as a contact for this area. We would appreciate your comments identifying any sensitive sites in or near the proposed project areas that you may be aware of, any concerns or issues pertinent to the proposed project.

If you have any questions or comments, please contact me by phone at (831) 737-7438 or by email at cehringer@esassoc.com. We kindly request a response to this letter by July 24, 2020 to ensure that any concerns are adequately addressed in the EIR. Thank you for your cooperation on this matter.

Sincerely,

Candace Ehr

Candace Ehringer
Cultural Resources Program Manager

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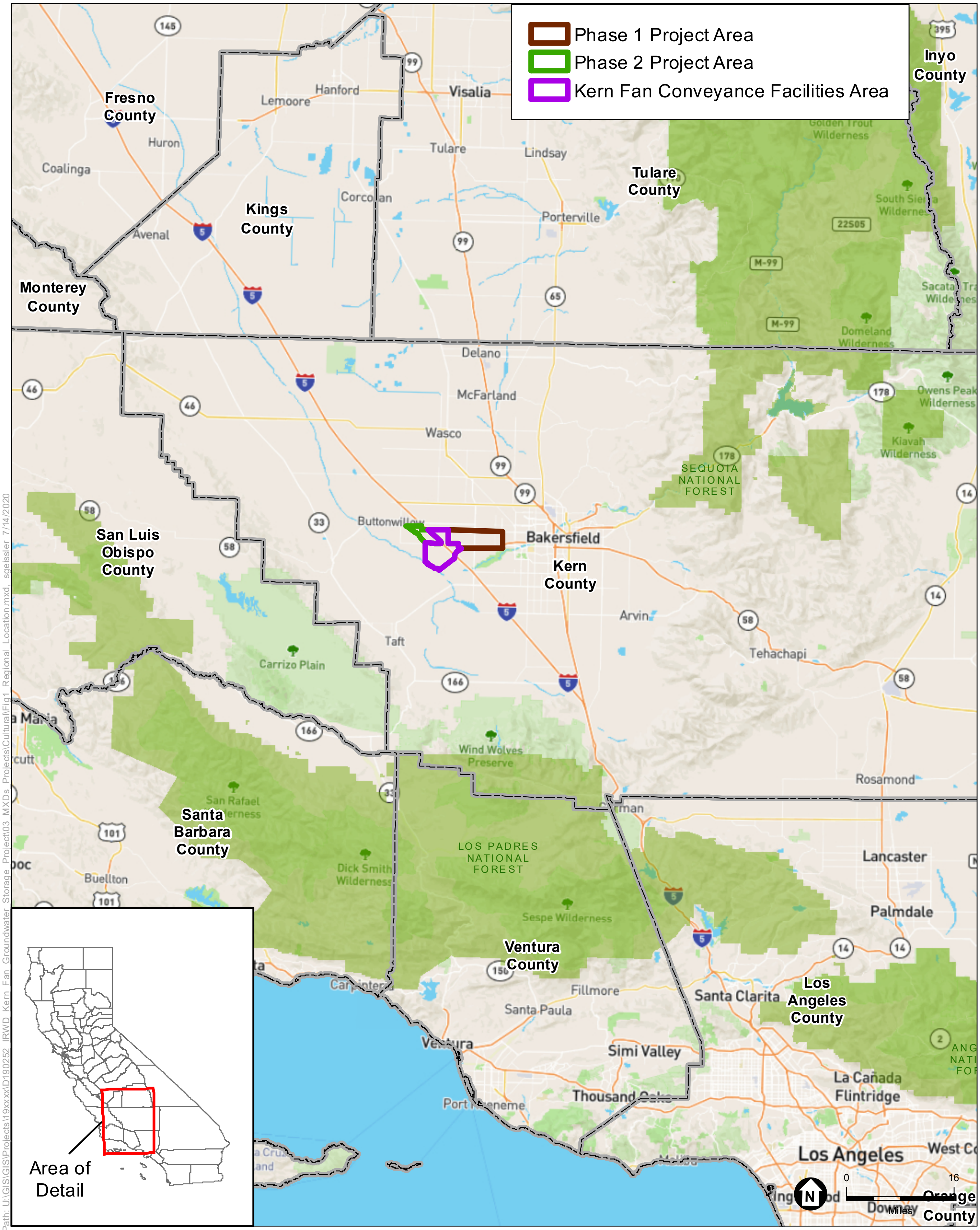
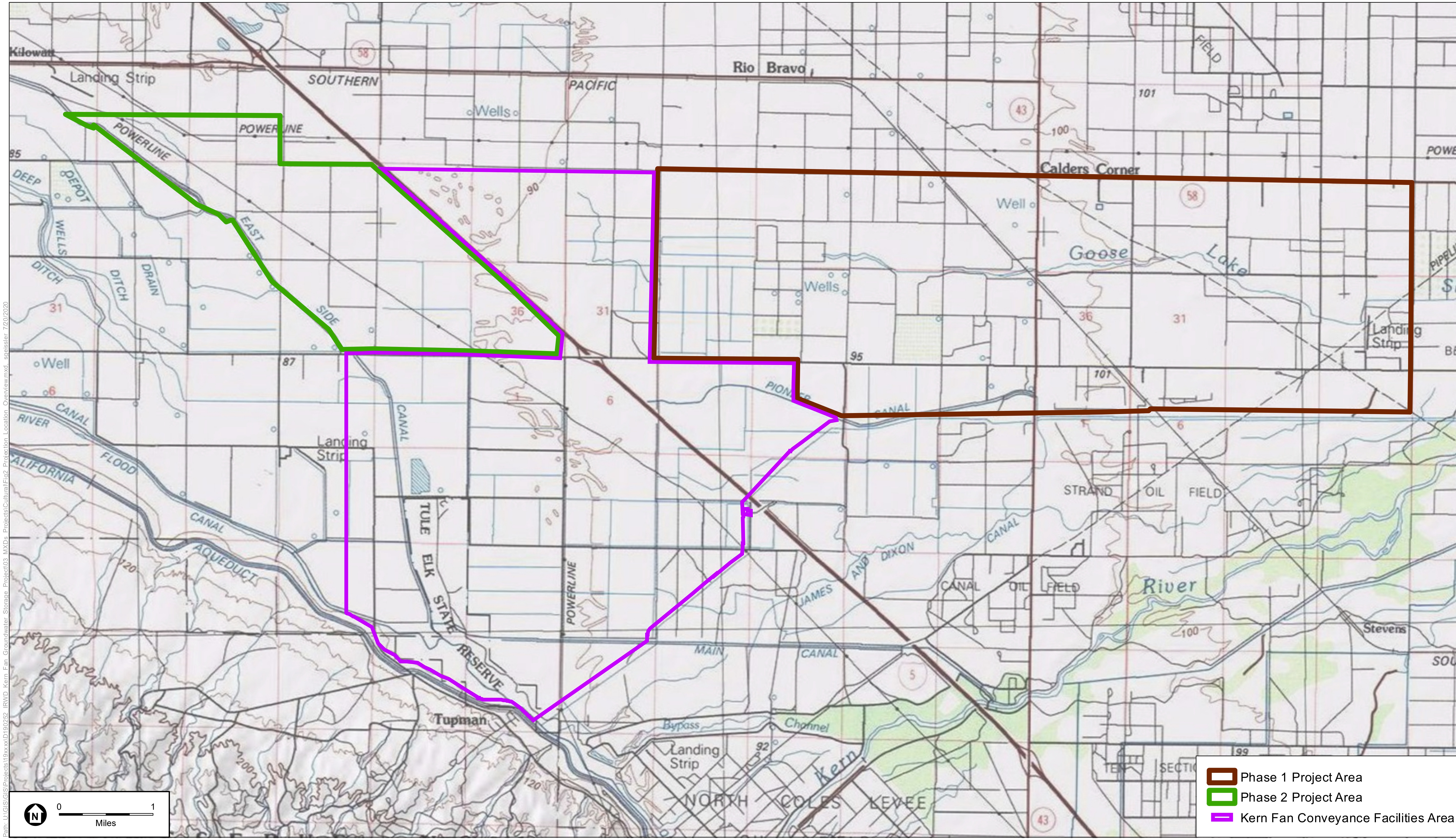


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA

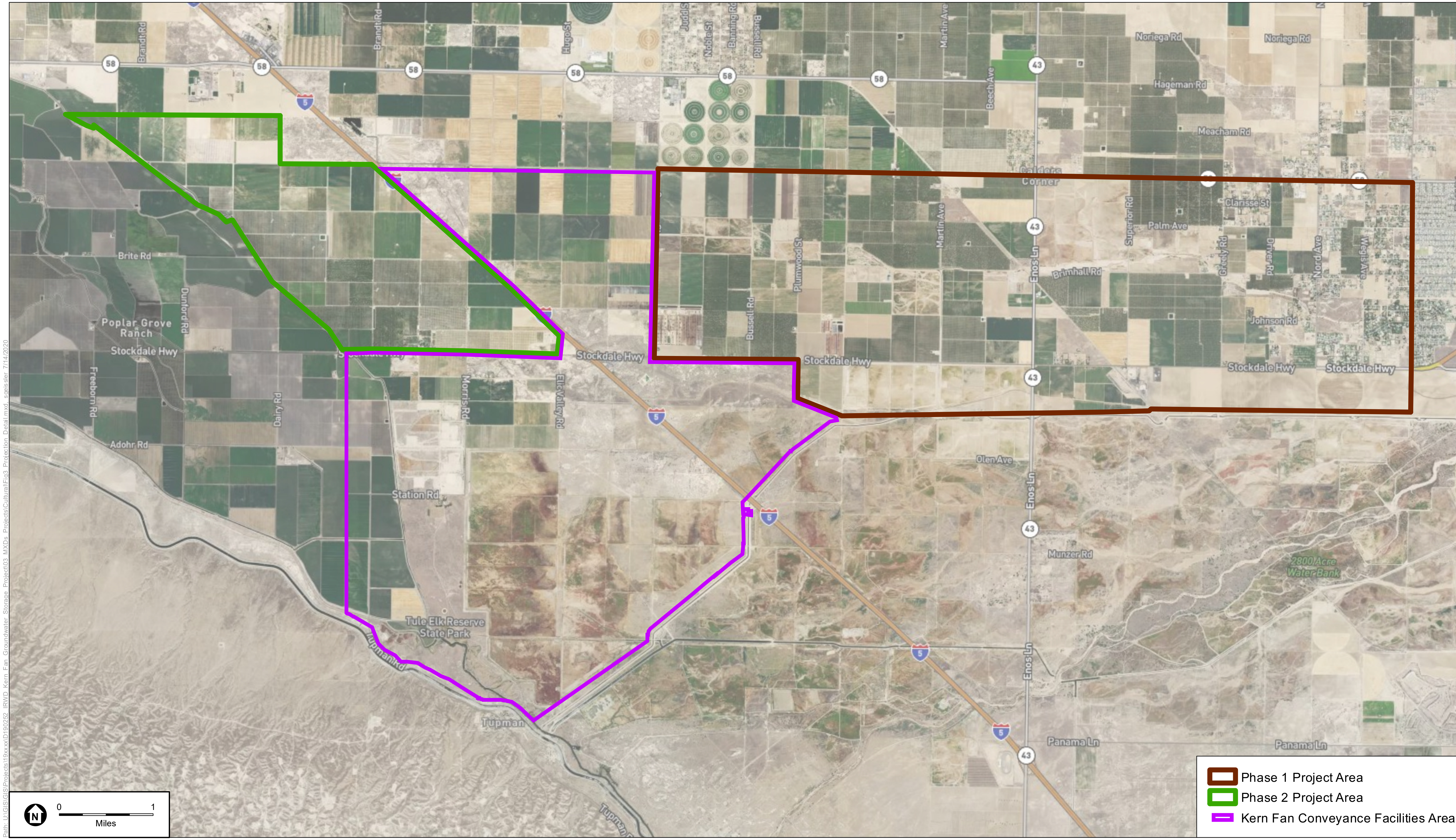


SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

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esassoc.com

July 23, 2020

Robert L. Gomez, Jr., Tribal Chairperson
Tubatulabals of Kern Valley
P.O. Box 226
Lake Isabella, CA 93240

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Tribal Chairperson Gomez:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

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Sincerely,

Candace Ehr

Candace Ehringer
Cultural Resources Program Manager

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Figure 2 – Project Location
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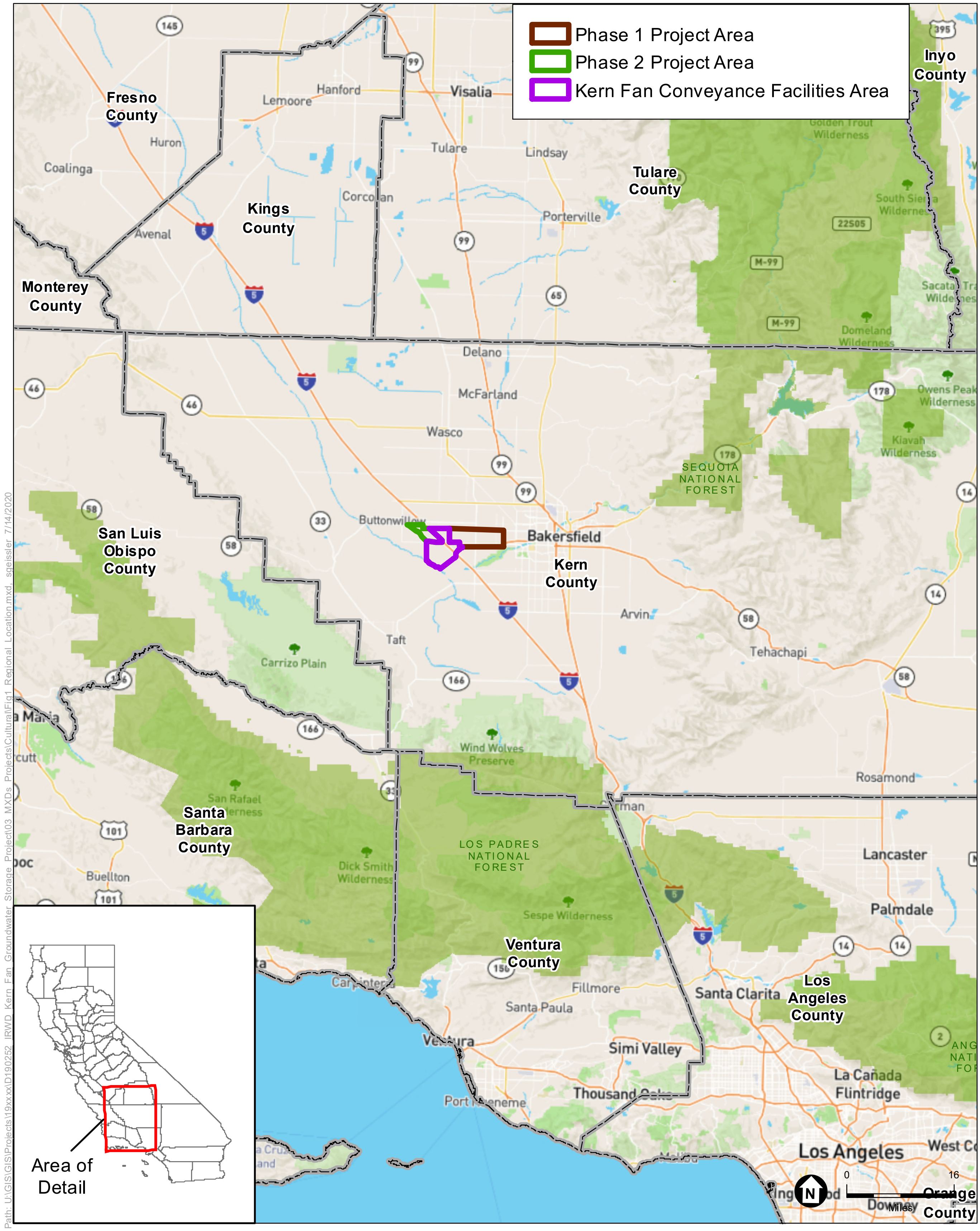

SOURCE: ESRI.

Kern Fan Groundwater Storage Project

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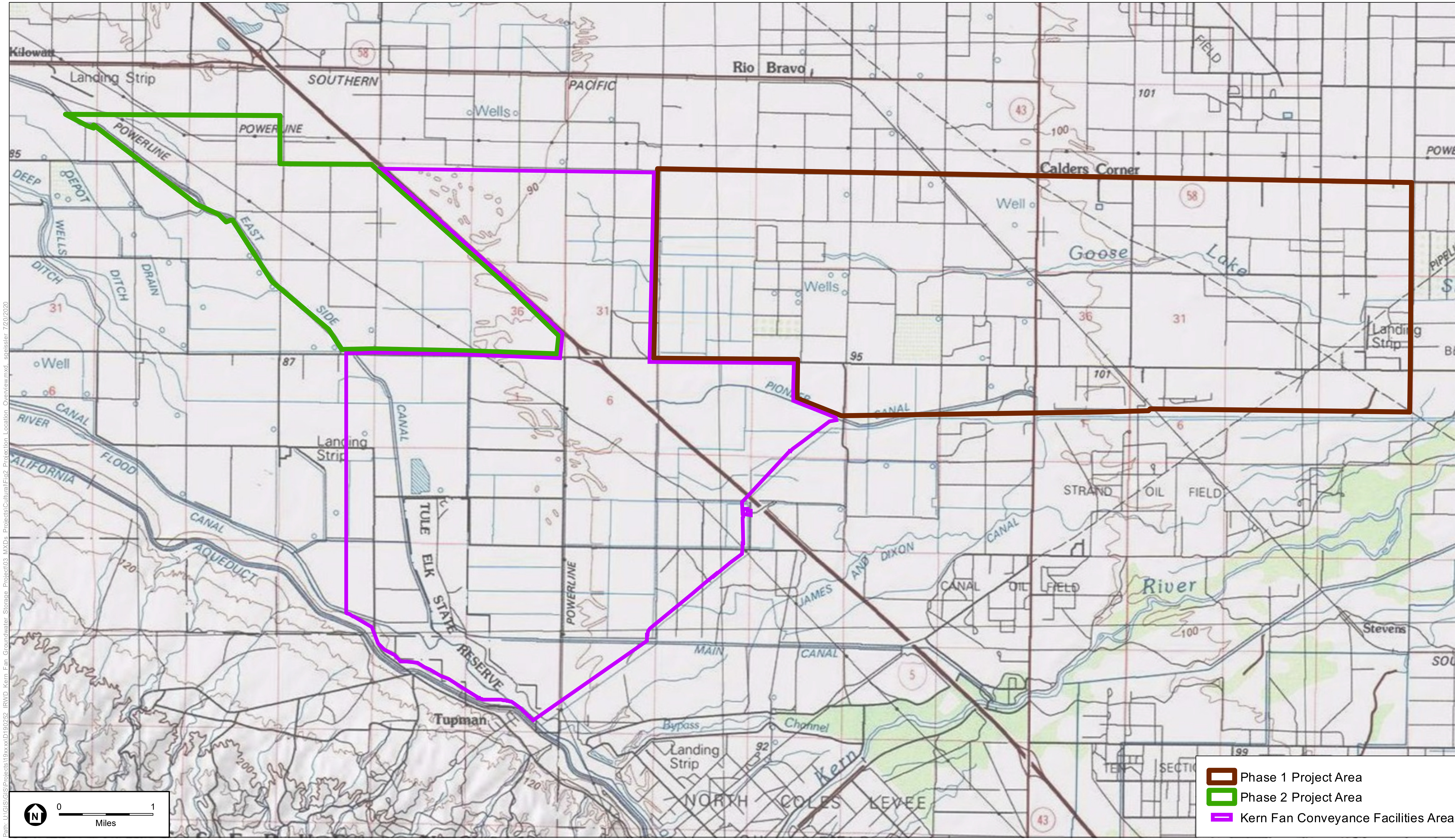
Regional Location

ESA



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Kern Fan Groundwater Storage Project

Figure 2
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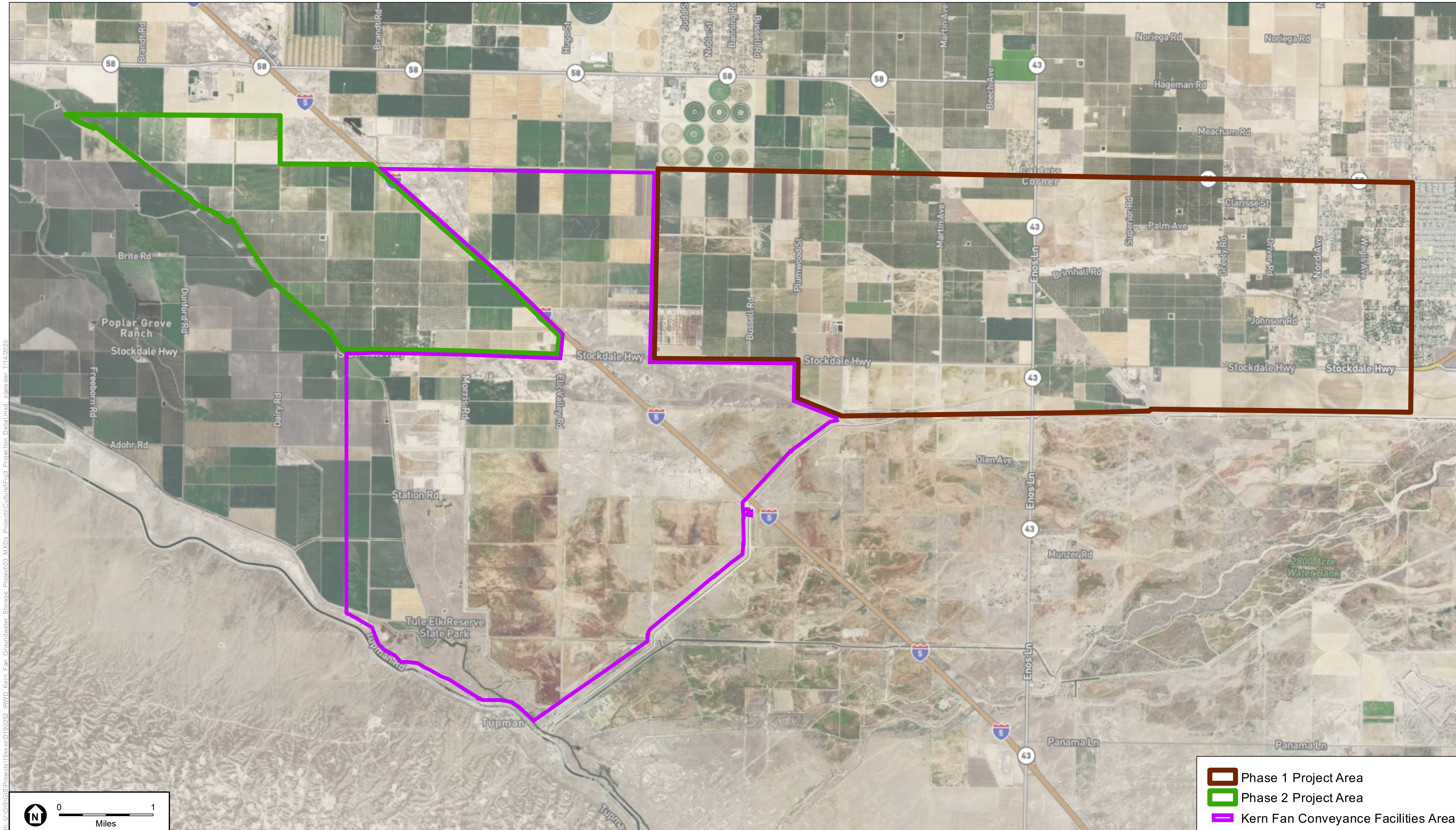

SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
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esassoc.com

July 23, 2020

Danelle Gutierrez, Tribal Historic Preservation Officer
Big Pine Paiute Tribe of the Owens Valley
P.O. Box 700
Big Pine, CA 93513

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Ms. Gutierrez:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

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Candace Ehr

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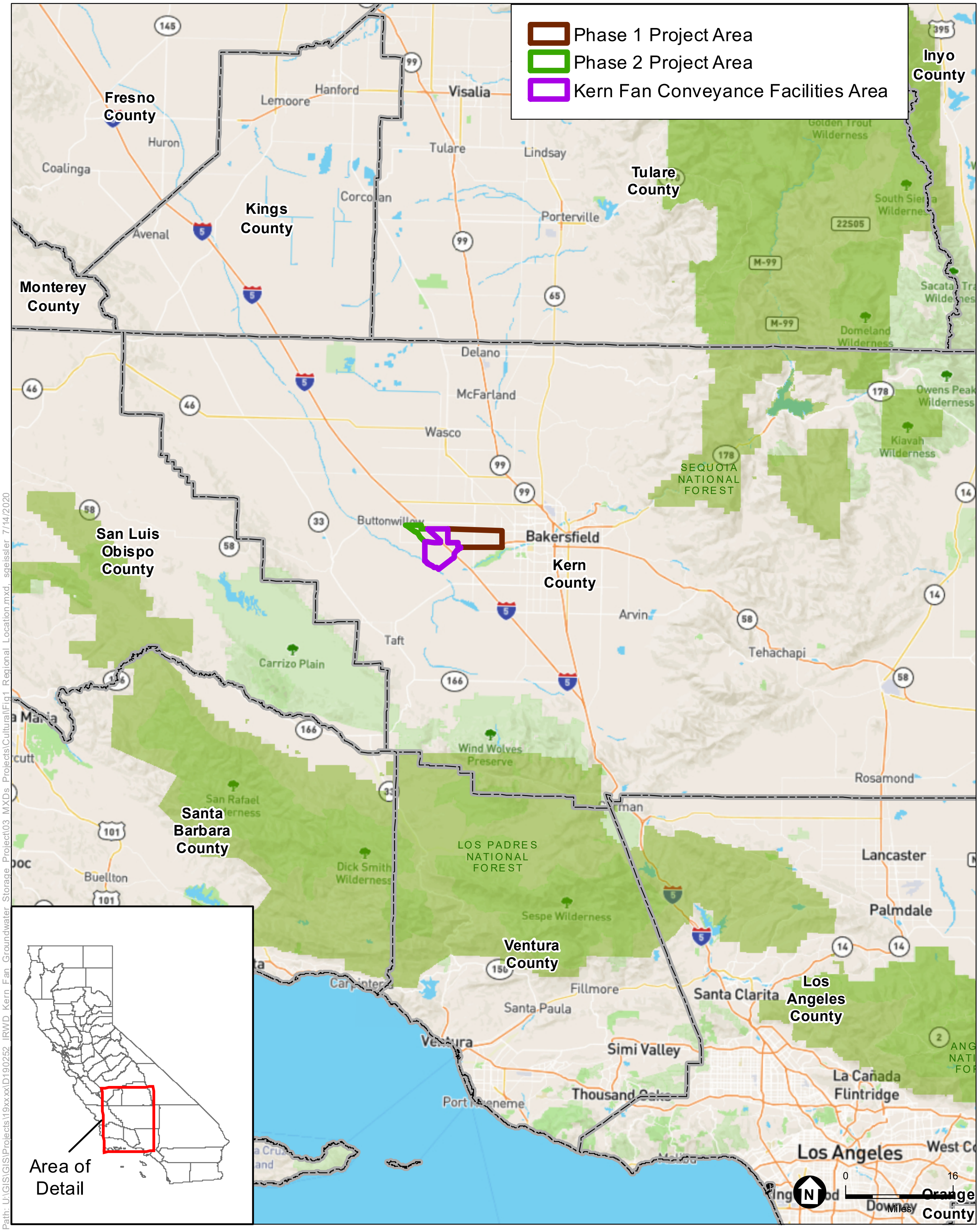
Figure 3 – Project Detail

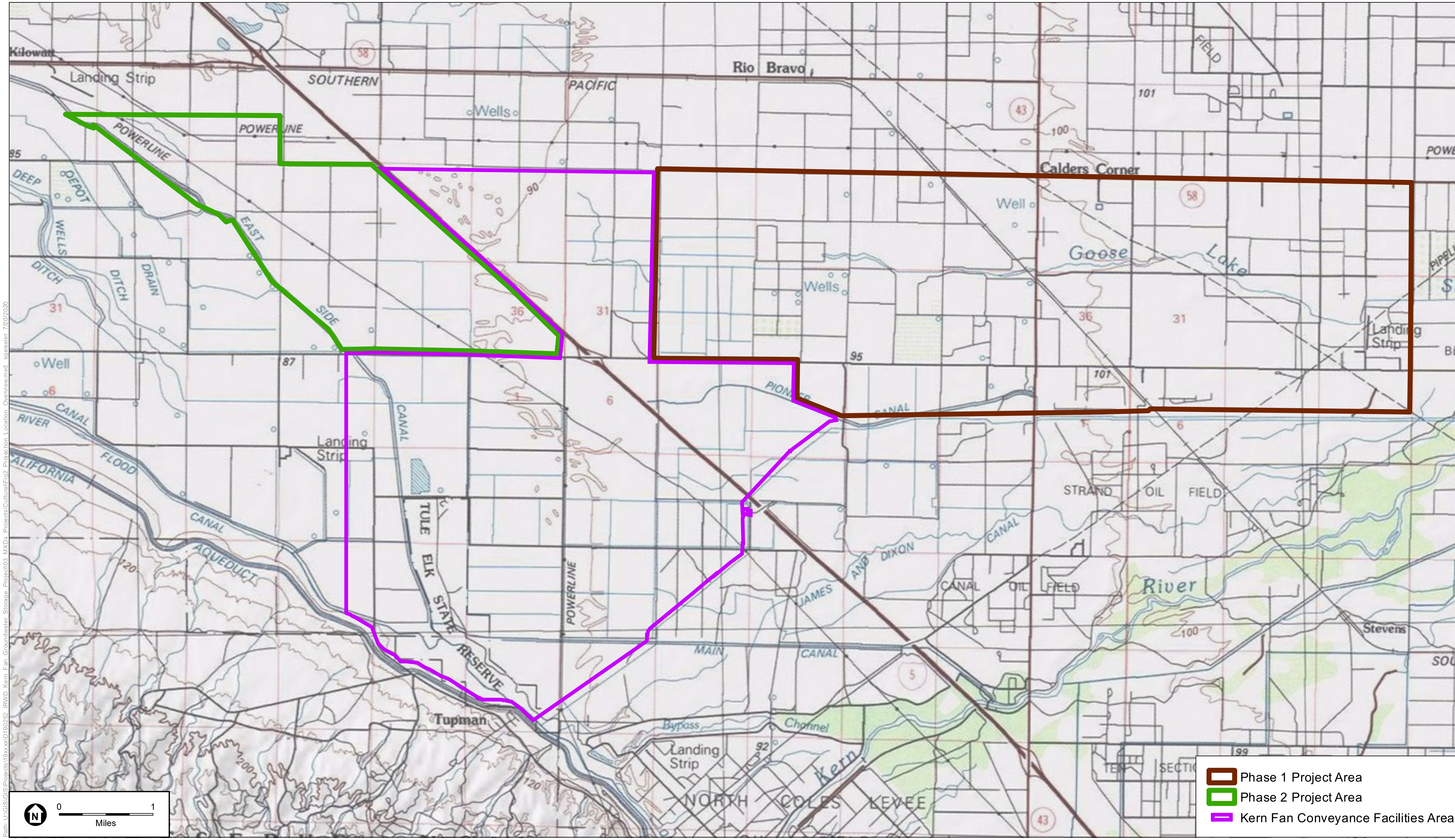


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

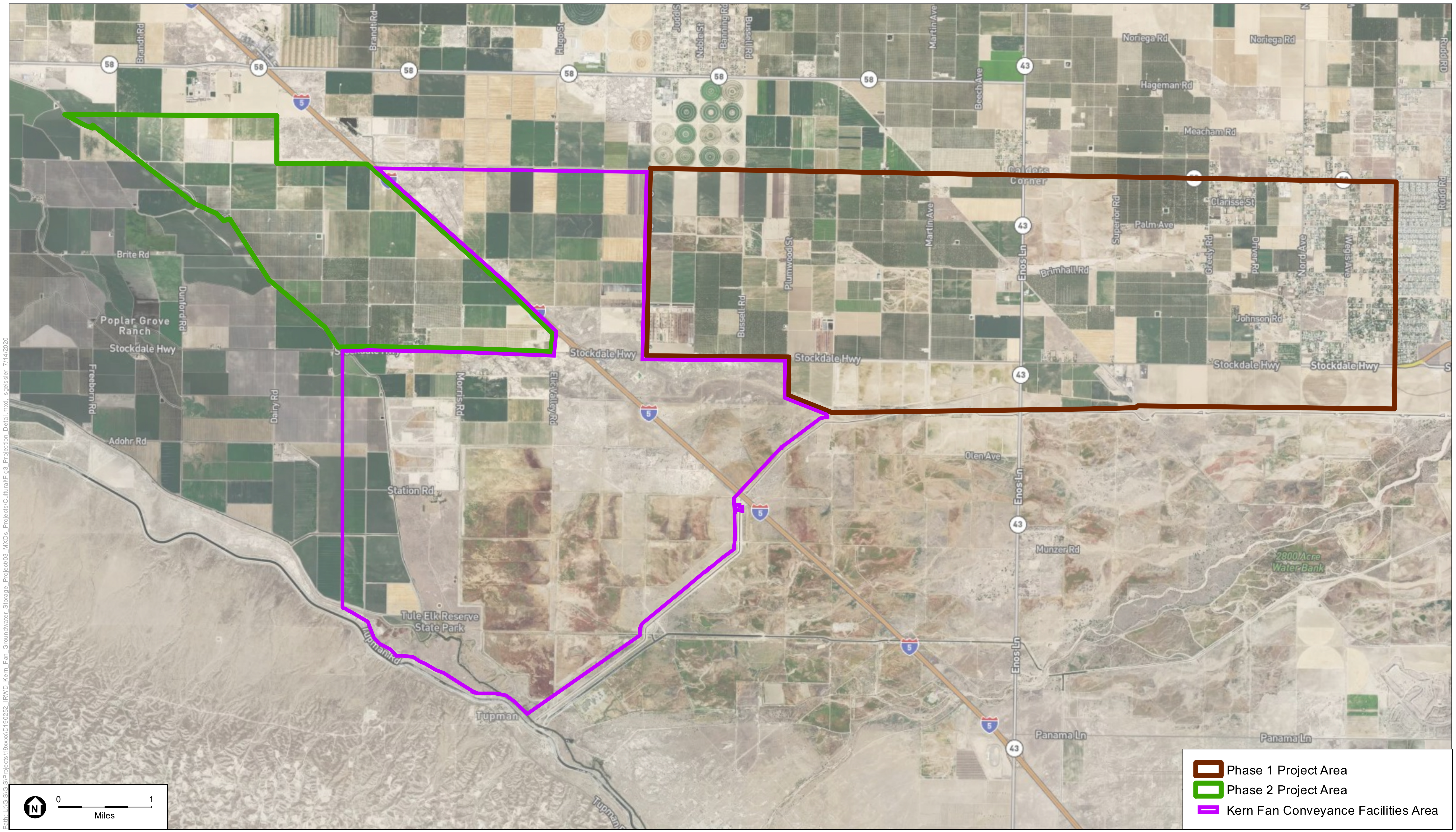
Figure 1
Regional Location

ESA



SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Figure 2
Project Location – Overview



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Brandy Kendricks
Kern Valley Indian Community
30741 Foxridge Court
Tehachapi, CA 93561

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Ms. Kendricks:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

The proposed project would allow Rosedale and IRWD to more effectively manage existing sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop water recharge and recovery facilities in the Kern Fan area of Kern County. The proposed project would recharge, store, recover and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and supply reliability benefits for agricultural, and municipal and industrial uses.

The proposed project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. In addition, the Kern Fan Conveyance Facilities would consist of pipelines, pump stations and a new turnout at the California Aqueduct to convey water between the recharge and recovery facilities and the California Aqueduct. The proposed project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the project area. Water could be conveyed to and from the Phase 1 and 2 properties through existing facilities and the proposed Kern Fan Conveyance Facilities connecting to the California Aqueduct. The proposed project would be located in western Kern County, west of the City of Bakersfield. Project facilities have yet to be sited, but would be located within the areas shown on the attached maps (Figures 1 through 3). There are three areas identified: Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area.

A cultural resources records search for the proposed project was conducted through the California Historical Resources Information System (CHRIS) Southern San Joaquin Valley Information Center (SSJVIC) on May 5, 2020. A total of five prehistoric or multicomponent resources have been recorded within the Phase I Project Area (four prehistoric isolates and one multicomponent archaeological site). No prehistoric resources have been recorded within the Phase II Project Area. A total of 38 prehistoric or multicomponent resources have been recorded within the Kern Fan Conveyance Facilities Area (29 prehistoric archaeological sites, two multicomponent archaeological sites, and seven prehistoric isolates).

A search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was conducted on May 6, 2020. The results were negative, indicating that the NAHC does not have any sacred sites or Native American cultural resources on file within the proposed project areas (Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area).

In an effort to address any potential impacts to archaeological or Native American resources, we are seeking comments and information from Native American representatives, and your name was supplied to us by the NAHC as a contact for this area. We would appreciate your comments identifying any sensitive sites in or near the proposed project areas that you may be aware of, any concerns or issues pertinent to the proposed project.

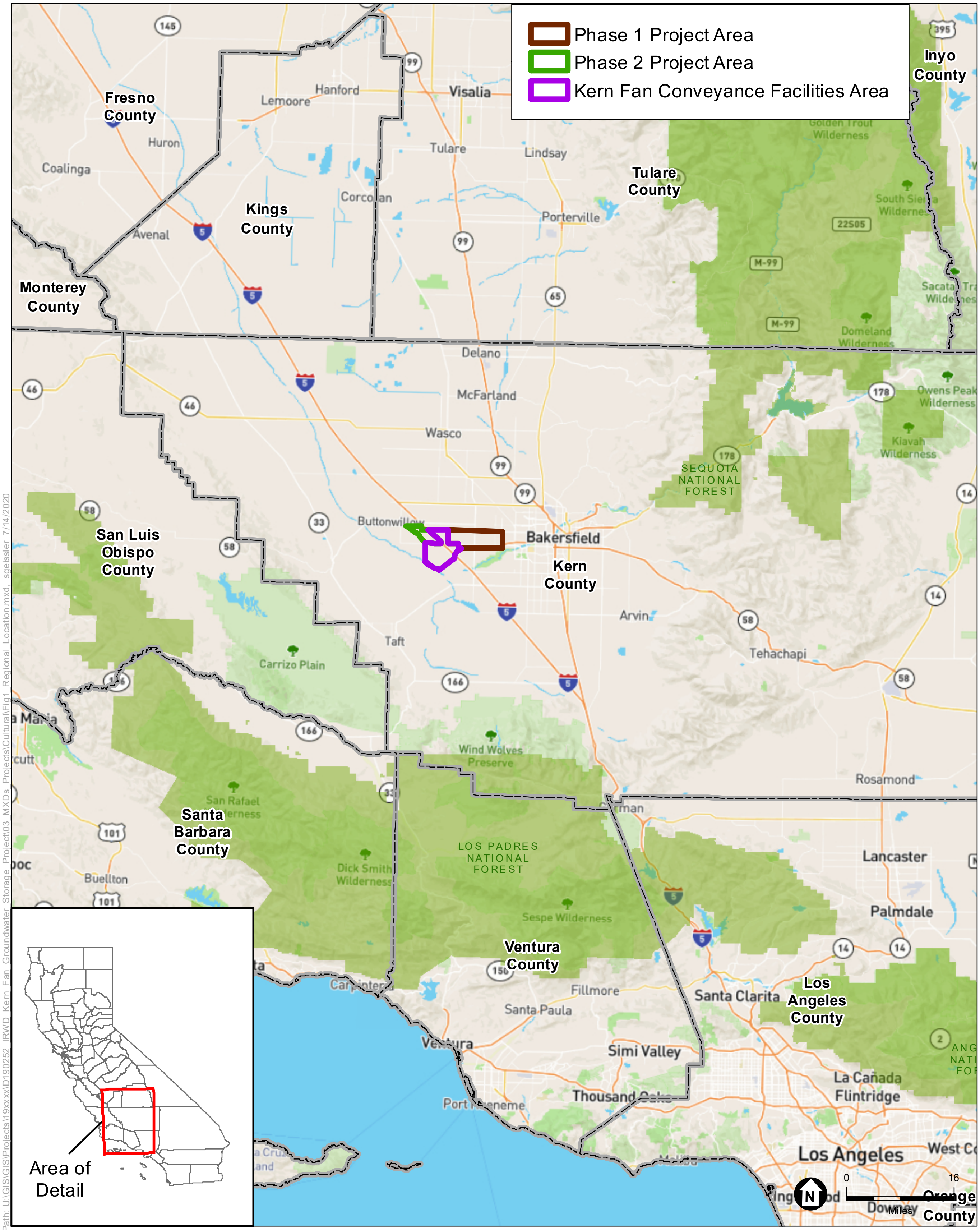
If you have any questions or comments, please contact me by phone at (831) 737-7438 or by email at cehringer@esassoc.com. We kindly request a response to this letter by July 24, 2020 to ensure that any concerns are adequately addressed in the EIR. Thank you for your cooperation on this matter.

Sincerely,

Candace Ehr

Candace Ehringer
Cultural Resources Program Manager

Enclosures: Figure 1 – Regional Location
Figure 2 – Project Location
Figure 3 – Project Detail

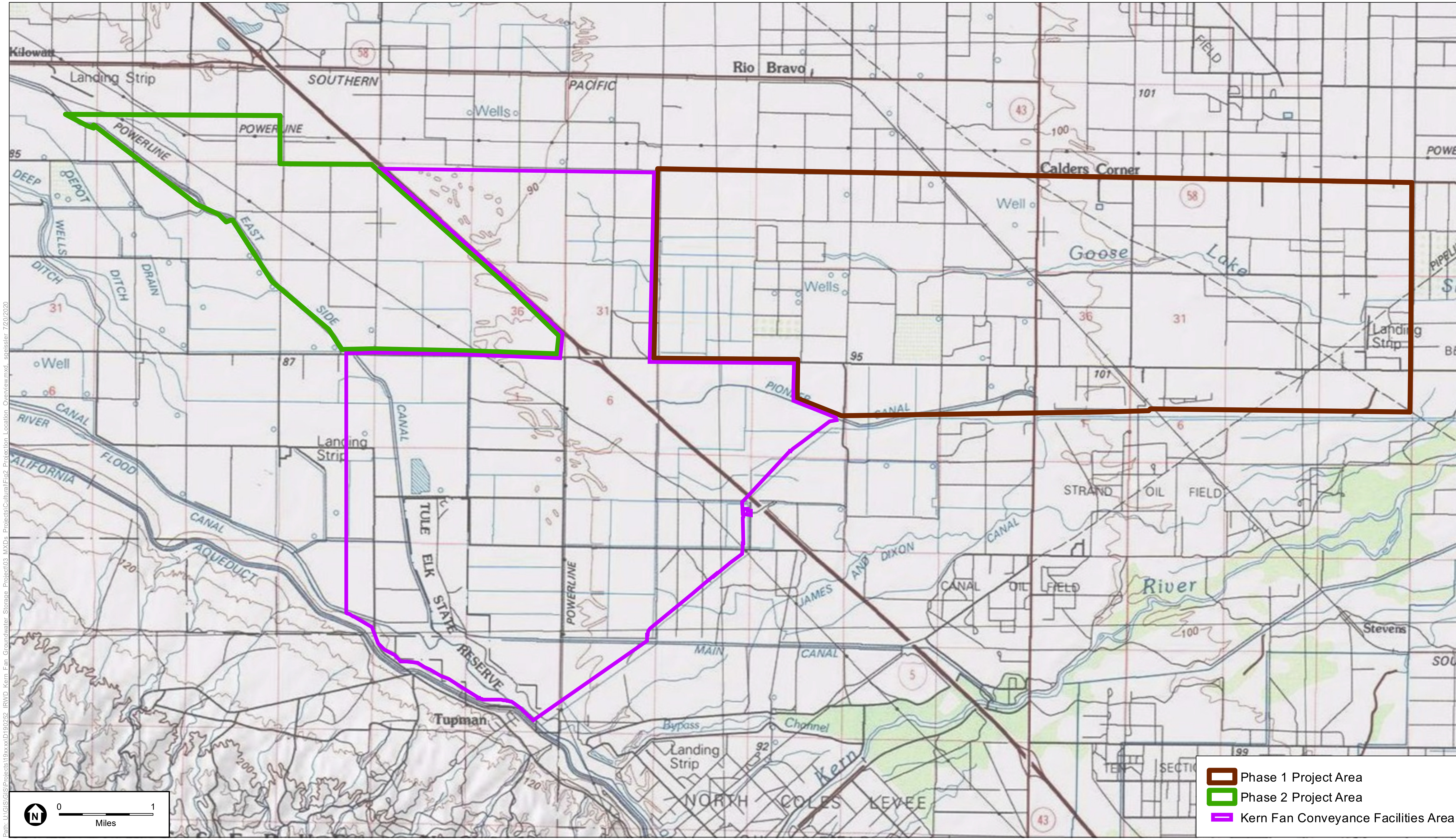


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA

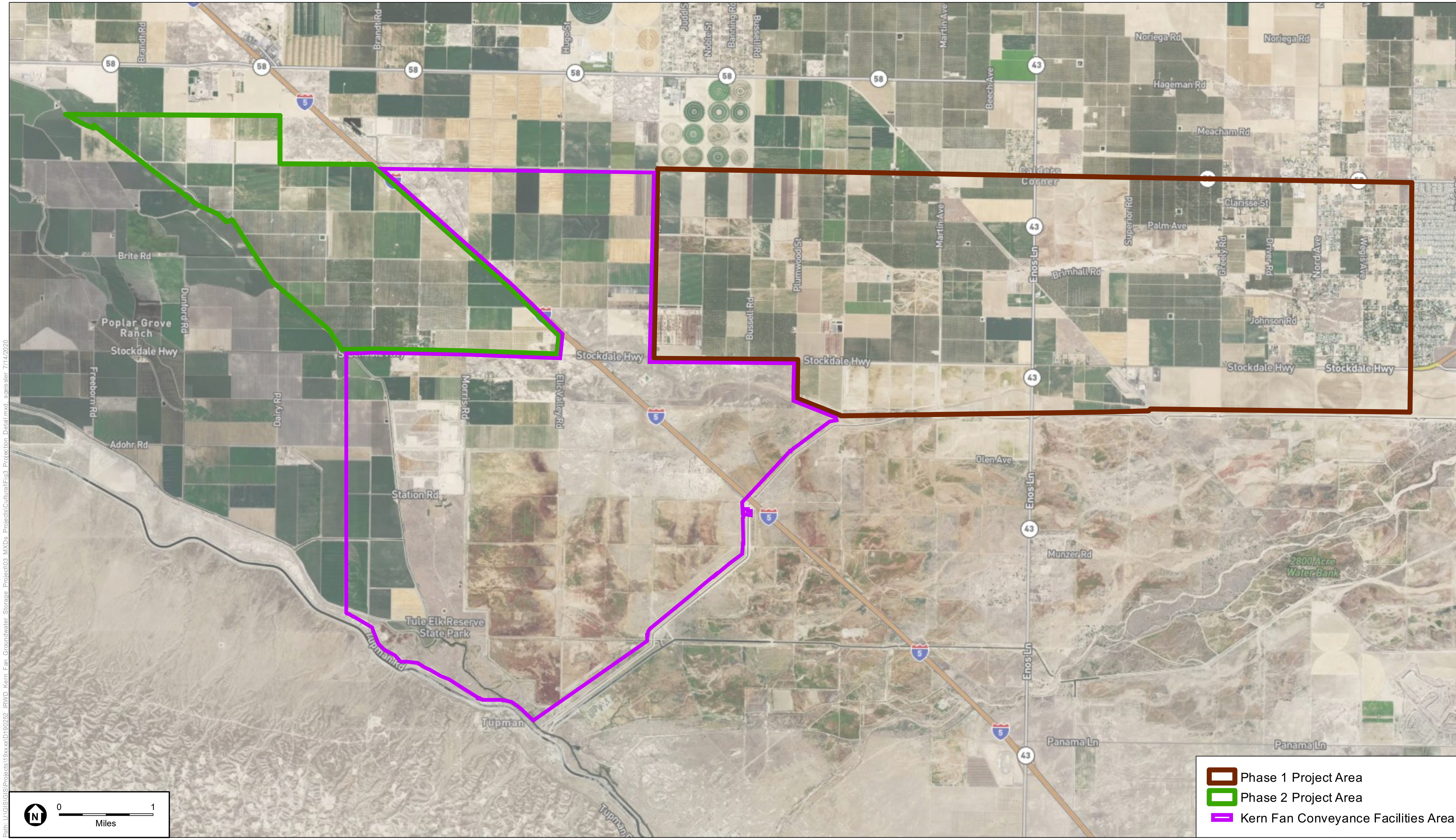


SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Sally Manning, Environmental Director
Big Pine Paiute Tribe of the Owens Valley
P.O. Box 700
Big Pine, CA 93513

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Ms. Manning:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

The proposed project would allow Rosedale and IRWD to more effectively manage existing sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop water recharge and recovery facilities in the Kern Fan area of Kern County. The proposed project would recharge, store, recover and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and supply reliability benefits for agricultural, and municipal and industrial uses.

The proposed project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. In addition, the Kern Fan Conveyance Facilities would consist of pipelines, pump stations and a new turnout at the California Aqueduct to convey water between the recharge and recovery facilities and the California Aqueduct. The proposed project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the project area. Water could be conveyed to and from the Phase 1 and 2 properties through existing facilities and the proposed Kern Fan Conveyance Facilities connecting to the California Aqueduct. The proposed project would be located in western Kern County, west of the City of Bakersfield. Project facilities have yet to be sited, but would be located within the areas shown on the attached maps (Figures 1 through 3). There are three areas identified: Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area.

A cultural resources records search for the proposed project was conducted through the California Historical Resources Information System (CHRIS) Southern San Joaquin Valley Information Center (SSJVIC) on May 5, 2020. A total of five prehistoric or multicomponent resources have been recorded within the Phase I Project Area (four prehistoric isolates and one multicomponent archaeological site). No prehistoric resources have been recorded within the Phase II Project Area. A total of 38 prehistoric or multicomponent resources have been recorded within the Kern Fan Conveyance Facilities Area (29 prehistoric archaeological sites, two multicomponent archaeological sites, and seven prehistoric isolates).

A search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was conducted on May 6, 2020. The results were negative, indicating that the NAHC does not have any sacred sites or Native American cultural resources on file within the proposed project areas (Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area).

In an effort to address any potential impacts to archaeological or Native American resources, we are seeking comments and information from Native American representatives, and your name was supplied to us by the NAHC as a contact for this area. We would appreciate your comments identifying any sensitive sites in or near the proposed project areas that you may be aware of, any concerns or issues pertinent to the proposed project.

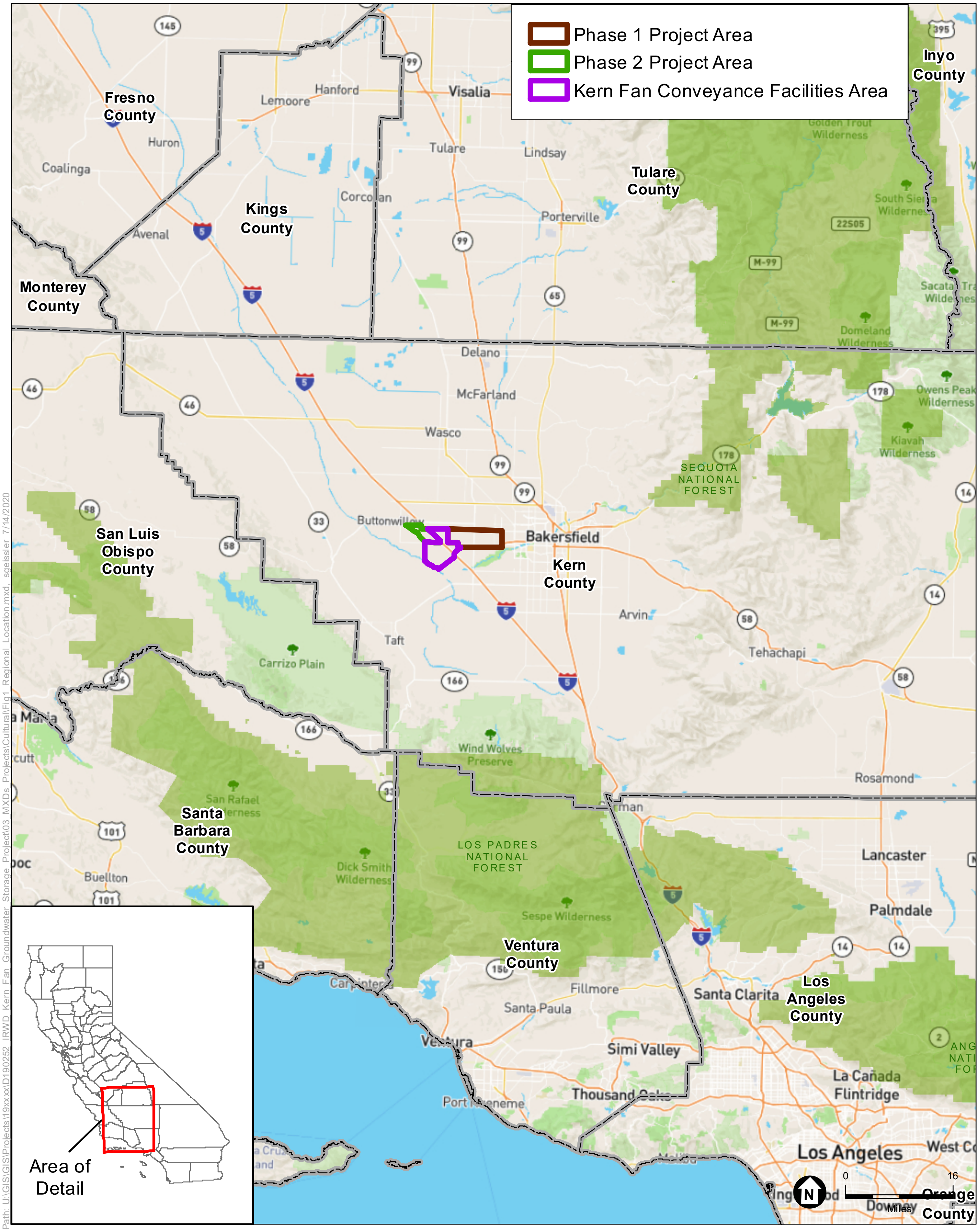
If you have any questions or comments, please contact me by phone at (831) 737-7438 or by email at cehringer@esassoc.com. We kindly request a response to this letter by July 24, 2020 to ensure that any concerns are adequately addressed in the EIR. Thank you for your cooperation on this matter.

Sincerely,

Candace Ehringer

Candace Ehringer
Cultural Resources Program Manager

Enclosures: Figure 1 – Regional Location
Figure 2 – Project Location
Figure 3 – Project Detail

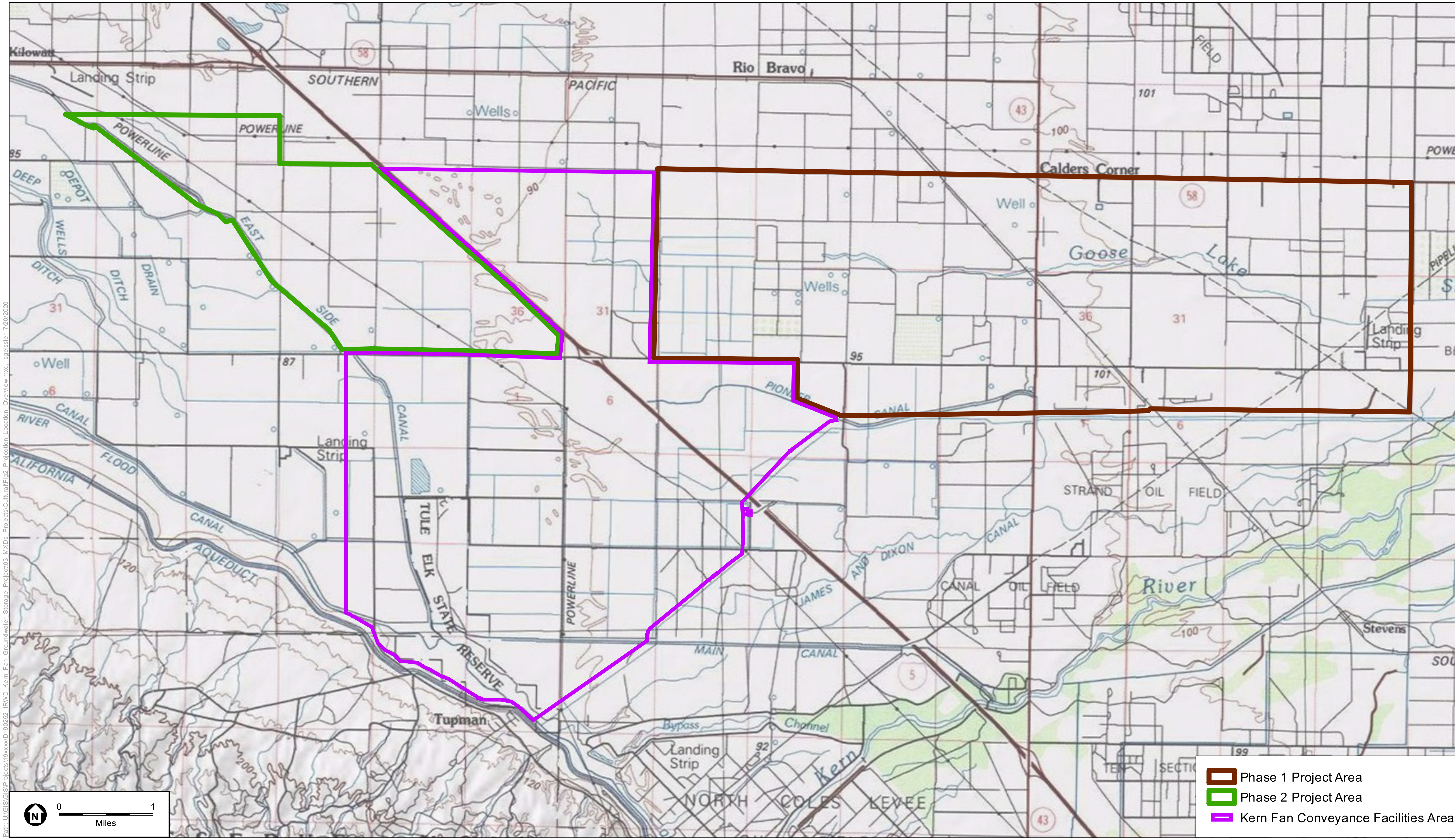


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA

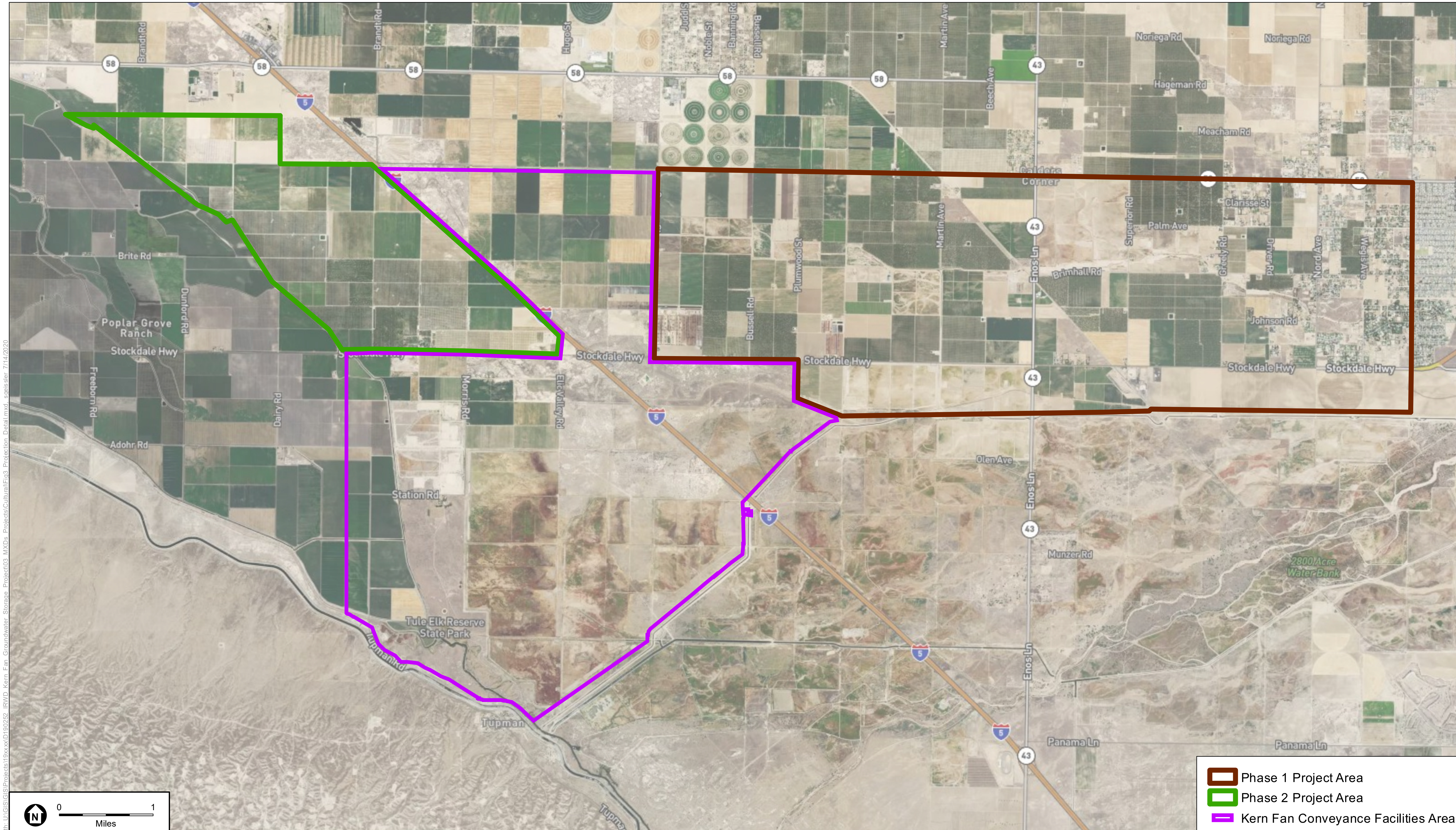


SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Jessica Mauck, Director-CRM Department
San Manuel Band of Mission Indians
26569 Community Center Drive
Highland, CA 92346

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Ms. Mauck:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

The proposed project would allow Rosedale and IRWD to more effectively manage existing sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop water recharge and recovery facilities in the Kern Fan area of Kern County. The proposed project would recharge, store, recover and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and supply reliability benefits for agricultural, and municipal and industrial uses.

The proposed project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. In addition, the Kern Fan Conveyance Facilities would consist of pipelines, pump stations and a new turnout at the California Aqueduct to convey water between the recharge and recovery facilities and the California Aqueduct. The proposed project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the project area. Water could be conveyed to and from the Phase 1 and 2 properties through existing facilities and the proposed Kern Fan Conveyance Facilities connecting to the California Aqueduct. The proposed project would be located in western Kern County, west of the City of Bakersfield. Project facilities have yet to be sited, but would be located within the areas shown on the attached maps (Figures 1 through 3). There are three areas identified: Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area.

A cultural resources records search for the proposed project was conducted through the California Historical Resources Information System (CHRIS) Southern San Joaquin Valley Information Center (SSJVIC) on May 5, 2020. A total of five prehistoric or multicomponent resources have been recorded within the Phase I Project Area (four prehistoric isolates and one multicomponent archaeological site). No prehistoric resources have been recorded within the Phase II Project Area. A total of 38 prehistoric or multicomponent resources have been recorded within the Kern Fan Conveyance Facilities Area (29 prehistoric archaeological sites, two multicomponent archaeological sites, and seven prehistoric isolates).

A search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was conducted on May 6, 2020. The results were negative, indicating that the NAHC does not have any sacred sites or Native American cultural resources on file within the proposed project areas (Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area).

In an effort to address any potential impacts to archaeological or Native American resources, we are seeking comments and information from Native American representatives, and your name was supplied to us by the NAHC as a contact for this area. We would appreciate your comments identifying any sensitive sites in or near the proposed project areas that you may be aware of, any concerns or issues pertinent to the proposed project.

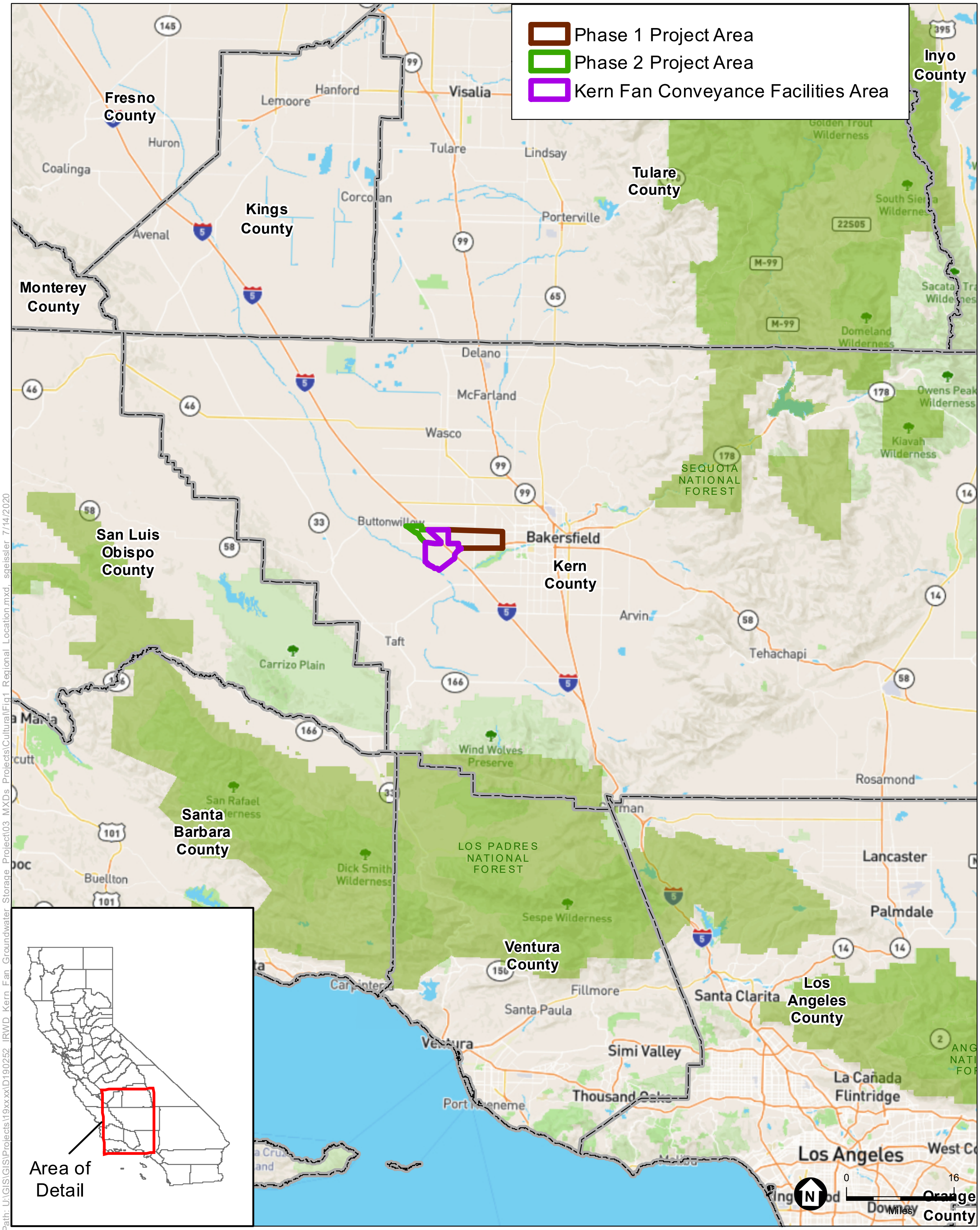
If you have any questions or comments, please contact me by phone at (831) 737-7438 or by email at cehringer@esassoc.com. We kindly request a response to this letter by July 24, 2020 to ensure that any concerns are adequately addressed in the EIR. Thank you for your cooperation on this matter.

Sincerely,

Candace Ehr

Candace Ehringer
Cultural Resources Program Manager

Enclosures: Figure 1 – Regional Location
Figure 2 – Project Location
Figure 3 – Project Detail

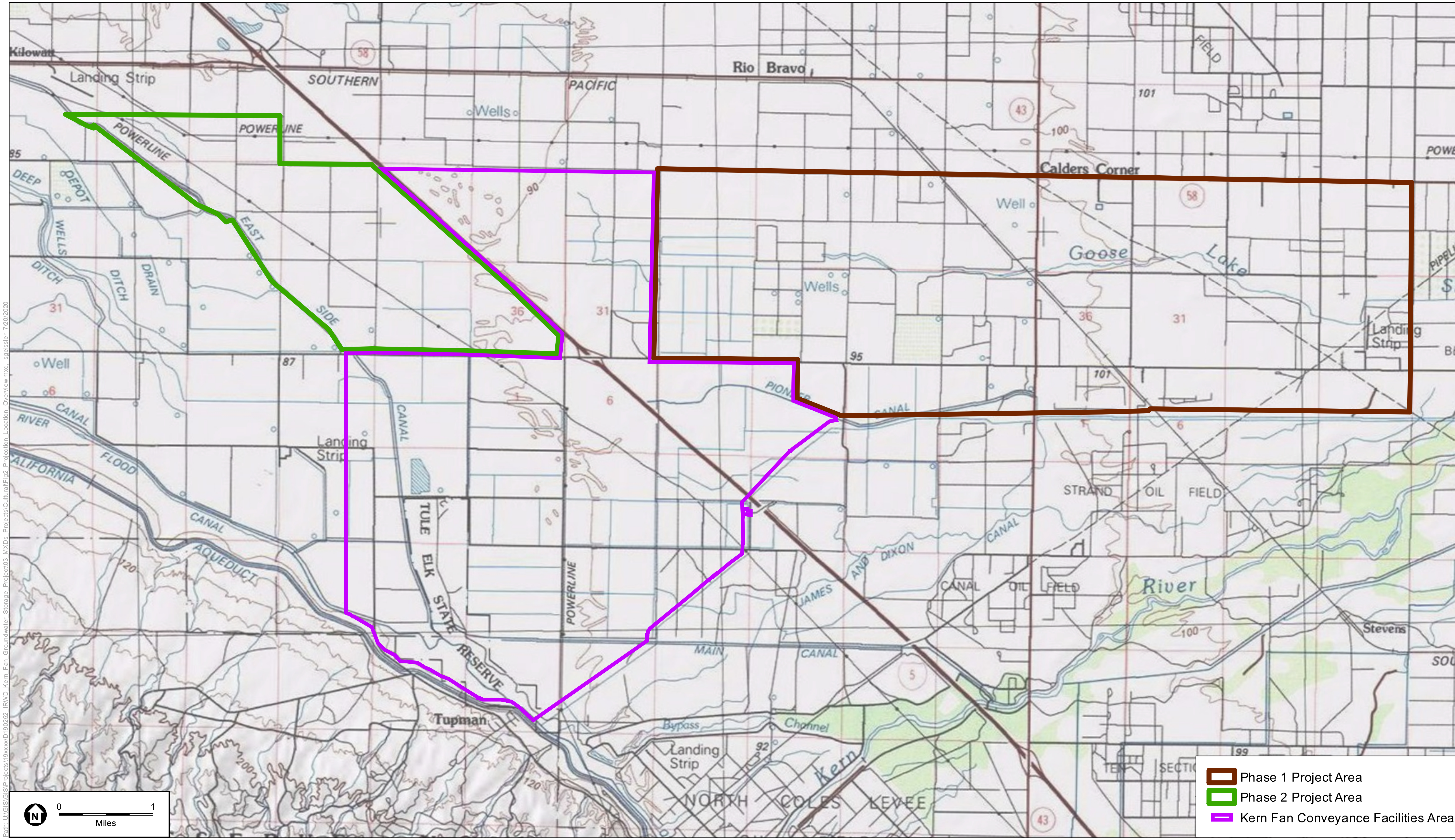


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA

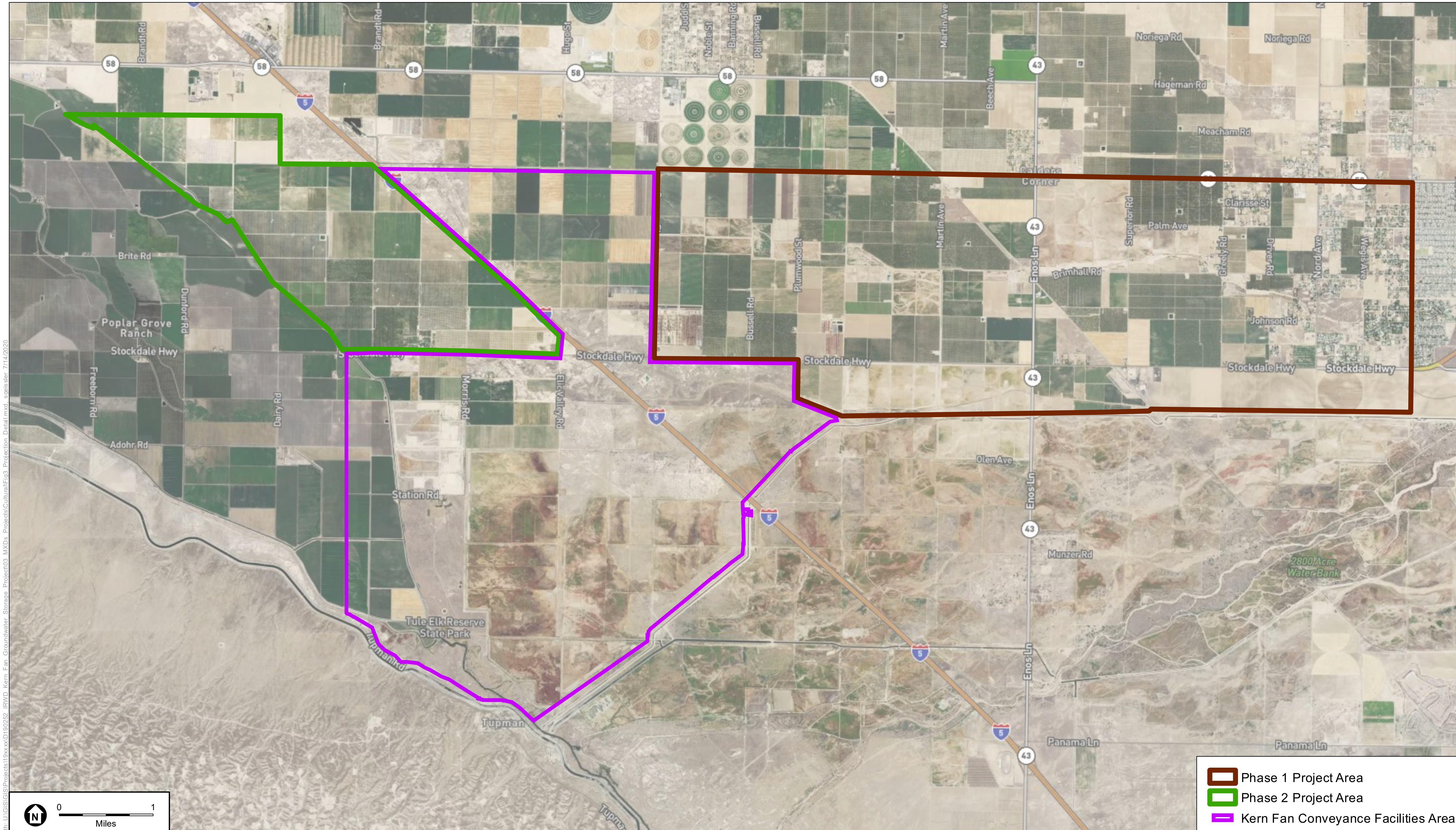


SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

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

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Chairperson Pevron:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

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The proposed project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. In addition, the Kern Fan Conveyance Facilities would consist of pipelines, pump stations and a new turnout at the California Aqueduct to convey water between the recharge and recovery facilities and the California Aqueduct. The proposed project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the project area. Water could be conveyed to and from the Phase 1 and 2 properties through existing facilities and the proposed Kern Fan Conveyance Facilities connecting to the California Aqueduct. The proposed project would be located in western Kern County, west of the City of Bakersfield. Project facilities have yet to be sited, but would be located within the areas shown on the attached maps (Figures 1 through 3). There are three areas identified: Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area.

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A search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was conducted on May 6, 2020. The results were negative, indicating that the NAHC does not have any sacred sites or Native American cultural resources on file within the proposed project areas (Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area).

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Sincerely,

Candace Ehr

Candace Ehringer
Cultural Resources Program Manager

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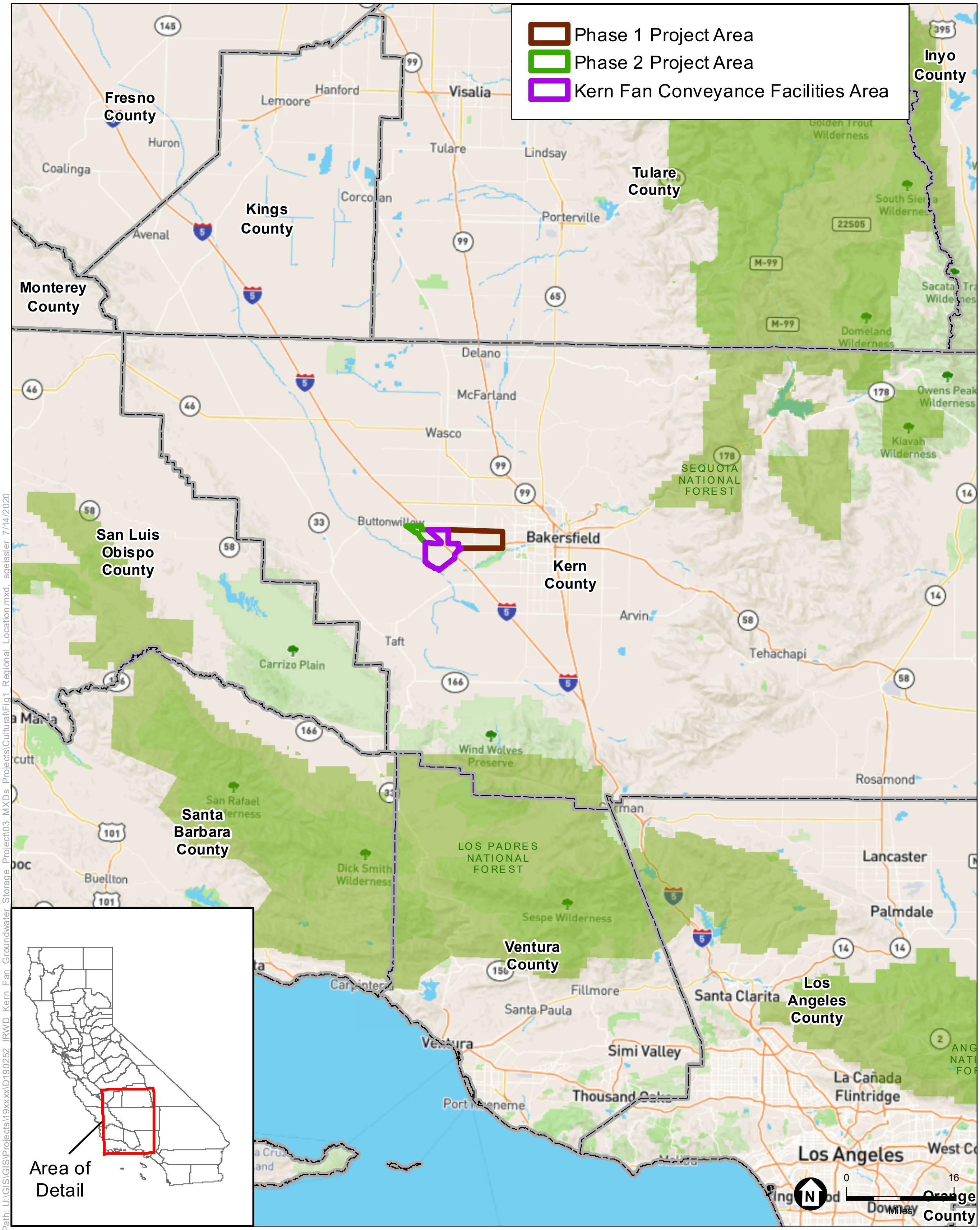
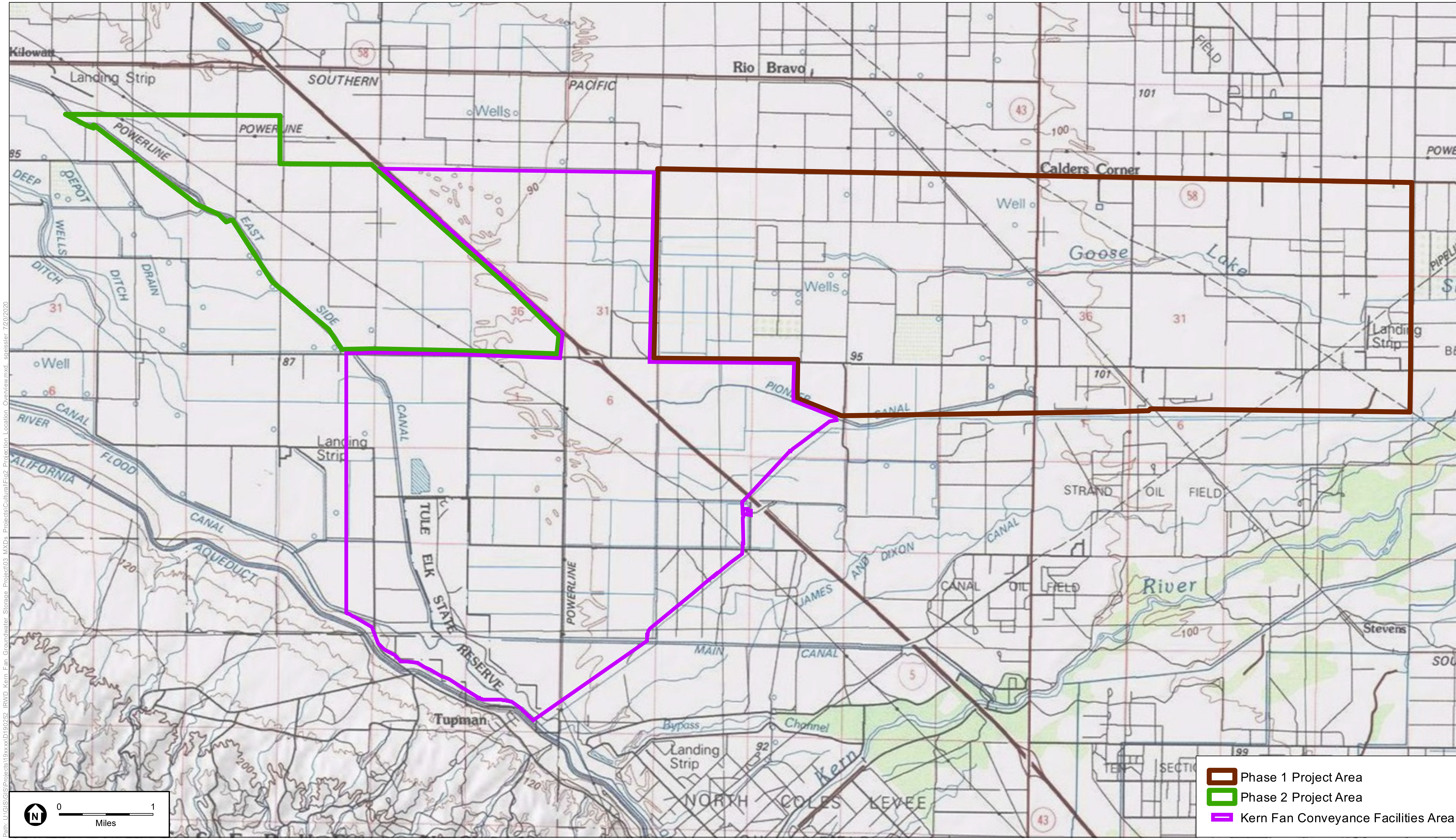


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA

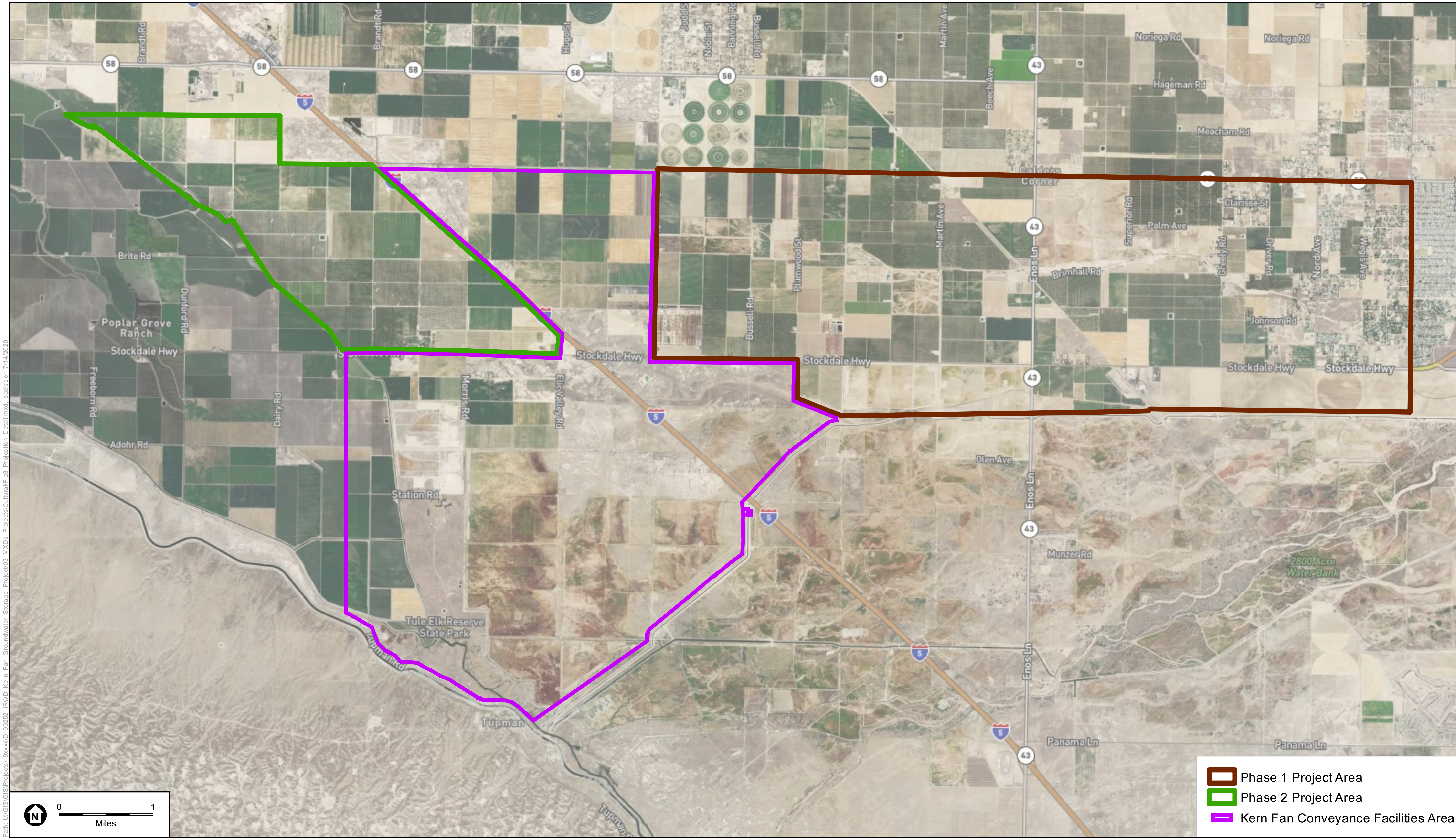


SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Julio Quair, Chairperson
Chumash Council of Bakersfield
729 Texas Street
Bakersfield, CA 93307

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Chairperson Quair:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

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A search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was conducted on May 6, 2020. The results were negative, indicating that the NAHC does not have any sacred sites or Native American cultural resources on file within the proposed project areas (Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area).

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Sincerely,

Candace Ehr

Candace Ehringer
Cultural Resources Program Manager

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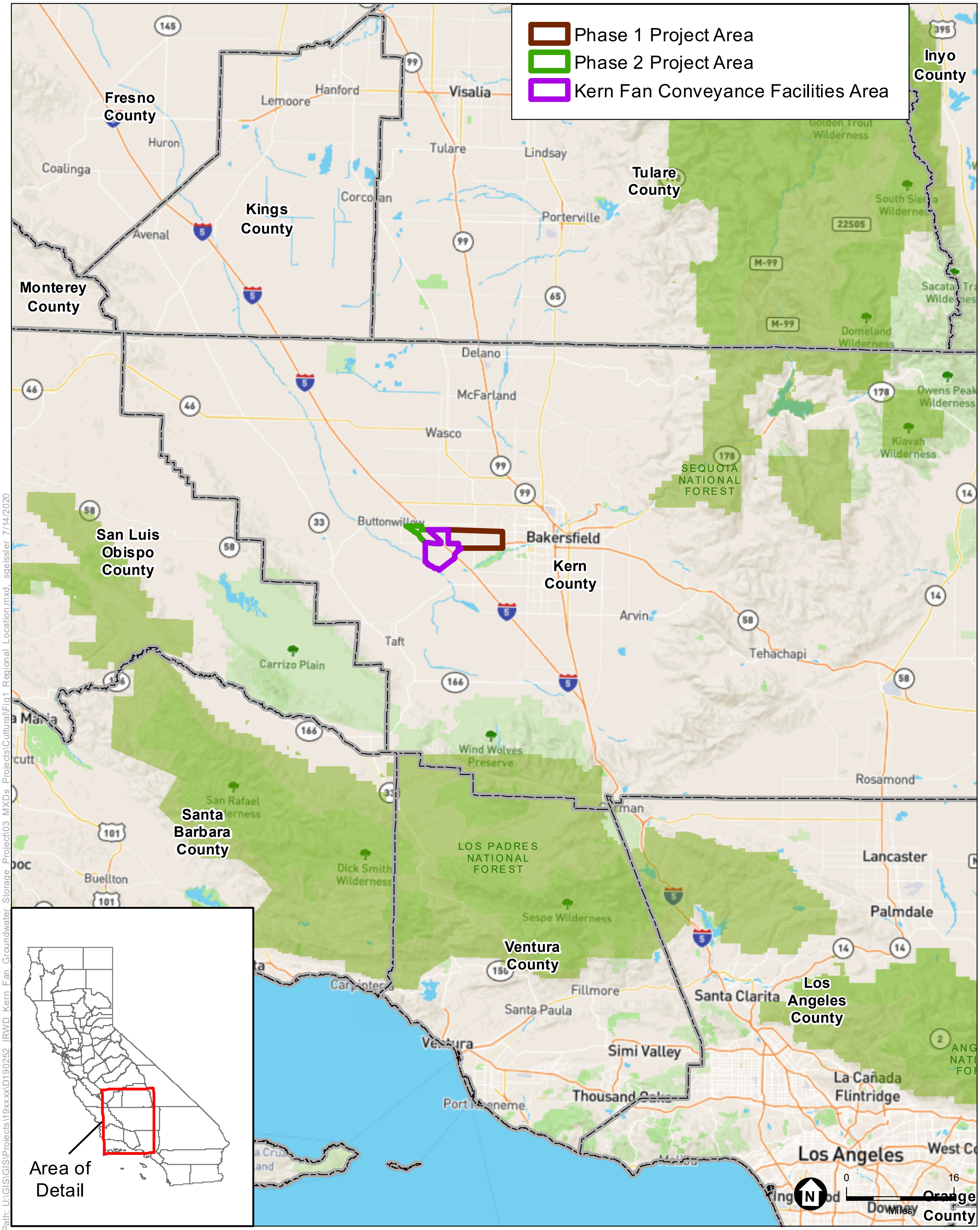
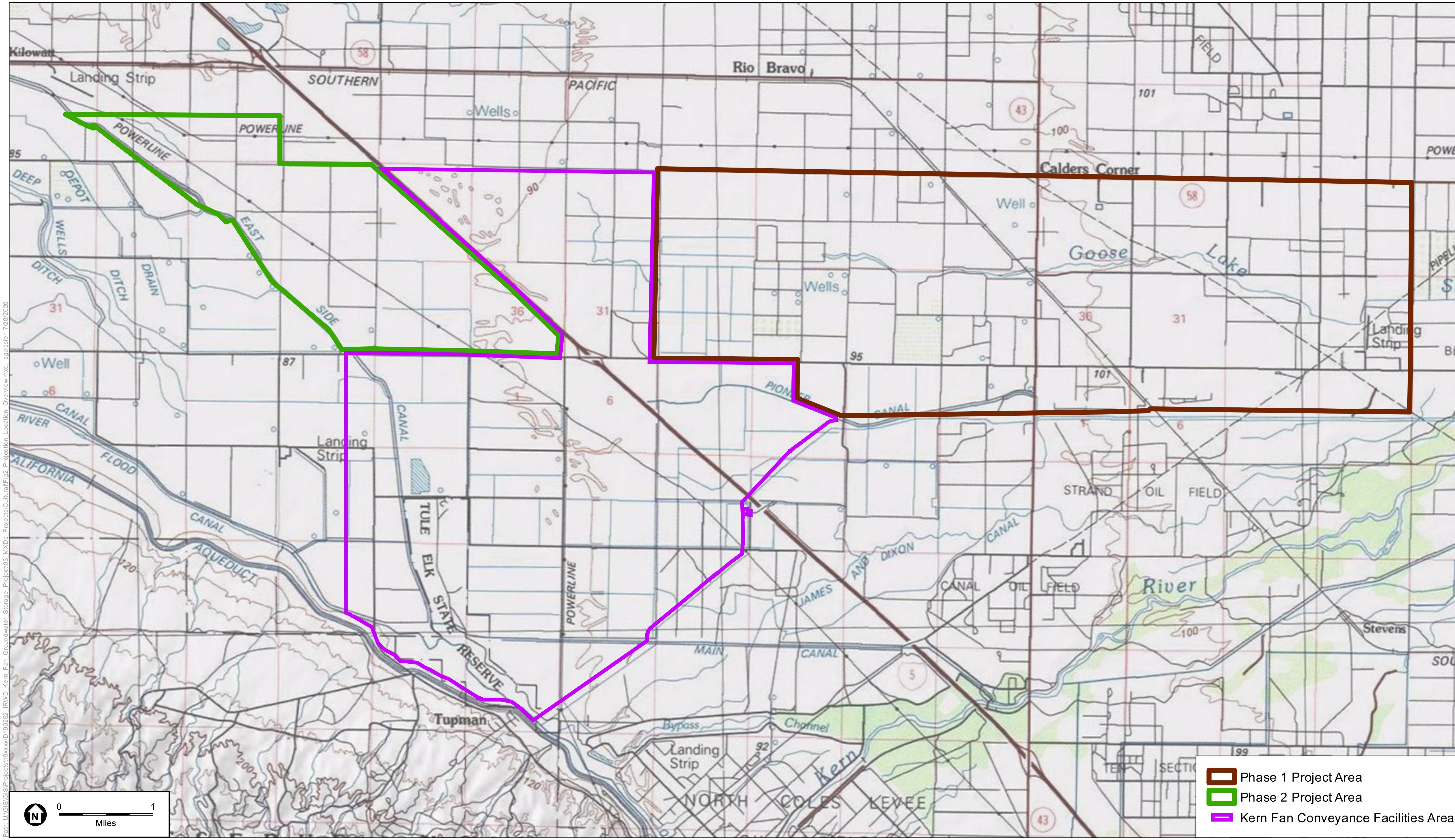


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA

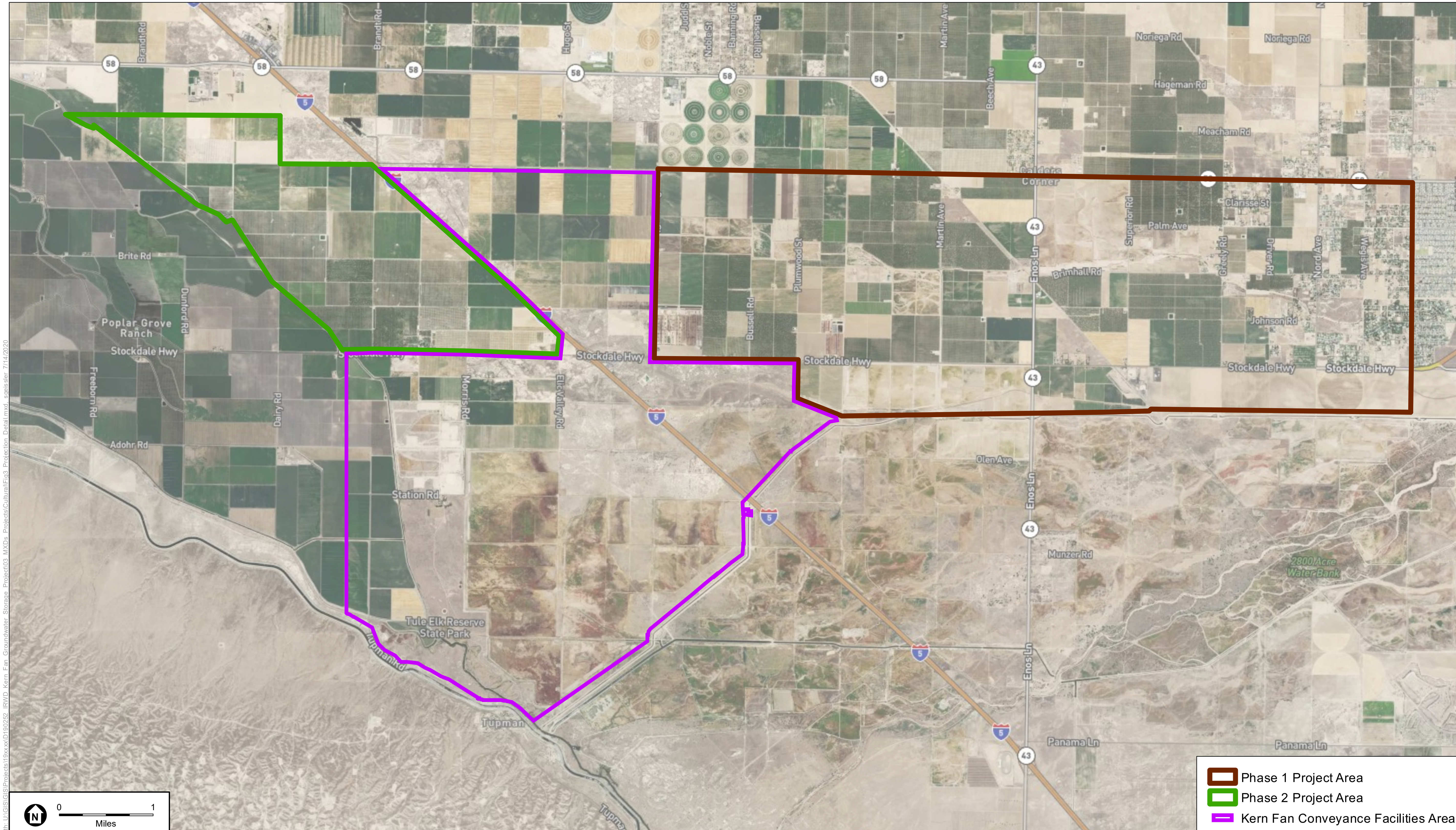


SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

James Rambeau, Sr., Chairperson
Big Pine Paiute Tribe of the Owens Valley
P.O. Box 700
Big Pine, CA 93513

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Chairperson Rambeau:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

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A cultural resources records search for the proposed project was conducted through the California Historical Resources Information System (CHRIS) Southern San Joaquin Valley Information Center (SSJVIC) on May 5, 2020. A total of five prehistoric or multicomponent resources have been recorded within the Phase I Project Area (four prehistoric isolates and one multicomponent archaeological site). No prehistoric resources have been recorded within the Phase II Project Area. A total of 38 prehistoric or multicomponent resources have been recorded within the Kern Fan Conveyance Facilities Area (29 prehistoric archaeological sites, two multicomponent archaeological sites, and seven prehistoric isolates).

A search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was conducted on May 6, 2020. The results were negative, indicating that the NAHC does not have any sacred sites or Native American cultural resources on file within the proposed project areas (Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area).

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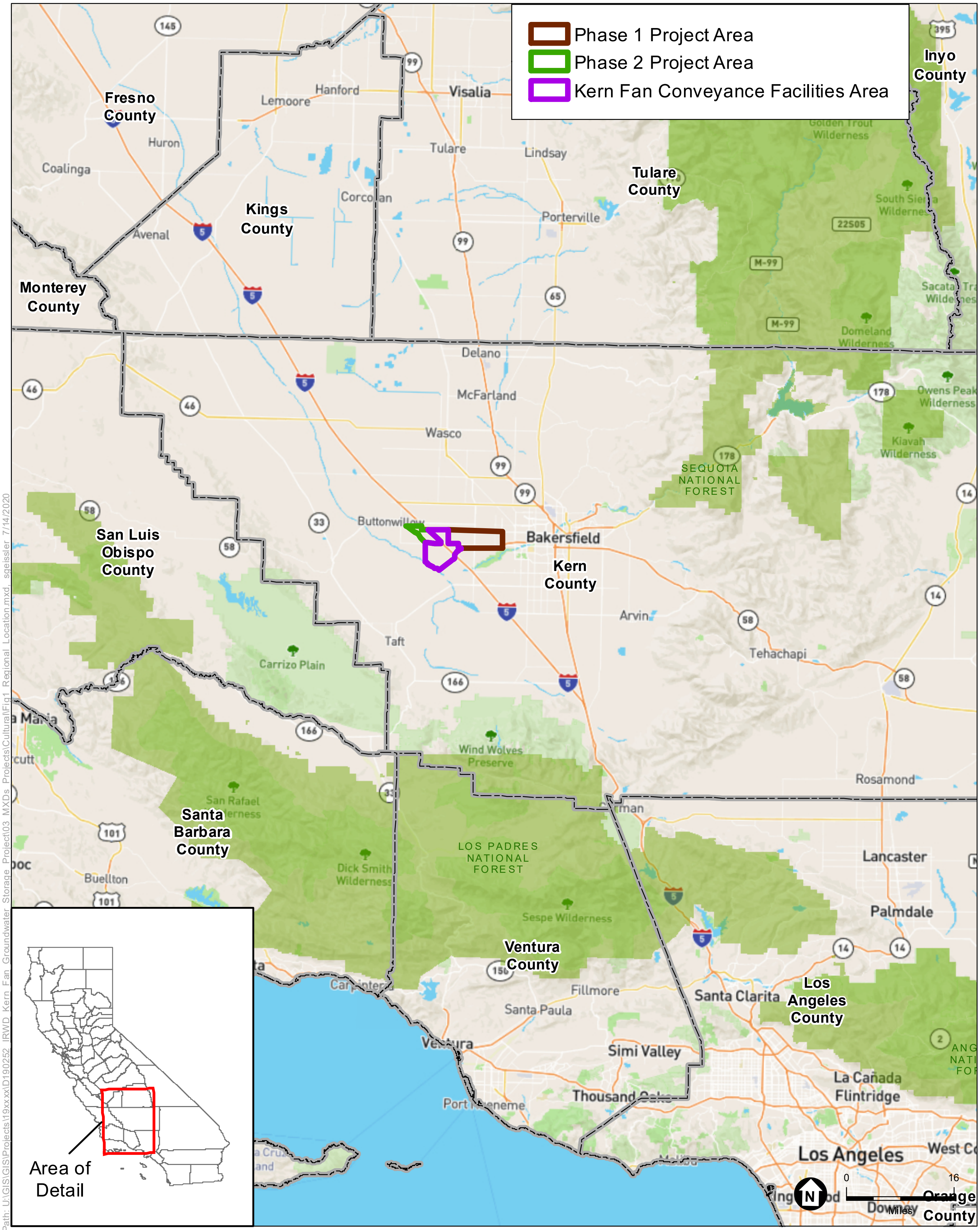
Sincerely,

Candace Ehringer

Candace Ehringer
Cultural Resources Program Manager

Enclosures: Figure 1 – Regional Location
Figure 2 – Project Location
Figure 3 – Project Detail



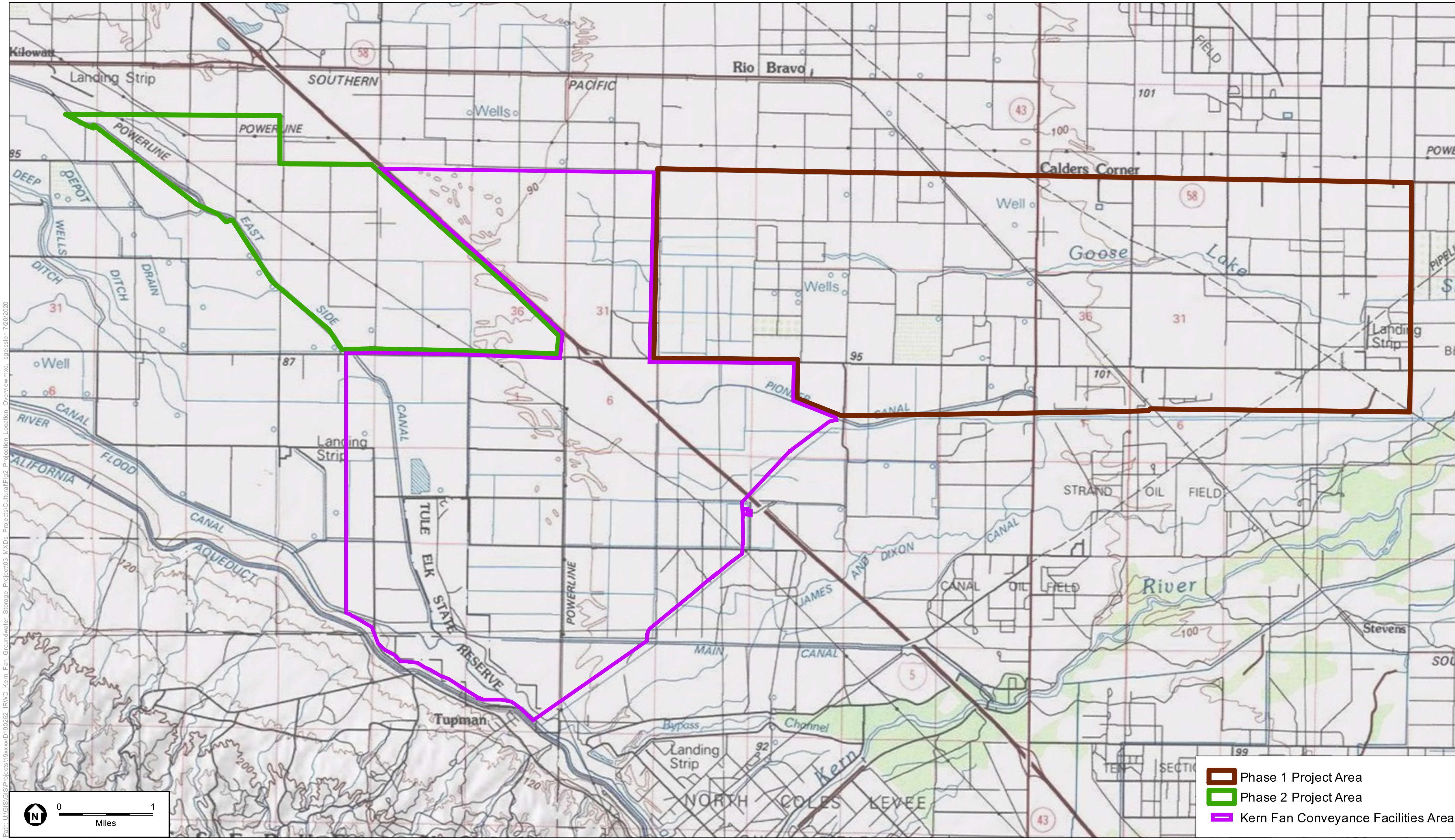
Path: U:\GIS\GIS\Projects\19xxxx\D190252_IRWD_Kern_Fan_Groundwater_Storage_Project\03_MXDs_Projects\Cultural\Fig1_Regional_Location.mxd, sgeissler 7/14/2020

SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA

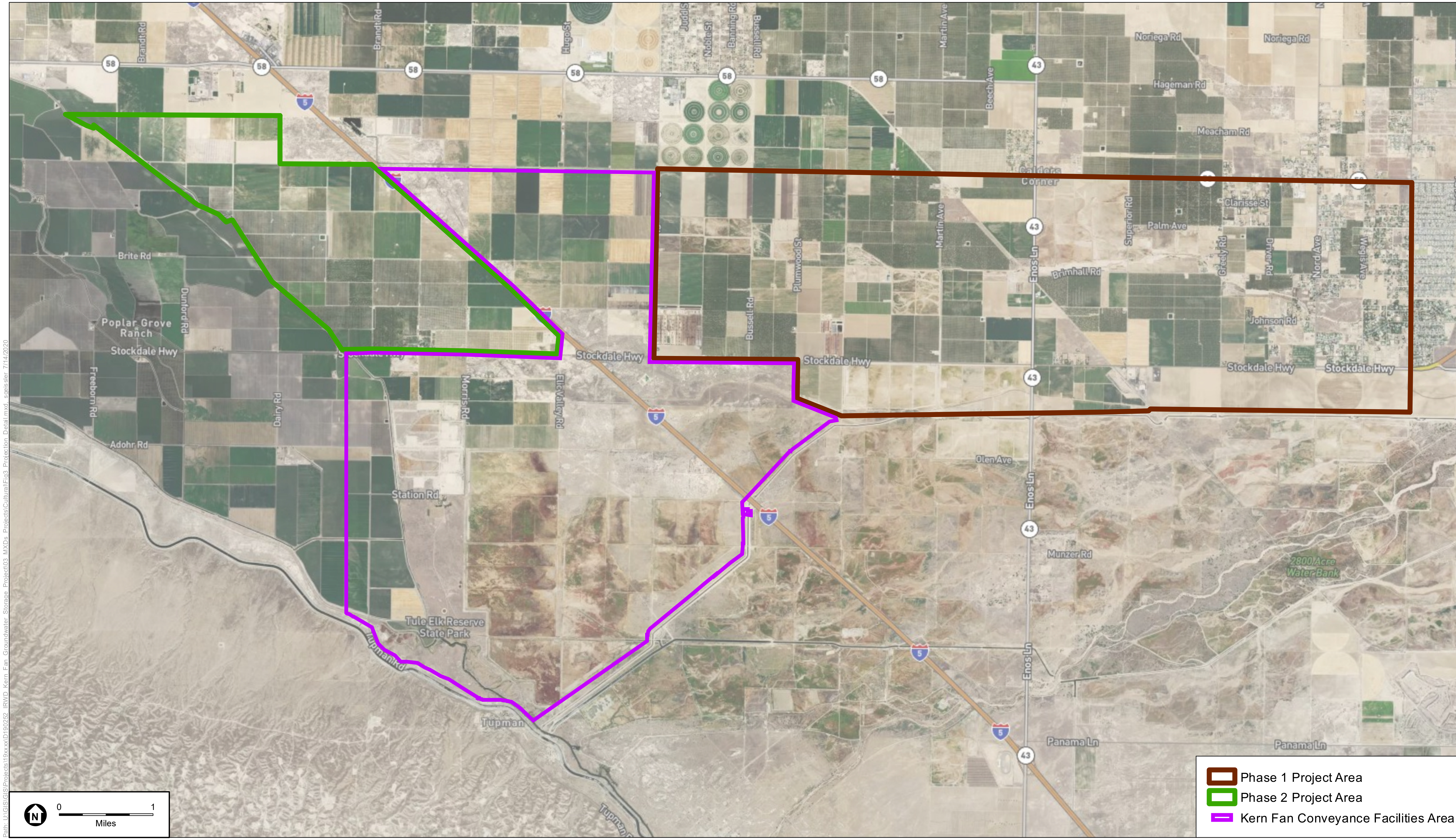


SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Colin Rambo, CRM Tech
Tejon Indian Tribe
P.O. Box 640
Arvin, CA 93203

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Mr. Rambo:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

The proposed project would allow Rosedale and IRWD to more effectively manage existing sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop water recharge and recovery facilities in the Kern Fan area of Kern County. The proposed project would recharge, store, recover and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and supply reliability benefits for agricultural, and municipal and industrial uses.

The proposed project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. In addition, the Kern Fan Conveyance Facilities would consist of pipelines, pump stations and a new turnout at the California Aqueduct to convey water between the recharge and recovery facilities and the California Aqueduct. The proposed project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the project area. Water could be conveyed to and from the Phase 1 and 2 properties through existing facilities and the proposed Kern Fan Conveyance Facilities connecting to the California Aqueduct. The proposed project would be located in western Kern County, west of the City of Bakersfield. Project facilities have yet to be sited, but would be located within the areas shown on the attached maps (Figures 1 through 3). There are three areas identified: Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area.

A cultural resources records search for the proposed project was conducted through the California Historical Resources Information System (CHRIS) Southern San Joaquin Valley Information Center (SSJVIC) on May 5, 2020. A total of five prehistoric or multicomponent resources have been recorded within the Phase I Project Area (four prehistoric isolates and one multicomponent archaeological site). No prehistoric resources have been recorded within the Phase II Project Area. A total of 38 prehistoric or multicomponent resources have been recorded within the Kern Fan Conveyance Facilities Area (29 prehistoric archaeological sites, two multicomponent archaeological sites, and seven prehistoric isolates).

A search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was conducted on May 6, 2020. The results were negative, indicating that the NAHC does not have any sacred sites or Native American cultural resources on file within the proposed project areas (Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area).

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Sincerely,

Candace Ehringer

Candace Ehringer
Cultural Resources Program Manager

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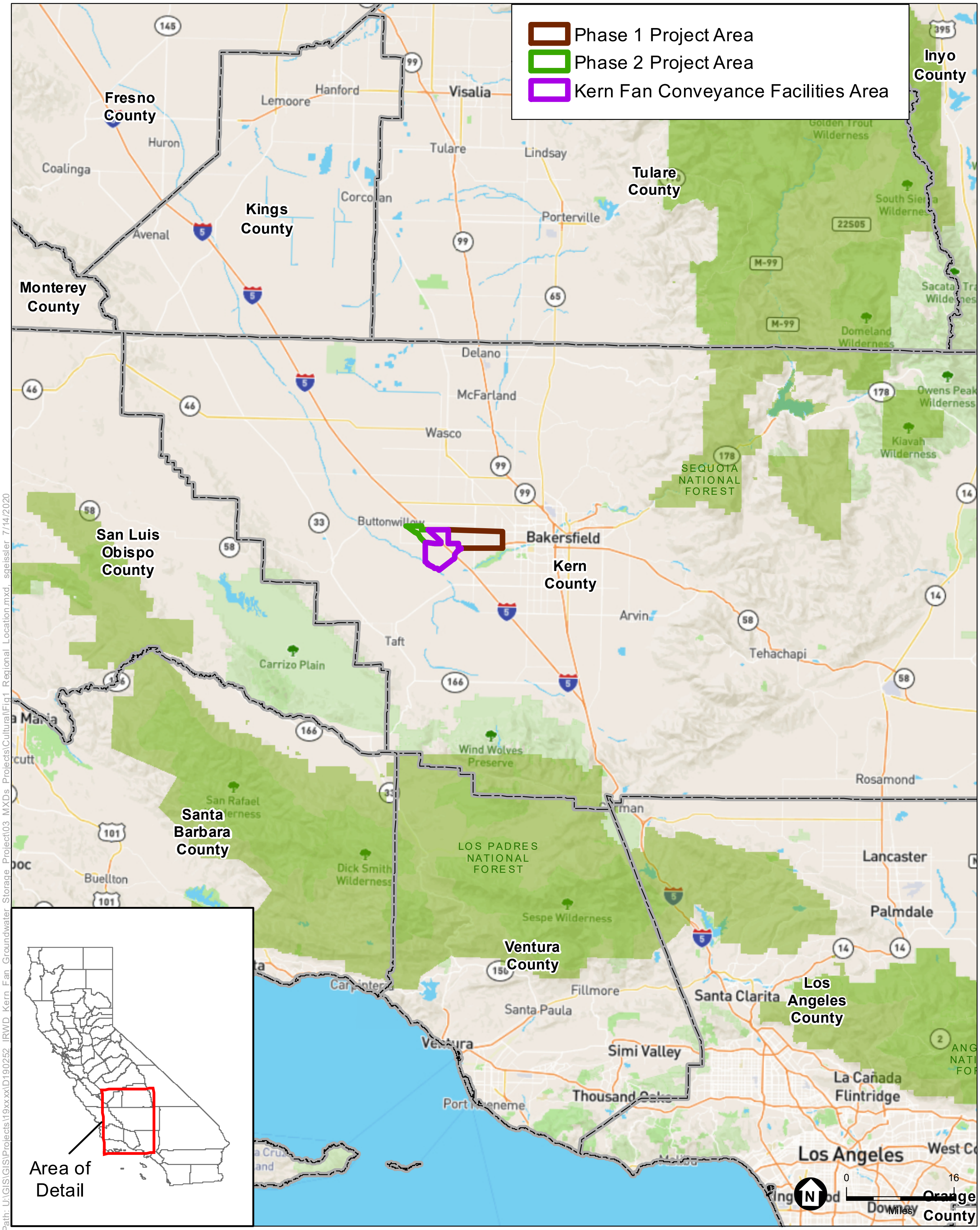
Figure 3 – Project Detail



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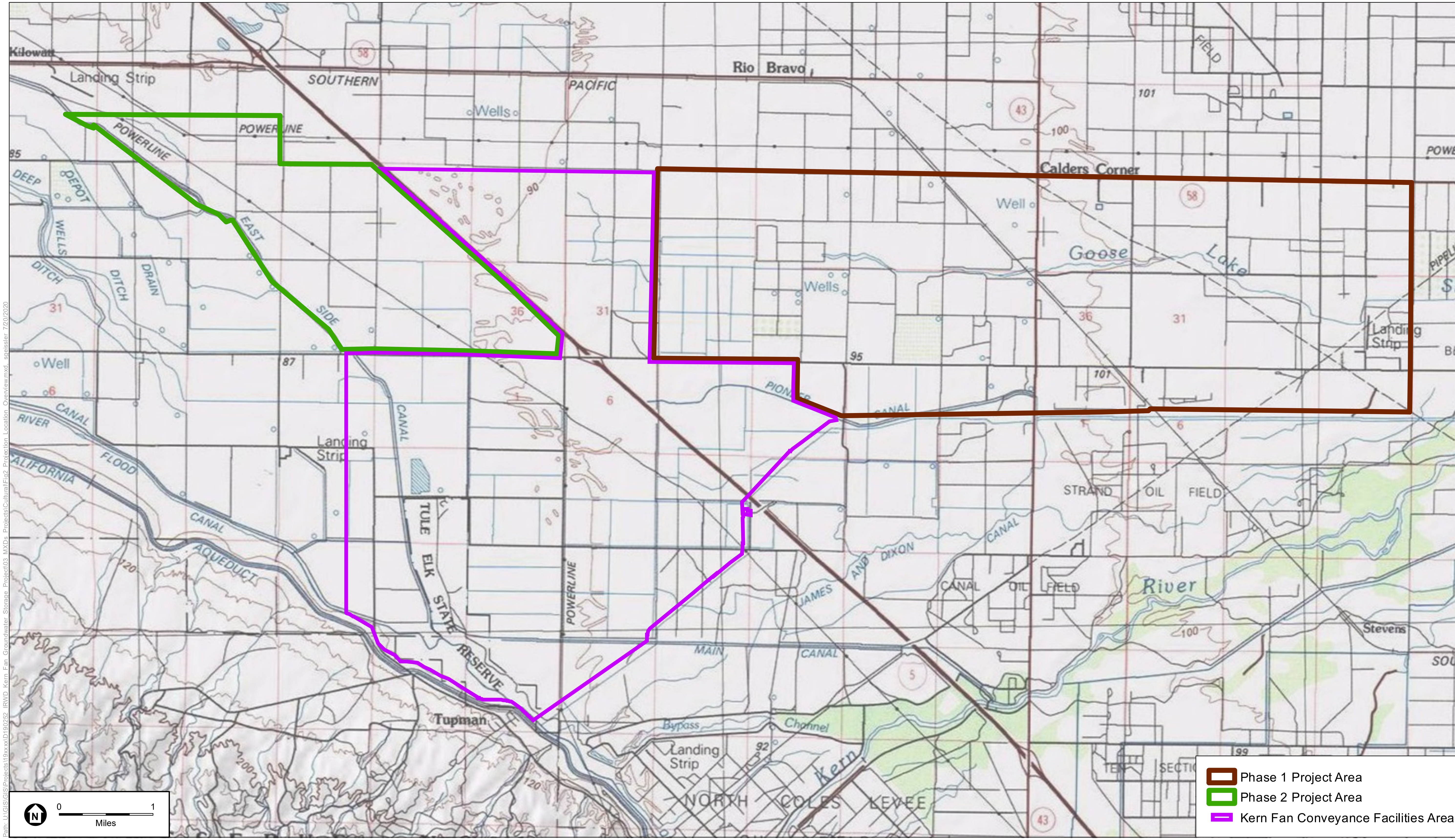
SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

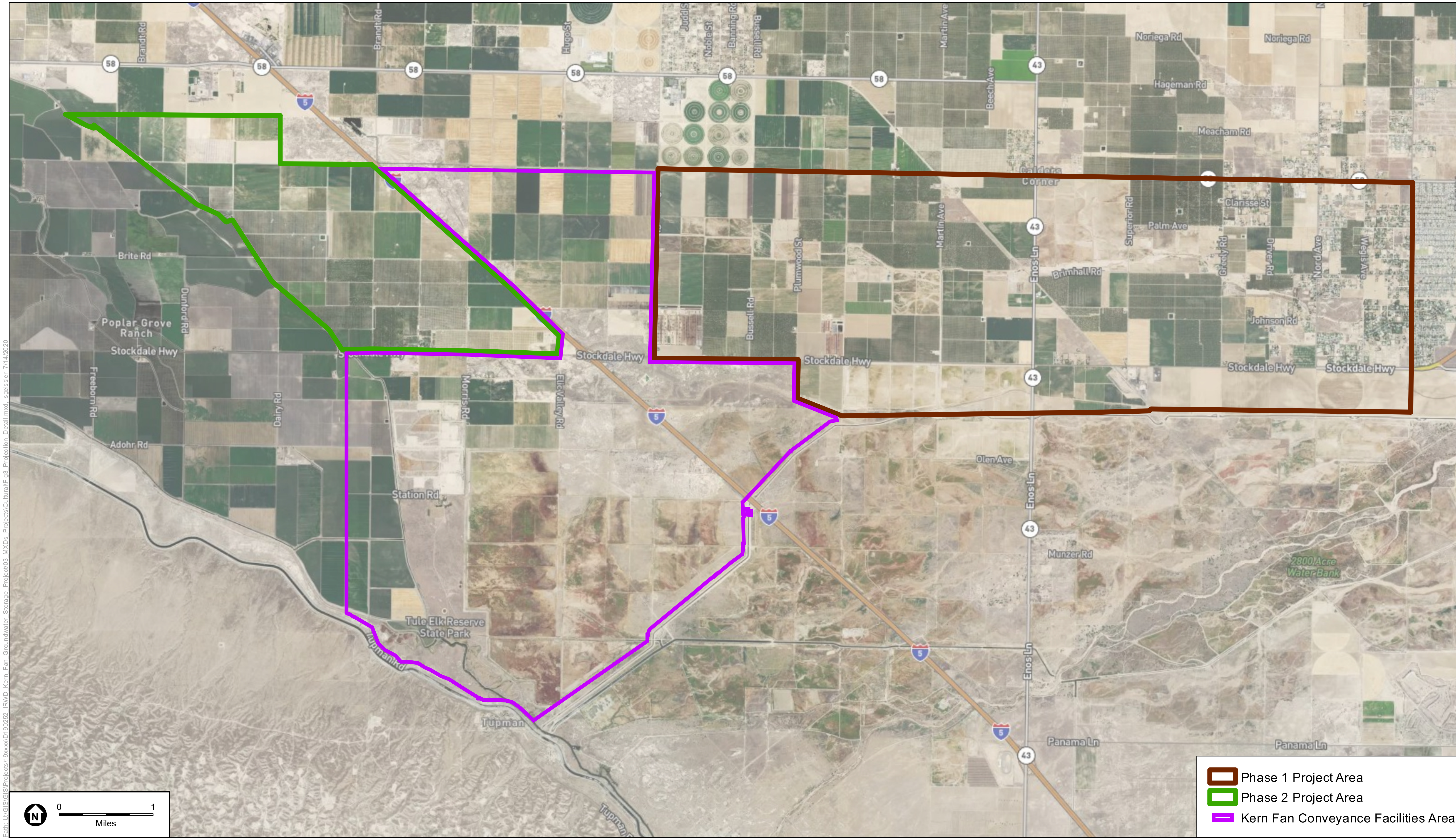


SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Robert Robinson, Chairperson
Kern Valley Indian Community
P.O. Box 1010
Lake Isabella, CA 93240

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Chairperson Robinson:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

The proposed project would allow Rosedale and IRWD to more effectively manage existing sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop water recharge and recovery facilities in the Kern Fan area of Kern County. The proposed project would recharge, store, recover and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and supply reliability benefits for agricultural, and municipal and industrial uses.

The proposed project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. In addition, the Kern Fan Conveyance Facilities would consist of pipelines, pump stations and a new turnout at the California Aqueduct to convey water between the recharge and recovery facilities and the California Aqueduct. The proposed project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the project area. Water could be conveyed to and from the Phase 1 and 2 properties through existing facilities and the proposed Kern Fan Conveyance Facilities connecting to the California Aqueduct. The proposed project would be located in western Kern County, west of the City of Bakersfield. Project facilities have yet to be sited, but would be located within the areas shown on the attached maps (Figures 1 through 3). There are three areas identified: Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area.

A cultural resources records search for the proposed project was conducted through the California Historical Resources Information System (CHRIS) Southern San Joaquin Valley Information Center (SSJVIC) on May 5, 2020. A total of five prehistoric or multicomponent resources have been recorded within the Phase I Project Area (four prehistoric isolates and one multicomponent archaeological site). No prehistoric resources have been recorded within the Phase II Project Area. A total of 38 prehistoric or multicomponent resources have been recorded within the Kern Fan Conveyance Facilities Area (29 prehistoric archaeological sites, two multicomponent archaeological sites, and seven prehistoric isolates).

A search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was conducted on May 6, 2020. The results were negative, indicating that the NAHC does not have any sacred sites or Native American cultural resources on file within the proposed project areas (Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area).

In an effort to address any potential impacts to archaeological or Native American resources, we are seeking comments and information from Native American representatives, and your name was supplied to us by the NAHC as a contact for this area. We would appreciate your comments identifying any sensitive sites in or near the proposed project areas that you may be aware of, any concerns or issues pertinent to the proposed project.

If you have any questions or comments, please contact me by phone at (831) 737-7438 or by email at cehringer@esassoc.com. We kindly request a response to this letter by July 24, 2020 to ensure that any concerns are adequately addressed in the EIR. Thank you for your cooperation on this matter.

Sincerely,

Candace Ehr

Candace Ehringer
Cultural Resources Program Manager

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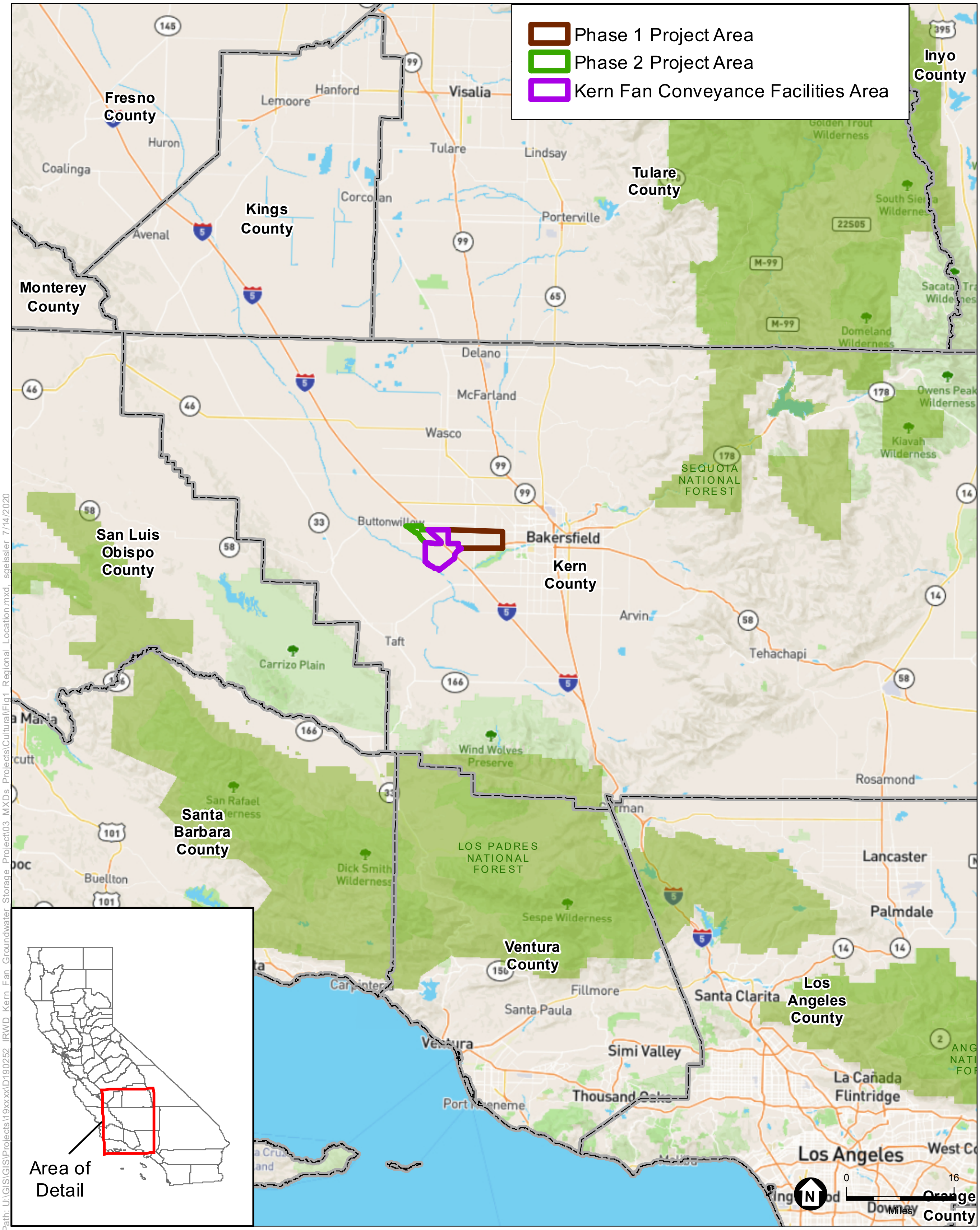
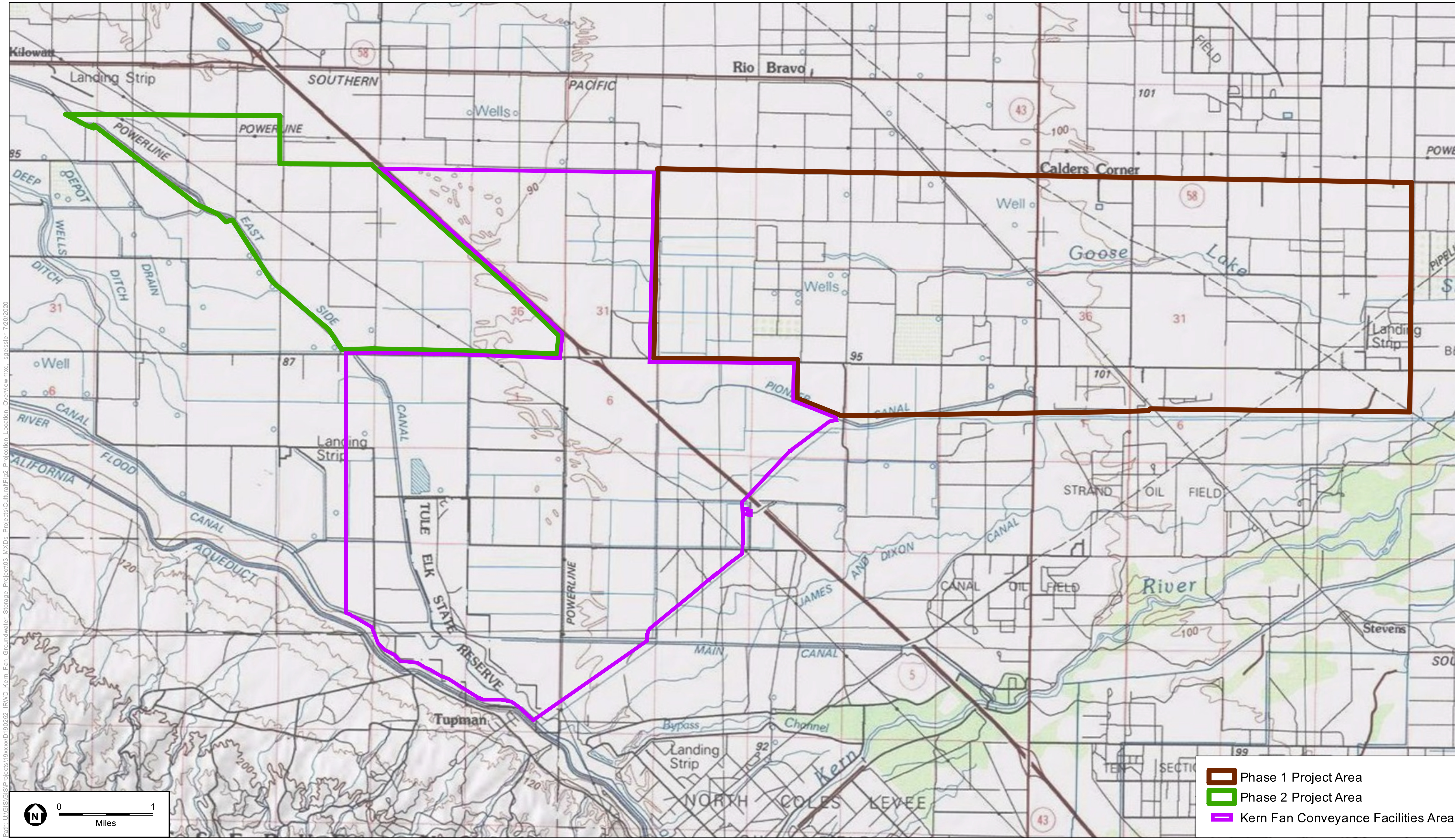


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA

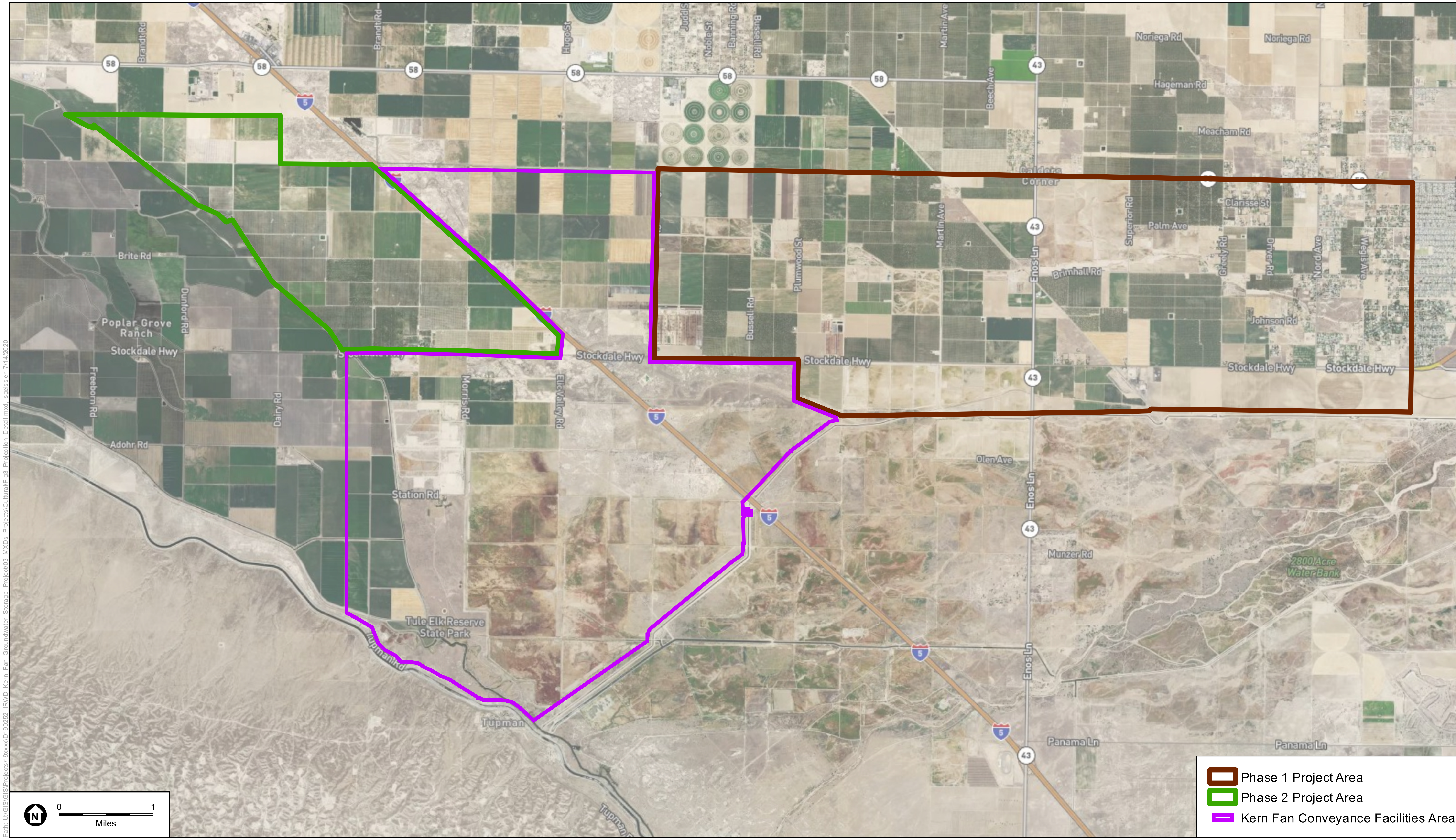


SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Leo Sisco, Chairpeson
Santa Rosa Rancheria Tachi Yokut Tribe
P.O. Box 8
Lemoore, CA 93245

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Chairperson Sisco:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

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Cultural Resources Program Manager

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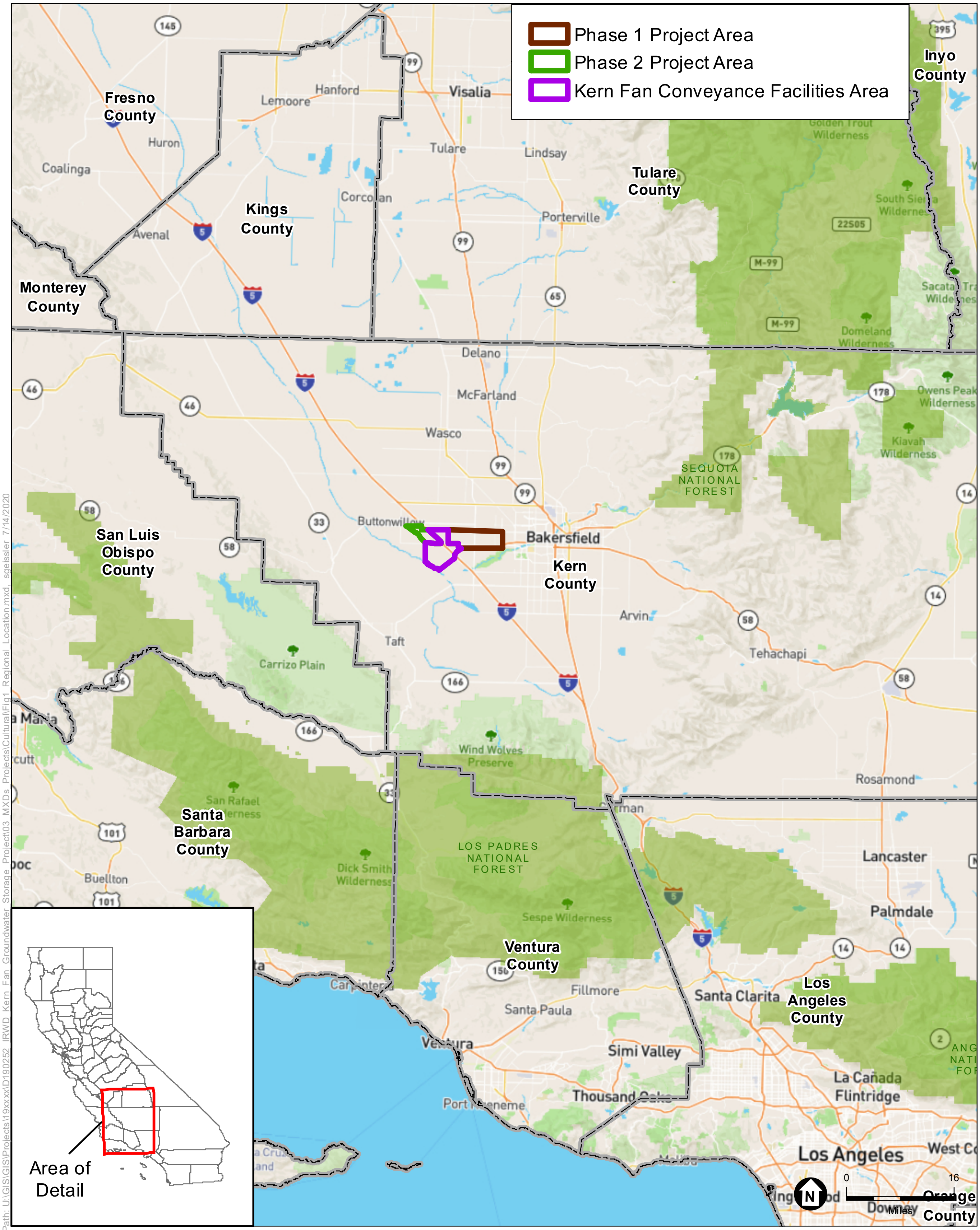
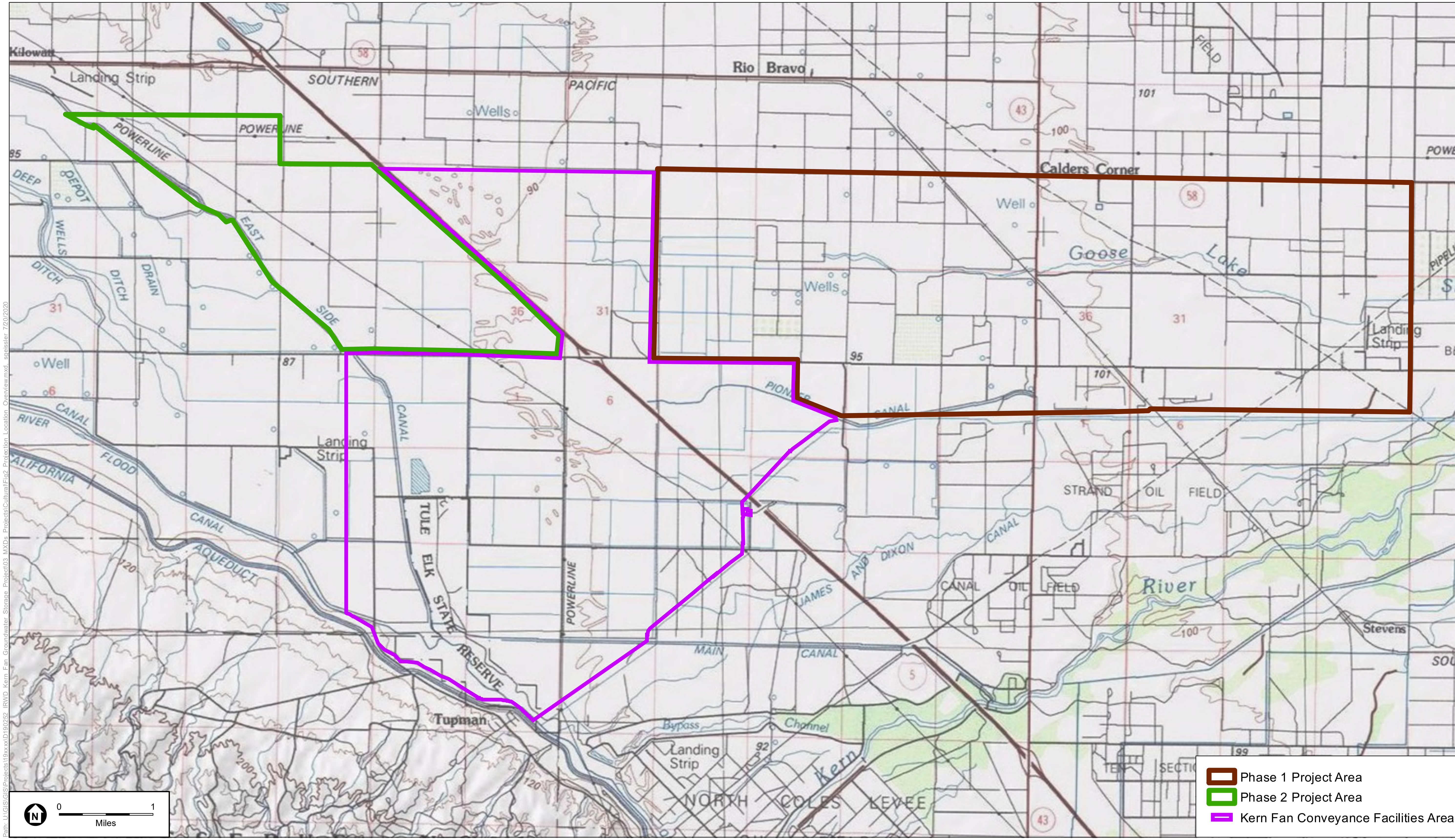


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

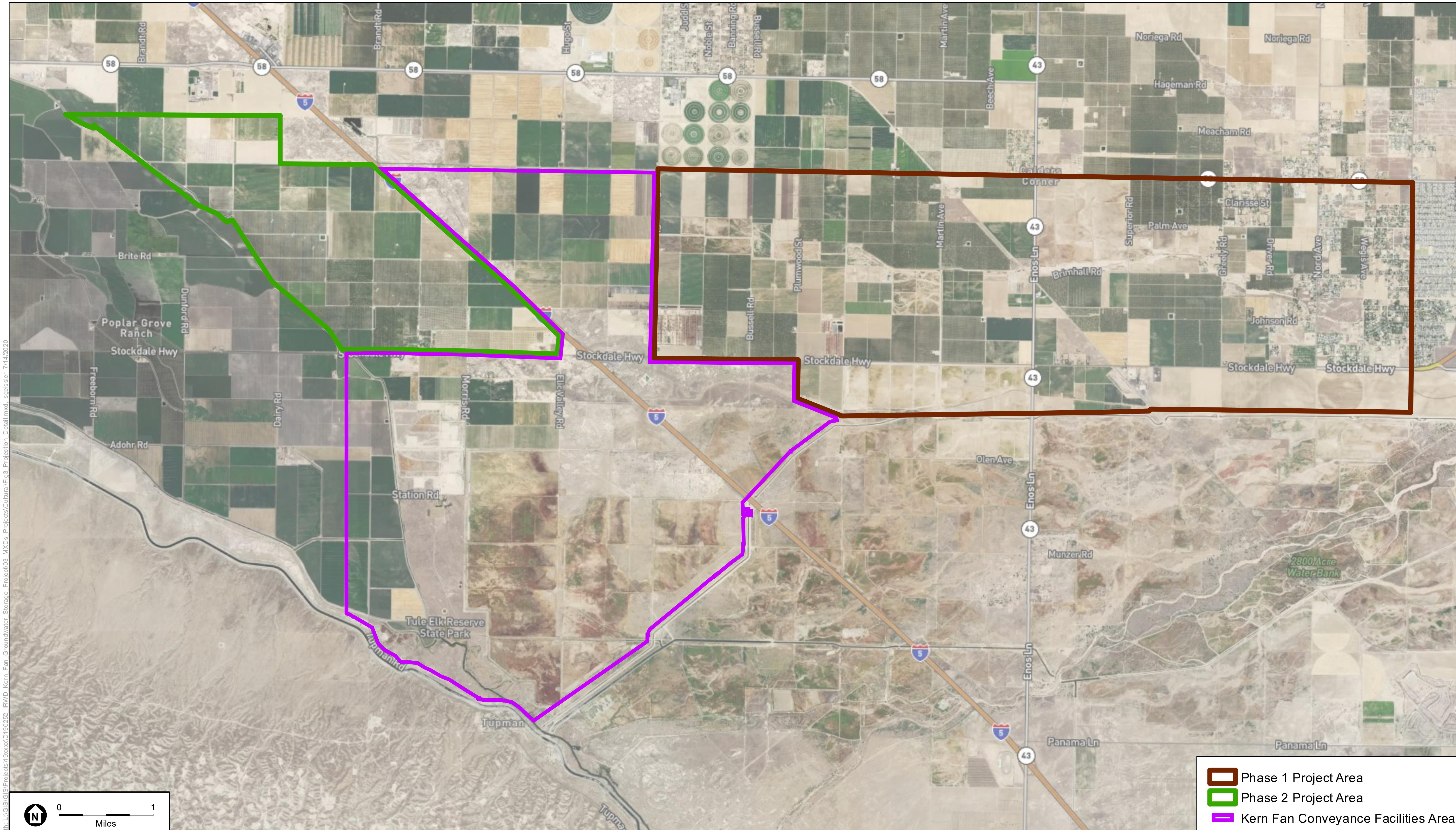


SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Mona Olivas Tucker, Chairwoman
Yak tityu tityu yak tilhini – Northern Chumash Tribe
660 Camino del Rey
Arroyo Grande, CA 93420

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Chairwoman Olivas Tucker:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

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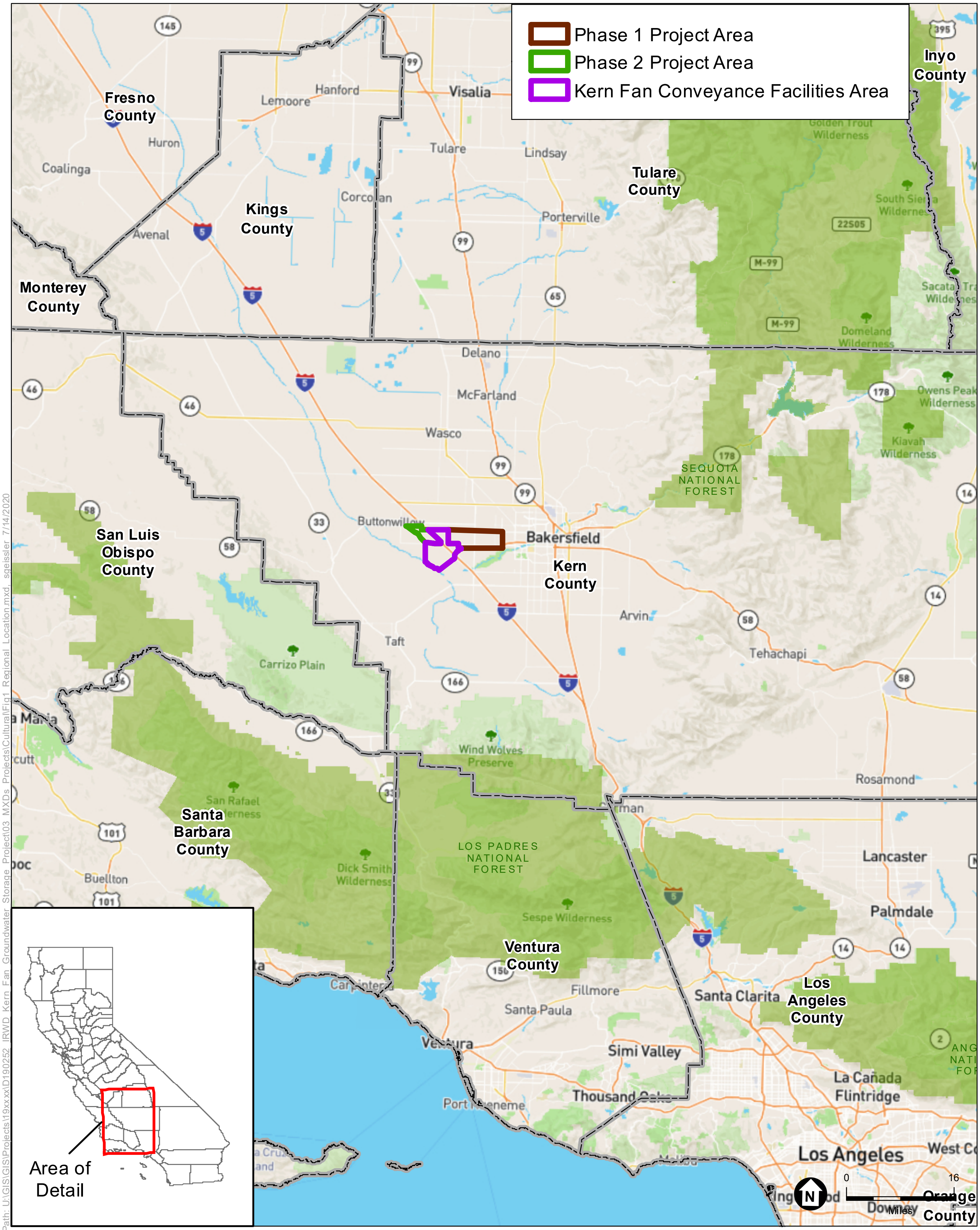
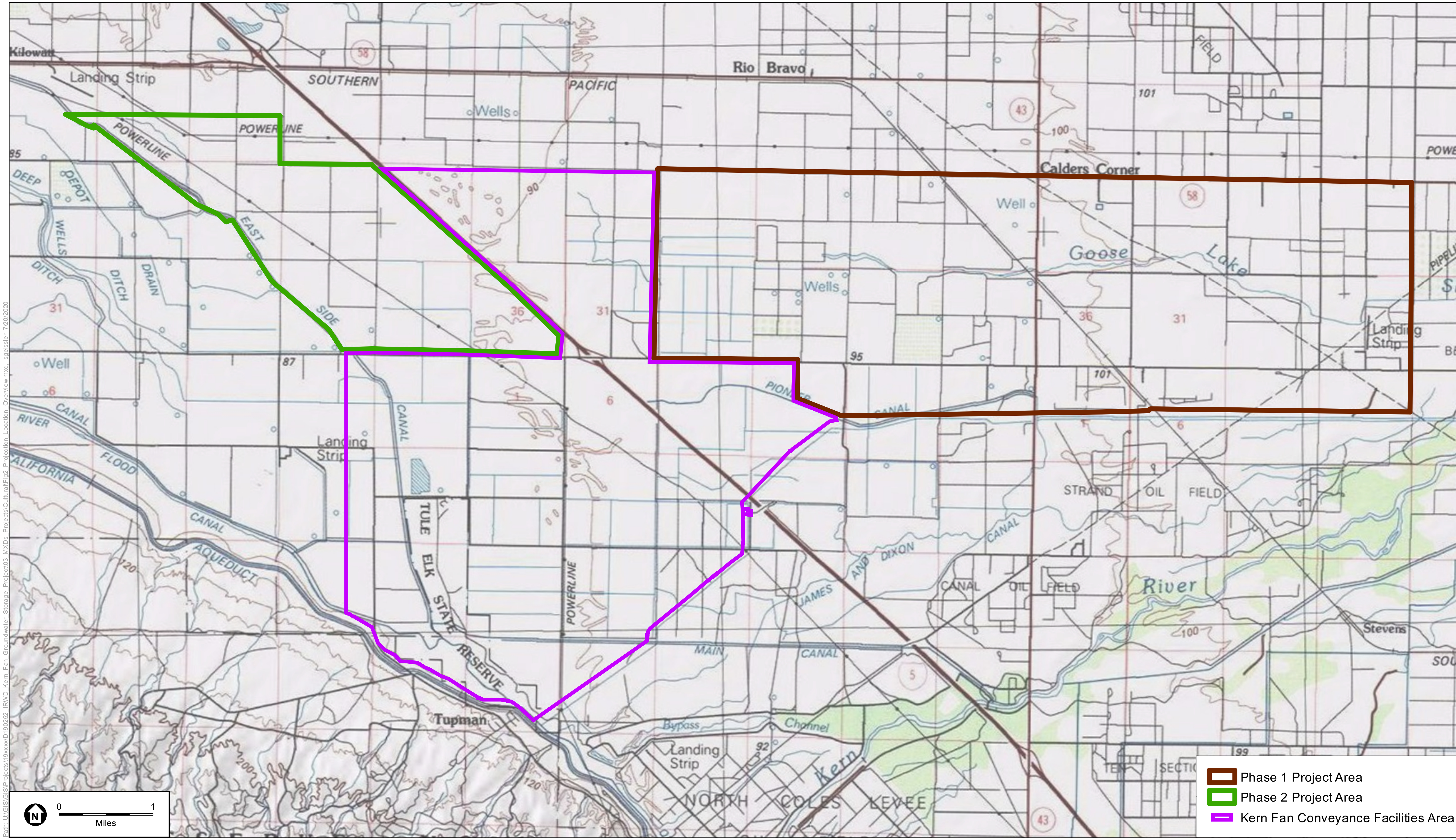


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA

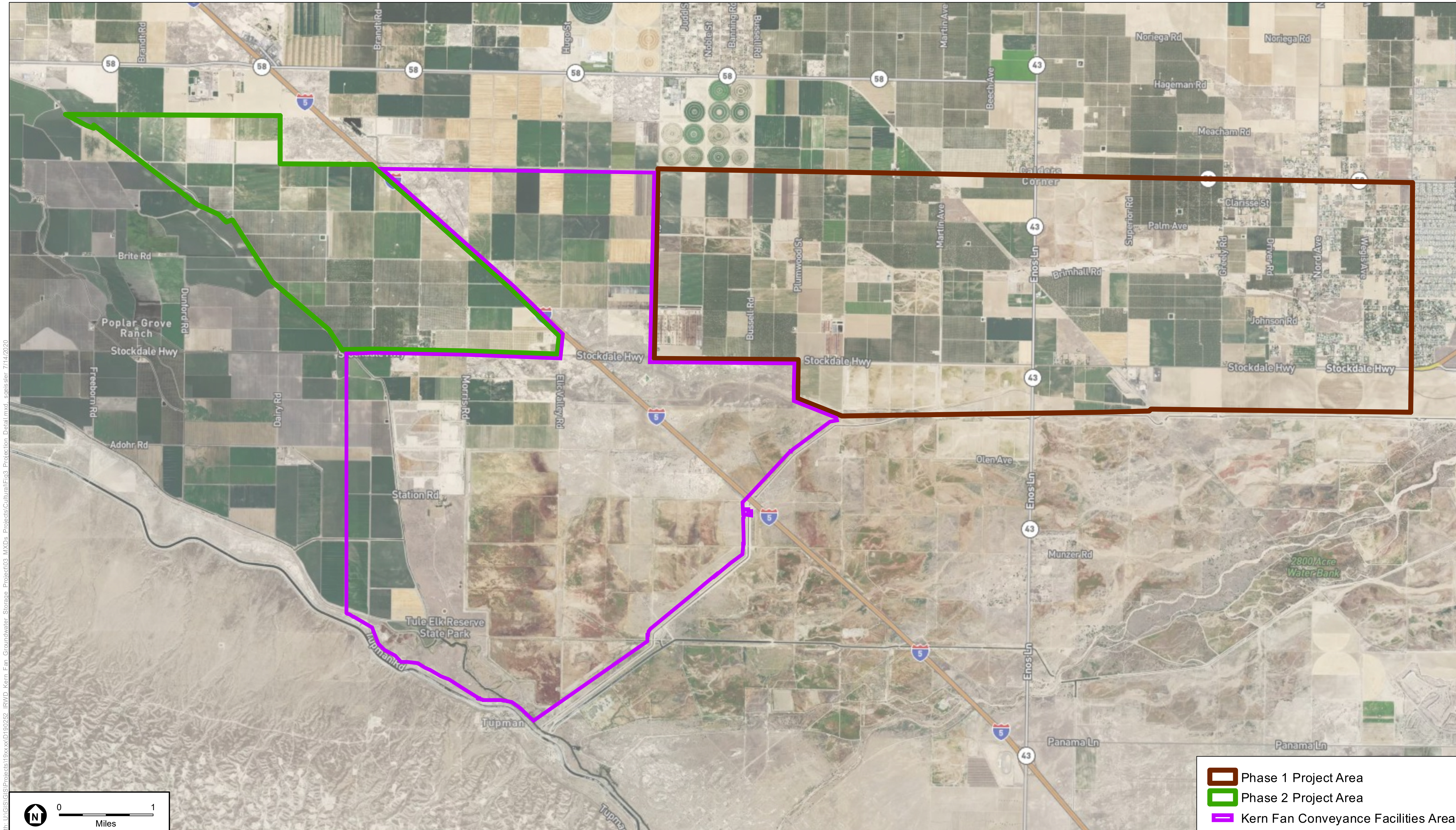


SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Julie Turner, Secretary
Kern Valley Indian Community
P.O. Box 1010
Lake Isabella, CA 93240

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Ms. Turner:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

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Candace Ehringer

Candace Ehringer
Cultural Resources Program Manager

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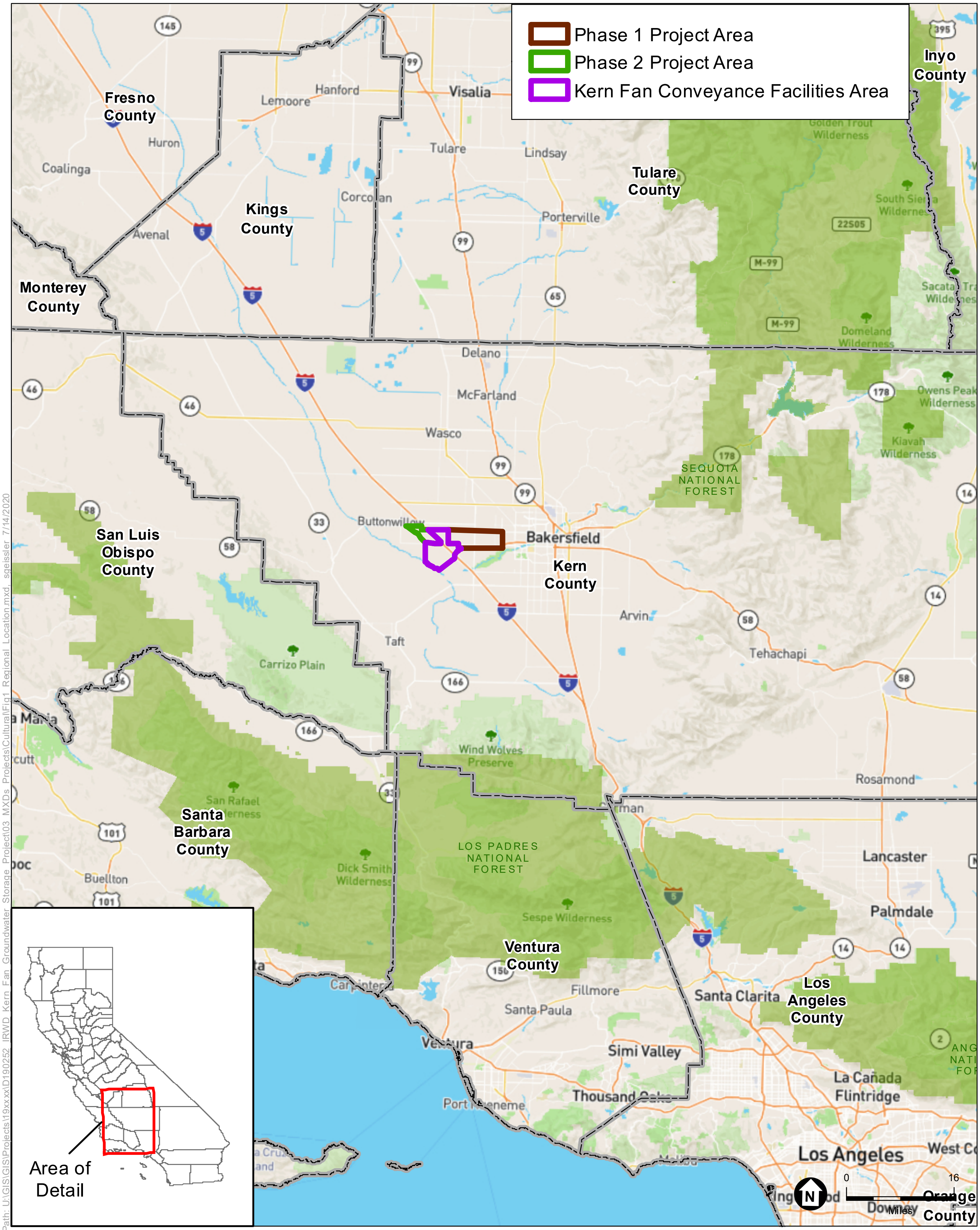
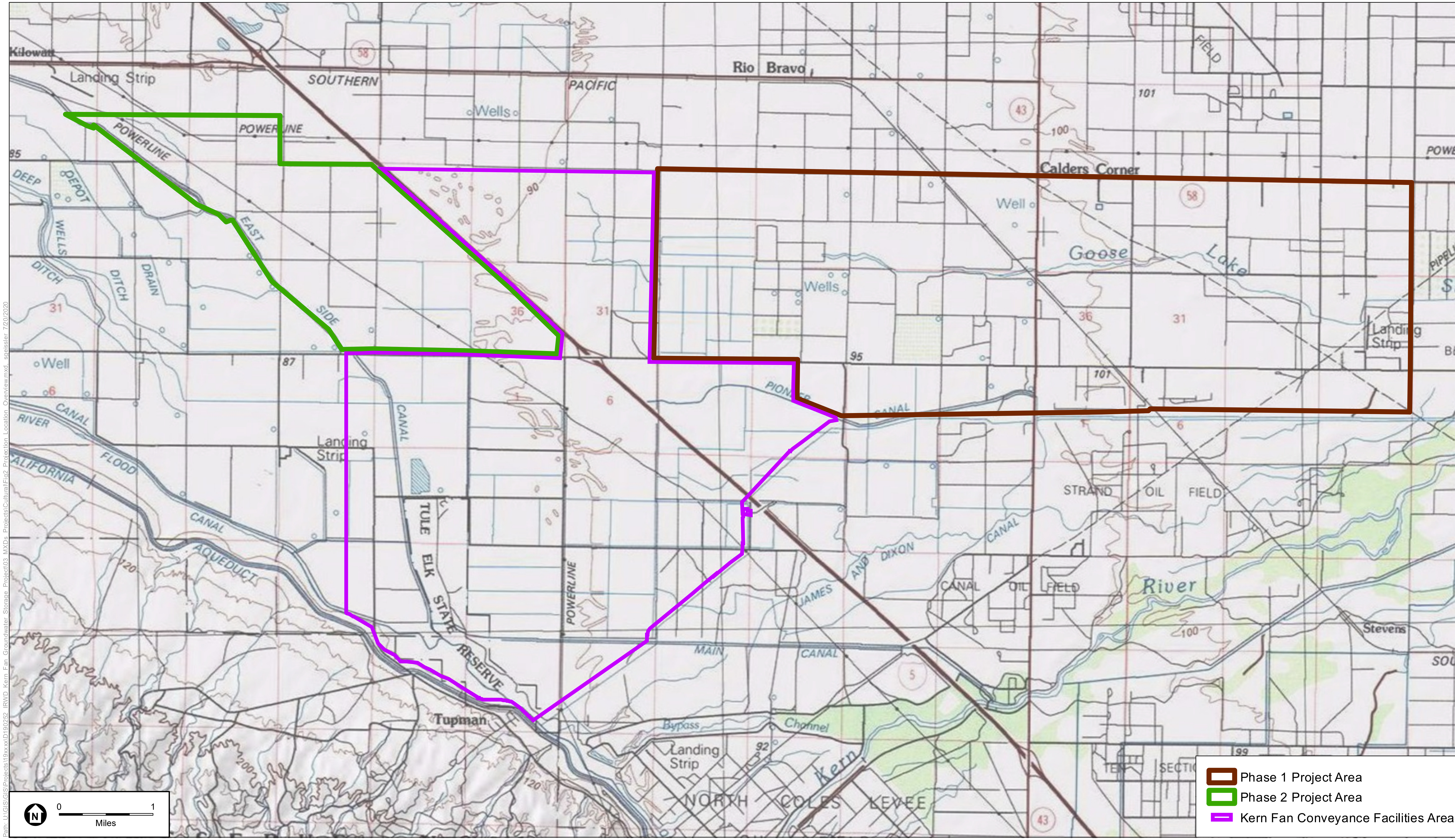


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA

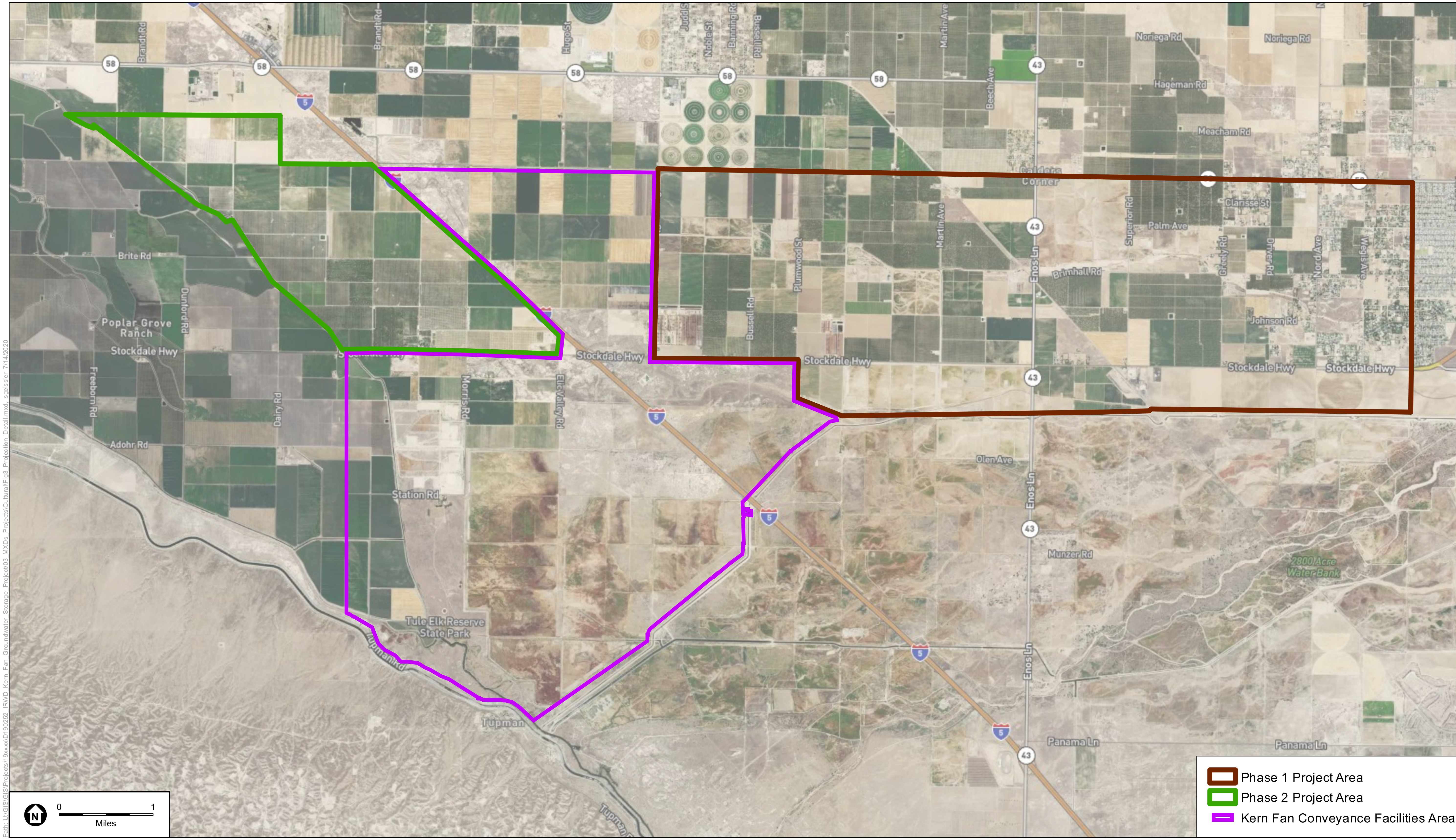


SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Kenneth Woodrow, Chairperson
Wuksache Indian Tribe/Eshom Valley Band
1179 Rock Haven Ct.
Salinas, CA 93906

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Chairperson Woodrow:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

The proposed project would allow Rosedale and IRWD to more effectively manage existing sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop water recharge and recovery facilities in the Kern Fan area of Kern County. The proposed project would recharge, store, recover and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and supply reliability benefits for agricultural, and municipal and industrial uses.

The proposed project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. In addition, the Kern Fan Conveyance Facilities would consist of pipelines, pump stations and a new turnout at the California Aqueduct to convey water between the recharge and recovery facilities and the California Aqueduct. The proposed project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the project area. Water could be conveyed to and from the Phase 1 and 2 properties through existing facilities and the proposed Kern Fan Conveyance Facilities connecting to the California Aqueduct. The proposed project would be located in western Kern County, west of the City of Bakersfield. Project facilities have yet to be sited, but would be located within the areas shown on the attached maps (Figures 1 through 3). There are three areas identified: Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area.

A cultural resources records search for the proposed project was conducted through the California Historical Resources Information System (CHRIS) Southern San Joaquin Valley Information Center (SSJVIC) on May 5, 2020. A total of five prehistoric or multicomponent resources have been recorded within the Phase I Project Area (four prehistoric isolates and one multicomponent archaeological site). No prehistoric resources have been recorded within the Phase II Project Area. A total of 38 prehistoric or multicomponent resources have been recorded within the Kern Fan Conveyance Facilities Area (29 prehistoric archaeological sites, two multicomponent archaeological sites, and seven prehistoric isolates).

A search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was conducted on May 6, 2020. The results were negative, indicating that the NAHC does not have any sacred sites or Native American cultural resources on file within the proposed project areas (Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area).

In an effort to address any potential impacts to archaeological or Native American resources, we are seeking comments and information from Native American representatives, and your name was supplied to us by the NAHC as a contact for this area. We would appreciate your comments identifying any sensitive sites in or near the proposed project areas that you may be aware of, any concerns or issues pertinent to the proposed project.

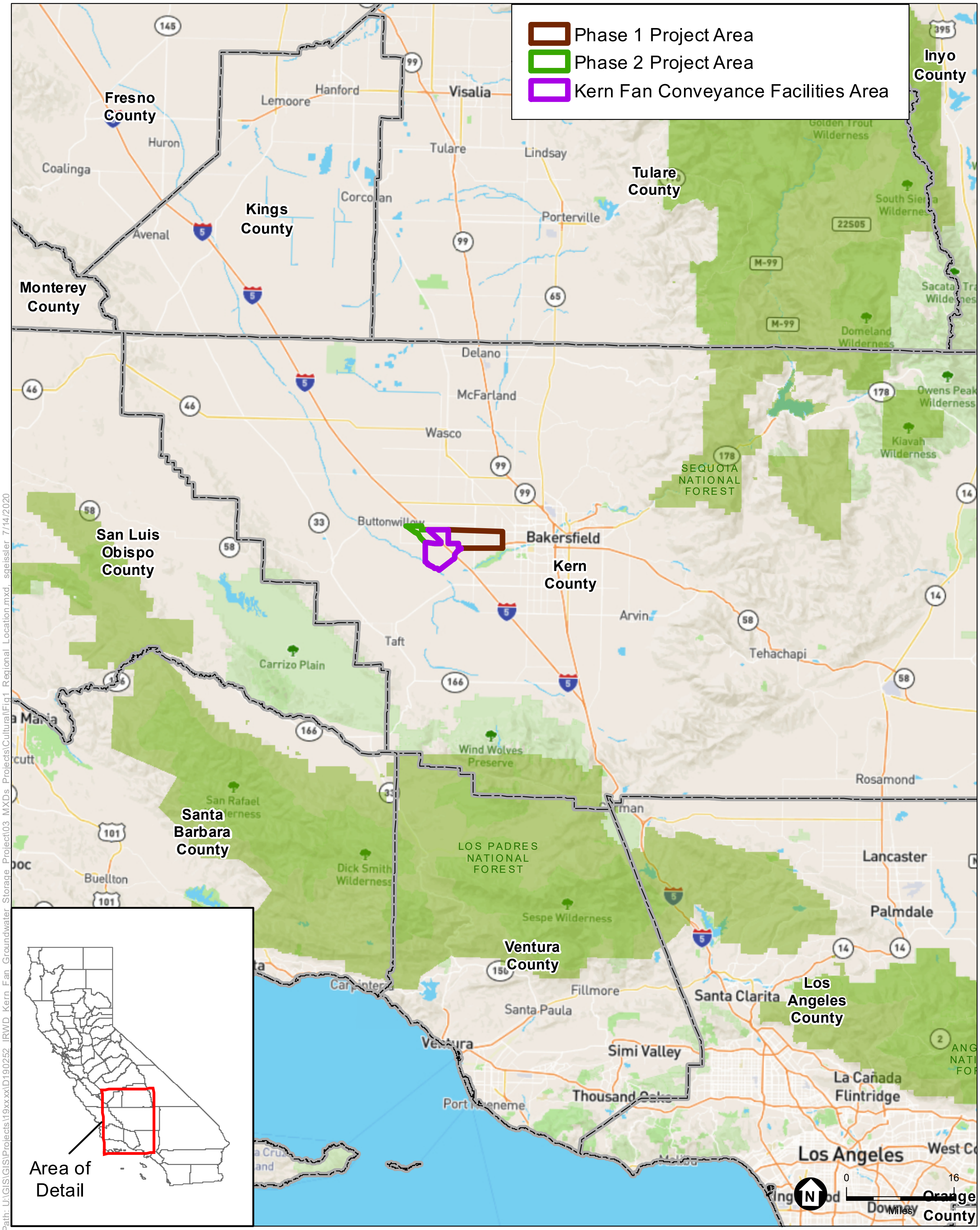
If you have any questions or comments, please contact me by phone at (831) 737-7438 or by email at cehringer@esassoc.com. We kindly request a response to this letter by July 24, 2020 to ensure that any concerns are adequately addressed in the EIR. Thank you for your cooperation on this matter.

Sincerely,

Candace Ehringer

Candace Ehringer
Cultural Resources Program Manager

Enclosures: Figure 1 – Regional Location
Figure 2 – Project Location
Figure 3 – Project Detail

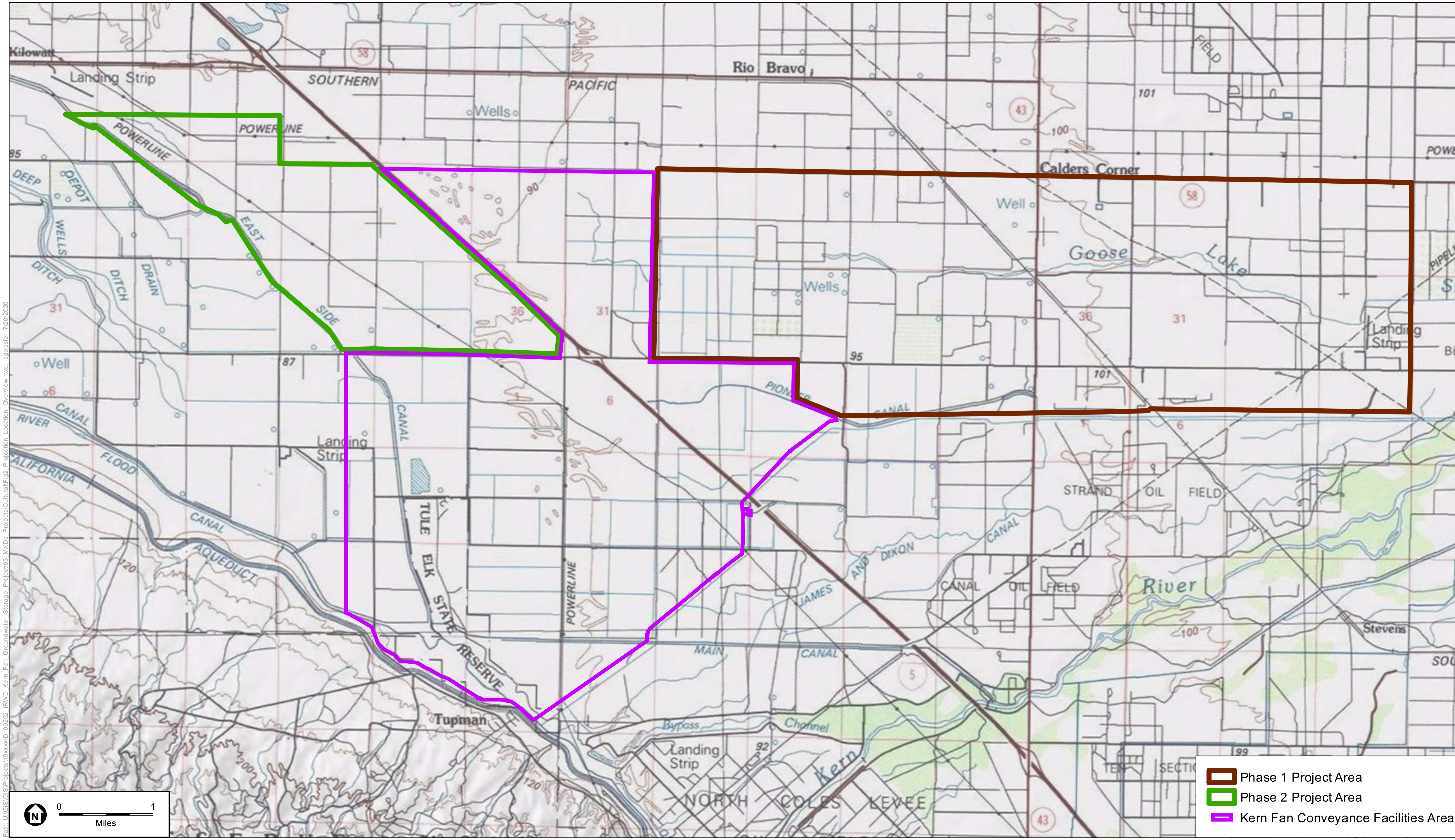


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA

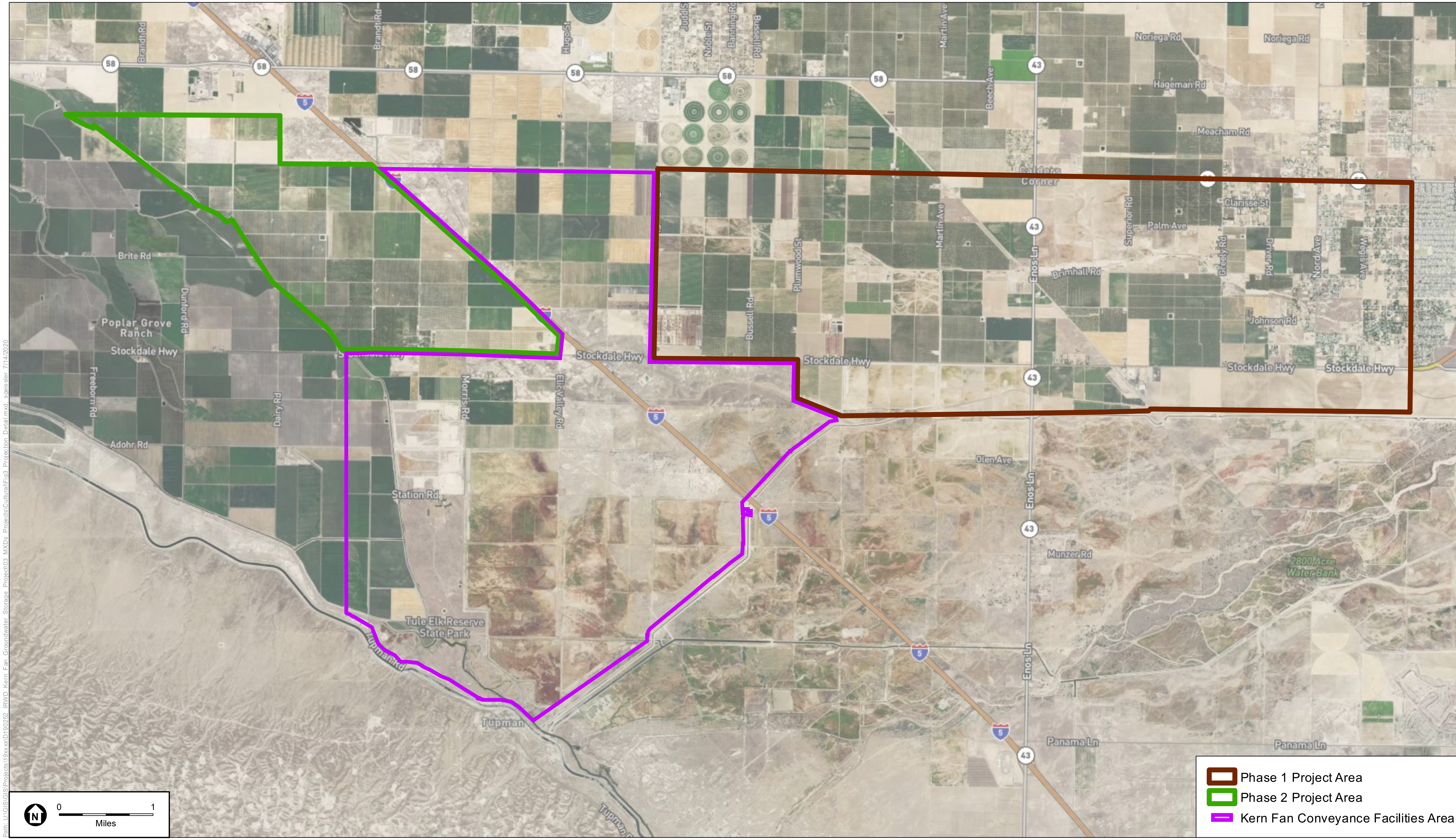


SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Delia Dominguez, Chairperson
Kitanemuk & Yowlumne Tejon Indians
115 Radio Street
Bakersfield, CA 93305

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Chairperson Dominguez:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

The proposed project would allow Rosedale and IRWD to more effectively manage existing sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop water recharge and recovery facilities in the Kern Fan area of Kern County. The proposed project would recharge, store, recover and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and supply reliability benefits for agricultural, and municipal and industrial uses.

The proposed project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. In addition, the Kern Fan Conveyance Facilities would consist of pipelines, pump stations and a new turnout at the California Aqueduct to convey water between the recharge and recovery facilities and the California Aqueduct. The proposed project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the project area. Water could be conveyed to and from the Phase 1 and 2 properties through existing facilities and the proposed Kern Fan Conveyance Facilities connecting to the California Aqueduct. The proposed project would be located in western Kern County, west of the City of Bakersfield. Project facilities have yet to be sited, but would be located within the areas shown on the attached maps (Figures 1 through 3). There are three areas identified: Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area.

A cultural resources records search for the proposed project was conducted through the California Historical Resources Information System (CHRIS) Southern San Joaquin Valley Information Center (SSJVIC) on May 5, 2020. A total of five prehistoric or multicomponent resources have been recorded within the Phase I Project Area (four prehistoric isolates and one multicomponent archaeological site). No prehistoric resources have been recorded within the Phase II Project Area. A total of 38 prehistoric or multicomponent resources have been recorded within the Kern Fan Conveyance Facilities Area (29 prehistoric archaeological sites, two multicomponent archaeological sites, and seven prehistoric isolates).

A search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was conducted on May 6, 2020. The results were negative, indicating that the NAHC does not have any sacred sites or Native American cultural resources on file within the proposed project areas (Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area).

In an effort to address any potential impacts to archaeological or Native American resources, we are seeking comments and information from Native American representatives, and your name was supplied to us by the NAHC as a contact for this area. We would appreciate your comments identifying any sensitive sites in or near the proposed project areas that you may be aware of, any concerns or issues pertinent to the proposed project.

If you have any questions or comments, please contact me by phone at (831) 737-7438 or by email at cehringer@esassoc.com. We kindly request a response to this letter by July 24, 2020 to ensure that any concerns are adequately addressed in the EIR. Thank you for your cooperation on this matter.

Sincerely,

Candace Ehringer

Candace Ehringer
Cultural Resources Program Manager

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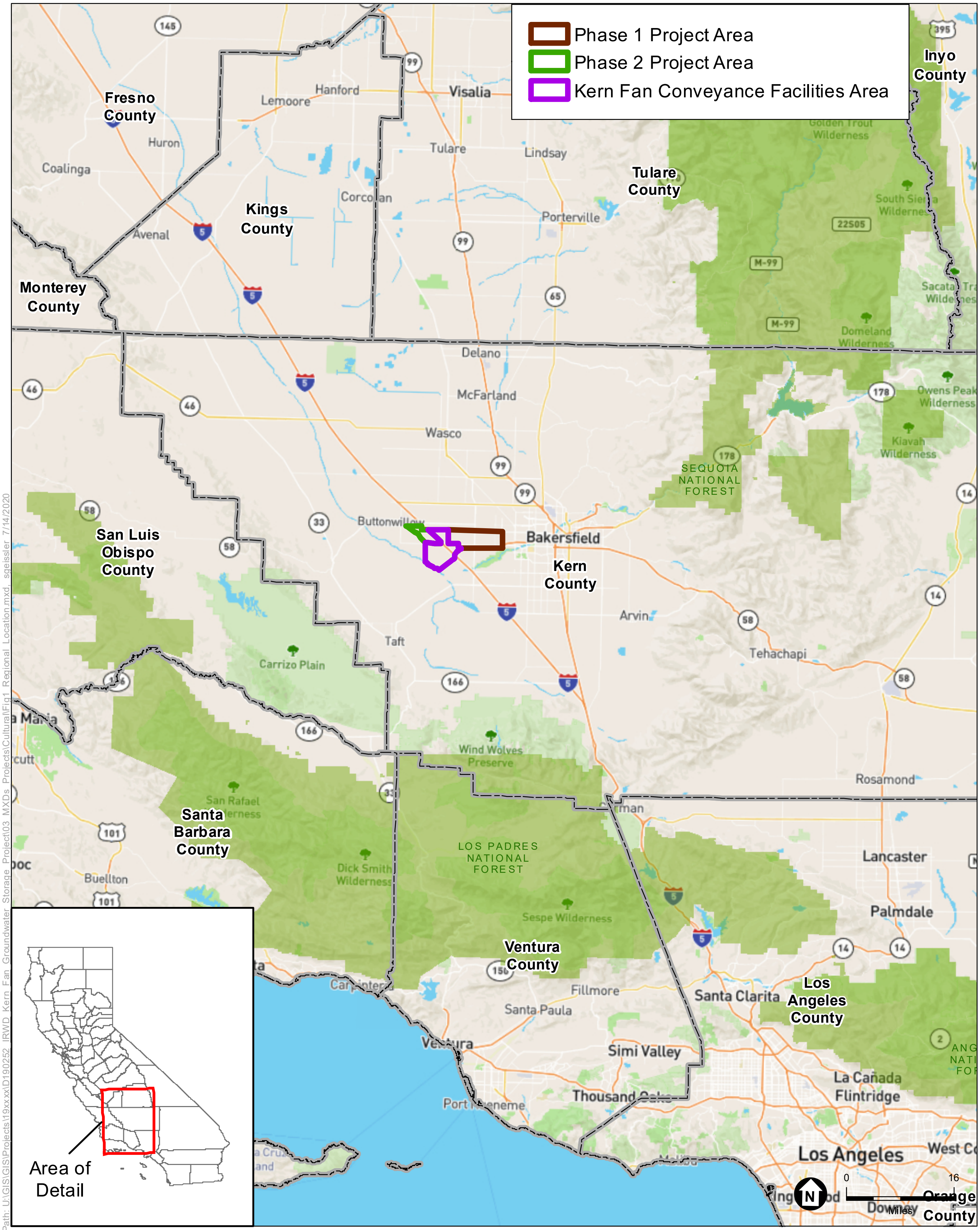
Figure 3 – Project Detail

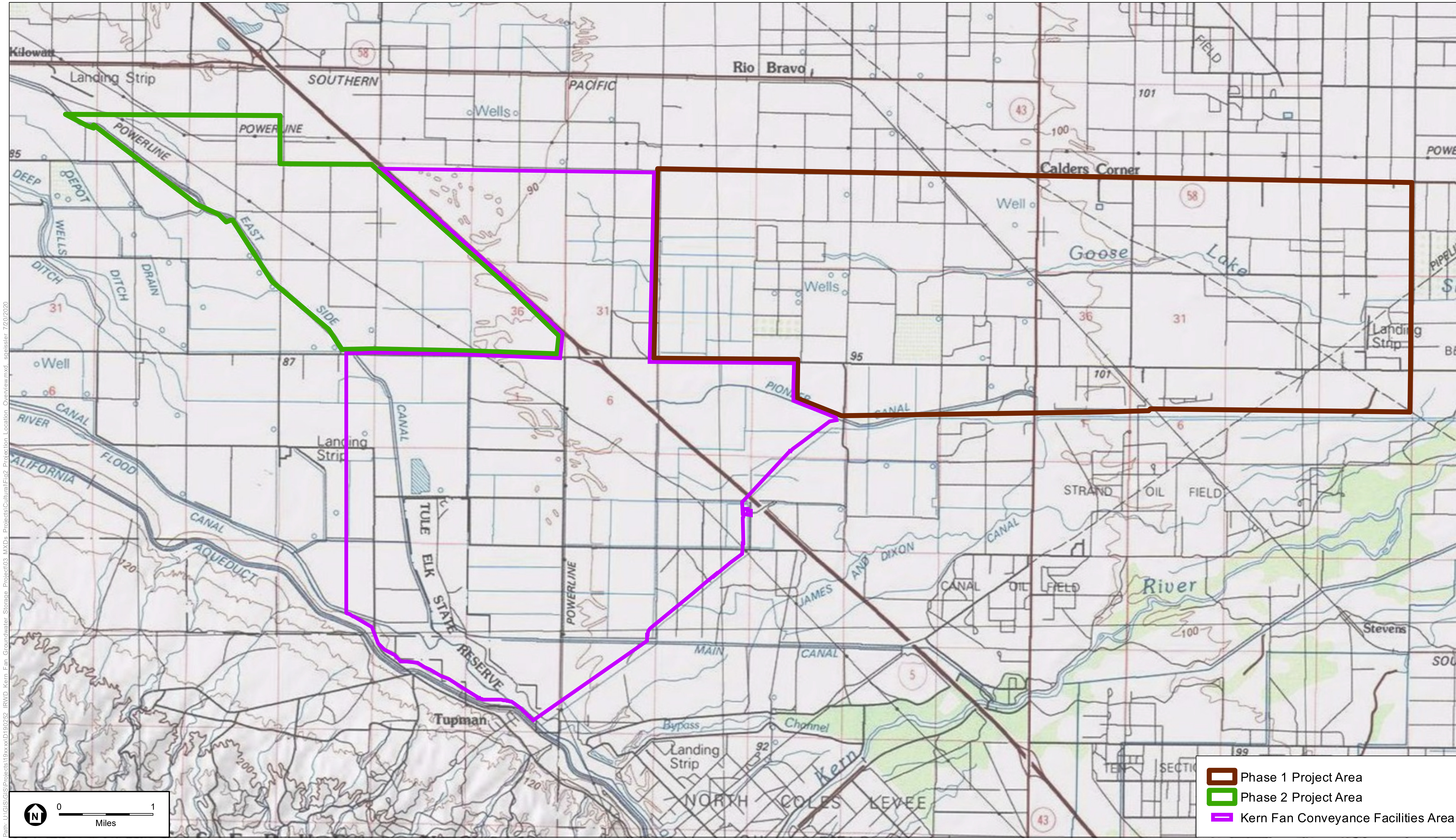


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA

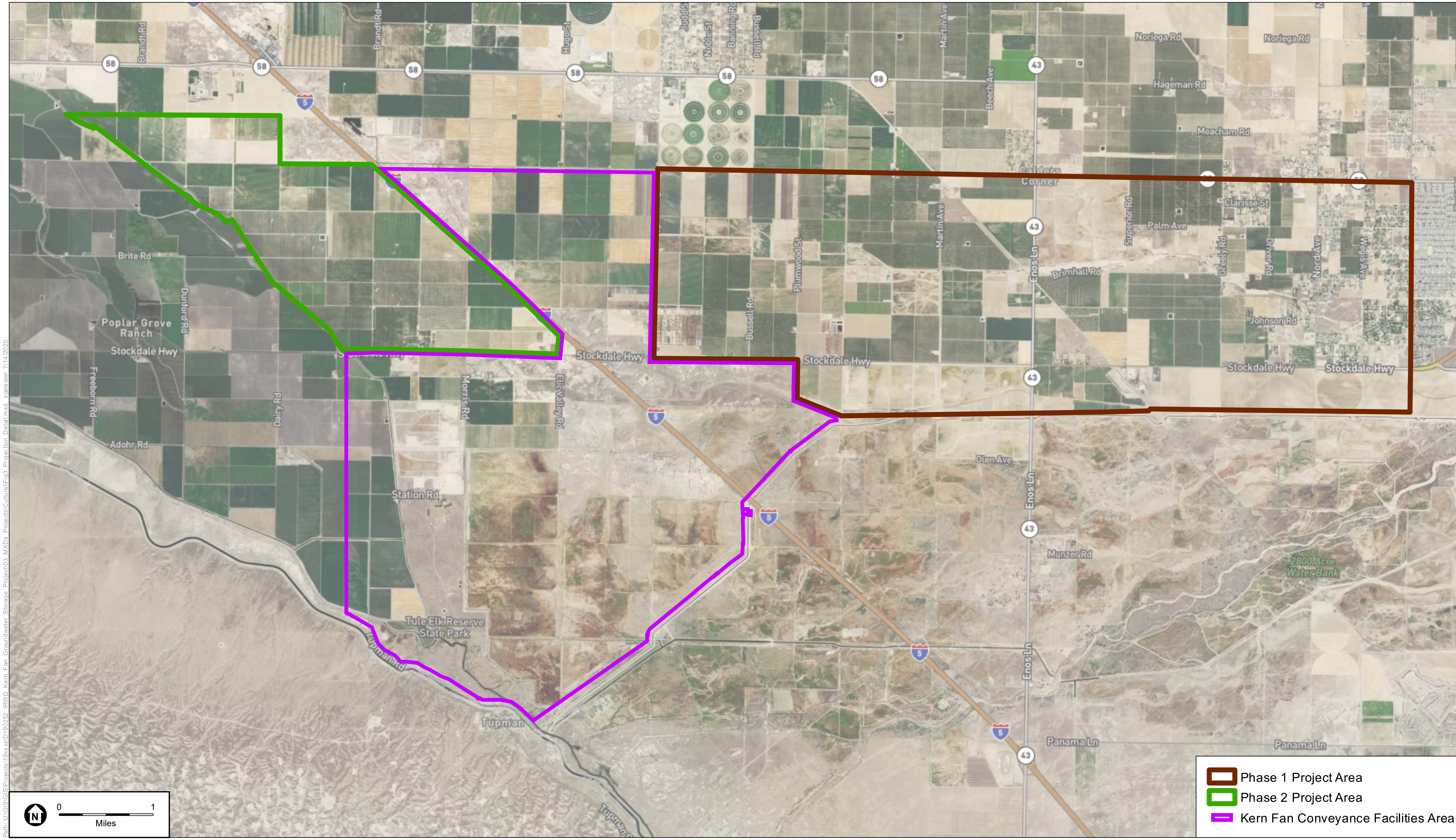


SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Octavio Escobedo III, Chairpeson
Tejon Indian Tribe
P.O. Box 640
Arvin, CA 93203

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Chairperson Escobedo:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

The proposed project would allow Rosedale and IRWD to more effectively manage existing sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop water recharge and recovery facilities in the Kern Fan area of Kern County. The proposed project would recharge, store, recover and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and supply reliability benefits for agricultural, and municipal and industrial uses.

The proposed project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. In addition, the Kern Fan Conveyance Facilities would consist of pipelines, pump stations and a new turnout at the California Aqueduct to convey water between the recharge and recovery facilities and the California Aqueduct. The proposed project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the project area. Water could be conveyed to and from the Phase 1 and 2 properties through existing facilities and the proposed Kern Fan Conveyance Facilities connecting to the California Aqueduct. The proposed project would be located in western Kern County, west of the City of Bakersfield. Project facilities have yet to be sited, but would be located within the areas shown on the attached maps (Figures 1 through 3). There are three areas identified: Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area.

A cultural resources records search for the proposed project was conducted through the California Historical Resources Information System (CHRIS) Southern San Joaquin Valley Information Center (SSJVIC) on May 5, 2020. A total of five prehistoric or multicomponent resources have been recorded within the Phase I Project Area (four prehistoric isolates and one multicomponent archaeological site). No prehistoric resources have been recorded within the Phase II Project Area. A total of 38 prehistoric or multicomponent resources have been recorded within the Kern Fan Conveyance Facilities Area (29 prehistoric archaeological sites, two multicomponent archaeological sites, and seven prehistoric isolates).

A search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was conducted on May 6, 2020. The results were negative, indicating that the NAHC does not have any sacred sites or Native American cultural resources on file within the proposed project areas (Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area).

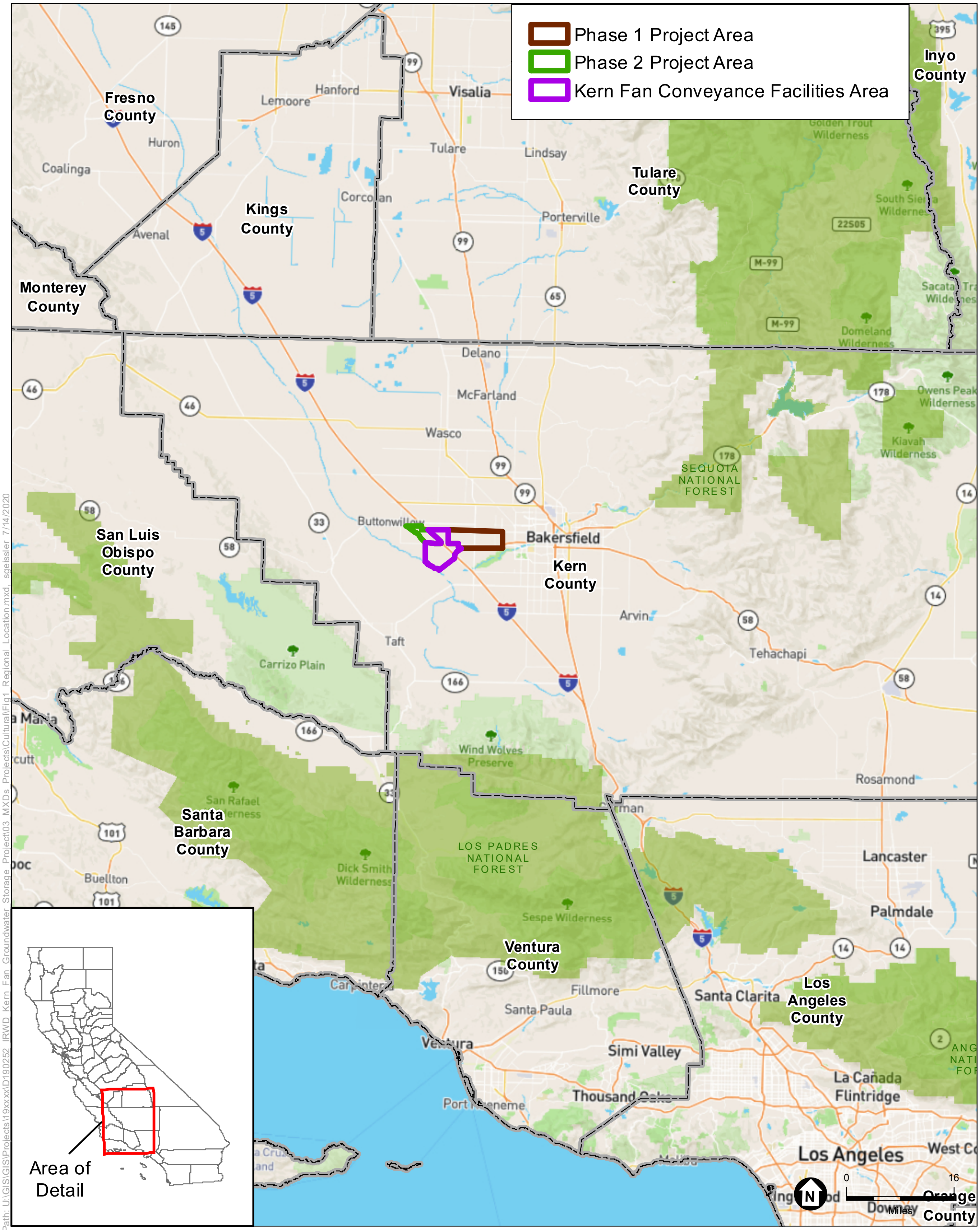
In an effort to address any potential impacts to archaeological or Native American resources, we are seeking comments and information from Native American representatives, and your name was supplied to us by the NAHC as a contact for this area. We would appreciate your comments identifying any sensitive sites in or near the proposed project areas that you may be aware of, any concerns or issues pertinent to the proposed project.

If you have any questions or comments, please contact me by phone at (831) 737-7438 or by email at cehringer@esassoc.com. We kindly request a response to this letter by July 24, 2020 to ensure that any concerns are adequately addressed in the EIR. Thank you for your cooperation on this matter.

Sincerely,

Candace Ehringer
Cultural Resources Program Manager

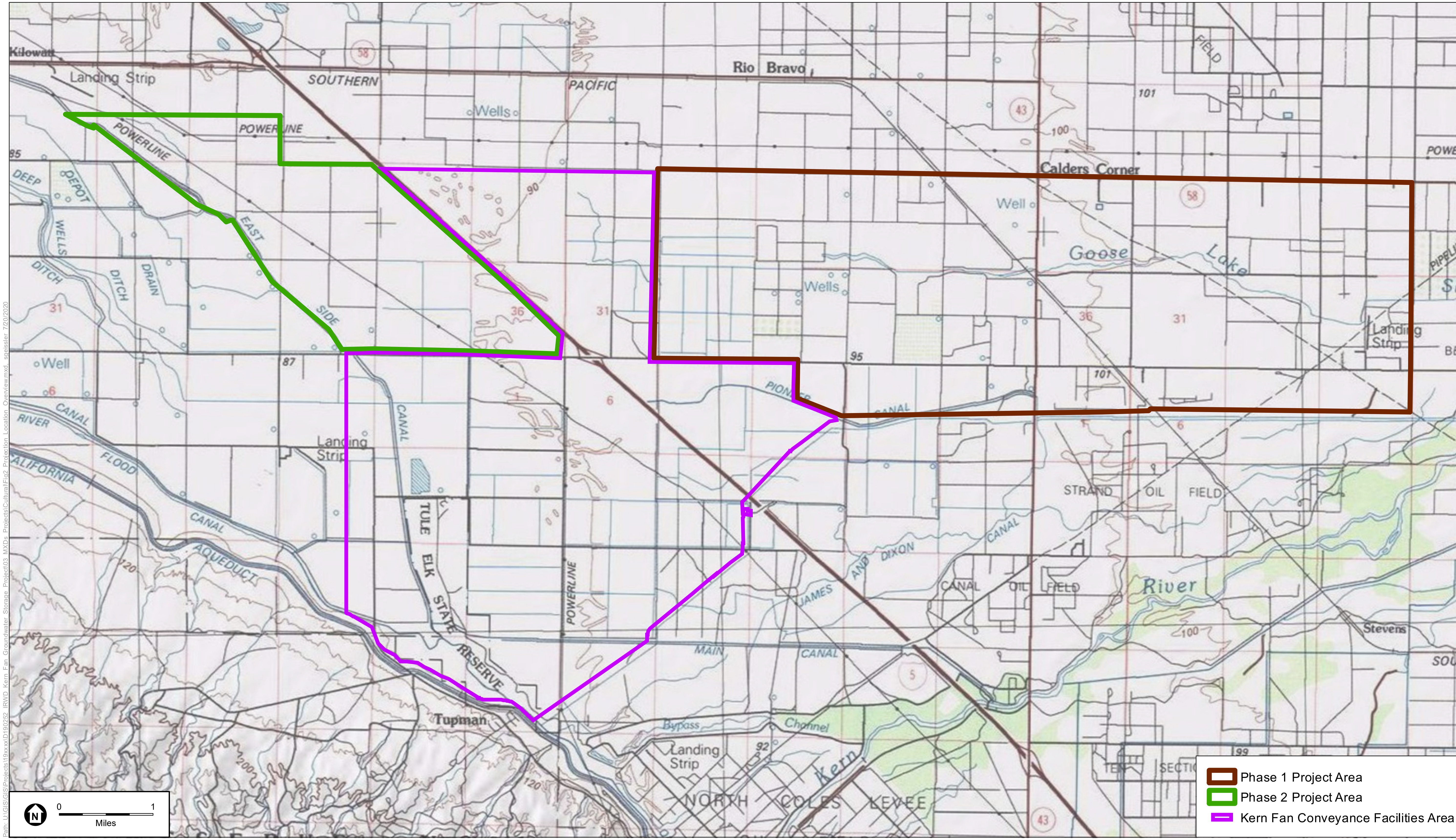
Enclosures: Figure 1 – Regional Location
Figure 2 – Project Location
Figure 3 – Project Detail



SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

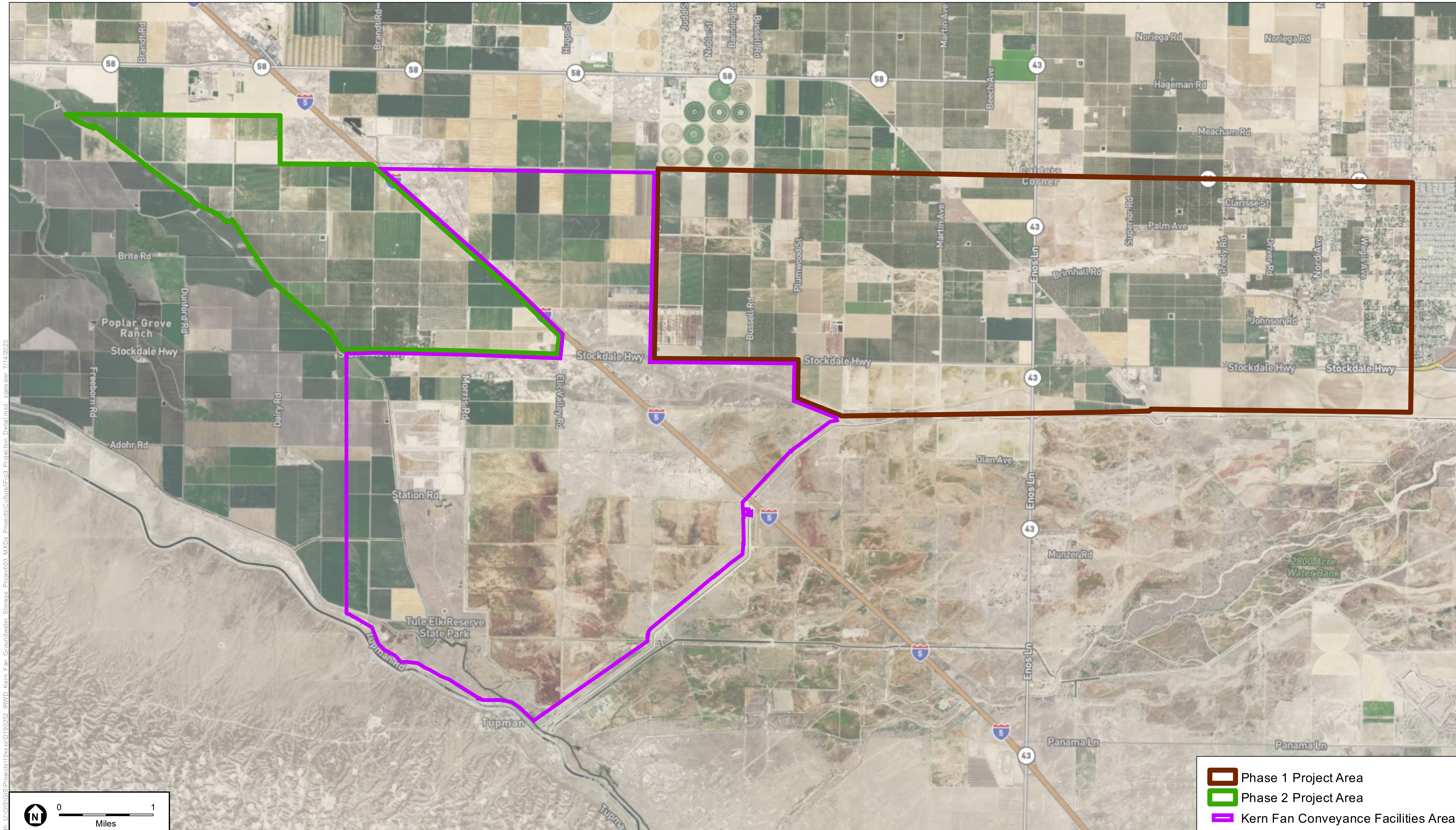


SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Robert L. Gomez, Jr., Tribal Chairperson
Tubatulabals of Kern Valley
P.O. Box 226
Lake Isabella, CA 93240

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Tribal Chairperson Gomez:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

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Candace Ehringer
Cultural Resources Program Manager

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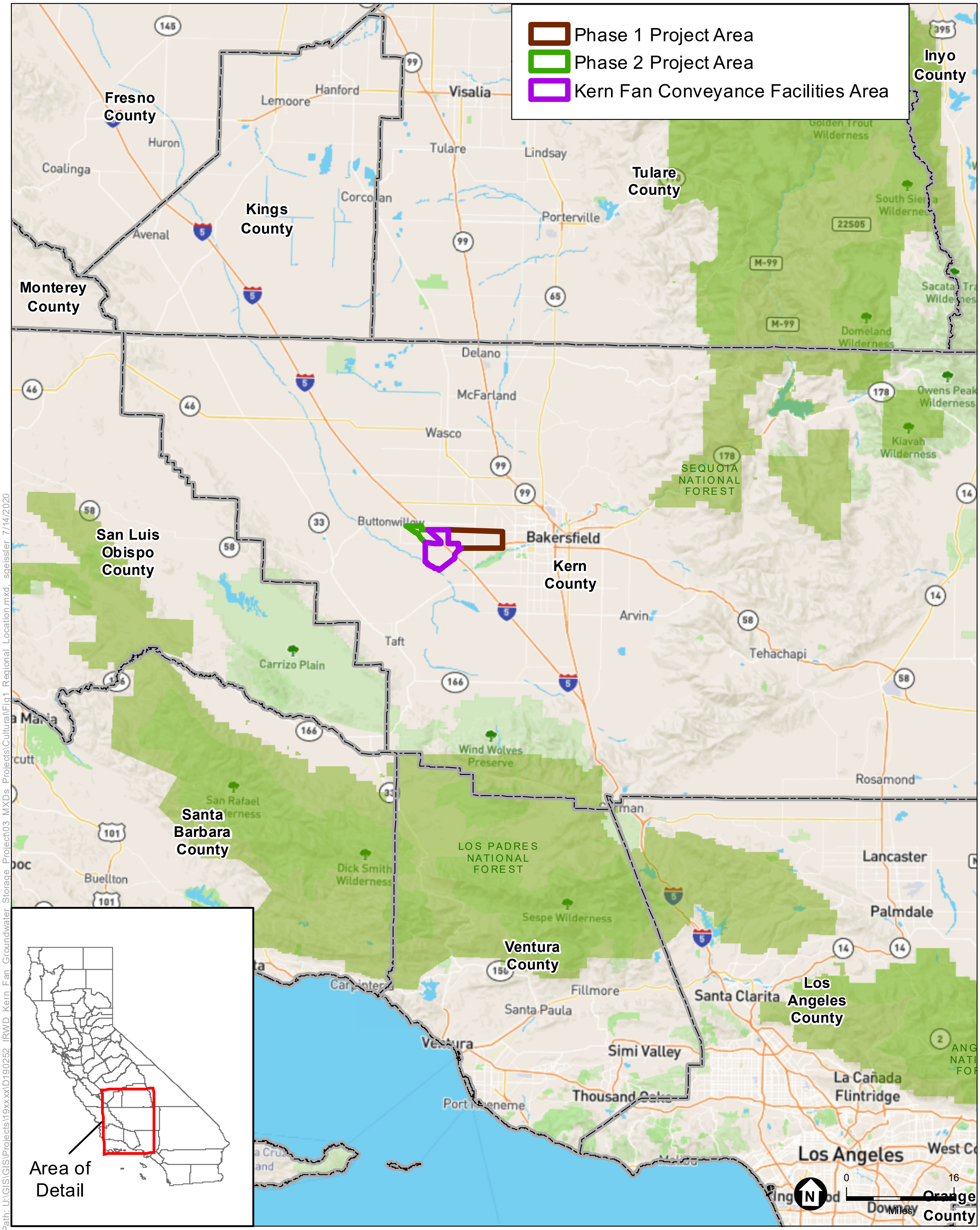
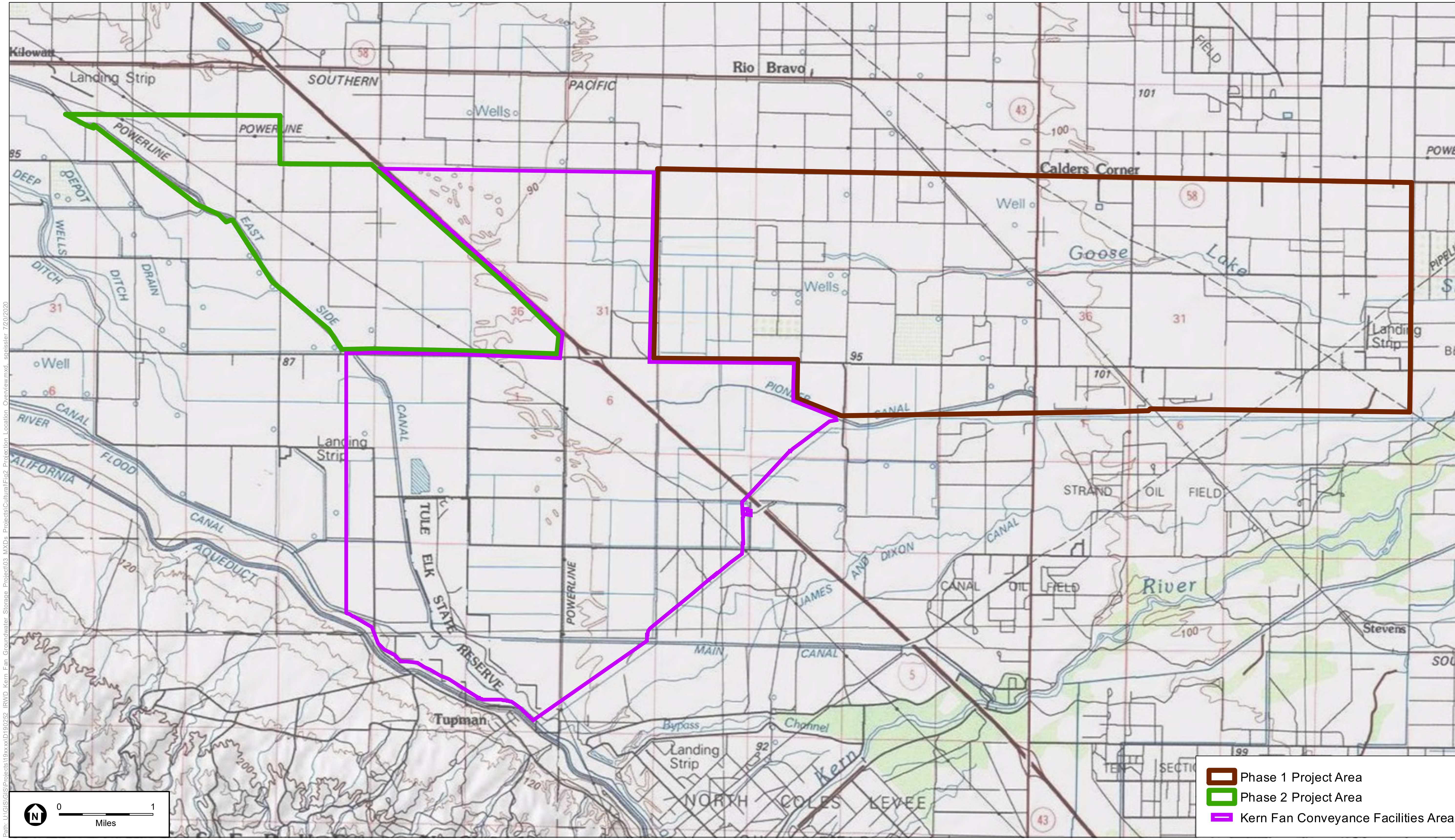


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA



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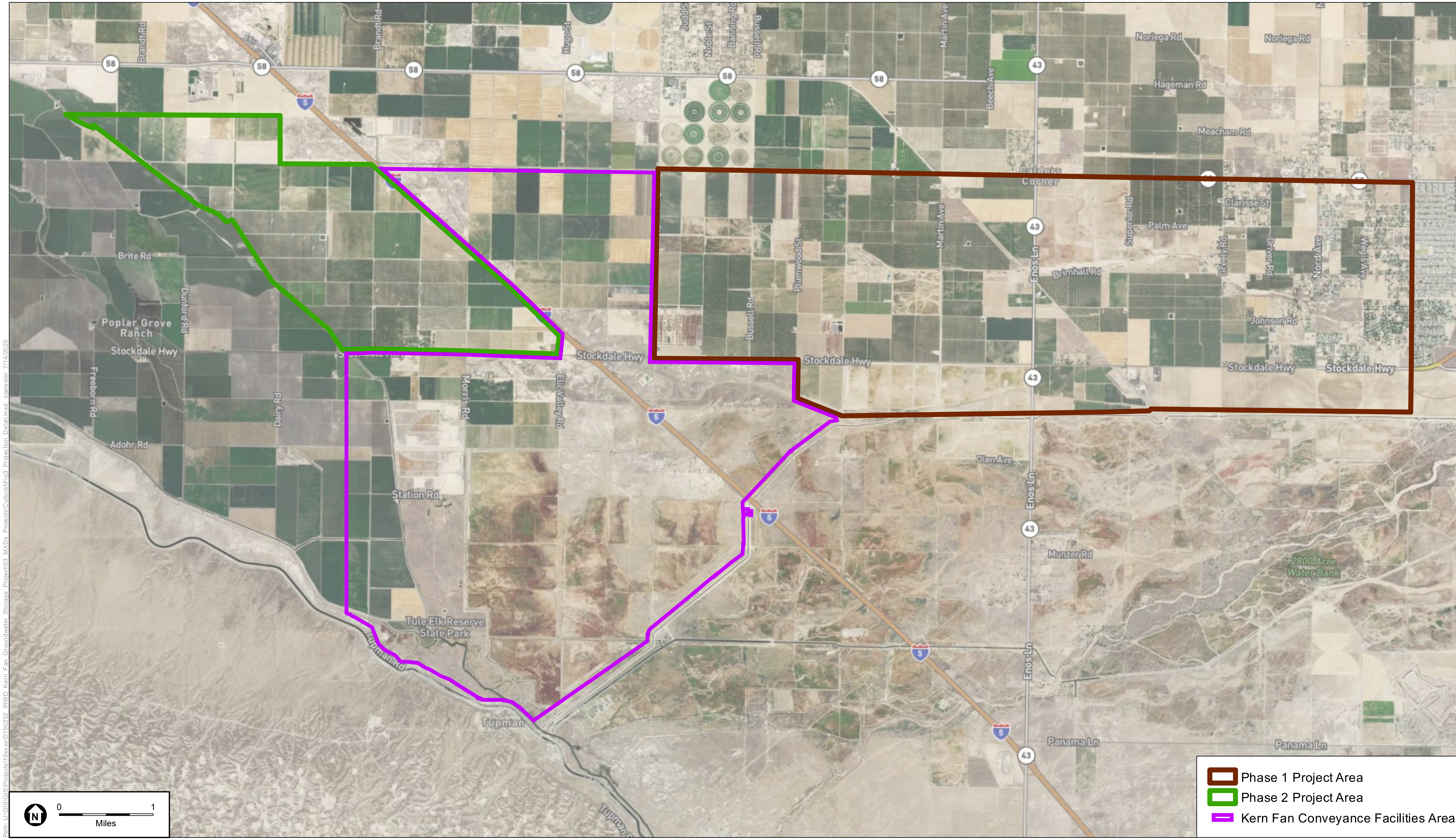
Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Danelle Gutierrez, Tribal Historic Preservation Officer
Big Pine Paiute Tribe of the Owens Valley
P.O. Box 700
Big Pine, CA 93513

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Ms. Gutierrez:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

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Candace Ehr

Candace Ehringer
Cultural Resources Program Manager

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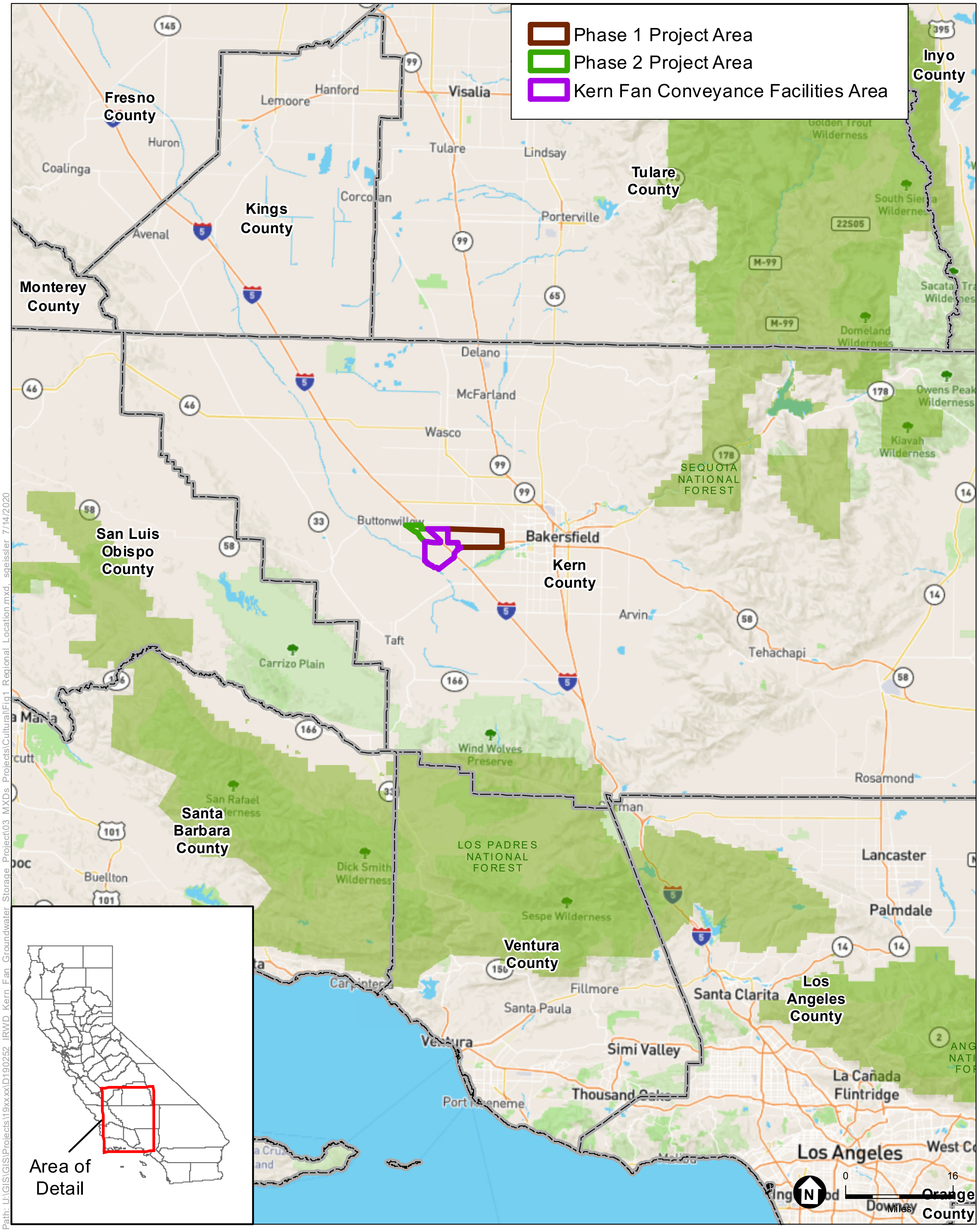
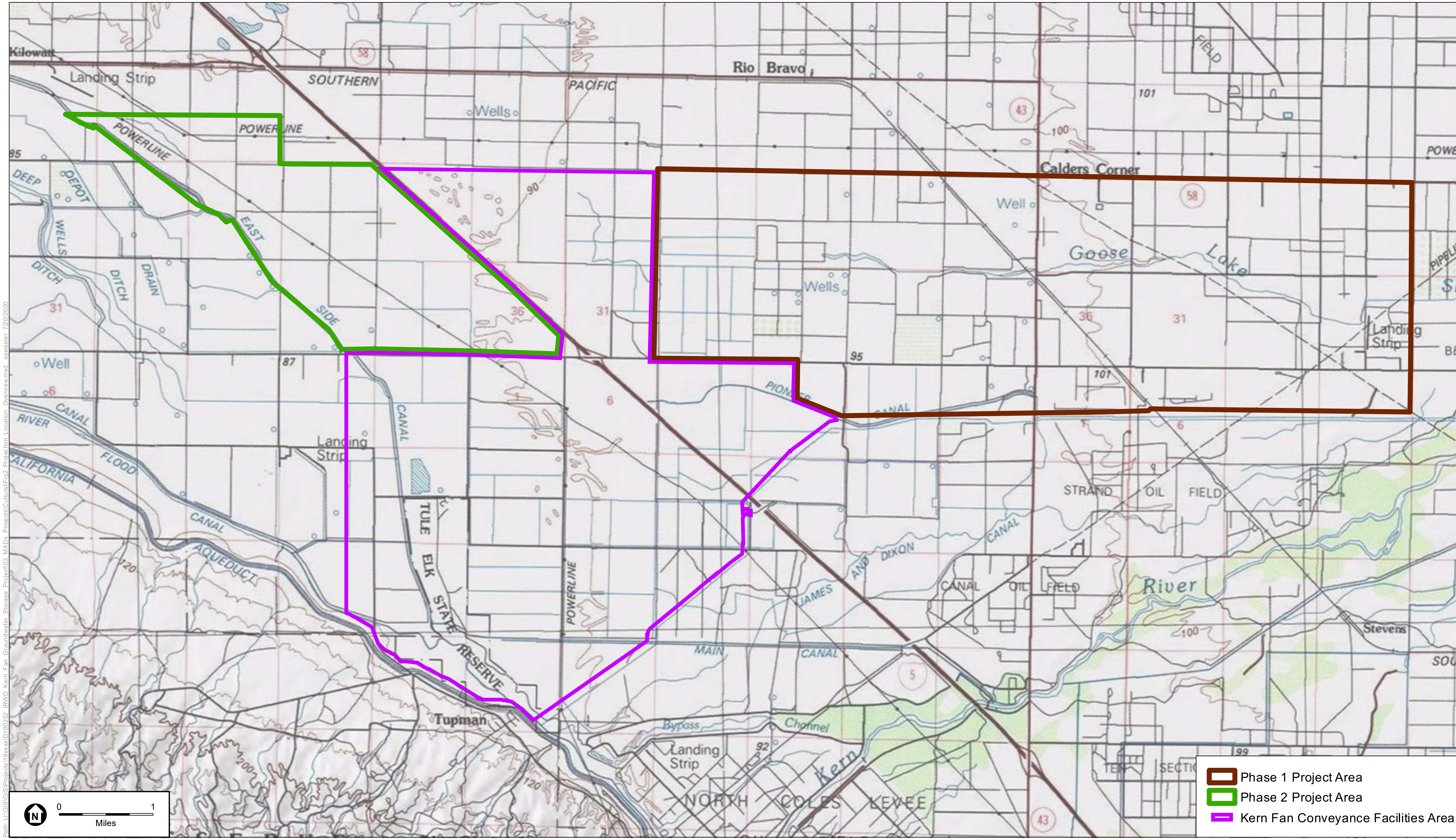


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA



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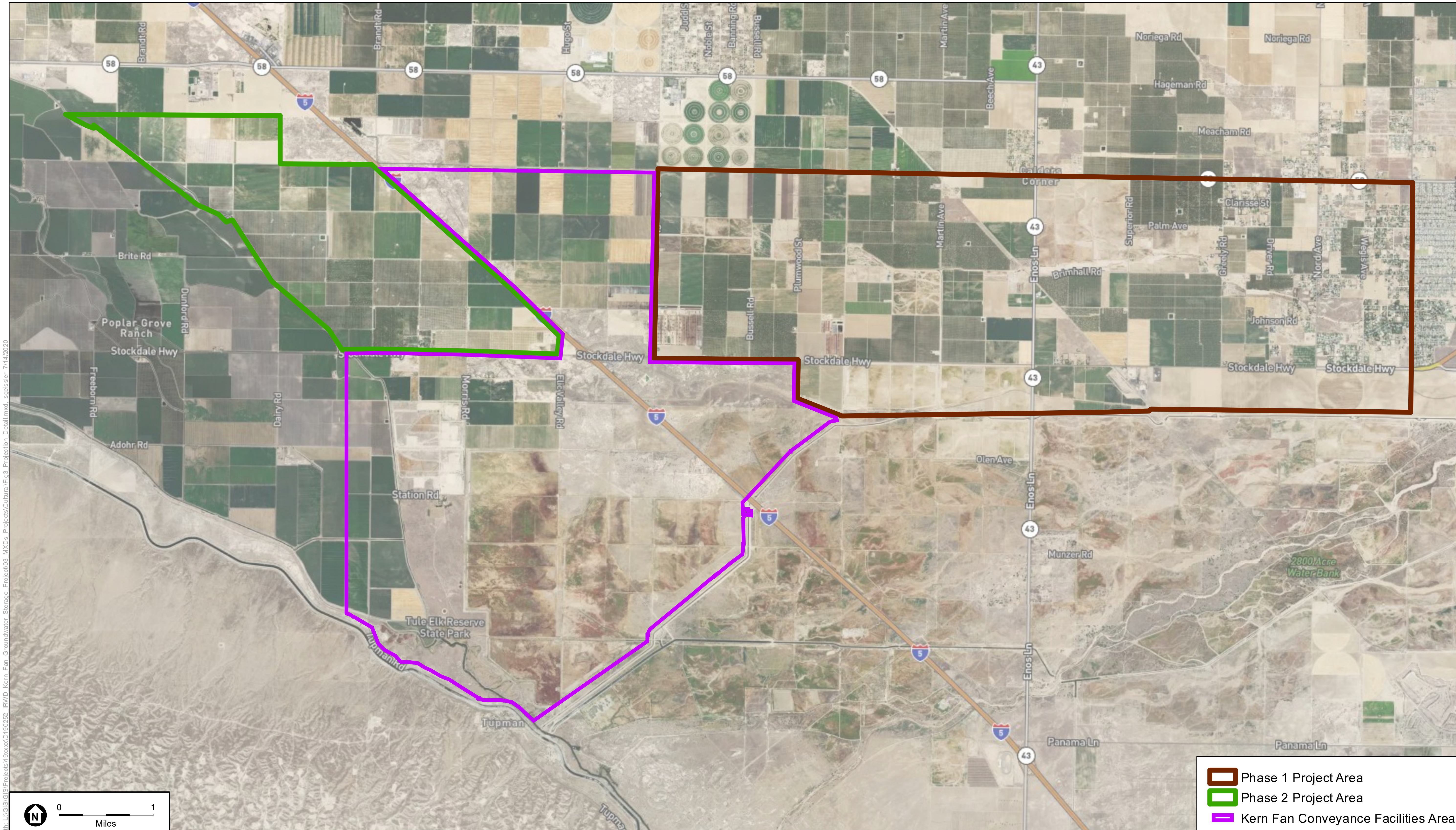
Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
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213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Brandy Kendricks
Kern Valley Indian Community
30741 Foxridge Court
Tehachapi, CA 93561

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Ms. Kendricks:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

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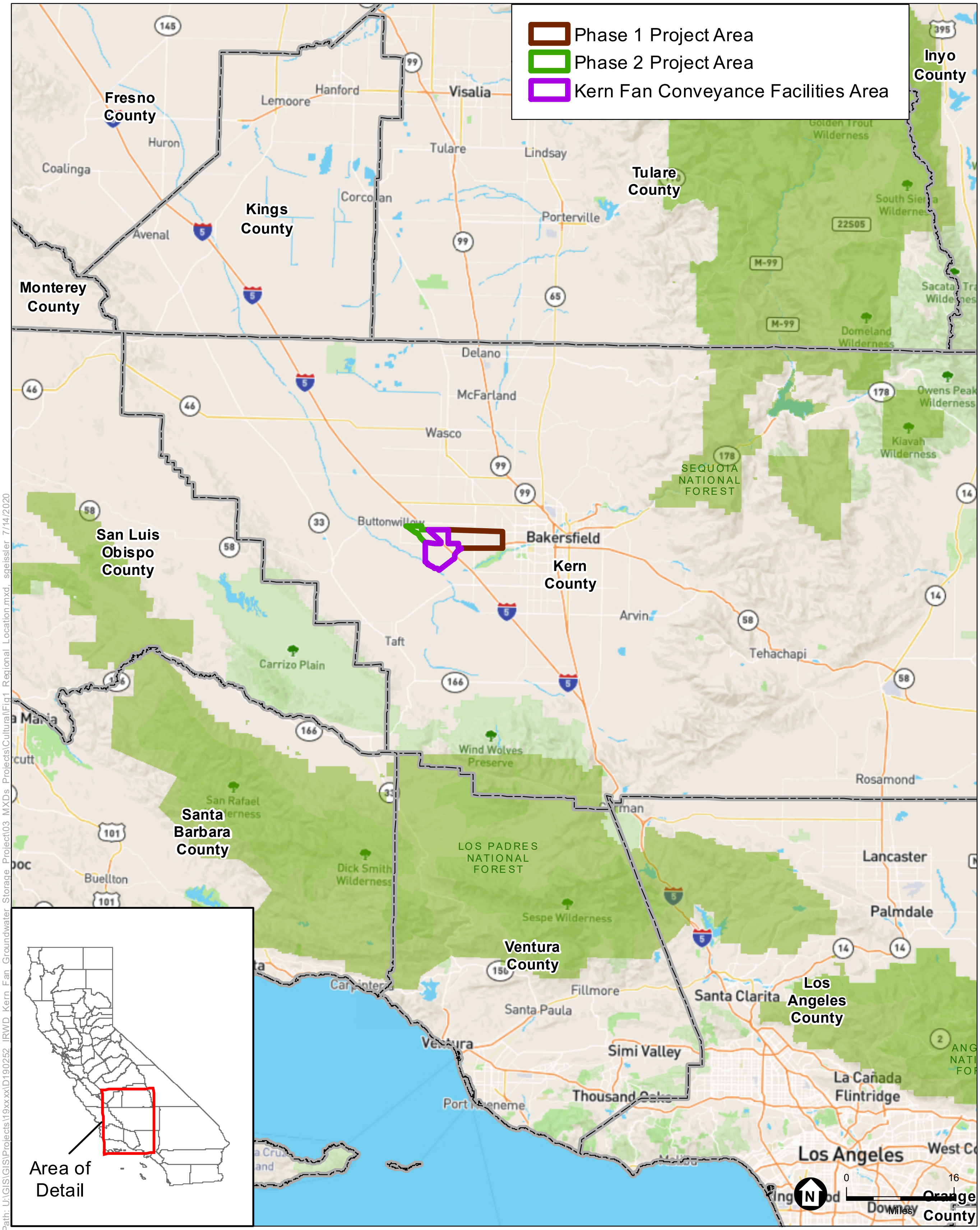
If you have any questions or comments, please contact me by phone at (831) 737-7438 or by email at cehringer@esassoc.com. We kindly request a response to this letter by July 24, 2020 to ensure that any concerns are adequately addressed in the EIR. Thank you for your cooperation on this matter.

Sincerely,

Candace Ehringer
Cultural Resources Program Manager

Enclosures: Figure 1 – Regional Location
Figure 2 – Project Location
Figure 3 – Project Detail

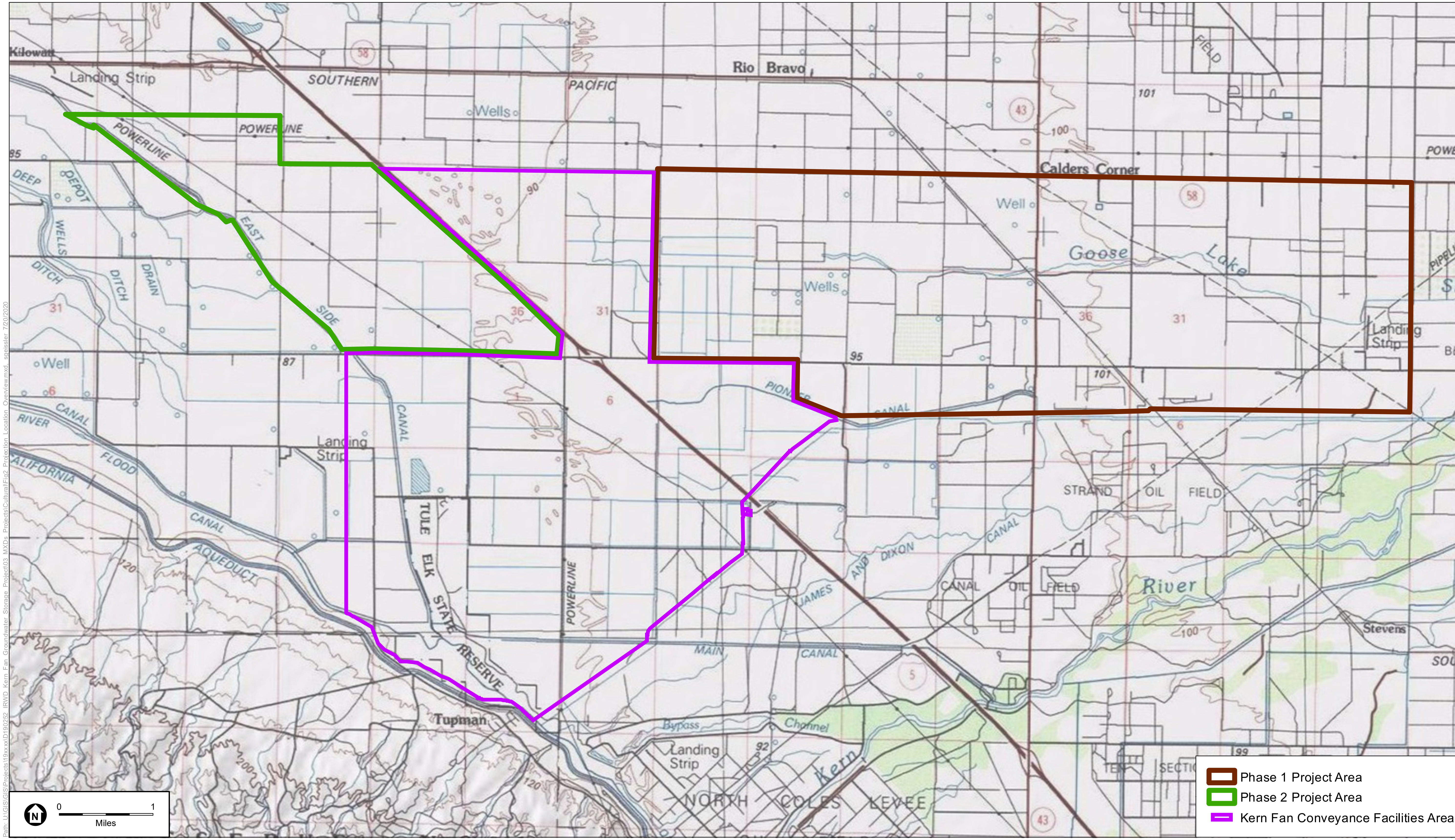


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

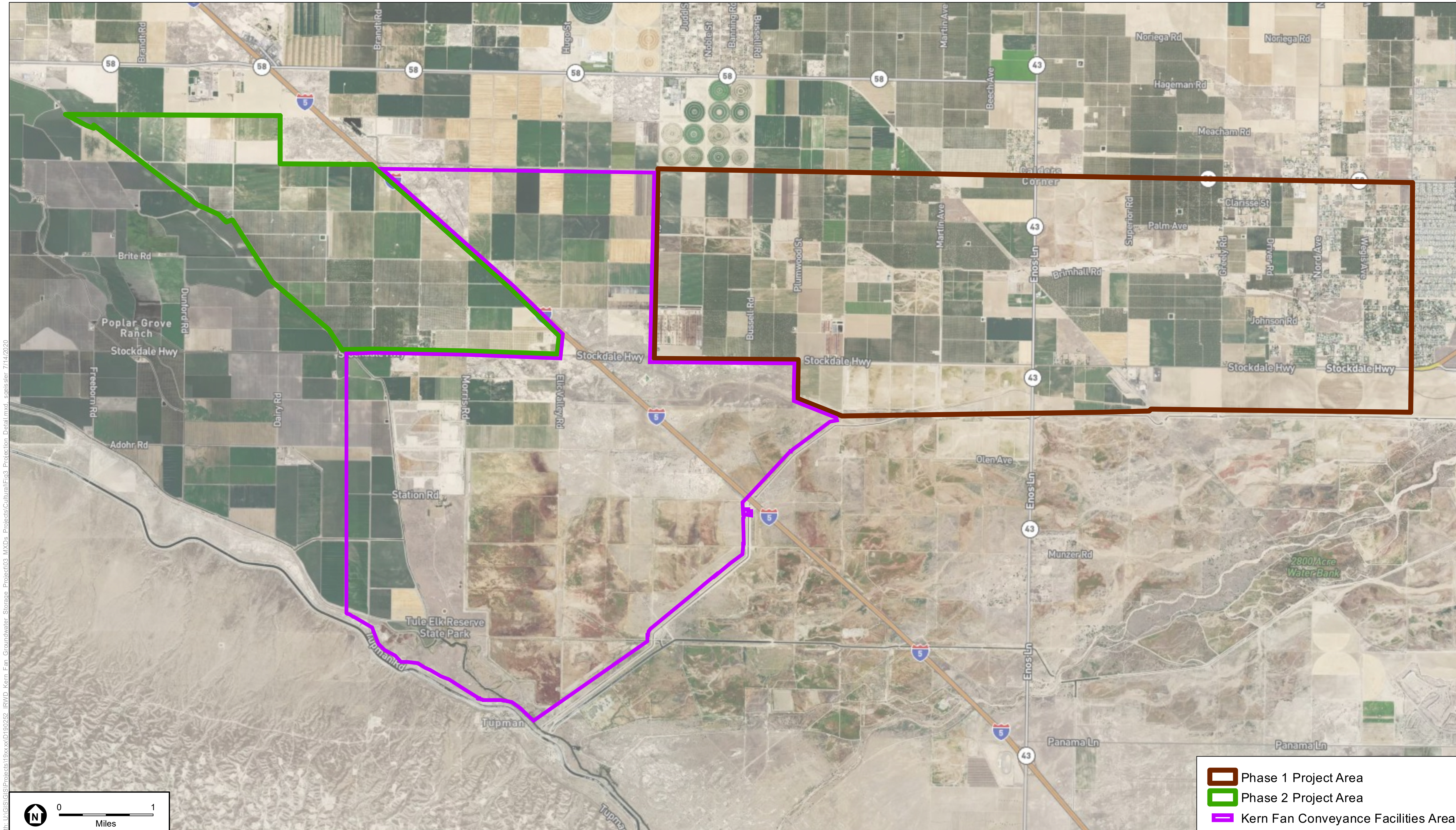
ESA



SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Sally Manning, Environmental Director
Big Pine Paiute Tribe of the Owens Valley
P.O. Box 700
Big Pine, CA 93513

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Ms. Manning:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

The proposed project would allow Rosedale and IRWD to more effectively manage existing sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop water recharge and recovery facilities in the Kern Fan area of Kern County. The proposed project would recharge, store, recover and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and supply reliability benefits for agricultural, and municipal and industrial uses.

The proposed project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. In addition, the Kern Fan Conveyance Facilities would consist of pipelines, pump stations and a new turnout at the California Aqueduct to convey water between the recharge and recovery facilities and the California Aqueduct. The proposed project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the project area. Water could be conveyed to and from the Phase 1 and 2 properties through existing facilities and the proposed Kern Fan Conveyance Facilities connecting to the California Aqueduct. The proposed project would be located in western Kern County, west of the City of Bakersfield. Project facilities have yet to be sited, but would be located within the areas shown on the attached maps (Figures 1 through 3). There are three areas identified: Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area.

A cultural resources records search for the proposed project was conducted through the California Historical Resources Information System (CHRIS) Southern San Joaquin Valley Information Center (SSJVIC) on May 5, 2020. A total of five prehistoric or multicomponent resources have been recorded within the Phase I Project Area (four prehistoric isolates and one multicomponent archaeological site). No prehistoric resources have been recorded within the Phase II Project Area. A total of 38 prehistoric or multicomponent resources have been recorded within the Kern Fan Conveyance Facilities Area (29 prehistoric archaeological sites, two multicomponent archaeological sites, and seven prehistoric isolates).

A search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was conducted on May 6, 2020. The results were negative, indicating that the NAHC does not have any sacred sites or Native American cultural resources on file within the proposed project areas (Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area).

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Candace Ehr

Candace Ehringer
Cultural Resources Program Manager

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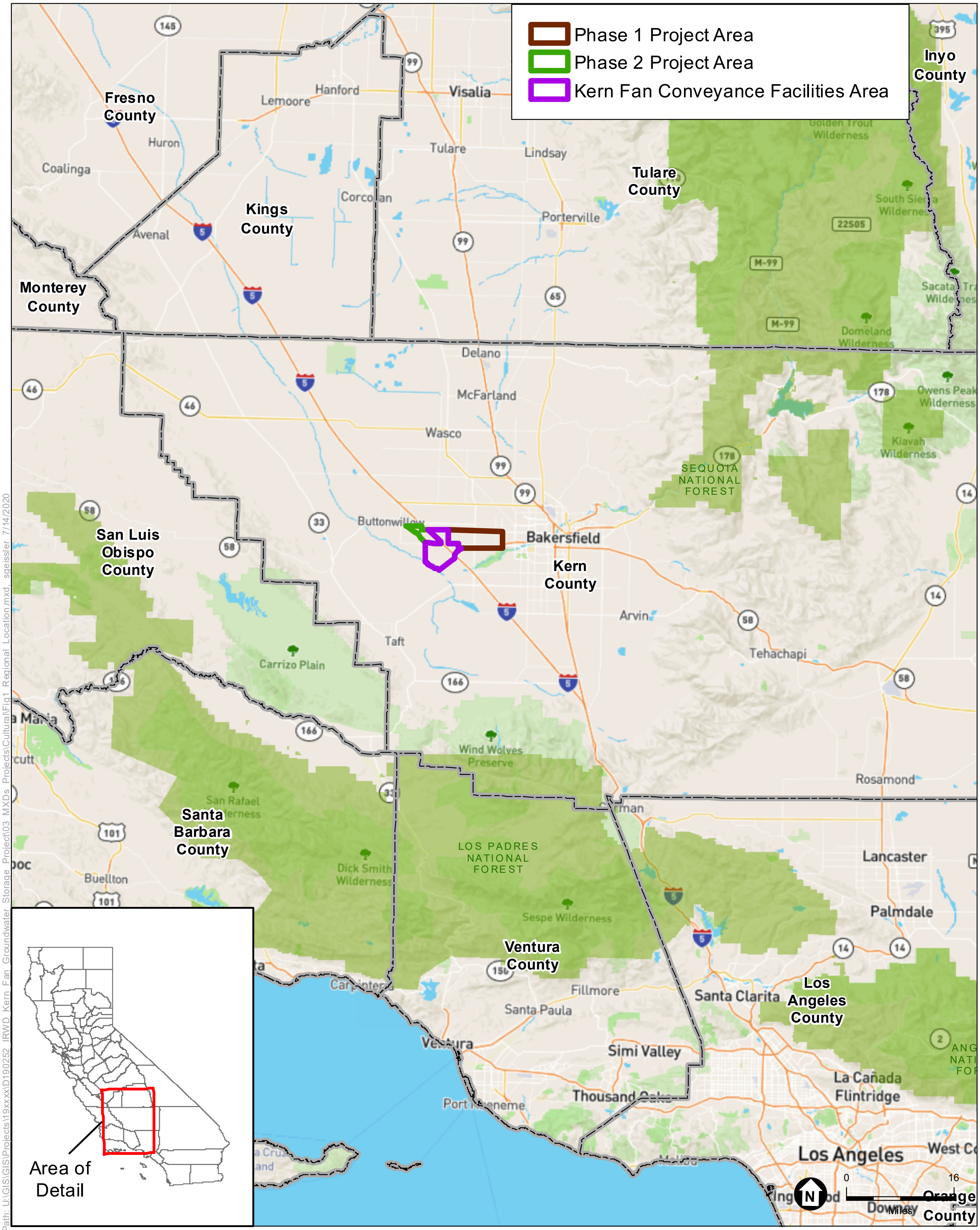
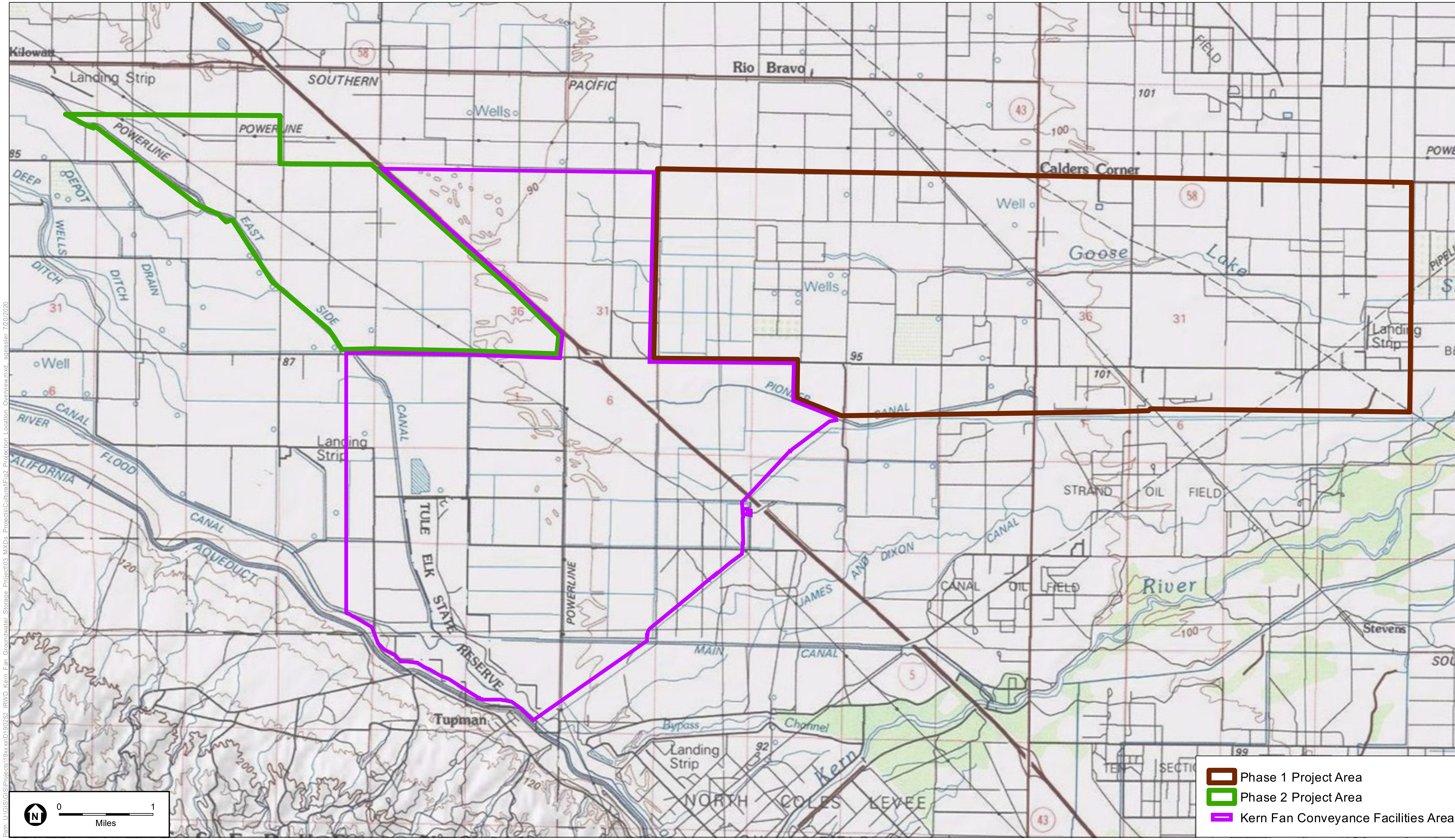


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA



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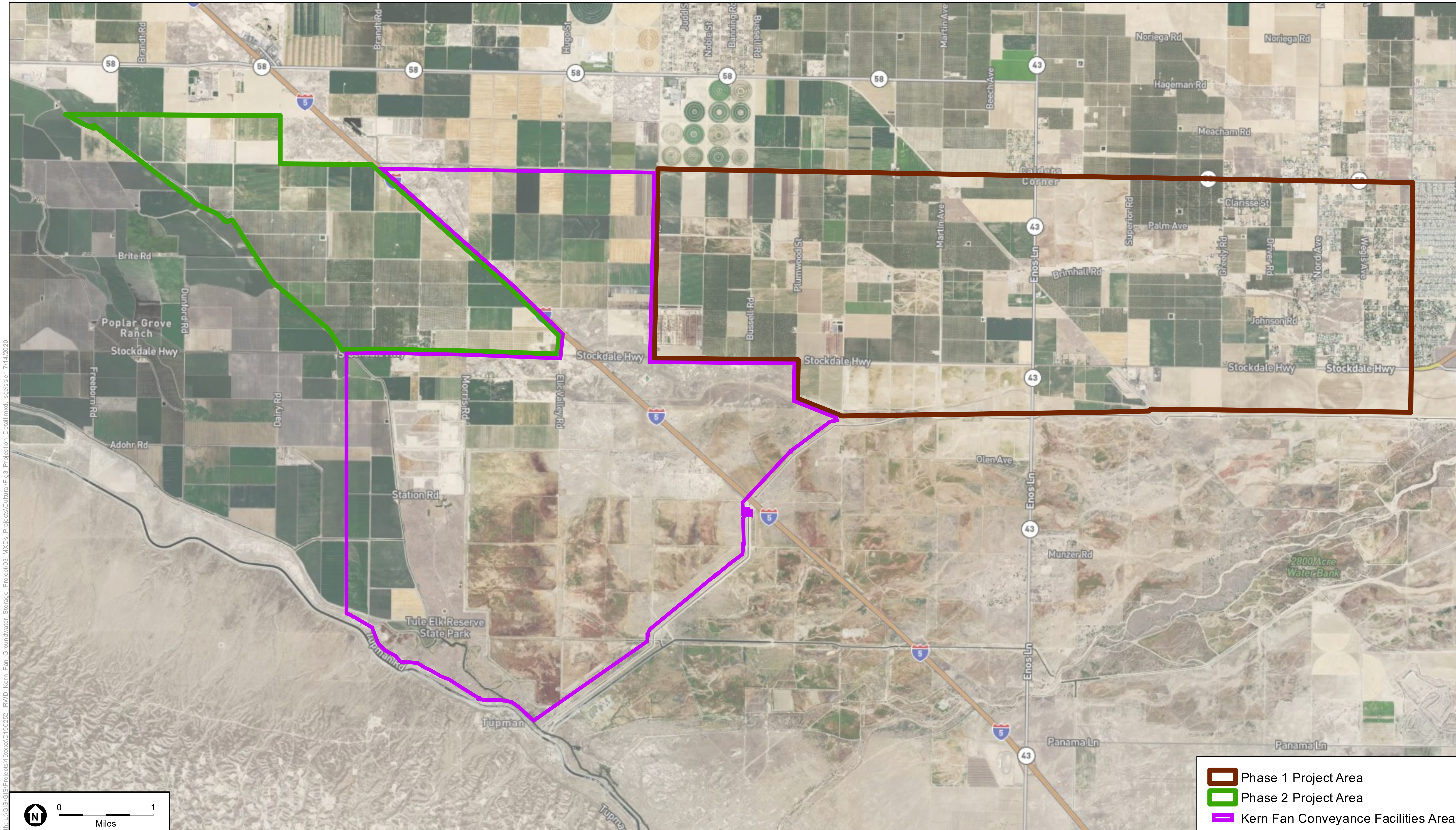
Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

July 23, 2020

Jessica Mauck, Director-CRM Department
San Manuel Band of Mission Indians
26569 Community Center Drive
Highland, CA 92346

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Ms. Mauck:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

The proposed project would allow Rosedale and IRWD to more effectively manage existing sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop water recharge and recovery facilities in the Kern Fan area of Kern County. The proposed project would recharge, store, recover and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and supply reliability benefits for agricultural, and municipal and industrial uses.

The proposed project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. In addition, the Kern Fan Conveyance Facilities would consist of pipelines, pump stations and a new turnout at the California Aqueduct to convey water between the recharge and recovery facilities and the California Aqueduct. The proposed project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the project area. Water could be conveyed to and from the Phase 1 and 2 properties through existing facilities and the proposed Kern Fan Conveyance Facilities connecting to the California Aqueduct. The proposed project would be located in western Kern County, west of the City of Bakersfield. Project facilities have yet to be sited, but would be located within the areas shown on the attached maps (Figures 1 through 3). There are three areas identified: Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area.

A cultural resources records search for the proposed project was conducted through the California Historical Resources Information System (CHRIS) Southern San Joaquin Valley Information Center (SSJVIC) on May 5, 2020. A total of five prehistoric or multicomponent resources have been recorded within the Phase I Project Area (four prehistoric isolates and one multicomponent archaeological site). No prehistoric resources have been recorded within the Phase II Project Area. A total of 38 prehistoric or multicomponent resources have been recorded within the Kern Fan Conveyance Facilities Area (29 prehistoric archaeological sites, two multicomponent archaeological sites, and seven prehistoric isolates).

A search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was conducted on May 6, 2020. The results were negative, indicating that the NAHC does not have any sacred sites or Native American cultural resources on file within the proposed project areas (Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area).

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Sincerely,

Candace Ehr

Candace Ehringer
Cultural Resources Program Manager

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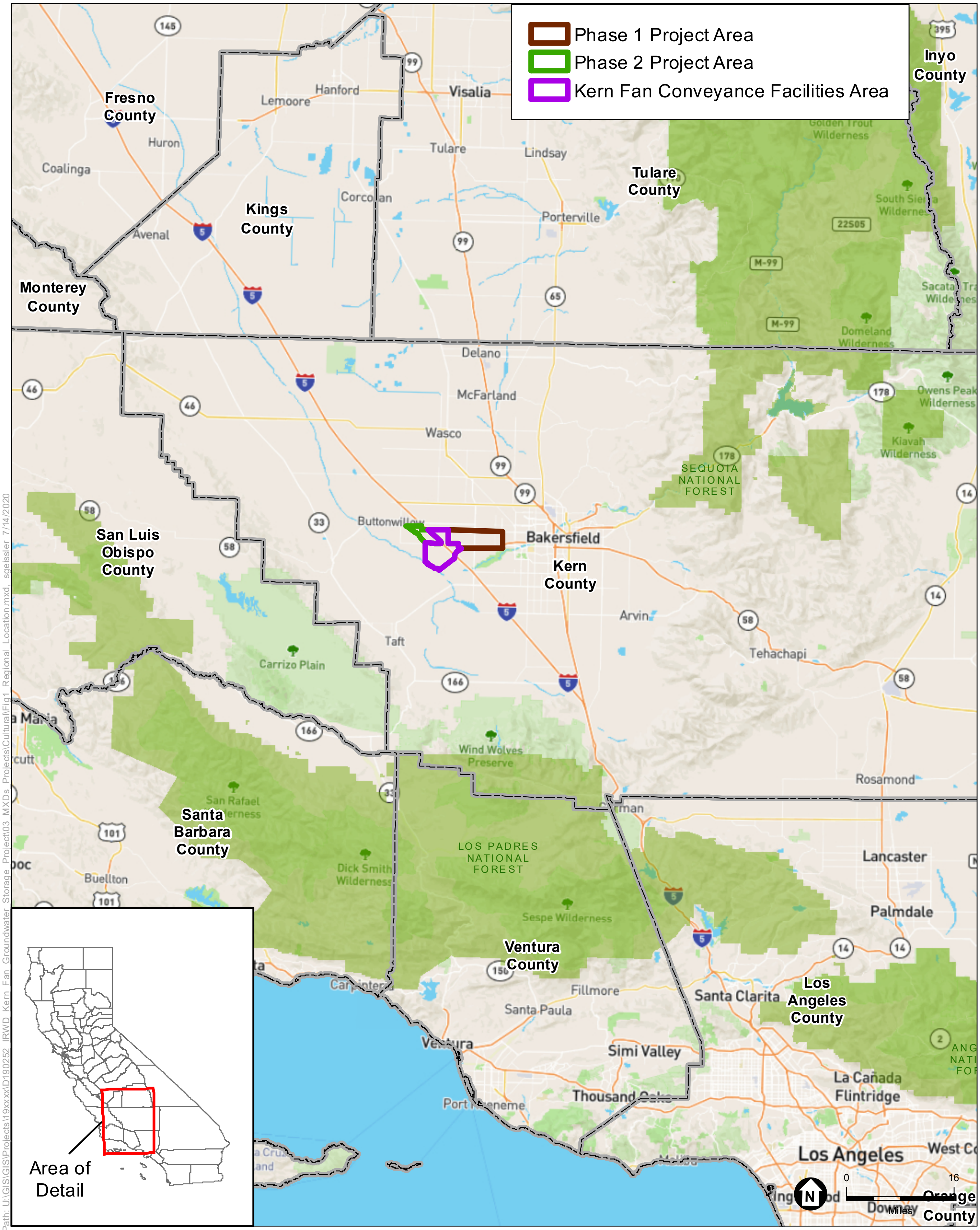
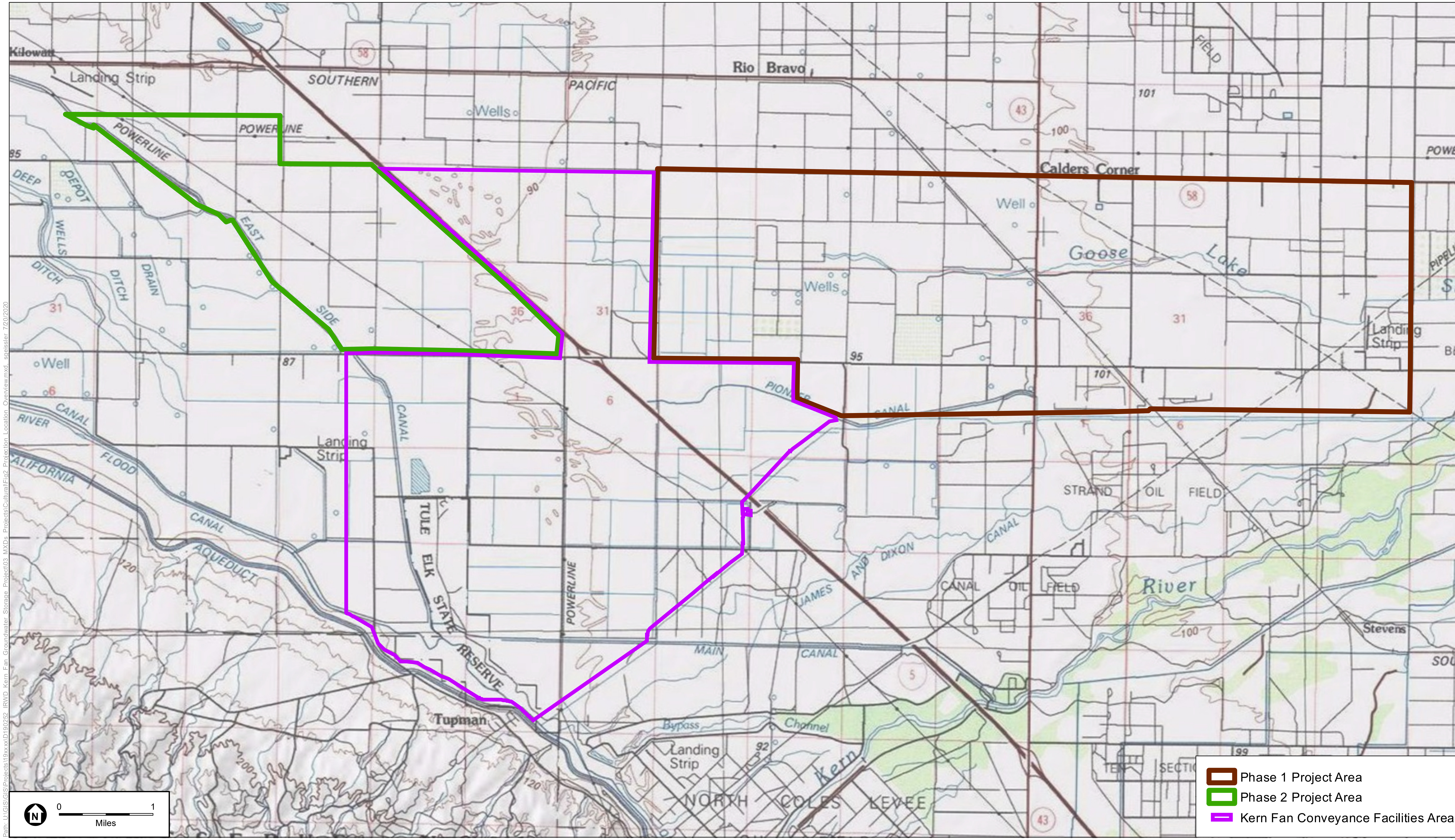


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA



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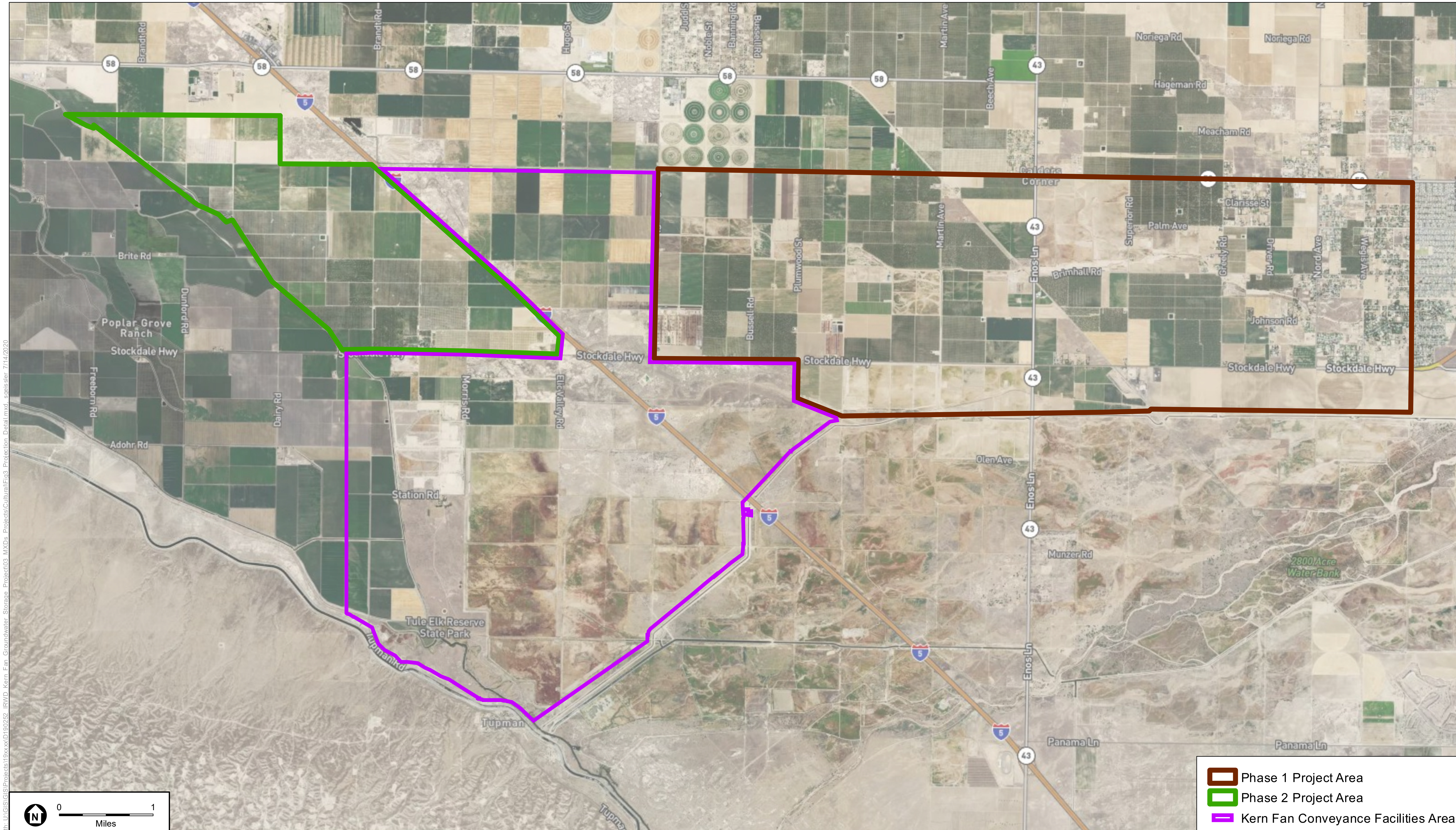
Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

July 23, 2020

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

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Chairperson Pevron:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

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The proposed project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. In addition, the Kern Fan Conveyance Facilities would consist of pipelines, pump stations and a new turnout at the California Aqueduct to convey water between the recharge and recovery facilities and the California Aqueduct. The proposed project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the project area. Water could be conveyed to and from the Phase 1 and 2 properties through existing facilities and the proposed Kern Fan Conveyance Facilities connecting to the California Aqueduct. The proposed project would be located in western Kern County, west of the City of Bakersfield. Project facilities have yet to be sited, but would be located within the areas shown on the attached maps (Figures 1 through 3). There are three areas identified: Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area.

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Candace Ehringer

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Cultural Resources Program Manager

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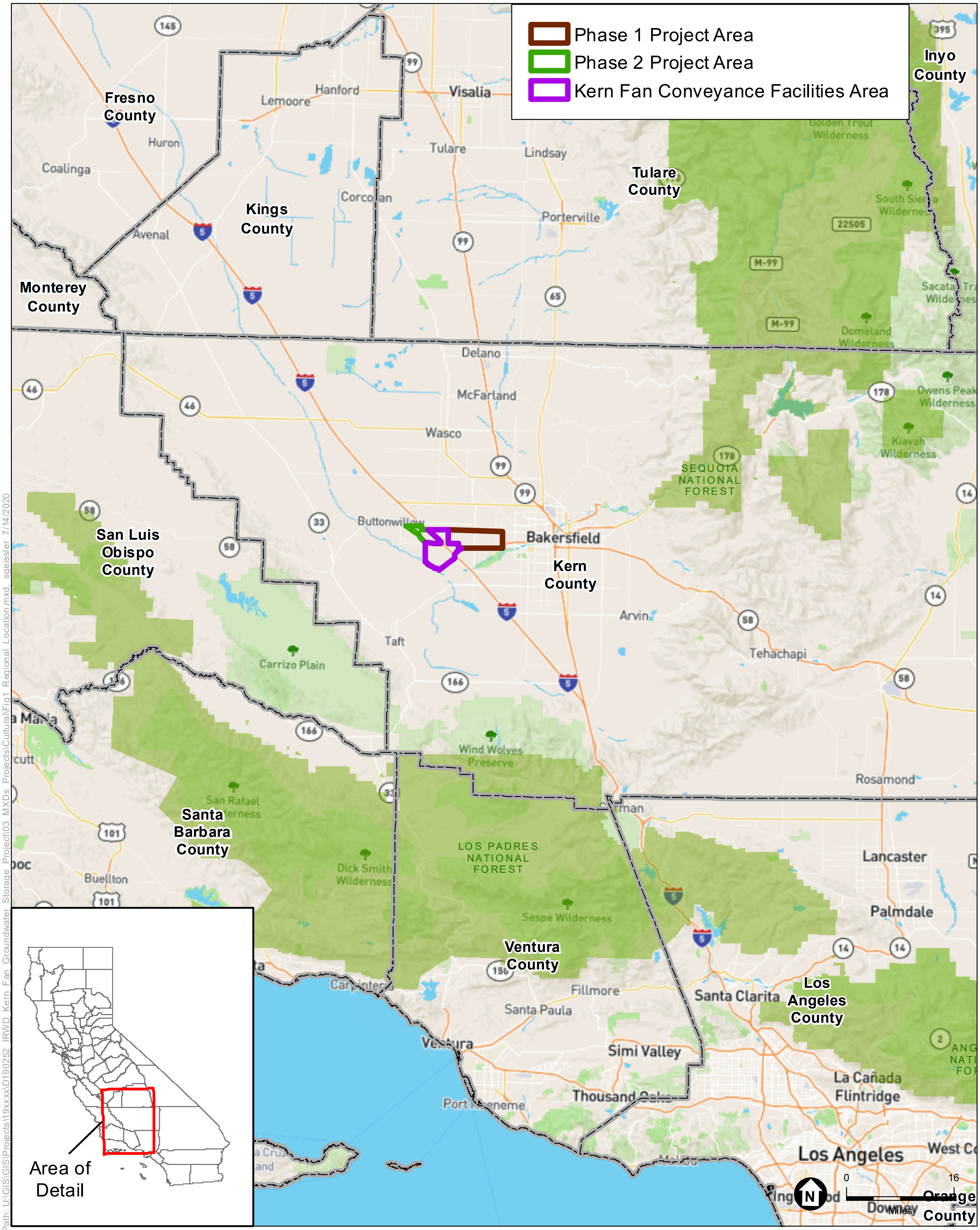

SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA

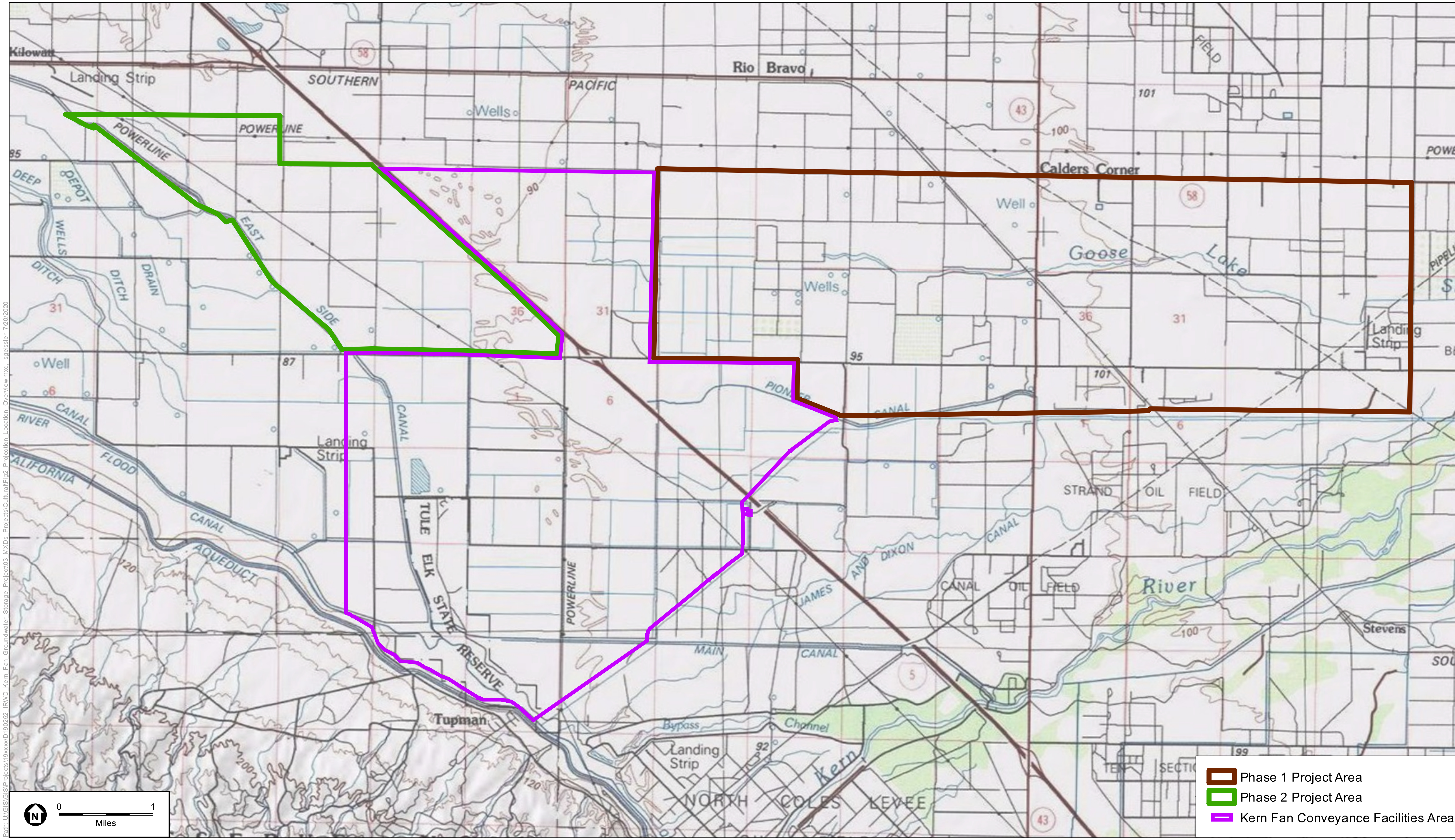

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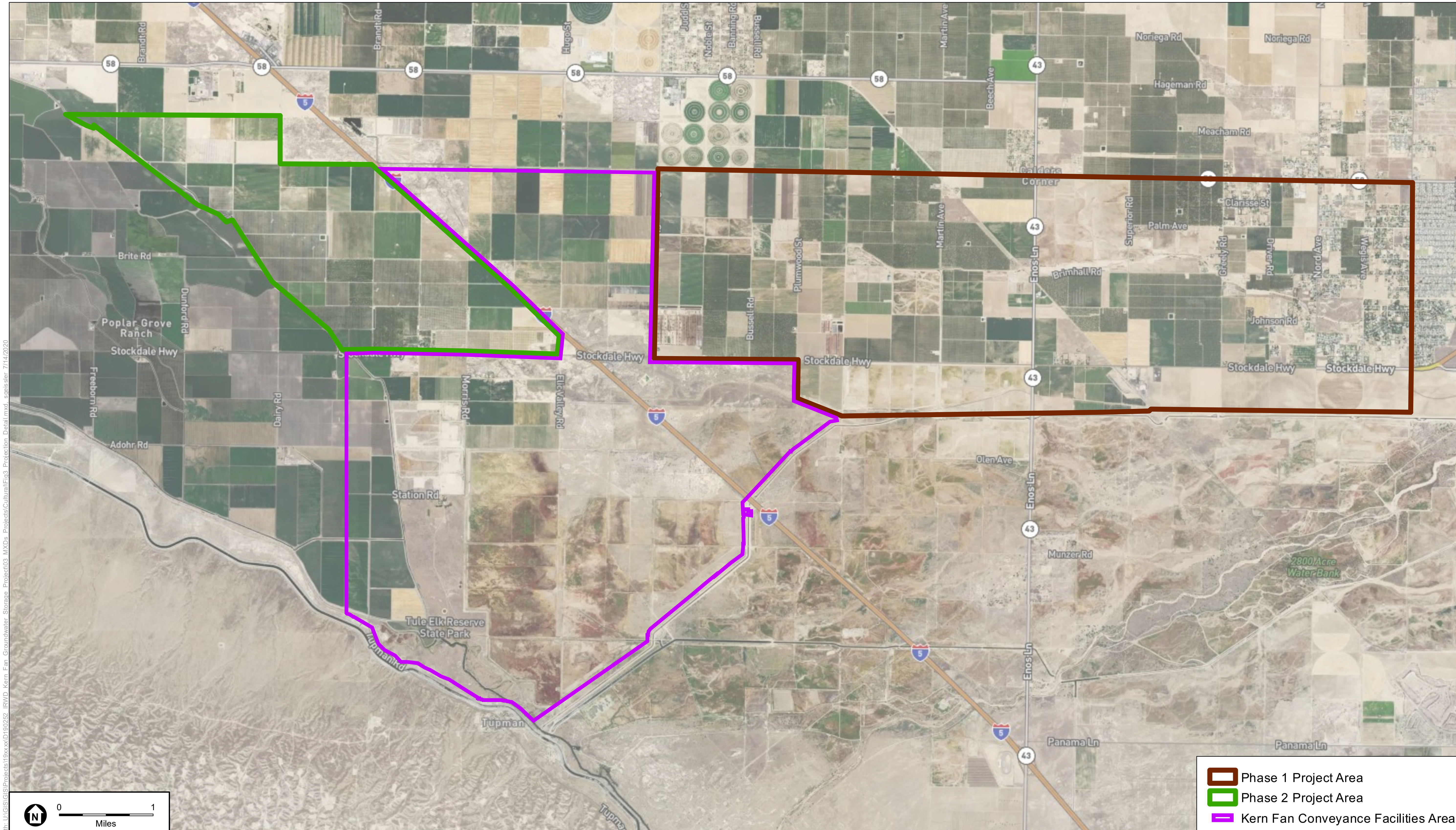
Figure 2
Project Location – Overview



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Julio Quair, Chairperson
Chumash Council of Bakersfield
729 Texas Street
Bakersfield, CA 93307

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Chairperson Quair:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

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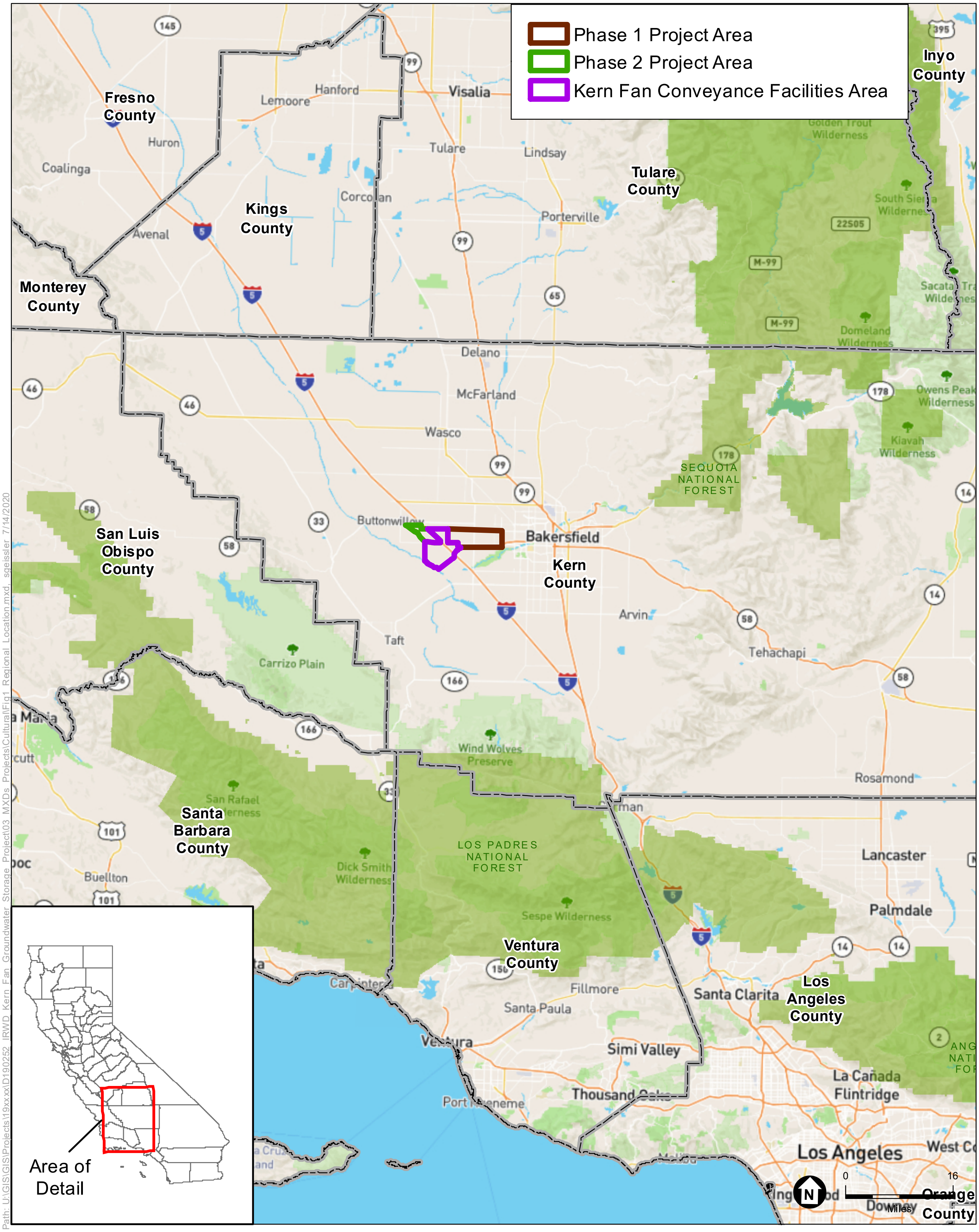

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Kern Fan Groundwater Storage Project

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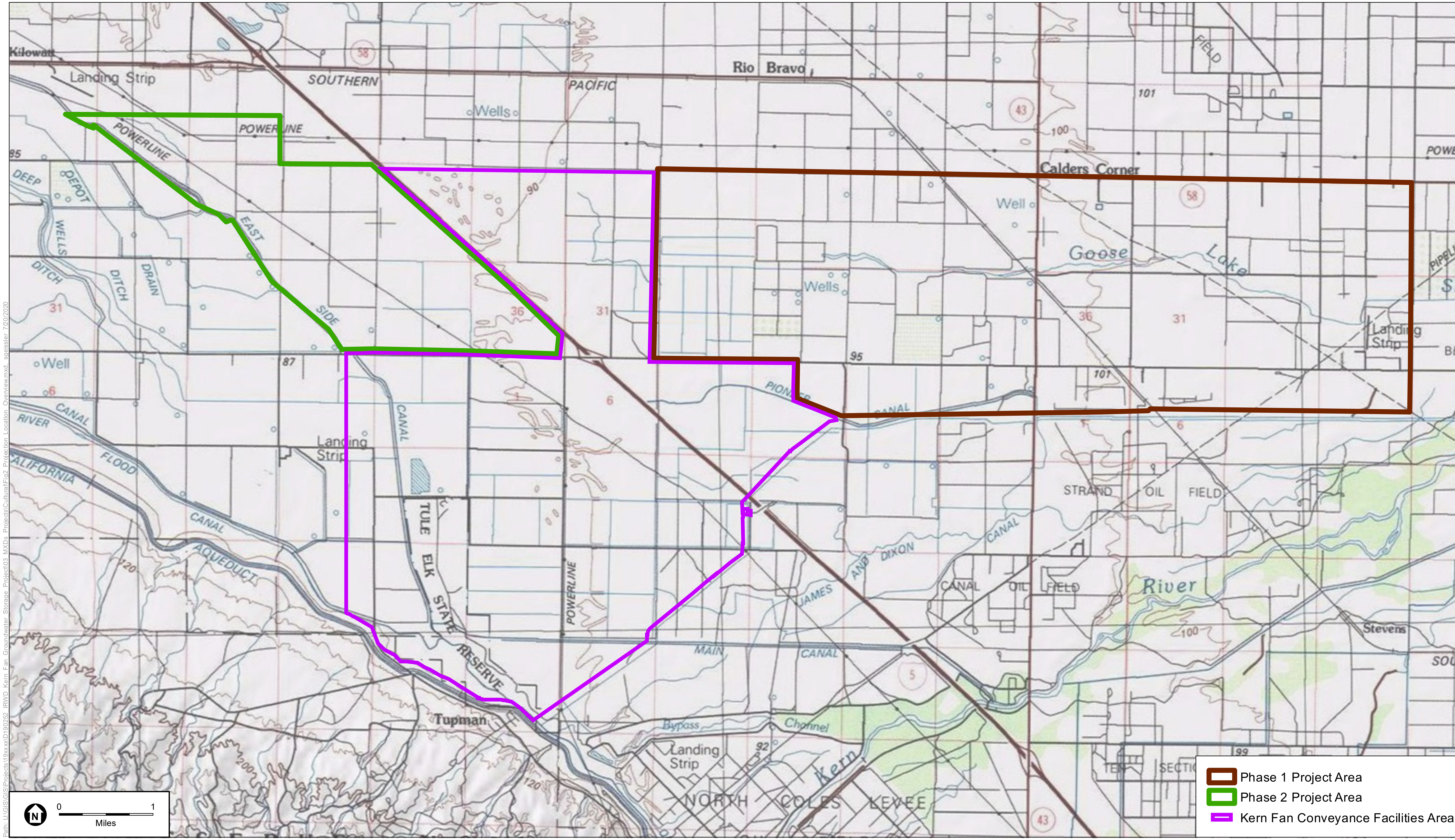
Regional Location

ESA



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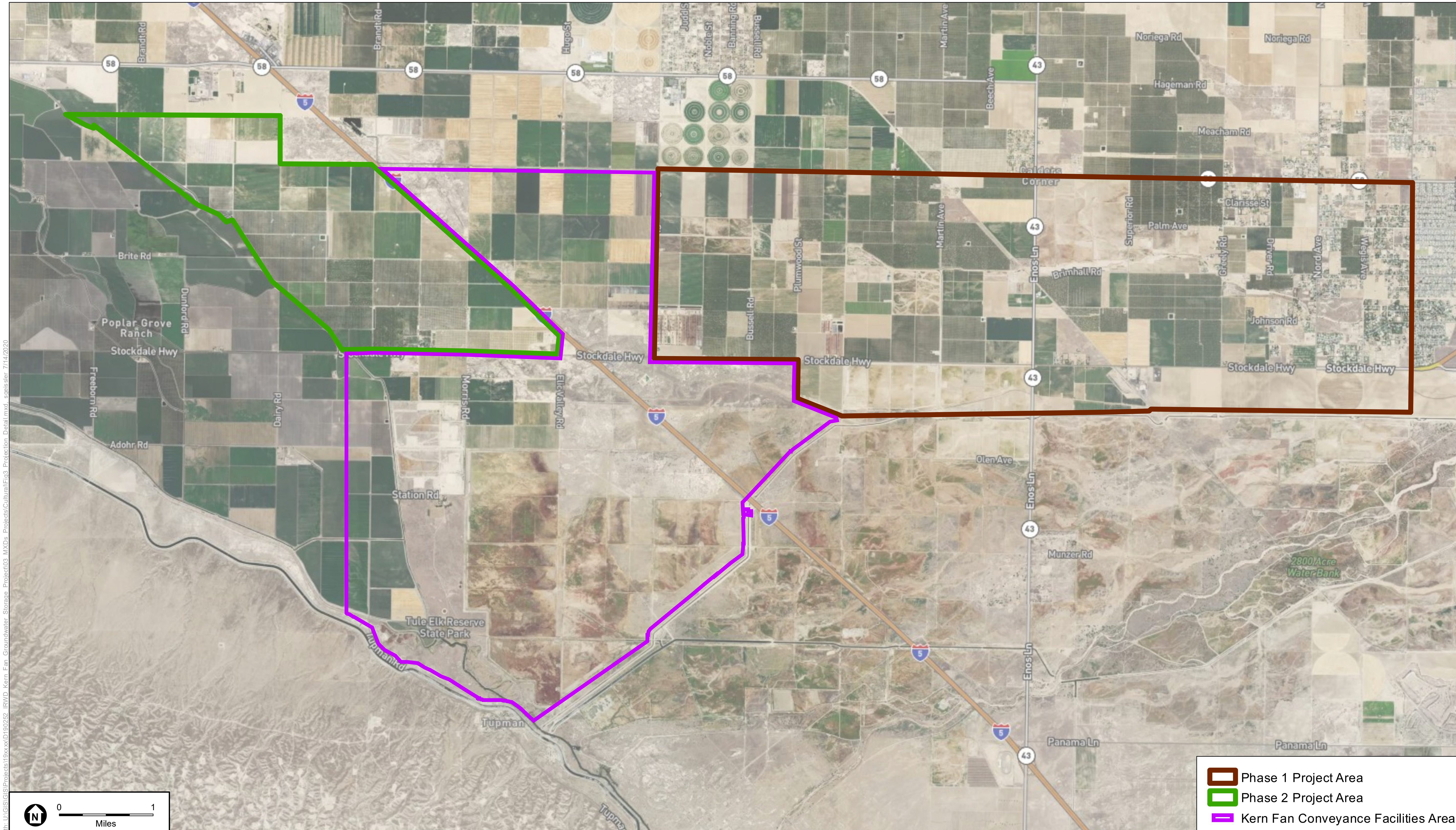
Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

James Rambeau, Sr., Chairperson
Big Pine Paiute Tribe of the Owens Valley
P.O. Box 700
Big Pine, CA 93513

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Chairperson Rambeau:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

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Cultural Resources Program Manager

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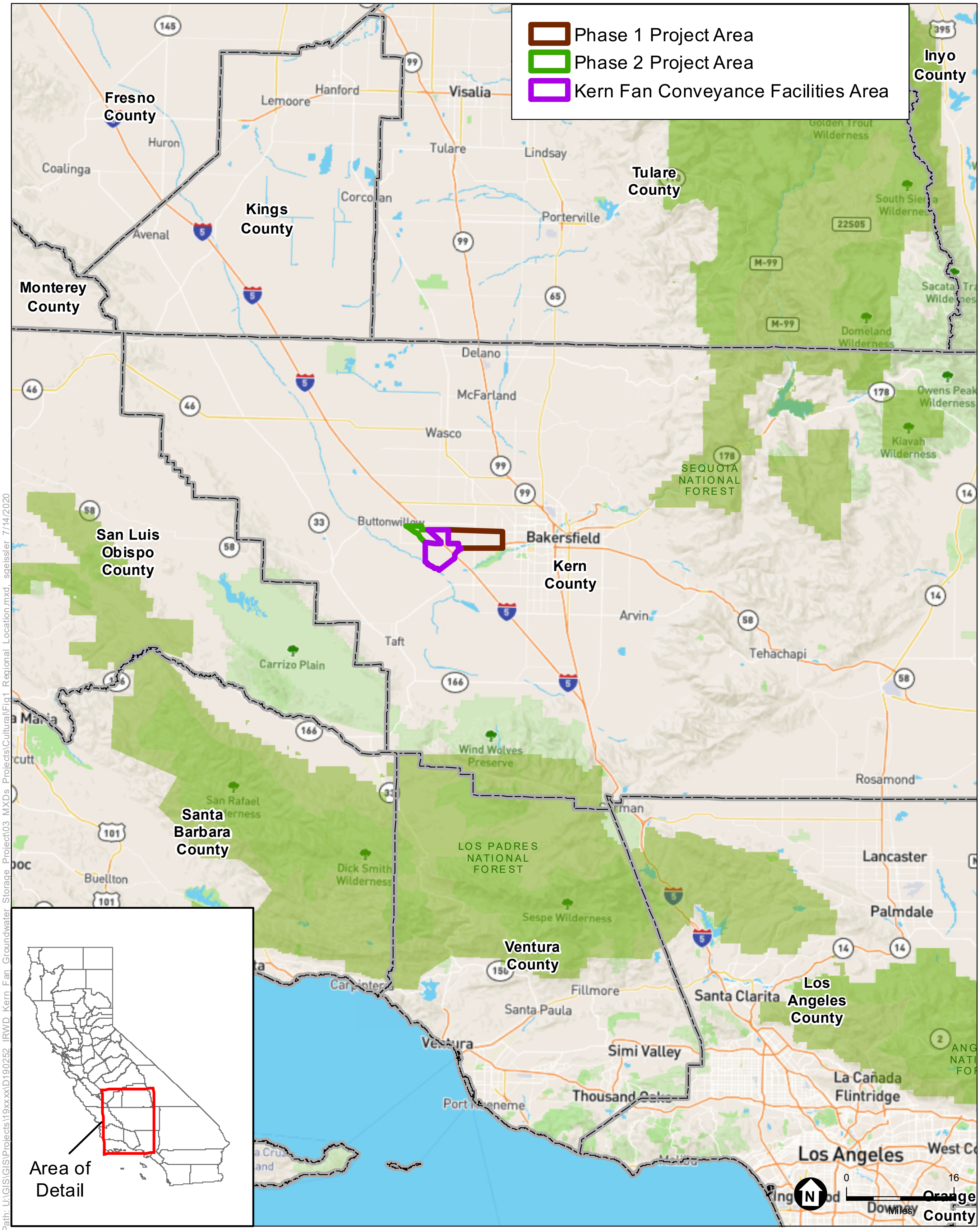

SOURCE: ESRI.

Kern Fan Groundwater Storage Project

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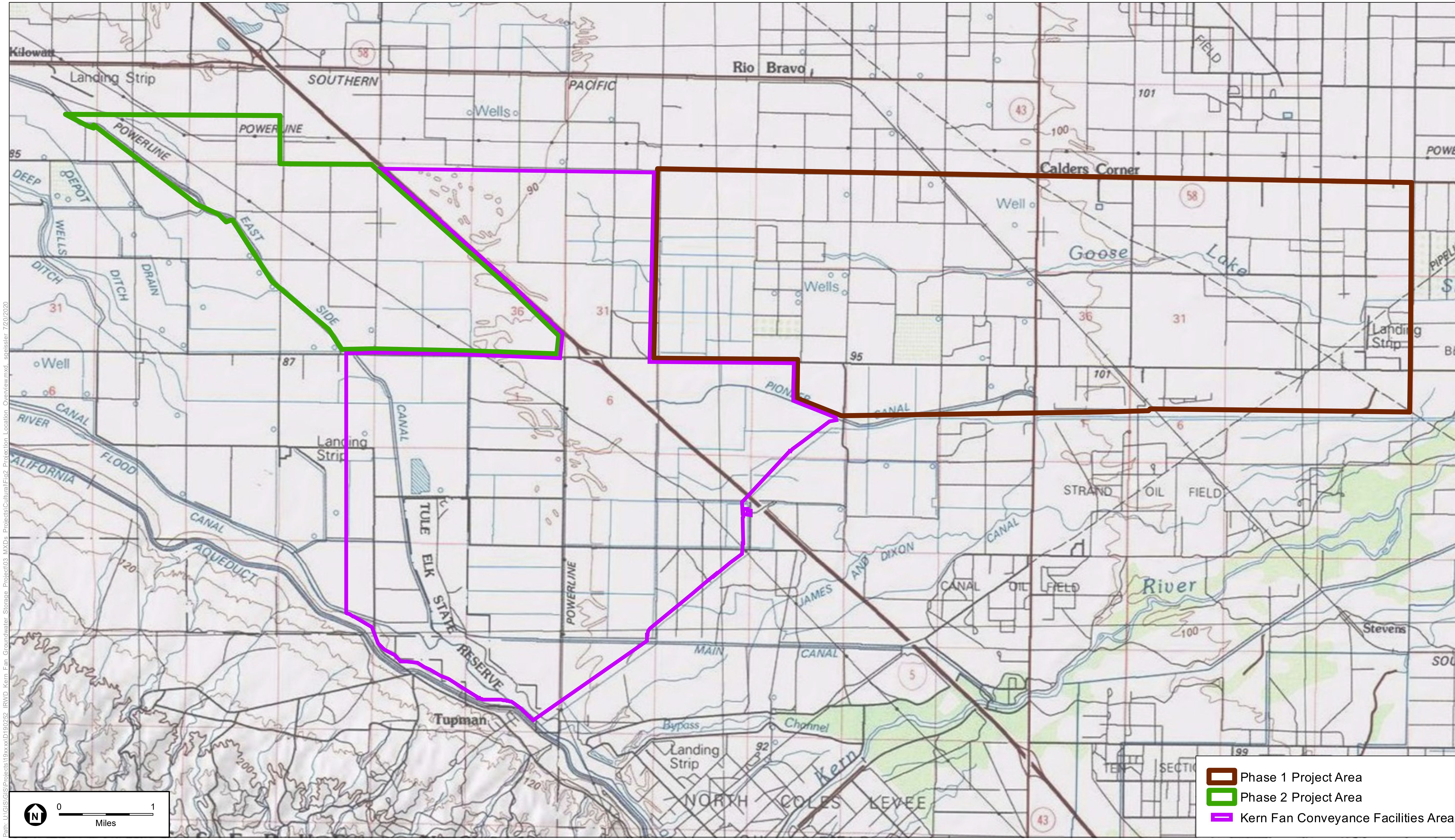
Regional Location



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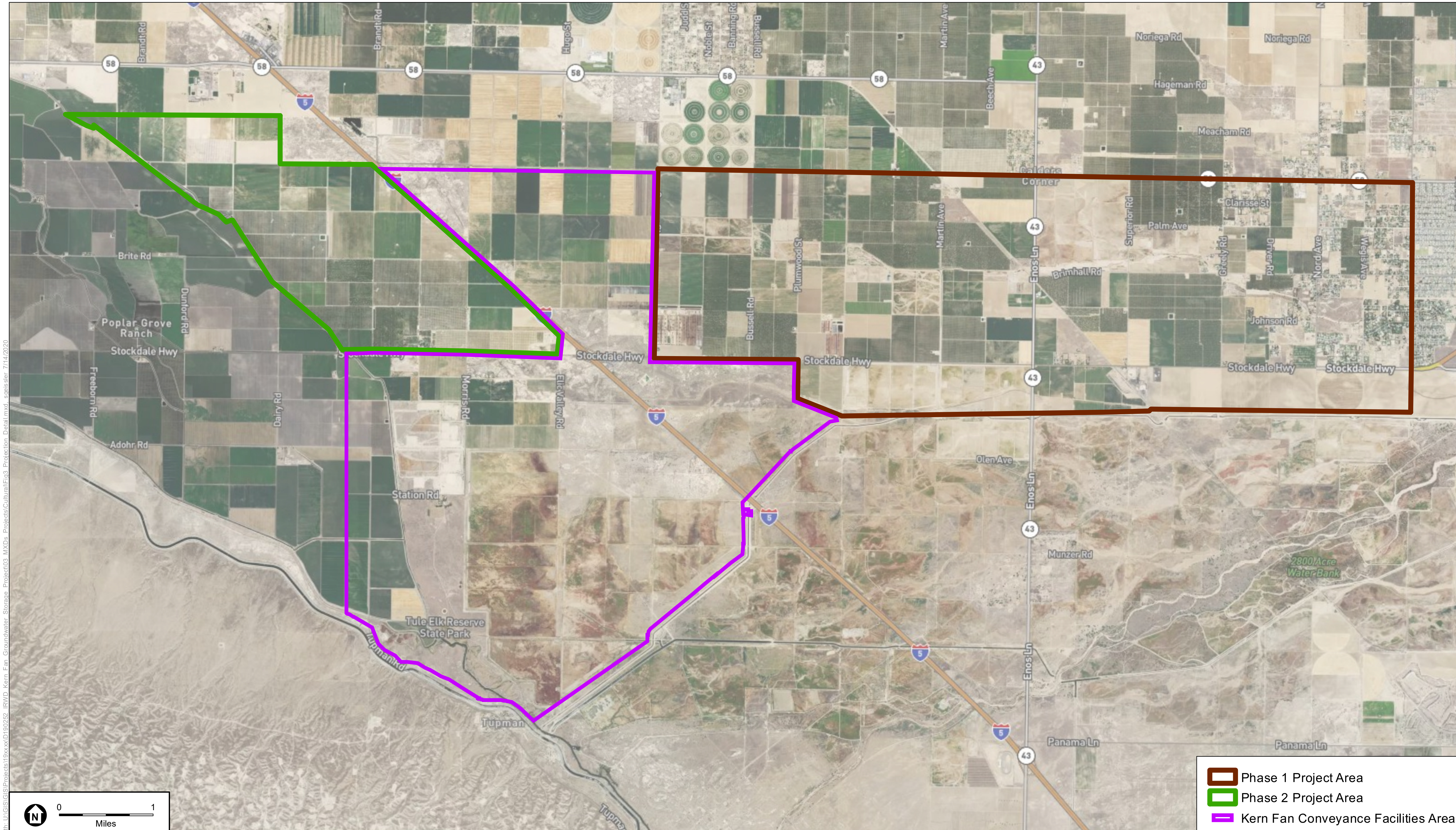
Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Colin Rambo, CRM Tech
Tejon Indian Tribe
P.O. Box 640
Arvin, CA 93203

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Mr. Rambo:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

The proposed project would allow Rosedale and IRWD to more effectively manage existing sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop water recharge and recovery facilities in the Kern Fan area of Kern County. The proposed project would recharge, store, recover and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and supply reliability benefits for agricultural, and municipal and industrial uses.

The proposed project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. In addition, the Kern Fan Conveyance Facilities would consist of pipelines, pump stations and a new turnout at the California Aqueduct to convey water between the recharge and recovery facilities and the California Aqueduct. The proposed project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the project area. Water could be conveyed to and from the Phase 1 and 2 properties through existing facilities and the proposed Kern Fan Conveyance Facilities connecting to the California Aqueduct. The proposed project would be located in western Kern County, west of the City of Bakersfield. Project facilities have yet to be sited, but would be located within the areas shown on the attached maps (Figures 1 through 3). There are three areas identified: Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area.

A cultural resources records search for the proposed project was conducted through the California Historical Resources Information System (CHRIS) Southern San Joaquin Valley Information Center (SSJVIC) on May 5, 2020. A total of five prehistoric or multicomponent resources have been recorded within the Phase I Project Area (four prehistoric isolates and one multicomponent archaeological site). No prehistoric resources have been recorded within the Phase II Project Area. A total of 38 prehistoric or multicomponent resources have been recorded within the Kern Fan Conveyance Facilities Area (29 prehistoric archaeological sites, two multicomponent archaeological sites, and seven prehistoric isolates).

A search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was conducted on May 6, 2020. The results were negative, indicating that the NAHC does not have any sacred sites or Native American cultural resources on file within the proposed project areas (Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area).

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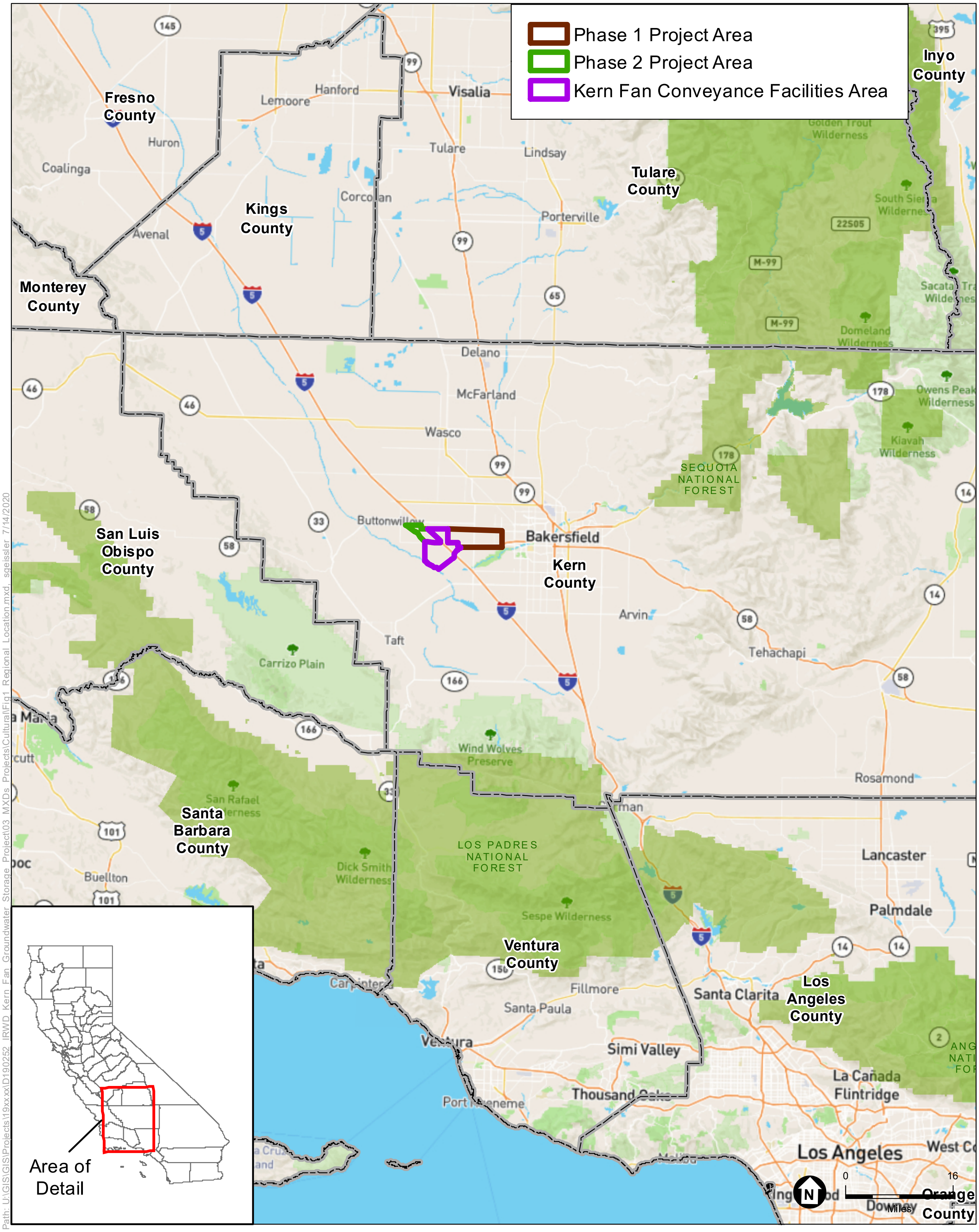
If you have any questions or comments, please contact me by phone at (831) 737-7438 or by email at cehringer@esassoc.com. We kindly request a response to this letter by July 24, 2020 to ensure that any concerns are adequately addressed in the EIR. Thank you for your cooperation on this matter.

Sincerely,

Candace Ehr

Candace Ehringer
Cultural Resources Program Manager

Enclosures: Figure 1 – Regional Location
Figure 2 – Project Location
Figure 3 – Project Detail

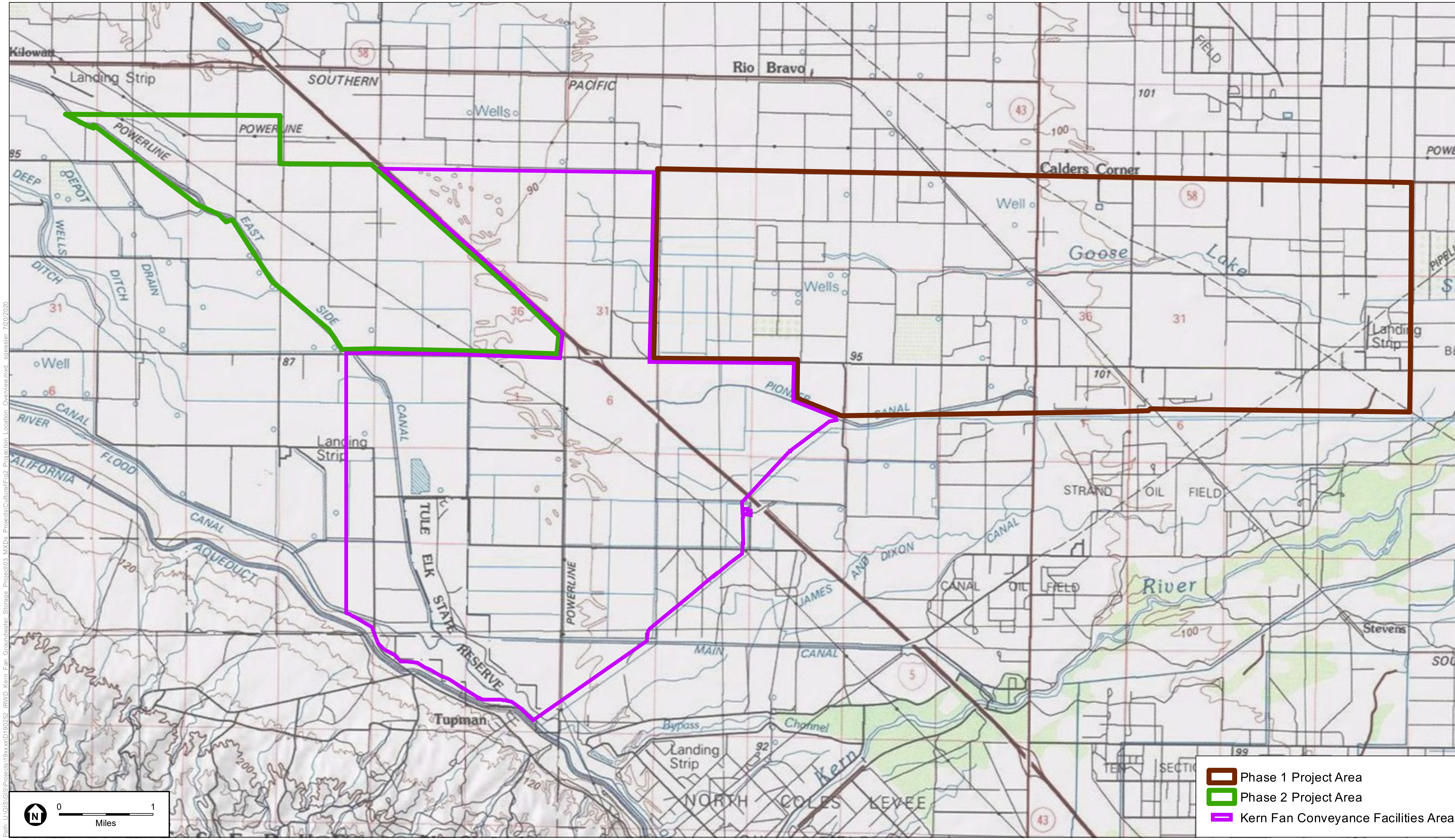


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA

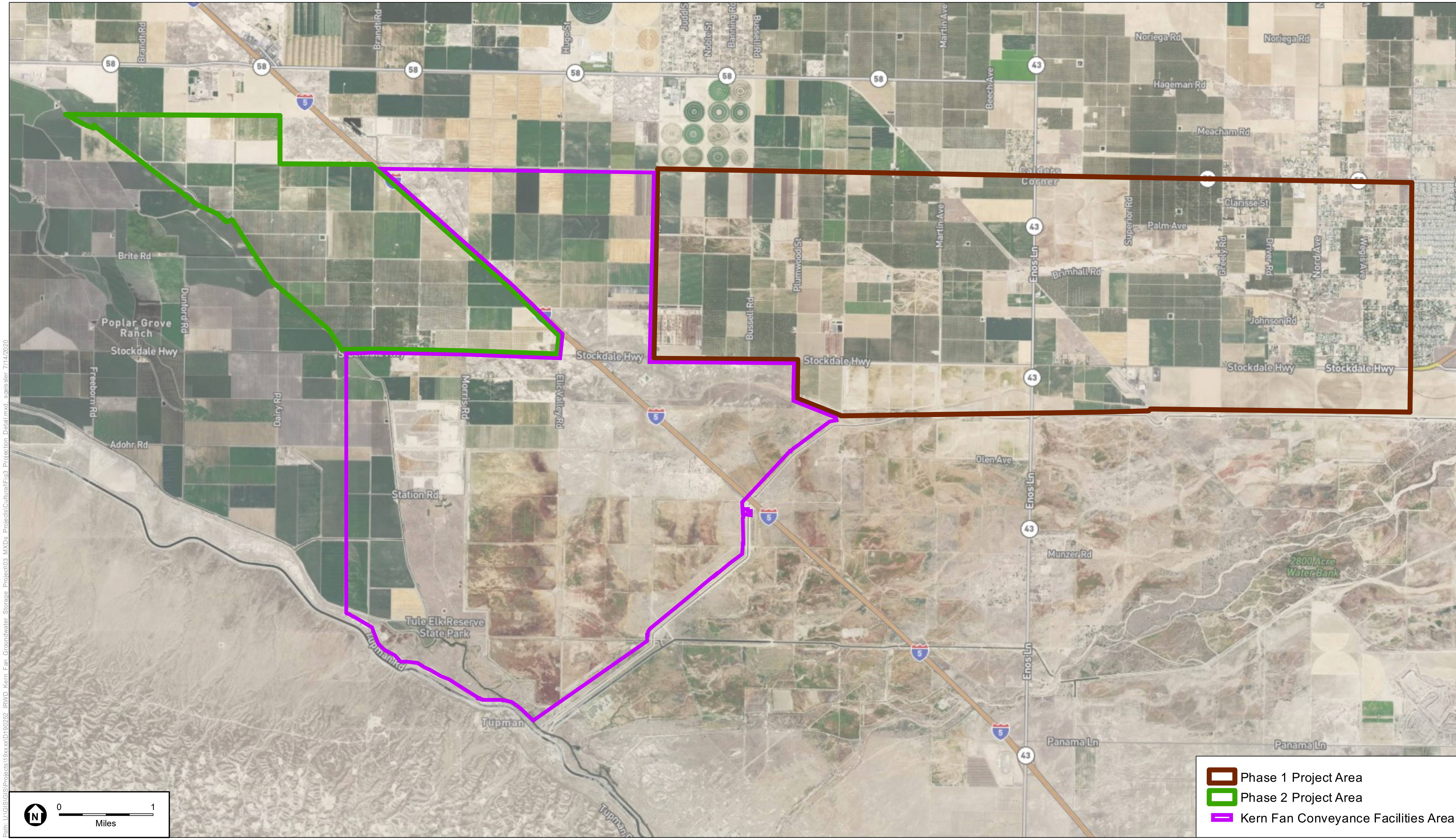


SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Robert Robinson, Chairperson
Kern Valley Indian Community
P.O. Box 1010
Lake Isabella, CA 93240

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Chairperson Robinson:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

The proposed project would allow Rosedale and IRWD to more effectively manage existing sources of water supply by using available underground storage in the local San Joaquin Valley Groundwater Basin. To do that, Rosedale and IRWD would develop water recharge and recovery facilities in the Kern Fan area of Kern County. The proposed project would recharge, store, recover and deliver State Water Project (SWP) water, including Article 21 water, and water from other sources when available. The stored water would be used to provide ecosystem benefits downstream from the SWP's Lake Oroville and supply reliability benefits for agricultural, and municipal and industrial uses.

The proposed project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. In addition, the Kern Fan Conveyance Facilities would consist of pipelines, pump stations and a new turnout at the California Aqueduct to convey water between the recharge and recovery facilities and the California Aqueduct. The proposed project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the project area. Water could be conveyed to and from the Phase 1 and 2 properties through existing facilities and the proposed Kern Fan Conveyance Facilities connecting to the California Aqueduct. The proposed project would be located in western Kern County, west of the City of Bakersfield. Project facilities have yet to be sited, but would be located within the areas shown on the attached maps (Figures 1 through 3). There are three areas identified: Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area.

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A search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was conducted on May 6, 2020. The results were negative, indicating that the NAHC does not have any sacred sites or Native American cultural resources on file within the proposed project areas (Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area).

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Sincerely,

Candace Ehr

Candace Ehringer
Cultural Resources Program Manager

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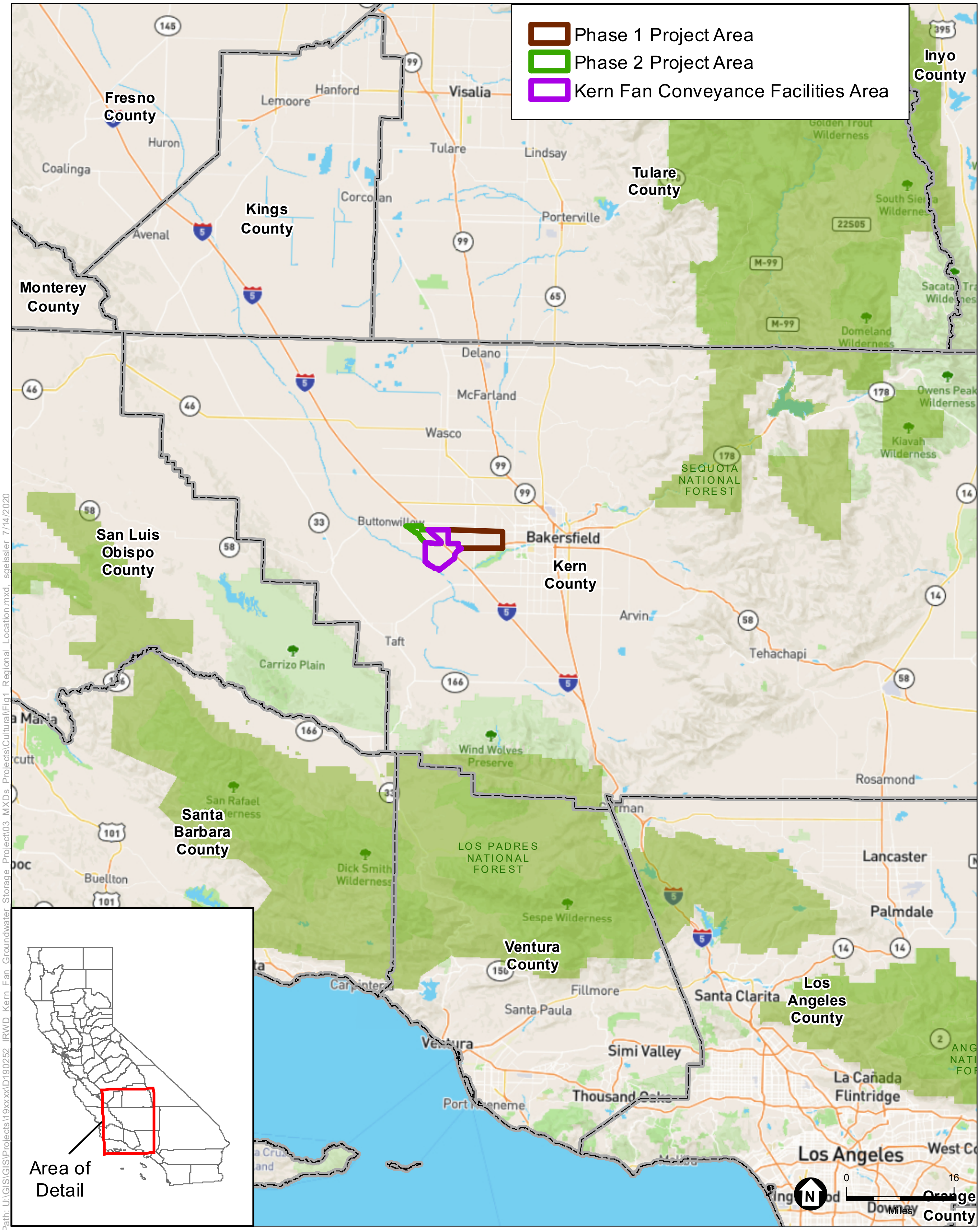
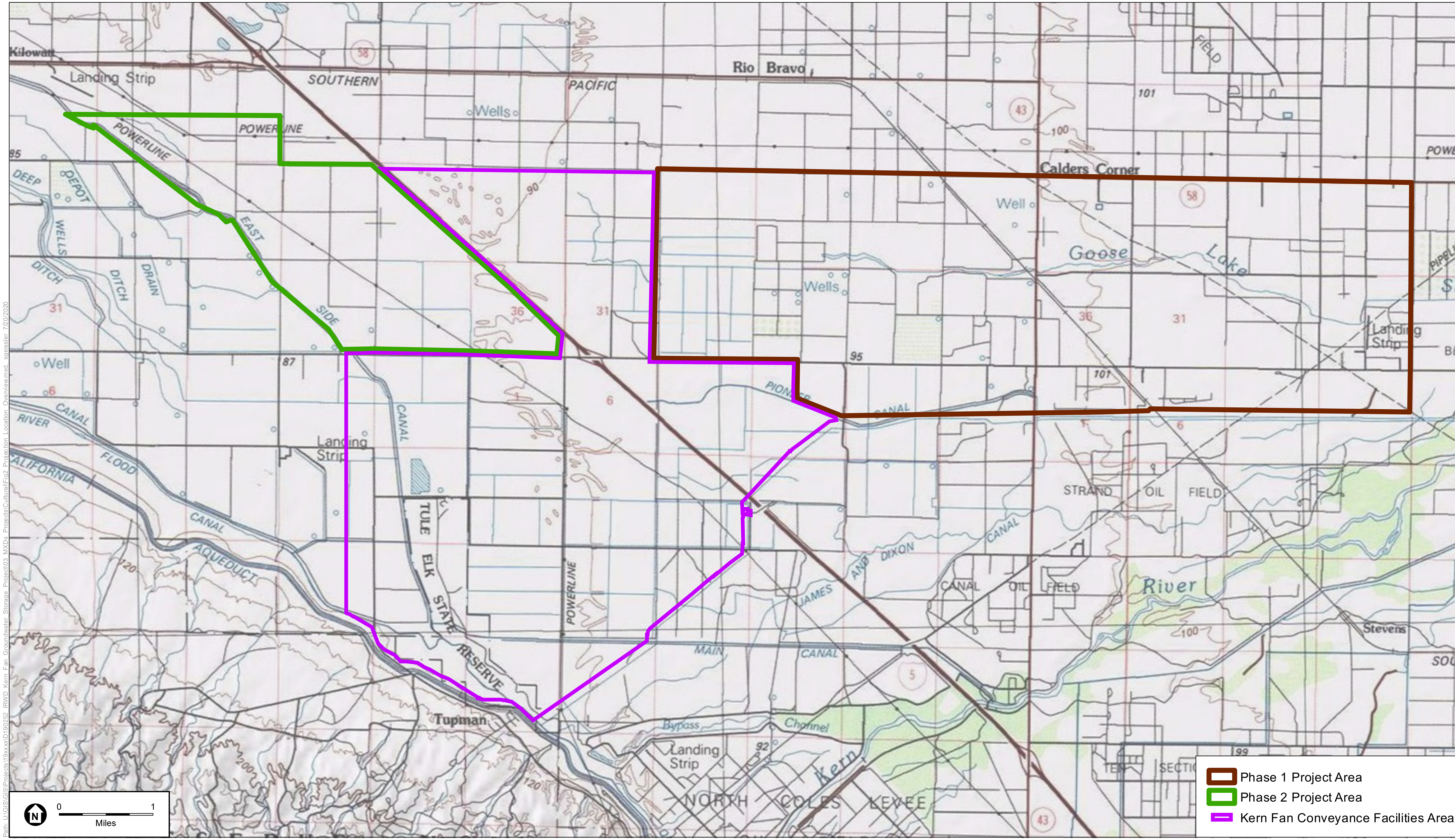


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA

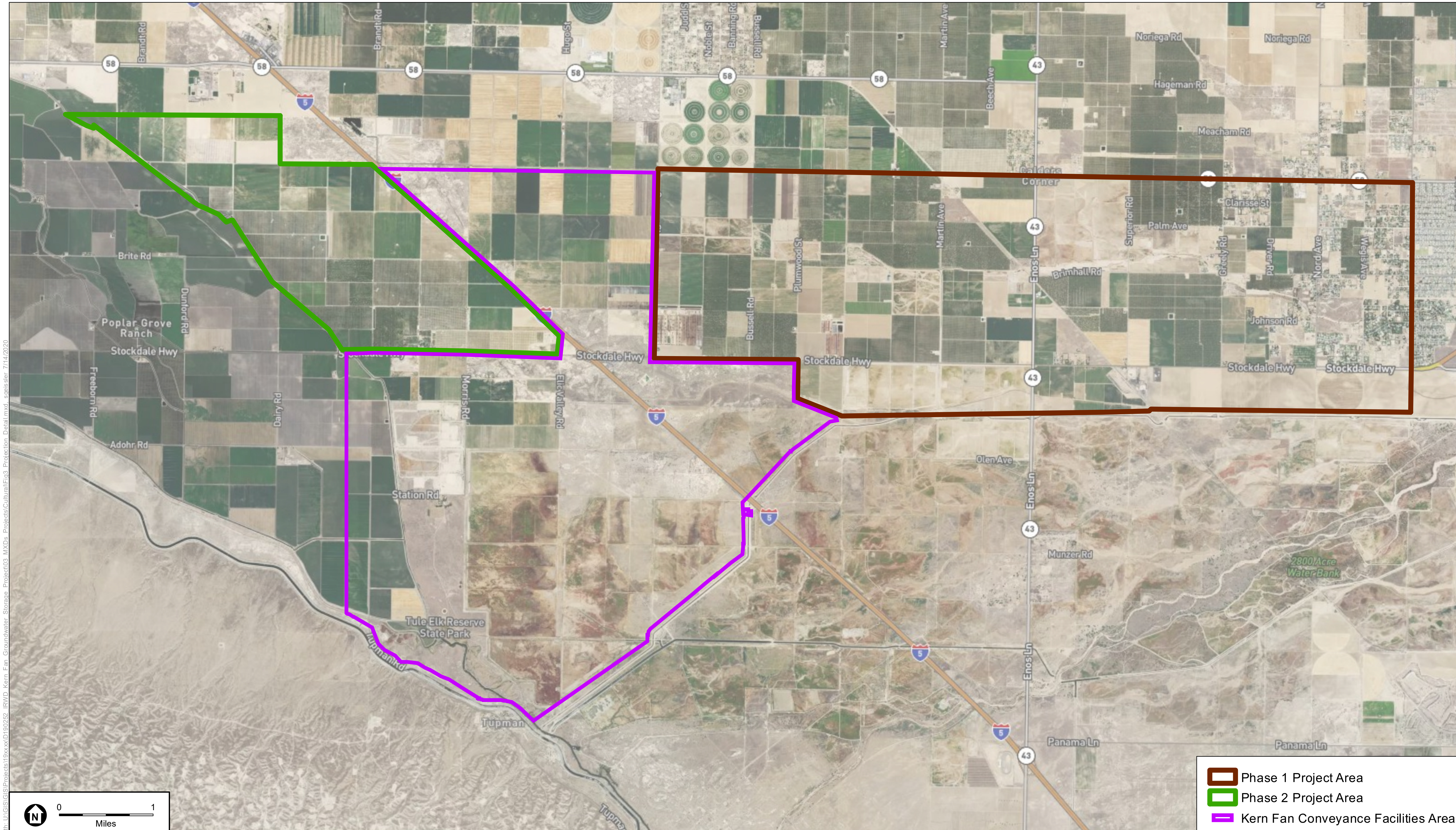


SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Leo Sisco, Chairpeson
Santa Rosa Rancheria Tachi Yokut Tribe
P.O. Box 8
Lemoore, CA 93245

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Chairperson Sisco:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

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The proposed project would consist of construction of up to 1,300 acres of recharge basin facilities and approximately 12 recovery wells. In addition, the Kern Fan Conveyance Facilities would consist of pipelines, pump stations and a new turnout at the California Aqueduct to convey water between the recharge and recovery facilities and the California Aqueduct. The proposed project would be implemented in two phases; each phase would construct up to approximately 640 acres of recharge and recovery facilities within the project area. Water could be conveyed to and from the Phase 1 and 2 properties through existing facilities and the proposed Kern Fan Conveyance Facilities connecting to the California Aqueduct. The proposed project would be located in western Kern County, west of the City of Bakersfield. Project facilities have yet to be sited, but would be located within the areas shown on the attached maps (Figures 1 through 3). There are three areas identified: Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area.

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A search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was conducted on May 6, 2020. The results were negative, indicating that the NAHC does not have any sacred sites or Native American cultural resources on file within the proposed project areas (Phase I Project Area, Phase II Project Area, and Kern Fan Conveyance Facilities Area).

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Sincerely,

Candace Ehringer

Candace Ehringer
Cultural Resources Program Manager

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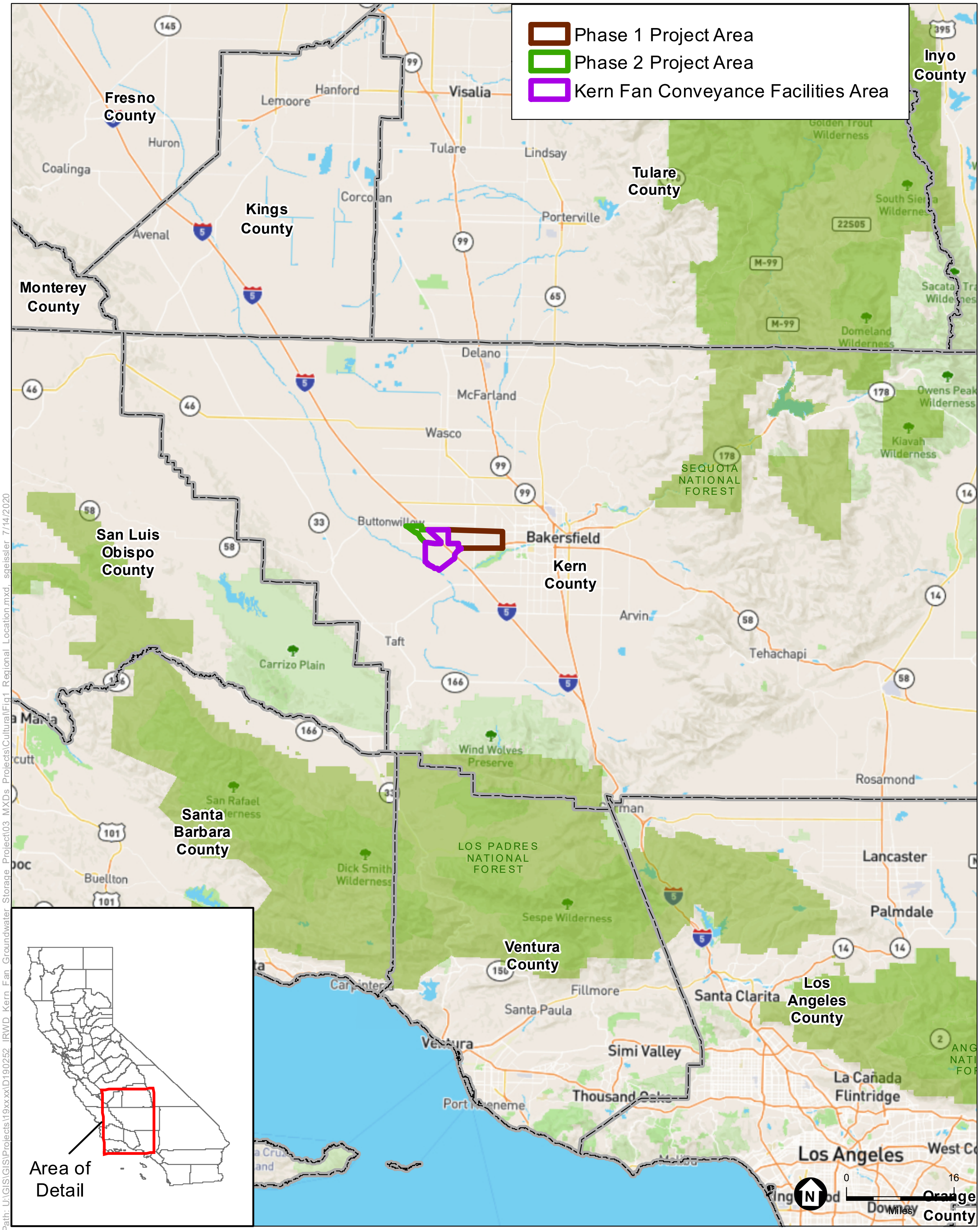
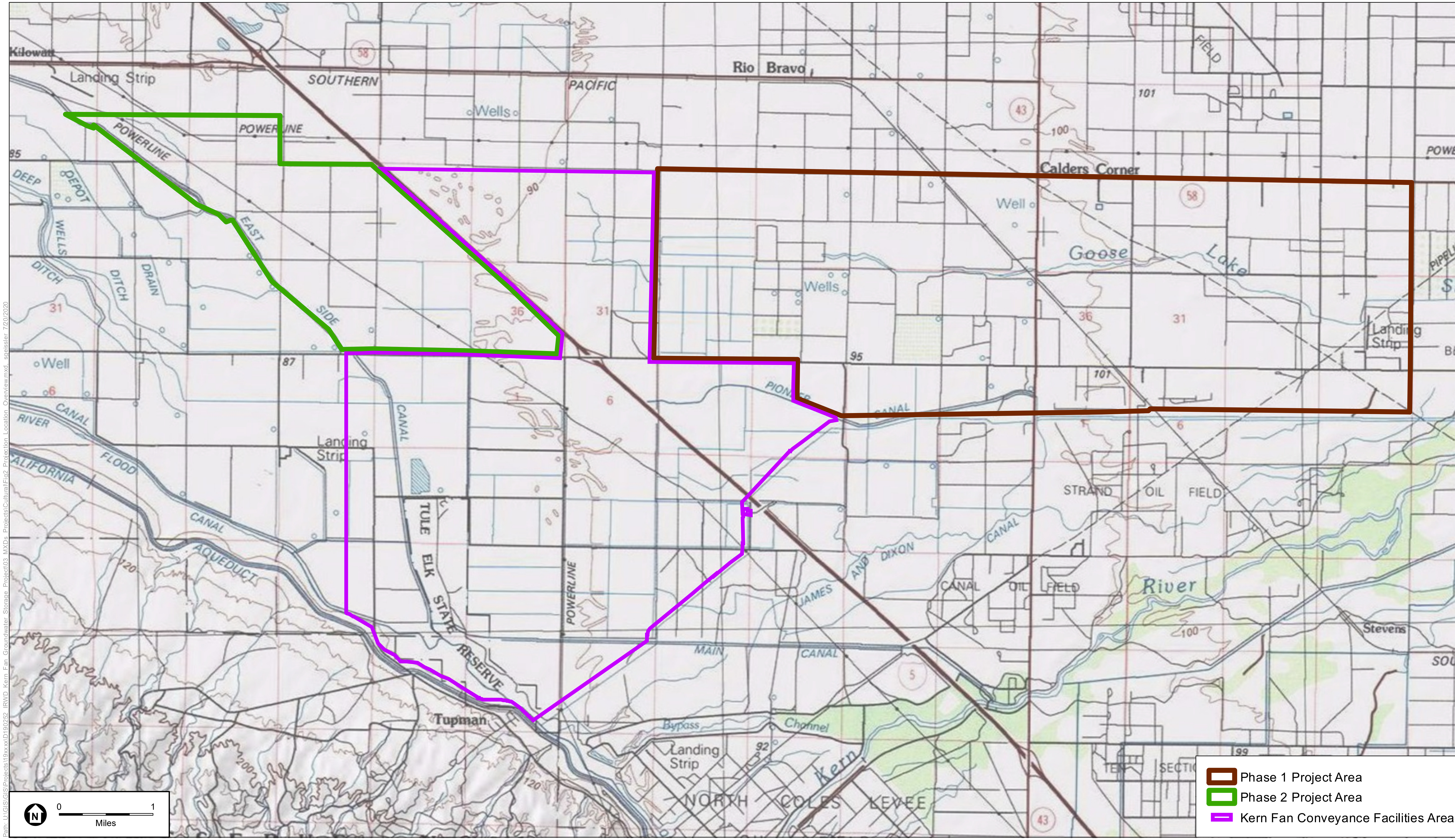


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

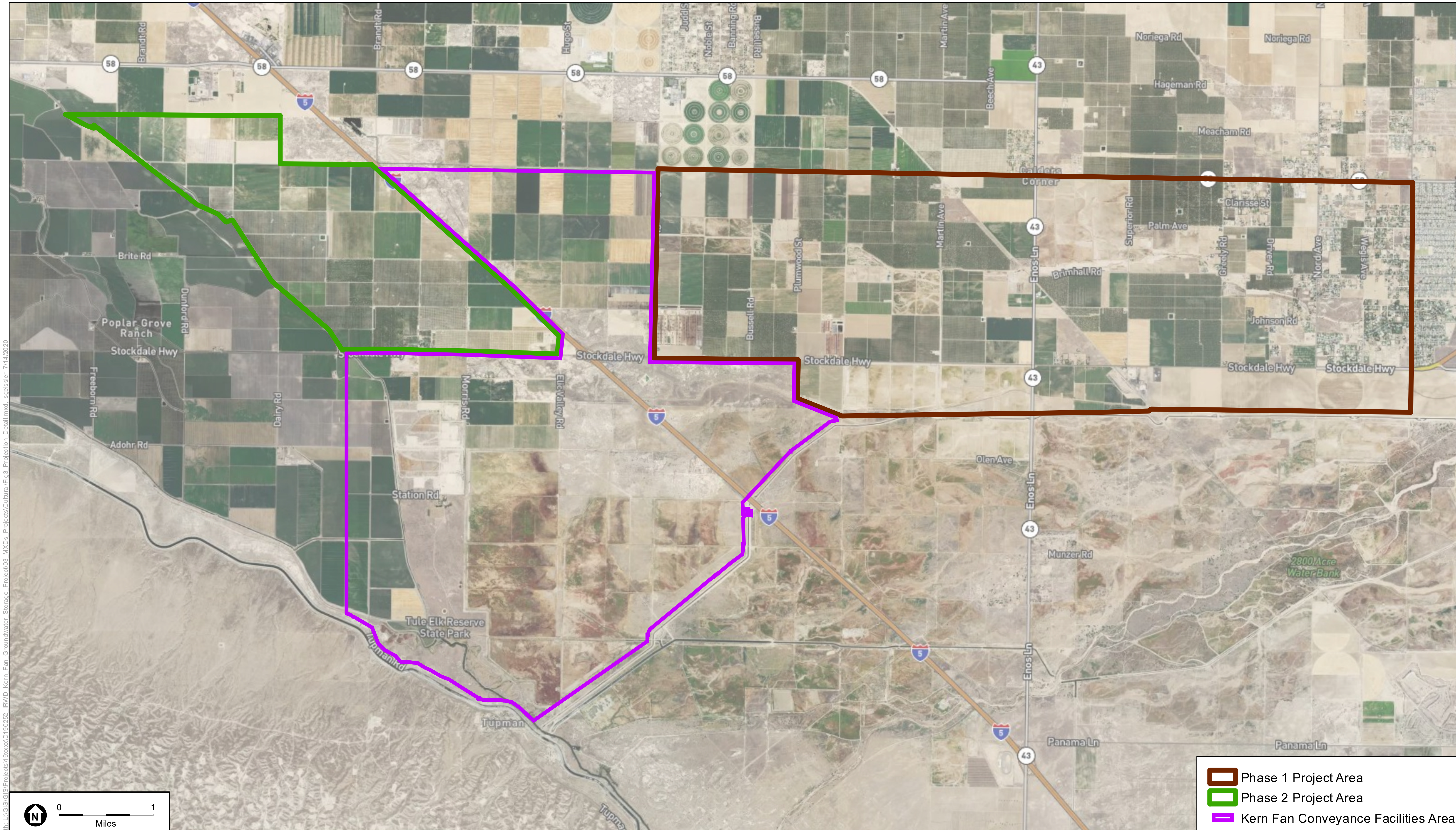
ESA



SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Mona Olivas Tucker, Chairwoman
Yak tityu tityu yak tilhini – Northern Chumash Tribe
660 Camino del Rey
Arroyo Grande, CA 93420

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Chairwoman Olivas Tucker:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

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Cultural Resources Program Manager

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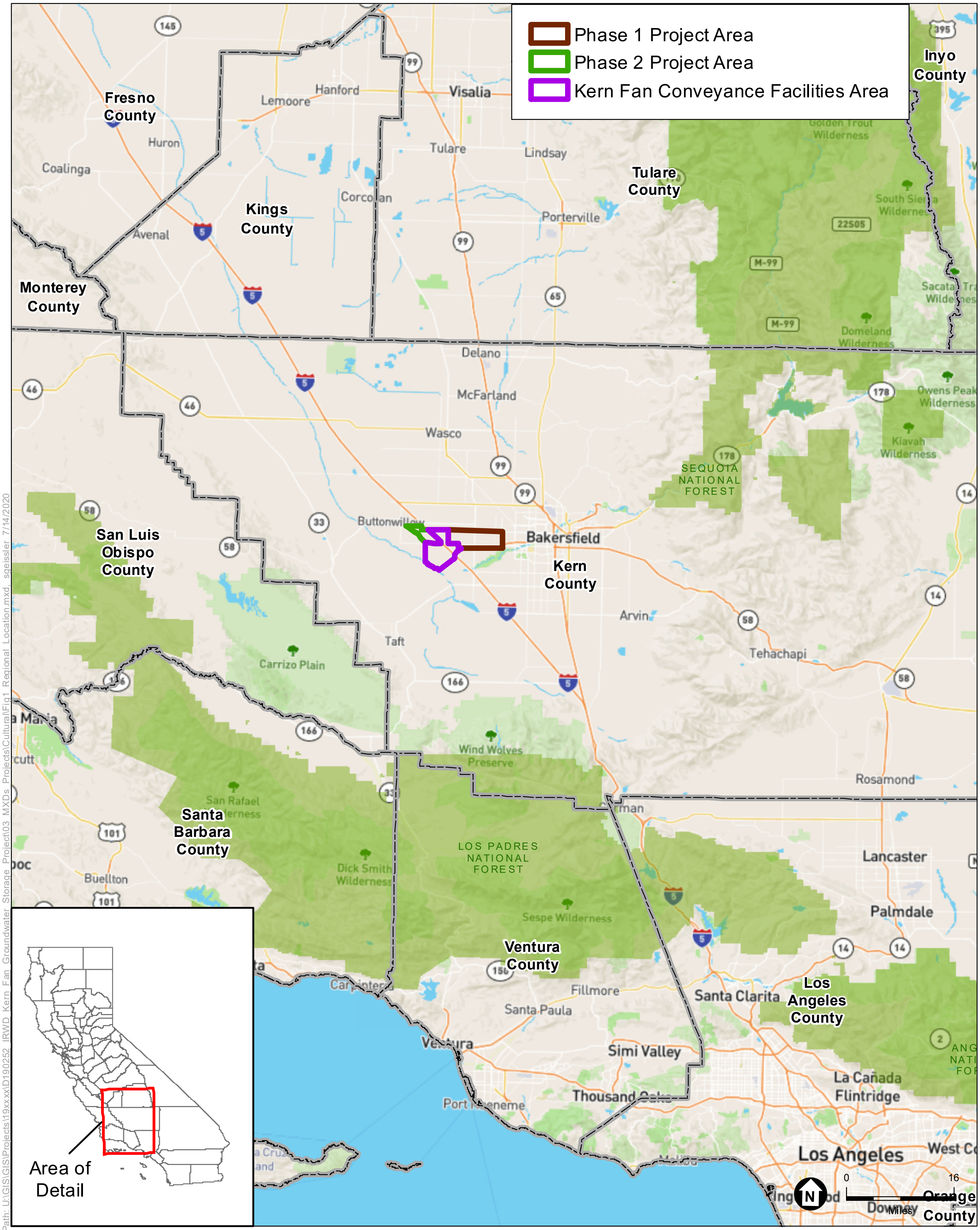
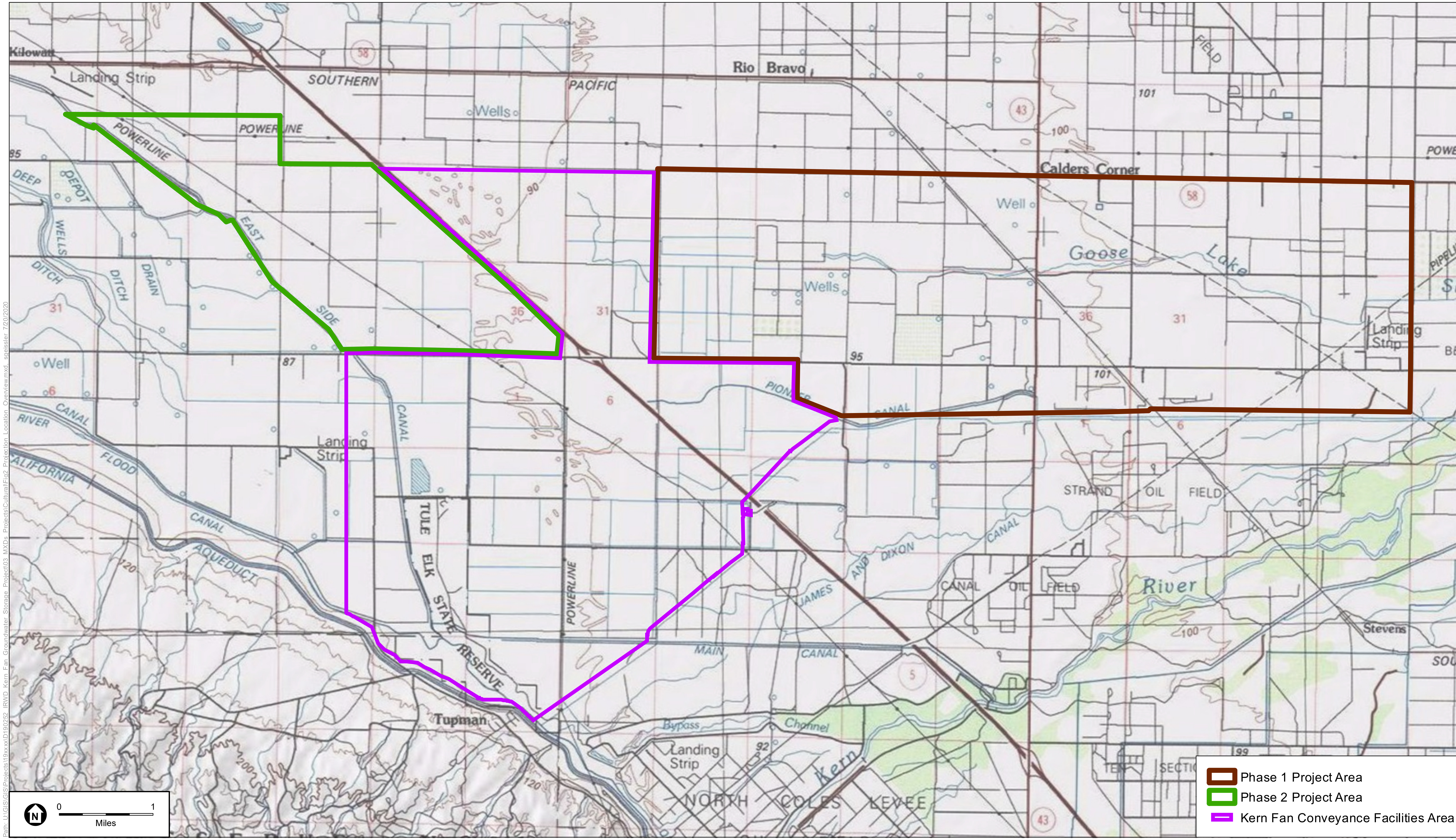


SOURCE: ESRI.

Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA



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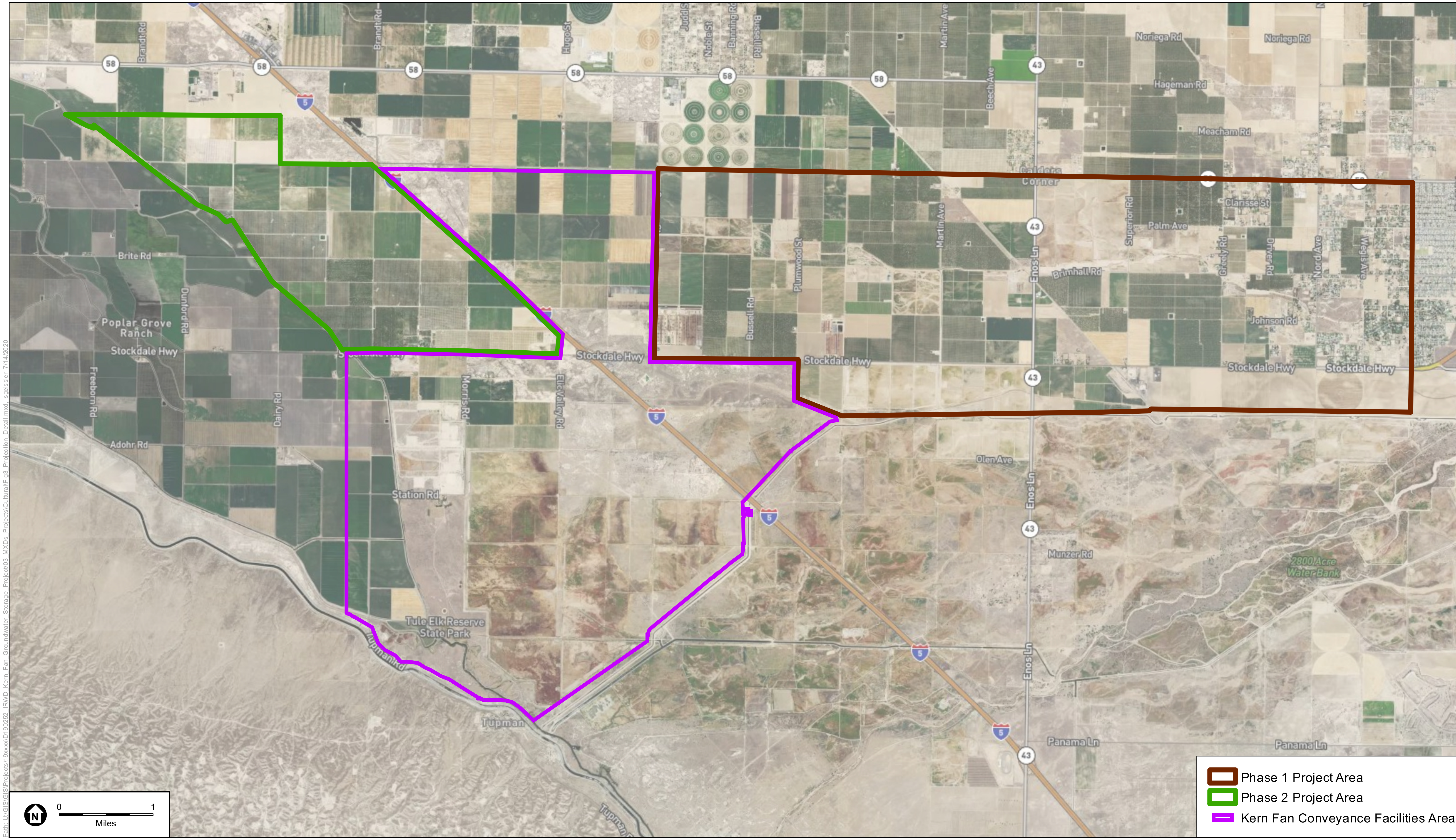
Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Julie Turner, Secretary
Kern Valley Indian Community
P.O. Box 1010
Lake Isabella, CA 93240

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Ms. Turner:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

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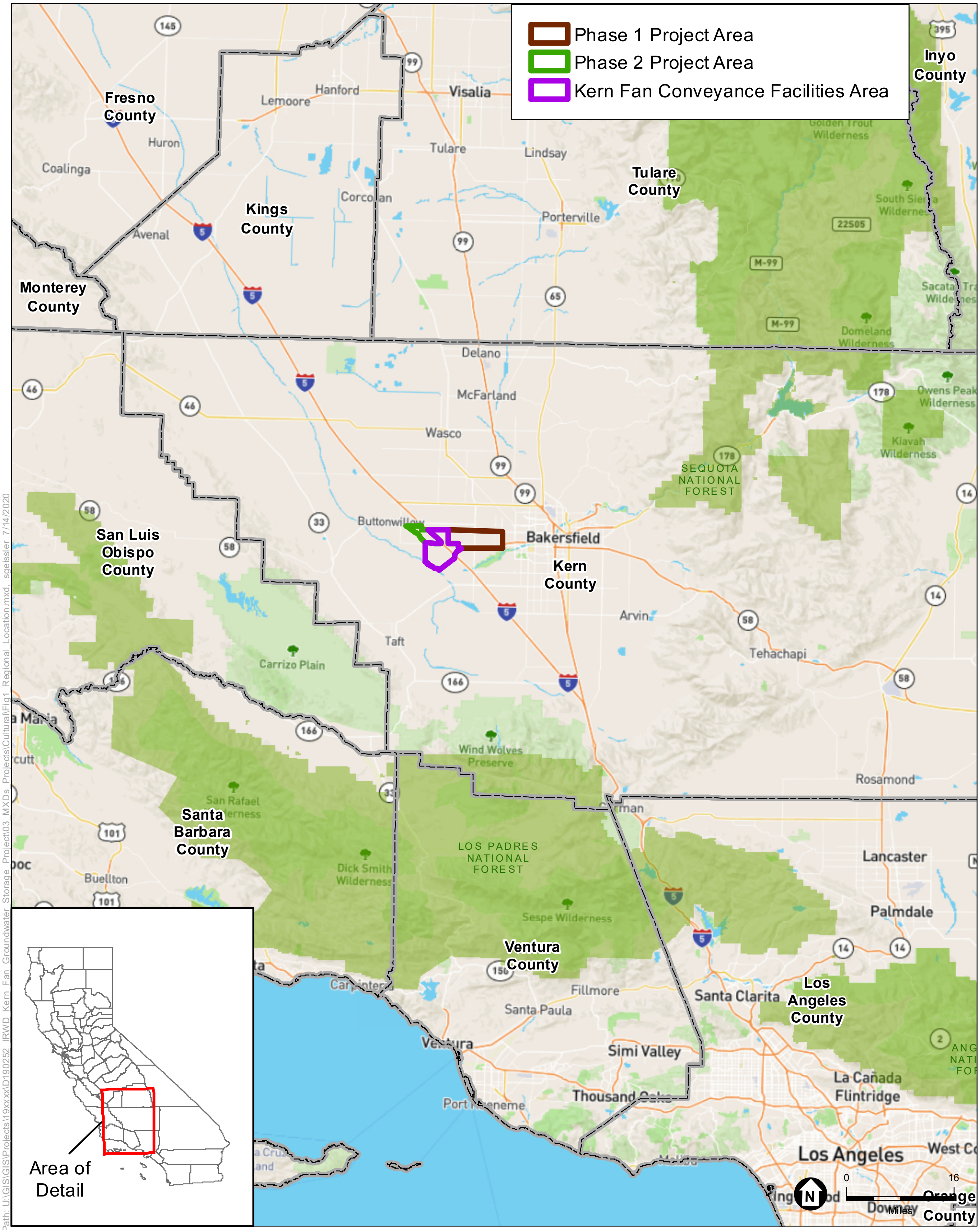

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Kern Fan Groundwater Storage Project

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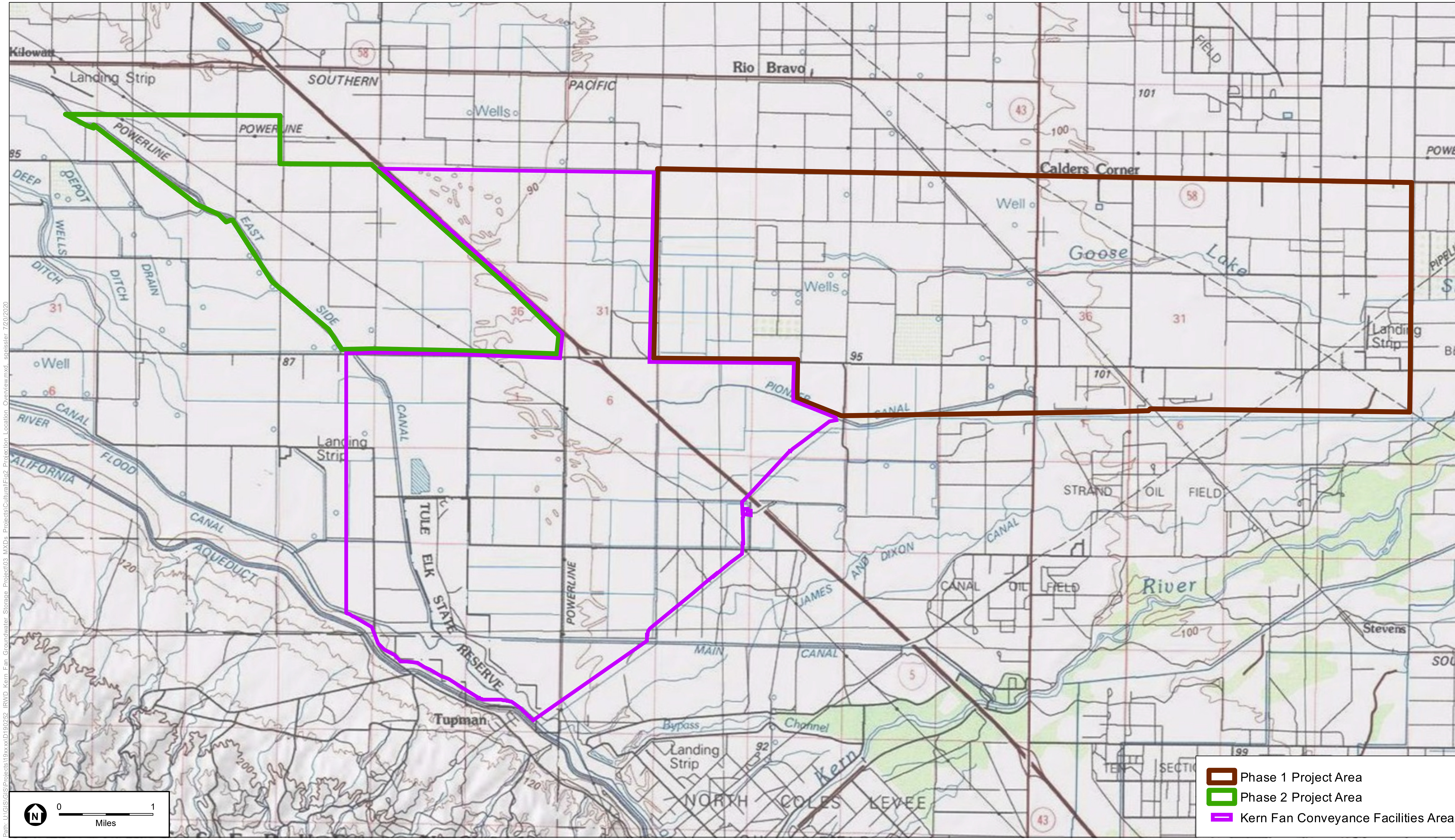
Regional Location

ESA



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Kern Fan Groundwater Storage Project

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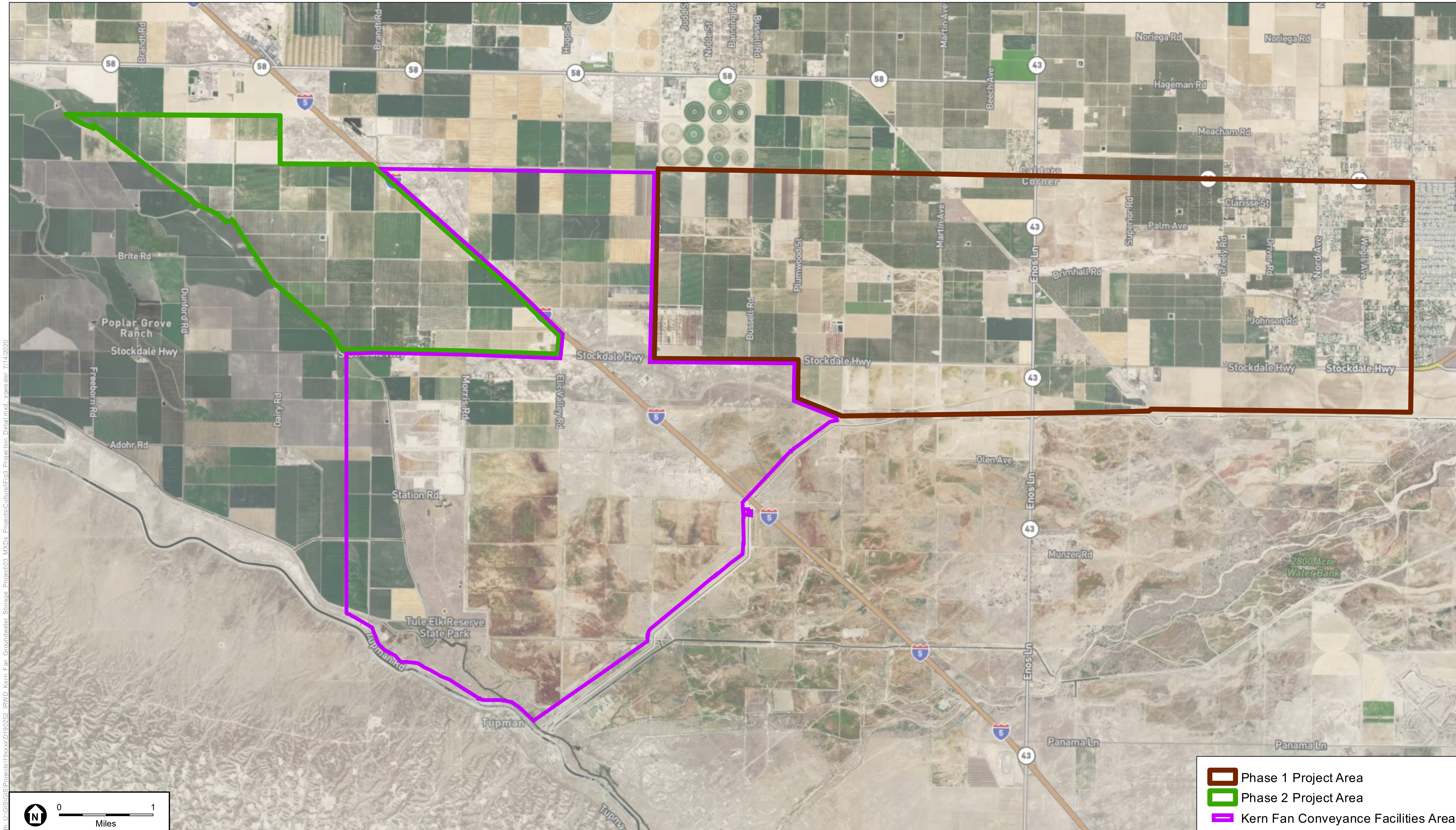
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

ESA 50 YEARS 1969-2019

626 Wilshire Boulevard
Suite 1100
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213.599.4300 phone
213.599.4301 fax

esassoc.com

July 23, 2020

Kenneth Woodrow, Chairperson
Wuksache Indian Tribe/Eshom Valley Band
1179 Rock Haven Ct.
Salinas, CA 93906

Subject: Proposed Kern Fan Groundwater Storage Project, Kern County, California

Dear Chairperson Woodrow:

Environmental Science Associates (ESA) has been retained by the Rosedale-Rio Bravo Water Storage District (Rosedale) and Irvine Ranch Water District (IRWD) to prepare an Environmental Impact Report (EIR)for the Kern Fan Groundwater Storage Project (proposed project) located in western Kern County and west of the City of Bakersfield. The proposed project would be carried out jointly by Rosedale and IRWD through the Groundwater Banking Joint Powers Authority.

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Cultural Resources Program Manager

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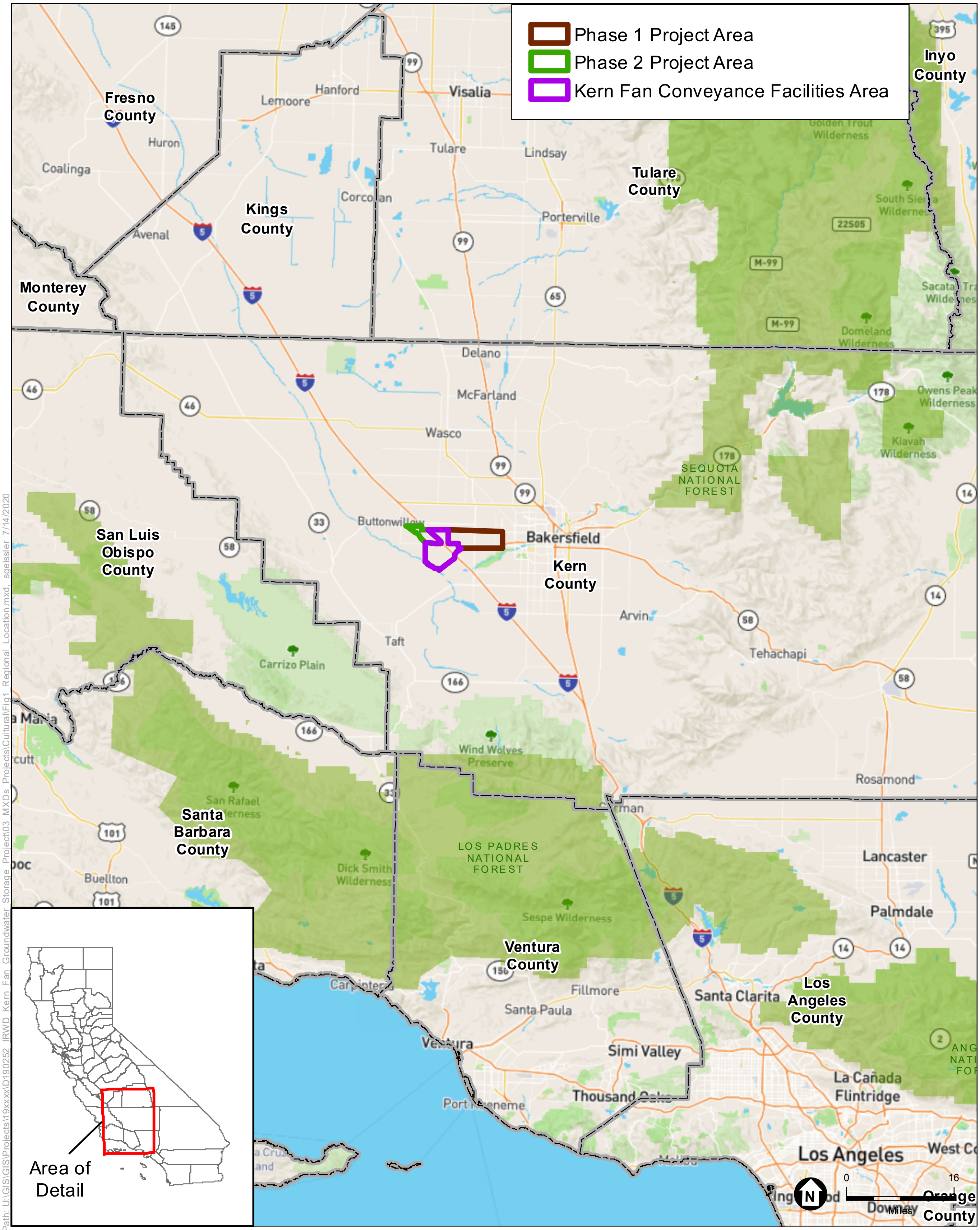

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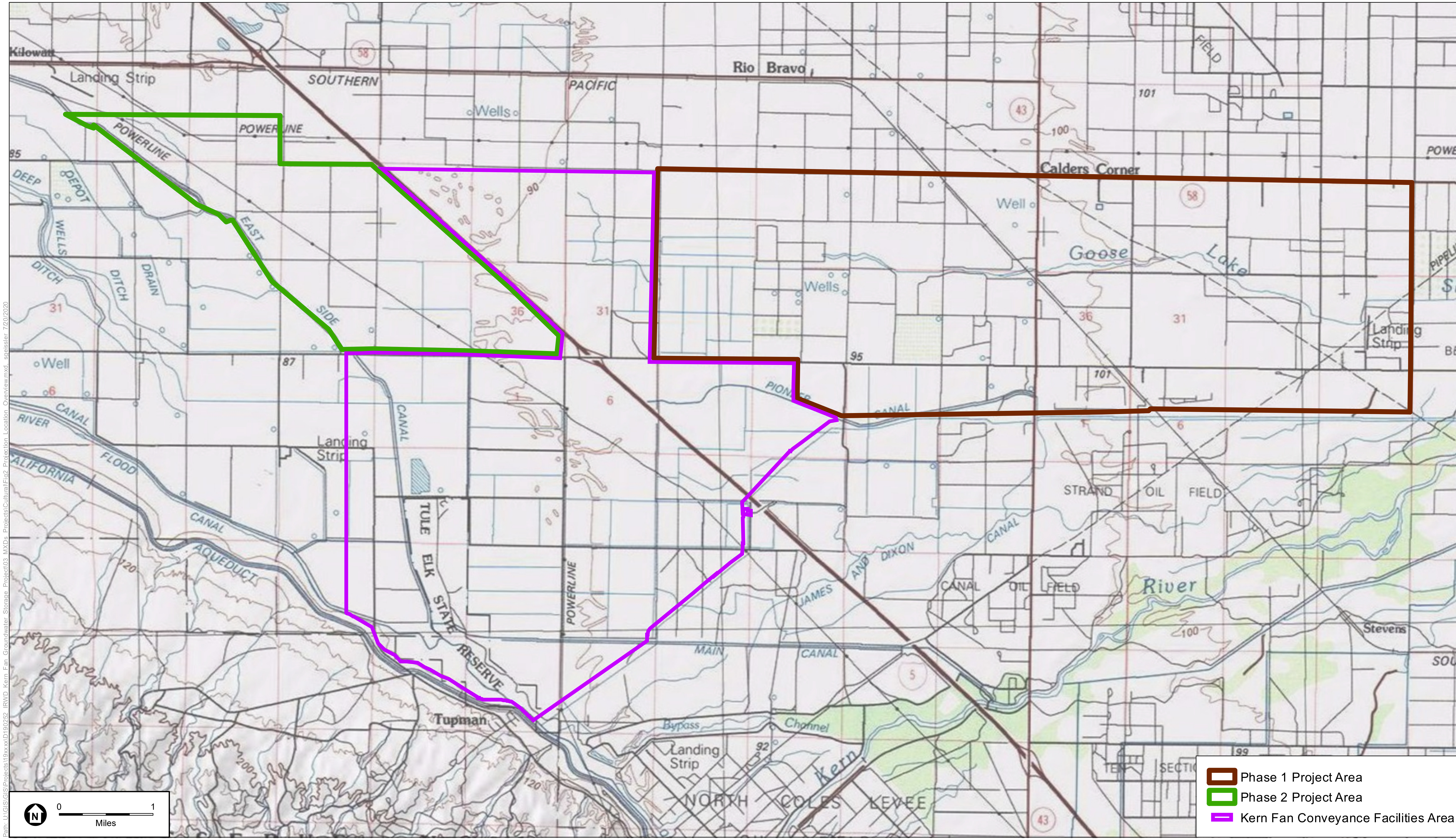
Kern Fan Groundwater Storage Project

Figure 1
Regional Location

ESA

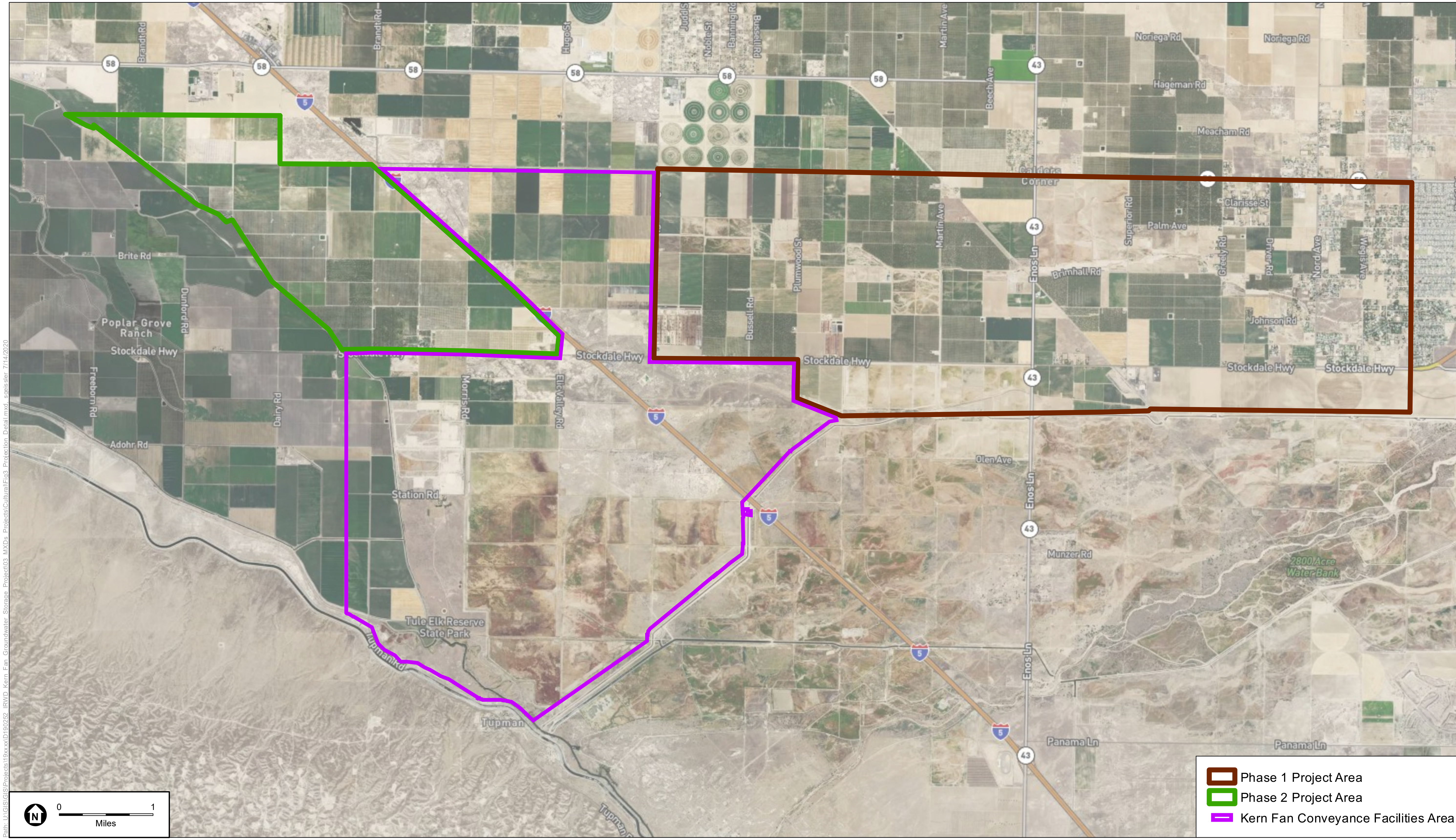


SOURCE: USGS Topographic Series (Buttonwillow, East Elk Hills, Rio Bravo, Rosedale, Stevens, Tupman, CA).

Kern Fan Groundwater Storage Project

Figure 2
Project Location – Overview

ESA



SOURCE: Mapbox, 2020.

Kern Fan Groundwater Storage Project

Figure 3
Project Detail

ESA

Appendix H
Hydrogeological Analysis

ESA

Technical Memorandum

To: Mr. Eric Averett
Rosedale-Rio Bravo Water Storage District

From: Thomas Harder, P.G., CH.G.
Thomas Harder & Co.

Date: 12-Oct-20

Re: Kern Fan Groundwater Storage Project – Hydrogeological Analysis

1. Introduction

This Technical Memorandum (TM) summarizes an analysis of potential groundwater level changes from proposed artificial recharge and recovery operations at the Kern Fan Groundwater Storage Project (the Project). The proposed Project includes facilities in three different areas within the western part of Rosedale-Rio Bravo Water Storage District's (RRBWSD's) service area: an eastern property in Section 29S/25E-33, a central property in sections 29S/24E-36 and 29S/25E-31, and a western property in sections 29S/24E-26, 27, 28 and 34 (see Figures 1 and 2). Facilities in each area include both spreading basins and recovery wells. The Project will be operated by the RRBWSD in cooperation with the Irvine Ranch Water District (IRWD).

This TM presents the results of a hydrogeological analysis to assess potential groundwater level impacts associated with managed recharge and groundwater recovery associated with the Project. The analysis was conducted using a calibrated numerical groundwater flow model previously developed to assess groundwater level changes in the area of banking projects along the lower Kern River.

1.1. Purpose and Scope

The purpose of the analysis presented herein is to:

1. Identify conceptual locations for recharge basins within the properties identified for the Project.
2. Estimate the annual recharge capacity of the proposed recharge facilities.

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3. Identify the location of extraction wells for the Project.
4. Evaluate potential changes in groundwater levels associated with recharge and recovery at the facilities.

The scope of work to address the objectives included:

1. Compiling and reviewing hydrogeological data for the immediate Project area.
2. Developing estimates of recharge capacity at the recharge basins.
3. Identifying the location and conceptual construction of new wells for use in analysis of groundwater level impacts.
4. Developing recharge and recovery scenarios for analysis.
5. Analyzing the scenarios using a calibrated groundwater flow model.
6. Evaluating potential groundwater level changes from model results.
7. Preparing this TM describing the analysis and summarizing the results.

1.2. Conceptual Project Description

The Project includes both recharge basins and extraction wells distributed within three properties in the western part of RRBWSD's service area as shown on Figure 2. The area for recharge basins is 1,200 acres of the properties. Groundwater recovery will be accomplished from 12 planned recovery wells. Water will be conveyed to the recharge basins and from the recovery wells via pipelines as shown Figure 2.

1.3. Analysis Methodology

Potential changes in groundwater levels predicted for Project recovery scenarios were analyzed using a calibrated numerical groundwater flow model. The groundwater model used for the analysis was previously developed to evaluate groundwater level changes in the vicinity of banking projects along the Kern River west of Bakersfield, California. The model was developed using MODFLOW, a block centered, finite difference groundwater flow modeling code developed by the United States Geological Survey (USGS) for simulating groundwater flow (McDonald and Harbaugh, 1988).[1] MODFLOW is one of the most widely used and critically accepted model codes available (Anderson and Woessner, 2002).[2]

[1] McDonald, M.G., and Harbaugh, A.W., 1988. A Modular Three-Dimensional Finite-Difference Ground-Water Flow Model: in Techniques of Water-Resources Investigations of the United States Geological Survey; Book 6 Modeling Techniques.
[2] Anderson, M.P., and Woessner, W.W., 2002. Applied Groundwater Modeling, Simulation of Flow and Advective Transport. Academic Press.

The original documentation for the model is presented in TH&Co (2011).[3] Since that time, the model has been updated, refined, and recalibrated. The version used for this analysis is calibrated through December 2018.

1.4. Types and Sources of Data

The calibrated groundwater flow model used in the analysis of groundwater level changes incorporates a comprehensive hydrogeological database of the Project Area, as summarized in TH&Co (2011).[3] The types of data used to develop the model included geology, soils/lithology, groundwater levels, hydrogeology, surface water hydrology, and groundwater recharge and pumping. Information regarding the Project areas was provided by RRBWSD. Future pipeline alignments were informed from Dee Jaspar (2020).[4]

[3] TH&Co., 2011. Hydrogeological Impact Evaluation Related to Operation of the Kern Water Bank and Pioneer Projects. Prepared for McMurtrey, Hartsock, & Worth and Rosedale-Rio Bravo Water Storage District, December 5, 2011.

[4] Dee Jaspar & Associates, 2020. Kern Fan Groundwater Storage Project – 30% Design Report. Prepared for Rosedale-Rio Bravo Water Storage District and Irvine Ranch Water District. Dated March 27, 2020.

2. Project Operational Parameters

2.1. Criteria for Identifying Recharge Basin Locations

The locations for recharge basins within the larger properties were identified to coincide with areas where available data indicates high infiltration potential and to minimize distance from the proposed distribution pipeline alignment (see Figure 3). Infiltration potential was assessed through the University of California at Davis' Soil Agricultural Groundwater Banking Index (SAGBI) that identifies favorable areas of recharge based on deep percolation potential, root zone residence time, topography, chemical limitations, and soil surface condition. The SAGBI zones for the Project area are shown on Figure 3. Recharge basins were sited to coincide with infiltration zones identified as "Excellent," "Good" or "Moderately Good" where possible. Infiltration potential in some of the recharge basin area in the western property is identified as "Moderately Poor," which could not be avoided to balance recharge potential with proximity to the proposed distribution pipeline.

2.2. Estimates of Maximum Annual Recharge Capacity

For this analysis, annual recharge capacity is defined as the maximum volume of water that the Project can infiltrate into the subsurface in a year. The recharge capacity was estimated based on the size of the facility (wetted area), the time available to accept water (assumed to be 10 months), and the infiltration rate. The wetted area is estimated to be 960 acres for the full project, which is 80 percent of the planned recharge basin area (1,200 acres) as provided by RRBWSD. The reduced wetted area accounts for berms, well pads, and other areas that will not be wetted and is consistent with other recharge projects in the vicinity.

Potential infiltration rates in the recharge basins were assigned based on infiltration rates measured in nearby existing recharge basins. The eastern and central basins were assigned an infiltration rate of 0.5 ft/day based on measured infiltration rates in RRBWSD's Mayer ponds. The infiltration rate for the western basins were assigned a value of 0.3 ft/day, which is consistent with infiltration rates previously measured in some of the northern Kern Water Bank basins.

Using the assumed infiltration rates and the wetted area for the Project, as described above, the resulting annual recharge capacity for the full project is approximately 117,400 acre-ft/yr (see Table 1).

2.3. Individual Well Pumping Rates

The potential pumping rate for individual Project wells was determined based on pumping rates for existing wells in the Project area. Individual well production rates in the Project area typically range from approximately 1,600 gallons per minute (gpm) to approximately 5,000 gpm. However, wells with both intermediate and deep perforated intervals (250 to 700 feet below ground surface; ft bgs) typically produce more than 3,000 gpm. For analysis purposes, it is assumed that each well will be perforated in both the intermediate and deep aquifer systems. Pumping rates were assigned to the 12 Project wells to enable recovery of 50,000 acre-ft in the first year of a two-year recovery cycle and 40,000 acre-ft in the second year (see Table 2). Assuming a 10-month recovery year, maximum simulated individual well pumping rates used for the groundwater level analysis were 3,090 gpm/well during the first recovery year and 2,473 gpm/well during the second recovery year.

3. Project Operational Scenarios for Analysis Using the Groundwater Flow Model

The Kern Fan Groundwater Storage Project is located in the western part of RRBWSD's service area. Existing recharge and recovery operations are already occurring to the south (Kern Water Bank) and east of the Project area (RRBWSD Drought Relief Project). In addition, there is ongoing groundwater production in the area to supply agriculture and municipal demands. For this analysis, monthly artificial recharge and groundwater production for the Project was superimposed on a portion of the historical groundwater record that represents a potential range of groundwater level conditions that could be expected in the future. Significant changes in groundwater levels have occurred during the various recharge and recovery cycles in the Project area since 1995 when the Kern Water Bank began operations (see Figure 4). In the past 10 years, groundwater levels have fluctuated as much as 50 ft between 2013 (high groundwater condition) and 2016 (low groundwater condition). For Model simulations, this period of extreme groundwater level fluctuations was selected as the baseline conditions upon which to superimpose Project recharge and recovery in order to simulate the greatest potential cumulative groundwater level impact at existing wells, the Eastside Canal and the Cross Valley Canal (CVC).

3.1. Baseline Groundwater Level Conditions

The baseline condition for this analysis is the historical groundwater condition for the calibrated groundwater flow model. This baseline condition includes all historical hydrological conditions, including recharge and recovery from other projects (e.g. KWB, Pioneer Project, Strand Ranch, etc.), which resulted in the calibrated groundwater levels in the model.

3.2. Project Operational Scenarios

Project-related groundwater recharge and pumping was superimposed on the Baseline condition in accordance with the Project scenarios summarized in Table 2. Project recharge was introduced into the model for the historical period from March 2012 through December 2012 to simulate high groundwater conditions (see Figure 4). The maximum capacity of the basins (combined total of 117,413 acre-ft) was recharged in the model during this period. Groundwater recovery was simulated over two 10-month periods overlapped on March 2015 through December 2015 and March 2016 through December 2016 groundwater level conditions. A total of 90,000 acre-ft of groundwater was recovered during this time (see Table 2).

4. Findings

4.1. Predicted Changes in Groundwater Levels During Maximum Recharge Mounding

During the recharge cycle (March 2012 through December 2012), as much as approximately 110 ft of groundwater mounding is simulated to occur in the shallow/intermediate aquifer in the central portion of the Project (see Figure 5). During maximum mounding, groundwater levels in the central basin are within approximately 64 ft of the land surface. Maximum Project mounding in the deep aquifer is approximately 45 ft relative to baseline conditions (see Figure 6). Maximum mounding in the deep aquifer is spread out beneath the western and central basins.

4.2. Predicted Changes in Groundwater Levels During Recovery

Maximum groundwater level decline from Project recovery, relative to the baseline condition, is predicted to occur primarily in the western Project area where most of the Project extraction wells are located. Maximum drawdown at the Project pumping wells is predicted to be on the order of approximately 30 ft in the shallow/intermediate aquifer (see Figure 7) and approximately 28 ft in the deep aquifer (see Figure 8). Maximum pumping interference at the nearest existing project and private wells is predicted to be approximately 22 ft and occur in the deep aquifer in the western portion of the Project area (see Figure 8).

4.3. Cumulative Changes in Groundwater Levels During Recovery

In addition to evaluating the Project impact on groundwater levels for existing private wells and other banking project wells based on historical operations, TH&Co evaluated the cumulative pumping drawdown predicted for nearby private and project wells that could result when the nearby Drought Relief Project (DRP) and Stockdale Integrated Project are operating at full capacity in the future. Groundwater level impacts from the DRP and Stockdale Integrated Projects were reported in TH&Co (2015).[5] The drawdown from these projects and the drawdown from the Kern Fan Groundwater Storage Project are additive in accordance with the principle of superposition. Thus, the sum of the drawdowns from each individual project at any given point is the total drawdown that can be expected at that point. Based on this, the maximum cumulative pumping interference from all projects occurs at 29S/24E-28A61 where cumulative drawdown is predicted to be approximately 20 ft in the shallow/intermediate aquifer (see Figure 9) and 22 ft in the deep aquifer (see Figure 10). At the existing DRP project well WB-1, the maximum total pumping interference from all projects is approximately 53 ft (see Figure 10). The predicted

[5] TH&Co, 2015. 2014 Drought Relief Project – Supplemental Analysis. Model Analysis Figures Submitted on June 19, 2015.

maximum cumulative pumping interference at the nearest other banking project well (WKWD NW 1) is 16 feet (see Figure 10). Predicted cumulative interference at the nearest Kern Water Bank well (30S/25E-06K01) is 20.5 ft.

4.4. Predicted Project Groundwater Levels Relative to Sustainable Management Criteria

TH&Co compared the projected groundwater levels during simulated Project recovery under historical low groundwater conditions to the Minimum Thresholds established for the Rosedale-Rio Bravo Management Area (RRBMA) in the Kern Groundwater Authority Groundwater Sustainability Plan (GSP) established under the 2014 Sustainable Groundwater Management Act (SGMA). The deepest projected groundwater levels for the Intermediate Aquifer at designated RRBMA monitoring wells are shown on Figure 11 and the deepest projected groundwater levels for the Deep Aquifer at the same wells are shown on Figure 12. As shown on Figure 11, the deepest simulated Project groundwater levels in the Intermediate Aquifer are not projected to exceed the Minimum Thresholds at RRBMA monitoring wells (see Attachment A) although groundwater levels immediately west of the western basins and in between the central and eastern basins approach the Minimum Thresholds. Projected Project groundwater levels in the Deep Aquifer during maximum pumping drawdown slightly exceed the Minimum Threshold at the westernmost RRBMA monitoring well and are at the Minimum Threshold at the monitoring well between the central and eastern Project basins (see Figure 12).

5. Conclusions

The following summarizes the findings that have been developed based on the analysis of Project recharge and recovery scenarios:

1. Based on infiltration rates estimated from recharge operational data at the adjacent banking facilities, the maximum estimated recharge capacity of Project facilities is approximately 117,400 acre-ft/yr.
2. Groundwater levels predicted for maximum mounding conditions are not anticipated to rise to levels that would damage existing canals or cause a liquefaction hazard. In general, maintaining groundwater levels below 50 ft bgs will be protective of liquefaction during an earthquake.[6] Further geotechnical studies in the Kern Water Bank area have shown that groundwater levels below 15 ft bgs are protective of liquefaction.[7] Model simulations for this Project show that groundwater levels remain below approximately 64 ft bgs during maximum mounding.
3. Project groundwater pumping is predicted to result in up to 22 ft of additional drawdown at the nearest existing private well. This drawdown is cumulative with anticipated DRP and Stockdale Integrated Banking project pumping.
4. Project groundwater pumping is predicted to result in up to ten feet of additional drawdown at the nearest banking project well (WKWD NW-1) and a cumulative of up to 16 feet of drawdown at this well when the DRP and Stockdale Integrated Banking project are taken into account.
5. Project groundwater pumping is predicted to result in up to six feet of additional drawdown at the nearest Kern Water Bank well (30S/25E-06K01) and a cumulative of up to approximately 21 ft of drawdown at this well when the DRP and Stockdale projects are included.
6. Project groundwater pumping is predicted to lower groundwater levels in the Deep Aquifer to the established Minimum Thresholds at the RRBMA monitoring well immediately west of the western Project recharge basin and the RRBMA monitoring well in between the central and eastern Project recharge basin. Criteria to establish these Minimum Thresholds were based, in part, on the potential to produce groundwater with elevated arsenic concentrations when the groundwater level was drawn below them. In order to avoid the undesirable result of producing groundwater level with arsenic concentrations above the Maximum Contaminant Level, Project management actions (e.g. limiting groundwater

[6] Martin, G.R., and Lew M., eds, 1999. Recommended Procedures for Implementation of DMG Special Publication 117: Guidelines for Analyzing and Mitigating Liquefaction Hazards in California. Southern California Earthquake Center – University of Southern California.

[7] Krazen & Associates, 2013. *Soil Liquefaction Evaluation for the Proposed McAllister Ranch Irrgation District – James Project, Panama Lane, Kern County, California*. Dated March 13, 2012.

pumping or wellhead treatment) may be necessary when groundwater levels are at the Minimum Thresholds.

Table 1

Kern Fan Groundwater Storage Project
Annual Recharge Capacity Estimates

	Basin			
	West Basin	Central Basin	East Basin	Total
Total Basin Size (acres)[1]	475	386	98	960
Estimated Infiltration Rate (ft/day)	0.3	0.5	0.5	NA
Monthly Infiltration Capacity (acre-ft/month)[2]	4,348	5,893	1,501	11,741
Annual Infiltration Capacity (acre-ft/yr)	43,481	58,926	15,006	117,413

Notes:

[1]Estimated as 80% of the property.

[2]acre-ft = acre-feet.

NA = Not applicable.

Table 2

Kern Fan Groundwater Storage Project
Summary of Operational Scenario

Facility	Recharge			Recovery		
	Amount Recharged (acre-ft)[1]	Total Recharged (acre-ft/yr)	Simulated Period of Recharge	Total Recovered (acre-ft/yr)[2]	Total Recovered (acre-ft)	Period of Recovery
West Basin	43,481	117,413	Mar 2012 - Dec 2012	50,000, 40,000	90,000	Mar 2015 - Dec 2015, Mar 2016 - Dec 2016
Central Basin	58,926					
East Basin	15,006					

Notes:

[1] Assumes 80% of the total property.

[2] Assumes 70% utility.

Rosedale-Rio Bravo Water Storage District / Irvine Ranch Water District

Kern Fan Groundwater Storage Project

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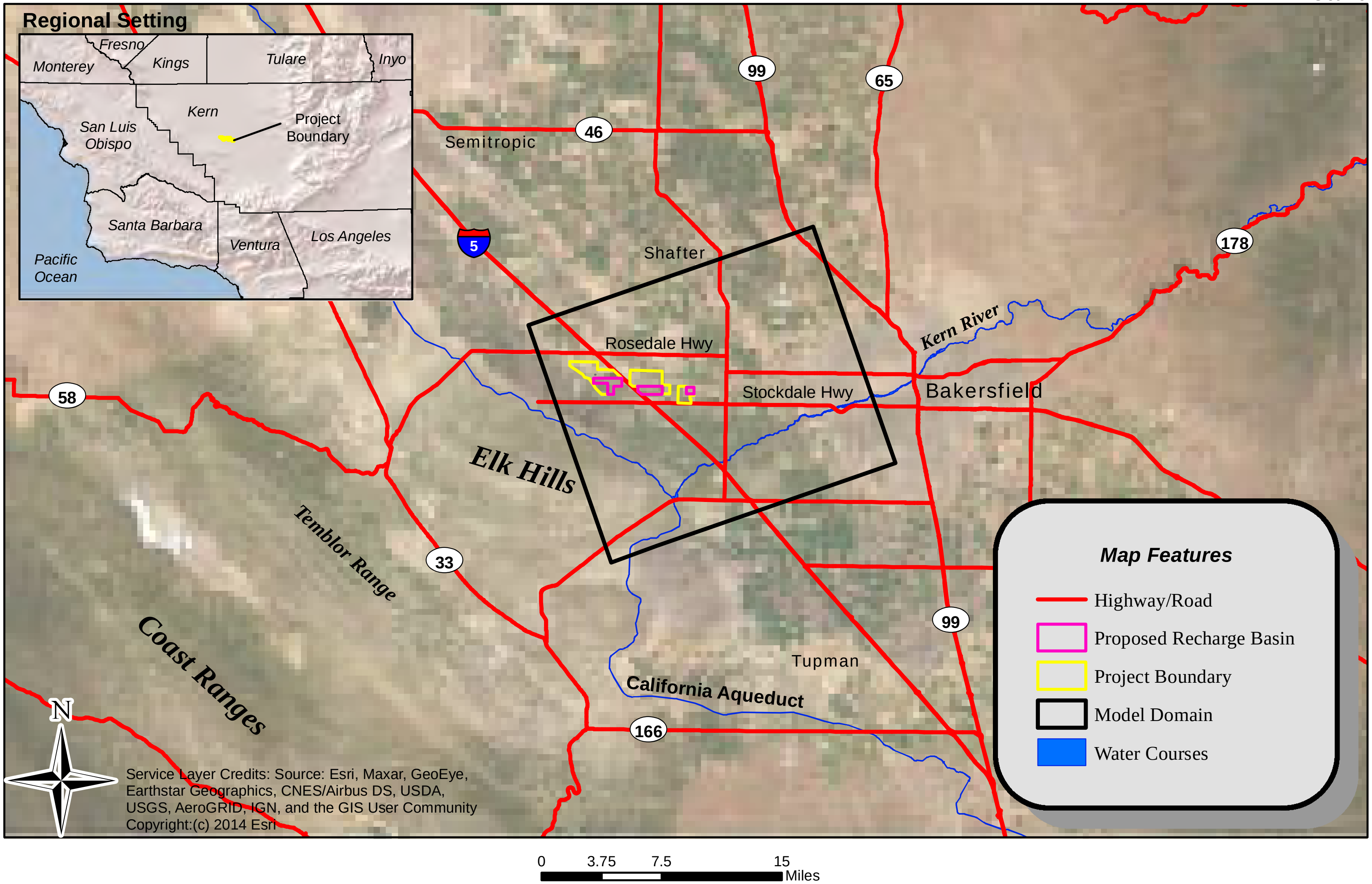

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Study Area

Figure 1

Rosedale-Rio Bravo Water Storage District / Irvine Ranch Water District

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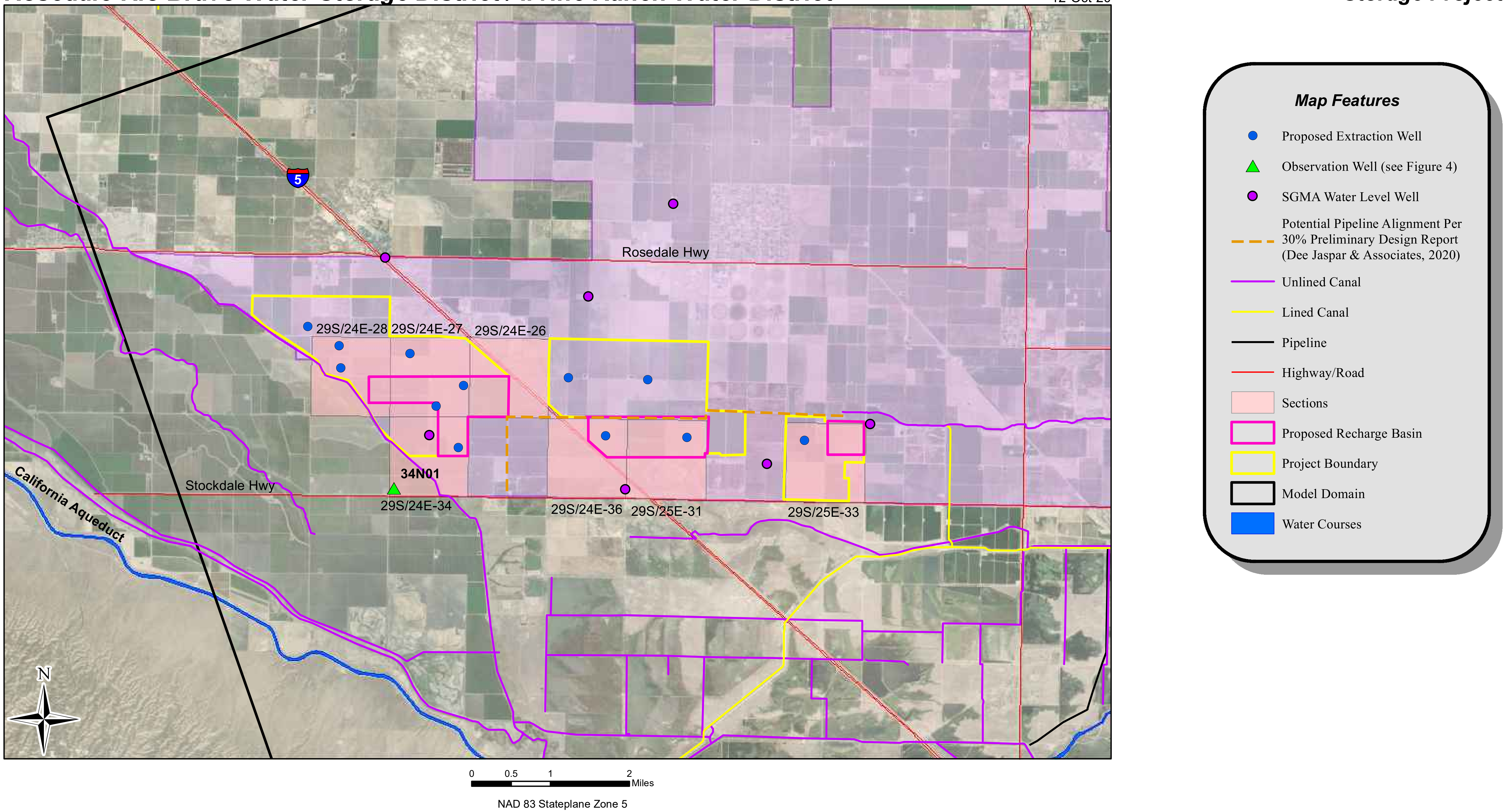
Kern Fan Groundwater Storage Project



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Proposed Project Facilities

Figure 2

Rosedale-Rio Bravo Water Storage District / Irvine Ranch Water District

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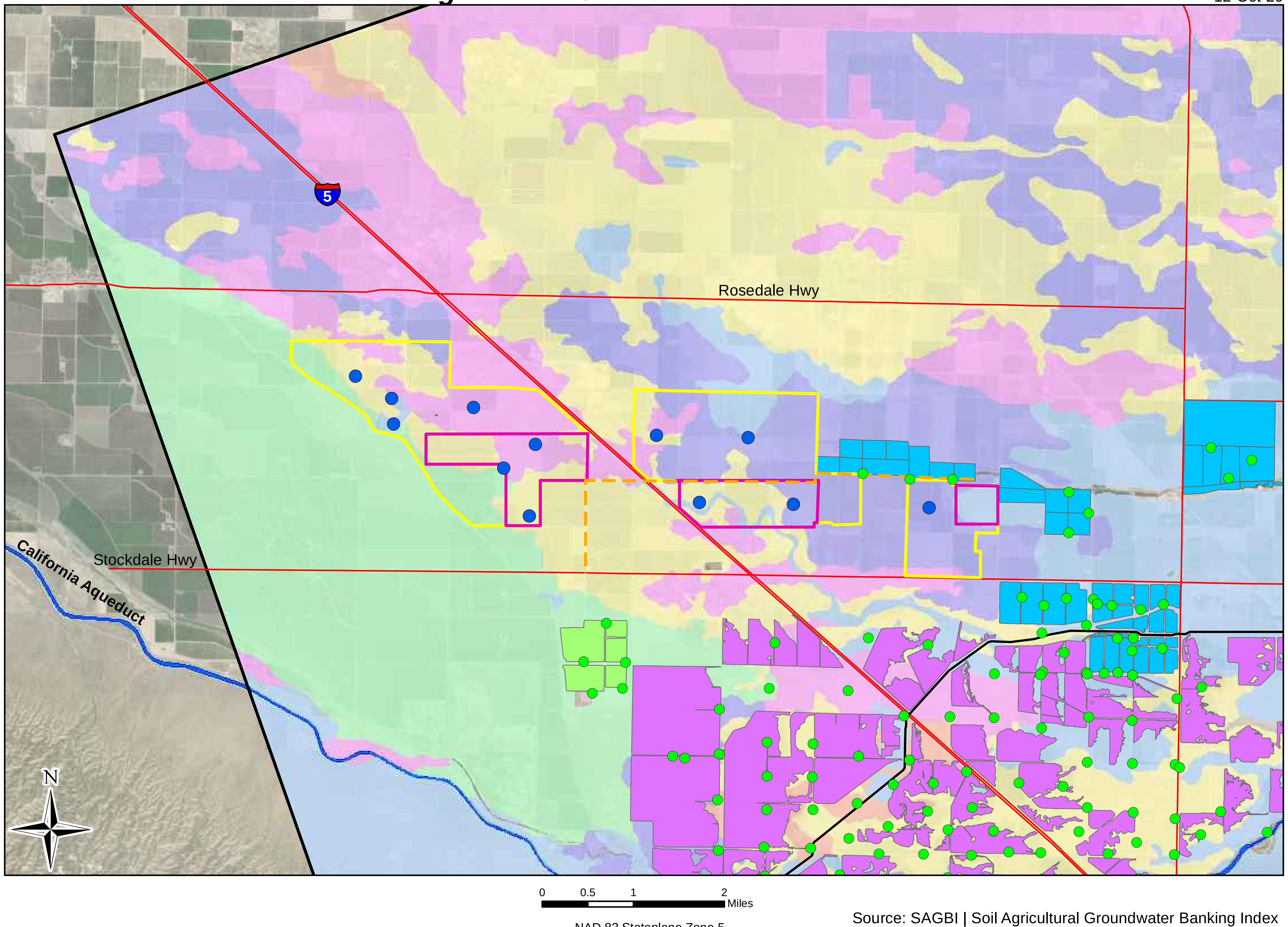
Kern Fan Groundwater Storage Project



Map Features

- Existing Project Well
- Proposed Extraction Well
- Potential Pipeline Alignment Per 30% Preliminary Design Report (Dee Jaspar & Associates, 2020)

SAGBI Index

- Excellent
- Good
- Moderately Good
- Moderately Poor
- Poor
- Very Poor
- Proposed Recharge Basin
- Project Property
- Kern Water Bank Recharge Basin
- RRBWSD Recharge Basin
- West Kern Water District Recharge Basin
- Model Domain
- Water Courses
- Highway/Road

The Soil Agricultural Groundwater Banking Index (SAGBI) is a suitability index for groundwater recharge on agricultural land. It is based on five factors: deep percolation, root zone residence time, topography, chemical limitations, and soil surface condition.

Source: SAGBI | Soil Agricultural Groundwater Banking Index interactive map. https://casoilresource.lawr.ucdavis.edu/sagbi/

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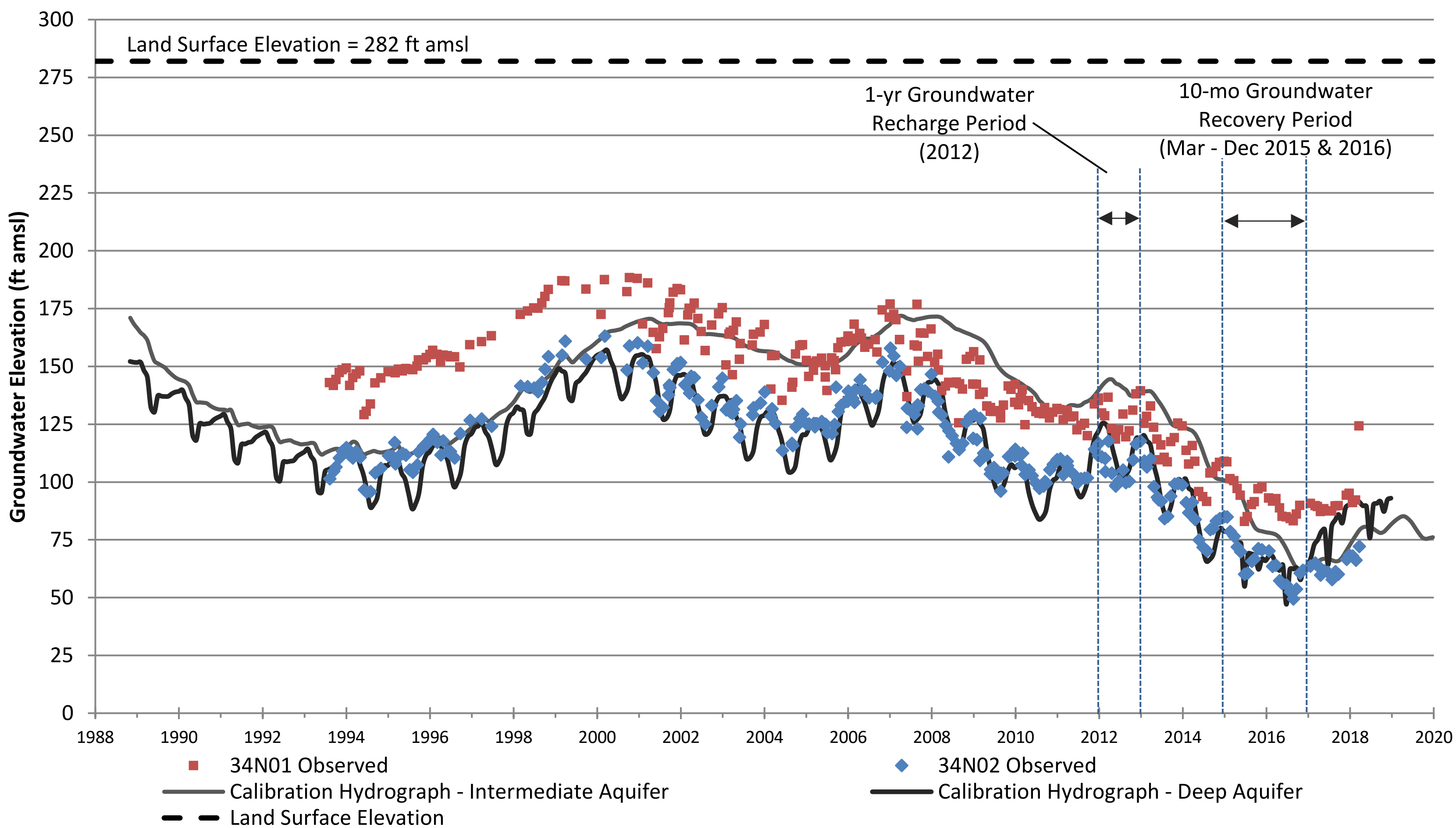
Recharge Basins and Favorable Areas for Recharge

Figure 3

Rosedale Rio-Bravo Water Storage District
Irvine Ranch Water District
Kern Fan Groundwater Banking Project

Figure 4

Hydrologic Conditions for Recharge and Recovery Periods
Baseline Hydrograph - 29S/24E-34N



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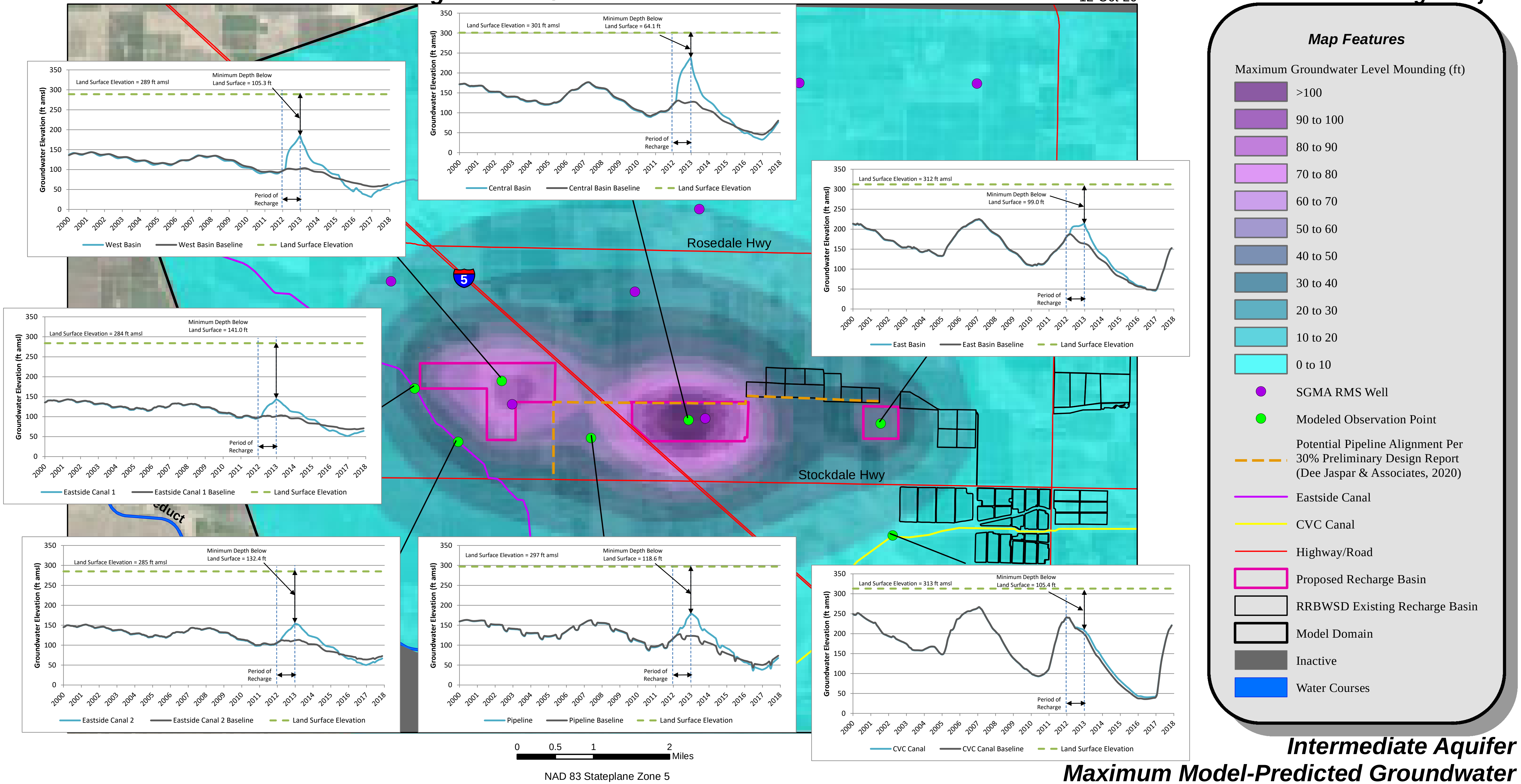
Rosedale-Rio Bravo Water Storage District / Irvine Ranch Water District

12-Oct-20

Kern Fan Groundwater Storage Project



Intermediate Aquifer Maximum Model-Predicted Groundwater Recharge Mounding - December 2012

Figure 5

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Rosedale-Rio Bravo Water Storage District / Irvine Ranch Water District

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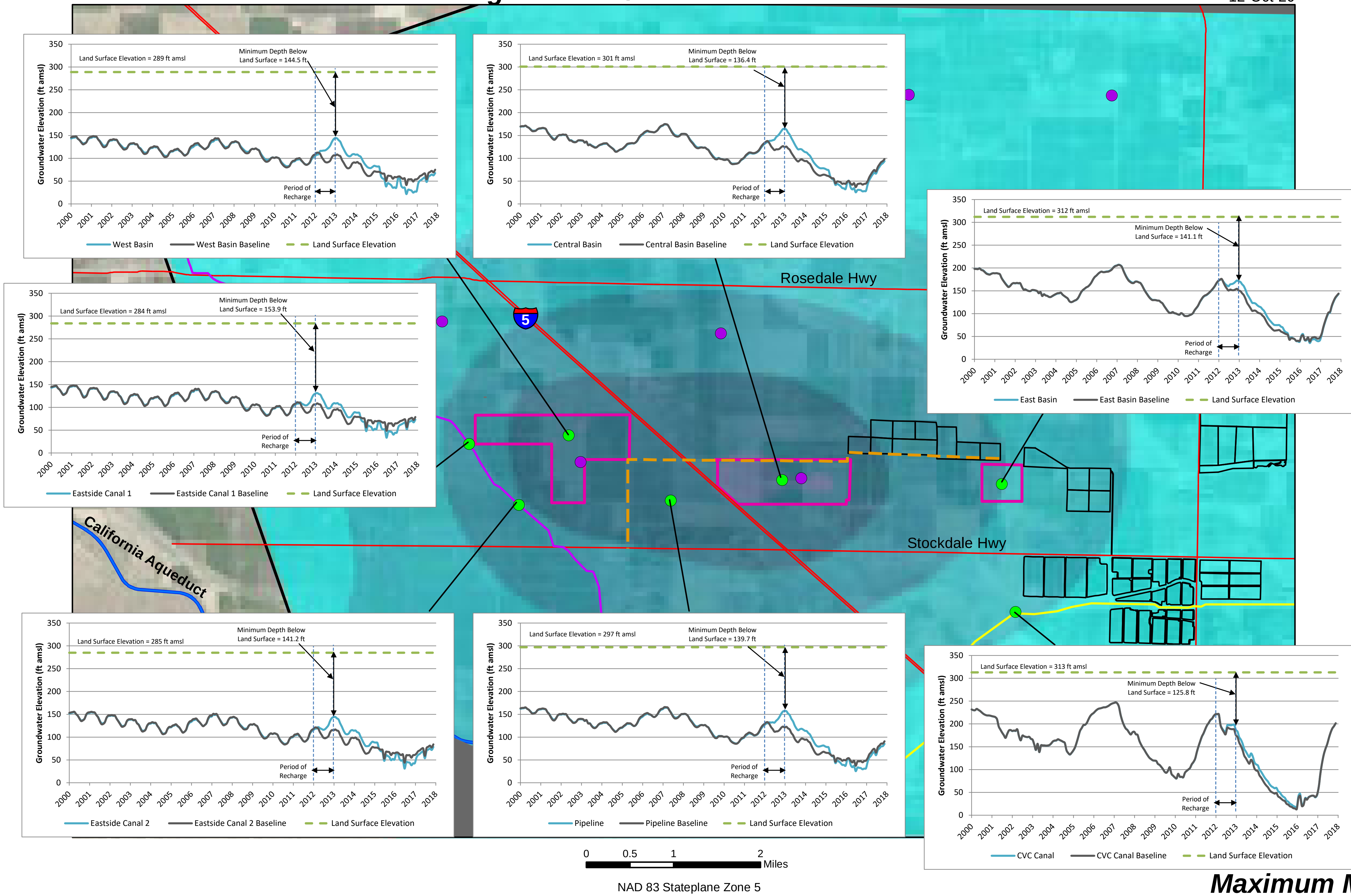
Kern Fan Groundwater Storage Project



Map Features

Maximum Groundwater Level Mounding (ft)

- >100
- 90 to 100
- 80 to 90
- 70 to 80
- 60 to 70
- 50 to 60
- 40 to 50
- 30 to 40
- 20 to 30
- 10 to 20
- 0 to 10
- SGMA RMS Well
- Modeled Observation Point
- Potential Pipeline Alignment Per 30% Preliminary Design Report (Dee Jaspar & Associates, 2020)
- Eastside Canal
- CVC Canal
- Highway/Road
- Proposed Recharge Basin
- RRBWSD Existing Recharge Basin
- Model Domain
- Inactive
- Water Courses

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Deep Aquifer
Maximum Model-Predicted Groundwater Recharge Mounding - December 2012

Figure 6

Kern Fan Groundwater Storage Project

Rosedale-Rio Bravo Water Storage District / Irvine Ranch Water District

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Map Features

Maximum Groundwater Level Drawdown (ft)

- 0 to 10
- 0 to -10
- -10 to -20
- -20 to -30
- < -30
- SGMA RMS Well
- Proposed Extraction Well
- Modeled Observation Point
- Potential Pipeline Alignment Per 30% Preliminary Design Report (Dee Jaspar & Associates, 2020)
- Eastside Canal
- CVC Canal
- Highway/Road
- Proposed Recharge Basin
- RRBWSD Existing Recharge Basin
- Model Domain
- Inactive
- Water Courses

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Intermediate Aquifer Maximum Model-Predicted Groundwater Pumping Drawdown December 2016

Figure 7

Kern Fan Groundwater Storage Project

Rosedale-Rio Bravo Water Storage District / Irvine Ranch Water District

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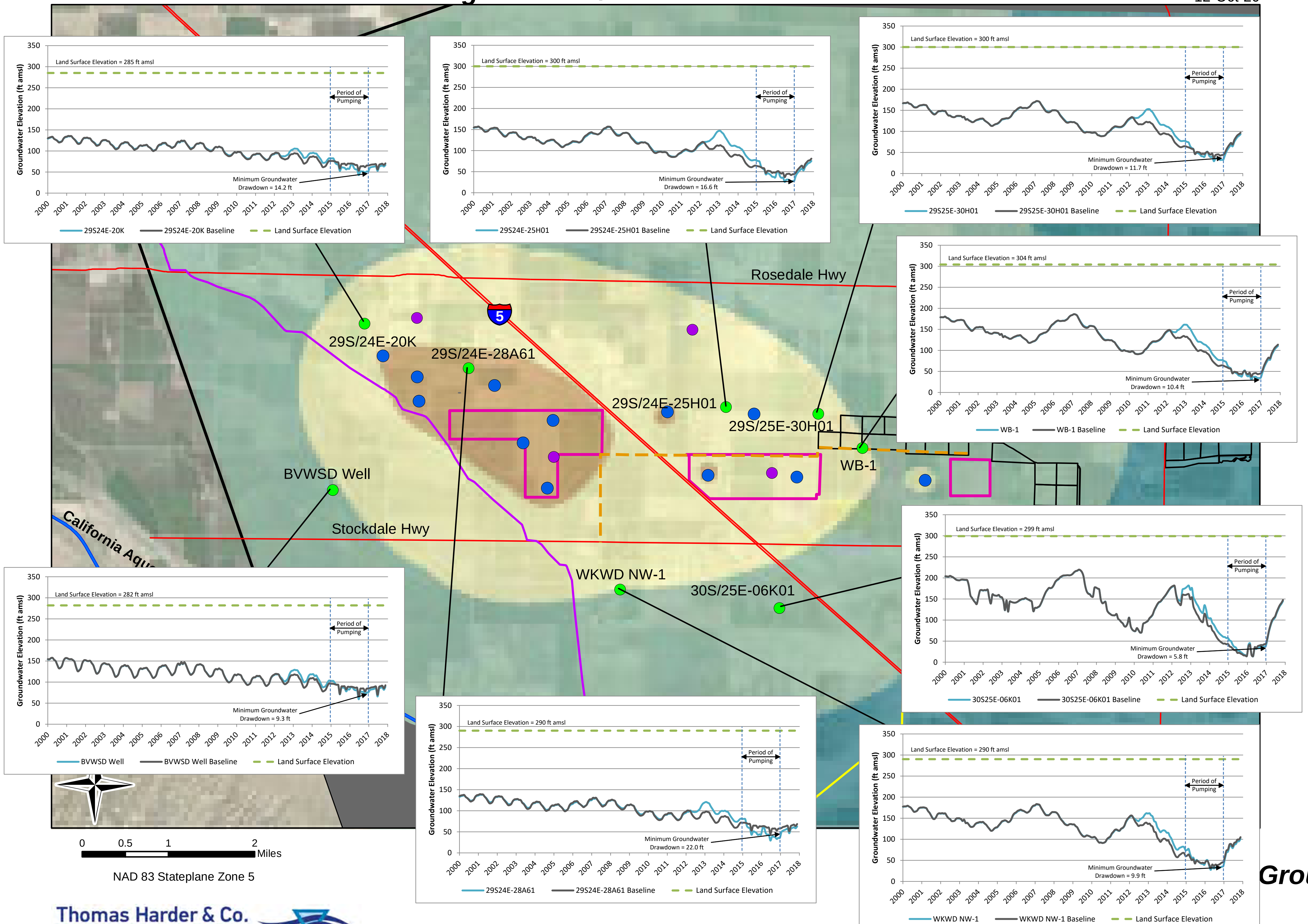

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Map Features

Maximum Groundwater Level Drawdown (ft)

- 0 to 10
- 0 to -10
- -10 to -20
- -20 to -30
- < -30
- SGMA RMS Well
- Proposed Extraction Well
- Modeled Observation Point
- Potential Pipeline Alignment Per 30% Preliminary Design Report (Dee Jaspar & Associates, 2020)
- Eastside Canal
- CVC Canal
- Highway/Road
- Proposed Recharge Basin
- RRBWSD Existing Recharge Basin
- Model Domain
- Inactive
- Water Courses

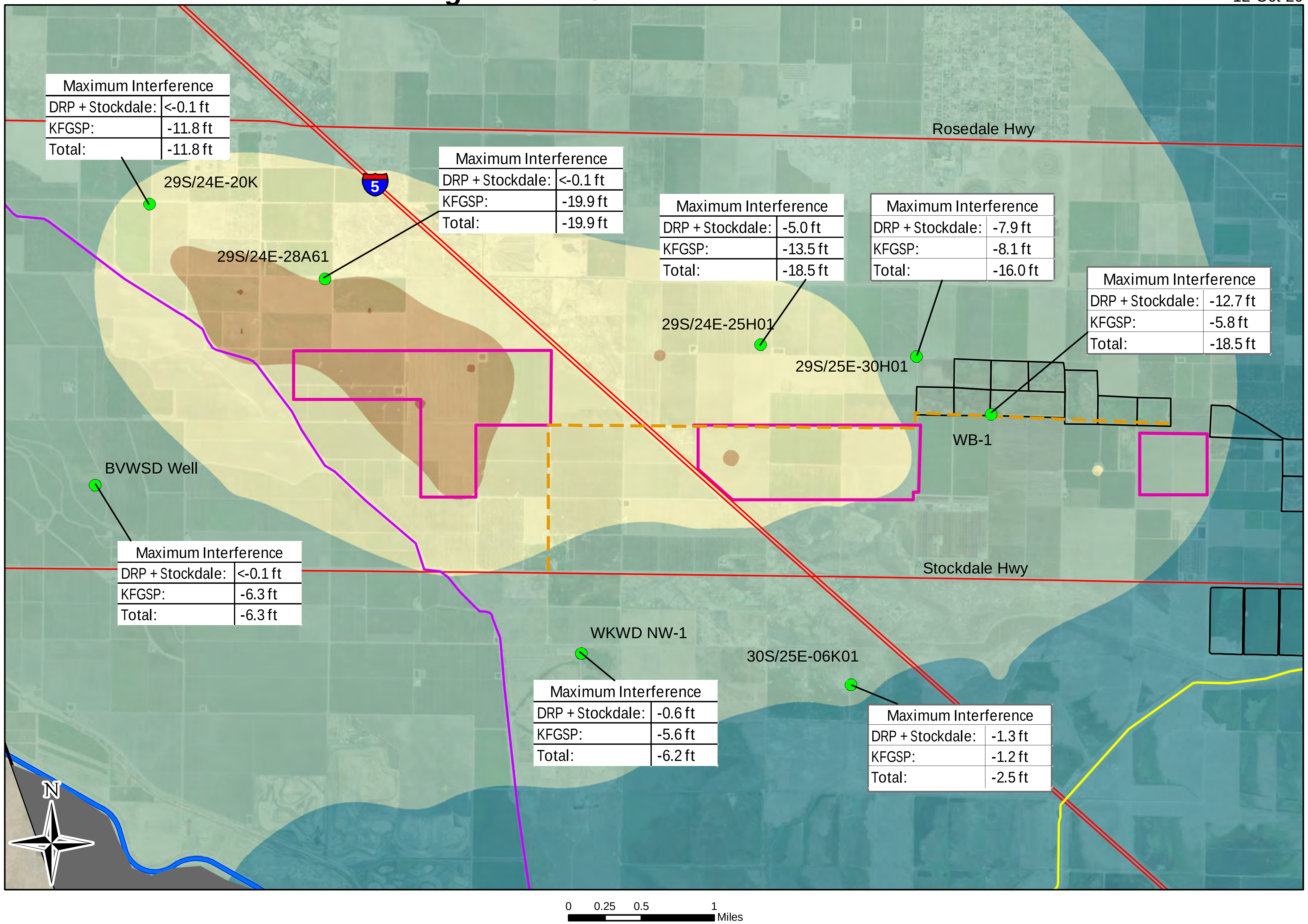
Deep Aquifer Maximum Model-Predicted Groundwater Pumping Drawdown December 2016

Figure 8

Rosedale-Rio Bravo Water Storage District / Irvine Ranch Water District

12-Oct-20

Kern Fan Groundwater Storage Project



NAD 83 Stateplane Zone 5

Map Features

Maximum Groundwater Level Drawdown (ft)

- 0 to 10
- 0 to -10
- -10 to -20
- -20 to -30
- < -30
- Modeled Observation Point
- Potential Pipeline Alignment Per 30% Preliminary Design Report (Dee Jaspar & Associates, 2020)
- Eastside Canal
- CVC Canal
- Highway/Road
- Proposed Recharge Basin
- RRBWSD Existing Recharge Basin
- Model Domain
- Inactive
- Water Courses

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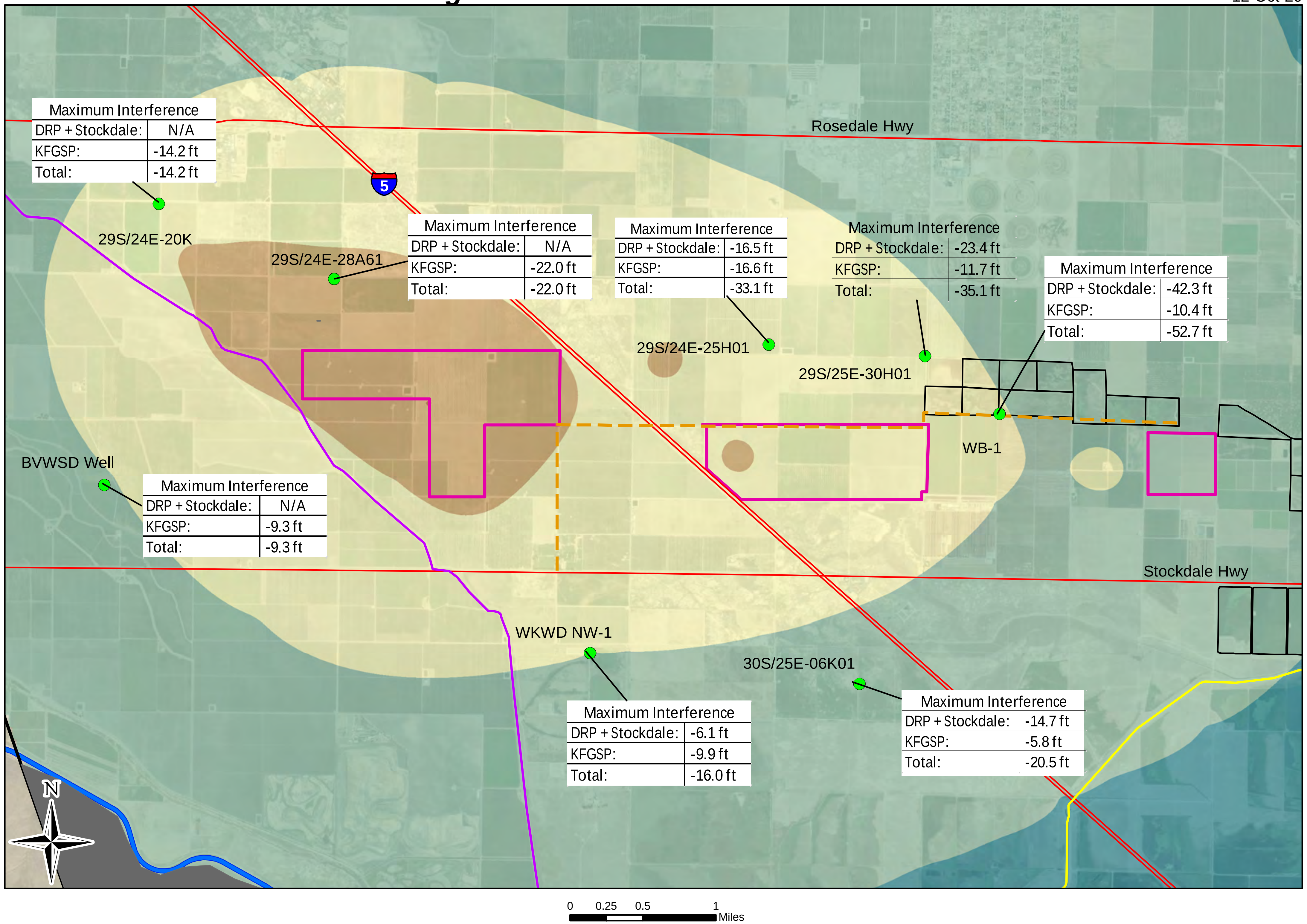
Intermediate Aquifer Maximum Cumulative Model-Predicted Pumping Interference

Figure 9

Kern Fan Groundwater Storage Project

Rosedale-Rio Bravo Water Storage District / Irvine Ranch Water District

12-Oct-20



NAD 83 Stateplane Zone 5

Map Features

Maximum Groundwater Level Drawdown (ft)

- 0 to 10
- 0 to -10
- -10 to -20
- -20 to -30
- < -30
- Modeled Observation Point
- Potential Pipeline Alignment Per 30% Preliminary Design Report (Dee Jaspar & Associates, 2020)
- Eastside Canal
- CVC Canal
- Highway/Road
- Proposed Recharge Basin
- RRBWSD Existing Recharge Basin
- Model Domain
- Inactive
- Water Courses

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Deep Aquifer Maximum Cumulative Model-Predicted Pumping Interference

Figure 10

Kern Fan Groundwater Storage Project

Rosedale-Rio Bravo Water Storage District / Irvine Ranch Water District

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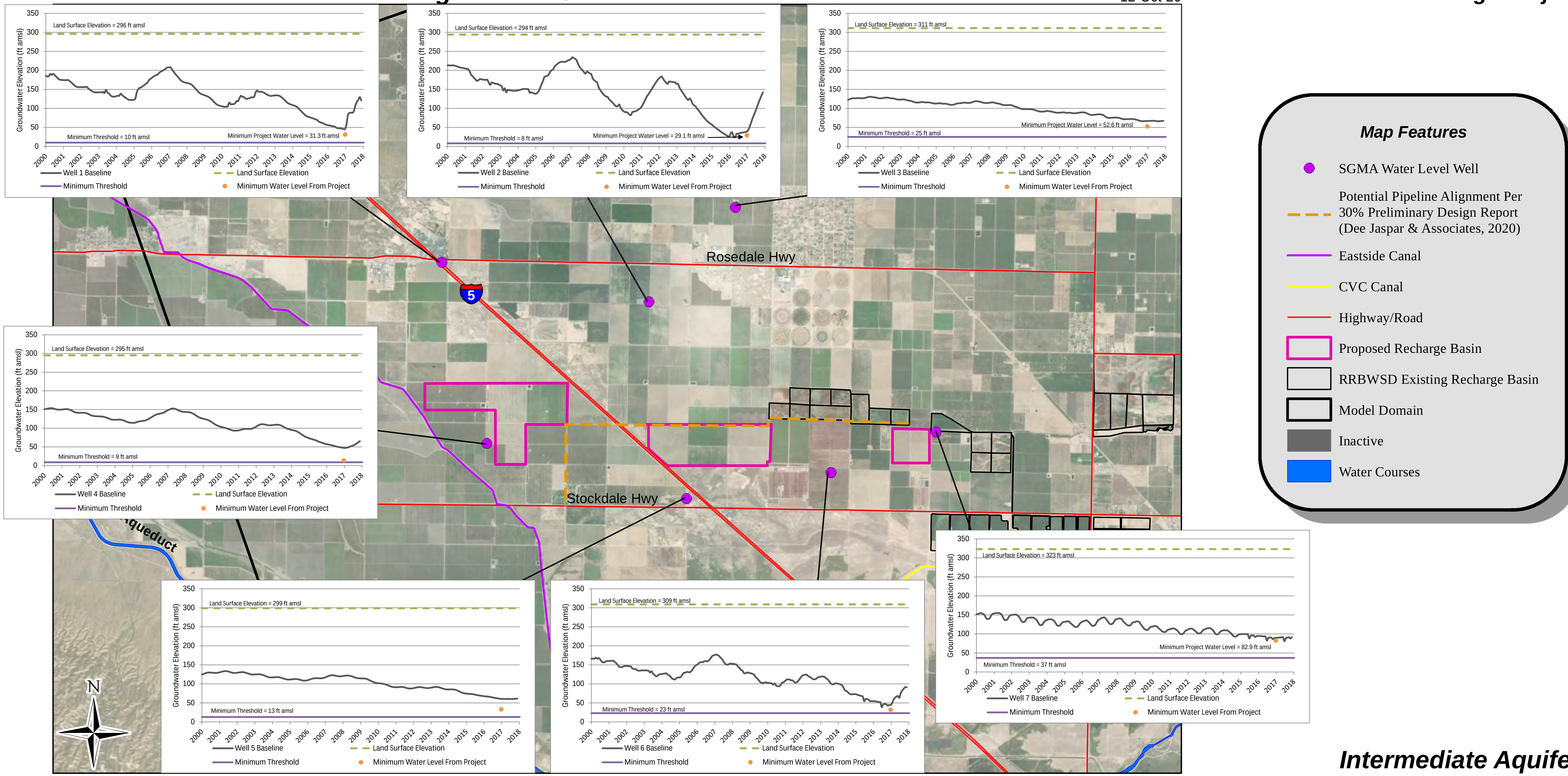

0 0.5 1 2 Miles

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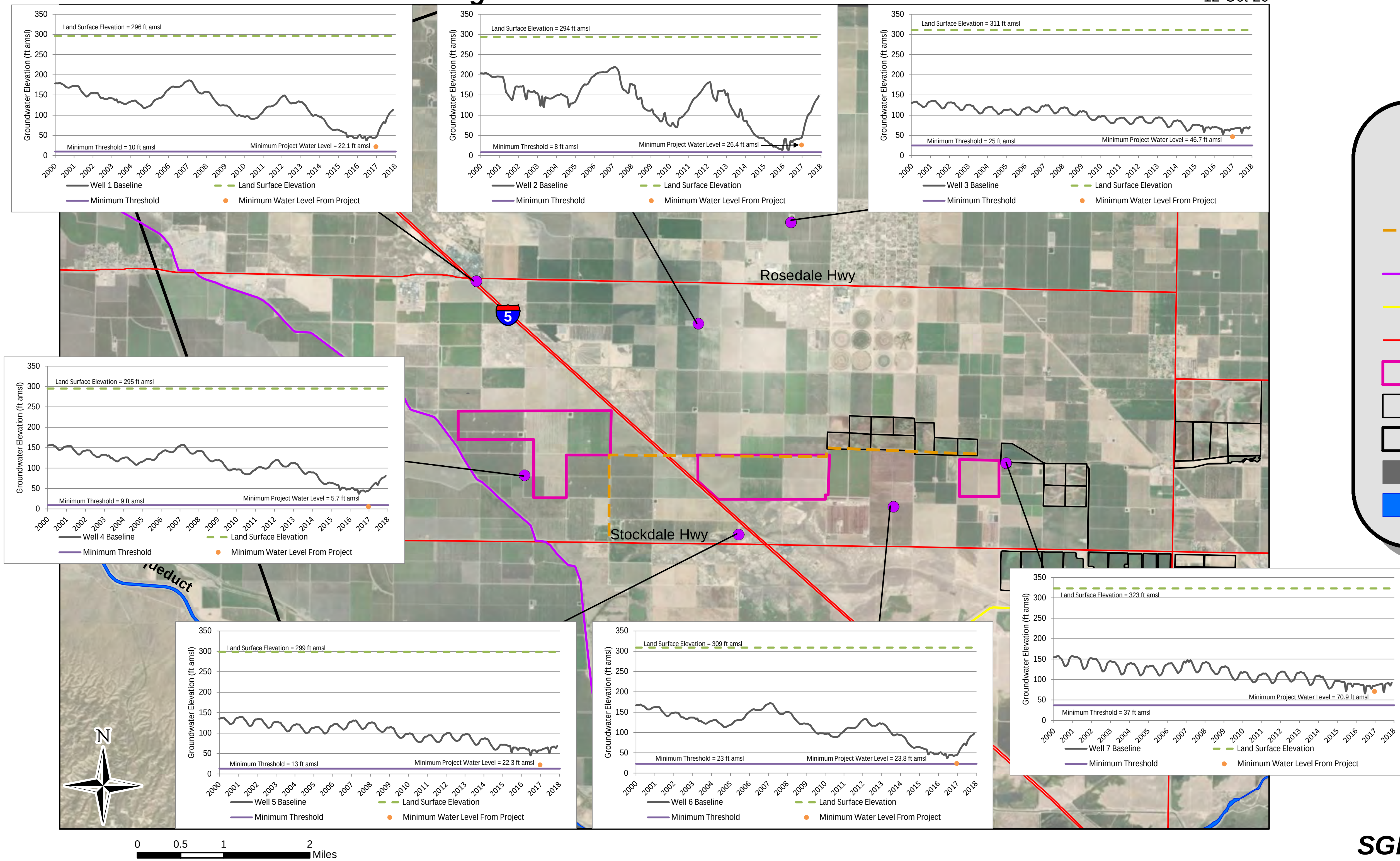
Intermediate Aquifer SGMA Minimum Threshold Project Impacts December 2016

Figure 11

Kern Fan Groundwater Storage Project

Rosedale-Rio Bravo Water Storage District / Irvine Ranch Water District

12-Oct-20



NAD 83 Stateplane Zone 5

Map Features

- SGMA Water Level Well
- Potential Pipeline Alignment Per 30% Preliminary Design Report (Dee Jaspar & Associates, 2020)
- Eastside Canal
- CVC Canal
- Highway/Road
- Proposed Recharge Basin
- RRBWSD Existing Recharge Basin
- Model Domain
- Inactive
- Water Courses

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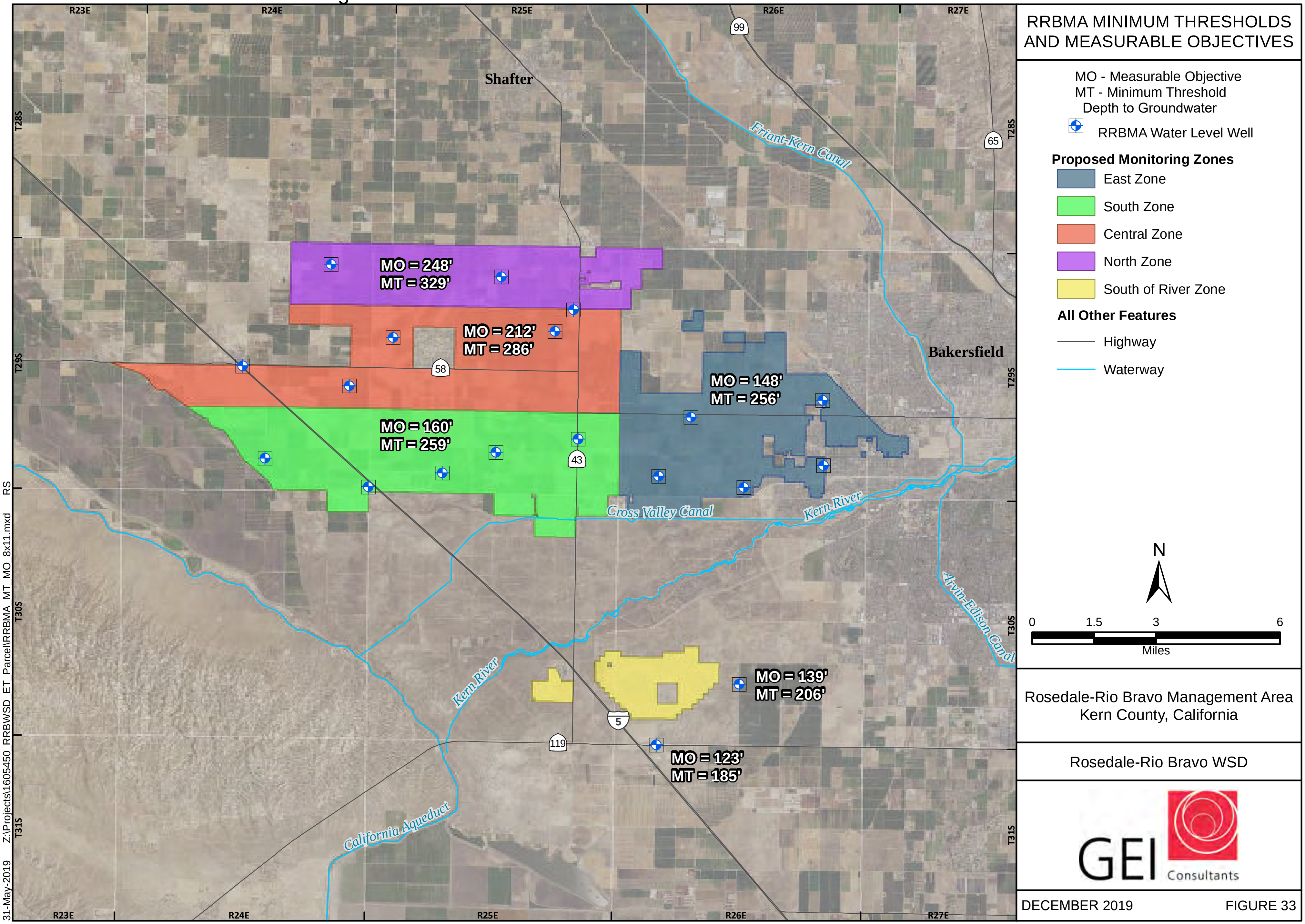
Deep Aquifer SGMA Minimum Threshold Project Impacts December 2016

Figure 12

Attachment A

RRBMA Minimum Thresholds and Measurable Objectives

Rosedale-Rio Bravo Water Storage District / Irvine Ranch Water District



Source: ROSEDALE-RIO BRAVO Management Area Groundwater Sustainability Plan Chapter