Appendix E

Biological Resources Reports

Appendix E1

Biological Resources Technical Report

RE Scarlet Solar Project

Biological Resources Technical Report

April 2017

Prepared for:
RE Scarlet LLC
300 California Street, 7th Floor
San Francisco, CA 94104

Prepared by:
HELIX Environmental Planning, Inc.
11 Natoma Street, Suite 155
Folsom, CA 95630

This page intentionally left blank

Table of Contents

Tables

Appendices

1 INTRODUCTION

HELIX Environmental Planning, Inc. (HELIX) has prepared this Biological Resources Technical Report (BTR) for the RE Scarlet Solar Project (Project) proposed by RE Scarlet LLC (Proponent). The purpose of this report is to provide the County of Fresno (County), trustee agencies, and the public with current data on biological resources necessary for processing the Project under the California Environmental Quality Act (CEQA). This report includes information on the current biological resources in the Project site, including vegetation and land cover, aquatic resources, general flora and fauna, and special-status species. It also includes analysis of the potential for regionally-occurring special-status species to occur in the Project site, potential Project impacts to biological resources, and recommends mitigation to avoid, minimize, and offset impacts to biological resources.

1.1 DESCRIPTION OF THE PROPOSED PROJECT

The RE Scarlet Solar Project is a proposed 400 mega-Watt solar photovoltaic (PV) generating facility and an electrical substation to be constructed on approximately 4,000 acres of agricultural land in unincorporated western Fresno County (**Appendix A – Figure 1**). The Project site is comprised of active and fallow agricultural land, with associated unpaved farm roads and equipment staging areas. There are no residences or other permanent structures in the Project site. The site is bisected by West Manning Avenue, which is the only paved road in the site.

The proposed photovoltaic arrays would be mounted in rows on steel posts approximately 4 feet above grade with approximately 15 feet between rows. Collection lines would be underground, and the substation would connect to the regional electrical grid at the Pacific Gas and Electric Company's (PG&E) 230 kilovolt (kV) Tranquillity Switching Station located west of State Route 33 and south of Manning Avenue. An overhead generation tie (gen-tie) line would run through easements across the existing Tranquillity Solar Generating Facility. Construction of the proposed project would take place in one phase beginning in early 2018 and is expected to continue for 12 months.

Construction activities would take place during daylight hours, approximately 7am to 5 pm, and would be continuous unless prevented by rain. Construction would include establishment of access roads with dirt or decomposed granite surfaces, trenching for underground collection lines, boring for posts to support solar arrays, installation of posts and solar arrays, and construction of an electrical substation consisting of above-ground facilities mounted on concrete pads. Equipment used would be standard construction equipment such as excavators, loaders, graders, cranes, forklifts, container trucks, and water trucks. The site will not require mass grading or cut and fill, as it is already flat and level. Existing shallow earthen ditches along field margins would be filled. The project would be constructed in a single phase; however, activities would occur in stages throughout the site.

1.2 LOCATION

The Project site is located in the San Joaquin Valley, in western Fresno County. The nearest towns are Tranquillity, 4 miles to the northeast, and San Joaquin, 6.9 miles to the east. Interstate 5 is 6.6 miles to the southwest and Fresno is 29 miles to the east. The Project site lies on both sides of West Manning Avenue, east of South Derrick Avenue (State Route 33) and west of South San Mateo Avenue. The northernmost boundary of the Project site is West South Avenue, and the southernmost boundary is West Dinuba Avenue (**Appendix A – Figure 2**). The Project site occupies all or part of Sections 20 – 22 and 27 – 30 of Township 15 South, Range 15 East, Mount Diablo Meridian. The site is depicted on the U.S. Geological Survey "Cantua Creek", "Levis", and "Tranquillity" 7.5-minute quadrangle maps

(**Appendix A –Figure 3**). The approximate center of the Project site is at latitude 36.603017° North; longitude 121.348996° West.

A prior site plan, which is shown on some of the protocol survey reports (e.g., San Joaquin kit fox), included a 0.5-mile-wide and 1.0-mile-long extension of the project along the west side of South Merced Avenue beginning at West South Avenue and extending northward up to West Adams Avenue. The prior site plan also showed an extension of the project west of State Route 33. Those areas have since been removed from the project. **Appendix A - Figure 4** is the current site plan for the proposed project.

2 REGULATORY SETTING

Policies, regulations, and plans pertaining to the protection of biological resources on the Project site are summarized in the following sections.

2.1 FEDERAL REQUIREMENTS

2.1.1 Federal Endangered Species Act

The U.S. Fish and Wildlife Service (USFWS) enforces the provisions stipulated within the Federal Endangered Species Act of 1973 (FESA; 16 USC 1531 et seq.). Species identified as federally threatened or endangered (50 CFR 17.11, and 17.12) are protected from take, defined as direct or indirect harm, unless a Section 10 permit is granted to an entity other than a federal agency or a Biological Opinion with incidental take provisions is rendered to a federal lead agency via a Section 7 consultation. Pursuant to the requirements of FESA, an agency reviewing a proposed project within its jurisdiction must determine whether any federally-listed species may be present in the study area and determine whether the proposed project will jeopardize the continued existence of or result in the destruction or adverse modification of critical habitat of such species (16 USC 1536 (a)[3], [4]). Other federal agencies designate species of concern (species that have the potential to become listed), which are evaluated during environmental review under the National Environmental Protection Act (NEPA) or California Environmental Quality Act (CEQA) although they are not otherwise protected under FESA.

2.1.2 Executive Order 13186: Migratory Bird Treaty Act

Under the Migratory Bird Treaty Act of 1918 (16 USC 703-712), migratory bird species and their nests and eggs are protected from injury or death; these species are listed at 50 CFR 10.13. Project-related nest disturbances must be reduced or eliminated during the nesting cycle for these species.

2.2 STATE REQUIREMENTS

2.2.1 California Endangered Species Act

The California Endangered Species Act (CESA) (California Fish and Game Code Sections 2050 to 2097) is similar to the FESA. The California Fish and Wildlife Commission is responsible for maintaining lists of threatened and endangered species under CESA. CESA prohibits the take of listed and candidate (petitioned to be listed) species. “Take” under California law means to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch capture, or kill (California Fish and Game Code, Section 86). The California Department of Fish and Wildlife (CDFW) can authorize take of a state-listed species under Section 2081 of the California Fish and Game Code if the take is incidental to an otherwise lawful activity, the impacts are minimized and fully mitigated, funding is ensured to implement and monitor

mitigation measures, and CDFW determines that issuance would not jeopardize the continued existence of the species. A CESA permit must be obtained if a project will result in the "take" of listed species, either during construction or over the life of the project. For species listed under both FESA and CESA requiring a Biological Opinion under Section 7 of the FESA, CDFW may also authorize impacts to CESA species by issuing a Consistency Determination under Section 2080.1 of the Fish and Game Code.

2.2.2 California Code of Regulations Title 14 and California Fish and Game Code

The official listing of endangered and threatened animals and plants is contained in the California Code of Regulations Title 14 §670.5. A state candidate species is one that the California Fish and Game Code has formally noticed as being under review by CDFW to include in the state list pursuant to Sections 2074.2 and 2075.5 of the California Fish and Game Code.

Legal protection is also provided for wildlife species in California that are identified as "fully protected animals." These species are protected under Sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), and 5515 (fish) of the California Fish and Game Code. These statutes prohibit take or possession of fully protected species at any time. CDFW is unable to authorize incidental take of fully protected species unless any such take authorization is issued in conjunction with the approval of a Natural Community Conservation Plan that covers the fully protected species (California Fish and Game Code Section 2835).

2.2.3 California Environmental Quality Act

Under the California Environmental Quality Act of 1970 (CEQA; Public Resources Code Section 21000 *et seq*.), lead agencies analyze whether projects would have a substantial adverse effect on a candidate, sensitive, or special-status species (Public Resources Code Section 21001(c)). These "special-status" species generally include those listed under FESA and CESA, and species that are not currently protected by statute or regulation, but would be considered rare, threatened, or endangered under the criteria included CEQA Guidelines Section 15380. Therefore, species that are considered rare are addressed under CEQA regardless of whether they are afforded protection through any other statute or regulation. The California Native Plant Society (CNPS) inventories the native flora of California and ranks species according to rarity; plants ranked as 1A, 1B, 2A and 2B are generally considered special-status species under CEQA.[1]

Although threatened and endangered species are protected by specific federal and state statutes, CEQA Guidelines Section 15380(d) provides that a species not listed on the federal or state list of protected species may be considered rare if it 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 and animals. Section 15380(d) allows a public agency to undertake a review to determine if a significant effect on species that have not yet been listed by either the USFWS or CDFW (i.e., candidate species) would occur.

[1] The California Rare Plant Rank system can be found online at < http://www.cnps.org/cnps/rareplants/ranking.php>

2.2.4 California Native Plant Protection Act

The California Native Plant Protection Act of 1977 (California Fish and Game Code Sections 1900-1913) requires all state agencies to use their authority to carry out programs to conserve endangered and otherwise rare species of native plants. Provisions of the act prohibit the taking of listed plants from the wild and require notification of CDFW at least 10 days in advance of any change in land use (other than changing from one agricultural use to another), which allows CDFW to salvage listed plants that would otherwise be destroyed.

2.2.5 Nesting Birds

California Fish and Game Code Subsections 3503 and 3800 prohibit the possession, take, or needless destruction of birds, their nests, and eggs, and the salvage of dead nongame birds. California Fish and Game Code Subsection 3503.5 protects all birds in the orders of Falconiformes and Strigiformes (birds of prey).

2.2.6 California Food and Agriculture Code Section 403

This section directs the California Department of Food and Agriculture (CDFA) to prevent the introduction and spread of injurious pests including noxious weeds.

CDFA Code Section 7271 designates the CDFA as the lead department in noxious weed management responsible for implementing state laws concerning noxious weeds. Representing a statewide program, noxious weed management laws and regulations are enforced locally in cooperation with the County Agricultural Commissioner.

Under state law, noxious weeds include any species of plant that is, or is liable to be, troublesome, aggressive, intrusive, detrimental, or destructive to agriculture, silviculture, or important native species, and difficult to control or eradicate, which the director, by regulation, designates to be a noxious weed (CDFA Code Section 5004).

2.2.7 California Land Conservation Act of 1965 (also known as the Williamson Act)

The California Land Conservation Act of 1965 (Government Code Section 51200 *et seq.*), commonly known as the Williamson Act, provides a tax incentive for the voluntary enrollment of agricultural and open space lands in contracts between the local government and landowners. The contract confines the enrolled land to agricultural and open space uses or other compatible uses defined in state law and local ordinances.

Williamson Act contracts last for at least 10 years, and the contract renews automatically each year, maintaining a constant, 10-year contract, unless the landowner or local government files to initiate nonrenewal. Should that occur, the Williamson Act would terminate 9 years after the filing of a notice of nonrenewal. Only a landowner can petition for a contract cancellation. The landowner is required to pay a cancellation fee, and the local government must approve the petition to complete the contract cancellation. The proposed Scarlet Solar project does not include any lands contracted under the Williamson Act.

2.3 LOCAL PLANS AND POLICIES

2.3.1 Fresno County General Plan

The Fresno County General Plan outlines several policies intended for the protection of biological resources County-wide, including the following, which apply to the Project. The policies are provided as written by the County; note that the CDFG is now referred to as CDFW.

Policy OS-E.1: The County shall support efforts to avoid the "net" loss of important wildlife habitat where practicable. In cases where habitat loss cannot be avoided, the County shall impose adequate mitigation for the loss of wildlife habitat that is critical to supporting special-status species and/or other valuable or unique wildlife resources. Mitigation shall be at sufficient ratios to replace the function, and value of the habitat that was removed or degraded. Mitigation may be achieved through any combination of creation, restoration, conservation easements, and/or mitigation banking. Conservation easements should include provisions for maintenance and management in perpetuity. The County shall recommend coordination with the U.S. Fish and Wildlife Service and the California Department of Fish and Game to ensure that appropriate mitigation measures and the concerns of these agencies are adequately addressed. Important habitat and habitat components include nesting, breeding, and foraging areas, important spawning grounds, migratory routes, migratory stopover areas, oak woodlands, vernal pools, wildlife movement corridors, and other unique wildlife habitats (e.g., alkali scrub) critical to protecting and sustaining wildlife populations.

Policy OS-E.2: The County shall require adequate buffer zones between construction activities and significant wildlife resources, including both on-site habitats that are purposely avoided and significant habitats that are adjacent to the project site, in order to avoid the degradation and disruption of critical life cycle activities such as breeding and feeding. The width of the buffer zone should vary depending on the location, species, etc. A final determination shall be made based on informal consultation with the U.S. Fish and Wildlife Service and/or the California Department of Fish and Game.

Policy OS-E.3: The County shall require development in areas known to have particular value for wildlife to be carefully planned and, where possible, located so that the value of the habitat for wildlife is maintained.

Policy OS-E.4: The County shall encourage private landowners to adopt sound wildlife habitat management practices, as recommended by the California Department of Fish and Game officials and the U.S. Fish and Wildlife Service.

Policy OS-E.6: The County shall ensure the conservation of large, continuous expanses of native vegetation to provide suitable habitat for maintaining abundant and diverse wildlife populations, as long as this preservation does not threaten the economic well-being of the County.

Policy OS-E.9: Prior to approval of discretionary development permits, the County shall require, as part of any required environmental review process, a biological resources evaluation of the project site by a qualified biologist. The evaluation shall be based upon field reconnaissance performed at the appropriate time of year to determine the presence or absence of significant resources and/or special-status plants or animals. Such evaluation will consider the potential for significant impact on these resources and will either identify feasible mitigation measures or indicate why mitigation is not feasible.

Policy OS-E.10: The County shall support State and Federal programs to acquire significant fish and wildlife habitat areas for permanent protection and/or passive recreation use.

Policy OS-E.16: Areas that have unusually high value for fish and wildlife propagation should be preserved in a natural state to the maximum possible extent.

Policy OS-E.18: The County should preserve, to the maximum possible extent, areas defined as habitats for rare or endangered animal and plant species in a natural state consistent with State and Federal endangered species laws.

Policy OS-E.19: The County should preserve areas identified as habitats for rare or endangered plant and animal species primarily through the use of open space easements and appropriate zoning that restrict development in these sensitive areas.

Policy OS-B.2: The County shall work closely with agencies involved in the management of forest ecosystems and shall coordinate with State and Federal agencies, private landowners, and private preservation/ conservation groups in habitat preservation and protection of rare, endangered, threatened, and special concern species, to ensure consistency in efforts and to encourage joint planning and development of areas to be preserved. The County shall encourage State and Federal agencies to give notice to and coordinate with the County on any pending, contemplated, or proposed actions affecting local communities and citizens of the County. The County will encourage State and Federal agencies to address adverse impacts on citizens and communities of Fresno County, including environmental, health, safety, private property, and economic impacts.

Policy OS-F.5: The County shall establish procedures for identifying and preserving rare, threatened, and endangered plant species that may be adversely affected by public or private development projects. The County shall require, as part of the environmental review process, a biological resources evaluation of the project site by a qualified biologist. The evaluation shall be based on field reconnaissance performed at the appropriate time of year to determine the presence or absence of significant plant resources and/or special-status plant species. Such evaluation shall consider the potential for significant impact on these resources and shall either identify feasible mitigation measures or indicate why mitigation is not feasible.

Policy OS-F.7: The County should encourage landowners to maintain natural vegetation or plant suitable vegetation along fence lines, drainage and irrigation ditches and on unused or marginal land for the benefit of wildlife.

2.4 JURISDICTIONAL WATERS

2.4.1 Federal

Any person, firm, or agency planning to alter or work in “waters of the U.S.,” including the discharge of dredged or fill material, must first obtain authorization from the USACE under Section 404 of the Clean Water Act (CWA; 33 USC 1344). Permits, licenses, variances, or similar authorization may also be required by other federal, state, and local statutes. Section 10 of the Rivers and Harbors Act prohibits the obstruction or alteration of navigable waters of the U.S. without a permit from USACE (33 USC 403).

Waters of the U.S. are defined as: all waters used in interstate or foreign commerce; all interstate waters including interstate wetlands; all other waters such as intrastate lakes, rivers, streams, mudflats,

sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes or natural ponds, where the use, degradation, or destruction of which could affect interstate commerce; impoundments of these waters; tributaries of these waters; or wetlands adjacent to these waters (33 CFR Part 328). With non-tidal waters, in the absence of adjacent wetlands, the extent of USACE jurisdiction extends to the ordinary high water mark (OHWM) – the line on the shore established by fluctuations of water and indicated by a clear, natural line impressed on the bank, shelving, changes in soil character, destruction of terrestrial vegetation, or the presence of litter and debris. Wetlands are defined in 33 CFR Part 328 as:

> *"those areas that are inundated or saturated by surface or ground water at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."*

Federal and state regulations pertaining to waters of the U.S., including wetlands, are discussed below.

Clean Water Act (33 USC 1251-1376). The CWA provides guidance for the restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters.

Section 401 requires that an applicant for a federal license or permit that allows activities resulting in a discharge to waters of the U.S. must obtain a state certification that the discharge complies with other provisions of CWA. The Regional Water Quality Control Board (RWQCB) administers the certification program in California, and may require State Water Quality Certification before other permits are issued.

Section 402 establishes a permitting system for the discharge of any pollutant (except dredged or fill material) into waters of the U.S.

Section 404 establishes a permit program administered by USACE that regulates the discharge of dredged or fill material into waters of the U.S. (including wetlands). Implementing regulations by USACE are found at 33 CFR Parts 320-332. The Section 404 (b)(1) Guidelines were developed by the U.S. Environmental Protection Agency in conjunction with USACE (40 CFR Part 230), allowing the discharge of dredged or fill material for non-water dependent uses into special aquatic sites only if there is no practicable alternative that would have less adverse impacts.

2.4.2 State Requirements

2.4.2.1 *Porter-Cologne Act*

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act, Water Code Section 13000 et seq.) is California's statutory authority for the protection of water quality in conjunction with the federal CWA. The Porter-Cologne Act requires the State Water Resources Control Board (SWRCB) and RWQCBs under the CWA to adopt and periodically update water quality control plans, or basin plans. Basin plans are plans in which beneficial uses, water quality objectives, and implementation programs are established for each of the nine regions in California. The Porter-Cologne Act also requires dischargers of pollutants or dredged or fill material to notify the RWQCBs of such activities by filing Reports of Waste Discharge and authorizes the SWRCB and RWQCBs to issue and enforce waste discharge requirements, National Pollution Discharge Elimination System (NPDES) permits, Section 401 water quality certifications, or other approvals.

2.4.2.2 *California Fish and Game Code Section 1602 – Lake and Streambed Alteration Program*

Diversions or obstructions of the natural flow of, or substantial changes or use of material from the bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources are subject to regulation by CDFW, pursuant to Section 1602 of the California Fish and Game Code. The CDFW requires notification prior to commencement of any such activities, and a Streambed Alteration Agreement (SAA) pursuant to Fish and Game Code Sections 1601-1603, if the activity may substantially adversely affect an existing fish and wildlife resource.

3 METHODS

Studies conducted in preparation of this BTR included a desktop evaluation and background research to identify sensitive biological communities and/or special-status species with the potential to occur on or in the vicinity of the Project site, as well as biological field surveys to document baseline conditions and special-status species and/or their habitats on the site. These methods are presented in the following sections.

3.1 DATABASE AND LITERATURE REVIEW

The most current available lists of special-status species and sensitive natural habitats known to occur and/or having the potential to occur in the project region were reviewed to determine their potential to occur on the Project site or otherwise be affected by project-related activities on the Project site.

For the purposes of this analysis, special-status species and sensitive natural habitats are defined as meeting one or more of the following criteria:

- Listed as Threatened or Endangered under the federal Endangered Species Act (ESA);
- Listed as Threatened or Endangered under the California Endangered Species Act (CESA);
- Under review for listing under ESA or CESA (Candidate);
- "Fully Protected" under California Fish and Game Code Section 3511, 4700, 5050, or 5515;
- Included on the list of Species of Special Concern (SSC) by the California Department of Fish and Wildlife;
- Included on the Watch List of species that may qualify as SSC by the California Department of Fish and Wildlife;
- Having a California Rare Plant Rank (CRPR) of 1A (presumed extinct in California and rare elsewhere), 1B (rare in California and elsewhere), 2A (presumed extinct in California but more common elsewhere), or 2B (rare in California but more common elsewhere), or:
- A natural community designated by CDFW or CNPS as a Natural Community of Special Concern or otherwise regulated by federal, state, or local laws regulating their development [(i.e., riparian vegetation regulated by CDFW through the Lake and Streambed Alteration program (Fish and Game Code Section 1602)].

The following lists included in **Appendix B** were obtained in March 2016 in advance of biological field studies and updated in April 2017 prior to finalizing the report:

- The Sacramento Fish and Wildlife Office list of threatened and endangered species that may occur in the project site and/or may be affected by the project (USFWS 2017).

- The California Native Plant Society (CNPS) list of special-status plants documented in the "Cantua Creek" quad and the eight surrounding 7.5-minute quads (Coit Ranch, Tranquillity, Jamesan, Levis, San Joaquin, Lillis Ranch, Tres Pecos Farms, Westside; CNPS 2017).
- The California Natural Diversity Database (CNDDB; CDFW 2017) list of special-status species documented within 10 miles of the Project site.

Biological surveys were conducted upon completion of the desktop analysis in order to evaluate the potential for special-status species or sensitive natural communities to occur in the Project site. **Appendix C** presents the general habitat requirements, status, the potential for the species to occur, and rationale for each species evaluated. Species and habitats determined to have no potential to occur in the Project site or be otherwise affected by activities in the site were excluded from further evaluation. Species having the potential to occur in the Project site and/or be affected by site activities are evaluated in detail in **Section 5** of this BTR.

3.2 BIOLOGICAL SURVEYS

Biological surveys conducted at the Project site include biological reconnaissance surveys, habitat mapping, botanical and wildlife inventories, a wetland assessment, and focused habitat assessments and protocol surveys for target special-status species (**Table 1**). These surveys are described briefly below. A list of plant and animal species observed during the biological surveys is included in **Appendix D**. Surveys were conducted by HELIX biologists unless otherwise noted.

Table 1. Summary of Biological Surveys Conducted for the Proposed Project

	Survey Dates*	Personnel
Biological Reconnaissance, Habitat Mapping, Floral/Faunal Inventories	April 12-13, April 19, October 6, April 27, 2017	Stephen Stringer, George Aldridge, Devin Barry
Wetland Assessment	April 19	Stephen Stringer, George Aldridge, Devin Barry
Swainson's Hawk Protocol Surveys	April 12-13, April 19, June 16-17, July 12	Stephen Stringer, George Aldridge, Devin Barry
Burrowing Owl Habitat Assessment and Protocol Surveys	April 12-13, April 19, May 24, June 17, July 12	George Aldridge, Devin Barry
San Joaquin Kit Fox Habitat Assessment	April 12-13, April 19, May 24	Stephen Stringer, George Aldridge, Devin Barry
San Joaquin Kit Fox Protocol Surveys**	September 19-October 6	Jeff Alvarez, various assistants
Kangaroo Rat Habitat Assessment	October 6	George Aldridge
Kangaroo Rat Live Trapping**	October 24-31	Jeff Halstead, various assistants

*All surveys conducted in 2016 unless otherwise noted.
**Conducted by Californian Environmental Services

3.2.1 General Biological Reconnaissance

HELIX Senior Scientist Stephen Stringer M.S. and HELIX Staff Biologists Devin Barry and George Aldridge Ph.D. conducted biological reconnaissance surveys of the Project site on April 12, 13, and 19, and October 6, 2016. An additional biological reconnaissance survey was conducted by Dr. Aldridge on April 27, 2017. Reconnaissance surveys included habitat mapping, botanical and wildlife inventories, and habitat assessments for rare plants, Swainson's hawk (*Buteo swainsoni*), burrowing owl (*Athene cunicularia*), San Joaquin kit fox (*Vulpes macrotus mutica*), and special-status kangaroo rats. Representative site photos are included in **Appendix E**.

3.2.2 Focused Surveys

Focused surveys were conducted for Swainson's hawk, burrowing owl, and San Joaquin kit fox in accordance with the most recent published protocols (SHTAC 2000; CDFW 2012; USFWS 1999a), or by modified protocols after consultation with USFWS and CDFW. The Project site lacks habitat for rare plants as determined by biological reconnaissance surveys and habitat assessments for rare plants; therefore, no focused surveys for rare plants were conducted. Focused surveys are described in detail in the following sections.

3.2.2.1 *Swainson's Hawk*

Focused surveys for Swainson's hawk were conducted by HELIX biologists on 6 occasions during the breeding season (**Table 1**), in accordance with the most recent published protocols (SHTAC 2000). Surveys covered the Project site and all lands within 0.5 mile of the Project site. All suitable trees were examined using binoculars, and the status of any suitable nest was determined (*i.e.*, occupied, vacant, occupied by another species). Survey methods and results are described in detail in **Appendix F**.

3.2.2.2 *Burrowing Owl*

A habitat assessment for burrowing owl was conducted in April 2016 consisting of desktop analysis and field surveys. Desktop analysis included interpretation of current and historical aerial imagery for the Project site and the surrounding region, sensitive species database queries, and review of existing biological resources reports for nearby lands. The field survey was conducted concurrently with general biological reconnaissance surveys by HELIX biologists Stephen Stringer, Devin Barry, and George Aldridge on April 12-13, and April 19, 2016. During the habitat assessment, the entire Project site was surveyed by car and on foot in areas with potential for suitable burrows outside of cultivated fields. Data collected in the field included mapping vegetation and land covers, locations of potential burrows, and general flora and fauna.

Focused surveys for burrowing owl were conducted by HELIX biologists on four occasions during the breeding season (**Table 1**), in accordance with the latest published protocols (CDFW 2012). During each survey, transects were walked in all areas of the site identified as habitat for burrowing owl in the habitat assessment (i.e., fallow fields and margins of active fields). As an additional means to cover the remainder of the site, HELIX drove the site's existing access roads searching for burrowing owls and stopped every 100 meters or less to scan the surrounding area for burrowing owl presence with binoculars. The majority of the site's acreage is unsuitable for burrowing owl nesting due to regular disking and intensive cultivation of row crops. Survey methods and results are described in detail in **Appendix G**.

In addition to protocol burrowing owl surveys, numerous biological surveys were conducted that also searched for subterranean holes in use by animals and opportunistically noted species of biological interest on the site. Closely-spaced pedestrian transects were conducted of parts of the site not in active cultivation during San Joaquin kit fox protocol surveys. During the San Joaquin kit fox transect surveys, the biologists also searched for burrowing owl dens and dens of other subterranean animals such as kangaroo rat. A total of 17 camera stations were also established on the site as part of the San Joaquin kit fox surveys. All photos taken at the camera stations were reviewed for burrowing owl or other special-status species.

3.2.2.3 *San Joaquin Kit Fox*

Surveys for San Joaquin kit fox began with an Early Evaluation conducted in accordance with USFWS protocol (USFWS 1999a). A search of the CNDDB was conducted in May 2016 to identify records of San Joaquin kit fox within 10 miles of the Project site. The USFWS was also contacted to request any records not included in the CNDDB. The Project site was generally surveyed and assessed for suitable kit fox habitat and signs of occupancy during all biological surveys conducted between April and early June 2016, including site reconnaissance, vegetation mapping and species inventories, and during outside-survey window hours on burrowing owl survey visits. A report of the Early Evaluation findings was submitted to the USFWS on June 22, 2016, and is included as **Appendix H**.

Focused surveys for San Joaquin kit fox were conducted by Californian Environmental Services in accordance with a USFWS-reviewed modification of the most recent protocol (USFWS 1999a). The survey protocol is described in detail in the San Joaquin kit fox survey report included in **Appendix H**. Surveys consisted of pedestrian transects of a subset of the Project site in September, followed by spotlight surveys and monitoring of motion-activated cameras in early October. A total of 17 motion-activated camera stations were established in the site at regular intervals and monitored for 15 days (**Appendix H**).

3.2.2.4 *Special-Status Kangaroo Rats*

A habitat assessment for special-status kangaroo rats was conducted by HELIX in early October in response to kangaroo rat sightings during the San Joaquin kit fox surveys. The habitat assessment covered all of the Project site that was not in active cultivation or recently disked, and included the entire perimeter of the site. A report of the findings of the kangaroo rat habitat assessment is included as **Appendix I**.

Live trapping for kangaroo rat was conducted by Californian Environmental Services in areas identified as having potential habitat for kangaroo rat. The trapping survey took place between October 24 and 31, 2016. The survey protocol is described in detail in the kangaroo rat live trapping survey report included in **Appendix I**.

3.3 ASSESSMENT OF WETLANDS AND OTHER WATERS

The Project site was assessed for the presence of aquatic resources that could quality as potential wetlands or other waters of the U.S. and State on April 19, 2016. The presence/absence of wetlands and other waters was determined based on the presence/absence of hydrophytic vegetation, evidence of wetland hydrology, topography, and/or the presence of bed and banks for ditches/drainages.

3.3.1 Waters of the U.S.

Typically, the USACE and the U.S. EPA will assert jurisdiction over the following types of wetlands and tributaries:

- Traditional navigable waters (TNWs),
- Wetlands adjacent to TNWs,
- Non-navigable tributaries of TNWs that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months), and
- Wetlands directly abutting such tributaries.

The USACE and U.S. EPA will decide jurisdiction over the following waters based on a fact-specific analysis to determine whether they have a significant nexus with a TNW:

- Non-navigable tributaries that are not relatively permanent,
- Wetlands adjacent to non-navigable tributaries that are not relatively permanent, and
- Wetlands adjacent to but not directly abutting a relatively permanent non-navigable tributary.

These agencies generally will not assert jurisdiction over the following features:

- Swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent, or short duration flow), and
- Ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water.

The USACE and U.S. EPA apply the significant nexus standard as follows:

> "*A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by all wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical and biological integrity of downstream traditional navigable waters*."

3.3.2 Waters of the State

The term "waters of the state" is defined by California Water Code as "any surface water or groundwater, including saline waters, within the boundaries of the state" (California Water Code Section 13050(e)).

3.4 INVASIVE SPECIES

Plant species observed in the project site were compared to the list of invasive plants in California maintained by the California Invasive Plant Council (Cal-IPC; Cal-IPC 2015) and the list of noxious weeds maintained by the CDFA (CDFA 2013). Several invasive and noxious weed species listed by Cal-IPC and CDFA occur in the project site, as would be expected due its highly disturbed nature. Invasive and noxious weeds are identified on the plant species observed list in **Appendix D** and those on the CDFA list and/or having a rating of "high" or "moderate" on the Cal-IPC list are discussed in **Section 4.6**.

CDFA List "C" species warrant state-endorsed holding action and eradication only when found in a nursery; actions to retard spread outside of nurseries is conducted at the discretion of the commissioner; and warrant rejection only when found in a crop seed for planting or at the discretion of the commissioner. In addition, the Cal-IPC categorizes plants as "high, moderate, or limited," reflecting the level of each species' negative ecological impact in California. Each plant on the list received an overall rating of high, moderate, or limited based on the following evaluation criteria:

- High – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.
- Moderate – These species have substantial and apparent, but generally not severe, ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.
- Limited – These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

4 RESULTS: ENVIRONMENTAL SETTING

4.1 EXISTING LAND USE

The Scarlet Solar Project is located in western Fresno County, approximately 29 miles west of Fresno and 6.5 miles east of Interstate-5. Major land uses in the vicinity of the Project site consist of agriculture and solar photovoltaic generating facilities. Other land uses include rural residences, cotton gins, and grain elevators. All vegetation in the vicinity of the Project site is active and fallow agriculture.

The Project site consists entirely of agricultural land, including active cultivation of alfalfa, tomatoes, garlic, wheat, and barley, and fallow land formerly used for wheat. Fields are bordered by unpaved farm roads at grade. Roads surrounding active fields are graded and free of vegetation; roads surrounding fallow fields are little more than paths between fields that are partially overgrown by the same weedy plants found in the fallow fields. North-south running temporary drainage ditches border most active fields to drain irrigation runoff to off-site sumps. These ditches are excavated as needed and filled when no longer needed.

The Scarlet Solar Project is located within an area designated as an Environmental Conservation Least Conflict Area by a project entitled "*A Path Forward: Identifying Least-Conflict Solar PV Development in California's San Joaquin Valley*", prepared in May 2016 by the Conservation Biology Institute (CBI), Berkeley Law's Center for Law, Energy and the Environment (CLEE), and Terrell Watt Planning Associates, with input from the Governor's Office of Planning and Research (OPR). The purpose of the project was to identify least-conflict lands for solar photovoltaic ("solar PV") development from the perspectives of the stakeholders. Lands in the project region have been in agricultural production for decades and natural habitats are sparse and highly fragmented.

4.2 CLIMATE

The climate of western Fresno County is Mediterranean, characterized by wet, cool winters and dry, hot summers. Mean daily maximum and minimum temperatures are 96 and 64 degrees Fahrenheit in July, and 56 and 39 degrees Fahrenheit in January (NESDIS 2016). The mean annual precipitation is 8.4 inches, with over 90 percent occurring as rain from October through April.

4.3 TOPOGRAPHY

The Project site is located in the central San Joaquin Valley. This area is in the southern portion of the Great Valley geomorphic province of California, which includes most of Fresno County. The Great Valley is an approximately 50-mile-wide and 400-mile-long alluvial plain that lies between the mountains and foothills of the Sierra Nevada to the east and the Coast Ranges to the west. The Project site and the surrounding areas are naturally flat, and the site has been leveled and for existing land uses. Elevations in the Project site range from 170 to 210 feet above mean sea level (amsl) across a distance of 4.8 miles.

4.4 SOILS

Soils in the Project site are saline-sodic clays and clay loams in 3 soil series (NRCS 2016): Tranquillity clay, saline-sodic, wet, 0 to 1 percent slopes; Ciervo clay, saline-sodic, wet, 0 to 1 percent slopes, and; Calfax clay loam, saline-sodic, wet, 0 to 1 percent slopes, MLRA 17. All of these soils are described as alluvium derived from calcareous rock, somewhat poorly- to moderately well-drained, with depths of 48 to 60 inches to the water table, and depths of greater than 80 inches to a restrictive layer. These soil types are not consistent with the dry, friable, sandy or loamy soils typically favored by burrowing animals.

4.5 HYDROLOGY

Hydrology on the site is currently managed for agriculture using water supplied by the Westlands Water District. The Westlands Water District receives water from San Luis Reservoir under contract from the Central Valley Project. Since the closure of the Westlands drain in the early 1980s, irrigation runoff in the Westlands region has been treated in detention basins and does not leave the Westlands region.

Runoff in the Project site drains to off-site sumps via shallow, earthen ditches constructed for that purpose. These ditches generally follow the edges of irrigated fields and convey water north. Non-irrigated fields do not generate runoff, as natural rainfall soaks into the ground or is taken up by the dense herbaceous vegetative cover in these fields.

4.6 GENERAL BIOLOGICAL RESOURCES

One vegetation community/land cover type is present in the Project site: agricultural land (**Appendix A - Figure 5**). Boundaries of biological habitats were primarily determined based on the composition of dominant plant species.

4.6.1 Agricultural Land

Agricultural land comprises a range of active and fallow agricultural fields including row crops, small grain crops, and recently disked land bare of vegetation, as well as dirt roads, field margins, and temporary ditches excavated to drain actively irrigated fields. Actively used dirt roads are generally graded and bare, while unused roads are mostly overgrown with the same vegetation found in the

adjacent fallow fields. Agricultural operations in the Project site change from year to year, resulting in a shifting mosaic of crops, irrigation, drainage, road use, sheep grazing, and fallowing throughout the site. There is no natural topography in the site and no permanent features such as dikes, berms, canals, or structures that imply a consistent land use that exists for long enough to warrant definition as something other than agriculture.

4.6.1.1 *Row Crops*

Row crops observed on the Project site during 2016 surveys include tomatoes, garlic, and alfalfa. Fields of these crops are irrigated and often bordered by recently excavated drainage ditches.

4.6.1.2 *Rainfed Agriculture*

Rainfed agriculture describes crops grown without irrigation, typically wheat and oats grown during the winter rainy season and harvested in the spring. Much of the Project site consisted of fields of mature wheat at the time of the reconnaissance surveys in 2016. Most of these fields were harvested and disked by mid-summer 2016. Some winter grain fields are not harvested, but rather grazed by sheep in the spring and summer.

4.6.1.3 *Fallow Fields*

Fallow fields are fields that did not appear to have been recently cultivated at the time of the surveys. These fields show evidence of past cultivation, including furrows and remnant crop species, but are heavily dominated by weedy non-crop species such as tumble mustard (*Sisymbrium altissimum*) and Russian thistle (*Salsola tragus*). Many fields that were fallow during the surveys in April and May 2016 had been disked by mid-July 2016.

4.6.2 Invasive Species

Two non-native species included on CDFA's category C list and/or having a rating of "moderate" on the Cal-IPC list were identified on the Project site: wild oat (*Avena fatua*) and hare barley (*Hordeum murinum*). Russian thistle (*Salsola tragus*) is also listed as a noxious weed by the CDFA and has a "limited" rating by Cal-IPC. All three of these species are common in fallow agricultural fields in western Fresno County and in the San Joaquin Valley.

4.6.3 Wildlife

Active agricultural areas in the Project site such as row crops and rainfed agriculture provide limited habitat for wildlife due to recent and ongoing disturbance associated with disking, planting, irrigating, pest control, and harvesting. Fallow fields provide nesting and foraging habitat for ground-nesting grassland bird species including western meadowlark (*Sturnella neglecta*), savannah sparrow (*Passerculus sandwichensis*), horned lark (*Eremophila alpestris actia*), and mourning dove (*Zenaida macroura*), as well as burrowing mammals such as Botta's pocket gopher (*Thomomys bottae*), California ground squirrel (*Otospermophilus beecheyi*), and Heermann's kangaroo rat (*Dipodomys heermanni*). Burrowing mammals are most common along the shoulders of roads, where their burrows are not periodically disturbed by disking. Fallow fields in the Project site also provide foraging habitat for birds that nest in trees, transmission towers, and marsh areas off-site, including common raven (*Corvus corax*), northern harrier (*Circus cyaneus*), barn owl (*Tyto alba*), and Swainson's hawk (*Buteo swainsoni*). Overall, wildlife is relatively scarce in the Project site.

4.7 SPECIAL-STATUS SPECIES

Based on documented species occurrences, species ranges and habitat affinities, and observations during biological surveys, a total of 7 regionally-occurring special-status species were identified as occurring or having the potential to occur in the Project site (**Table 2**); this analysis is described in **Section 3.1**. In addition, kangaroo rat is discussed because although no special-status kangaroo rats would be expected to occur on the site, unidentified kangaroo rats were observed on-site during SJKF surveys and live trapping was subsequently conducted for kangaroo rat to determine the species observed. Special-status species with potential to occur on the Project site are discussed in detail in **Section 5**. Special-status species observations in and adjacent to the Project site are shown on **Figure 5** in **Appendix A**. No sensitive natural communities are present on the Project site.

Table 2. Special-Status Species with the Potential to Occur in the RE Scarlet Solar Project Site

Scientific Name/ Common Name	Regulatory Status[1]	Status in the Project Site[2]	Suitable Habitat In The Project Site
Birds			
Asio flammeus short-eared owl	--/--/CDFW:SSC	Not observed	Active and fallow agricultural fields provide suitable nesting and foraging habitat.
Athene cunicularia burrowing owl	--/--/CDFW:SSC	Present (transient)	Disturbed areas at the margins of agricultural fields provide potential nesting and agricultural fields provide potential foraging habitat. One transient owl was observed on the site and a transient owl was also observed adjacent to the site, but no occupied burrows were observed.
Buteo swainsoni Swainson's hawk	--/ST/--	Present (foraging)	There are no trees on the Project site; therefore, there is no suitable nesting habitat for this species on the site. Active and fallow fields provide suitable foraging habitat for individuals nesting in trees on adjacent parcels.
Circus cyaneus northern harrier	--/--/CDFW:SSC	Present (foraging)	Observed in the Project site during biological surveys. Active and fallow fields provide suitable foraging habitat for individuals nesting in wetland habitat northeast of San Joaquin.
Eremophila alpestris actia California horned lark	--/--/CDFW:WL	Present	Disturbed areas along roads and field margins provide suitable foraging and nesting habitat.
Lanius ludovicianus loggerhead shrike	--/--/CDFW:SSC	Present (foraging)	Observed in the Project site during biological surveys. There is no nesting habitat for this species on the Project site. Fallow fields provide suitable foraging habitat for individuals nesting in shrubs in off-site parcels.

Scientific Name/ Common Name	Regulatory Status[1]	Status in the Project Site[2]	Suitable Habitat In The Project Site
Mammals			
Vulpes macrotis mutica San Joaquin kit fox	FE/SE/--	Not observed	Marginal dispersal and foraging habitat is present on the Project site. However, this species was not observed in the Project site during protocol surveys or any other biological surveys conducted for the proposed Project and is presumed absent.

[1]Regulatory Status is ESA listing/CESA listing/Other state status. FE=Federal Endangered; SE=State Endangered; SSC=Species of Special Concern; WL=Watch-list.

[2]Status in the Project Site is based on results of surveys summarized in **Table 2** and CNDDB reported occurrences.

5 RESULTS: EVALUATION OF POTENTIAL BIOLOGICAL RESOURCES IMPACTS

5.1 GUIDELINES FOR DETERMINING IMPACT SIGNIFICANCE

The following threshold criteria from the Fresno County CEQA Environmental Checklist Form were used to evaluate potential effects on biological resources. Based on these criteria, the Project would have a significant effect on biological resources if it would:

- Have substantial adverse effects, 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 Wildlife or U.S. Fish and Wildlife Service.
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Wildlife or US Fish and Wildlife Service.
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.
- 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.
- Conflict with the Migratory Bird Treaty Act or California Fish and Game Code pertaining to the protection of nesting birds.
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan.

5.2 POTENTIAL FOR IMPACTS TO SPECIAL-STATUS SPECIES

5.2.1 Special-status Birds

Species descriptions in this section are taken from Shuford and Gardali (2008), or from other sources as noted.

5.2.1.1 *Short-eared Owl (Asio flammeus)*

Federal status – Candidate
State status – species of special concern

Species Description

Short-eared owl is widespread throughout North America, and population sizes in California fluctuate widely and unpredictably due to migration. Range and breeding numbers in California are closely linked to fluctuations in populations of voles (*Microtus* spp.), which make up nearly the entire diet of short-eared owls. Breeding populations are concentrated in the Delta and the Modoc Plateau, and breeding elsewhere in California occurs mostly after wet winters that cause spikes in vole populations. This species nests on the ground in tall, dense vegetation such as marshes and irrigated crop land, including alfalfa fields in the San Joaquin Valley. Breeding occurs between April and July. Short-eared owls hunt in early morning and late evening.

Survey History

Short-eared owl was not observed in the Project site during morning and evening surveys for burrowing owl, which is also a ground-nesting owl, or during any other biological surveys conducted for the project. There are two reported occurrences of short-eared owl in the CNDDB within 10 miles of the Project site. The nearest CNDDB occurrence record is 6.5 miles west of the Project site, west of the California aqueduct. Both reported occurrences of short-eared owl within a 10-mile radius are from 1993 and document two adult short-eared owls observed in tall grass within a complex of non-native grassland and cultivated weedy fields. The owls were determined to be possibly nesting or establishing a nest site. Nesting was not confirmed for either reported occurrence.

Habitat Suitability

Irrigated fields on the Project site provide potentially suitable nesting habitat for short-eared owl during wet winters when vole populations spike.

Potential for Significant Adverse Effects

Construction and decommissioning activities could result in adverse effects to this species such as nest abandonment or forced fledging of young if it were to nest in or adjacent to the Project site prior to construction (or during the life of the project prior to decommissioning), although the potential for this is low. This would be a significant impact. The recommended mitigation measures for nesting birds contained in **Section 6** (**MM BIO-4**) would reduce impacts to short-eared owl potentially nesting in the Project site to less than significant.

Conversion of the Project site from irrigated fields to solar photovoltaic generation would temporarily remove potential nesting habitat for short-eared owl during operation of the Project. However, short-eared owl breeding in the San Joaquin Valley is sporadic and linked to unusually wet winters that produce a regional spike in vole populations. Very few short-eared owl have been documented nesting in the region (CDFW 2016). Alfalfa fields in the Project site are not regularly, if ever, used by short-eared owls for breeding, and loss of habitat acreage would not have a significant deleterious effect on short-eared owl populations in the region because the population size is not limited by availability of alfalfa fields. Therefore, the Project would not have a significant impact on foraging habitat for short-eared owl and no mitigation is necessary for the loss of potential nesting habitat for short-eared owl during the

project phase. Upon decommissioning, the site would be expected to return to potentially suitable habitat for short-eared owl.

5.2.1.2 *Burrowing Owl (Athene cunicularia)*

Federal status – none
State status – species of concern

Species Description

Burrowing owls are often found in open, dry grasslands, agricultural and range lands, and desert habitats. They can also inhabit grass, forb, and shrub stages of pinyon and ponderosa pine habitats. Burrowing owls occur at elevations ranging from 200 feet below mean sea level to over 9,000 feet amsl. In California, the highest elevation where burrowing owls are known to occur is 5,300 feet amsl in Lassen County. In addition to natural habitats, burrowing owls can be found in urban habitats such as at the margins of airports and golf courses and in vacant urban lots. Burrowing owls forage in adjacent grasslands and other suitable habitats primarily for insects and small mammals, and less often for reptiles, amphibians, and other small birds.

Burrowing owls nest in burrows in the ground and commonly perch on fence posts or mounds near the burrow. The owls often use ground squirrel burrows or badger dens or artificial burrows such as abandoned pipes or culverts. Although the more northern burrowing owl populations migrate seasonally, burrowing owls are year-round residents of the San Joaquin Valley. Burrowing owls often form loose colonies, with nest burrows 46 to 2,952 feet apart (Ross 1974; Gleason 1978). In the San Joaquin Valley, the nesting season for burrowing owl can begin as early as February 1 and continues through August 31.

Survey History

A habitat assessment and protocol surveys for burrowing owl were conducted in 2016. No burrowing owls or burrows showing sign of occupancy by burrowing owl were documented in the Project site during these surveys (**Appendix G**).

One individual burrowing owl was observed on the site in early October 2016 during monitoring of motion-sensitive cameras installed as part of the San Joaquin kit fox survey. A single burrowing owl flushed from a camera location in a disked field south of Manning Avenue as a biologist approached the camera station. No burrows, pellets, or other sign of burrowing owl occupancy were observed at the location, and the owl is assumed to have been a transient drawn to the location by the camera and bait station (See **Figure 5** in **Appendix A**). A single burrowing owl pellet was found on another camera installed in a fallow field approximately 0.25-mile north of the project site during the same San Joaquin kit fox surveys in early October 2016. This camera station was located in a burrow complex in a fallow field where ground squirrels, kangaroo rats, and mice were photographed by the motion-sensitive camera. There was also no sign of burrowing occupancy at this location.

A burrowing owl was also observed on the site of the RE Tranquillity Solar Project, which is immediately adjacent to the RE Scarlet Solar site to the southwest. This individual was reported by Rincon Consultants, Inc. (2014) during biological surveys in October 2013. Rincon concluded that the individual was most likely a dispersing juvenile (Rincon 2014). HELIX conducted pre-construction surveys and multiple nesting bird surveys for the RE Tranquillity Solar Project in 2015 and no burrowing owl or

suitable burrows were observed, although an incidental burrowing owl sighting was reported by construction personnel on the RE Tranquillity Solar Site during construction of the project in 2015.

The nearest CNDDB reported occurrence of burrowing owl is from canal banks along W. Adams Avenue, approximately 1.5 miles east of the Project site. Eight burrowing owls were observed using burrows at this location in 2006; nesting was not confirmed at this location but can be assumed. Other CNDDB occurrence records in the region are from canal banks south of the Mendota Wildlife Area, approximately 5 miles northeast of the Project site where burrowing owls were observed nesting at multiple locations in the late 1980's and early 1990's.

These survey results suggest that active and fallow fields on the Project site and vicinity are occasionally visited by transient or foraging burrowing owls nesting at other suitable locations in the region, but that the Project site does not support resident owls.

Habitat Suitability

Most of the Project site provides potential foraging habitat for burrowing owl although the quality of the habitat is low because of active cultivation, dense vegetation, and lack of suitable burrows and perches. Disking and other soil disturbance associated with on-going agricultural activities remove potential burrows in cultivated fields and reduce the abundance of small mammal prey. Fallow fields potentially support small mammal prey such as voles, gophers, and kangaroo rats; however, periodic and unpredictable tilling discourages development of suitable colonies of larger burrowing animals such as ground squirrels. Burrows of California ground squirrel (*Spermophilus beecheyi*) occur only in a fallow field north of the Project site, and these represent the only potentially suitable residence habitat for burrowing owl near the Project site. In addition to the scarcity of suitable habitat, the large number of barn owls in the Project site likely also discourages occupancy by burrowing owls through direct predation and competition for prey. Barn owls are very common in fields throughout the site and nest in large numbers in trees on surrounding properties.

Potential for Significant Adverse Effects

There is low potential for burrowing owl to occur in the Project site, except as transient individuals, due to the scarcity of suitable nesting habitat, regular site disturbance, and large numbers of predators (barn owls). Presence of California ground squirrels at isolated locations in the Project site presents a low potential for burrowing owls to establish a nest in the future.

If dispersing or transient burrowing owls were to occupy mammal burrows in the Project site prior to construction or decommissioning, construction activities could result in direct impacts to burrowing owl individuals through harm as a result of contact with construction equipment or personnel and/or indirect impacts as a result of habitat destruction or loss of burrows. Project construction activities that could occur in the vicinity of occupied burrows if this species were to occupy the site would include access road construction, trenching for low-voltage collection lines, boring for support posts, installation of solar panel arrays, and site decommissioning. These activities would be considered low-intensity impacts because the construction disturbance (noise, presence of equipment and personnel) would be comparable in nature to the agricultural practices in the region.

Disturbance of burrows occupied by burrowing owl and/or loss of foraging habitat for burrowing owl adjacent to occupied burrows would be a significant impact. The recommended mitigation measures for burrowing owl contained in **Section 6** (**MM BIO-1a, b**) would reduce impacts to this species to less than significant.

5.2.1.3 *Swainson's Hawk (Buteo swainsoni)*

Federal status – none
State status – Threatened

Species Description

Swainson's hawk was state listed as a California threatened species on April 17, 1983. This species has no federal listing status.

Swainson's hawk is an uncommon breeding resident and migrant in the Central Valley, Klamath Basin, Northeastern Plateau, Lassen County, and the Mojave Desert. There has been very limited Swainson's hawk breeding reported from Lanfair Valley, Owens Valley, Fish Lake Valley, Antelope Valley, and in eastern San Luis Obispo County. Swainson's hawk breeds in stands with few trees in juniper-sage flats, riparian areas, and in oak savannah in the Central Valley and forages in adjacent grasslands or suitable grain or alfalfa fields, or livestock pastures. Swainson's hawks breed in California and winters in Argentina, Mexico, and South America. Swainson's hawks usually arrive in the Central Valley between March 1 and April 1, and migrate south between September and October. Swainson's hawks usually nest in trees adjacent to suitable foraging habitat. Swainson's hawk nests are usually located in trees near the edges of riparian stands, in lone trees or groves of trees in agricultural fields, and in mature roadside trees. Valley oak, Fremont cottonwood, walnut, and large willow with an average height of about 58 feet, and ranging from 41 to 82 feet, are the most commonly used nest trees in the Central Valley. Suitable foraging areas for Swainson's hawk include native grasslands or lightly grazed pastures, alfalfa and other hay crops, idle land, certain grain and row croplands, and ruderal lands. Swainson's hawks primarily feed on voles; however, they will feed on a variety of prey including small mammals, birds, and insects.

Survey History

Swainson's hawk was not observed nesting in the Project site during focused protocol-level surveys conducted in 2016, due to a lack of suitable nest trees in the Project site (**Appendix F**). A pair of Swainson's hawks was observed nesting in eucalyptus trees along West Dinuba Avenue west of SR-33 in 2015 and 2016 by HELIX biologists monitoring the adjacent RE Tranquillity Solar Project. A second pair was observed nesting in a willow tree along W. Rose Avenue between San Bernardino Avenue and Ohio Avenue in 2015, also by HELIX biologists monitoring the RE Tranquillity Solar Project. These nest locations are 0.4 and 2 miles from the Project site, respectively. Although Swainson's hawks known to be nesting in trees on West Dinuba Avenue were not observed foraging in the Project site, it is likely that they would forage there, especially during and after harvest, when prey is exposed.

CNDDB reported occurrences within 10 miles of the Project site are all located near Mendota and north of Tranquillity, northeast of the Project site. These records are associated with trees in the Mendota Wildlife Area, Fresno Slough, and isolated trees near residences.

Habitat Suitability

The Project site does not support suitable nesting habitat for Swainson's hawk, as the site is treeless. Active and fallow agricultural fields provide suitable foraging habitat for Swainson's hawks nesting in nearby trees. The documented Swainson's hawk nest located 0.4 mile west of the Project site is shown on **Figure 5** in **Appendix A**.

Potential for Significant Adverse Effects

Because there are no trees in the Project site, the Project would not remove Swainson's hawk nesting habitat. Except for trees along Dinuba Avenue, there are no trees suitable for Swainson's hawk nesting within a 0.25-mile radius of the Project site. Project construction and decommissioning activities within 0.25 mile of suitable trees along Dinuba Avenue could potentially disturb nesting Swainson's hawks, if they were to begin nesting in those trees. Disturbance leading to nest abandonment, forced fledging, or other harm of Swainson's hawk or nestlings would be a significant impact.

The recommended mitigation measures for Swainson's hawk contained in **Section 6** (**MM BIO-2**) would reduce impacts to nesting Swainson's hawk to less than significant.

An analysis of potential impacts of the Project on Swainson's hawk foraging habitat is being conducted separately. Therefore, this BTR does not evaluate potential impacts to Swainson's hawk foraging habitat and potential impacts to Swainson's hawk foraging habitat are not discussed further in this document.

5.2.1.4 *Northern Harrier (Circus cyaneus)*

Federal status – none
State status – species of special concern

Species Description

Northern harrier is widespread throughout North America from southern Canada to northern Mexico, and is a year-round resident in California. Population sizes increase during the non-breeding season due to over-wintering migrants. Northern harriers breed in a variety of open habitats including marshes, wet meadows, weedy shorelines, grasslands, weed fields, pastures, sagebrush flats, desert sinks, and croplands. Northern harriers nest on the ground in patches of dense, tall vegetation in undisturbed areas. Breeding occurs from March to August. Northern harriers feed on a wide variety of vertebrate prey, including rodents, songbirds, waterfowl, and lizards.

Survey History

Northern harrier was observed foraging in the Project area during biological surveys in 2016. Individuals were regularly observed near the center of the site and at the eastern edge. No nests or nesting pairs were observed. There are no CNDDB reported occurrences of nesting northern harrier within 10 miles of the Project site.

Habitat Suitability

Fallow agricultural fields in the Project site provide suitable foraging habitat for northern harrier. The Project site does not support patches of dense, tall, undisturbed vegetation suitable for nesting.

Potential for Significant Adverse Effects

The Project would have no effect on nesting northern harrier, as there is no suitable nesting habitat in or adjacent to the Project site. The nearest suitable nesting habitat for northern harrier is in the Mendota Wildlife Area, approximately 2.5 miles northeast of the Project site. All intervening land is agricultural fields similar to the Project site, and provides similar foraging habitat. Converting the Project site to solar photovoltaic generation would not have a significant adverse effect on northern harrier foraging habitat

in the region of the Mendota Wildlife Area due to the abundance of similar agricultural fields in the area. No mitigation is necessary for northern harrier.

5.2.1.5 *California Horned Lark (Eremophila alpestris actia)*

Federal status – none
State status – watch list

Species Description

Horned lark is a common to abundant resident of a variety of open habitats from coastal grasslands to alpine dwarf shrub habitats. Horned larks usually leave mountainous areas in winter and gather in deserts and lowlands where they form large flocks, augmented by migrants from outside California. Horned larks forage on the ground for insects, snails, spiders, and seeds. Nests are built on the ground in areas of low, sparse vegetation; breeding occurs from March through July (CDFW 1990).

Survey History

Horned larks were observed in the Project site regularly during surveys in 2016. Individuals were seen along roads and in disturbed areas at the margins of fallow fields. The only CNDDB reported occurrence of horned lark within 10 miles of the Project site is located 0.5 mile west of Interstate 5 at Mountain View Avenue, which is over 5 miles west of the Project site.

Habitat Suitability

Disturbed areas at the margins of fallow fields provide open, sparsely vegetated habitat suitable for horned lark nesting and foraging. Horned larks were observed in these habitats during the breeding season in 2016, although nesting was not directly observed.

Potential for Significant Adverse Effects

In the absence of proposed mitigation measures, potential adverse effects of the proposed Project could include direct or indirect impacts to horned lark. Construction and decommissioning activities during the horned lark breeding season (March – July) would have the potential to disturb nests both directly and indirectly through nest destruction and/or construction equipment and/or personnel causing noise or other disturbance near nests. Disturbance could lead to destruction of nests, eggs, or chicks, or to abandonment of active nests. This would be a significant impact.

The recommended mitigation measures for nesting birds contained in **Section 6** (**MM BIO-4**) would reduce impacts to horned lark to less than significant.

5.2.1.6 *Loggerhead Shrike (Lanius ludovicianus)*

Federal status – none
State status – species of special concern

Species Description

The range of the loggerhead shrike extends throughout the United States and southern Canada, and it is a year-round resident throughout most of its California range. This species prefers open habitats with scattered shrubs, trees, posts, or other perches. It can be found in shrublands or open woodlands with

bare ground, or sparse herbaceous cover and is often found in open cropland. Loggerhead shrikes hunt in open areas of short grasses, forbs, or bare ground, and impale prey on thorns or barbed wire. Prey includes large insects, as well as various small reptiles, amphibians, rodents, and birds.

Suitable breeding habitat includes shrublands or open woodlands with grass cover or bare ground. Loggerhead shrikes in the Central Valley typically use riparian edges where they generally place their nests 1 to 2 meters (3.3 to 6.6 feet) above ground in shrubs or trees. Loggerhead shrike habitat includes alfalfa fields, grasslands, non-rice crops, oak groves, orchards, pastures, ponds and seasonally wet areas, riparian areas, disturbed areas, rural residential development, tree groves, and canals.

Survey History

Loggerhead shrike was observed foraging in the Project site during surveys in 2016, near the center of the site and at the eastern edge. These individuals were associated with remnant patches of alkali sink scrub dominated by Mojave saltbush (*Atriplex spinifera*) and allscale (*Atriplex polycarpa*) that are located on off-site parcels. These thorny shrubs offer suitable nesting and perching habitat for Loggerhead shrike that is not available in the Project site, and shrikes were not observed more than a few hundred feet inside the Project site boundary. There are no CNDDB reported occurrences of loggerhead shrike within 10 miles of the Project site.

Habitat Suitability

The Project site does not provide suitable nesting or perching/hunting habitat for Loggerhead shrike, but does provide foraging habitat for individuals residing in shrubby habitats just outside the Project site boundary. Periodic disking of fields in the Project site likely reduces the suitability of those areas as foraging habitat for neighboring shrikes.

Potential for Significant Adverse Effects

There is no suitable nesting habitat in the Project site, however, project activities related to construction and decommissioning have a low potential to affect loggerhead shrike nesting adjacent to the project site by causing noise or other disturbance near nests. Disturbance could lead to destruction of nests, eggs, or chicks, or to abandonment of active nests. Loggerhead shrike is a highly mobile bird species and individual birds foraging or otherwise occurring in the site could readily avoid construction areas or contact with construction equipment or personnel. Therefore, no direct impacts to loggerhead shrike individuals is anticipated. Potential impacts to shrikes nesting adjacent to the site would be a significant impact.

The recommended mitigation measures for nesting birds contained in **Section 6** (**MM BIO-4**) would reduce impacts to loggerhead shrike to less than significant.

5.2.2 Special-Status Mammals

5.2.2.1 *Giant Kangaroo Rat (Dipodomys ingens) and Fresno Kangaroo Rat (Dipodomys nitratoides exilis)*

Special-status kangaroo rats were evaluated due to kangaroo rat sightings in the project site during SJKF surveys. The project site falls within the potential range of two federally-listed as endangered kangaroo rats; giant kangaroo rat and Fresno kangaroo rat. Neither of these species has potential habitat in the

project site but are discussed below due to the kangaroo rat sightings, which were determined via live trapping to be the common Heermann's kangaroo rat (*Dipodomys heermanni*).

Species Description

Giant kangaroo rat was listed as "threatened with extinction" under the Endangered Species Preservation Act of October 15, 1966 (16 U.S.C. 668aa(c); 32 FR 4001), and is currently listed as "Endangered" under the Endangered Species Act of 1973 (16 U.S.C. 1531-1544).

Fresno kangaroo rat was listed as "Endangered" under the Endangered Species Act of 1973 (16 U.S.C. 1531-1544) on January 30, 1985 (50 FR 4222-4226) and Critical Habitat was designated.

The historic range of giant kangaroo rat was the Central Valley from the foot of the Tehachapi Mountains to Los Banos, and the Carrizo Plain and San Juan Creek watershed west of the Temblor Range. The species is currently fragmented into 6 major population units: (1) the Ciervo-Panoche Hills in Fresno and San Benito counties; (2) the Kettleman Hills in Kings County; (3) San Juan Creek Valley in San Luis Obispo County; (4) the Elk Hills area near McKittrick, Maricopa, and Taft; (5) Carrizo Plain, and; (6) the Cuyama Valley in Santa Barbara and San Luis Obispo counties (USFWS 1998). The range of Fresno kangaroo rat is restricted to valley grasslands within Fresno County.

Kangaroo rats are small mammals adapted for survival in arid environments, inhabiting dry, open country in southwestern North America. Kangaroo rats hop on their elongated hind legs, carry seeds in external cheek pouches, and cache seeds in shallow burrows. The giant kangaroo rat is the heaviest species of kangaroo rat, weighing 4.8 to 6.4 ounces. Total length is 12.2 – 13.7 inches, including a 6.2 – 7.8-inch tail. Giant kangaroo rats forage above ground at night, for as little as 20 minutes per night, within an area of approximately one-third of an acre (USFWS 1987). Giant kangaroo rats are associated with several other state - and federally-listed species that share their general habitat affinities, including San Joaquin kit fox (*Vulpes macrotis mutica*), blunt-nosed leopard lizard (*Gambelia sila*), San Joaquin antelope squirrel (*Ammospermophilus nelsoni*), and California jewelflower (*Caulanthus californicus*; USFWS 2016).

Habitat for giant kangaroo rat is arid grasslands with few or no shrubs, sandy-loam soils, and gentle slopes (USFWS 1998). Giant kangaroo rat burrows are generally shallow (less than 12-inches below ground). The project site is within the historic range of the species, but no longer supports grassland habitat. The giant kangaroo rat population center in the Ciervo-Panoche Hills is west and southwest of the project site, west of Interstate-5. The project site separated from this population center by Interstate-5, the California Aqueduct, and a minimum of 7.5 miles of agricultural land.

Fresno kangaroo rat is historically found in the southern San Joaquin Valley between the Merced River and Tulare Lake, as far west as Fresno Slough. Fresno kangaroo rat is no longer known from its historic range, and there are no confirmed extant populations (USFWS 2010b).

Survey History

HELIX conducted a habitat assessment for kangaroo rat in early October 2016 based on sightings of kangaroo rat on the site during San Joaquin kit fox surveys. Californian Environmental Services conducted a kangaroo rat live trapping study between October 24 and 31, 2016 in areas identified as potentially suitable kangaroo rat habitat. Details regarding these surveys are provided in **Appendix I**.

No giant or Fresno kangaroo rats were observed in the Project site during a protocol live trapping study for kangaroo rats. The common Heermann's kangaroo rat was caught repeatedly during the trapping survey and was the only kangaroo rat encountered.

The nearest CNDDB reported occurrences of any special-status kangaroo rat (giant kangaroo rat) are in the Ciervo-Panoche Hills, west of Interstate-5 and 10 miles west of the Project site.

Habitat Suitability

The Project site lacks suitable habitat for federally-listed kangaroo rats and there are no reported occurrences in the vicinity. There is no native grassland in the Project site, and all portions of the site have been subjected to cultivation in recent years. Kangaroo rat burrows belonging to the common Heermann's kangaroo rat on the Project site are restricted to fallow and grazed fields that have not been recently cultivated and field margins.

Potential for Significant Adverse Effects

The project site is separated from the nearest known population of giant kangaroo rat by at least 7 miles of agricultural land, a freeway, and the California Aqueduct. The entire project site is currently or recently active agricultural land; there is no remnant grassland habitat that could support giant kangaroo rat, and no nearby suitable habitat from which giant kangaroo rat could colonize fallow land in the site. Fresno kangaroo rats are no longer known to occur in the region and the site lacks suitable grassland habitat for this species. Converting the Project site to solar photovoltaic generation would have no effect on federally-listed kangaroo rats and no mitigation is required.

5.2.2.2 *San Joaquin Kit Fox (Vulpes macrotis mutica)*

Federal status – Endangered
State status – Endangered

Species Description

San Joaquin kit fox was listed as "threatened with extinction" under the Endangered Species Preservation Act of October 15, 1966 (16 U.S.C. 668aa(c); 32 FR 4001), and is currently listed as "Endangered" under the Endangered Species Act of 1973 (16 U.S.C. 1531-1544).

San Joaquin kit fox inhabits a wide range of open and shrubby habitats, including grassland, scrublands, agricultural areas where dens are available (e.g., unplowed fields, row crops, vineyards, or orchards), non-irrigated pastures, vernal pool grasslands, playas, and alkali meadows. San Joaquin kit fox dens are typically located on slopes less than 40 degrees, and pupping dens are usually on level ground; den entrances are typically 8 – 10 inches in diameter. San Joaquin kit foxes use many dens in a season, and occupied dens often show no signs of use. Common signs of use include a dirt ramp leading to the entrance, flattened grass around the entrance, scat, tracks, and prey remains.

The largest extant populations of San Joaquin kit fox are at the western margins of the Central Valley and the eastern Coast Ranges. Population centers occur in western Kern County (Elk Hills and Pixley National Wildlife Refuge), eastern San Luis Obispo County (Carrizo Plain), western Fresno County and eastern San Benito County (Ciervo – Panoche Natural Area), Southern Monterey County (Fort Hunter-Liggett and Camp Roberts), western Merced County, and eastern Contra Costa County. These population centers generally form a metapopulation lying west of Interstate 5 and/or south of Allensworth, with

only isolated occurrences in the remainder of the valley. By 2006, San Joaquin kit fox was determined to be largely eliminated from the central San Joaquin Valley (USFWS 2010).

Survey History

San Joaquin kit fox was not observed in the Project site during protocol-level surveys described in **Section 3.2.2**. The Project site contains no suitable dens (**Appendix H**) and no sign of this species has been observed on the site. No San Joaquin kit fox were observed during multiple pre-construction surveys and construction monitoring or during protocol-level surveys for the adjacent RE Tranquillity Solar Project.

There are 4 CNDDB reported occurrences of San Joaquin kit fox within 10 miles of the Project site, 3 of which are west of the California Aqueduct. The only reported occurrence not separated from the Project site by more than 5 miles and a major movement barrier is a record from the town of Mendota dated 1947.

Habitat Suitability

Small mammal burrows are abundant around the margins of the Project site north of Manning Avenue, but absent from the interior and edges of active agricultural fields. Frequent disking and cultivation of fields eliminates burrows and discourages occupancy by burrowing mammals. San Joaquin kit fox may potentially occur in the site as transient individuals dispersing, but has low potential to reside or breed in the site.

Potential for Significant Adverse Effects

No kit foxes or sign were observed in the Project site during protocol surveys in 2016 or on the adjacent RE Tranquillity Solar site during protocol surveys, pre-construction surveys and construction monitoring; however, because San Joaquin kit fox is a highly mobile animal, there is low potential for San Joaquin kit fox to occupy the Project site prior to commencement of the Project or to occur in the Project site as transient individuals either foraging or dispersing through the site during construction, operation, and decommissioning. In the absence of proposed mitigation measures, the Project would have low potential for adverse effects on San Joaquin kit fox. This would be a significant impact.

Implementation of the recommended mitigation measures for San Joaquin kit fox contained in **Section 6** (**MM BIO-3**) would avoid take of this species and would reduce impacts to San Joaquin kit fox to less than significant.

5.2.3 Migratory Birds and Raptors

The Project site provides nesting and foraging habitat for a variety of native birds common to the San Joaquin Valley that nest on the ground or in herbaceous vegetation, such as western meadowlark (*Sturnella neglecta*), western kingbird (*Tyrannus verticalis*), mourning dove (*Zenaida macroura*), and savannah sparrow (*Passerculus sandwichensis*). Destruction of nests, eggs, or chicks by vegetation clearing or ground-disturbing activities during the avian breeding season (March – August) would be considered a violation of the Migratory Bird Treaty Act and California Fish and Game Code, and mitigation is recommended.

There are no trees in the Project site, but trees adjacent to the project site provide potential nest sites for red-tailed hawk (*Buteo jamaicensis*) and other raptors. Project activities would not directly disturb

raptor nests, but could result in noise and other indirect disturbance that has potential to cause nest failure. Disturbance resulting in nest failure would be considered a significant impact.

A recent publication by the U.S. Department of Energy reviewed the current state of knowledge concerning avian mortality at utility-scale solar facilities (Walston *et al*. 2015). The report included discussion of the potential for solar photovoltaic generating facilities to cause death and injury to waterfowl that mistake fields of photovoltaic panels for waterbodies – a phenomenon called the "lake effect". The report concluded that few empirical data are available on the number of birds killed or injured at solar generating facilities generally, and by the lake effect specifically. In addition, the authors state that no scientific studies testing the reality of the lake effect had been conducted up to the time of publication. Because there are currently no data on the reality or magnitude of the lake effect in regard to large-scale solar photovoltaic generating facilities, there are no generally accepted, effective mitigation measures to avoid or reduce impacts to waterfowl resulting from it. While there is potential for the Project to affect migrating waterfowl through the lake effect, analysis of such impacts would be purely speculative. No significant impact due to the "lake effect" is anticipated.

The recommended mitigation measures for nesting birds contained in **Section 6** (**MM BIO-4**) would reduce impacts to nesting migratory birds and raptors to less than significant.

5.2.4 Special-Status Plants

There are three special-status plant species occurrences reported in the CNDDB within 5 miles of the project site. All three reported occurrences are from 1940 or earlier. Two of the reported occurrences are of San Joaquin woollythreads (*Monolopia congdonii*), which is listed as federally-endangered with no state listing status and is a California Native Plant Society rare plant rank 1B.2, and the third occurrence is of Munz's tidy-tips (*Layia munzii*), which has no state or federal listing status but has a California Native Plant Society rare plant rank of 1B.2. The two reported occurrences of San Joaquin woollythreads are approximately 4.5 miles north and and five miles south of the Project site and are dated from 1940 and 1935 respectively. These reported occurrences are considered "possibly extirpated" in the CNDDB due to loss of habitat. The reported occurrence of Munz's tidy tips is from 1940 where this species was observed approximately 2.5 miles north of the site. This reported occurrence is listed as "presumed extant" in the CNDDB.

San Joaquin woollythreads is found in sandy soils in valley and foothill grassland and chenopod scrub. Munz's tidy tips is found on clay soils in chenopod scrub and valley and foothill grassland. These soil and habitat types do not occur in the project site, which has been entirely converted to agriculture land use. There is no potential for these regionally-occurring special-status plant species to occur in the Project site and the Project will have no effect on special-status plants.

5.3 SENSITIVE NATURAL COMMUNITIES

There are no native or naturalized vegetation communities in the Project site. The entire site consists of active and fallow agricultural land that supports cultivated and ruderal non-native species (**Appendix D**). The Project would have no effect on sensitive native or naturalized vegetation communities and no mitigation is required.

5.4 JURISDICTIONAL WATERS AND WETLANDS

There are no aquatic resources on the Project site that qualify as potentially jurisdictional wetlands or other waters of the U.S. or state. Temporary drainage ditches are excavated along the sides of most irrigated fields to collect agricultural tailwater. These ditches, which are manipulated as needed to perform normal agricultural practices, drain to off-site sumps and have no hydrological connection to jurisdictional waters in the region. The Project would have no effect on jurisdictional waters and wetlands and no mitigation is required.

5.5 WILDLIFE NURSERIES AND MOVEMENT CORRIDORS

No wildlife nurseries of significance were identified on the Project site. Impacts to wildlife nurseries would be less than significant.

The Project site is not included in any corridors mapped by the California Essential Habitat Connectivity Project, and does not provide any unique movement or dispersal habitat relative to surrounding lands for several miles in all directions. The Project site is partially inside and south of a broad area defined as a "proposed area where connectivity and linkages should be promoted" in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998). This area extends north to the Fresno – Merced county line, and is intended as a location for linkages between the Ciervo-Panoche Hills area and the Fresno Slough – San Joaquin River corridor. The northern portion of the Project site is inside the extreme southern edge of this area and the remainder of the site is outside it to the south. Given the broad extent of this area, and the peripheral location of the Project site, the Project would not significantly constrain future establishment of wildlife movement corridors in this area and no mitigation is required.

The Project site is within the vicinity of the Pacific Flyway, a significant avian migration route. The Mendota Wildlife Area, located approximately 4 miles northeast of the project site, is a recognized stopover location for migratory birds travelling along the Pacific Flyway. The project would introduce new collision hazards to the site, including new transmission lines, and special status and migratory birds may collide with the new project infrastructure during both daytime and nighttime activity. However, there are existing transmission towers that present a collision risk. To reduce the likelihood of large bird collisions and electrocutions, new gen-tie lines would be built following the Avian Power Line Interaction Committee's guidance, Reducing Avian Collisions with Power Lines: State of the Art in 2012 (APLIC, 2012), and thereby reduce the potential impact of collisions and electrocutions with power line structures to a less-than significant level.

The Project site and surrounding lands currently provide extensive open, un-fenced dispersal habitat for wildlife movement in the region. Fencing the Project site could potentially interfere with movement and predator avoidance for local wildlife. This would be a significant impact.

Implementation of the recommended mitigation under fencing guidelines for San Joaquin kit fox (**MM BIO-3c, o.**) would reduce the Project's potential impacts to movement corridors to less than significant.

5.6 LOCAL POLICIES

The Fresno County General Plan includes several policies intended to promote conservation of existing high-value biological resources in the county and assure no net loss of sensitive resources and special-status species. The Project area has been subject to a long history of intensive agricultural land use that

has severely reduced the biological value of the site compared to undisturbed natural habitats. The Project has potential for impacts to special-status species, and includes avoidance, minimization, and mitigation measures that will reduce impacts to special-status species (**Section 6**). Therefore, the Project would not conflict with local policies and ordinances protecting biological resources and no additional mitigation is required.

5.7 HABITAT CONSERVATION PLANS

The Project site is not within the boundaries of any habitat conservation plan. Therefore, the Project would not conflict with any provisions of an adopted habitat conservation plan and no mitigation is required.

5.8 POTENTIAL FOR SPREAD OF INVASIVE SPECIES

Ongoing agricultural activities on the Project site likely reduce the spread of invasive species compared to leaving the land fallow because active agriculture regularly removes established vegetation and replaces it with a crop monoculture. Fallow fields typically become overgrown with invasive species, including host plants for agricultural pests. Converting active agricultural land to solar photovoltaic generation has potential to result in increased establishment of weedy species such as Russian thistle by reducing the frequency of disturbance. The Project is expected to comply with all weed abatement policies and orders of the Fresno County Agriculture Commissioner. This would reduce potential impacts from the spread of invasive species to less than significant. No mitigation for invasive species is required.

6 MITIGATION MEASURES

6.1 MITIGATION FOR POTENTIAL EFFECTS ON BURROWING OWL

MM BIO-1a: Avoid Construction and Decommissioning Activities During the Burrowing Owl Nesting Season. Ground disturbance activities associated with construction and decommissioning of the project shall begin outside of the burrowing owl nesting season (February 1 through August 31), unless reasonably necessary to stay on schedule, and the site shall be maintained in a manner that is inhospitable to burrowing owl such as keeping the site free of vegetation and maintaining regular site disturbance by construction equipment and personnel. This will discourage burrowing owl from occupying the Project site.

MM BIO-1b: Take Avoidance Survey. No more than 14 days prior to initiation of ground disturbing activities associated with construction and decommissioning, a qualified biologist shall conduct a Take Avoidance survey of the Project site and surrounding areas to a distance of 150 meters in accordance with the methods outlined in the CDFW *Staff Report on Burrowing Owl Mitigation* (2012). The pre-construction survey will cover all areas within 150 meters of the portion of the site in which construction is scheduled to start. Surveys will be phased based on the construction schedule such that the surveys are conducted no more than 14 days ahead of the start of ground disturbance in new areas. If construction activities in portions of the site cease for a period of 14 days, those portions of the site will be resurveyed for burrowing owls prior to the resumption of construction. If no occupied (breeding or wintering) burrowing owl burrows are identified, no further mitigation would be required. If occupied burrows are identified on the site or within 150 meters of the project disturbance area, one of the following actions shall be taken: 1) permanent avoidance of the burrow or 2) establishment of a temporary avoidance buffer followed by

passive relocation and compensatory mitigation for loss of habitat in conjunction with the measures below:

(A) If an occupied wintering burrow is discovered during pre-construction surveys, a 50-meter buffer area will be established around the burrow until the owl leaves on its own (if the burrow is more than 50 meters offsite and/or more than 50 meters from the work area, no buffer is necessary). Ground-disturbing work conducted during the nonbreeding (winter) season (September 1 to January 31) can proceed near the occupied burrow so long as the work occurs no closer than 50 meters to the burrow, and the burrow is not directly affected by the Project activity. A smaller buffer may be established in consultation with CDFW and monitored at the discretion of a qualified biologist. If the 50-meter buffer cannot be maintained for the duration of occupancy by the owl, owls may be excluded from an occupied wintering burrow in accordance with the conditions of an approved Burrowing Owl Exclusion Plan, which shall be prepared and submitted for approval by CDFW prior to passive relocation of any burrowing owls.

(B) If an occupied nesting burrow is discovered during pre-construction surveys, an avoidance buffer of 100 meters shall be established around the burrow location and maintained until a qualified biologist has determined that the nest has fledged or is no longer active. No Project activities shall take place within the 100-meter buffer during the time in which it is in place. A smaller buffer may be established in consultation with CDFW and monitored at the discretion of a qualified biologist.

(C) If an occupied nest burrow cannot be avoided, and the burrow is not actively in use as a nest, a 100-meter buffer will be established until the burrowing owls can be excluded from burrows in accordance with an approved Burrowing Owl Exclusion Plan, which will be prepared and submitted for approval by CDFW prior to passive relocation of any burrowing owls. The Burrowing Owl Exclusion Plan shall be based on the recommendations made in the *Staff Report on Burrowing Owl Mitigation* (CDFW 2012) and shall include the following information for each proposed passive relocation:
    - Confirmation by site surveillance that the burrow(s) is empty of burrowing owls and other species;
    - Type of scope to be used and appropriate timing of scoping;
    - Occupancy factors to look for and what shall guide determination of vacancy and excavation timing;
    - Methods for burrow excavation;
    - Removal of other potential owl burrow surrogates or refugia on-site;
    - Methods for photographic documentation of the excavation and closure of the burrow;
    - Monitoring of the site to evaluate success and, if needed, to implement remedial measures to prevent subsequent owl use to avoid take; h. Methods for assuring the impacted site shall continually be made inhospitable to burrowing owls and fossorial mammals.

MM BIO-1c: Protection of Off-Site Burrowing Owls. If an occupied burrow is identified off-site within 150 meters of the project disturbance area during construction or decommissioning and passive exclusion is deemed necessary to protect the owls, burrowing owls may be excluded

from burrows if permission is granted by the land owner and in accordance with an approved Burrowing Owl Exclusion Plan, which will be prepared and submitted for approval by CDFW prior to passive relocation of any burrowing owls. If burrowing owls cannot be excluded from an off-site burrow and it is not feasible to maintain an avoidance buffer as stated above, coordination will be conducted with CDFW to determine appropriate measures to minimize impacts to off-site burrowing owls. Such measures could include, but are not limited to: 1) installation of barriers between the construction area and the occupied burrows to block noise and views of construction equipment and personnel, and 2) regular monitoring by a qualified biologist to determine if construction is resulting in disturbance of the owls that could lead to nest abandonment or harm to adult owls or their young. If such disturbance was occurring, the biological monitor would have the authority to halt construction until further modifications could be made to avoid disturbance of the owls.

MM BIO-1d: Compensatory Mitigation for Lost Breeding Habitat. If burrowing owl pairs are passively relocated, compensatory mitigation for lost wintering/breeding habitat shall be provided either through dedication of 6 acres of suitable habitat (per pair of relocated owls) on or off-site, or through purchase of credits at a CDFW-approved mitigation bank in the region. No compensatory mitigation is required for passive relocation or eviction of transient, unpaired owls.

MM BIO-1e: Management of Permanent Avoidance Buffers. If permanent avoidance buffers are established on the project site to protect burrowing owls, such areas shall be managed for the duration of the Project through decommissioning to preserve current values as foraging habitat for burrowing owl. Management shall include: (1) exclusion of all Project activities throughout the construction, operation, and decommissioning phases, including staging, parking, driving, or dumping; (2) vegetation management by grazing or mowing to preserve open, low-growing vegetation; (3) fencing to discourage human incursion; (4) signing identifying the area as a biologically sensitive area managed for burrowing owl, and; (5) a worker education and awareness program for all personnel working on the site including contractors and sub-contractors.

6.2 MITIGATION FOR POTENTIAL EFFECTS ON SWAINSON'S HAWK

MM BIO-2: If Project construction or decommissioning is initiated during the Swainson's hawk nesting season (March 1 - September 15), a qualified biologist shall conduct a pre-construction Swainson's hawk nest survey of all potential nesting habitat within 0.5-mile of the Project site, according to current protocol (SHTAC 2000). If no active nests are identified, no further mitigation would be required. If active nests are identified, the following measure is required:

(A) A suitable avoidance buffer (e.g. 0.5 mile) shall be established around active nests consistent with the CDFW Staff Report (1994), and no construction within the buffer shall be allowed until a qualified biologist has determined that the nest is no longer active (e.g. the nestlings have fledged and are no longer reliant on the nest). If it is not feasible to maintain a 0.5-mile buffer and reasonably accommodate construction or decommissioning activities, the established buffer distance can be reduced in coordination with CDFW. Project activities within the reduced buffer should be monitored at the discretion of a qualified biologist.

6.3 MITIGATION FOR POTENTIAL EFFECTS ON SAN JOAQUIN KIT FOX

MM BIO-3a: Preconstruction Surveys for San Joaquin Kit Fox. A qualified biologist shall conduct a preconstruction survey no more than 14 days prior to the beginning of ground disturbance and/or construction or decommissioning activities, or any other Project activity likely to impact San Joaquin kit fox, to determine if potential San Joaquin kit fox dens are present in or within 500 feet of the Project site (inaccessible areas outside of the Project site can be surveyed using binoculars or spotting scopes from public roads). The surveys shall be conducted in all areas of suitable habitat for San Joaquin kit fox. Surveys need not be conducted for all areas of suitable habitat at one time; they may be phased so that surveys occur within 14 days prior to disturbance of any particular portion of the site. If potential dens are observed and avoidance of the dens is determined to be feasible by a qualified biologist in consultation with the project proponent and the County, the following minimum buffer distances shall be established prior to construction activities (consistent with USFWS 2011):

- Potential den: 50 feet
- Atypical den: 50 feet
- Known den: 100 feet
- Natal/pupping den: at least 500 feet – **USFWS must be contacted**.

- Buffer establishment shall follow the *USFWS Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance* (USFWS 2011) under "Exclusion Zones."

- If occupied San Joaquin kit fox dens are observed on the site, USFWS must be contacted.

MM BIO-3b: Avoidance of Adverse Effects to San Joaquin Kit Fox. If avoidance of the potential dens is not feasible, the following measures are required to avoid potential adverse effects to the San Joaquin kit fox:

- If the qualified biologist determines that potential dens are inactive, the biologist shall excavate these dens by hand with a shovel to prevent foxes from re-using them during construction.

- If the qualified biologist determines that a potential non-natal den may be active, an on-site passive relocation program may be implemented with prior concurrence from the USFWS. This program shall consist of excluding San Joaquin kit foxes from occupied burrows by installation of one way doors at burrow entrances, monitoring of the burrow for one week to confirm usage has been discontinued, and excavation and collapse of the burrow to prevent reoccupation. After the qualified biologist determines that the San Joaquin kit foxes have stopped using active dens within the project boundary, the dens shall be hand-excavated with a shovel to prevent re-use during construction with prior concurrence from USFWS.

MM BIO-3c: Avoidance and Minimization Measures for San Joaquin Kit Fox. In addition, the following avoidance and minimization measures for San Joaquin kit fox shall be implemented during construction and decommissioning (as applicable) of the Project (USFWS 2011):

a. Project-related vehicles shall observe a daytime speed limit of 20 mph and a nighttime speed limit of 10 mph throughout the Project site, except on County roads and state and federal highways. Off-road traffic shall be prohibited outside of designated project areas.
b. To prevent inadvertent entrapment of kit foxes or other animals during the construction phase of the Project, all excavated, steep-walled holes or trenches more than 2-feet deep should be covered at the close of each working day by plywood or similar materials. If the trenches cannot be closed, one or more escape ramps constructed of earthen-fill or wooden planks should be installed. Before such holes or trenches are filled, they should be thoroughly inspected for trapped animals. If at any time a trapped or injured kit fox is discovered, the USFWS and the CDFW should be contacted as noted under measure l. referenced below.
c. Kit foxes are attracted to den-like structures such as pipes and may enter stored pipes and become trapped or injured. All construction pipes, culverts, or similar structures with a diameter of 4-inches or greater that are stored at a construction site for one or more overnight periods should be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a kit fox is discovered inside a pipe, that section of pipe should not be moved until the USFWS has been consulted. If necessary, and under the direct supervision of the biologist, the pipe may be moved only once to remove it from the path of construction activity, until the fox has escaped.
d. All food-related trash items such as wrappers, cans, bottles, and food scraps should be disposed of in securely closed containers and removed at least once a week from a construction or Project site.
e. No firearms shall be allowed on the Project site.
f. No pets, such as dogs or cats, should be permitted on the Project site to prevent harassment, mortality of kit foxes, or destruction of dens.
g. Use of rodenticides and herbicides in Project areas should be restricted. This is necessary to prevent primary or secondary poisoning of kit foxes and the depletion of prey populations on which they depend. Use of such compounds should observe label and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Food and Agriculture, and other State and Federal legislation, as well as additional Project-related restrictions deemed necessary by the USFWS. If rodent control must be conducted, zinc phosphide should be used because of a proven lower risk to kit fox.
h. An employee education program shall be implemented and required for all personnel approved to work on the site during construction, operations, and maintenance. The program shall consist of a brief presentation by persons knowledgeable in kit fox biology and legislative protection to explain endangered species concerns to contractors, their employees, and military and/or agency personnel involved in the project. The program shall include the following: A description of the San Joaquin kit fox and its habitat needs; a report of the occurrence of kit fox in the Project area; an explanation of the status of the species and its protection under the Endangered Species Act; and a list of measures being taken to reduce impacts to the species during project construction and implementation. A fact sheet conveying this information shall be prepared for distribution to the previously referenced people and anyone else who may enter the Project site.

i. A representative shall be appointed by the Project proponent who will be the contact source for any employee or contractor who might inadvertently kill or injure a kit fox or who finds a dead, injured or entrapped kit fox. The representative will be identified during the employee education program and their name and telephone number shall be provided to the Service.
j. Upon completion of the Project, all areas subject to temporary ground disturbances, including storage and staging areas, temporary roads, pipeline corridors, etc. shall be re-contoured if necessary, and revegetated to promote restoration of the area to pre-Project conditions. An area subject to "temporary" disturbance means any area that is disturbed during the Project, but after Project completion will not be subject to further disturbance and has the potential to be revegetated. Appropriate methods and plant species used to revegetate such areas shall be determined on a site-specific basis in consultation with the USFWS, CDFW, and revegetation experts.
k. In the case of trapped animals, escape ramps or structures should be installed immediately to allow the animal(s) to escape, or the USFWS should be contacted for guidance.
l. Any contractor, employee, or military or agency personnel who are responsible for inadvertently killing or injuring a San Joaquin kit fox should immediately report the incident to their representative. This representative should contact the CDFW immediately in the case of a dead, injured or entrapped kit fox. The CDFW contact for immediate assistance is State Dispatch at (916) 445-0045. They will contact the local warden or the wildlife biologist at (530) 934-9309. The USFWS should be contacted at Endangered Species Division, 2800 Cottage Way, Suite W2605, Sacramento, CA 95825, (916) 414-6620 or (916) 414-6600.
m. The Sacramento Fish and Wildlife Office and CDFW shall be notified in writing within three working days of the accidental death or injury to a San Joaquin kit fox during Project related activities. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal and any other pertinent information.
n. New sightings of kit fox shall be reported to the CNDDB. A copy of the reporting form and a topographic map clearly marked with the location of where the kit fox was observed should also be provided to the USFWS at the address listed under measure l.
o. Fencing of the Project site shall incorporate wildlife-friendly fencing design. Fencing plans may use one of several potential designs that would allow kit foxes to pass through the fence while still providing for Project security and exclusion of other unwanted species (i.e. domestic dogs and coyotes). Raised fences or fences with entry/exit points of at least 6 inches in diameter spaced along the bottom of the fence to allow species such as San Joaquin kit fox access into and through the Project site would be appropriate designs.

6.4 MITIGATION FOR POTENTIAL EFFECTS ON NESTING BIRDS AND RAPTORS

MM BIO-4: Pre-Construction Nesting Bird Surveys. If ground-disturbing or vegetation clearing and grubbing activities associated with construction or decommissioning of the project commence during the avian breeding season (February 1 – August 31), a qualified biologist shall conduct a pre-construction nesting bird survey no more than 7 days prior to initiation of any such activities. The survey area shall include suitable nesting habitat within 300 feet of the Project boundary (inaccessible areas outside of the Project site can be surveyed from

the site or from public roads using binoculars or spotting scopes). Pre-construction surveys are not required in areas where Project activities have been continuous since prior to February 1. Areas that have been inactive for more than 14 days during the avian breeding season must be re-surveyed prior to resumption of Project activities. If no active nests are identified, no further mitigation is required. If active nests are identified, the following measure is required:

(A) A suitable buffer (e.g. 0.5 mile for Swainson's hawk, 300 feet for common raptors; 100 feet for passerines) shall be established by a qualified biologist around active nests and no construction within the buffer shall be allowed until a qualified biologist has determined that the nest is no longer active (i.e. the nestlings have fledged and are no longer reliant on the nest, or the nest has failed). Encroachment into the buffer may occur at the discretion of a qualified biologist. Any encroachment into the buffer shall be monitored by a qualified biologist to determine whether nesting birds exhibit any negative responses to the activity. The biologist shall have the authority to halt or redirect construction activities in order to protect nesting birds and to help ensure an impact to nesting birds is avoided.

7 LIST OF PREPARERS

Shelby Howard	M.S., Biology, San Diego State University, 2004 B.S., Biology, University of Texas, El Paso, 1999
Stephen Stringer	M.S., Biology, Focus in Biological Conservation, California State University, Sacramento, 2007 B.S., Biology, Focus in Biological Conservation, California State University, Sacramento, 2003
George Aldridge	Ph.D., Biology, University of California, Irvine, 2005 B.S., Botany, Humboldt State University, Arcata, 1998
Jameson Honeycutt	B.S. Ecology and Natural Resources, The Evergreen State College, 2009
Lesley Scheuber	B.S. Environmental Economics and Policy, University of California, Berkeley, 2013

8 REFERENCES

California Department of Fish and Wildlife (CDFW). 1990. California Wildlife Habitat Relationships System – Horned lark (*Eremophila alpestris*).

_____. 1994. Staff report regarding mitigation for impacts to Swainson's hawk (Buteo swainsoni) in the Central Valley of California. November 1.

_____. 2012. Staff Report on Burrowing Owl Mitigation. March 7.

_____. 2017. California Department of Fish and Wildlife, Natural Diversity Database Biogeographic Data Branch. Sacramento, California. Accessed online April 26, 2017. Information expires on October 1, 2017.

California Department of Food and Agriculture (CDFA). 2010. Pest ratings of noxious weed species and noxious weed seed. State of California Department of Food and Agriculture Division of Plant Health and Pest Prevention Services. January, 2010.

_____. 2013. Noxious weed data sheets. Accessed online on May 16, 2013 at http://www.cdfa.ca.gov/plant/ipc/weedinfo/winfo_table-commname.htm.

California Invasive Plant Council (Cal-IPC). 2015. California Invasive Plant Inventory. Available online at http://www.cal-ipc.org/ip/inventory/index.php#inventory.

California Native Plant Society, Rare Plant Program (CNPS). 2017. Inventory of Rare and Endangered Plants (online edition, v8-02). California Native Plant Society, Sacramento, CA. Website http://www.rareplants.cnps.org [accessed 23 March 2016].

Endangered Species Recovery Program (ESRP). 2016a. California State University Stanislaus. Species Profile for Ciervo aegilian scarab beetle. Available at: http://esrp.csustan.edu/speciesprofiles/profile.php?sp=aeco

_____. 2016b. California State University Stanislaus. Species Profile for San Joaquin dune beetle. Available at: http://esrp.csustan.edu/speciesprofiles/profile.php?sp=cogr

Gleason, R. S. 1978. Aspects of the breeding biology of burrowing owls in southeastern Idaho. M. S. Thesis, State University of Idaho, Moscow.

Holland, Robert F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. Prepared for the State of California, The Resources Agency, and Department of Fish and Game. Sacramento, CA. October 1986.

Jennings, M.R. and M.P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. California Department of Fish and [Wildlife], Inland Fisheries Division. November 1.

National Environmental Satellite, Data, and Information Service (NESDIS). 2016. Summary of Monthly Normals, 1981-2010 for Five Points 5 SSW, CA US, GHCND:USC00043083. National Centers for Environmental Information Administration, Asheville, North Carolina. Generated 4/25/2016.

National Oceanic and Atmospheric Administration (NOAA). 2005. 50 CFR Part 226 [Docket No. 41123329 5202–02; I.D. No.110904F] RIN 0648–AO04 Endangered and Threatened Species; Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Federal Register Vol. 70, No. 170. September 2.

Natural Resources Conservation Service (NRCS). 2016. Web Soil Survey. Accessed online April 3, 2015 at: http://websoilsurvey.nrcs.usda.gov.

Pierson, E.D. and W.E. Rainey. 1998. Western mastiff bat (*Eumops perotis*). In: Terrestrial Mammal Species of Special Concern in California, B.C. Bolster, ed.

Rincon Consultants, Inc. (Rincon). 2014. RE Tranquillity Solar Generating Facility Project – Biological Resources Assessment. February. Available at: http://www.co.fresno.ca.us/ViewDocument.aspx?id=59220

Ross, P. V. 1974. Ecology and behavior of a dense colony of burrowing owls in the Texas Panhandle. M. S. Thesis. West Texas State University, Canyon.

Shuford, W.D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1.Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Swainson's Hawk Technical Advisory Committee (SHTAC). 2000. Recommended timing and methodology for Swainson's hawk surveys in California's Central Valley. May 31.

U.S. Fish and Wildlife Service (USFWS). 1987. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Giant Kangaroo Rat. Federal Register, Vol. 52, No. 2, January 5, 1987.

_____. 1995. Sacramento – San Joaquin Delta Native Fishes Recovery Plan. U.S. Fish and Wildlife Service, Portland, OR.

_____. 1996. California Condor Recovery Plan, Third Revision. Portland, OR. 62 pp.

_____. 1998. Recovery Plan for Upland Species of the San Joaquin Valley, California. Region 1, Portland OR.

_____. 1999a. San Joaquin Kit Fox Protocol for the Northern Range. Sacramento Fish and Wildlife Office. June.

_____. 1999b. Draft Recovery Plan for the Giant Garter Snake (*Thamnophis gigas*). U.S. Fish and Wildlife Service, Portland, Oregon.

_____. 2001. 50 CFR Part 17 RIN–1018–AG32 Endangered and Threatened Wildlife and Plants; Final Determination of Critical Habitat for the California Redlegged Frog. Federal Register Vol. 66, No. 49. March 13.

_____. 2005. 50 CFR Part 17 RIN–1018–AU06 Endangered and Threatened Wildlife and Plants; Final Determination of Critical Habitat for Four Vernal Pool Crustaceans and Eleven Vernal Pool Plants in California and Southern Oregon. Federal Register Vol. 70, No. 154. August 11.

_____. 2010a. San Joaquin Kit Fox (*Vulpes macrotus mutica*) 5-Year Review: Summary and Evaluation. Prepared by the Sacramento Fish and Wildlife Office.

_____. 2010b. Blunt-nosed Leopard Lizard (*Gambelia sila*) 5-Year Review: Summary and Evaluation. Sacramento Fish and Wildlife Office. February.

_____. 2010c. Species Account, Fresno Kangaroo Rat (*Dipodomys nitratoides exilis*). Updated May 28.

_____. 2011. U.S. Fish and Wildlife Service Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior To Or During Ground Disturbance. Unpublished Agency Guidelines available at: http://www.fws.gov/ventura/species_information/protocols_guidelines/docs/sjkf/sanjoaquinkitfox_protection.pdf

_____. 2015. Bay Delta Fish & Wildlife Office Species Account for Longfin Smelt (*Spirinchus thaleichthys*). Available at http://www.fws.gov/sfbaydelta/species/longfin_smelt.pdf.Obtained online in December 2015.

_____. 2016. Species Profile for Giant Kangaroo Rat (*Dipodomys ingens*), Environmental Conservation Online System. Available at: http://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A08P.

_____. 2017. List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project. U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California. March 23.

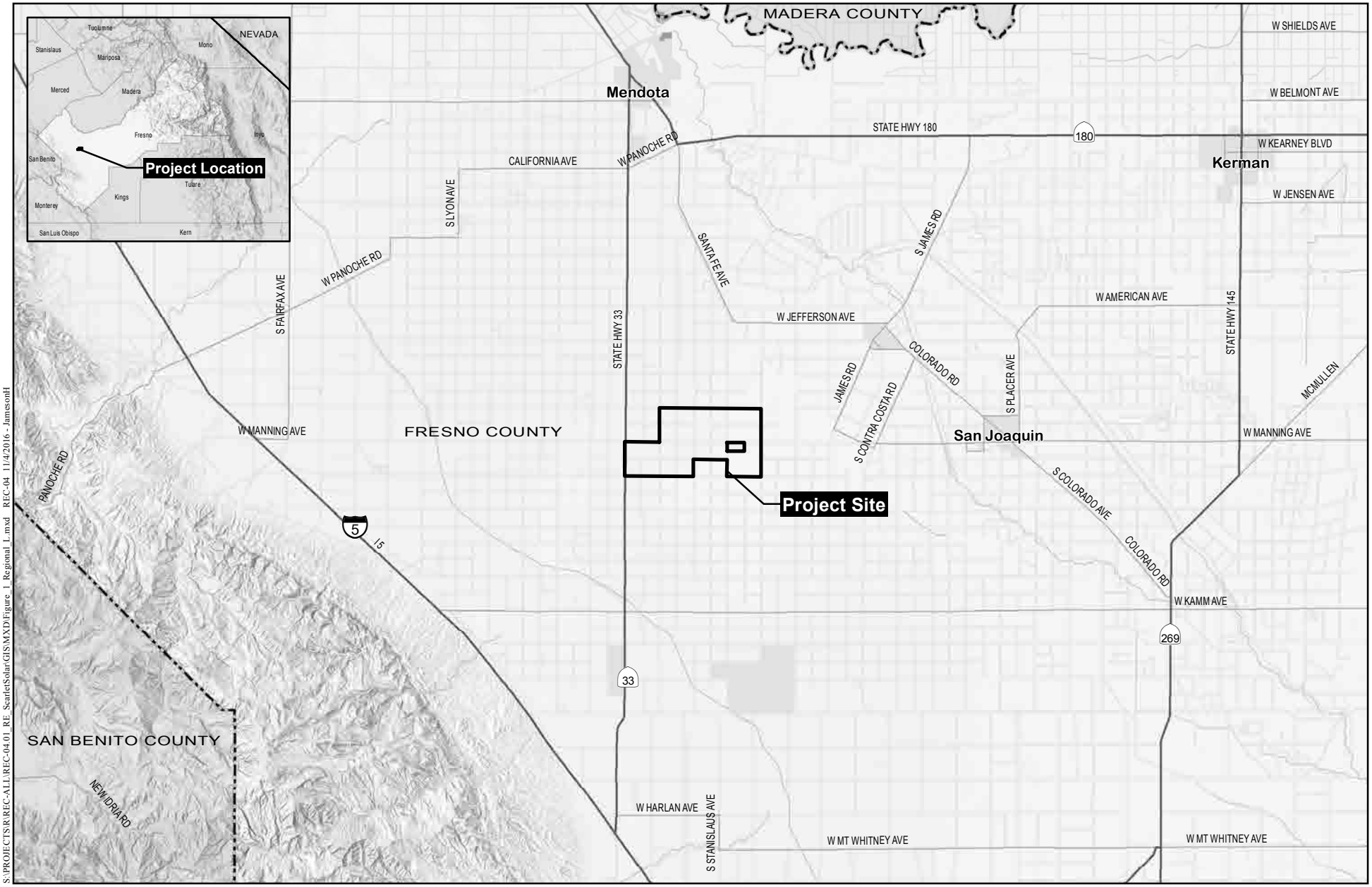
Walston, L.J, K.E. Rollins, K.P. Smith, K.E. LaGory, K. Sinclair, C. Turchi, T. Wendelin, and H. Souder. 2015. A Review of Avian Monitoring and Mitigation Information at Existing Utility-Scale Solar Facilities. prepared for: U.S. Department of Energy, SunShot Initiative and Office of Energy Efficiency & Renewable Energy. April.

Williams, D.F. 1986. Mammalian species of special concern in California. Wildlife Management Division Administrative Report 86-1. June.

Zeiner, D.C., W.F. Laudenslayer, K.E. Meyer, and M. White, *eds*. 1990. California's Wildlife, Vol's I-III. California Department of Fish and [Wildlife].

Appendix A

Figures 1-5: Regional Location Map, Site Location Map, USGS Quad Map, Site Plan, Habitat Map and Special-Status Species Sightings



S:\PROJECTS\R\REC-ALL\REC-04\01_RE_ScarletSolar\GIS\MXD\Figure_1_Regional_L.mxd REC-04 11/4/2016 - Jamesonf

Regional Location Map

RE SCARLET SOLAR PROJECT
FRESNO COUNTY, CA

Figure 1

HELIX Environmental Planning

N 0 5 Miles 1 inch = 5 miles

S:\PROJECTS\R\REC-ALL\REC-04.01_RE_ScarletSolar\GIS\MXD\Figure_2_Aerial_20160718.mxd REC-04 11/4/2016 - JamesonH

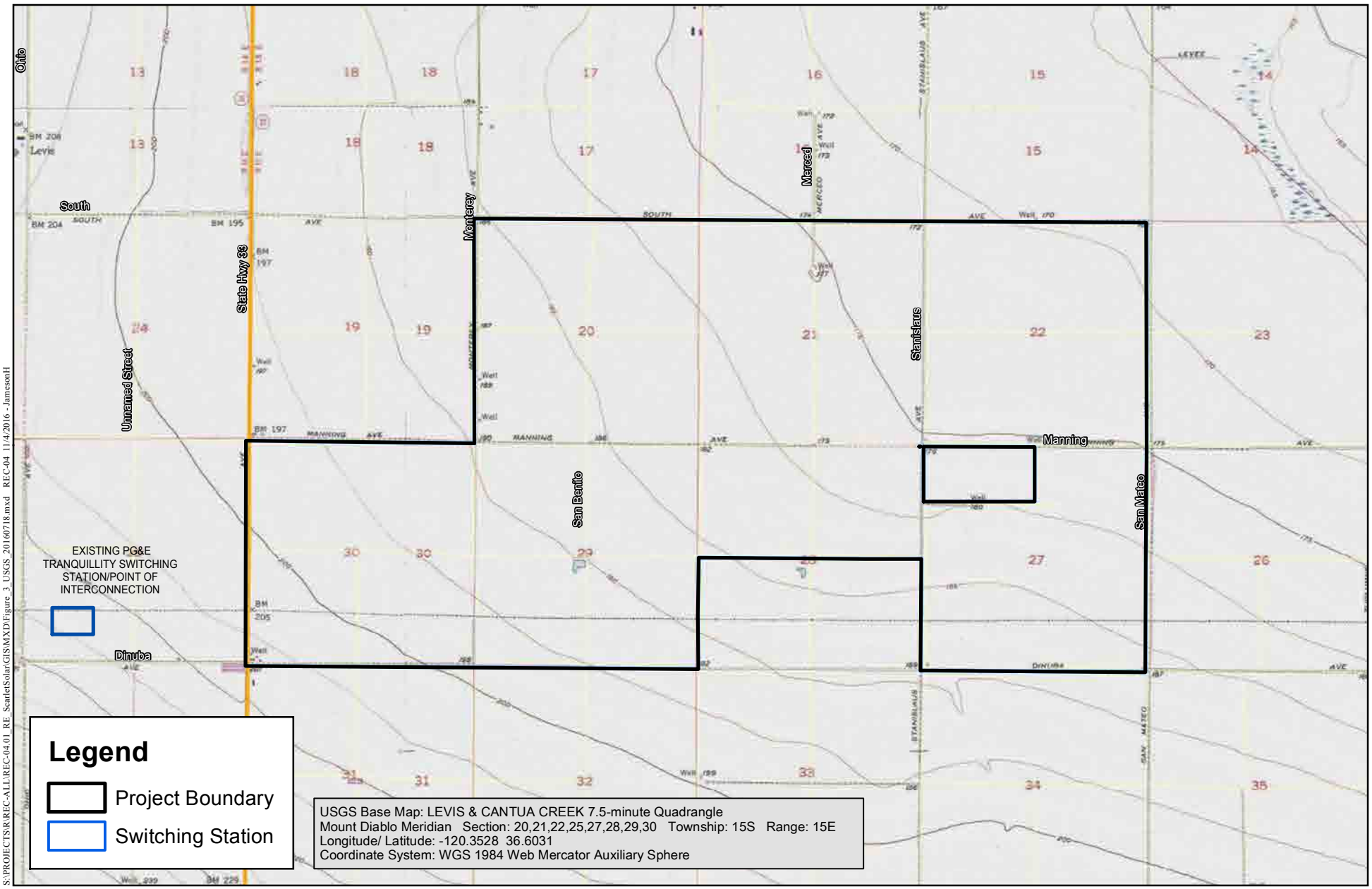
Site Location Map

RE SCARLET SOLAR PROJECT
FRESNO COUNTY, CA

HELIX Environmental Planning

N 0 4,000 Feet

Figure 2



S:\PROJECTS\R\REC-ALL\REC-04.01_RE_ScarletSolar\GIS\MXD\Figure_3_USGS_20160718.mxd REC-04 11/4/2016 - JamesonH

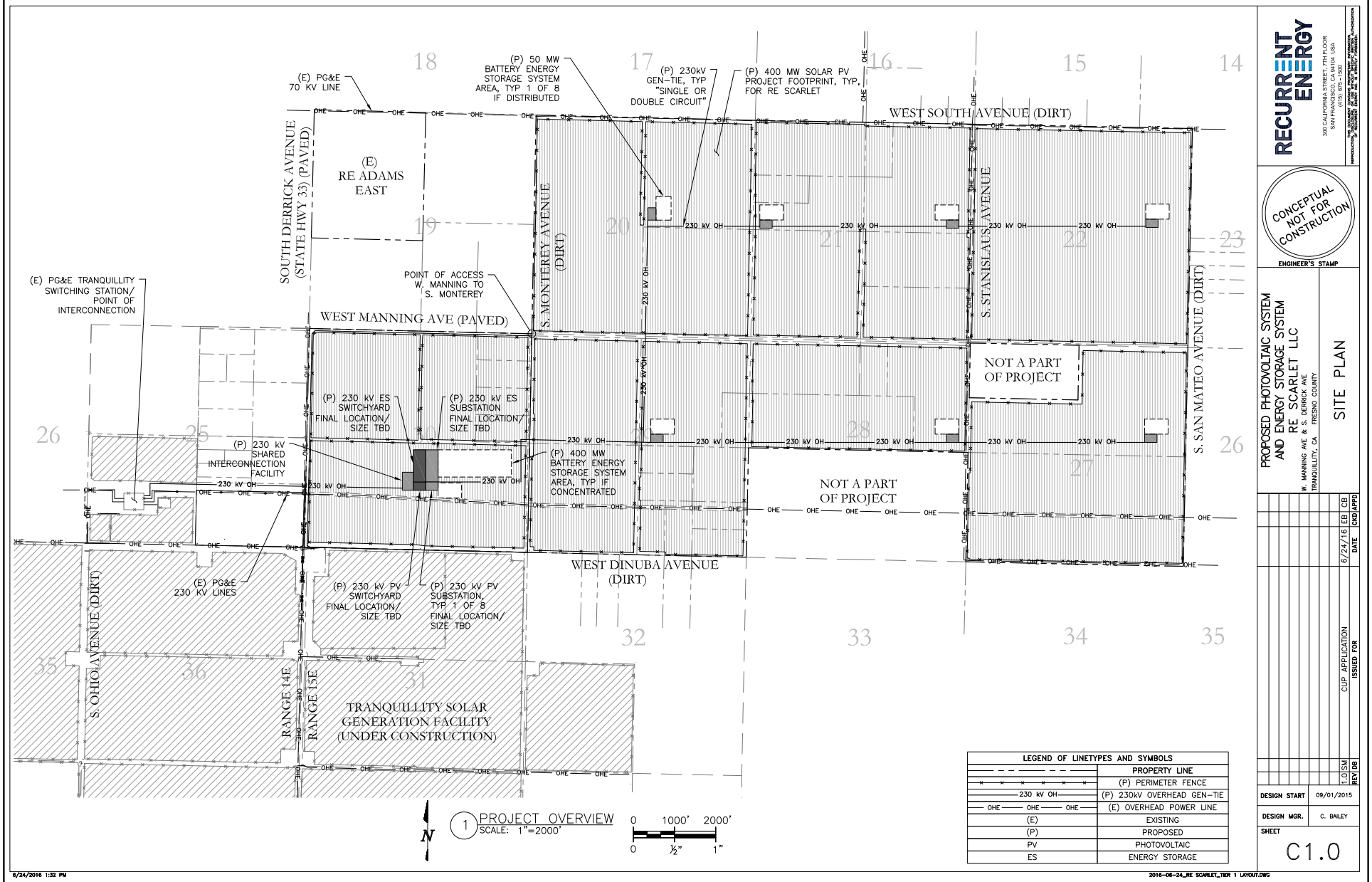
USGS 7.5-Minute Quadrangle Map

RE SCARLET SOLAR PROJECT
FRESNO COUNTY, CA

HELIX Environmental Planning

N 0 4,000 Feet

Figure 3



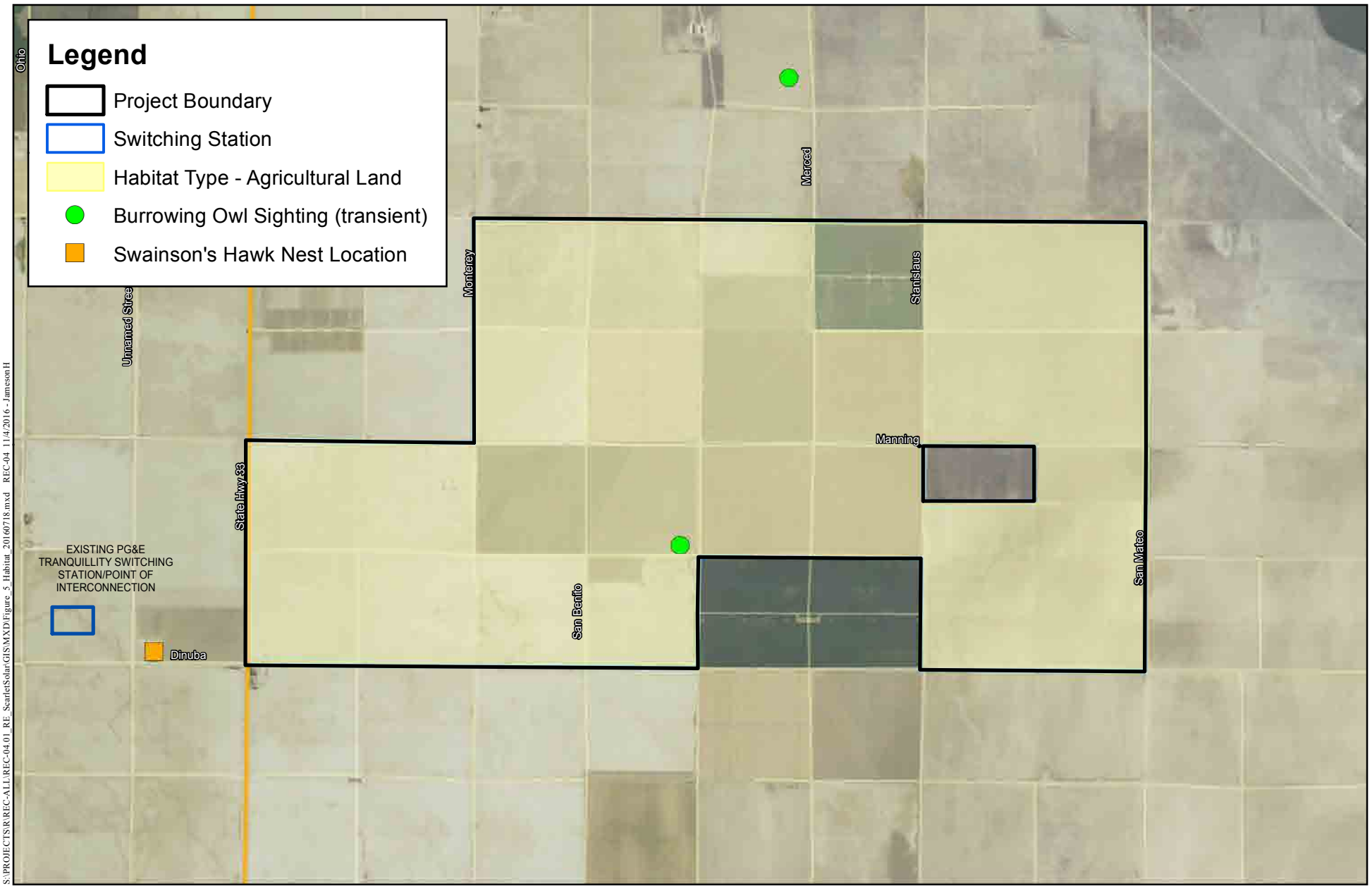
Source: Recurrent Energy 2016

Site Plan

RE SCARLET SOLAR PROJECT
FRESNO COUNTY,CA

Figure 4

HELIX Environmental Planning



Habitat Map and Special-Status Species Sightings

RE SCARLET SOLAR PROJECT
FRESNO COUNTY, CA

HELIX Environmental Planning

N 0 4,000 Feet

Figure 5

Appendix B

USFWS, CNDDB, and CNPS Lists of Regionally Occurring Special-Status Species

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
Phone: (916) 414-6600 Fax: (916) 414-6713

In Reply Refer To: April 26, 2017
Consultation Code: 08ESMF00-2017-SLI-1891
Event Code: 08ESMF00-2017-E-04783
Project Name: RE Scarlet Solar Project

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, under the jurisdiction of the U.S. Fish and Wildlife Service (Service) that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

Please follow the link below to see if your proposed project has the potential to affect other species or their habitats under the jurisdiction of the National Marine Fisheries Service:

http://www.nwr.noaa.gov/protected_species/species_list/species_lists.html

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to

utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
(916) 414-6600

Project Summary

Consultation Code: 08ESMF00-2017-SLI-1891

Event Code: 08ESMF00-2017-E-04783

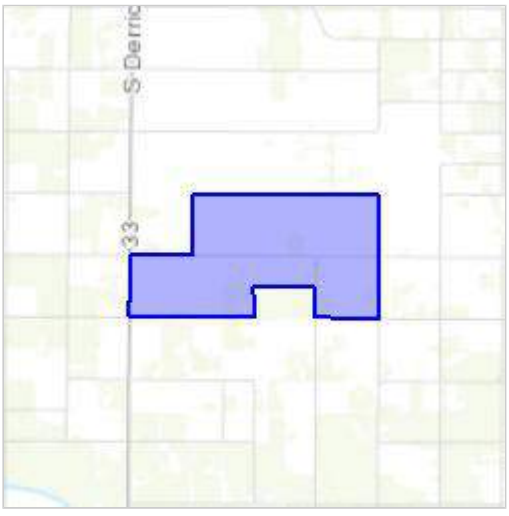
Project Name: RE Scarlet Solar Project

Project Type: POWER GENERATION

Project Description: The RE Scarlet Solar Project is a proposed 400 mega-Watt solar photovoltaic generating facility and an electrical substation to be constructed on approximately 4,000 acres of agricultural land in unincorporated western Fresno County. The nearest towns are Tranquillity, 4 miles to the northeast, and San Joaquin, 6.9 miles to the east. Interstate 5 is 6.6 miles to the southwest and Fresno is 29 miles to the east. The Project site lies on both sides of West Manning Avenue, east of South Derrick Avenue (State Route 33) and west of South San Mateo Avenue. The northernmost boundary of the Project site is West South Avenue, and the southernmost boundary is West Dinuba Avenue. Construction of the proposed project would take place in one phase beginning in early 2018 and is expected to continue for 12 months.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/36.60315905846193N120.35207184702644W



Counties: Fresno, CA

Endangered Species Act Species

There is a total of 10 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area. Please contact the designated FWS office if you have questions.

Mammals

NAME	STATUS
Fresno Kangaroo Rat *(Dipodomys nitratoides exilis)* There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5150	Endangered
Giant Kangaroo Rat *(Dipodomys ingens)* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6051	Endangered
San Joaquin Kit Fox *(Vulpes macrotis mutica)* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2873	Endangered

Birds

NAME	STATUS
California Condor *(Gymnogyps californianus)* Population: U.S.A. only, except where listed as an experimental population There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8193	Endangered

Reptiles

NAME	STATUS
Blunt-nosed Leopard Lizard *(Gambelia silus)* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/625	Endangered
Giant Garter Snake *(Thamnophis gigas)* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4482	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog *(Rana draytonii)* There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2891	Threatened

Fishes

NAME	STATUS
Delta Smelt *(Hypomesus transpacificus)* There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat. Species profile: https://ecos.fws.gov/ecp/species/321	Threatened

Crustaceans

NAME	STATUS
Vernal Pool Fairy Shrimp *(Branchinecta lynchi)* There is a **final** critical habitat designated for this species. Your location is outside the designated critical habitat. Species profile: https://ecos.fws.gov/ecp/species/498	Threatened

Flowering Plants

NAME	STATUS
San Joaquin Wooly-threads *(Monolopia (=Lembertia) congdonii)* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3746	Endangered

Critical habitats

There are no critical habitats within your project area.

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: BIOS selection

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Agelaius tricolor tricolored blackbird	ABPBXB0020	None	Candidate Endangered	G2G3	S1S2	SSC
Ammospermophilus nelsoni Nelson's antelope squirrel	AMAFB04040	None	Threatened	G2	S2S3	
Asio flammeus short-eared owl	ABNSB13040	None	None	G5	S3	SSC
Athene cunicularia burrowing owl	ABNSB10010	None	None	G4	S3	SSC
Atriplex cordulata var. cordulata heartscale	PDCHE040B0	None	None	G3T2	S2	1B.2
Atriplex coronata var. vallicola Lost Hills crownscale	PDCHE04250	None	None	G4T2	S2	1B.2
Atriplex depressa brittlescale	PDCHE042L0	None	None	G2	S2	1B.2
Atriplex minuscula lesser saltscale	PDCHE042M0	None	None	G2	S2	1B.1
Branchinecta longiantenna longhorn fairy shrimp	ICBRA03020	Endangered	None	G1	S1S2	
Branchinecta lynchi vernal pool fairy shrimp	ICBRA03030	Threatened	None	G3	S3	
Buteo swainsoni Swainson's hawk	ABNKC19070	None	Threatened	G5	S3	
Charadrius montanus mountain plover	ABNNB03100	None	None	G3	S2S3	SSC
Chloropyron palmatum palmate-bracted salty bird's-beak	PDSCR0J0J0	Endangered	Endangered	G1	S1	1B.1
Coastal and Valley Freshwater Marsh Coastal and Valley Freshwater Marsh	CTT52410CA	None	None	G3	S2.1	
Dipodomys ingens giant kangaroo rat	AMAFD03080	Endangered	Endangered	G1G2	S1S2	
Dipodomys nitratoides exilis Fresno kangaroo rat	AMAFD03151	Endangered	Endangered	G3TH	SH	
Emys marmorata western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
Eremophila alpestris actia California horned lark	ABPAT02011	None	None	G5T4Q	S4	WL
Eriastrum hooveri Hoover's eriastrum	PDPLM03070	Delisted	None	G3	S3	4.2
Eumops perotis californicus western mastiff bat	AMACD02011	None	None	G5T4	S3S4	SSC

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Falco mexicanus prairie falcon	ABNKD06090	None	None	G5	S4	WL
Gambelia sila blunt-nosed leopard lizard	ARACF07010	Endangered	Endangered	G1	S1	FP
Lasiurus blossevillii western red bat	AMACC05060	None	None	G5	S3	SSC
Lasiurus cinereus hoary bat	AMACC05030	None	None	G5	S4	
Layia munzii Munz's tidy-tips	PDAST5N0B0	None	None	G1	S1	1B.2
Lepidium jaredii ssp. album Panoche pepper-grass	PDBRA1M0G2	None	None	G2T2T3	S2S3	1B.2
Madia radiata showy golden madia	PDAST650E0	None	None	G2	S2	1B.1
Masticophis flagellum ruddocki San Joaquin coachwhip	ARADB21021	None	None	G5T2T3	S2?	SSC
Monolopia congdonii San Joaquin woollythreads	PDASTA8010	Endangered	None	G2	S2	1B.2
Myotis yumanensis Yuma myotis	AMACC01020	None	None	G5	S4	
Perognathus inornatus San Joaquin Pocket Mouse	AMAFD01060	None	None	G2G3	S2S3	
Phrynosoma blainvillii coast horned lizard	ARACF12100	None	None	G3G4	S3S4	SSC
Plegadis chihi white-faced ibis	ABNGE02020	None	None	G5	S3S4	WL
Spea hammondii western spadefoot	AAABF02020	None	None	G3	S3	SSC
Taxidea taxus American badger	AMAJF04010	None	None	G5	S3	SSC
Thamnophis gigas giant gartersnake	ARADB36150	Threatened	Threatened	G2	S2	
Thamnophis hammondii two-striped gartersnake	ARADB36160	None	None	G4	S3S4	SSC
Valley Sink Scrub Valley Sink Scrub	CTT36210CA	None	None	G1	S1.1	
Vulpes macrotis mutica San Joaquin kit fox	AMAJA03041	Endangered	Threatened	G4T2	S2	

Record Count: 39

CNPS California Native Plant Society

Plant List

Inventory of Rare and Endangered Plants

16 matches found. *Click on scientific name for details*

Search Criteria

California Rare Plant Rank is one of [1A, 1B, 2A, 2B, 3], Found in Quads 3612064, 3612063, 3612062, 3612054, 3612053, 3612052, 3612044 3612043 and 3612042;

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
Atriplex cordulata var. cordulata	heartscale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G3T2
Atriplex coronata var. vallicola	Lost Hills crownscale	Chenopodiaceae	annual herb	Apr-Sep	1B.2	S2	G4T2
Atriplex depressa	brittlescale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G2
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
Caulanthus lemmonii	Lemmon's jewelflower	Brassicaceae	annual herb	Feb-May	1B.2	S3	G3
Chloropyron palmatum	palmate-bracted bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	May-Oct	1B.1	S1	G1
Delphinium recurvatum	recurved larkspur	Ranunculaceae	perennial herb	Mar-Jun	1B.2	S2?	G2?
Layia heterotricha	pale-yellow layia	Asteraceae	annual herb	Mar-Jun	1B.1	S2	G2
Layia munzii	Munz's tidy-tips	Asteraceae	annual herb	Mar-Apr	1B.2	S1	G1
Lepidium jaredii ssp. album	Panoche pepper-grass	Brassicaceae	annual herb	Feb-Jun	1B.2	S2S3	G2T2T3
Madia radiata	showy golden madia	Asteraceae	annual herb	Mar-May	1B.1	S2	G2
Malacothamnus aboriginum	Indian Valley bush-mallow	Malvaceae	perennial deciduous shrub	Apr-Oct	1B.2	S3	G3
Monolopia congdonii	San Joaquin woollythreads	Asteraceae	annual herb	Feb-May	1B.2	S2	G2
Puccinellia simplex	California alkali grass	Poaceae	annual herb	Mar-May	1B.2	S2	G3
Sagittaria sanfordii	Sanford's arrowhead	Alismataceae	perennial rhizomatous herb (emergent)	May-Oct (Nov)	1B.2	S3	G3

Suggested Citation

California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website http://www.rareplants.cnps.org [accessed 26 April 2017].

Search the Inventory
Simple Search
Advanced Search
Glossary

Information
About the Inventory
About the Rare Plant Program
CNPS Home Page
About CNPS
Join CNPS

Contributors
The Calflora Database
The California Lichen Society

Appendix C

Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Project Site

APPENDIX C. Potential for Special-Status Species and Critical Habitats in the Region to Occur in the Scarlet Solar Project Site

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other*	General Habitat Description	Potential to Occur	Rationale
Invertebrates				
Aegialia concinna Ciervo aegilian scarab beetle	--/--/--; G1; S1	This small, flightless beetle inhabits sand dunes in the San Joaquin Valley; it is currently known from 4 locations in Contra Costa, San Benito, San Joaquin, and Fresno counties (ESRP 2016a).	Will not occur	The Project site does not contain suitable sand dune habitat.
Branchinecta longiantenna longhorn fairy shrimp	FE/--/--	Occurs in warm, alkaline or sandstone vernal pools in 4 locations in the interior Coast Ranges: Contra Costa County (2), Merced County, and San Luis Obispo County (USFWS 2005).	Will not occur	The Project site does not contain suitable vernal pool habitat.
Branchinecta lynchi vernal pool fairy shrimp	FT/--/--	Occurs in vernal pools ranging from small, clear, sandstone rock pools to large, turbid, alkaline, grassland valley floor pools. It is most frequently found in pools measuring less than 0.05 acre; although has been collected from vernal pools exceeding 25 acres. The known range within California includes the Central Valley and southern California (USFWS 2005).	Will not occur	The Project site does not contain suitable vernal pool habitat.
Coelus gracilis San Joaquin dune beetle	--/--/--; G1; S1	Inhabits sand dunes in the western San Joaquin Valley; historically found from eastern Contra Costa County to southern Kern County (ESRP 2016b).	Will not occur	The Project site does not contain suitable sand dune habitat.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other*	General Habitat Description	Potential to Occur	Rationale
Fishes				
Hypomesus transpacificus Delta smelt	FT/--/--	Delta smelt spawn in shallow, fresh or slightly brackish water upstream of the mixing zone. Most spawning happens in tidally-influenced backwater sloughs and channel edgewaters. Although spawning has not been observed in the wild, the eggs are thought to attach to substrates such as cattails, tules, tree roots and submerged branches. Delta smelt are found only from the Suisun Bay upstream through the Delta in Contra Costa, Sacramento, San Joaquin, Solano and Yolo counties (USFWS 1995).	Will not occur	No suitable aquatic habitat in the Project site.
Oncorhynchus mykiss irideus Central Valley steelhead	FT, CH/--/--	Steelhead spawn in rivers and streams with cool, clear, water and suitable substrate. This distinct population segment includes all naturally spawned anadromous *O. mykiss* (steelhead) populations below natural and manmade impassable barriers in the Sacramento and San Joaquin Rivers and their tributaries, excluding steelhead from San Francisco and San Pablo Bays and their tributaries, as well as two artificial propagation programs: the Coleman NFH, and Feather River Hatchery steelhead hatchery programs (NOAA 2005).	Will not occur	No suitable aquatic habitat in the Project site.
Spirinchus thaleichthys Longfin smelt	FC/ST/--	The longfin smelt is a pelagic estuarine fish that spawns in freshwater and then moves downstream to brackish water to rear. They usually live for 2 years, spawn, and then die, although some individuals may spawn as 1- or 3-year-old fish before dying. Longfin smelt in the Bay-Delta may spawn as early as November and as late as June, although spawning typically occurs from January to April. The known range of the longfin smelt extends from the San Francisco Bay-Delta in California northward to the Cook Inlet in Alaska. Longfin smelt have been observed as far upstream	Will not occur	No suitable aquatic habitat in the Project site.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other*	General Habitat Description	Potential to Occur	Rationale
		as Isleton in the Sacramento River, Santa Clara shoal in the San Joaquin system, Hog Slough off the South-Fork Mokelumne River, and in Old River south of Indian Slough (USFWS 2015).		
Amphibians				
Spea hammondii western spadefoot	--/SSC/--	Spadefoot toads are generally restricted to vernal pools and seasonal ponds, including many constructed stock ponds, in grassland and oak savannah plant communities (Jennings and Hayes 1994).	Will not occur	The Project site does not contain suitable vernal pools or seasonal ponds to provide breeding and larval habitat.
Rana draytonii California red-legged frog	FT/SSC/--	The California red-legged frog occupies a fairly distinct habitat, combining both specific aquatic and riparian components. The adults require dense, shrubby or emergent riparian vegetation closely associated with deep (greater than 2 1/3-foot deep) still or slow moving water. The largest densities of California red-legged frogs are associated with deep-water pools with dense stands of overhanging willows (*Salix* spp.) and an intermixed fringe of cattails (*Typha latifolia*). Well-vegetated terrestrial areas within the riparian corridor may provide important sheltering habitat during winter. California red-legged frogs aestivate (enter a dormant state during summer or dry weather) in small mammal burrows and moist leaf litter. They have been found up to 100 feet from water in adjacent dense riparian vegetation. Studies have indicated that this species cannot inhabit water bodies that exceed 70° F, especially if there are no cool, deep portions (USFWS 2001).	Will not occur	The Project site does not contain suitable water sources with shrubby or emergent riparian vegetation. In addition, this species is considered extirpated from the floor of the Central Valley.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other*	General Habitat Description	Potential to Occur	Rationale
Reptiles				
Emys marmorata western pond turtle	--/SSC/--	Western pond turtle occurs from the west coast of North America from southern Washington, USA to northern Baja California, Mexico. Many populations have been extirpated and others continue to decline throughout the range, especially in southern California. This species requires aquatic habitats with suitable basking sites. Nest sites most often characterized as having gentle slopes (<15%) with little vegetation or sandy banks (Jennings and Hayes 1994).	Will not occur	The Project site contains no suitable open water habitat.
Gambelia sila blunt-nosed leopard lizard	FE/SE/--	Blunt-nosed leopard lizard is endemic to the southern Coast Ranges and Central Valley, from Santa Clara and Merced Counties south to Ventura and Los Angeles Counties. Occurs in alkali sink, playa, and saltbush scrub habitats in the Central Valley, and grassland habitats in the foothills. The principal threat to the species is loss of habitat to agriculture and urban development (USFWS 2010a).	Will not occur	The Project site consists of agricultural fields and disturbed areas that are not suitable habitat for blunt-nosed leopard lizard.
Masticophis flagellum ruddocki San Joaquin whipsnake	--/SSC/--	Occurs in dry, open habitats including grassland and shadscale scrub. Requires a large prey base of burrowing rodents. The species is threatened by loss of habitat to agriculture (Jennings and Hayes 1994).	Will not occur	Conversion of land to agriculture is the principal threat to this species; the Project site is entirely agricultural land with no suitable habitat.
Phrynosoma blainvillii coast horned lizard	--/SSC/--	Occurs in the Coast Ranges, southwestern Sierra Nevada, Transverse and Peninsular Ranges, and the southern deserts. Requires sandy soils, chaparral vegetation, and native ant prey (Jennings and Hayes 1994).	Will not occur	The Project site does not contain suitable sandy soils or chaparral vegetation.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other*	General Habitat Description	Potential to Occur	Rationale
Thamnophis gigas giant garter snake	FT/ST/--	The giant garter snake is endemic to the San Joaquin and Sacramento Valley floors. Counties include Butte, Colusa, Contra Costa, Fresno, Glenn, Kern, Madera, Merced, Sacramento, San Joaquin, Solano, Sutter, Yolo, and Yuba. Inhabits agricultural wetlands and other waterways such as irrigation and drainage canals, sloughs, ponds, small lakes, low gradient streams, and adjacent uplands. Requires adequate water during its active season (early spring through mid-fall) to provide food and cover, emergent, herbaceous wetland vegetation for foraging and cover, grassy banks and openings in waterside vegetation for basking, and higher elevation uplands for cover and refuge from flood waters during its dormant season (winter). Inhabits small mammal burrows and other soil crevices with sunny exposure along south and west facing slopes, above prevailing flood elevations when dormant. Primarily found in marshes and sloughs as well as slow-moving creeks but are absent from large rivers. Often bask on emergent vegetation such as cattails and tules (USFWS 1999).	Will not occur	The Project site does not contain suitable marsh or irrigation canal habitat.
Thamnophis hammondii two-striped garter snake	--/SSC/--	A highly aquatic snake rarely found far from water; inhabits perennial or intermittent streams with rocky beds and borders of dense willows or other vegetation. Will use stock ponds and other artificial ponds if they are bordered by dense vegetation. Snakes are not found where dense riparian vegetation is absent. Known from eastern San Benito County (Jennings and Hayes 1994).	Will not occur	The Project site does not contain suitable streams or other aquatic habitat with dense riparian vegetation.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other*	General Habitat Description	Potential to Occur	Rationale
Birds				
Agelaius tricolor tri-colored blackbird	FC/SC/--	Common locally throughout central California. Nests and seeks cover in emergent wetland vegetation, specifically cattails and tules. Nesting area must be large enough to support a minimum colony of 50 pairs as they are a highly colonial species. Forages on ground in croplands, grassy fields, flooded land, and edges of ponds (Shuford and Gardali 2008).	Will not occur	The nearest suitable nesting habitat is over 2 miles from the Project site and agricultural pest control reduces the availability of insect prey during the breeding season.
Asio flammeus **short-eared owl**	**--/SSC/--**	**Nests on the ground in tall herbaceous vegetation and feeds almost exclusively on voles (*Microtus* spp.). Range and abundance are linked closely to cycles in vole populations (Shuford and Gardali 2008).**	**May occur**	**Agricultural fields provide suitable habitat. Prey base in the Project site may be too low to support breeding.**
Athene cunicularia **burrowing owl**	**--/SSC/--**	**Forages in grasslands, agricultural fields, and disturbed places where burrowing mammals are abundant. Nests in burrows, especially those of California ground squirrel (*Spermophilus beecheyi*; Shuford and Gardali 2008).**	**Present**	**Surveys of the Project site for suitable burrows were negative; the site has a relatively low abundance of small mammal prey. One transient burrowing owl was observed on the Project site indicating the site is used by burrowing owl for foraging and dispersal.**
Buteo swainsoni **Swainson's hawk**	**--/ST/--**	**Forages in grasslands, suitable grain or alfalfa fields, or livestock pastures adjacent to nesting habitat. Nests on large trees in open areas (CDFW 1994).**	**May occur**	**No nesting habitat is present. The project site provides suitable foraging habitat; nearby trees provide suitable nest sites. This species in known to nest in trees within 1 mile of the Project site.**

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other*	General Habitat Description	Potential to Occur	Rationale
Charadrius montanus mountain plover	--/SSC/--	A winter resident of the Central Valley, southern deserts, and southern coast, as well as Texas, Arizona, and northern Mexico; does not breed in California. Found in places with sparse, low-growing vegetation such as fallow or burned agricultural fields, heavily grazed pastures, and playas (Shuford and Gardali 2008).	Will not occur	Fallow fields in the site are densely vegetated; the site does not include playas or open habitats.
***Eremophila alpestris actia* California horned lark**	**--/WL/--**	**A year-round resident of grasslands and other herbaceous communities along the coast, the transverse ranges, and in the Central Valley. Nests on the ground (Zeiner *et al.* 1990).**	**May occur**	**Agricultural fields in the Project site provide suitable nesting and foraging habitat. This species was observed in the Project site numerous times during biological surveys; no nest sites were confirmed.**
Falco columbarius merlin	--/WL/--	An uncommon winter migrant in California; breeds in Alaska and Canada. Uses a variety of habitats but requires trees close to water for cover and is usually found near coastlines, lakeshores, and wetlands (Zeiner *et al.* 1990).	Will not occur	The Project site does not contain suitable trees or aquatic habitats.
Falco mexicanus prairie falcon	--/WL/--	An uncommon permanent resident of the deserts, Central Valley, inner Coast Ranges, and Sierra Nevada in California. Primarily found in grasslands, rangelands, desert scrub, and some agricultural areas. Requires sheltered cliffs and ledges for cover. Dives from a perch or from flight to take prey on the ground (Zeiner *et al.* 1990).	Will not occur	The Project site does not contain suitable nesting or perching sites. Individuals may soar over the Project site, but will not be present as residents.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other*	General Habitat Description	Potential to Occur	Rationale
Gymnogyps californianus California condor	FE/SE/--	The largest land bird in North America, with a wingspan of 9.5 feet, this scavenger requires large areas of remote country. Condors roost in large trees and nest in shallow caves and rock crevices on cliffs. Scavenges carcasses of large mammals such as deer, cattle, and seals. Currently known from the southern Coast Ranges, Transverse Ranges, southwest Sierra Nevada, and northern Arizona (USFWS 1996).	Will not occur	The Project site is not within the current range of condors and does not provide large mammal carcasses such as deer or cattle for scavenging.
Plegadis chihi white faced ibis	--/WL/--	This species nests sporadically in the Sacramento-San Joaquin Valley, but occurs as a transient throughout California. This species requires extensive marshes for nesting and forages in marshes, pastures, and croplands. It no longer nests regularly in the Central Valley (Zeiner *et al.* 1990).	Will not occur	Unlikely to be present even as a transient; no extensive marshes with suitable nesting habitat are present in or near the Project site.
Mammals				
Ammospermophilus nelsoni Nelson's antelope squirrel	--/ST/--	Found in areas of dry, sparsely vegetated, loamy soils in the western San Joaquin Valley. Prefers areas of broken terrain with small gullies and washes. Uses kangaroo rat burrows, digs its own burrow, or uses rocks for cover. Cultivation has eliminated over 80 percent of natural habitat (Zeiner *et al.* 1990).	Will not occur	The Project site does not contain suitable loamy soils or broken terrain with washes and gullies.
Dipodomys ingens giant kangaroo rat	FE/SE/--	Inhabits annual grasslands with well-drained sandy-loam soils. Currently known from 6 major population centers, the closest of which is the Ciervo-Panoche hills over 10 miles west of the Project site (USFWS 2016).	Will not occur	The Project site does not contain suitable well-drained sandy-loam soils, and is separated from known populations of the species by Interstate 5, the California Aqueduct, and over 10 miles of unsuitable agricultural habitats.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other*	General Habitat Description	Potential to Occur	Rationale
Dipodomys nitratoides exilis Fresno kangaroo rat	FE/SE/--	Historically found in the southern San Joaquin Valley between the Merced River and Tulare Lake, as far west as Fresno Slough. No longer known from its historic range, and with no confirmed extant populations (USFWS 2010b).	Will not occur	The Project site is outside the historic range of the species and there are no known extant populations of the species.
Eumops perotis californicus western mastiff bat	--/SSC/--	Found throughout California and the southwestern U.S. to west Texas. Roosts in natural crevices in large outcrops of granite, sandstone, or basalt, on cliff faces, among boulders, and in appropriately proportioned cracks in buildings. Roosts are at least 10 feet above the ground (Pierson and Rainey 1998).	Will not occur	The Project site does not contain suitable large rock outcrops or buildings, nor are there suitable roost sites within several miles.
Lasiurus blossevillii western red bat	--/SSC/--	Insectivorous bat closely associated with well-developed riparian habitats, typically Fremont cottonwood/western sycamore and/or valley oak. Use a variety of mature trees for breeding roosts. In the Central Valley, breeds along the Sacramento and San Joaquin Rivers. Breeds from May through August (Williams 1986).	Will not occur	The Project site does not support suitable well-developed riparian habitat with mature trees.
Lasiurus cinereus hoary bat	--/--/--; G5, S4	Insectivorous bat, roosts in dense foliage of medium to large trees. Suitable breeding habitats include woodlands and forests with medium to large trees and dense foliage. Winters along the coasts and in southern California, and breeds inland and north of the winter range. Breeds from May through August (Zeiner *et al.* 1990).	Will not occur	The Project site does not support suitable dense woodland or forest habitat.
Taxidea taxus American badger	--/SSC/--	Inhabits drier open stages of most shrub, forest, and herbaceous habitats with loose, friable soils. Preys on a wide variety of mammals, reptiles, birds, and carrion, and hunts mostly by digging out fossorial prey. Also occasionally takes prey on the surface. Not tolerant of cultivation. No longer occur in the Central Valley except in the extreme western edge (Williams 1986).	Will not occur	Badgers do not persist in agricultural fields and were regarded as no longer extant in the Central Valley except for the extreme western edge as of 1986.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other*	General Habitat Description	Potential to Occur	Rationale
Vulpes macrotis mutica **San Joaquin kit fox**	**FE/ST/--**	**Inhabits grasslands, agricultural areas, playas, and scrublands. Formerly widespread in the Central Valley; now primarily found in foothills at the margins of the Central Valley and in the interior Coast Ranges. Uses natural and artificial burrows with entrances between 8 and 10 inches in diameter, and occupies many different burrows in a single season (USFWS 1999).**	**May occur (non-resident)**	**Marginal denning and foraging habitat for this species is present on the Project site, however, this species was not observed during protocol surveys. The Project site contains a low abundance of small mammal prey, and does not contain suitable burrows. The nearest reported occurrences of SJKF are over 7 miles from the Project site and separated from it by the California Aqueduct. This species has a low potential to use the site for dispersal or foraging.**
Plants				
Atriplex cordulata var. *cordulata* heartscale	--/--/1B.2	An annual herb found in chenopod scrub, meadows and seeps, and valley and foothill grassland within saline and alkaline soils from 0 to 560 meters in elevation. Currently known to occur in Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kern, Madera, Merced, San Joaquin, San Luis Obispo, Solano, Stanislaus, Tulare, and Yolo counties. Blooms April to October (CNPS 2016).	Will not occur	There is no suitable alkaline or saline soil and chenopod scrub, meadow, or grassland habitat in the Project site.
Atriplex coronata var. *vallicola* Lost Hills crownscale	--/--/1B.2	An annual herb found on alkaline soils in chenopod scrub, valley and foothill grassland, and vernal pools from 50 to 635 meters in elevation. Currently known to occur in Fresno, Kern, Kings, Merced, San Luis Obispo, and Tulare counties. Blooms April to September (CNPS 2016).	Will not occur	There is no suitable alkaline soil and chenopod scrub, vernal pool, or grassland habitat in the Project site.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other*	General Habitat Description	Potential to Occur	Rationale
Atriplex depressa brittlescale	--/--/1B.2	An annual herb found on alkaline and clay soils in chenopod scrub, meadows and seeps, playas, valley and foothill grassland, and vernal pools from 1 to 320 meters in elevation (CNPS 2016). Currently known to occur in Alameda, Contra Costa, Colusa, Fresno, Glenn, Kern, Merced, Solano, Stanislaus, Tulare, and Yolo counties. Blooms April to October.	Will not occur	There is no suitable alkaline or clay soil and chenopod scrub, meadow, playa, vernal pool, or grassland habitat in the Project site.
Atriplex minuscula lesser saltscale	--/--/1B.1	An annual herb found in alkaline and sandy habitats in chenopod scrub, playas, and valley and foothill grassland from 15 to 200 meters in elevation. Currently known to occur in Alameda, Butte, Fresno, Kern, Merced, and Tulare counties. Blooms May to October (CNPS 2016).	Will not occur	There is no suitable alkaline or sandy soil and chenopod scrub, playa, or grassland habitat in the Project site.
Atriplex subtilis subtle orache	--/--/1B.2	An annual herb found in alkaline habitats in valley and foothill grassland from 40 to 100 meters in elevation. Currently known to occur in Butte, Fresno, Kings, Kern, Madera, Merced, Stanislaus, and Tulare counties. Blooms June to October (2016).	Will not occur	There is no suitable alkaline soil and grassland habitat in the Project site.
Caulanthus lemmonii Lemmon's jewelflower	--/--/1B.2	An annual herb found in pinyon-juniper woodland and valley and foothill grassland from 80 to 1580 meters in elevation. Currently known to occur in Fresno, Kings, Kern, Merced, Monterey, San Benito, San Joaquin, San Luis Obispo, Santa Barbara, Stanislaus, and Ventura counties. Blooms February to May.	Will not occur	There is no suitable woodland or grassland habitat in the Project site.
Chloropyron palmatum (*Cordylanthus palmatus*) palmate-bracted bird's-beak	FE/SE/1B.1	A hemiparasitic annual herb found on alkaline soils in chenopod scrub and valley and foothill grassland from 5 to 155 meters in elevation. Currently known to occur in Alameda, Colusa, Fresno, Glenn, Madera, San Joaquin, and Yolo counties. Blooms May to October (CNPS 2016).	Will not occur	There is no suitable alkaline soil and chenopod scrub, or grassland habitat in the Project site.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other*	General Habitat Description	Potential to Occur	Rationale
Delphinium recurvatum recurved larkspur	--/--/1B.2	An annual herb found on alkaline soils in chenopod scrub, cismontane woodland, and valley and foothill grassland from 3 to 790 meters in elevation. Currently known to occur in Alameda, Contra Costa, Fresno, Glenn, Kings, Kern, Madera, Merced, Monterey, San Joaquin, San Luis Obispo, Solano, Sutter, and Tulare counties. Blooms March to June (CNPS 2016).	Will not occur	There is no suitable alkaline soil and chenopod scrub, woodland, or grassland habitat in the Project site.
Layia heterotricha pale-yellow layia	--/--/2B.21	An annual herb found on clay soils in cismontane woodland, coastal scrub, pinyon-juniper woodland, and valley and foothill grassland from 300 to 1705 meters in elevation. Currently known to occur in Fresno, Los Angeles, Monterey, Santa Barbara, and Ventura counties. Blooms March to June (CNPS 2016).	Will not occur	There is no suitable clay soil and woodland, scrub, or grassland habitat in the Project site; the project site is outside the elevation range for this species.
Layia munzii Munz's tidy-tips	--/--/1B.2	An annual herb found on clay soils in chenopod scrub and valley and foothill grassland from 150 to 700 meters in elevation. Currently known to occur in Fresno, Kern, San Benito, and San Luis Obispo counties. Blooms March to April (CNPS 2016).	Will not occur	There is no suitable clay soil grassland or chenopod scrub habitat in the Project site.
Lepidium jaredii ssp. *album* Panoche pepper-grass	--/--/1B.2	An annual herb found in clay soils on steep slopes in valley and foothill grassland from 185 to 275 meters in elevation. Currently known to occur in Fresno, San Benito, and San Luis Obispo counties. Blooms February to June (CNPS 2016).	Will not occur	There is no suitable clay soil and steep slope grassland habitat in the Project site; the project site is outside the elevation range for this species.
Madia radiata showy golden madia	--/--/1B.1	An annual herb found in cismontane woodland and valley and foothill grassland from 25 to 1215 meters in elevation. Currently known to occur in Fresno, Kern. San Benito, San Luis Obispo, Santa Clara, and Stanislaus counties. Blooms March to May (CNPS 2016).	Will not occur	There is no suitable woodland or grassland habitat in the Project site.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other*	General Habitat Description	Potential to Occur	Rationale
Malacothamnus aboriginum Indian Valley bush-mallow	--/--/1B.2	A perennial shrub found in rocky granitic soils in chaparral and cismontane woodland often after a fire, from 150 to 1700 meters in elevation. Currently known to occur in Fresno, Kings, Monterey, San Benito, San Mateo, and Santa Clara counties. Blooms April to October (CNPS 2016).	Will not occur	There is no suitable rocky chaparral or woodland habitat in the Project site; the project site is outside the elevation range for this species.
Monolopia congdonii San Joaquin woollythreads	FE/--/1B.2	An annual herb found in sandy soils in valley and foothill grassland and chenopod scrub from 60 to 800 meters in elevation. Currently known to occur in Fresno, Kern, Kings, San Benito, San Luis Obispo, and Santa Barbara counties. Blooms February to May (CNPS 2016).	Will not occur	There is no suitable grassland or chenopod scrub habitat in the Project site.
Puccinellia simplex California alkali grass	--/--/1B.2	An annual herb found in alkaline, vernally mesic areas within chenopod scrub, meadows and seeps, valley and foothill grassland and vernal pools from 2 to 930 meters in elevation. Currently known to occur in Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kings, Kern, Lake, Los Angeles, Madera, Merced, Napa, San Bernardino, Santa Clara, Santa Cruz, San Luis Obispo, Solano, Stanislaus, Tulare, and Yolo counties. Blooms March to May (CNPS 2016).	Will not occur	There is no suitable vernally mesic habitat in the Project site.
Sagittaria sanfordia Sanford's arrowhead	--/--/1B.2	A perennial rhizomatous herb found in marshes and swamps from 0 to 650 meters in elevation. Currently known to occur in Butte, Del Norte, El Dorado, Fresno, Merced, Mariposa, Placer, Sacramento, San Bernardino, San Joaquin, Shasta, Solano, Tehama, and Yuba counties. Blooms May to November (CNPS 2016).	Will not occur	There is no suitable marsh or swamp habitat in the Project site.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other*	General Habitat Description	Potential to Occur	Rationale
Sensitive Natural Habitats				
Coastal and Valley Freshwater Marsh	--/--/--; G3; S2.1	A community dominated by perennial emergent monocots 4-5 meters tall, often forming a completely closed canopy. It occurs in permanently flooded sites with little or no current. Characteristic species include bulrushes (*Schoenoplectus* spp.), cattails (*Typha* spp.), and common reed (*Phragmites australis*; Holland 1986).	Does not occur	This community is not present in the Project site.
Valley Sink Scrub	--/--/--; G1; S1.1	An open to dense community of low-growing, succulent alkali-tolerant species in the goosefoot family (Chenopodiaceae), especially iodine-bush (*Allenrolfea occidentalis*) and seepweed (*Suaeda* spp.) It occurs in heavy clay soils in lakebeds and playas with shallow groundwater and a salt crust on the surface. Once widespread in the San Joaquin and southern Sacramento Valleys; now essentially extirpated by agriculture and flood control (Holland 1986).	Does not occur	This community is not present in the Project site.

Note: Bold font indicates a species with the potential to occur in the project site; these species are evaluated in detail in the body of the report.

*FE – federally endangered; FT – federally threatened; FC – federally candidate; FD – federally delisted; SE – state endangered; ST – state threatened; SSC – state species of special concern; CNPS – California Native Plant Society (see definitions of CNPS rankings below)

CNPS ratings:

1B = Rare, threatened, or endangered in California and elsewhere

1B.1 = Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)

1B.2 = Fairly endangered in California (20-80% occurrences threatened)

2 = Rare, threatened, or endangered in California but more common elsewhere.

2.2 = Fairly endangered in California (20-80% occurrences threatened)

Global and State rankings in descending order of sensitivity (1=critically imperiled; 5=demonstrably secure)

Appendix D

Plant and Wildlife Species Observed in the Project Site

Appendix D. Observed Plant Species within the RE Scarlet Solar Project Site

Family	Species Name	Common Name	Status*
Native			
Asteraceae	*Helianthus annuus*	western sunflower	--
Non-native			
Alliaceae	*Allium sativum*	garlic	--
Asteraceae	*Lactuca serriola*	wild lettuce	--
Brassicaceae	*Sisymbrium altissimum*	tumble mustard	--
Chenopodiaceae	*Chenopodium album*	lamb's quarters	--
	Salsola tragus	Russian thistle	Limited
Convolvulaceae	*Convolvulus arvensis*	bindweed	--
Fabaceae	*Medicago sativa*	alfalfa	--
Malvaceae	*Malva parviflora*	cheeseweed	--
Poaceae	*Avena fatua*	wild oats	Moderate
	Festuca myuros	fescue	--
	Hordeum murinum	hare barley	Moderate
	Hordeum vulgare	common barley	--
	Triticum aestivum	wheat	--
Solanaceae	*Lycopersicon esculentum*	tomato	--

*Status for Native Species is federal or state listing, or California Rare Plant Rank (CRPR).
Status for Non-native Species is invasiveness rating by the California Invasive Plant Council (Cal-IPC 2016).

Appendix D. Observed Animal Species within the RE Scarlet Solar Project Site

Order/Family	Species Name	Common Name	Status*
Birds			
Accipitriformes			
Accipitridae	*Buteo jamaicensis*	red-tailed hawk	--
	Buteo swainsoni	Swainson's hawk	ST
	Circus cyaneus	northern harrier	CDFW:SSC
	Cathartes aura	turkey vulture	--
Anseriformes			
Anatidae	*Anas platyrhynchos*	mallard	--
Charadriiformes			
Charadriidae	*Charadrius vociferus*	killdeer	--
Scolopacidae	*Numenius americanus*	long-billed curlew	--[1]
Columbiformes			
Columbidae	*Zenaida macroura*	mourning dove	--
Passeriformes			
Alaudidae	*Eremophila alpestris actia*	horned lark	CDFW:WL
Corvidae	*Corvus corax*	common raven	--
Emberizidae	*Passerculus sandwichensis*	savannah sparrow	--
Icteridae	*Agelaius phoeniceus*	red-winged blackbird	--
	Sturnella neglecta	western meadowlark	--
Laniidae	*Lanius ludovicianus*	loggerhead shrike	CDFW:SSC
Tyrannidae	*Tyrannus verticalis*	western kingbird	--
Strigiformes			
Strigidae	*Athene cunicularia*	Burrowing owl	CDFW:SSC
	Bubo virginianus	great horned owl	--
	Tyto alba	barn owl	--
Mammals			
Rodentia			
Geomyidae	*Thomomys bottae*	Botta's pocket gopher	--
Heteromyidae	*Dipodomys heermanni*	Heermann's kangaroo rat	--
Sciuridae	*Otospermophilus beecheyi*	California ground squirrel	--

*Status for animal species: ST=State Threatened; CDFW=California Department of Fish and Wildlife; WL= Watch-List; SSC= Species of Special Concern.

[1]CDFW:WL only when breeding; species does not breed in the Project area.

Appendix E

Site Photographs

Photo 1. Irrigated crops and winter wheat south of Manning Avenue in the spring.

Photo 2. Typical view of the Project site south of Manning Avenue in the fall.

Photo 3. Disked and fallow fields north of Manning Avenue in the fall.

Photo 4. Fallow field in the northwest corner of the Project site.

Appendix F

Swainson's Hawk Protocol Survey Report

HELIX Environmental Planning, Inc.
11 Natoma Street, Suite 155
Folsom, CA 95630
916.365.8700 **tel**
www.**helixepi**.com

November 4, 2016

Ms. Marisa Mitchell
Senior Manager, Site Development
Recurrent Energy
300 California Street, 7th Floor
San Francisco, CA 94104

RE: Swainson's Hawk Survey Report
RE Scarlet Solar Project, Fresno County, California

On behalf of RE Scarlet LLC, HELIX Environmental Planning, Inc. (HELIX) conducted surveys for Swainson's hawk (SWHA; *Buteo swainsoni*) on an approximately 4,000-acre project site in western Fresno County, near the town of Tranquillity, California. The surveys were conducted according to the guidelines prepared by the Swainson's Hawk Technical Advisory Committee (TAC) in the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (TAC 2000). We understand that RE Scarlet LLC may develop the site as a utility-scale solar photovoltaic generating facility.

INTRODUCTION

The site is in unincorporated Fresno County, 29 miles west of Fresno and 6.6 miles northeast of Interstate-5. The Fresno County Department of Public Works and Planning is processing the proposed project as a Conditional Use Permit and requires analysis of potential environmental impacts in accordance with the California Environmental Quality Act (CEQA). The surveys described in this report were undertaken to determine the potential of the proposed project for significant impacts to SWHA.

This report describes the methods used to conduct the SWHA surveys and summarizes the findings. Supplemental information included in this report includes maps and graphics (**Attachment A**) and site photographs (**Attachment B**).

PROJECT LOCATION AND EXISTING CONDITIONS

The project site is located in western Fresno County, 4 miles southwest of the town of Tranquillity, 6.9 miles west of the town of San Joaquin, and 6.6 miles northwest of Interstate-5 (**Attachment A – Figure 1**). The site is bounded by West South Avenue on the north, South San Mateo Avenue on the east, West Dinuba Avenue on the South, and South Derrick Avenue (State Route 33) on the west (**Attachment A – Figure 2**). The proposed project is located adjacent to and in the immediate vicinity of

the existing RE Adams and RE Tranquillity solar projects. The project would connect to the existing PG&E Tranquillity Switching Station located 0.75-mile west of the project site via an overhead 230 kV gen-tie line.

The project site is in the west-central San Joaquin Valley, and terrain in the site is flat and level, draining naturally to the east at a very shallow gradient. There is no natural or artificial topographic relief in the site; elevations range from 172 to 209 feet above mean sea level.

The project site is currently used for agricultural activities including intensive cultivation and stock grazing. Crops grown in the site include alfalfa, wheat, garlic, and tomatoes. Large portions of the site were disked during the course of the surveys conducted for this report, and other portions were used for grazing sheep. No part of the site was undisturbed for the entire duration of the surveys.

There are no structures in the project site, and no paved roads except for West Manning Avenue, which bisects the site east-west. Farm roads in the site border individual fields and are at-grade, with unimproved surfaces. Temporary ditches are excavated as-needed along the edges of irrigated fields and function to hold metal irrigation pipes or to drain irrigation runoff. There are no permanent canals or ditches in the site. Overall, the project site is a mosaic of agricultural uses that change with the seasons.

There are no trees in the project site. The locations of suitable SWHA nest trees within 0.5-mile of the project site boundary are described in Table 1 and depicted in **Attachment A – Figure 3**.

Table 1. Suitable SWHA Nest Trees Within 0.5-mile of the Project Site

Stand No.	Location Description	Distance from Site	Notes
1	SE corner of West Dinuba Avenue and State Route 33	200 ft.	Stand of eucalyptus trees near a house. Only 1 large nest – occupied by common ravens in 2016.
2	West Dinuba Avenue 0.4-mile west of State Route 33	2,000 ft.	Stand of eucalyptus trees near a former residence. 2 nests in adjacent trees. Active SWHA nest discovered by HELIX in 2015 – successfully fledged 2 young. Pair of SWHA observed by HELIX again in 2016 – success unknown.
3	Monterey Avenue 0.5-mile north of South Avenue	2,500 ft	Stand of eucalyptus trees near a former home site. Only 1 large nest – occupied by common ravens in 2016. Several barn owl nests, 1 occupied by barn owl in 2016.

METHODS

SWHA surveys were conducted in accordance with the guidelines prepared by the TAC in the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (TAC 2000). The project site was surveyed a total of six times during survey periods III and V (Table 2) by HELIX biologists with extensive experience at SWHA surveys.

Surveys were at times of day prescribed in the survey protocol (TAC 2000) to allow for maximum probability of detection. The morning surveys started after morning civil twilight when birds become active, and ended by 12 pm. The evening surveys were conducted between roughly one hour before sunset and shortly after sunset. Each survey began with close observation of the 3 known nest locations within 0.5-mile of the project site to determine the status of the nests. Nest monitoring in each survey did not continue after confirmation that the birds identified occupying the nests in the previous surveys were still present. During Period V, the first hour of each survey was spent monitoring the nest at location 2 to determine if SWHA seen in the vicinity were using the nest. Given the small number of possible nest locations in the survey area, much of the survey time was spent watching for individuals foraging in the project site itself rather than monitoring potential nest locations.

Table 2. Survey Dates and Times (all surveys conducted in 2016)

Date	Start / End Time	Start/End Temp (° F)	Wind Speed (mph)	Weather	Personnel
Period III (April 5 – April 20)					
April 12	0900-1200	59/75	2-10	Overcast	G. Aldridge, D. Barry
April 13	0630-0900	46/50	2-7	Partly cloudy	G. Aldridge, D. Barry
April 19	--	--	--	--	S. Stringer, D. Barry
Period V (June 10 – July 30)					
June 16	1700-1915	81/79	0-3	Clear	G. Aldridge
June 17	0600-0930	57/64	0-3	Clear	G. Aldridge
July 12	1820-2015	93/80	2-10	Clear	G. Aldridge

RESULTS

There are no trees in the project site, and therefore no possibility for SWHA to nest in the project site. There are trees suitable for SWHA nesting at 3 locations within 0.5-mile of the project site and all 3 locations were monitored during surveys. SWHA were not observed using trees at the 2 locations east of State Route 33 (Table 1 - Locations 1 and 3) (**Attachment A – Figure 2**). Each of these locations has a single large stick nest of the type suitable for SWHA and both of these nests were occupied by pairs of common ravens (*Corvus corax*) during the 2016 breeding season.

A pair of SWHA occupied the nest tree on West Dinuba Avenue 0.4 mi west of State Route 33 (Table 1 - Location 2), and was observed at that location during all of the surveys conducted in Period III. A single SWHA was observed foraging over fields west of State Route 33 and perching on power poles along the west side of State Route 33 during surveys conducted in Period V; however, this individual was never observed approaching the nest at Location 2 (Table 1) and no adult or fledgling hawks were observed at that nest. HELIX biologists Barry and Aldridge monitored a pair of SWHA successfully fledging offspring in another nest at Location 2 in 2015.

Individual SWHA were observed foraging over fields east of State Route 33, including the northwestern portions of the project site sporadically during surveys. Such individuals were not observed flying to the nest at Location 2 or any other potential nest location near the project site, and often soared out of sight to the north and east. SWHA were most often observed foraging in the project site during evening surveys.

SUMMARY/CONCLUSION

Protocol surveys of the RE Scarlet Project Site were conducted by qualified biologists in accordance with the Swainson's Hawk Technical Advisory Committee's *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (TAC 2000). There are no trees in the

project site and therefore no possibility for SWHA to nest in the project site. Potentially suitable nesting sites were identified at 3 locations within 0.5-mile of the project site (Table 1), and nests suitable for use by SWHA were identified at all 3 locations. Of these suitable nests, 2 were occupied by common ravens during the 2016 breeding season, and 1 was occupied by SWHA for at least the beginning of the season (Period III). The breeding success of this nest was undetermined, as no SWHA were observed using it during the surveys conducted in the latter part of the season (Period V). The project site was used by foraging SWHA throughout the survey period.

Feel free to contact me by phone at (916) 365-8700 or by email at StephenS@helixepi.com if you have any questions.

Sincerely,

Stephen Stringer

Stephen Stringer, M.S.
Senior Biologist

Attachments:

Attachment A - Figures

- Figure 1. Regional Location Map
- Figure 2. Aerial Map
- Figure 3. Suitable Nest Tree Locations within 0.5 Mile

Attachment B – Site Photographs

References:

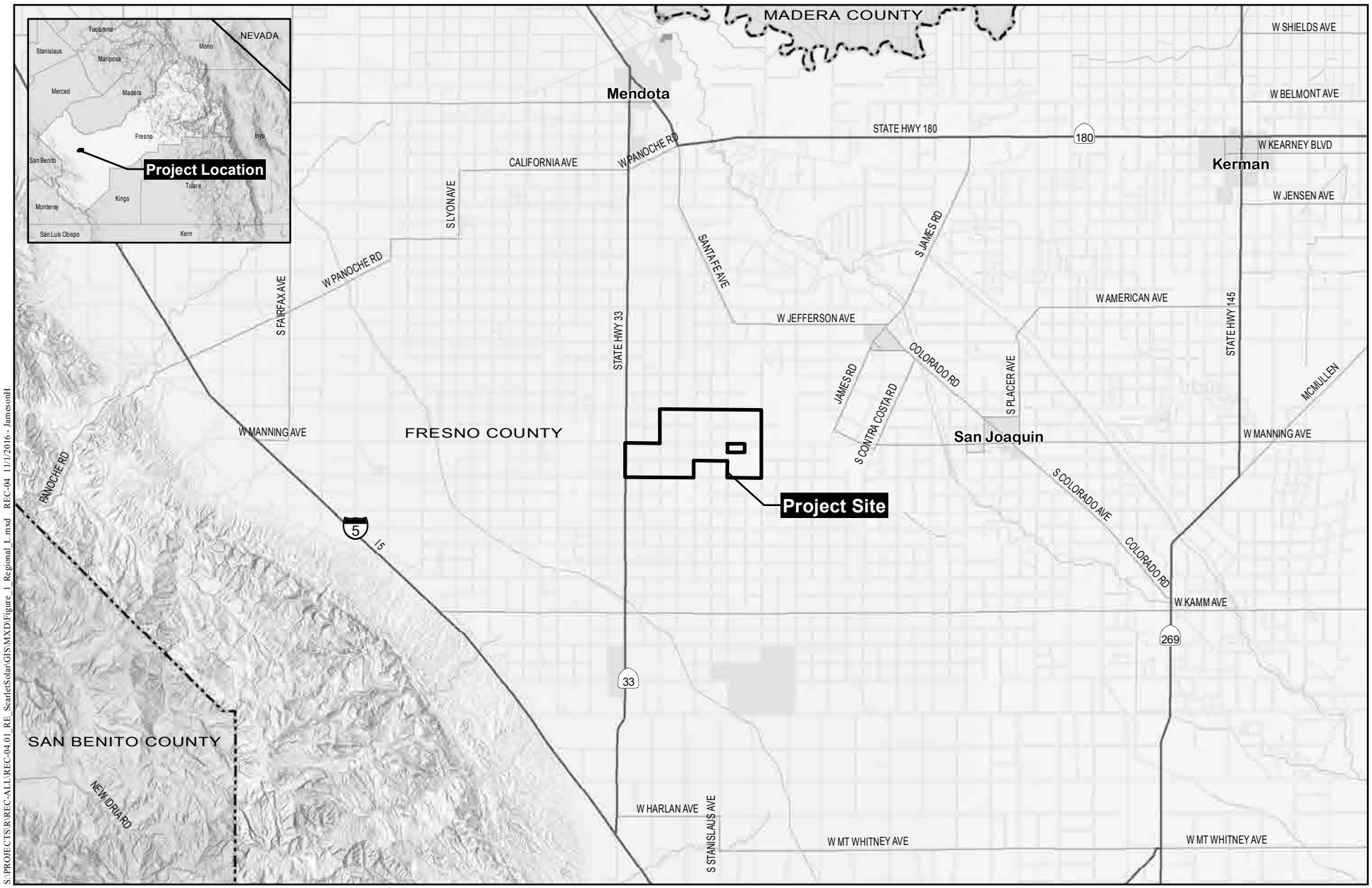
Swainson's Hawk Technical Advisory Committee (TAC). 2000. Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley. May 31.

Attachment A

Project Location Map

Aerial Map

Suitable Nest Tree Locations within 0.5 Mile



S:\PROJECTS\R\REC-ALL\REC-04\01_RE_ScarletSolar\GIS\MXD\Figure_1_Regional_L.mxd REC-04 11/1/2016 - Jamesonf

Regional Location Map

RE SCARLET SOLAR PROJECT
FRESNO COUNTY, CA
Figure 1

HELIX Environmental Planning

N 0 5 Miles 1 inch = 5 miles

S:\PROJECTS\R\REC-ALL\REC-04.01_RE_ScarletSolarGIS\MXD\Figure_2_Aerial_20160718.mxd REC-04 11/1/2016 - JamesonH

Site Location Map

RE SCARLET SOLAR PROJECT
FRESNO COUNTY, CA

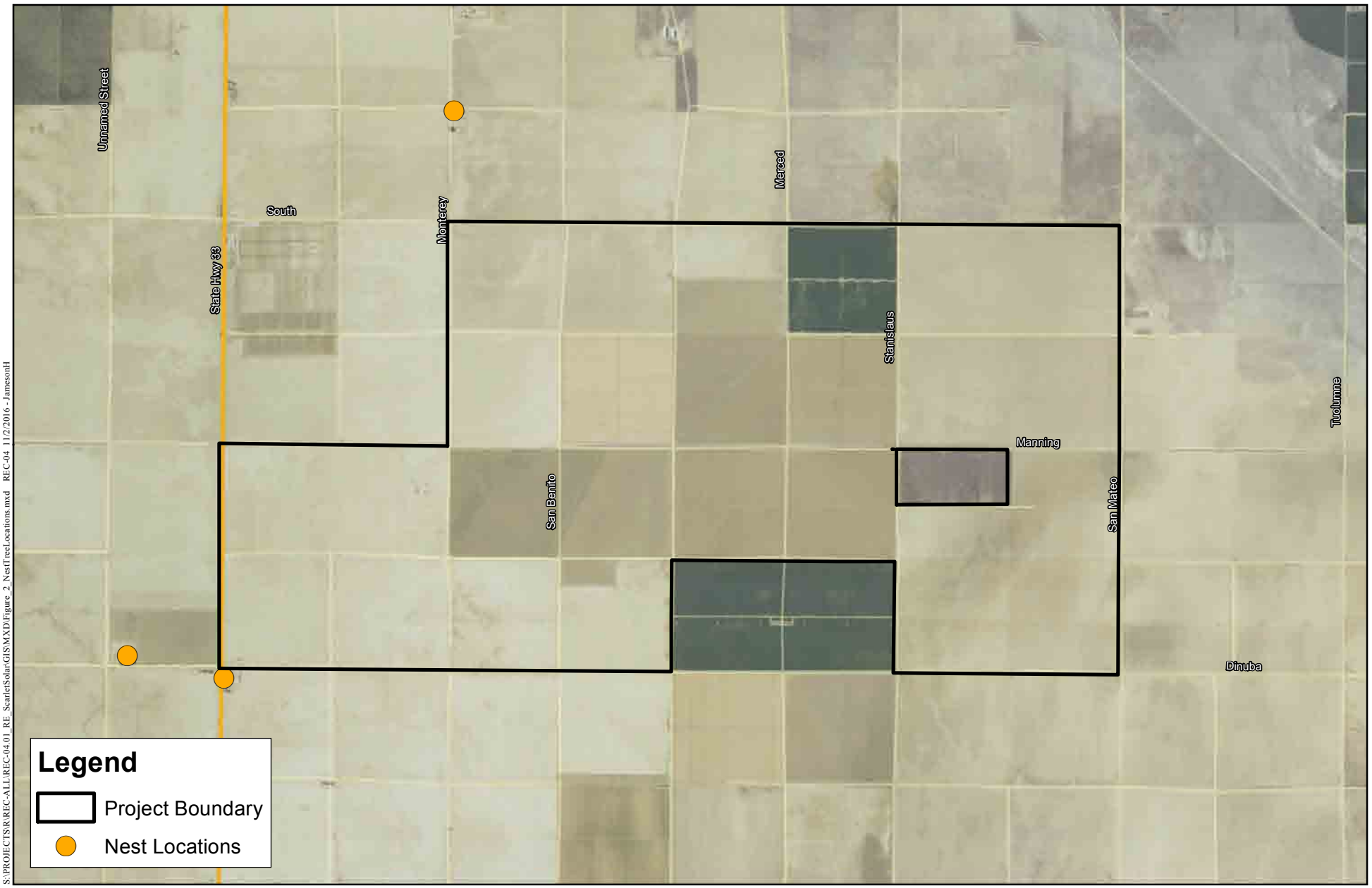
HELIX Environmental Planning

N

0 4,000 Feet

1 inch = 4,000 feet

Figure 2



S:\PROJECTS\R\REC-ALL\REC-04.01_RE_ScarletSolar\GIS\MXD\Figure_2_NestTreeLocations.mxd REC-04 11/2/2016 - Jamesonfl

Suitable Nest Tree Locations within 0.5 Mile

RE SCARLET SOLAR PROJECT
FRESNO COUNTY, CA

HELIX Environmental Planning

N 0 4,000 Feet

Figure 3

Attachment B

Site Photographs

Photo 1. Trees at nest Location 2 on West Dinuba Avenue west of State Route 33. The SWHA nests are in the two trees at the left of the picture. These are the only active SWHA nests within 0.5-mile of the project site.

Photo 2. Wheat and alfalfa fields typical of the treeless project site.

Appendix G

Burrowing Owl Habitat Assessment and Protocol Survey Report

RE Scarlet Solar Project

Burrowing Owl Habitat Assessment Report

April 2016

Prepared for:
Recurrent Energy
300 California Street, 7th Floor
San Francisco, CA 94104

Prepared by:
HELIX Environmental Planning, Inc.
11 Natoma Street, Suite 155
Folsom, CA 95630

1 INTRODUCTION

HELIX Environmental Planning, Inc. (HELIX) has prepared this burrowing owl habitat assessment report on behalf of the RE Scarlet Solar Project (Project). The purpose of this report is to provide the Project proponent (Recurrent Energy) and the California Department of Fish and Wildlife with the information outlined in the Habitat Assessment and Reporting section of the *Staff Report on Burrowing Owl Mitigation* (CDFW 2012).

Information in this report comes from site reconnaissance and desktop surveys. Site reconnaissance was conducted by HELIX biologists Stephen Stringer, Devin Barry, and George Aldridge on April 12-13, and April 19, 2016. Site reconnaissance consisted of a survey of the entire Project site by car and binoculars, and on foot in areas with potential for suitable burrows outside of cultivated fields. Data collected in the field included mapping vegetation and land covers, locations of potential burrows, and general flora and fauna. Desktop surveys included interpretation of current and historical aerial imagery for the Project site and the surrounding region, sensitive species database queries, and review of existing biological resources reports for nearby lands. Supplemental information provided with this report includes maps and graphics (**Attachment A**) and representative site photos (**Attachment B**).

2 PROJECT DESCRIPTION

The RE Scarlet Solar Project is a proposed solar photovoltaic generating facility located in unincorporated western Fresno County, California (**Attachment A - Figure 1**). The nearest towns are Tranquillity, 4 miles to the northeast, and San Joaquin, 6.9 miles to the east. Interstate 5 is 6.6 miles to the southwest and Fresno is 29 miles to the east. The Project site lies on both sides of West Manning Avenue, east of South Derrick Avenue (State Route 33) and west of South San Mateo Avenue. The northernmost boundary of the Project site is West South Avenue, and the southernmost boundary is West Dinuba Avenue (**Attachment A - Figure 2**). The Project site occupies all or part of Sections 20 – 22 and 27 – 30 of Township 15 South, Range 15 East, and Section 25 of Township 15 South, Range 14 East, Mount Diablo Meridian. The site is depicted on the U.S. Geological Survey “Cantua Creek”, “Levis”, and “Tranquillity” 7.5-minute quadrangle maps.

The Project site comprises approximately 4,000 acres of active and fallow agricultural land, with associated unpaved farm roads and staging areas. There are no residences or other permanent structures in the Project site. The site is bisected by West Manning Avenue, which is the only paved road in the site.

Recurrent Energy proposes to construct an approximately 400 MW solar photovoltaic generating facility east of South Derrick Avenue, and an electrical substation adjacent to an existing high voltage transmission line southeast of the intersection of South Derrick Avenue and West Manning Avenue. The proposed photovoltaic arrays would be mounted in rows on steel posts approximately 4 feet above grade with approximately 15 feet between rows. Construction of the proposed project would begin in early 2018 and is expected to continue for 12 months. Construction activities would take place during daylight hours, approximately 7am to 5 pm, and would be continuous unless prevented by rain. Construction would include establishment of access roads with dirt or decomposed granite surfaces, trenching for underground collection lines, boring for posts to support solar arrays, installation of posts and solar arrays, and construction of an electrical substation consisting of above-ground facilities mounted on concrete pads. Equipment used would be standard construction equipment such as

excavators, loaders, graders, cranes, forklifts, container trucks, and water trucks. The site will not require mass grading or cut and fill, as it is already flat and level. Existing shallow earthen ditches along field margins would be filled. The project would be constructed in a single phase; however, activities would occur in stages throughout the site.

3 BURROWING OWL SIGHTING RECORDS

The California Natural Diversity Database (CNDDB) was queried for burrowing owl occurrence records within 10 miles of the Project site. The query returned a total of 4 burrowing owl occurrence records within 10 miles of the Project site: 1 record near Fresno Slough, 6 miles northeast of the site, dated 1989; 1 record on the east bank of the San Luis Drain, 5 miles northeast of the site, dated 1991; 1 record on the east bank of the San Luis Drain, 4 miles northeast of the site, dated 1989, and; 1 record on the east bank of the San Luis Drain, 2 miles east-northeast of the site, dated 2006 (**Attachment A - Figure 3**).

One individual burrowing owl was observed on the site of the Tranquillity Solar Project, which is immediately adjacent to the RE Scarlet Solar site to the southwest. This individual was reported by Rincon Consultants, Inc. (2014) during biological surveys in October 2013. Rincon concluded that the individual was most likely a dispersing juvenile (Rincon 2014).

4 VEGETATION COMMUNITIES IN THE PROJECT SITE

The Project site contains no natural vegetation communities classified in CNDDB; vegetation in the site is a shifting mosaic of active and fallow agriculture. Active agriculture is generally unsuitable for burrowing owl due to lack of prey and burrows; fallow agriculture is generally suitable for burrowing owl unless vegetation is too tall or dense to allow foraging.

4.1 ACTIVE AGRICULTURE

Active agriculture includes irrigated row crops and non-irrigated crop fields under active cultivation at the time of the survey. Crops grown on the site include alfalfa, garlic, tomatoes, winter wheat, and barley. Irrigated fields in the site are bordered by north-south oriented, shallow, earthen drainage ditches that convey irrigation runoff. These ditches appeared to have been recently dug and did not support mammal burrows at the time of the field surveys.

4.2 FALLOW AGRICULTURE

Recently fallow agriculture includes agricultural fields not under active cultivation at the time of the survey, but that have been recently disked and/or mown and are largely bare or contain remains of a winter wheat crop. Vegetation in fallow fields of small grain crops such as wheat and barley is generally 1-2 feet tall and reaches 75-80 percent cover. These areas provide potential foraging habitat for burrowing owl.

Older fallow fields still show signs of past cultivation but have become overgrown with early-successional non-native species associated with past disturbance. Vegetation in these areas is overwhelmingly dominated by tumble mustard (*Sisymbrium altissimum*), Russian thistle (*Salsola tragus*), and volunteer wheat (*Triticum aestivum*). Older fallow areas are covered by dense vegetation 2 – 5 feet in height and feature very little, if any, open ground.

Vegetation in disturbed areas such as dirt roads, staging areas, and field margins is low-growing and provides little cover or forage for wildlife. Disturbed areas in the Project site are sparsely vegetated by non-native forbs and grasses, including pigweed (*Chenopodium album*), wild lettuce (*Lactuca serriola*), cheeseweed (*Malva parviflora*), and hare barley (*Hordeum murinum*).

4.3 SOILS

Soils in the Project site are saline-sodic clays and clay loams in 3 soil series (NRCS 2016): Tranquillity clay, saline-sodic, wet, 0 to 1 percent slopes; Ciervo clay, saline-sodic, wet, 0 to 1 percent slopes, and; Calfax clay loam, saline-sodic, wet, 0 to 1 percent slopes, MLRA 17. All of these soils are described as alluvium derived from calcareous rock, somewhat poorly- to moderately well-drained, with depths of 48 to 60 inches to the water table, and depths of greater than 80 inches to a restrictive layer. These soil types are not consistent with the dry, friable, sandy or loamy soils typically favored by burrowing animals.

5 HABITAT SUITABILITY OF THE PROJECT SITE FOR BURROWING OWL

Most of the Project site provides potential foraging habitat for burrowing owl but the habitat is low-quality because of regular disturbance, active cultivation, or dense cover of vegetation. Disking and other soil disturbance associated with on-going agricultural activities remove potential burrows in cultivated fields and reduce the abundance of small mammal prey. Fallow fields potentially support small mammal prey such as voles and gophers; however, periodic and unpredictable tilling discourages development of suitable colonies of larger burrowing animals such as ground squirrels. Burrows of California ground squirrel (*Spermophilus beecheyi*) occur only along roads in the northeast of the Project site, and these represent the only potentially suitable residence habitat for burrowing owl in the Project site. None of these burrows showed signs of occupancy by burrowing owl at the time of the field surveys.

6 REFERENCES

California Department of Fish and Wildlife (CDFW). 2012. Staff Report on Burrowing Owl Mitigation. March 7.

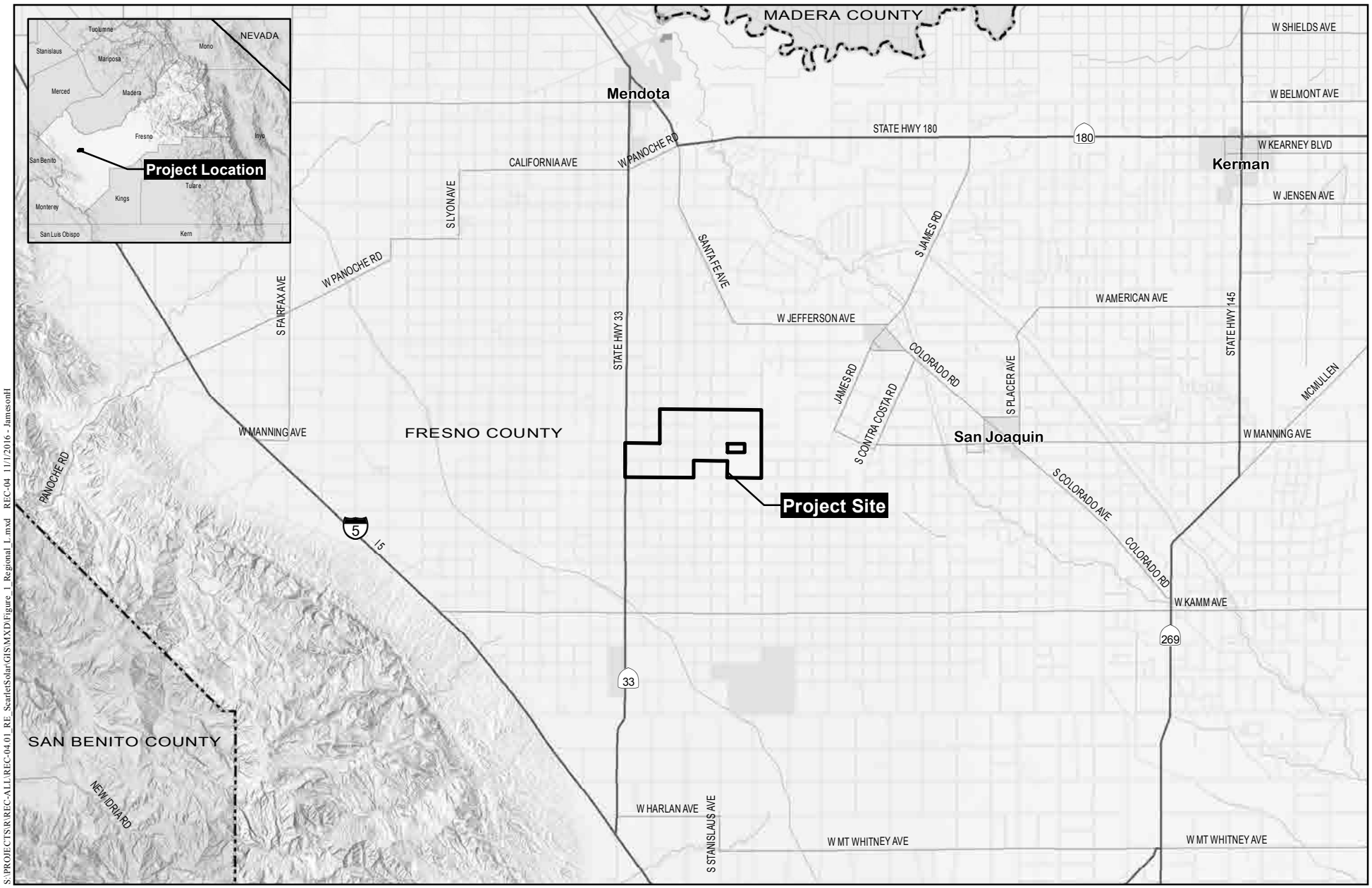
ESA Associates. 2014. Tranquillity Solar Generating Facility Project Draft Environmental Impact Report. May. Available at: <http://www.co.fresno.ca.us/ViewDocument.aspx?id=59219>

Natural Resource Conservation Service (NRCS). 2016. Web Soil Survey. Available at: <http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx.> Accessed 03/28/2016.

Rincon Consultants, Inc. (Rincon). 2014. RE Tranquillity Solar Generating Facility Project – Biological Resources Assessment. February. Available at: <http://www.co.fresno.ca.us/ViewDocument.aspx?id=59220>

U.S. Fish and Wildlife Service (USFWS). 1998. *Recovery plan for upland species of the San Joaquin Valley, California* . Region 1, Portland, OR. 319 pp.

Attachment A – Maps and Graphics



S:\PROJECTS\R\REC-ALL\REC-04\01_RE_ScarletSolar\GIS\MXD\Figure_1_Regional_L.mxd REC-04 11/1/2016 - Jamesonf

Regional Location Map

RE SCARLET SOLAR PROJECT
FRESNO COUNTY, CA
Figure 1

HELIX Environmental Planning

N 0 5 Miles 1 inch = 5 miles

S:\PROJECTS\R\REC-ALL\REC-04.01_RE_ScarletSolarGIS\MXD\Figure_2_Aerial_20160718.mxd REC-04 11/1/2016 - JamesonH

Site Location Map

RE SCARLET SOLAR PROJECT
FRESNO COUNTY, CA

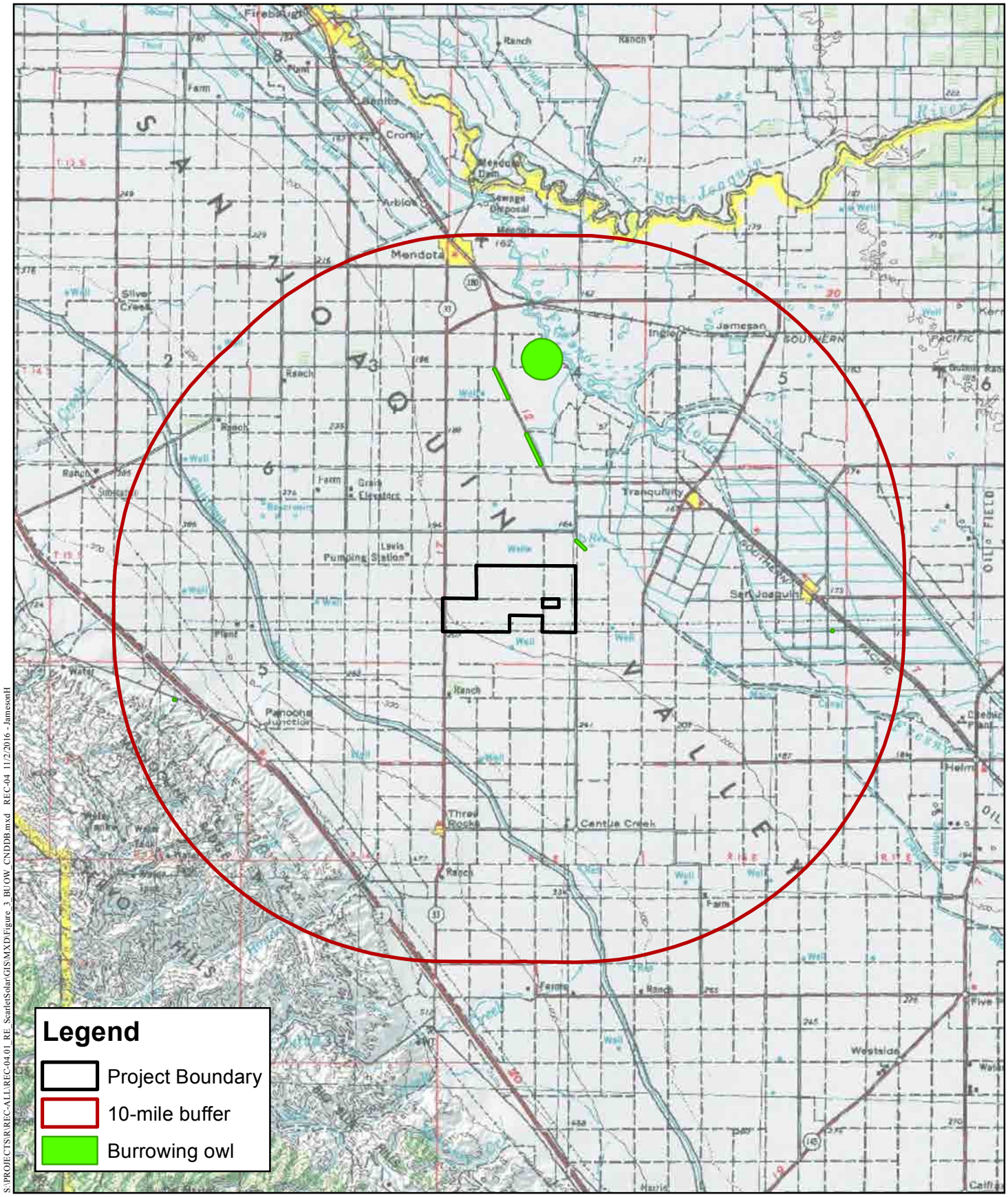
HELIX Environmental Planning

N

0 4,000 Feet

1 inch = 4,000 feet

Figure 2



CNDDB Records for Burrowing Owl

RE SCARLET SOLAR PROJECT
FRESNO COUNTY, CA

HELIX Environmental Planning

N 0 5 Miles 1 inch = 5 miles

Figure 3

Attachment B

Site Photographs

Photo 1. Typical irrigated alfalfa field with perimeter road

Photo 2. Typical disked field

Photo 3. Typical winter wheat field

Photo 4. Irrigated tomato field

Photo 5. Fallow field with barley

Photo 6. Typical fallow field with tumble mustard

HELIX Environmental Planning, Inc.
11 Natoma Street, Suite 155
Folsom, CA 95630
916.365.8700 **tel**
www.**helixepi**.com

November 4, 2016

Ms. Marisa Mitchell
Senior Manager, Site Development
Recurrent Energy
300 California Street, 7th Floor
San Francisco, CA 94104

RE: Burrowing Owl Survey Report
RE Scarlet Solar Project, Fresno County, California

On behalf of RE Scarlet LLC, HELIX Environmental Planning, Inc. (HELIX) conducted breeding season surveys for burrowing owl (*Athene cunicularia*) on an approximately 4,000-acre project site in western Fresno County, near the town of Tranquillity, California. The surveys were conducted according to the guidelines prepared by the California Department of Fish and Wildlife (CDFW) in the *Staff Report on Burrowing Owl Mitigation* (CDFW 2012). We understand that RE Scarlet LLC may develop the site as a utility-scale solar photovoltaic generating facility.

INTRODUCTION

The site is in unincorporated Fresno County, 29 miles west of Fresno and 6.6 miles northeast of Interstate-5. The Fresno County Department of Public Works and Planning is processing the proposed project as a Conditional Use Permit and requires analysis of potential environmental impacts in accordance with the California Environmental Quality Act (CEQA). The surveys described in this report were undertaken to determine the potential of the proposed project for significant impacts to burrowing owl.

This report describes the methods used to conduct the burrowing owl surveys and summarizes the findings.

PROJECT LOCATION AND EXISTING CONDITIONS

The project site is located in western Fresno County, 4 miles southwest of the town of Tranquillity, 6.9 miles west of the town of San Joaquin, and 6.6 miles northwest of Interstate-5 (**Attachment A – Figure 1**). The site is bounded by West South Avenue on the north, South San Mateo Avenue on the east, West Dinuba Avenue on the South, and South Derrick Avenue (State Route 33) on the west (**Attachment A – Figure 2**). The proposed project is located adjacent to and in the immediate vicinity of the existing RE Adams and RE Tranquillity solar projects. The project would connect to the existing PG&E Tranquillity Switching Station located 0.75-mile west of the project site via an overhead 230 kV gen-tie line.

The project site is in the west-central San Joaquin Valley, and terrain in the site is flat and level, draining naturally to the east at a very shallow gradient. There is no natural or artificial topographic relief in the site; elevations range from 172 to 209 feet above mean sea level.

The project site is currently used for agricultural activities including intensive cultivation and stock grazing. Crops grown in the site include alfalfa, wheat, garlic, and tomatoes. Large portions of the site were disked during the course of the surveys conducted for this report, and other portions were used for grazing sheep. No part of the site was undisturbed for the entire duration of the surveys.

There are no structures in the project site, and no paved roads except for West Manning Avenue, which bisects the site east-west. Farm roads in the site border individual fields and are at-grade, with unimproved surfaces. Temporary ditches are excavated as-needed along the edges of irrigated fields and function to hold metal irrigation pipes or to drain irrigation runoff. There are no permanent canals or ditches in the site. Overall, the project site is a mosaic of agricultural uses that change with the seasons.

METHODS

Breeding season burrowing owl surveys were conducted according to the guidelines prepared by CDFW in the *Staff Report on Burrowing Owl Mitigation* (CDFW 2012). The project site was surveyed a total of four times during the burrowing owl breeding season (**Table 1**) by HELIX biologists with extensive experience at burrowing owl surveys.

An initial habitat assessment was performed by car and on foot. Fields fallow at the time of the initial assessment were inspected on foot to characterize the ground surface, which was found to be uniformly furrowed and devoid of burrows of any kind. All fields that were fallow at the beginning of the survey period were disked before the end of the surveys in July, which suggests that no part of the project site remains undisturbed long enough to allow for establishment of a significant colony of ground squirrels. The habitat assessment included adjoining lands to a distance of at least 200 meters. Conditions in surrounding lands were found to be the same as in the project site. No ground squirrel burrows were observed anywhere except along roads in the northeast corner of the site. Gopher holes were fairly

common along roads bordering fallow fields. Roads next to actively cultivated fields typically appeared to have been scraped to accommodate higher volumes of car traffic or compacted by heavy machinery, which removed all rodent holes.

During each survey, the entire site was surveyed by driving slowly and stopping every 100 meters or less to scan the surrounding area for burrowing owl presence with binoculars. The majority of the site's acreage is unsuitable for burrowing owl nesting due to regular disking and intensive cultivation of row crops.

Surveys were timed to allow for comprehensive surveys of this site and a high detection probability. The morning surveys started after morning civil twilight to allow ambient temperatures to increase to a level more suitable for burrowing owl detection and ended at 10 am. The evening surveys were conducted between roughly one hour before sunset and shortly after the end of evening civil twilight.

Table 1. Survey Dates and Times (all surveys conducted in 2016)

Date	Start / End Time	Start/End Temp (° F)	Wind Speed (mph)	Weather	Personnel
Habitat Assessment					
April 12	1200-1600	75/80	0-2	Overcast	G. Aldridge, D. Barry
Surveys					
April 13	0620-1000	46/50*	2-10	Partly cloudy	G. Aldridge, D. Barry
May 24	1800-2030	75/65	2-7	Partly cloudy	G. Aldridge, D. Barry
June 17	0600-1000	57/64	0-2	Clear	G. Aldridge
July 12	1700-2015	97/93	5-10	Clear	G. Aldridge

*Although the protocol calls for conducting the survey during warmer temperatures, based on the forecast it didn't seem as though the project site would experience 70+ degree temps during the appropriate survey times prior to April 15th. Owls were observed during these surveys despite the cool temperatures.

RESULTS

No burrowing owls, burrowing owl sign, or potentially suitable burrows were observed in or adjacent to the project site during any of the surveys. Overall, animal activity was very low at the project site.

Potential predators of burrowing owl observed in the project site and immediate vicinity included red-tailed hawk (*Buteo jamaicensis*) and barn owl (*Bubo virginianus*). Barn owls are ubiquitous in the project site and surrounding lands. All trees in the general area of the project site have owl nests in them and a person approaching nearly any tree will cause barn owls to flush. Barn owls were regularly seen perched on metal irrigation pipes alongside irrigated fields at night after the conclusion of burrowing owl surveys. The high density of barn owls in the area may be a significant deterrent to burrowing owls. No signs of burrowing owl predation were observed in the project site.

SUMMARY/CONCLUSION

Protocol surveys of the project site were conducted by qualified biologists in accordance with CDFW's *Staff Report on Burrowing Owl Mitigation* (CDFW 2012). No active burrows, burrowing owl sign, or potentially suitable burrowing owl habitat were observed in or adjacent to the site during any of the burrowing owl surveys.

It is worth noting that after the completion of the burrowing owls surveys one individual burrowing owl was observed on the project site at a camera/bait station installed for San Joaquin kit fox (*Vulpes macrotis mutica*) surveys. The burrowing owl was apparently attracted to the camera/bait station by the presence of prey. No other burrowing owls were observed on the site during any other surveys. Burrowing owls have been incidentally observed on other properties in the area and likely use the project site occasionally for foraging but are not using the site for nesting.

Feel free to contact me by phone at (916) 365-8700 or by email at StephenS@helixepi.com if you have any questions.

Sincerely,

Stephen Stringer

Stephen Stringer, M.S.
Senior Biologist

Attachments:

Attachment A - Figures

- Figure 1. Regional Location Map
- Figure 2. Aerial Map
- Figure 3. CNDDB Records

Attachment B – Site Photographs

References:

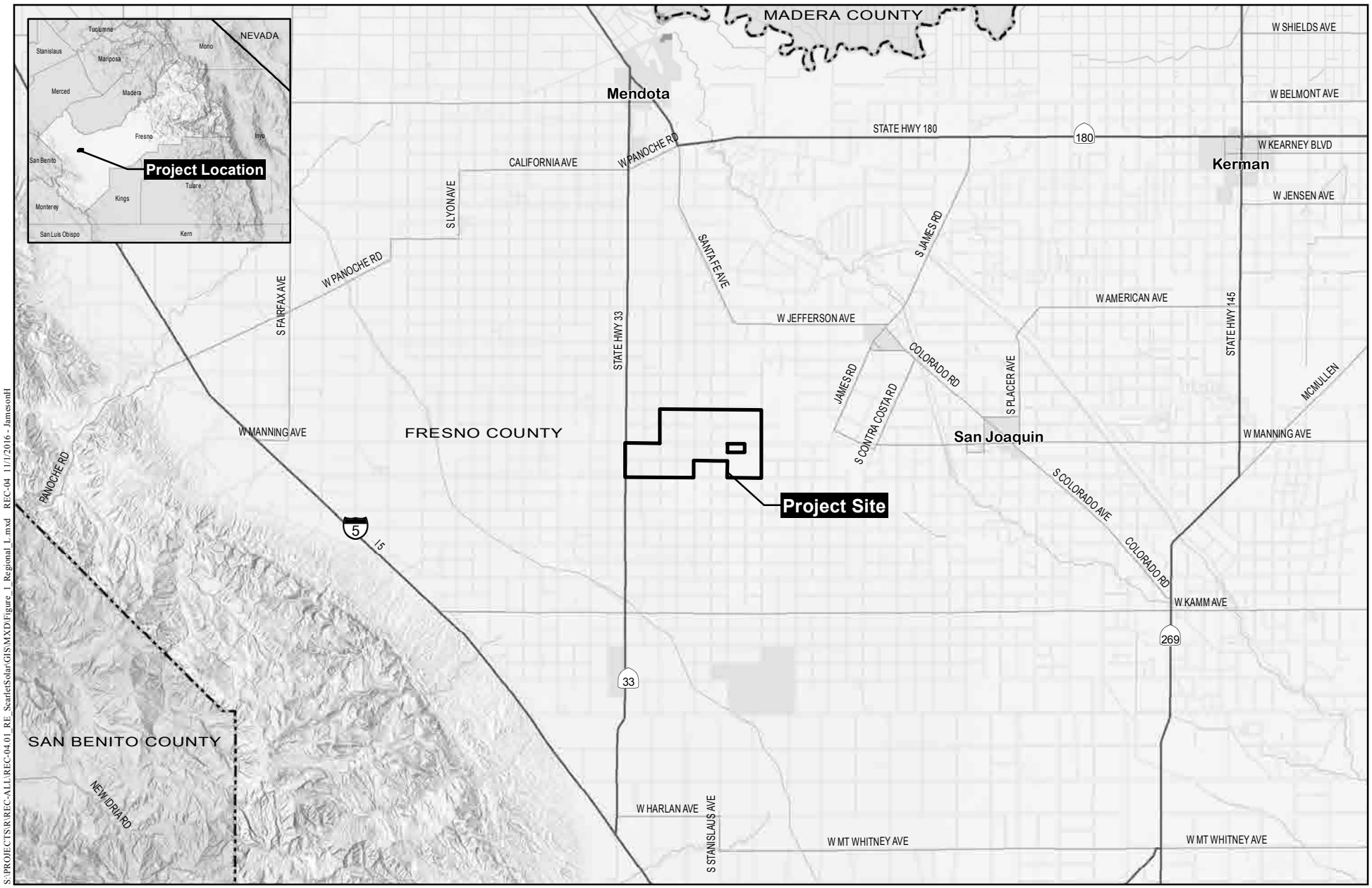
California Department of Fish and Wildlife (CDFW). 2012. Staff Report on Burrowing Owl Mitigation. State of California Natural Resources Agency Department of Fish and Game. March 2012.

Attachment A

Regional Location Map

Aerial Map

CNDDB Records



S:\PROJECTS\R\REC-ALL\REC-04\01_RE_ScarletSolar\GIS\MXD\Figure_1_Regional_L.mxd REC-04 11/1/2016 - Jamesonf

Regional Location Map

RE SCARLET SOLAR PROJECT
FRESNO COUNTY, CA
Figure 1

HELIX Environmental Planning

N 0 5 Miles 1 inch = 5 miles

S:\PROJECTS\R\REC-ALL\REC-04.01_RE_ScarletSolarGIS\MXD\Figure_2_Aerial_20160718.mxd REC-04 11/1/2016 - JamesonH

Site Location Map

RE SCARLET SOLAR PROJECT
FRESNO COUNTY, CA

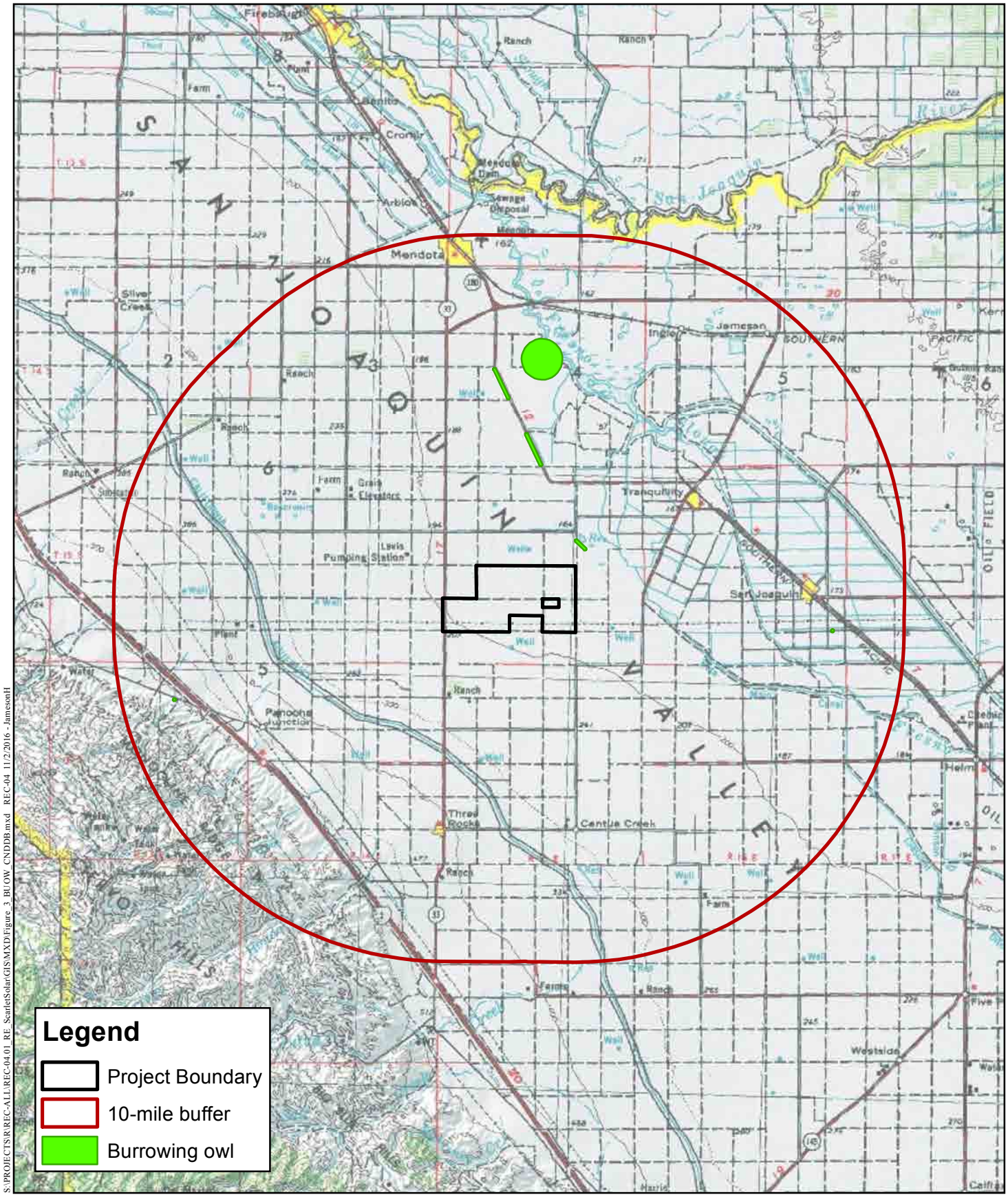
HELIX Environmental Planning

N

0 4,000 Feet

1 inch = 4,000 feet

Figure 2



CNDDB Records for Burrowing Owl

RE SCARLET SOLAR PROJECT
FRESNO COUNTY, CA

HELIX Environmental Planning

N 0 5 Miles 1 inch = 5 miles

Figure 3

Photo 1. A temporary drainage ditch and alfalfa field typical of the south-center of the site.

Photo 2. Metal irrigation pipe, tomatoes, and garlic typical of the southeast quadrant of the site.

Photo 3. Disked field in the western half of the site.

Photo 4. Temporary ditch and a wheat field typical of the southwest quadrant of the site.

Photo 5. Fallow field and wheat field in the northwest quadrant of the site. The wheat field was later mowed and grazed; the fallow field was later disked.

Photo 6. Typical view of the northern half of the site showing a road and fields. These fields were later disked.

Appendix H

Early Evaluation Requirements and Protocol Survey Report for San Joaquin Kit Fox

RE Scarlet Solar Project

Early Evaluation Requirements for San Joaquin Kit Fox

June 2016

Prepared for:
RE Scarlet LLC
300 California Street, 7th Floor
San Francisco, CA 94104

Prepared by:
HELIX Environmental Planning, Inc.
11 Natoma Street, Suite 155
Folsom, CA 95630

1 INTRODUCTION

HELIX Environmental Planning, Inc. (HELIX) has prepared this San Joaquin kit fox (SJKF) habitat assessment report on behalf of the RE Scarlet Solar Project (Project). The purpose of this report is to provide the project proponent (RE Scarlet LLC) and the U.S. Fish and Wildlife Service (USFWS) with the information outlined in the Early Evaluation Requirements section of the *U.S. Fish and Wildlife Service San Joaquin Kit Fox Survey Protocol for the Northern Range* (USFWS 1999).

Information in this report comes from site reconnaissance and desktop evaluation. Site reconnaissance was conducted by HELIX biologists Stephen Stringer, Devin Barry, and George Aldridge on April 12-13, April 19, and May 24, 2016. Site reconnaissance consisted of a visual inspection of the entire Project site. The field survey was conducted to obtain 100% visual coverage of the site. The field survey was modified to account for the size and condition of the project site (e.g., the entire site consists of active and recently fallowed agricultural fields). Surveys were conducted using a combination of pedestrian transects and vehicular surveys from roads and accessible portions of the fields. All surveys were conducted with the aid of high power binoculars. Data collected in the field included mapping vegetation and land cover types, assessing the suitability of the site for SJKF, mapping locations of potentially suitable burrows, and identification of general flora and fauna. Desktop evaluation included interpretation of current and historical aerial imagery for the Project site and the surrounding region, sensitive species database queries, and review of existing biological resources reports for nearby lands. Supplemental information provided with this report includes figures (**Attachment A**) and representative site photos (**Attachment B**).

1.1 SAN JOAQUIN KIT FOX

San Joaquin kit fox (SJKF; *Vulpes macrotus mutica*) was listed as "threatened with extinction" on March 11, 1967 under the Endangered Species Preservation Act of October 15, 1966 (16 U.S.C. 668aa(c); 32 FR 4001), and is currently listed as "Endangered" under the Endangered Species Act of 1973 (16 U.S.C. 1531-1544). The following discussion of SJKF ecology is taken from the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998).

Average size for SJKF is a body length of 19 – 20 inches plus an 11 – 12 inch tail, 12 inches high at the shoulder, and weighing 4.5 – 5 pounds, with females typically smaller than males. The coat is tan in the summer and silver-gray in the winter, with pale undersides and a black-tipped tail. SJKF is distinguishable from sympatric fox species (red fox [*Vulpes vulpes*] and gray fox [*Urocyon cinereoargenteus*]) by having smaller feet, larger ears, and overall smaller bodies. Gray foxes are most similar to SJKF; however, gray foxes are larger and have a distinct longitudinal black stripe on the tail.

The largest extant populations of SJKF are at the western margins of the Central Valley and the eastern Coast Ranges. Population centers occur in western Kern County (Elk Hills and Pixley National Wildlife Refuge), eastern San Luis Obispo County (Carrizo Plain), western Fresno County and eastern San Benito County (Ciervo – Panoche Natural Area), Southern Monterey County (Fort Hunter-Liggett and Camp Roberts), western Merced County, and eastern Contra Costa County. These population centers generally form a metapopulation lying west of Interstate 5 and/or south of Allensworth, with only isolated occurrences of SJKF in the remainder of the valley. By 2006, SJKF was determined to be largely eliminated from the central San Joaquin Valley (USFWS 2010).

In the San Joaquin Valley, SJKF is known to use grasslands, scrublands, agricultural areas where dens are available (e.g., unplowed fields, row crops, vineyards, or orchards), non-irrigated pastures, vernal pool grasslands, playas, and alkali meadows. SJKF dens are typically located on slopes less than 40 degrees, and pupping dens are usually on level ground; den entrances are typically 8 – 10 inches in diameter. SJKF use many dens in a season, and occupied dens often show no signs of use. Common signs of use include a dirt ramp leading to the entrance, flattened grass around the entrance, scat, tracks, and prey remains. Home ranges for SJKF vary from 1 to 12 square miles, depending on prey availability. Kit foxes are nocturnal.

2 PROJECT DESCRIPTION

The RE Scarlet project is a proposed solar photovoltaic generating facility located in unincorporated western Fresno County, California (**Figure 1**). The nearest towns are Tranquillity, 4 miles to the northeast, and San Joaquin, 6.9 miles to the east. Interstate 5 is 6.6 miles to the southwest and the City of Fresno is 29 miles to the east. The project site lies on both sides of West Manning Avenue, east of South Derrick Avenue (State Route 33) and west of South San Mateo Avenue. The northernmost boundary of the project site is West Adams Avenue, and the southernmost boundary is West Dinuba Avenue (**Figure 2**). The project site occupies all or part of Sections 16, 20 – 22, and 27 – 30 of Township 15 South, Range 15 East, and Section 25 of Township 15 South, Range 14 East, Mount Diablo Meridian. The site is depicted on the U.S. Geological Survey "Cantua Creek", "Levis", and "Tranquillity" 7.5-minute quadrangle maps.

The project site comprises approximately 4,069 acres of active and recently fallow agricultural land, with associated unpaved farm roads and staging areas. There are no residences or other permanent structures in the Project site. The site is bisected by West Manning Avenue, which is the only paved road in the site. RE Scarlet LLC proposes to construct a solar photovoltaic generating facility east of South Derrick Avenue, and an electrical substation adjacent to an existing high voltage transmission line southwest of the intersection of South Derrick Avenue and West Manning Avenue. The proposed photovoltaic arrays would be mounted in rows on steel posts approximately 4 feet above grade with approximately 15 feet between rows. The Project would interconnect to the regional electrical grid at the Pacific Gas and Electric Company's (PG&E) 230 kilovolt (kV) Tranquillity Switching Station located west of State Route 33 and south of Manning Avenue. A gen-tie line will run through easements across the Tranquillity Solar Generating Facility and will not result in new ground-disturbing impacts. Construction of the proposed project is expected to begin in early 2018.

3 SJKF SIGHTING RECORDS/ OTHER SURVEY RESULTS

HELIX queried the California Natural Diversity Database (CNDDB) for SJKF occurrence records within 10 miles of the Project site (CDFW 2016). The query returned a total of 4 SJKF occurrence records within 10 miles of the Project site: 1 record immediately east of Interstate 5, 10 miles southwest of the site, dated 1975; 2 records immediately west of the California Aqueduct, 7.5 miles west of the site, dated 1997, and; 1 record in the town of Mendota, 10 miles north of the site, dated 1947 (**Table 1**). HELIX contacted the Sacramento Fish and Wildlife Office on March 29, 2016, regarding USFWS spatial data potentially not in CNDDB. USFWS personnel indicated that the USFWS does not possess recent SJKF occurrence records for western Fresno County not reflected in CNDDB (T. Lehman, personal communication March 29, 2016).

Table 1. CNDDB SJKF Occurrence Records (within 10-miles) Summary

Occurrence No.	Distance	Information:
82	7.5 miles west	Record from 1997; west side of the California Aqueduct; one adult observed foraging in an irrigation canal/drainage ditch in a recently cultivated field
83	7.5 miles west	Record from 1997; west side of the California Aqueduct; one adult observed foraging in a dry grain field
373	10 miles north	Record from 1947; location given as the "vicinity of Mendota"; one male specimen collected
866	10 miles southwest	Record from 1975; vicinity of Interstate 5 and Panoche Junction; road kill and den observed sometime from 1972 through 1975

Protocol-level surveys for SJKF were performed and approved by USFWS for the adjacent Tranquillity Solar Generating Facility Project in 2013. The Tranquillity project site is immediately adjacent to the Scarlet Project site, lying south and west of South Derrick Avenue and West Manning Avenue, and was similar to the current condition of the Scarlet Project site in physical characteristics and land use at the time of the 2013 survey. This survey used a combination of pedestrian surveys of a randomized sample of approximately one quarter (800 acres) of the project site, and motion-activated cameras. No SJKF individuals or sign were detected during surveys at the Tranquillity solar site (Rincon 2014). HELIX has conducted multiple pre-construction clearance surveys and construction monitoring events in 2015 and 2016 for the Tranquillity Solar Generating Facility Project and no SJKF, sign, or potential dens have been detected.

4 VEGETATION COMMUNITIES IN THE PROJECT SITE

The Project site contains no natural vegetation communities classified in CNDDB; vegetation in the site is a shifting mosaic of active agriculture and fallow agriculture.

4.1 ACTIVE AGRICULTURE

Active agriculture includes irrigated row crops and non-irrigated crop fields under active cultivation at the time of the survey. Crops grown on the site include alfalfa, garlic, tomatoes, and winter wheat.

4.2 FALLOW AGRICULTURE

Recently fallow agriculture includes agricultural fields not under active cultivation at the time of the survey, but recently disked and/or mown and largely bare or containing remains of a winter wheat crop.

Older fallow fields still show signs of past cultivation but have become overgrown with early-successional non-native species associated with past disturbance. Vegetation in these areas is overwhelmingly dominated by tumble mustard (*Sisymbrium altissimum*), Russian thistle (*Salsola tragus*), and volunteer wheat (*Triticum aestivum*). Abandoned agriculture areas are covered by dense vegetation 2 – 5 feet in height and feature very little, if any, open ground.

Vegetation in disturbed areas such as dirt roads, staging areas, and field margins is low-growing and provides little cover or forage for wildlife. Disturbed areas in the Project site are sparsely vegetated by non-native forbs and grasses, including pigweed (*Chenopodium album*), wild lettuce (*Lactuca serriola*), cheeseweed (*Malva parviflora*), and hare barley (*Hordeum murinum*).

4.3 SOILS

Soils in the Project site are saline-sodic clays and clay loams in 3 soil series (NRCS 2016): Tranquillity clay, saline-sodic, wet, 0 to 1 percent slopes; Ciervo clay, saline-sodic, wet, 0 to 1 percent slopes, and; Calfax clay loam, saline-sodic, wet, 0 to 1 percent slopes, MLRA 17. All of these soils are described as alluvium derived from calcareous rock, somewhat poorly- to moderately well-drained, with depths of 48 to 60 inches to the water table, and depths of greater than 80 inches to a restrictive layer. These soil types are not consistent with the dry, friable, sandy or loamy soils typically favored by burrowing animals.

5 CONTINUITY WITH SURROUNDING AREAS

The project site is flat and level, sloping less than 0.2 percent to the northeast. The highest point in the project site is 210 feet above mean sea level (amsl) in the southwest corner and the lowest point is 170 feet amsl, 4.8 miles to the northeast. Surrounding lands are similarly flat and level, and consist of an expanse of agricultural fields in all directions. Agriculture in the 10 miles surrounding the project site is a mix of irrigated and non-irrigated land, with a predominance of non-irrigated wheat and oat cultivation immediately surrounding the project site. With the exceptions discussed below, there is complete continuity between the habitat in the Project site and similar habitat to a distance of 10 miles in all directions.

Non-agricultural land uses within 10 miles of the Project site include: existing solar photovoltaic generating facilities adjacent to the northwest and southwest corners of the site; the towns of Mendota, Tranquillity, and San Joaquin to the north, northeast, and east, respectively; the Mendota Wildlife Area and Fresno Slough 3 miles to the northeast; the James Bypass Canal 6.7 miles to the northeast; the California Aqueduct 3.5 miles to the southwest; Interstate 5 6.5 miles to the southwest, and; undeveloped grasslands in the foothills of the Diablo Range west of Interstate 5.

Paved roads in the vicinity of the project site include State Route 33, West Manning Avenue, and Colorado Avenue, which are un-fenced 2-lane highways that do not pose significant barriers to wildlife movement. The California Aqueduct is a fenced, concrete-lined channel containing an open water surface over 150 feet wide, that is crossed by road bridges at irregular intervals of 0.5 to several miles. Interstate 5 is a 4-lane freeway in a fenced right-of-way 350 feet wide. These 2 features pose significant barriers to the movement of wildlife from the undeveloped foothill areas west of Interstate 5 to the Project area.

6 HABITAT SUITABILITY OF THE PROJECT SITE FOR SJKF

The entire project site provides low-quality potential foraging and dispersal habitat for SJKF. Disking and other soil disturbance associated with on-going agricultural activities remove potential burrows in cultivated fields and reduce the abundance of small mammal prey. Fallow fields potentially support small mammal prey such as voles and gophers; however, periodic and unpredictable tilling discourages development of suitable colonies of larger burrowing animals such as ground squirrels. Burrows of California ground squirrel (*Spermophilus beecheyi*) occur only along roads in the northeast of the Project

site (**Figure 3**), and these represent the only potentially suitable denning habitat for SJKF in the Project site. None of these burrows had openings of sufficient size or showed signs of occupancy by SJKF at the time of the field surveys.

The nearest CNDDB reported occurrences of SJKF are over 7 miles from the Project site and are separated from it by the California Aqueduct. The only SJKF record within 10 miles of the Project site not separated from it by a significant movement barrier is based on a museum specimen collected from the vicinity of the town of Mendota and dated 1947. In addition, SJKF protocol surveys and numerous pre-construction and construction surveys for SJKF and other species have been conducted on the adjacent Tranquillity site and no SJKF or their sign have been found.

The Project site has low abundance of rodent prey, few suitable burrows, and is isolated by distance and/or movement barriers from known locations of SJKF. There is very low potential for SJKF to be present on the Project site, and likely then only as transient individuals.

7 POTENTIAL ADVERSE EFFECTS ON SJKF

The Project has very low potential for adverse effects on SJKF. Based on the lack of suitable denning habitat and absence of reported occurrences in or near the site, SJKF is not expected to occur in the project site or to utilize the site for residence or reproduction. Dispersal of individual SJKF through the site and/or foraging on the site is possible; however, the project site does not provide any unique habitat or movement corridor compared to surrounding lands.

8 RECOMMENDATIONS FOR MITIGATING POTENTIAL ADVERSE EFFECTS ON SJKF

Not applicable at this time.

9 ANALYSIS OF CUMULATIVE EFFECTS

For the purposes of this analysis, cumulative effects are defined as follows (USFWS 1999):

"The cumulative or incremental environmental impact of the effect of the action together with impacts of past, present, and reasonably foreseeable future actions. The action area includes all areas to be affected directly or indirectly by the action, not merely the immediate area involved in the action."

As discussed in **Section 7** above, potential adverse effects on SJKF would likely be limited to modification of potentially suitable foraging and dispersal habitat. The Project site is not located in any areas identified as SJKF "core", "link", or "satellite" recovery areas (USFWS 1998). Thus, the Project would not contribute to a cumulative impact to identified SJKF population centers or important linkage or satellite habitat areas.

10 REFERENCES

Natural Resource Conservation Service (NRCS). 2016. Web Soil Survey. Available at: <http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx.> Accessed 03/28/2016.

Rincon Consultants, Inc. (Rincon). 2014. RE Tranquillity Solar Generating Facility Project – Biological Resources Assessment. February. Available at: <http://www.co.fresno.ca.us/ViewDocument.aspx?id=59220>

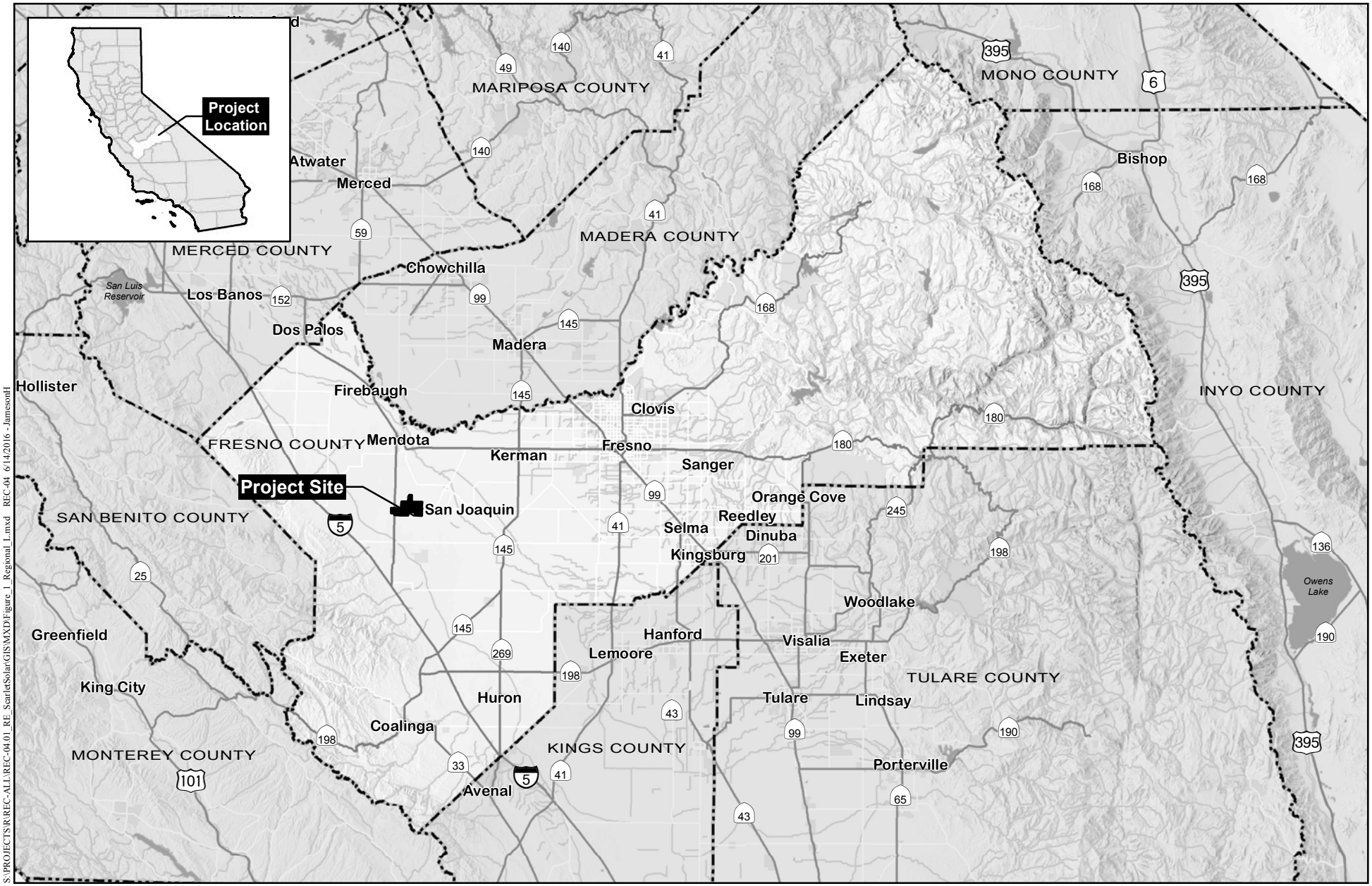
U.S. Fish and Wildlife Service (USFWS). 1998. *Recovery plan for upland species of the San Joaquin Valley, California* . Region 1, Portland, OR. 319 pp.

____. 1999. San Joaquin Kit Fox Survey Protocol for the Northern Range. Prepared by the Sacramento Fish and Wildlife Office. June.

____. 2010. San Joaquin Kit Fox (*Vulpes macrotus mutica*) 5-Year Review: Summary and Evaluation. Prepared by the Sacramento Fish and Wildlife Office.

Attachment A

FIGURES



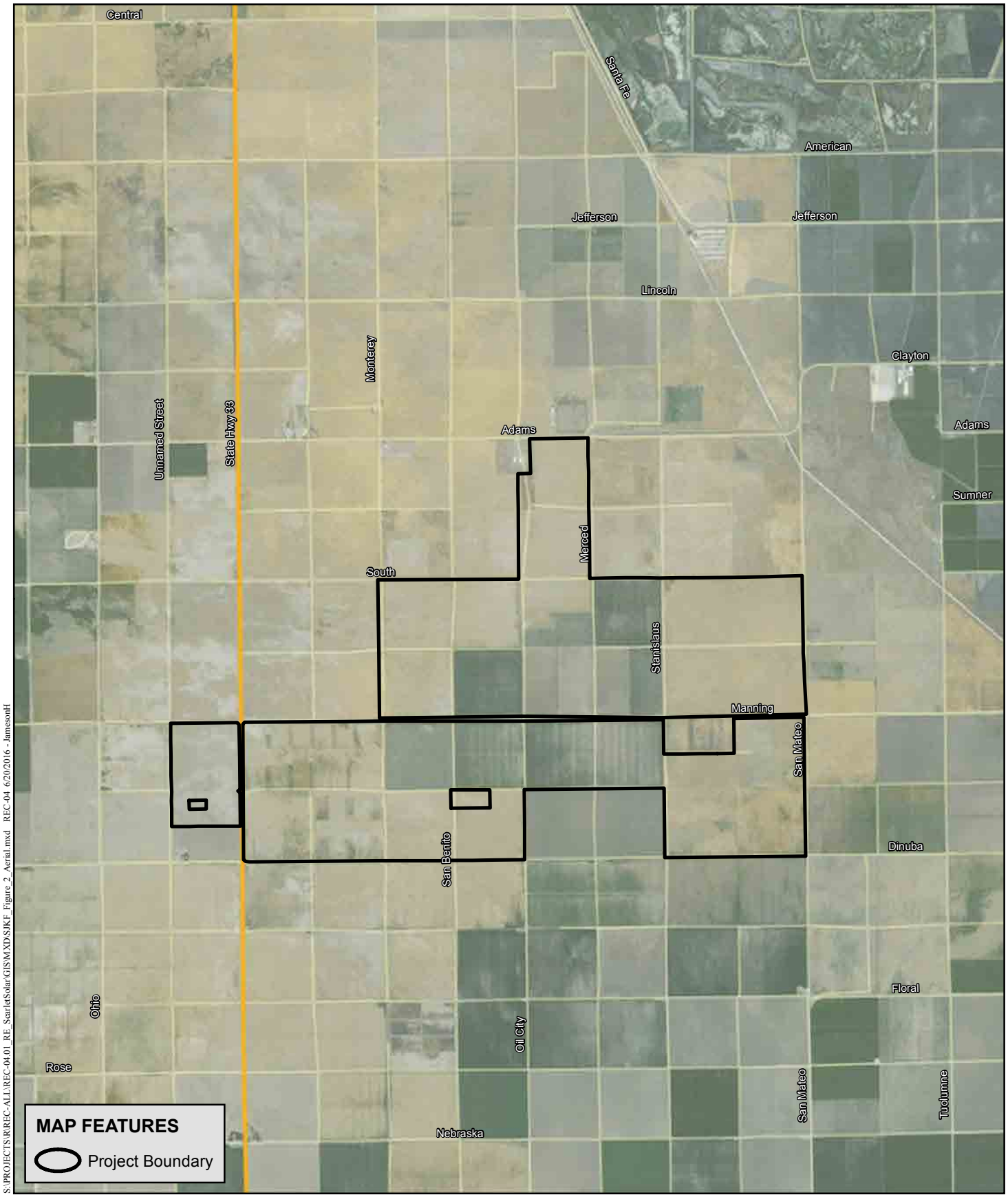
Project Location Map

RE SCARLET SOLAR PROJECT
SAN JOAQUIN KIT FOX HABITAT ASSESSMENT

Figure 1

HELIX Environmental Planning

N 0 20 Miles 1 inch = 20 miles



S:\PROJECTS\R\REC-ALL\REC-04.01_RE_ScarletSolarGIS\MXD\SJKF_Figure_2_Aerial.mxd REC-04 6/20/2016 - JamesonH

Aerial Map

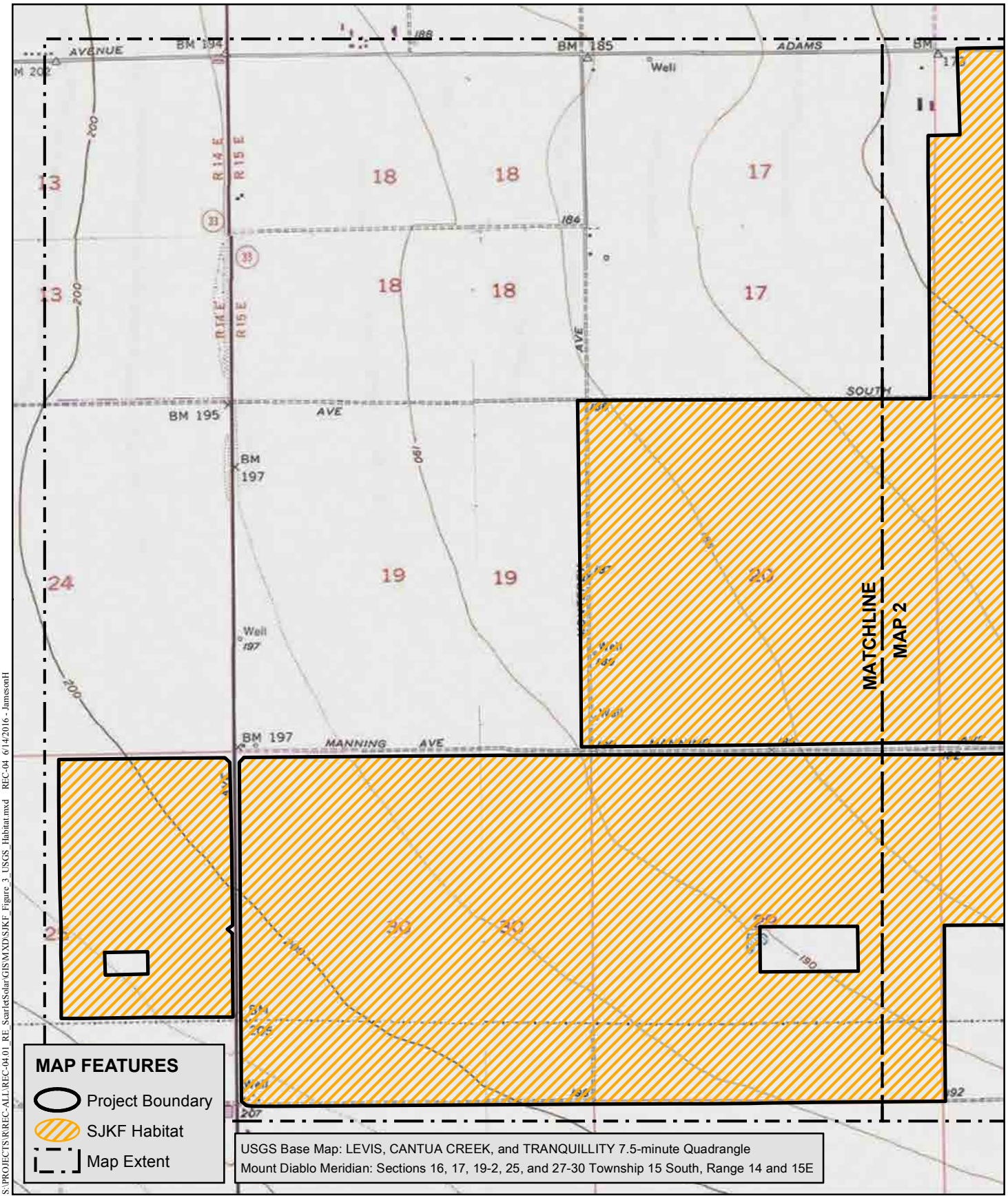
RE SCARLET SOLAR PROJECT
SAN JOAQUIN KIT FOX HABITAT ASSESSMENT
Figure 2

HELIX Environmental Planning

N

0 5,000 Feet

1 inch = 5,000 feet



S:\PROJECTS\R\REC-ALL\REC-04.01_RE_ScarletSolarGIS\MXD\SJKF_Figure_3_USGS_Habitat.mxd REC-04 6/14/2016 - JamesonH

Habitat Map

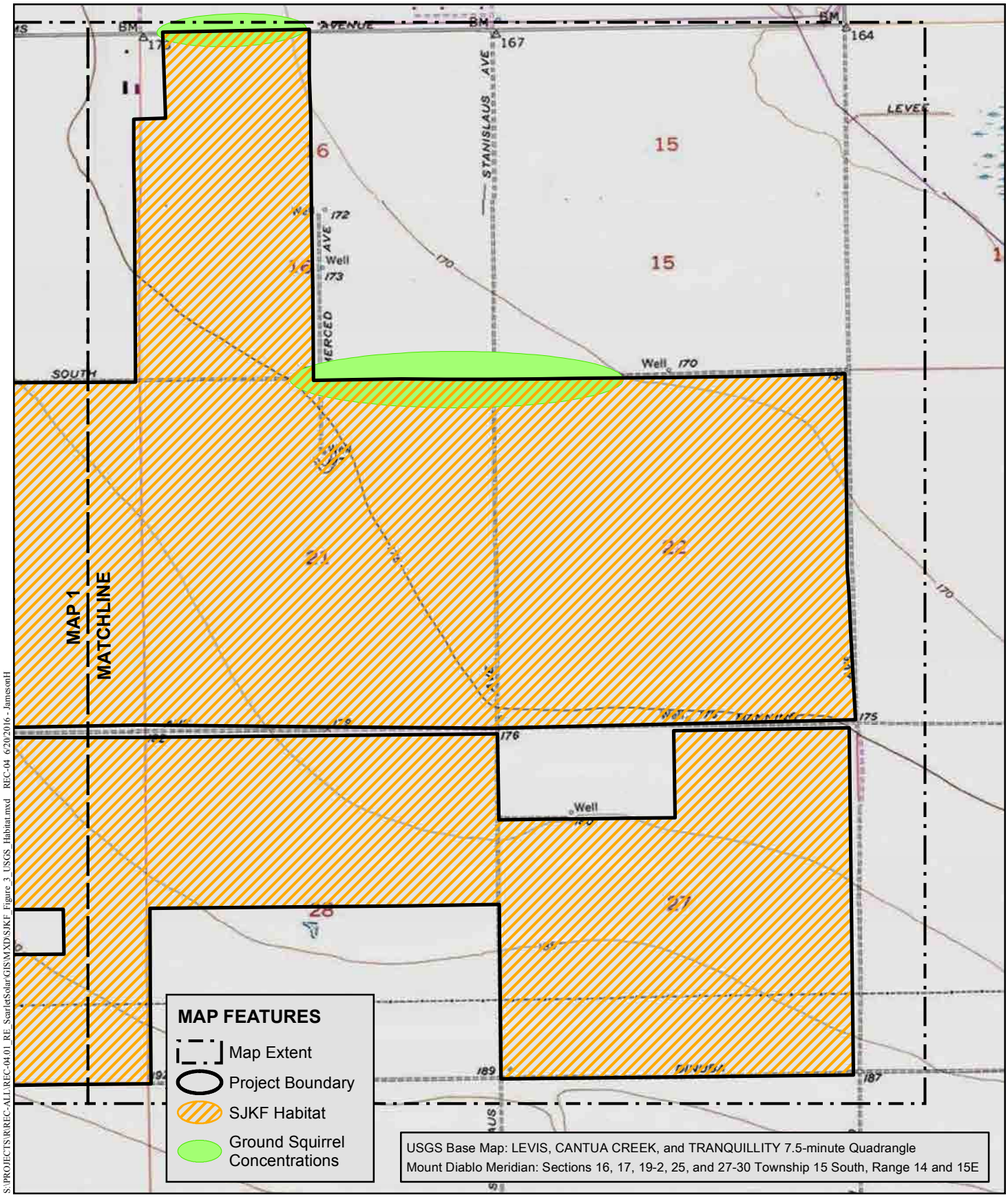
RE SCARLET SOLAR PROJECT
SAN JOAQUIN KIT FOX HABITAT ASSESSMENT
Figure 3 - Map 1

HELIX Environmental Planning

N

0 2,000 Feet

1 inch = 2,000 feet



S:\PROJECTS\R\REC-ALL\REC-04.01_RE_ScarletSolarGIS\MXD\SJKF_Figure_3_USGS_Habitat.mxd REC-04 6/20/2016 - JamesonH

Habitat Map

RE SCARLET SOLAR PROJECT
SAN JOAQUIN KIT FOX HABITAT ASSESSMENT
Figure 3 - Map 2

HELIX Environmental Planning

N 0 2,000 Feet 1 inch = 2,000 feet

Attachment B

SITE PHOTOGRAPHS

Attachment B – Site Photographs

Typical alfalfa field with perimeter road

Typical disked field

Typical winter wheat field

Irrigated tomato field

Fallow field with barley

Typical fallow field with tumble mustard

RE Scarlet Property:
San Joaquin Kit Fox Survey Report


Red-tailed Hawk (*Buteo jamaicensis*)

Prepared by:

Californian Environmental Services
4127 Bay Street, Suite B
Fremont, CA 94538
(925) 789-7459

Prepared For:
HELIX Environmental Planning
11 Natoma Street
Folsom, CA 95630
(916) 365-8700

OCTOBER 2016

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ATTACHMENTS

Attachment D: Representative Track Station Photographs
Attachment E: Species List

List of Abbreviations and Acronyms

CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CES	Californian Environmental Services
CNDDB	California Natural Diversity Database
GIS	Geographic Information System
GPS	Global Positioning System
SJKF	San Joaquin Kit Fox
US	United States
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

1 – INTRODUCTION

At the request of Helix Environmental Planning Inc. (HELIX), biologists from Californian Environmental Services (CES) conducted a presence/absence survey for San Joaquin kit fox (*Vulpes macrotis mutica*; SJKF) at the RE Scarlet Solar Property (Property), based on the United States (US) Fish and Wildlife Service(USFWS) *SJKF Survey Protocol for the Northern Range* (USFWS 1999a), which was modified to account for the site conditions. The surveys were completed by biologists Josh Goodwin, Ryan Witthaus, Jennifer Flohr, Kyle Walters, Rachel McCracken, and Will Molland-Simms beginning September 19th and ending October 6th, 2016. This report provides a property description, background research, methods, results, and conclusions of the surveys.

The intended use of the Property is for development of a solar photovoltaic generating facility (project). The project would entail installation of solar panels across the Property and fencing the outer perimeter. Previous reports for the Property (HELIX 2016) provided detailed property descriptions, evaluations of requirements for SJKF surveys, and associated mapping.

2 – PROPERTY DESCRIPTION

2.1 LOCATION

The Property is approximately 4,069 acres in size and is comprised of active and recently fallow agricultural lands, with associated unpaved farm roads and staging areas. It is located in unincorporated Fresno County approximately 1 mile east of the unincorporated town of Levis, California. Figure 1 illustrates the Property in relation to its vicinity, which is partially located within the Tranquility, Levis, and Cantua Creek USGS 7.5 Minute Quadrangle Maps (quad), with the majority (90 percent) of the property in the Cantua Creek quad. The town of Levis is located less than 1 mile west of the Property, and Highway 33 bisects the Property near the west end.

The Property is approximately 4.5 miles in width from east to west and approximately 3 miles in length from north to south with some variation in shape and size as shown in Figure 2. West Manning Avenue runs east-west bisecting the Property into approximately equal portions to the north and south. One small parcel is located to the south of Manning Avenue and west of Highway 33. The Property boundary is approximately 3.35 miles north of the California Aqueduct on Highway 33, with the foothills to Monocline Ridge approximately 6.3 miles to the southwest.

2.2 PROPERTY DESCRIPTION

The Property is located in a part of the southern San Joaquin Valley floor that drains the San Joaquin River Watershed. Land within the Property slopes gradually from west to east and the property can be divided into three separate and irregularly shaped blocks of agricultural and fallow fields bordered by access roads.

Based on the Habitat Assessment conducted by HELIX, the entire Property consists of low-quality habitat for SJKF (HELIX 2016). Ongoing and regular disking and other soil disturbance associated with historic and current agricultural activities regularly remove potential burrows in cultivated fields reducing the abundance of small mammal prey. Fallow fields potentially support small mammal prey such as voles (*Microtus spp*.) and gophers (*Thomomys bottae*); however, periodic and unpredictable tilling discourages development of suitable colonies of larger burrowing mammals such as California ground squirrels (*Otospermophilus beecheyi*).

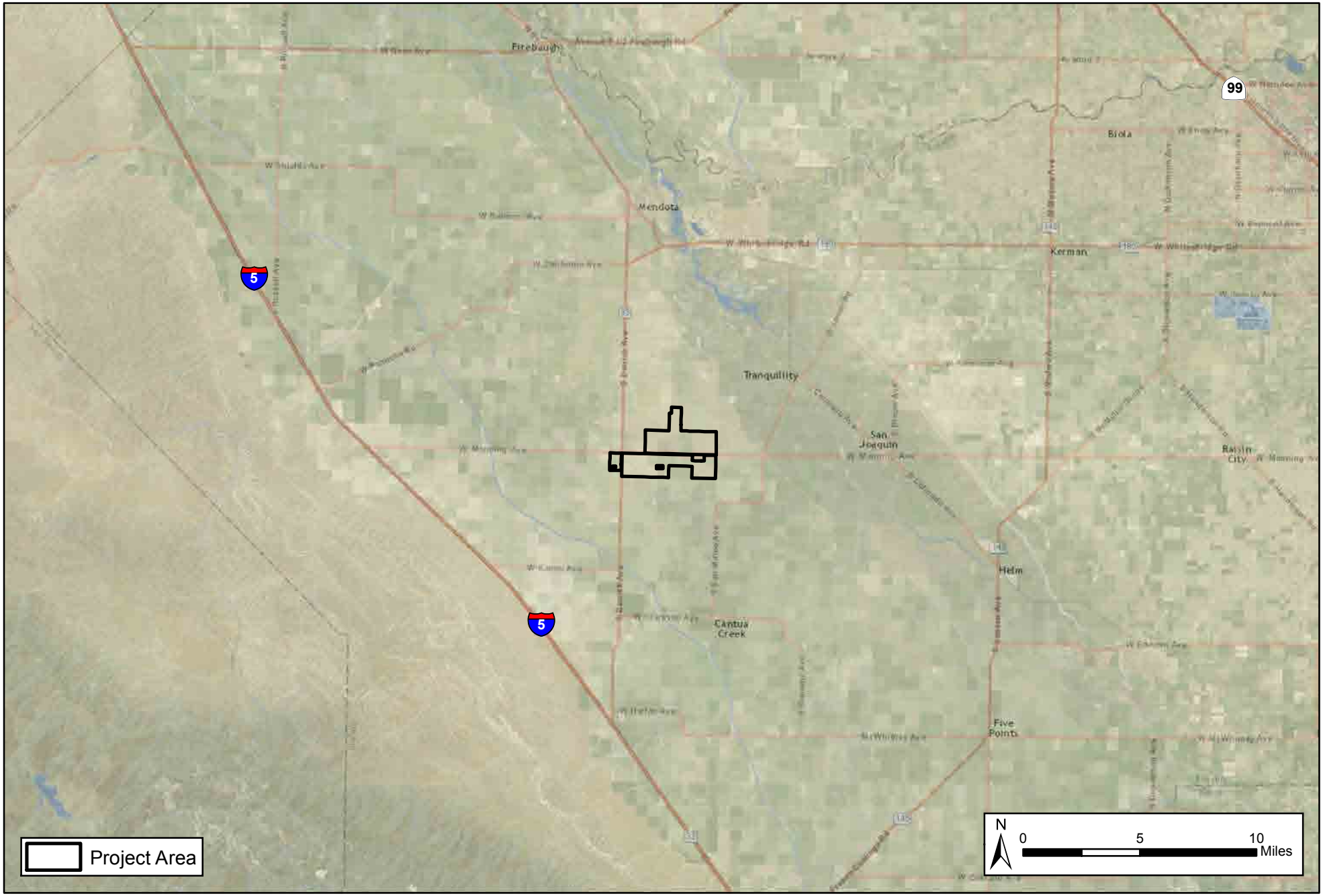
Habitats present within the Property include active and fallow agricultural fields, non-native annual grassland habitat, and patches of ruderal habitat along the perimeters of the Property and road ways. The Property has historically been used for agricultural crop production, and there is evidence of recent agricultural activity, including alfalfa (*Medicago sativa*), tomato (*Solanum ssp*.), yellow onion (*Allium ssp*.), and the stubble remains of wheat (*Triticum aestivum*) crops. Predominant vegetation on uncultivated portions of the Property is largely composed of non-native species including, but not limited to, Russian thistle (*Salsola kali*), saltscale (*Atriplex serenana var. serenana*), alkali mallow (*Malvella leprosa*), and wild lettuce (*Lactuca serriola*). At the time of the SJKF surveys, much of the Property was not in cultivation, though portions of the Property were being actively grazed by herds of sheep and had active alfalfa crops.

2.3 REGULATORY FRAMEWORK

The California Environmental Quality Act (CEQA) is a California State law created to inform governmental decision-makers and the public about the potential environmental effects of proposed activities and to reduce negative effects. Project proponents are required under CEQA to disclose, consider, and avoid or reduce significant effects to endangered, threatened and rare species. Significant effects are identified in Appendix G of CEQA Guidelines as those that will:

- Substantially affect an endangered or rare animal or plant or its habitat;
- Interfere substantially with the movement of any resident or migratory fish or wildlife species; or
- Substantially diminish habitat for fish, wildlife, or plants.

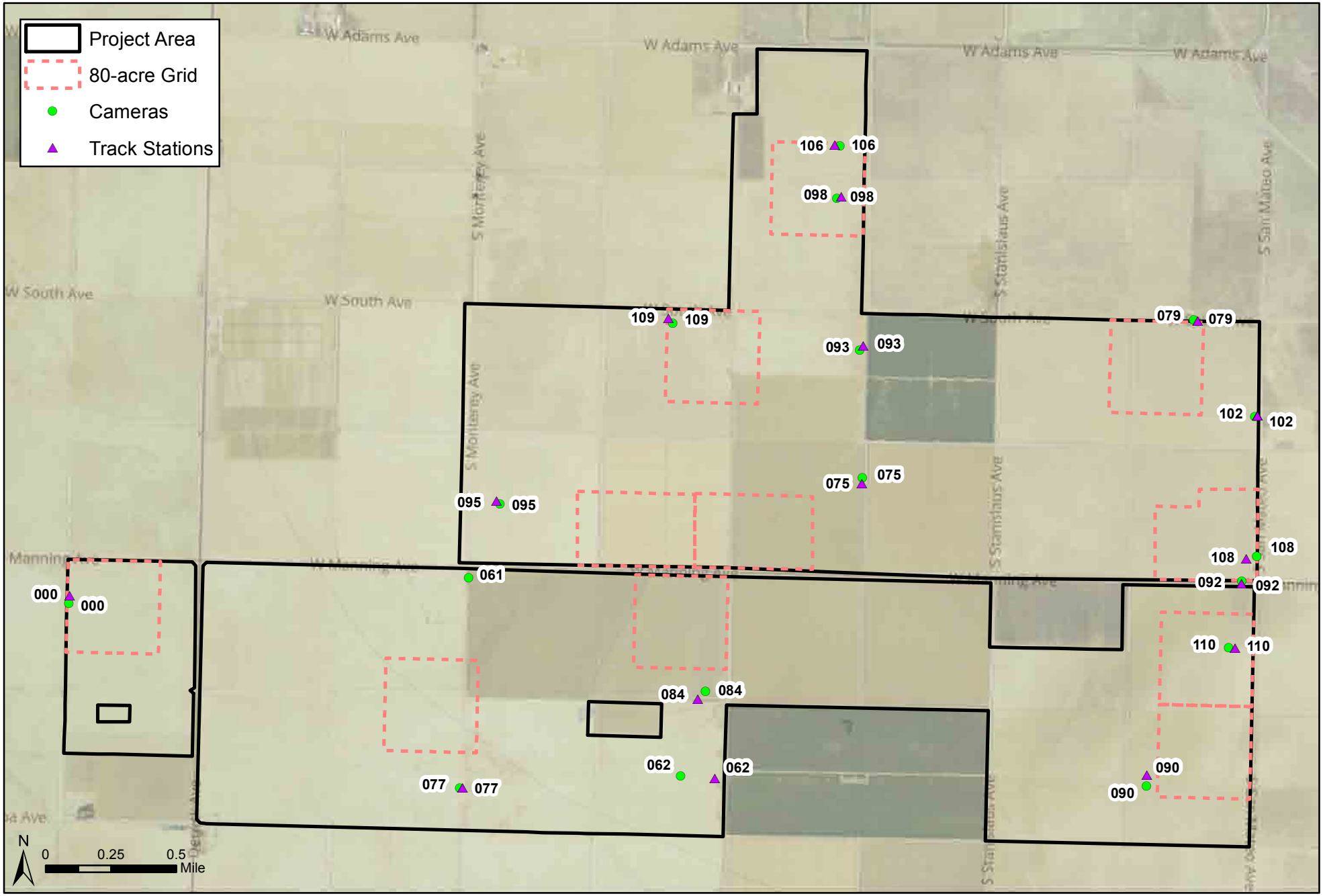
CEQA Guidelines (California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387) are the regulations that explain and interpret CEQA for both the public agencies required to administer CEQA and for the public generally. The Guidelines provide objectives, criteria and procedures for the orderly evaluation of projects and the preparation of environmental impact reports, negative declarations, and mitigated negative declarations by public agencies. As such, they incorporate and interpret both the statutory mandates of CEQA



Californian Environmental Services, Inc.

4127 Bay Street, Ste. B
Fremont, CA 94538

Figure 1: Vicinity Map
San Joaquin Kit Fox Survey
RE Scarlet Solar Project



Californian Environmental Services, Inc.

4127 Bay Street, Ste. B
Fremont, CA 94538

Figure 2: Project Site Map
San Joaquin Kit Fox Survey
RE Scarlet Solar Project

and the principles advanced by judicial decisions. With regard to endangered, rare, or threatened species, Sections 15380(b), (c) and (d) of the CEQA Guidelines state that:

"(b) A species of animal or plant is:

"(1) "Endangered" when its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, disease, or other factors; or

"(2) "Rare" when either:

"(A) the species exists in such small numbers throughout all or a portion of its range that it may become endangered if its environment worsens;

"(B) The species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range and may be considered "threatened" as that term is used in the Federal Endangered Species Act.

"(c) A species shall be presumed to be endangered, rare or threatened, as it is listed in:

"(1) Sections 670.2 or 670.5, Title 14, California Code of Regulations; or

"(2) Title 50, Code of Federal Regulations §17.11 or 17.12 pursuant to the Federal Endangered Species Act as rare, threatened, or endangered.

"(d) A species not included in any listing identified in subdivision (c) shall nevertheless be considered to be endangered, rare or threatened, if the species can be shown to meet the criteria in subdivision (b)."

3 – SAN JOAQUIN KIT FOX

3.1 CONSERVATION STATUS

On March 11th, 1967 SJKF was listed as a Federally Endangered species by the USFWS and in 1971, the California Department of Fish and Wildlife (CDFW) followed suit listing the species as State Threatened. No critical habitat has been proposed for SJKF; however, the subspecies is afforded full protection under federal and state law which prohibit killing, harming or harassing (all forms of "take") of SJKF. Federal and State agencies are required to ensure that activities they authorize, fund, or perform do not jeopardize the continued existence of the species. "Take" means to harass, harm, pursue, shoot, hunt, capture, or collect, or to engage in any such conduct.

3.2 SPECIES BIOLOGY

SJKF is a small, slim-bodied canid with large, conspicuously long and pointed ears, and a long, bushy, tail with a black tip providing a diagnostic feature for identification. SJKF is distinguished from the related gray fox (*Urocyon cinereoargenteus*) as gray fox has a prominent black stripe running along the length of the tail, is slightly larger in size, and lacks the large ears of the SJKF. Another close relative of the SJKF, is red fox (*Vulpes vulpes*), which is significantly larger, and has a pronounced white tip at its tail. All three canids use similar habitat types.

SJKF is the smallest canid species in North America, but is, conversely, the largest of the kit fox subspecies, with adults weighing 2.1 to 2.3 kg (4.6 to 5 pounds). This subspecies lives in annual grassland habitats or grassy open habitat stages with scattered shrubby vegetation where friable soils are present.

SJKF is primarily nocturnal and is active year-round. SJKF requires dens for temperature regulation, shelter from adverse weather, protection from predators, and pupping. Prey items for SJKF consist of small mammals such as kangaroo rats (*Dipodomys* spp.), white-footed mice (*Peromyscus leucopus*), California ground squirrels (*Otospermophilus beecheyi*), desert cottontails (*Sylvilagus audobonii*), and black-tailed jack rabbits (*Lepus californicus*), as well as insects (Jensen 1972; Archon 1992).

Grassland habitats with a large rodent prey base and loose-textured soils are thought to provide the best habitat for the SJKF. Historical SJKF habitat consisted of open grassland areas at or close to valley bottoms; however, due to the extent of agricultural development in these areas, SJKF are currently known to use foothill habitat. SJKF also exhibits a capacity to utilize habitats that have been altered by humans, such as oil fields, grazed pasturelands, and "wind farms" (Cypher 2000). SJKF prefers gentle slopes of less than 10 degrees, and the requirement for gentle slopes for reproductive dens may limit population viability in slopes with greater topographic relief; however, topographic heterogeneity has been identified as an important habitat requirement affecting SJKF distribution (Warrick et al. 1998). Home range sizes varies from 642 to 7,660 acres (2.6 to 31 square km), which are likely to be affected by stochastic changes in resource abundance.

SJKF is likely to use more than one den, and has not been found to be highly territorial, since home range territory overlap is known to occur. Multiple den use is most prevalent during the dispersal season, and the use of approximately 11.8 dens per SJKF has been documented at the Naval Petroleum Reserve (Coopman et al. 1998). Individual animals have been reported to use up to 70 different dens (Hall 1983). Therefore, it is important to designate and protect unused dens as potential SJKF habitat if the subspecies is known to occur within a given area.

SJKF usually breeds in December and January, and is primarily monogamous. After a gestation of 48 to 54 days, pups are born during late January-March (Zoellick et al. 1987). Several studies have found that mean litter sizes range from 2 to 3.8. Pups appear above ground at three to four weeks of age and are weaned when they are six to eight weeks of age. Reproductive rates (the proportion of females bearing young) vary annually with environmental conditions, particularly with food availability. Although some yearling SJKF produce young, most do not reproduce until two years of age (Spencer et al. 1992; Spiegel and Tom 1996; Cypher 2000). Some young of both sexes - but particularly females - may delay dispersal, and may assist their parents in raising in the following year's litter of pups (Spiegel and Tom 1996).

Juvenile SJKF begin dispersing as early as June with a peak dispersal occurring in July. The age at dispersal ranges from 4 to 32 months (Cypher 2000). One study found that among juvenile SJKF surviving to July 1 at the Naval Petroleum Reserve, 49 percent of the males dispersed from natal home ranges while only 24 percent of the females dispersed (Koopman et al. 2000). A total of 87 percent of the dispersing SJKF were within a year of age. A total of 65.2 percent of the dispersing juveniles died within the first 10 days of leaving their natal home (Koopman et al.

2000). Some SJKF delay dispersal and may inherit their home range. Dispersal distances of up to 123 kilometers (76.3 miles) have been documented for SJKF.

SJKF is subject to competitive exclusion or predation by species such as the non-native red fox, coyote *(Canis latrans)*, domestic dog *(Canis familiaris)*, bobcat *(Felis rufus)*, and large raptors. Although coyote could prey on SJKF, the taxa are not considered mutually exclusive (Cypher and Spencer 1998). One study has shown that larger carnivores can be a significant source of mortality (Briden et al. 1992). SJKF is also negatively impacted by fragmentation and loss of habitat, and the increasing number of roads, which can result in mortalities through vehicle strikes (Bjurlin 2004).

4 – METHODS

4.0 BACKGROUND RESEARCH

Prior to the initiation of field surveys, CES biologists conducted a query of the California Natural Diversity Data Base (CNDDB). Documented occurrences of SJKF were accessed by searching the CNDDB database records to include all SJKF occurrences within a 10-mile radius of the Property.

4.1 FIELD SURVEYS

Due to the low-quality habitat present on the Property, CES prepared a modified SJKF protocol survey methodology (hereafter "Protocol"; Attachment A) based on the USFWS *San Joaquin Kit Fox Survey Protocol for the Northern Range* (USFWS 1999). The modified Protocol was submitted by HELIX via email to Mr. Timothy Ludwick with the USFWS for review and comment on July 14th, 2016. Mr. Ludwick responded via email on August 16th, 2016 stating he did not have any issues with the survey protocol. Surveys were conducted by CES biologists according to the modified Protocol beginning September 19th, 2016. The modified Protocol consisted of conducting walking transects and operating camera and scent stations for 15 nights over approximately 25 percent of the total Property; but did not implement nighttime spotlight surveys.

Eleven 80-acre plots were randomly placed throughout the Property, providing survey coverage of approximately one quarter of the total Property acreage. Randomization of plot location was completed using ArcMap®. A grid was generated over an aerial of the Property such that each block was 80 acres in size. Each block was uniquely numbered and 11 blocks were chosen using a random number generator.

4.1.0 Walking Transects

Walking transects were conducted to visually survey the 11 randomly chosen 80-acre blocks throughout the Property. Transects were walked from September 19th through September 21st, 2016. A team of biologists walked transects in a north-to-south and south-to-north direction. As the vegetation height was generally low and there were no visual obstructions within the Property, walking transect widths ranging from 60 to 100 feet were utilized to achieve 100 percent visual coverage of the Property.

Walking transects were conducted across all habitats, excluding active agricultural lands, including:

- Fallow agricultural lands that were recently in use
- Recently plowed agricultural lands
- Dryland farming
- Ruderal lands associated with the above habitats located along the edges of fallow fields.

4.1.1 Camera and Scent Stations

Camera and scent stations were established within the Property in all 11 survey blocks. Hand-held Garmins® were used to record the Global Positioning System (GPS) coordinates of all camera and scent stations for later mapping efforts. Scent stations were established at locations where there was evidence of mammal activity (e.g., game trails, access roads, burrow complexes, etc.). Scent stations were installed using media, such as flour, gypsum, or diatomaceous earth, spread out over an aluminum track plate measuring 2 feet by 3 feet in size. All burrows were surveyed approximately 24 hours after tracking medium placement, for signs of SJKF activity including tracks, and prey remains.

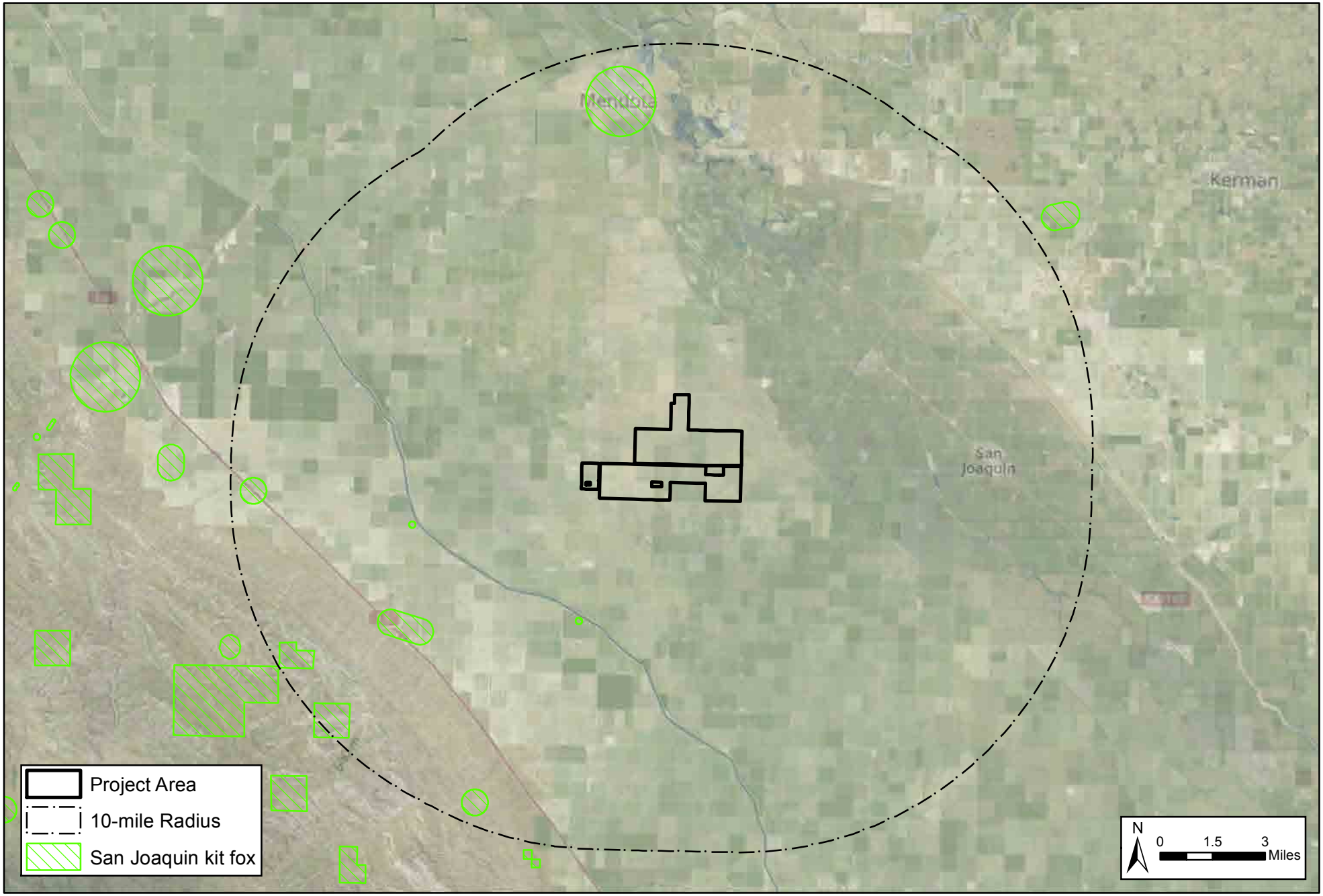
A total of 17 camera stations and nearby scent stations were established within the Property (Figure 2). As specified in the Protocol, camera and scent stations were placed within each randomly chosen survey block and "hotspot" areas as well. If appropriate habitat was present in several closely-spaced areas, the camera stations were placed to maximize the potential for documenting canids within the Property. Camera and scent stations were maintained for 15 consecutive nights beginning September 21st and concluding October 6th. Camera stations were checked each morning and all photos were tagged by camera identification number and immediately downloaded for later viewing. Scent stations were examined closely each morning to identify all tracks in the media. Bait (canned cat food) was replaced at each scent station on a daily basis, to attract potential canids to each station.

5 – RESULTS

5.0 BACKGROUND RESEARCH

Eight SJKF occurrences have been documented within 10 miles of the Property (Figure 3). A majority of the sightings were documented between 1975 and 1997 and the nearest occurrences (#83 and #82) are respectively reported 3.46 miles southwest and 4.8 miles south of the Property. CNDDB records are summarized below:

- Occurrence #83, May 20, 1997 – 3.35 miles south of the Property. SJKF was observed on the Westside of the California Aqueduct adjacent to a dry grain field.
- Occurrence #82, May 21, 1997 –1.75 miles south of Manning Ave, 2.5 miles northeast of I-5. just north of Floral Ave, west of Lyon Ave.
- Occurrence #248, November 20, 1995 –8.96 miles west of the Property. SJKF was observed 1.5 miles South of junction of Interstate 5 and Manning Avenue.



Californian Environmental Services, Inc.

4127 Bay Street, Ste. B
Fremont, CA 94538

Figure 3: CNDDB SJKF Occurrences
San Joaquin Kit Fox Survey
RE Scarlet Solar Project

- Occurrence #435, July 15, 1981 –9.0 miles southwest of the Property. SJKF was observed within the Ciervo Hills on Monocline Ridge, 2.1 miles Northeast of Ciervo Spring.
- Occurrence #865, July 1975 – 9.00 miles southwest of the Property. SJKF was observed East of Ciervo Hills, 3.7 miles NW of intersection of Highway 33 and Interstate 5.
- Occurrence #866, July 1975 – 5.76 miles southwest of the Property. SJKF was observed north of Ciervo Hills, about 0.8 miles South of Panoche junction.
- Occurrence #434 – 8.89 miles southwest of the Property. SJKF was observed in Ciervo Hills, northwest of Ciervo Spring.
- Occurrence #373 – Observed February 1, 1947 approximately 7.5 miles north of the Property. Location recorded only as in the vicinity of Mendota.

5.1 ASSESSMENT OF HABITAT FOR SAN JOAQUIN KIT FOX

Based on the CNDDB results, the Property lies within the known range of SJKF. The Property contains habitat that may be suitable for SJKF, but since it has historically and recently been used as farmland, its current habitat does not represent the most preferred nor optimal habitat available in the region (Attachment B). The Property does support some burrow complexes for ground squirrels and desert cottontails that could serve as a prey base for SJKF. Larger burrow complexes occupied by brush rabbits were observed at the edge of the hill slopes bordering roadways in the vicinity of the Property. The preferred soils in which these mammals burrow are looser, friable types with a sandy component. Soils on the Property are considered potentially suitable for SJKF den sites.

5.2 FIELD SURVEYS

5.2.0 Walking Transects

No dens with sign of SJKF use were documented during the walking transects. All wildlife sightings and potential habitat observations were noted and documented during the walking transect surveys (Table 1). All burrow complexes and potentially suitable canid burrows were recorded with a Garmin® GPS unit. Mapping of burrows assisted in focusing locations for the establishment of camera and scent stations. All observed burrows within the survey area were determined to be too small (less than 4 inches in diameter) to support SJKF. California ground squirrel burrows were present within the survey area north of Manning Avenue with the majority of the burrows in a state of collapse due to disking. There were two small California ground squirrel burrow complexes containing less than five burrows. Burrow tailings and other evidence of Botta's pocket gopher were also present throughout the survey area north of Manning Avenue in addition to many rodent burrows. The survey area south of Manning Avenue was in active row crops or had been recently plowed. No ground squirrel activity was observed in this area. Gopher activity and rodent activity was observed along the access roads.

5.2.1 Camera and Scent Stations

No SJKF were detected in the camera and scent stations. Coyotes and domestic dog were the only canids detected by camera and scent stations within the Property. The coyotes were utilizing habitats within both the northern and southern parts of the Property. Species

documented by the camera stations included coyote (*Canis latrans)*, domestic dog (*Canis domesticus*), black-tailed jack rabbit (*Lepus californicus*), California ground squirrel (*Otospermophilus beecheyi*), deer mouse (*Peromyscus maniculatus*), common raven (*Corvus corax*), red-tailed hawk (*Buteo jamaicensis*), song sparrow (*Melospiza melodia*), loggerhead shrike (*Lanius ludovicianus*), turkey vulture (*Cathartes aura)*, sheep (*Ovis aries*), and western meadowlark (*Sturnella neglecta*) as shown in Attachment C. Tracks of small rodents, domestic dog, sheep, black-tailed jack rabbit, song sparrow, turkey vulture, and coyote were documented at the scent stations (Attachment D). A complete list of species that were detected at each station can be found in Attachment E.

Table 1: Wildlife Species Observed during Walking Transect Surveys

Common Name	Scientific Name
Birds	
American crow	*Corvus brachyrhynchos*
American kestrel	*Falco sparverius*
Barn owl	*Tyto alba*
Black phoebe	*Sayornis nigricans*
Common raven	*Corvus corax*
Eurasian-collared dove	*Streptopelia decaoct*
Great egret	*Ardea alba*
Horned lark	*Eremophila alpestris*
Killdeer	*Charadrius vociferous*
Loggerhead shrike	*Lanius ludovicianus*
Northern flicker	*Colaptes auratus*
Northern harrier	*Circus cyaneus*
Northern mockingbird	*Mimus polyglottos*
Red-tailed hawk	*Buteo jamaicensis*
Song sparrow	*Melospiza melodia*
Turkey vulture	*Cathartes aura*
Western meadowlark	*Sturnella neglecta*
White-crowned sparrow	*Zonotrichia leucophrys*
Western burrowing owl	*Athene cunicularia*
Mammals	
Black-tailed jack rabbit	*Lepus californicus*
Botta's pocket gopher	*Thomomys bottae*
California ground squirrel	*Otospermophilus beecheyi*
Deer mouse	*Peromyscus maniculatus*
Unidentified kangaroo rat	*Dipodomys* spp.
Western coyote	*Canis latrans*

6 – CONCLUSIONS

No SJKF were observed during any of the surveys and no dens with SJKF sign were detected during walking transects. The Property provides suitable foraging habitat and could serve as a corridor for SJKF movement. Based on relatively recent CNDDB sightings in the vicinity, it is possible that SJKF occurs in the vicinity of the Property.

SJKF is negatively affected by human activities such as habitat loss due to urbanization. Habitat fragmentation can be a threat to SJKF as changing habitat conditions can affect connectivity between existing local populations. It is unlikely that development of the Property will be associated with negative impacts to SJKF breeding areas, because appropriate dens were not present. Furthermore, habitat on the Property is unlikely to serve as potential SJKF breeding habitat, due to the sparse distribution of suitable mammal burrows and the presence of abundant coyotes, which are strong competitors and can also prey on SJKF.

Due to the potential for SJKF to use the Property for a movement corridor or limited foraging, detailed plans for avoidance and preventative measures for the SJKF are recommended prior to development of the Property.

7 – RECOMMENDED AVOIDANCE MEASURES

1. If feasible, restrict construction activities to begin after the peak dispersal season (June to July).
2. Prohibit the use of rodenticides on the Property.
3. Have a qualified biologist survey the Property using walking transects prior to the start of construction to identify whether SJKF have colonized the Property.
4. Install wildlife exclusion fencing around construction areas. Do not use Ertech™ fencing as it is detrimental to wildlife.

8 – LITERATURE CITED

Archon. 1992. Ecology of San Joaquin Kit Fox in Western Merced County, California. Master's Thesis. California State University, Fresno.

Bjurlin, C.D. 2004. Effects of roads on San Joaquin Kit Fox: A Review and Synthesis of Existing Data. *In*: Proceedings of the 2003 International Conference on Ecology and Transportation, Eds. Irwin CL, Garrett P, McDermott KP. Center for Transportation and the Environment, North Carolina State University, Raleigh, NC: pp. 397-406.

Briden, L.E., M. Archon, and D. L. Chesemor. 1992. Ecology of the San Joaquin Kit Fox in Western Merced County.

Clawson, W.J., N.K. McDougald, and D.A. Duncan. 1982. Guidelines for Residue Management on Annual Range. U.C. Div. Agr. Sci. Leaflet 21327.

Cypher, B.L. and K.A. Spencer. 1998. Competitive Interactions between Coyotes and San Joaquin Kit Fox. Journal of Mammalogy. 79(1):204-214.

Cypher, B.L. 2000. Effects of Roads on San Joaquin Kit Fox: A Review and Synthesis of Existing Data. Endangered Species Recovery Program, California State University, Fresno, California.

Edwards, S.W. 1992. Observations on the Prehistory and Ecology of Grazing in California. Fremontia, Vol. 20, No.1, pp.3-11.

Griggs, F.T. 2000. Vina Plains Preserve: Eighteen Years of Adaptive Management. Fremontia 27 (4) and 28(1): 48-51.

Hall, H.M. 1983. Status of the SJKF at the Bethany wind turbine generating (WTC) Property, Alameda County, California. California Department of Fish and Game, Sacramento, California.

Heady, H.F., T.E. Foin, M.M. Hektner, D.W. Taylor, M.G. Barbour, and W.J. Barry. 1977. Coastal prairie and northern coastal scrub. *In*: Barbour, M.G. and J. Major., Eds. Terrestrial Vegetation of California. New York, NY: Wiley Interscience. pp. 491-514.

Helix Environmental Planning. 2016. RE Scarlet Solar Project Early Evaluation Requirements for San Joaquin SJKF. June.

Jensen. 1972. San Joaquin Kit Fox distribution. U.S. Fish and Wildlife Service, Sacramento.

Koopman, M.E., J.H. Scrivner, and T.T. Kato. 1998. Patterns of Den Use by San Joaquin Kit Fox. Journal of Wildlife Management. 62(1) pp.373-379.

Koopman, M.E., B.L. Cypher, and J.H. Scrivner. 2000. Dispersal patterns of San Joaquin Lit Fox. Journal of Mammalogy. 81(1):213-222.

Menke, J.W. 1992. Grazing and Fire Management for Native Perennial Grass Restoration in California Grasslands. Fremontia, Vol. 20, No.2, pp.22-25.

Spencer, K.A., W.H. Berry, W.G. Standley, and T.P. O'Farrell. 1992. Reproduction of the San Joaquin Kit Fox on Camp Roberts Army National Guard Training Site, California. US Dept. Energy Topical Report EGG 10617-2154.

Spiegel, L.K. and J. Tom 1996. Reproduction of San Joaquin Kit Fox in Undeveloped and Oil-developed Habitats of Kern County, California. *In*: LK Spiegel (ed.) Studies of the San Joaquin Kit Fox in Undeveloped and Oil-developed Areas. California Energy Commission, Sacramento, California. Pp 53-69.

Tu, W., C. Hurd, and J.M. Randall. 2001. Weed Control Methods Handbook. The Nature Conservancy.

Warrick, G.D. and B.L. Cypher. 1998. Journal of Wildlife Management. 62(2) pp. 707-717.

U.S.D.A Forest Service. 1984. Range Analysis Handbook. Calif. Region. San Francisco, California.

U.S. Fish and Wildlife Service. 1999a. San Joaquin Kit Fox Survey Protocol for The Northern Range. June.

US Fish and Wildlife Service. 1999b. Standardized recommendations for the protection of the San Joaquin Kit Fox prior to or during ground disturbance. Sacramento Fish and Wildlife Office. June.

Attachment A: Approved SJKF Modified Protocol

Californian Environmental Services, Inc.
4127 Bay Street, Suite B
Fremont, CA 94538-4239
Phone: (925) 789-7459 Fax: (510) 573-2184

Project: RE Scarlet Solar Project

TO Stephen Stringer
HELIX
11 Natoma Street, Suite 155
Folsom, California 95630

June 27, 2016

RE: San Joaquin Kit Fox (*Vulpes macrotis mutica*) Survey-Proposed Methods

Dear Mr. Stringer,

At the request of HELIX Environmental Planning, Inc. (HELIX), Californian Environmental Services (CES) has prepared a Proposed San Joaquin Kit Fox (SJKF) Survey Plan for the RE Scarlet Solar Project site (Project Site) located in unincorporated Fresno County, California (Figure 1). Our understanding is that the Project Site is comprised of approximately 4,069 acres of active and recently fallow agricultural land, with associated unpaved farm roads and staging areas. There are no residences or other permanent structures in the Project site.

Based on the Habitat Assessment conducted by HELIX (HELIX June 2016), the entire Project Site provides low-quality habitat for SJKF. Ongoing and regular disking and other soil disturbance associated with historic and current agricultural activities regularly remove potential burrows in cultivated fields reducing the abundance of small mammal prey. Fallow fields potentially support small mammal prey such as voles (*Microtus* spp.) and gophers (*Thomomys bottae*); however, periodic and unpredictable tilling discourages development of suitable colonies of larger burrowing mammals such as California ground squirrels (*Otospermophilus beecheyi*). Ground squirrel burrows occur only along roads in the northeast portion of the Project Site.

METHODS

Due to the low-quality habitat and size of the Project Site, CES proposes to conduct a modified protocol SJKF survey based on the *U.S. Fish and Wildlife Service San Joaquin Kit Fox Survey Protocol for the Northern Range* (hereafter "Protocol"; USFWS 1999, Attachment A) - conditional upon approval from the USFWS. CES proposes to follow the modified protocol previously proposed and approved for the Tranquility Solar Project which is located adjacent to the proposed Project Site. The modified protocol consists of conducting walking transects and operating camera and scent stations over approximately 25 percent of the total Project Site; but does not implement nighttime spotlight surveys. This modified protocol is appropriate for the RE Scarlet Solar Project because the habitat conditions are similar to those at the Tranquility Solar Project and the sites are adjacent. No SJKF or sign were found during surveys conducted for the Tranquillity Solar Project and the protocol survey report for the Tranquillity Solar Project concluded that SJKF were unlikely to occur on the site due to poor habitat conditions and poor prey base.

Walking Transect Surveys: Four biologists will conduct walking transects at eleven 80-acre plots randomly placed throughout the Project Site, providing survey coverage of approximately one quarter of the total Project Site acreage (Figure 2). Randomization of plot location will be

completed using ArcMap. A grid will be generated over an aerial of the Project Site such that each block is 80 acres in size. Each block will be uniquely numbered and 11 blocks will be chosen using a random number generator. Polygons of each chosen block will be loaded into two Trimble GeoXT GPS units with sub-meter accuracy (one for each team) to ensure that the biologists can quickly and efficiently locate the survey blocks.

The biologists will survey each entire block by walking in tandem to ensure 100 percent visual coverage. During surveys, all dens of sufficient size (if present) will be flagged, measured, and mapped using two Trimble GeoXT GPS units. Evidence of potential prey (e.g., California ground squirrel or kangaroo rats (*Dipodomys* spp.)) will be noted. All SJKF sign (e.g., tracks, scat, prey remains), as well as sign of other special-status species, will be documented, if present.

Camera and Scent Stations: Camera and scent stations will be established following completion of the walking transect surveys. Two biologists will establish 12 to 15 camera and scent stations that will be operated for 15 consecutive days on the Project Site. Cameras will be spaced relatively evenly across the Project Site (Figure 2), with additional cameras placed at stormwater basins (if present). Cameras will be checked daily to ensure they were operating properly, to download photos, and to replenish bait at the scent stations. A variety of bait including canned cat and dog food will be used to attract animals. At the end of the survey effort all camera and scent station materials will be removed. Two biologists will conduct the camera and scent stations work for safety reasons.

Scent stations will consist of 3' X 3' aluminum track sheets coated with contact paper and dusted with carpenter's chalk. Bait will consist of canned cat food and placed in the middle of the track plate. Camera and track plates will be inspected each morning and bait and tracking medium replaced daily.

PERSONNEL

Senior personnel will consist of Mr. Jeff Alvarez, Ms. Sarah Foster, Ms. Maya Khosla and/or Ms. Molly Goble. All of these biologists have extensive experience conducting protocol SJKF surveys. Mr. Joshua Goodwin, Mr. Ryan Witthaus, Ms. Jennifer Gonterman, Mr. Will Molland-Simms, and/or Mr. Kyle Walters will provide assistance to the senior biologists. All resumes are provided in Attachment B.

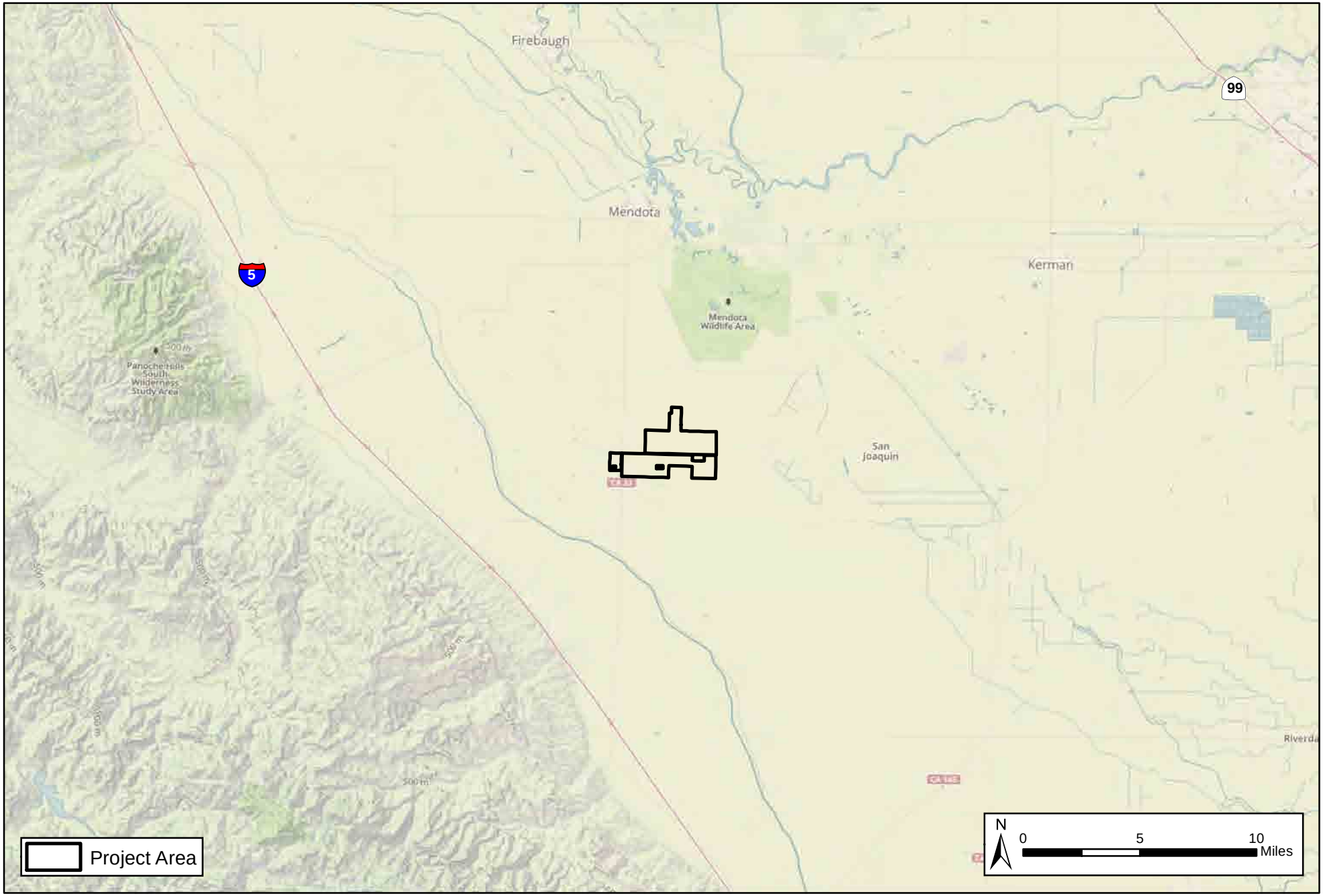
Sincerely,

Gretchen Padgett-Flohr

Dr. Gretchen Padgett-Flohr

Certified Wildlife Biologist

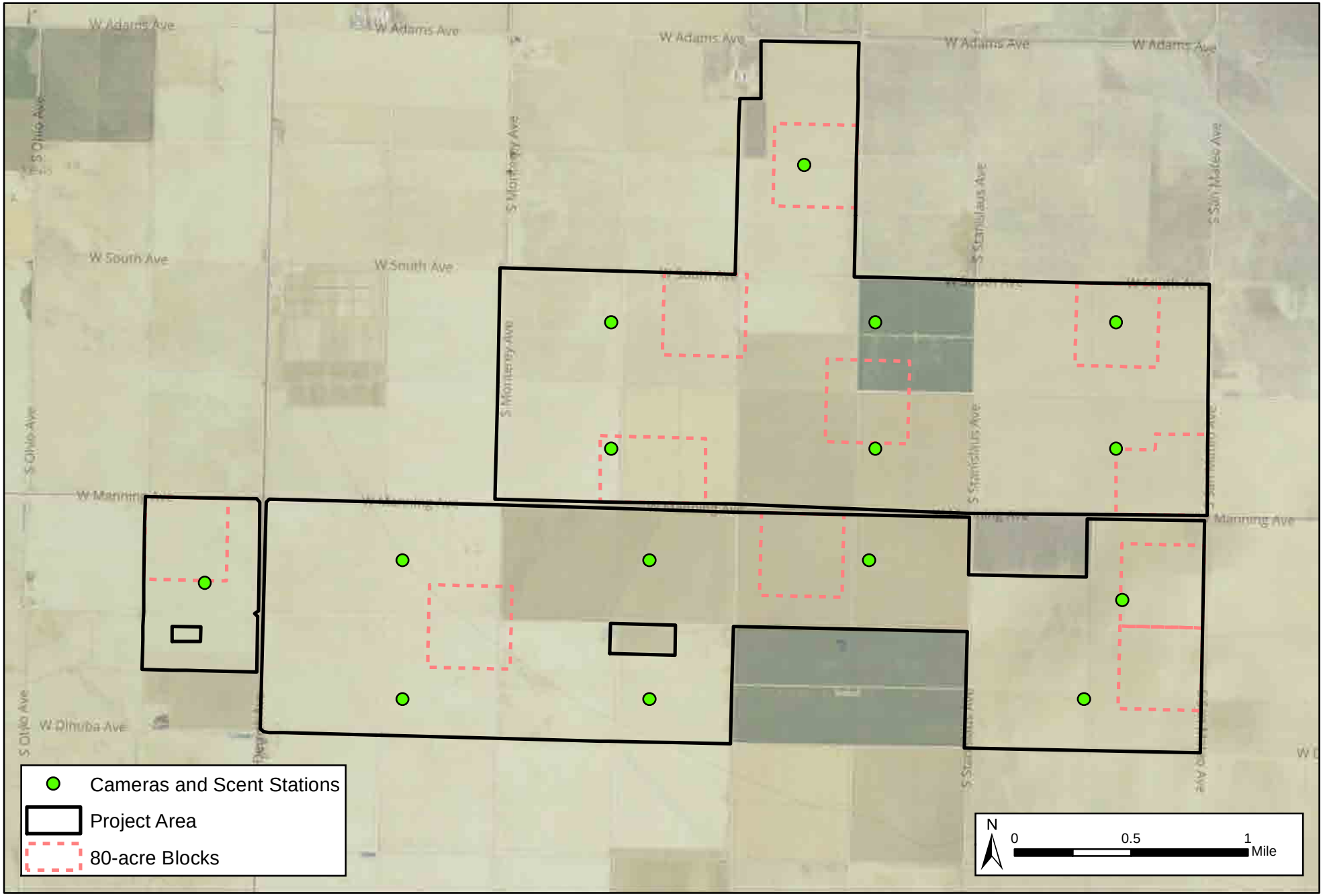
President, Californian Environmental Services



Californian Environmental Services, Inc.

4127 Bay Street, Ste. B
Fremont, CA 94538

Figure 1: Vicinity Map
San Joaquin Kit Fox Survey
RE Scarlet Solar Project



Californian Environmental Services, Inc.

4127 Bay Street, Ste. B
Fremont, CA 94538

Figure 2: Camera and Scent Station Locations
San Joaquin Kit Fox Survey
RE Scarlet Solar Project

Attachment B: Representative Site Photographs

Representative Site Photographs

Photograph 1:

Active alfalfa field at the Scarlet Property

September 19, 2016.

Photograph 2:

Fallow agricultural field with ruderal vegetation the Scarlet Property. Photo from transect block 7.

September 19, 2016.

Photographs Continued

Photograph 3:

Plowed field at Scarlet Property. Photo from transect block 9.

September 19, 2016.

Photograph 4:

Harvested wheat field at Scarlet Property. Phot from transect block 1.

September 20, 2016.

Photographs Continued

Photograph 5:

Unutilized pasture lands on the Scarlet Property. Photo from transect block 2.

September 21, 2016.

Photograph 6:

Roadway along norther boundary of Scarlet Property. Photo at camera station 11079.

September 19, 2016.

Photographs Continued

Photograph 7:

Typical small mammal burrow found near Manning Avenue on the Scarlet Property.

September 20, 2016.

Photograph 8:

Burrow B02 on the Scarlet Property.

September 20, 2016.

Attachment C: Representative Camera Station Photographs

Representative Camera Station Photographs:

Photograph 1:

September 30, 2016

Coyotes at Camera Station 11075.

Photograph 2:

September 21, 2016

California ground squirrel at Camera Station 11092.

Photographs Continued

Photograph 3:

September 23, 2016.

Black-tailed jackrabbit, camera station 0000.

Photograph 4:

September 24, 2016.

Deer mouse with perched owl in the background, camera station 11092.

Photographs Continued

Photograph 5:

September 23, 2016.

American raven, camera station 11084.

Photograph 6:

September 24, 2016.

Loggerhead shrike and California ground squirrel, camera station 11092.

Photographs Continued

Photograph 7:

September 24, 2016.

Turkey vulture, camera station 11075.

Photograph 8:

September 25, 2016.

Song sparrow, camera station 11075.

Photographs Continued

Photograph 9:

September 24, 2016.

Domestic dog, camera station 0000.

Photograph 10:

September 28, 2016.

Sheep, camera station 11079.

Photographs Continued

Photograph 11:

September 30, 2016.

Kangaroo rat, camera station 11106.

Photograph 12:

September 30, 2016.

Red-tailed hawk, camera station 11098.

Photographs Continued

Photograph 13:

October 1, 2016.

Western meadowlark, camera station 11106.

Photograph 14:

October 2, 2016.

Representative camera station picture. Camera station 11109.

Attachment D: Representative Track Station Photographs

Representative Track Station Photographs:

Photograph 1:

September 21, 2016

Representative track plate photo. Track plate 11095.

Photograph 2:

October 2, 2016

Coyote tracks at track station 11061.

Photographs Continued

Photograph 3:

October 2, 2016.

Mouse tracks, track station 11098.

Photograph 4:

October 1, 2016.

Black-tailed jackrabbit tracks, track station 0000.

Photographs Continued

Photograph 5:

October 2, 2016.

Turkey Vulture tracks, track station 11084.

Photograph 6:

September 26, 2016.

Raven tracks, track station 11075.

Photographs Continued

Photograph 7:

October 3, 2016.

Kangaroo rat tracks (from left to right at bottom), track station 11106.

Photograph 8:

September 22, 2016.

Track plate becoming airborne in high winds, track station 11098.

Attachment E: Species List

Species	Camera Station Number																			
	000	061	062	075	077	079	084	090	092	093	095	098	100	102	106	108	109	072[1]	097	107
Ground squirrel									x						x					
Jackrabbit	x			x													x			
Loggerhead shrike									x								x			
Turkey vulture (photo and/or track)				x		x	x													
Peromyscus spp. (tracks)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
Peromyscus spp. (photo)				x					x				x							
Coyote (photo and/or tracks)	x	x	x	x	x	x		x			x			x						
Kangaroo rat (*Dipodomys* spp.)									x						x			x	x	x
Raven (photo and/or tracks)		x	x	x		x	x			x	x	x	x	x						
Domestic dog	x																			
Song sparrow				x																
Sheep						x														
Barn owl (not confirmed)									x											
Red-tailed hawk												x								
Western meadowlark															x					

[1] Cameras marked in red were set up the final three nights (October 4-6) at potential kangaroo rat sightings.

Appendix I

Habitat Assessment Report and Live Trapping Survey Report for Kangaroo Rat

HELIX Environmental Planning, Inc.
11 Natoma Street, Suite 155
Folsom, CA 95630
916.365.8700
www.**helixepi**.com

November 4, 2016

Ms. Marisa Mitchell
Senior Manager, Site Development
Recurrent Energy
300 California Street, 7th Floor
San Francisco, CA 94104

RE: Habitat Assessment for Special-Status Kangaroo Rats
RE Scarlet Solar Project, Fresno County, California

On behalf of RE Scarlet LLC, HELIX Environmental Planning, Inc. (HELIX) conducted a habitat assessment for special-status kangaroo rats on the approximately 4,000-acre site of the proposed RE Scarlet Solar Project in western Fresno County, near the town of Tranquillity, California. The site is the location of a proposed 400 Megawatt utility-scale solar photovoltaic generating facility. This habitat assessment was conducted in response to kangaroo rat sightings on the project site during protocol surveys for San Joaquin kit fox (*Vulpes macrotis mutica*).

INTRODUCTION

The site is in unincorporated Fresno County, 29 miles west of Fresno. The Fresno County Development Services Division is processing a Conditional Use Permit for the proposed project, which requires analysis of potential environmental impacts, including to species listed as threatened or endangered by the U.S. Fish and Wildlife Service, in accordance with the California Environmental Quality Act (CEQA).

The habitat assessment described in this report was undertaken to determine the potential for special-status kangaroo rats to inhabit the proposed project site. Project impacts to any federally-listed threatened or endangered kangaroo rat habitat or potential for take of individual animals would trigger consultation with the U.S. Fish and Wildlife Service under Section 10 of the Endangered Species Act of 1973 (16 U.S.C. § 1531 *et seq*.). This report describes the methods used to conduct the habitat assessment and summarizes the findings. Supplemental information provided with this habitat assessment includes maps and graphics (**Attachment A**) and site photographs (**Attachment B**).

BACKGROUND

Two federally-listed as endangered kangaroo rats were determined to have the potential to occur in the project region: giant kangaroo rat and Fresno kangaroo rat. These species are discussed in the following paragraphs. Information in this section is from U.S. Fish and Wildlife publications (USFWS 1987, 1998, 2016).

Giant kangaroo rat was listed as "Endangered" on January 5, 1987 under the Endangered Species Act of 1973. Potential threats to giant kangaroo rat include rodenticides used to control ground squirrels, and recreation (USFWS 1987).

Fresno kangaroo rat was listed as "Endangered" under the Endangered Species Act of 1973 (16 U.S.C. 1531-1544) on January 30, 1985 (50 FR 4222-4226) and Critical Habitat was designated.

Kangaroo rats are small mammals adapted for survival in arid environments, inhabiting dry, open country in southwestern North America. Kangaroo rats hop on their elongated hind legs, carry seeds in external cheek pouches, and cache seeds in shallow burrows. The giant kangaroo rat is the heaviest species of kangaroo rat, weighing 4.8 to 6.4 ounces. Total length is 12.2 – 13.7 inches, including a 6.2 – 7.8 inch tail. Giant kangaroo rats forage above ground at night, for as little as 20 minutes per night, within an area of approximately one-third of an acre (USFWS 1987). Giant kangaroo rats are associated with several other state- and federally-listed species that share their general habitat affinities, including San Joaquin kit fox (*Vulpes macrotis mutica*), blunt-nosed leopard lizard (*Gambelia sila*), San Joaquin antelope squirrel (*Ammospermophilus nelsoni*), and California jewelflower (*Caulanthus californicus*; USFWS 2016).

The historic range of giant kangaroo rat was the Central Valley from the foot of the Tehachapi Mountains to Los Banos, and the Carrizo Plain and San Juan Creek watershed west of the Temblor Range. The species is currently fragmented into 6 major population units: (1) the Ciervo-Panoche Hills in Fresno and San Benito counties; (2) the Kettleman Hills in Kings County; (3) San Juan Creek Valley in San Luis Obispo County; (4) the Elk Hills area near McKittrick, Maricopa, and Taft; (5) Carrizo Plain, and; (6) the Cuyama Valley in Santa Barbara and San Luis Obispo counties (USFWS 1998).

Habitat for giant kangaroo rat is arid grasslands with few or no shrubs, sandy-loam soils, and gentle slopes (USFWS 1998). Giant kangaroo rat burrows are generally shallow (less than 12-inches below ground). The project site is within the historic range of the species, but no longer supports grassland habitat. The giant kangaroo rat population center in the Ciervo-Panoche Hills is west and southwest of the project site, west of Interstate-5. The project site separated from this population center by Interstate-5, the California Aqueduct, and a minimum of 7.5 miles of agricultural land.

Fresno kangaroo rat is historically found in the southern San Joaquin Valley between the Merced River and Tulare Lake, as far west as Fresno Slough. Fresno kangaroo rat is no longer known from its historic range, and there are no confirmed extant populations.

PROJECT LOCATION AND EXISTING CONDITIONS

The project site is located in western Fresno County, 4 miles southwest of the town of Tranquillity and 6.6 miles east of Interstate-5 (**Attachment A – Figure 1**). The project site lies on both sides of West Manning Avenue, east of South Derrick Avenue (State Route 33) and west of South San Mateo Avenue. The northernmost boundary of the Project site is West South Avenue, and the southernmost boundary is West Dinuba Avenue (**Attachment A – Figure 2**).

The site is on the floor of the San Joaquin Valley, and terrain in the site is flat and level, draining naturally to the north at a very shallow gradient. There is no topographic relief in the site; existing relief consists of shallow, temporary drains constructed along the edges of irrigated fields. Elevations in the site range from roughly 170 to 210 feet above mean sea level. The entire site is actively used for agricultural activities including irrigated and non-irrigated agriculture, and stock grazing. All portions of the site are periodically disked, mowed, grazed, or planted; there are no permanently undisturbed areas in the site.

METHODS

HELIX Senior Biologist George Aldridge, Ph.D. conducted a focused assessment of habitats within and adjacent to the project site on October 6, 2016. The assessment included visual inspection of the entire perimeter of the site and all fields that were not either in active cultivation or disked at the time. The focus of the survey was soils and vegetation supporting small burrows and dust-bath areas consistent with kangaroo rat occupancy. Typical kangaroo rat burrows are 2-3 inches in diameter, on level ground, with a prominent clearing around the burrow entrance, and characteristic paired large hind-foot prints and tail drag marks. Photos are provided in **Attachment B**.

RESULTS

The site and adjacent area lacks native habitats such as grasslands that could support special-status kangaroo rats. The entire site is comprised of agricultural land. At the time of the survey, most of the site was either recently disked fields or active alfalfa fields (**Attachment A – Figure 3**). Disked fields were disked up to the bordering dirt roads, without any margin of undisturbed soil. The only portion of the site that had not been recently plowed or was not irrigated alfalfa was south and east of the intersection of South Avenue and Monterey Avenue. This portion of the site consisted of 3 fields, 2 of which supported patches of dense Russian thistle (*Salsola tragus*) separated by open areas of non-native grasses and tumble mustard (*Sisymbrium altissimum*), and 1 field that had been recently grazed by sheep then mowed. The latter field had undisturbed soils only along the southern edge. These three

fields in the northwest corner of the project site contained kangaroo rat burrows; however, this type of habitat would not likely be used by special-status kangaroo rats (**Attachment A – Figure 3**).

All lands surrounding the project site south of West Manning Avenue are also actively farmed and had been recently disked at the time of the survey. Lands surrounding the project site to the north are largely fallow and appear to be less intensively farmed than the project site. These fields supported kangaroo rat burrows along the dirt roads separating them from the project site. Most of the land in the project site adjacent to this off-site suitable habitat had been disked and provided no potential foraging habitat for kangaroo rats living off-site.

SUMMARY/CONCLUSION

The site is not believed to contain suitable habitat for giant kangaroo rat or Fresno kangaroo rat. The project site is separated from the nearest known population of giant kangaroo rat by at least 7 miles of agricultural land, a freeway, and the California Aqueduct. Fresno kangaroo rat is not currently known to occur in the region.

The entire project site is currently or recently active agricultural land; there is no remnant grassland habitat that could support giant kangaroo rat or Fresno kangaroo rat, and no nearby suitable habitat from which these species could colonize fallow land in the site. However, kangaroo rat burrows were observed on the site during the habitat assessment. Identification of kangaroo rat to species requires live trapping to look at specific morphological characteristics. Therefore, live trapping surveys are recommended within areas of suitable habitat as a precautionary measure to determine which species of kangaroo rat(s) are present on the site. The majority of the project site does not provide habitat for kangaroo rat, therefore live trapping surveys should be targeted to areas where kangaroo rat burrows were observed.

Feel free to contact me by phone at (916) 365-8700 or by email at StephenS@helixepi.com if you have any questions.

Sincerely,

Stephen Stringer

Stephen Stringer, M.S.
Senior Biologist

Attachments:

Attachment A - Figures

- Figure 1. Project Location Map
- Figure 2. Project Vicinity Map
- Figure 3. Kangaroo Rat Habitat

Attachment B – Site Photographs

References:

U.S. Fish and Wildlife Service (USFWS). 1987. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Giant Kangaroo Rat. Federal Register, Vol. 52, No. 2, January 5, 1987.

_____. 1998. Recovery Plan for the Upland Species of the San Joaquin Valley, California. U.S. Fish and Wildlife Service, Portland, OR.

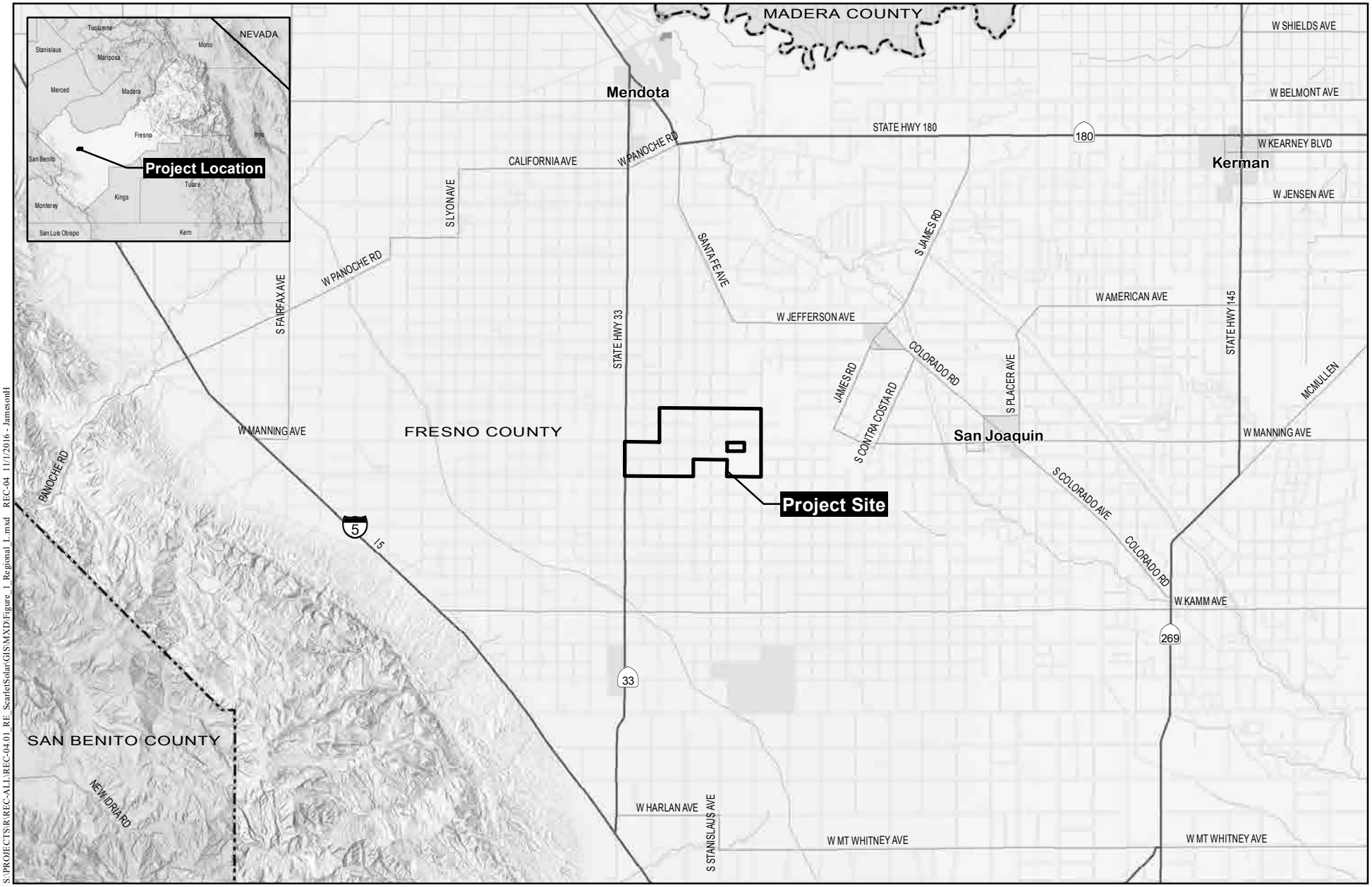
_____. 2016. Species Profile for Giant Kangaroo Rat (*Dipodomys ingens*), Environmental Conservation Online System. Available at: http://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A08P.

Attachment A

Project Location Map

Project Vicinity Map

Kangaroo Rat Habitat



S:\PROJECTS\R\REC-ALL\REC-04\01_RE_ScarletSolar\GIS\MXD\Figure_1_Regional_L.mxd REC-04 11/1/2016 - Jamesonf

Regional Location Map

RE SCARLET SOLAR PROJECT
FESNO COUNTY, CA

Figure 1

HELIX Environmental Planning

N 0 5 Miles 1 inch = 5 miles

S:\PROJECTS\R\REC-ALL\REC-04.01_RE_ScarletSolarGIS\MXD\Figure_2_Aerial_20160718.mxd REC-04 11/1/2016 - JamesonH

Site Location Map

RE SCARLET SOLAR PROJECT
FESNO COUNTY, CA

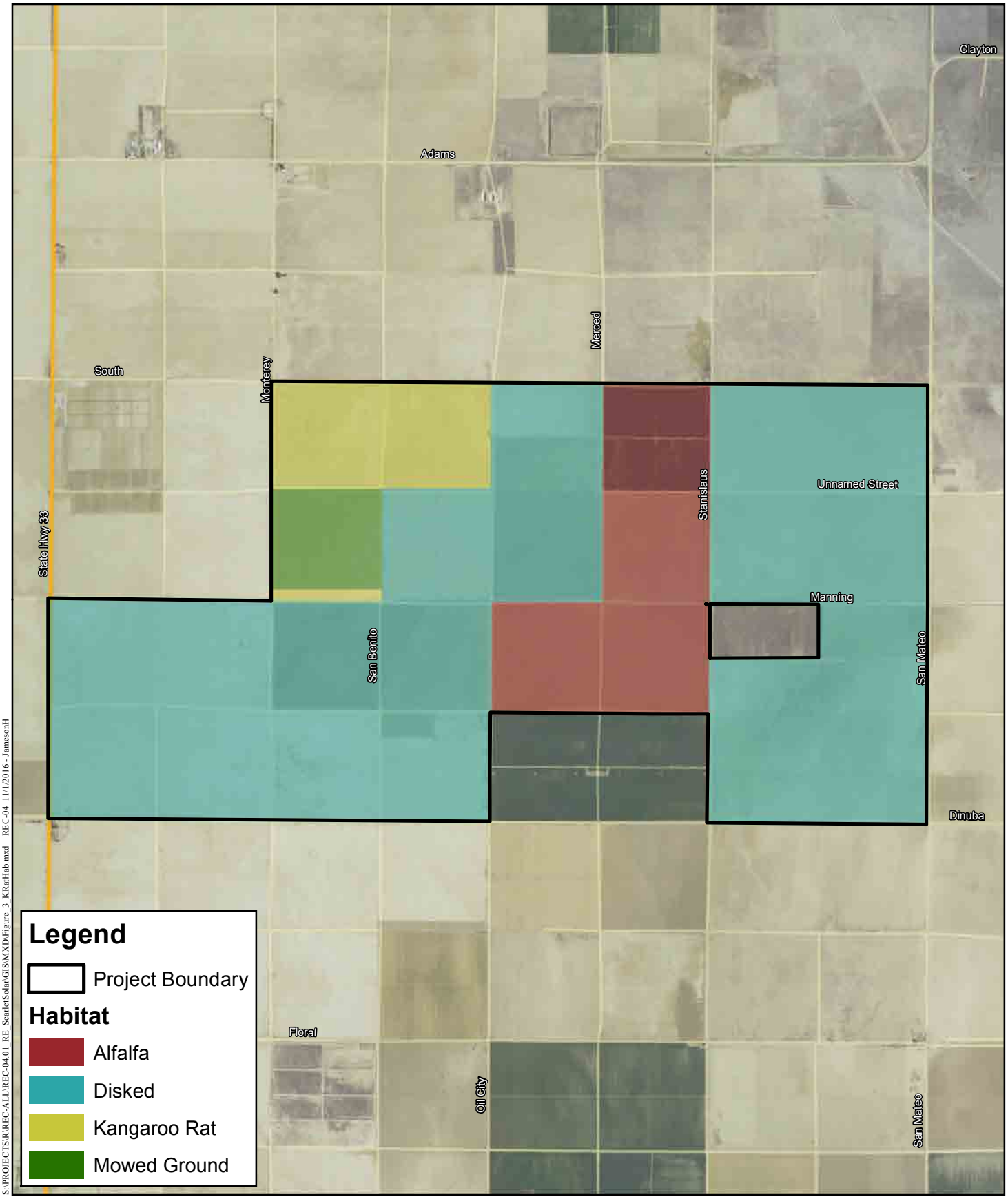
HELIX Environmental Planning

N

0 4,000 Feet

1 inch = 4,000 feet

Figure 2



S:\PROJECTS\R\REC-ALL\REC-04.01_RE_ScarletSolarGIS\MXD\Figure_3_KRatHab.mxd REC-04 11/1/2016 - JamesonH

Kangaroo Rat Habitat

RE SCARLET SOLAR PROJECT
FRESNO COUNTY, CA

HELIX Environmental Planning

N 0 4,000 Feet 1 inch = 4,000 feet

Figure 3

Attachment B

Site Photos

Photo 1. Typical kangaroo rat burrow.

Photo 2. Typical view of the Project site south of Manning Avenue.

Photo 3. Disked and fallow fields north of Manning Avenue.

Photo 4. Fallow field in the northwest corner of the project site.

RE Scarlet Property: Special-status Kangaroo Rat Live-trapping Survey Report

Merriam's Kangaroo rat (*Dipodomys merriami*)

Prepared by:

Halstead & Associates
296 Burgan Avenue
Clovis, CA 93611
(559) 298-2334

and

Californian Environmental Services
4127 Bay Street, Suite B
Fremont, CA 94538
(925) 789-7459

Prepared For:
HELIX Environmental Planning
11 Natoma Street
Folsom, CA 95630
(916) 365-8700

NOVEMBER 2016

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ATTACHMENTS

List of Abbreviations and Acronyms

CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CES	Californian Environmental Services
CNDDB	California Natural Diversity Database
GIS	Geographic Information System
GPS	Global Positioning System
US	United States
USFWS	United States Fish and Wildlife Service

All photographs were taken by Halstead & Associates.

1 – INTRODUCTION

At the request of Helix Environmental Planning Inc. (HELIX), biologists from Californian Environmental Services (CES) and Halstead & Associates (Halstead) conducted protocol live-trapping studies for kangaroo rat at the RE Scarlet Solar Property (Property), located approximately 10 miles west of San Joaquin, Fresno County, California. The intended use of the Property is for development of a solar photovoltaic generating facility (project). The project would entail installation of solar panels across the Property and fencing the outer perimeter. Previous reports for the Property (HELIX 2016) provided detailed property descriptions and associated mapping. During survey work for San Joaquin kit fox (*Vulpes macrotis mutica*) in September 2016, CES captured unidentified kangaroo rats (*Dipodomys* spp.) on camera stations and observed a few kangaroo rat burrows with evidence of footprints and tail-drags at two areas in the approximately 4,000-acre Property. The purpose of this current survey was to identify the species and/or subspecies of kangaroo rat occurring in these areas.

This report presents the results of protocol surveys conducted in October 2016 to determine if special-status kangaroo rats are present on the Property; specifically, the Fresno kangaroo rat (*Dipodomys nitratoides exilis*), a federal and state endangered subspecies whose historic range overlaps the Property. Protocol surveys methods [United States (US) Fish and Wildlife Service] (USFWS 2013) were conducted for five-nights. No Fresno kangaroo rat or other special-status kangaroo rats were found on the Property. Twenty-four Heermann's kangaroo rats (ubiquitous species with no special-status designation), 52 house mice (*Mus musculus*), and 80 deer mice (*Peromyscus maniculatus*), were captured during 470 trap-nights of effort. We, therefore, conclude that the project will not cause negative direct, indirect, or cumulative adverse impacts to the Fresno kangaroo rat or other special-status kangaroo rats or their habitat, and that no mitigation is needed or required for Fresno kangaroo rat or other special-status kangaroo rats.

2 – PROPERTY DESCRIPTION

2.1 LOCATION

The Property is approximately 4,000 acres in size and is comprised of active and recently fallow agricultural lands, with associated unpaved farm roads and staging areas. The Property is located in unincorporated Fresno County approximately 1 mile east of the unincorporated town of Levis, California. Figure 1 illustrates the Property in relation to its vicinity, which is partially located within the Tranquility, Levis, and Cantua Creek USGS 7.5 Minute Quadrangle Maps (quad), with the majority (90 percent) of the property in the Cantua Creek quad. The town of Levis is located less than 1 mile west of the Property, and Highway 33 forms the western boundary.

The Property is approximately 4.0 miles in width from east to west and approximately 2.0 miles in length from north to south with some variation in shape and size as shown in Figure 2. West Manning Avenue runs east-west bisecting the Property into approximately equal portions to the north and south. The Property boundary is approximately 3.35 miles north of the California

Aqueduct on Highway 33, with the foothills to Monocline Ridge approximately 6.3 miles to the southwest.

2.2 PROPERTY DESCRIPTION

The Property is located in a part of the southern San Joaquin Valley floor that drains the San Joaquin River Watershed. Land within the Property slopes gradually from west to east and the property can be divided into three separate and irregularly shaped blocks of agricultural and fallow fields bordered by access roads.

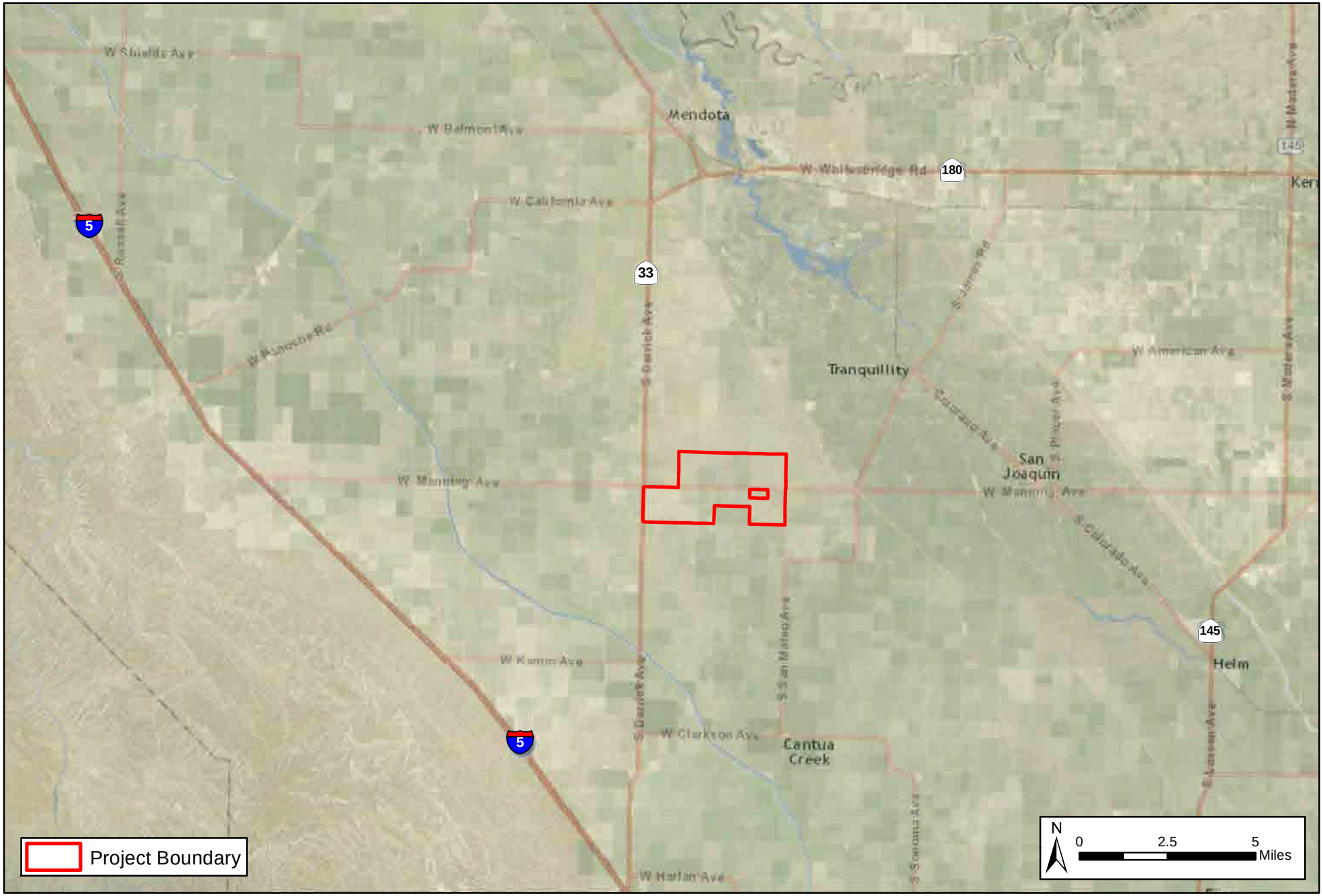
The majority of the Property is unsuitable habitat for kangaroo rat, because it is in active agricultural use (HELIX 2016). Ongoing and regular disking and other soil disturbance associated with historic and current agricultural activities preclude the establishment of permanent burrows in cultivated fields. Fallow fields provide some potential for establishment of semi-permanent burrows by small mammals; however, fallow fields are subjected to periodic and unpredictable tilling or disking as well (as experienced during the protocol surveys when 30 traps were lost on the last night due to disking).

Habitats present within the Property include active and fallow agricultural fields and patches of ruderal habitat along the perimeters of the Property and road ways. The Property has historically been used for agricultural crop production, and there is evidence of recent agricultural activity, including alfalfa (*Medicago sativa*), tomato (*Solanum ssp*.), yellow onion (*Allium ssp*.), and the stubble remains of wheat (*Triticum aestivum*) crops. Predominant vegetation on uncultivated portions of the Property is largely composed of non-native species including, but not limited to, Russian thistle (*Salsola kali*), saltscale (*Atriplex serenana var. serenana*), alkali mallow (*Malvella leprosa*), and wild lettuce (*Lactuca serriola*). At the time of the kangaroo rat surveys, much of the Property was not in cultivation, though portions of the Property were being actively grazed by herds of sheep and had active alfalfa crops.

2.3 REGULATORY FRAMEWORK

The California Environmental Quality Act (CEQA) is a California State law created to inform governmental decision-makers and the public about the potential environmental effects of proposed activities and to reduce negative impacts. Project proponents are required under CEQA to disclose, consider, and avoid or reduce significant effects to endangered, threatened and rare species. Significant effects are identified in Appendix G of CEQA Guidelines as those that will:

- Substantially affect an endangered or rare animal or plant or its habitat;
- Interfere substantially with the movement of any resident or migratory fish or wildlife species; or
- Substantially diminish habitat for fish, wildlife, or plants.



Californian Environmental Services, Inc.

4127 Bay Street, Ste. B
Fremont, CA 94538

Figure 1: Vicinity Map
Special-status Kangaroo Rat Survey
RE Scarlet Solar Project

Californian Environmental Services, Inc.
4127 Bay Street, Ste. B
Fremont, CA 94538

Figure 2: Live-trapping Station Locations
Special-status Kangaroo Rat Survey
RE Scarlet Solar Project

CEQA Guidelines (California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387) are the regulations that explain and interpret CEQA for both the public agencies required to administer CEQA and for the public generally. The Guidelines provide objectives, criteria and procedures for the orderly evaluation of projects and the preparation of environmental impact reports, negative declarations, and mitigated negative declarations by public agencies. As such, they incorporate and interpret both the statutory mandates of CEQA and the principles advanced by judicial decisions. Regarding endangered, rare, or threatened species, Sections 15380(b), (c) and (d) of the CEQA Guidelines state that:

(b) A species of animal or plant is:

(1) "Endangered" when its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, disease, or other factors; or

(2) "Rare" when either:

(A) The species exists in such small numbers throughout all or a portion of its range that it may become endangered if its environment worsens; or

(B) The species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range and may be considered "Threatened" as that term is used in the Federal Endangered Species Act.

(c) A species shall be presumed to be endangered, rare or threatened, as it is listed in:

(1) Sections 670.2 or 670.5, Title 14, California Code of Regulations; or

(2) Title 50, Code of Federal Regulations §17.11 or 17.12 pursuant to the Federal Endangered Species Act as rare, threatened, or endangered.

(d) A species not included in any listing identified in subdivision (c) shall nevertheless be considered to be endangered, rare or threatened, if the species can be shown to meet the criteria in subdivision (b).

3 – FRESNO KANGAROO RAT

3.1 CONSERVATION STATUS

Fresno kangaroo rat was listed by the State of California as Rare on June 27, 1971 (Title 14, Calif. Admin. Code, § 670.5). This designation was subsequently upgraded to Endangered status on October 2, 1980 (Title 14, Calif. Admin. Code, § 670.5). Fresno kangaroo rat was designated as a federally-listed Endangered species on January 30, 1985.

3.2 SPECIES BIOLOGY

Fresno kangaroo rat is one of three subspecies of the San Joaquin kangaroo rat (*Dipodomys nitratoides*) endemic to the state of California. The historic range of Fresno kangaroo rat extended from north-central Merced County, south through southwestern Madera and central

Fresno counties. Fresno kangaroo rat occupies alkali sink, chenopod shrub, and valley and foothill grassland habitats typically between 200 and 300 feet in elevation. In this habitat, the terrain is level to gently sloping and consists of alkaline clay-based soils subject to seasonal flooding.

Fresno kangaroo rat is the smallest of the three subspecies of the San Joaquin kangaroo rat, with a total length of approximately 8.9 inches - including an approximately 4.9-inch tail. Adults weigh approximately 1.2 ounces. Fresno kangaroo rat has a dark yellowish-buff dorsum and white venter with a white stripe extending along the flanks and the sides of the tufted tail. San Joaquin and Merriam's (*Dipodomys merriami*) kangaroo rats are the only taxa that have four toes on the hind foot, whereas other similar species have five toes on the hind foot. All kangaroo rats have specialized hind limbs for hopping locomotion, a long, tufted tail for balance, a short neck, and a comparatively large head with external cheek pouches for transport of the primary food items, grass and forb seeds, to underground burrow systems. Kangaroo rats are adapted to arid environments having evolved efficient kidneys that maximize retention of water such that animals seldom require moisture in the form of free water, obtaining what they require from the foods they eat.

Various studies have provided some population density information relative to this subspecies. Population densities near Kerman, Fresno County for example, range from 2.0 to 6.8 individuals per acre of grazed and un-grazed habitat. Other studies have yielded Fresno kangaroo rat population densities ranging from 0.4 per acre to 20.2 per acre.

Loss of habitat and subsequent extirpation of resident Fresno kangaroo rat populations, due to agricultural conversion of native habitats, is the principal cause of mortality and population decline of this subspecies. Estimates calculate that between 1974 and 1982 alone, habitat acreage decreased from 14,618 to 10,353 acres. Early research on this subspecies showed that Fresno kangaroo rat populations could be exterminated by agricultural cultivation activities.

Approximately 932 acres of habitat is preserved for this subspecies on the Alkali Sink Ecological Reserve in Fresno County and approximately 1,800 acres of habitat is preserved on the nearby Kerman Ecological Reserve. Although existing preserves are promising for the survival of the subspecies, many more acres will be necessary to ensure population viability of Fresno kangaroo rat on public lands. Research estimates that approximately 167 acres of Alkali Sink Ecological Reserve habitat can support 394 to 662 individuals; however, recent CDFW-funded surveys have failed to locate extant populations on these lands. Review of existing management programs may be necessary to re-establish viable populations in suitable habitat. To ensure genetic fitness of a population, additional blocks of suitable habitat consisting of 800 to 2,800 acres will be required for reserves. Securing additional reserves of sufficient size is a primary goal for the recovery strategy for this subspecies.

4 – METHODS

4.0 BACKGROUND RESEARCH

The Property occurs within the historic range of Fresno kangaroo rat in Fresno County, California. Prior to the initiation of field surveys, CES and Halstead biologists conducted a query of the California Natural Diversity Data Base (CNDDB). Documented occurrences of Fresno kangaroo rat were accessed by searching the CNDDB database records to include all Fresno kangaroo rat occurrences within a 10-mile radius of the Property.

4.1 LIVE-TRAPPING SURVEYS

Trapping activities were conducted under J. A. Halstead's USFWS Recovery Permit #TE769304-9 and CDFW Scientific Collecting Permit #SC-001100, and Andrew Roberts' CDFW Scientific Collecting Permit #SC-11954, as well as CDFW Memorandum of Understanding for Endangered Kangaroo Rats (April 2011). A Request for Permission to Live-trap was submitted to USFWS on September 29, 2016 and was subsequently approved October 7, 2016 (Sarah Markegard, USFWS); this correspondence is provided in Attachment A.

Live-trapping for Fresno kangaroo rat followed the *Survey Protocol for Determining Presence of San Joaquin Kangaroo Rats* (Protocol; USFWS 2013). Ten stations were established consisting of 10 traps per station on an approximately 100-acre area on the Property in the areas where kangaroo rats, sign, tracks, and/or burrows had been previously observed (Figure 2). The location of each trap and station was recorded using a Global Positioning System unit (GPS) and each station was marked in the field with a flagged post displaying signage indicating that a field study was in progress. The 100 traps were baited with a bird seed mixture and provided with material for nesting and/or shredding. Traps were set approximately one hour before sunset and checked approximately one hour before sunrise for five nights beginning the evening of October 23, 2016.

All animals captured were photographed, identified to species, weighed and assessed for sex and reproductive status. Hind feet of all kangaroo rats were measured and examined for number of toes present. All data were recorded on field forms which are provided in Attachment B. In addition, the weather forecast and moon phase were checked daily prior to and during the survey to ensure that weather conditions were within those specified in the USFWS Protocol (2013). Daily temperature measurements and weather conditions were also recorded each day on the field data sheets provided in Attachment B. Representative photographs of species captured and trap stations are provided in Attachment C.

5 – RESULTS

5.0 BACKGROUND RESEARCH

Six Fresno kangaroo rat occurrences have been documented between 1934 and 2003 within 14 miles of the Property, two of which (Occurrences # 1 and 4) are believed to possibly have been

extirpated. The remining four occurrences were all documented 10.2 to 13.7 miles from the Property (Figure 3).

5.1 LIVE-TRAPPING SURVEYS

One hundred traps were operated beginning the evening of October 23, 2016. Trap setting for Night #4 (October 28,2016) was delayed due to rain forecasts and heavy rainfall and was rescheduled and conducted on October 29, 2016. Upon returning to set traps on Night #5, Halstead biologists discovered that three stations with a total of 30 traps had been disked and destroyed. Thus, only 70 traps were set on Night #5 for a total of 470 traps-nights for the entire five-day survey.

No Fresno kangaroo rats or other special-status kangaroo rat species or subspecies were captured during the 470 trap-nights of trapping. All captured kangaroo rats displayed five toes on the hind feet. A total of 191 small mammals were captured including 54 Heermann's kangaroo rats, 55 house mice, and 82 deer mice. Table 1 provides daily captures and Table 2 provides captures by trap station.

Table 1: Daily Captures During Live-trapping Survey Efforts

Date	# of Traps	Fresno kangaroo rat	Heermann's Kangaroo Rat	House Mouse	Deer Mouse	Total Captures
10/24/16	100	0	11	13	7	31
10/25/16	100	0	8	16	13	37
10/26/16	100	0	11	10	17	38
10/27/16	100	0	11	9	24	44
10/29/16	70[1]	0	13	7	21	41
TOTAL	**470**	**0**	**54**	**55**	**82**	**191**

Table 2: Daily Captures by Trap Station

Station #	# of Traps	10/24/16	10/25/16	10/26/16	10/27/16	10/29/16	TOTAL
1	10	4HKR 2HM	1HM	2HKR 2HM 1DM	1HKR 2HM 2DM	4HKR 2HM 2DM	25
2	10	3HM 2DM	7HM	1HKR 4HM 1DM	4HM 1DM	3HKR 3HM 2DM	31
3	10	1HKR 3HM 1DM	1HKR 3HM 2DM	2HM 1DM	2HM 4DM	1HKR 1HM 2DM	24
4	10	2HKR 3HM 1DM	3HKR 2HM 3DM	2HKR 4DM	2HKR 3DM	3HKR 3DM	31
5	10	1DM	1DM	2DM	1HKR 1DM	0	6

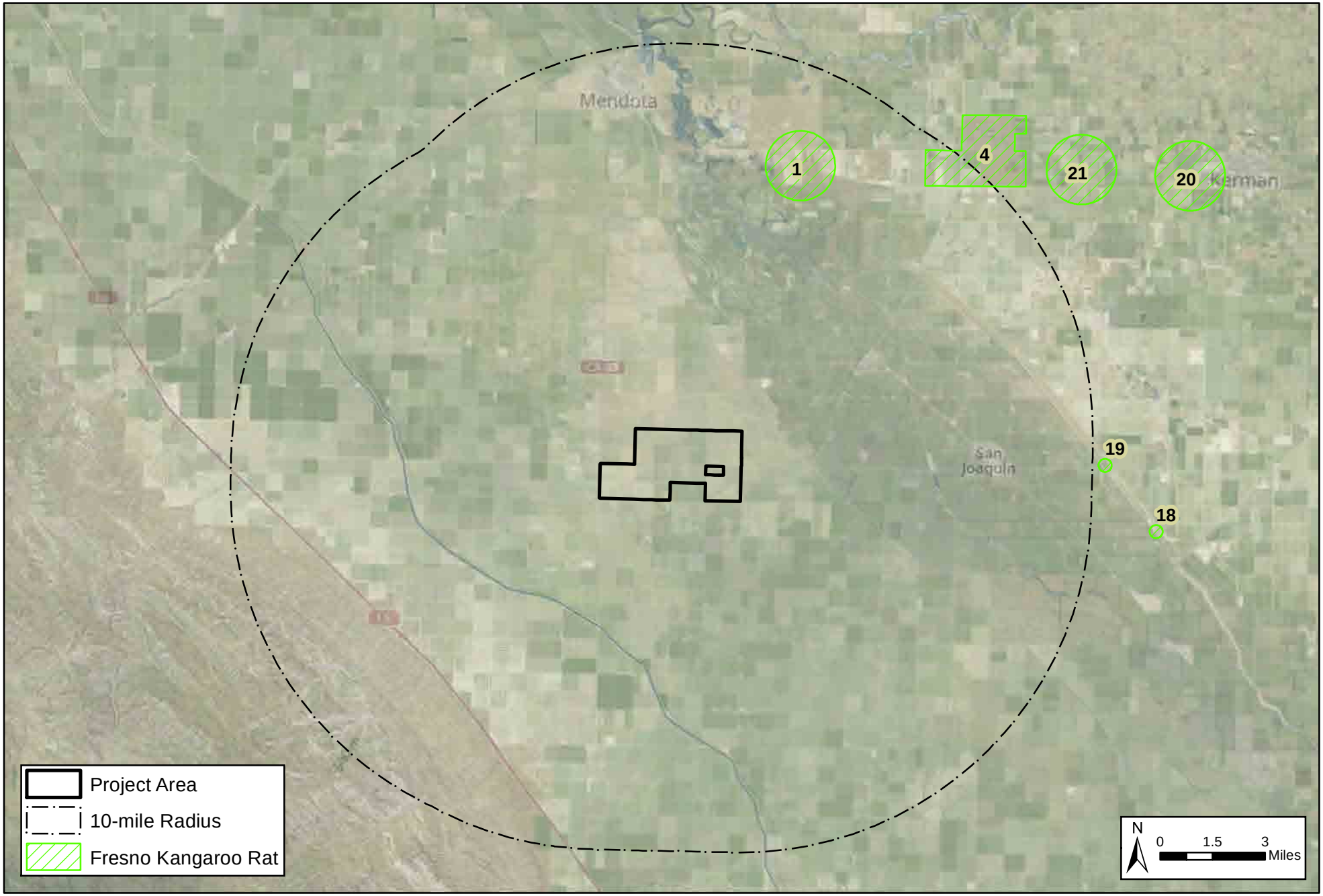
[1] Three stations with 10 traps each were disked and destroyed prior to their setting on 10/28/2016.

Station #	# of Traps	10/24/16	10/25/16	10/26/16	10/27/16	10/29/16	TOTAL
6	10	1HKR	1HKR 1HM 2DM	1HKR 3DM	3HKR 1DM	0	13
7	10	1HKR 1HM	1HKR 3DM	1HKR 1DM	5DM	1HKR 4DM	18
8	10	0	0	0	0	1HKR 2DM	3
9	10	1HKR 2DM	2DM	2HKR 3DM	1HKR 4DM	1HM 6DM	22
10	10	1HKR 1HM	2HKR 2HM	2HKR 2HM 1DM	3HKR 1HM 3DM	**	18
TOTAL	**100/night***	**31**	**37**	**38**	**44**	**41**	**191**

6 – CONCLUSIONS

The protocol-level kangaroo rat trapping survey was conducted in accordance with the *Survey Protocol for Determining Presence of San Joaquin Kangaroo Rats* (USFWS 2013), and in compliance with the USFWS and CDFW permits. All mammals captured were in good condition and released alive and unharmed. No mortalities or injuries were incurred during the trapping efforts.

No Fresno kangaroo rat or other special-status kangaroo rats were captured; however, the common Heermann's kangaroo rat, house mouse, and deer mouse are resident within the Property. We conclude that Fresno kangaroo rat or other special-status kangaroo rats do not inhabit the Property and that any proposed project will, therefore, not result in negative direct, indirect, or cumulative adverse impacts to Fresno kangaroo rat or special-status kangaroo rats or their habitat. No mitigation is needed or required for the Fresno kangaroo rat or other special-status kangaroo rats.



Californian Environmental Services, Inc.

4127 Bay Street, Ste. B
Fremont, CA 94538

Figure 3: CNDDB Fresno Kangaroo Rat Occurrences
Special-status Kangaroo Rat Survey
RE Scarlet Solar Project

7 – REFERENCES

Best, T.L. 1991. *Dipodomys nitratoides*. Mammal Species, 381:1-7.

Boolootian, R.A. 1954. An analysis of subspecific variations in *Dipodomys nitratoides*. Journal of Mammalogy, 35:570-577.

Burt, W.H. and R.P. Grossenheider. 1976. A Field Guide to the Mammals. Houghton Mifflin Co., Boston, MA.

California Natural Diversity Data Base (CNDDB). 2016. Rarefind 5. California Department of Fish and Wildlife, Natural Heritage Division, Sacramento, CA. Accessed November 2016.

California Department of Fish and Game. 2000. The status of rare, threatened, and endangered animals and plants of California, Tipton Kangaroo Rat: *Dipodomys nitratoides nitratoides*. California Department of Fish and Game, Wildlife Branch (Habitat Conservation Planning Branch), Sacramento, CA.

Chesemore, D.L. and W.M. Rhodehamel. 1992. Ecology of a vanishing subspecies: the Fresno kangaroo rat (*Dipodomys nitratoides exilis*). Pages 99-103, *In:* Endangered and Sensitive Species of the San Joaquin Valley, California (D.F. Williams, S. Byrne, and T.A. Rado, eds.). California Energy Commission, Sacramento. 388 pp.

Culbertson, A.E. 1934. Rediscovery of *Dipodomys nitratoides exilis*. Journal of Mammalogy, 15:161-162.

Culbertson, A.E. 1946. Observations on the natural history of the Fresno kangaroo rat. Journal of Mammalogy, 27:189-203.

Cypher, B.L. 2001. Spatiotemporal variation in rodent abundance in the San Joaquin Valley, California. The Southwestern Naturalist, 46(1):66-75.

Eisenberg, J.F. and D.E. Isaac. 1963. The reproduction of heteromyid rodents in captivity. Journal of Mammalogy, 44:122-127.

Eisenberg, J.F. 1963. The behavior of heteromyid rodents. University of California Publications in Zoology, 69:1-100.

Germano, D.J. 2001. Assessing translocation and reintroduction as mitigation tools for Tipton kangaroo rats (*Dipodomys nitratoides nitratoides*). Transactions of the Western Section of The Wildlife Society, 37:71-76.

Germano, D.J. and W.M. Rhodehamel. 1995. Characteristics of kangaroo rat burrows in fallow fields of the southern San Joaquin Valley. Transactions of the Western Section of The Wildlife Society, 31:40-44.

Germano, D.J., G.B. Rathbun, and L.R. Saslaw. 2001. Managing exotic grasses and conserving declining species. Wildlife Society Bulletin, 29(2):551-559.

Germano, D.J., G.B. Rathbun, E. Cypher, L.R. Saslaw, and S. Fitton. 2005. Effects of livestock grazing on a community of species at risk of extinction in the San Joaquin Valley, California. 2005 Annual Report: the Lokern grazing study project. Bureau of Land Management,

Bakersfield, California. Available on the Internet at <http://www.csub.edu/germano/GrazingWebSite.htm.

Goldingay, R.L., P.A. Kelly, and D.F. Williams. 1997. The kangaroo rats of California: endemism and conservation of keystone species. Pacific Conservation Biology, 3:47-60.

Griggs, F.T. 1992. The remaining biological diversity of the San Joaquin Valley, California. Pp. 11-15, *In*: Endangered and Sensitive Species of the San Joaquin Valley, California: Their Biology, Management and Conservation. D.F. Williams, S. Byrne, and T.A. Rado, eds. California Energy Commission, Sacramento, 388 pp.

Grinnell, J. 1920. A new kangaroo rat from the San Joaquin Valley, California. Journal of Mammalogy, 1:178-179.

Grinnell, J. 1921. Revised list of the species in the genus *Dipodomys*. Journal of Mammalogy, 1:178-179.

Grinnell, J. 1922. A geographical study of the kangaroo rats of California. University of California Publications in Zoology, 24:1-124.

Hafner, M.S. 1979. Density, distribution, and taxonomic status of *Dipodomys nitratoides nitratoides* Merriam, 1894 (Rodentia – Heteromyidae). California Department of Fish and Game, Nongame Wildlife Investigations. Sacramento, California. 17 pp. [Draft final report; not seen; cited by Service 1998:264]

Hall, F.A and K.R. Kelson. 1959. The mammals of North America. Ronald Press, New York. 1:1-600+90.

Hoffman, W.M. and D.L. Chesemore. 1982. Distribution and status of the Fresno kangaroo rat, *Dipodomys nitratoides exilis*. Calif. Dept. Fish and Game, Sacramento, Nongame Wildlife Investigations, Draft Final Rep. 32 pp.

Hoffman, M.W. 1985. Distribution, abundance, and behavior of Fresno and Heermann kangaroo rats in West-Central Fresno County, California. California State University, Fresno. Unpubl. Master's Thesis.

Hoffmann, W.M. 1974. The Fresno kangaroo rat study, 1974. California Department of Fish and Game, Special Wildlife Investigations Final Report. Proj. W-54-R-6, Job II-5.4. 22 pp.

Hoffmann, W.M. 1975. Geographic variation and taxonomy of *Dipodomys nitratoides* from the California San Joaquin Valley. Calif. State Univ., Fresno. Unpubl. thesis.

Ingles, L.G. 1965. Mammals of the Pacific States: California, Oregon, and Washington. Stanford University Press, Stanford, CA.

Johnson, W.E. and R.E. Selander. 1971. Protein variation and systematics in kangaroo rats (genus *Dipodomys*). Systematic Zoology, 20:377-405.

Johnson, C.D. and S.D. Clifton. 1992. The Systematic and Population Statuses of the San Joaquin Kangaroo Rat (*Dipodomys nitratoides*) in Merced County, California. Pages 139-142, *In*: Endangered and Sensitive Species of the San Joaquin Valley, California. D.F. Williams, S. Byrne, and T.A. Rado, eds. California Energy Commission, Sacramento, 388 pp.

Kelly, P., S. Phillips, C. Wilkinson, and F. Vang. 2009. Surveys for Fresno kangaroo rats (*Dipodomys nitratoides*) and Blunt-nosed Leopard-lizards (*Gambelia sila*) at the Madera Ranch, Madera County, California.

Knapp, D.K. 1975. The Fresno kangaroo rat survey, 1975. California Department of Fish and Game, Nongame Wildlife Investigations. Final Report, Proj. W-54-R-7, Job I-1.8. 21 pp.

Koos, K.A. 1977. The Fresno kangaroo rat population survey, 1977. California Department of Fish and Game, Nongame Wildlife Investigations. Final Report, Proj. E-1-1, Job IV-1.1. 10 pp.

Koos, K.A. 1979. Food relationship of an alkali sink rodent community. Master's thesis, California State University, Fresno, CA. 45 pp.

Merriam, C.H. 1894. Preliminary descriptions of eleven new kangaroo rats of the genus *Dipodomys* and *Perodipus*. Proceedings of the Biological Society of Washington, 8:129-138.

Morrison, M.L., L.S. Mills, and A.J. Kuenzi. 1996. Study and management of an isolated, rare population: the Fresno kangaroo rat. Wildlife Society Bulletin, 24(4):602-606.

Newman, D.P., C.E. Uptain, P.A. Kelly, and D.F. Williams. 2004. Population decline of endangered Tipton kangaroo rats in central California: Results of an 11-year study. Abstract and poster. 84th Annual Meeting of the American Society of Mammalogists, June 12-16, 2004, Humboldt State University, Arcata, CA.

Patton, J.L., H. MacArthur, and S.Y. Yang. 1976. Systematic relationships of the four-toed populations of *Dipodomys heermanni*. Journal of Mammalogy, 57:159-1963.

Patton, J.L. 1994. Determining the distribution and status of the Fresno kangaroo rat a proposal for meeting critical need. U.S. Bureau of Reclamation, Sacramento, CA. Unpub. Data. Grant proposal, 16 pp.

Patton, James. 2010. Electronic mail from Professor Emeritus at University of California at Berkeley to Shelley Buranek, San Joaquin Valley Branch, Endangered Species Division, Sacramento Fish and Wildlife Service Office, U.S. Fish and Wildlife Service, Sacramento, California. Feb 10, 2010.

Single, J.R., D.J. Germano, and M.H. Wolfe. 1996. Decline of kangaroo rats during a wet winter in the Southern San Joaquin Valley, California. 1996 Transactions of the Western Section of The Wildlife Society 32:34-41. Available at: http://www.twswest.org/transactions/Single%20Germano%20Wolfe.pdf (accessed on November 18, 2007).

Stock, A.D. 1974. Chromosome evolution in the genus *Dipodomys* and its taxonomic and, phylogenetic implications. Journal of Mammalogy. 55:505-526.

Tappe, D.T. 1941. Natural history of the Tulare kangaroo rat. Journal of Mammalogy, 22:117-148.

Tennant, E. And D. Germano. 2010. Determining optimal translocation conditions and potential competitive interactions for the endangered Tipton kangaroo rat (*Dipodomys nitratoides*

nitratoides) and the Heermann's kangaroo rat (*D. heermanni*). Transactions of the Western Section of the Wildlife Society Conference, Visalia, California. January 2010.

Uptain, C.E., D.F. Williams, P.A. Kelly, L.P. Hamilton, and M.C. Potter. 1999. The status of Tipton kangaroo rats and the potential for their recovery. Transactions of the Western Section of The Wildlife Society 35:1-9.

USFWS. 1985. Endangered and threatened wildlife and plants; determination of endangered status and critical habitat for the Fresno kangaroo rat. FR 50:4222-4226.

USFWS. 1988. Endangered and threatened wildlife and plants; determination of endangered status for the Tipton kangaroo rat: Final Rule. FR 53(131):25608-25611. Available at: http://heinonline.org/HOL/Index?collection=fedreg (accessedon November 20, 2007).

USFWS. 1989. Habitat Suitability Index Model: Heermann's Kangaroo Rat (*Dipodomys heermanni*). Sacramento, California.

USFWS. 1998. Recovery Plan for Upland Species of the San Joaquin Valley, California. Region 1, Portland, OR. 319 pp.

USFWS. 2010. Tipton Kangaroo Rat. 5-Year Review: Summary and Evaluation.

Warner, D.R. 1976. The effects of grazing on *Dipodomys nitratoides exilis* in an alkali sink community. California State University, Fresno. Unpub. thesis.

Whisson, D.A. 1999. Modified bait stations for California ground squirrel control in endangered kangaroo rat habitat. Wildlife Society Bulletin, 27(1):172-177.

Williams, D.F. 1985. A review of the population status of the Tipton kangaroo rat *Dipodomys nitratoides nitratoides*. USFWS, Sacramento, Endangered Species Office, CA, Final Report. 44 pp.

Williams, D.F. 1986a. Mammalian species of special concern in California. CDFG, Wildlife Management Division, Sacramento, CA. Administrative Report 86.

Williams, D.F. 1986b (reformatted 2005). Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*). Pages 25-27, *In:* Mammalian Species of Special Concern in California. Prepared for The State of California, The Resources Agency, Department of Fish and Game, Sacramento, CA 95814.

Williams, D.F. 1987. Fresno kangaroo rat workbook. USFWS, Washington D.C., 29.pp.

Williams, D.F. and K.S. Kilburn 1992. The conservation status of the endemic mammals of the San Joaquin Faunal Region, California. Pp. 329-348, *In*: Endangered and Sensitive Species of the San Joaquin Valley, California. D.F. Williams, S. Byrne, and T.A. Rado, eds. California Energy Commission, Sacramento. 388 pp.

Williams, D.F., H.H. Genoways, and J.K. Braun. 1993. Taxonomy. Pages 38-196, *In:* Biology of the Heteromyidae. H.H. Genoways and J.H. Browns, eds. American Society Mammalian Species Public on 10:1-719.

Williams, D.F. 1986. Mammalian species of special concern in California. Calif. Dept. of Fish and Game, Wildlife Management Branch Administrative Report. No. 86-1. Sacramento, CA.

Williams, D.F. and D. Germano. 1992. Recovery of endangered kangaroo rats in the San Joaquin Valley, California. 1992 Transactions of the Western Section of the Wildlife Society, 28:93-106.

Williams, D.F., D.J. Germano, and W. Tordoff, III. 1993. Population studies of endangered kangaroo rats and blunt-nosed leopard studies in the Carrizo Plain Natural Area, California. California Department of Fish and Game, Sacramento, CA. Nongame Bird and Mammal Section Report 93 01. 114 pp.

Attachment A: Request and Permission to Live-Trap for Special-status Kangaroo Rat Species

HALSTEAD & ASSOCIATES
Environmental / Biological Consultants
296 Burgan Avenue, Clovis, CA 93611
Office (559) 298-2334; Mobile (559) 970-2875
Fax (559) 322-0769; HalsteadEnv@aol.com

October 10, 2016

Ms. Sarah Markegard
Recovery Permit Coordinator
U. S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office
2800 Cottage Way, Rm W-2605
Sacramento, CA 95814

Dr. Scott Osborn, SCP Coordinator
California Department of Fish and Game
Wildlife Branch, Nongame Wildlife Program
1812 9th Street
Sacramento, CA 95811

RE: Scarlet Solar Project – Feasibility and Biological Constraints Study
4,065 Acres West of San Joaquin Near the Town of Levis (Fresno County, California)
Request for Authorization to Conduct Live Trapping Survey for Fresno Kangaroo Rat

Dear Ms. Markegard and Dr. Osborn:

This letter is my request for authorization to conduct a live trapping survey for the Fresno Kangaroo Rat for the Scarlet Solar Project – Feasibility and Biological Constraints Study. The project is located approximately 10 miles west of the City of San Joaquin near unincorporated town of Levis (Fresno County, California (Attachment A). The site is mostly under active cultivation with agricultural row crops. Activities would be conducted under my Federal Fish and Wildlife Permit No. TE-769304-9 and State Scientific Collecting Permits (SC-001100 and SC-11954). During environmental work by California Environmental Services (Fremont, California) in September 2016, a few potential kangaroo rat burrows with evidence of foot prints and tail-drags were found at two areas of the project site. The purpose of the survey is to determine the species of kangaroo rats occurring in these areas. Would you please email or send me a letter with authorization to conduct the kangaroo rat trapping. We have tentatively scheduled the trapping for the last week in October 2016.

PROPOSAL FOR FRESNO KANGAROO RAT TRAPPING SURVEY

Project Description

A feasibility and biological constraints study is being conduct on 4,065 acres of agricultural land east of San Joaquin for a potential solar development project. The project is known as the Scarlet Solar Project.

For the kangaroo rat trapping survey, the area of concern is the two areas where kangaroo rat burrows were found on the project site (Attachment B).

Purpose of Survey

During environmental work by California Environmental Services in September 2016, a few kangaroo rat burrows with evidence of foot prints and tail-drags were found at two areas of the project site. The purpose of the survey is to determine the species of kangaroo rats occurring in these areas. The project occurs within the range of the State and Federally Endangered Fresno Kangaroo Rat. Results from the survey will provide occurrence data and facilitate the evaluation of potential project impacts to the Fresno Kangaroo Rat, additional and further consultation with the resource agencies, permitting requirements and procedures, and possible avoidance measures and/or mitigation (if necessary).

Location of Survey Site

The project is located approximately 10 miles west of the City of San Joaquin near the unincorporated town of Levis in Fresno County, California (Attachment A). Specifically, the trapping will occur in Sections 19 and 20, Township 15 South, Range 15 East of the Cantua Creek 7.5 minute topographic map.

Description of Survey Methods

A protocol-level live-trapping survey will be conducted for the Fresno Kangaroo Rat using the methods noted in my Federal and State permits and the U. S Fish and Wildlife's (2013) "Survey Protocol for Determining Presence of San Joaquin Kangaroo Rats."

The live-trapping survey is described below.

Field Personnel

The live-trapping survey will be conducted by Jeffrey A. Halstead, the permit holder, and Andrew Roberts, who is an Independent Authorized Individual under the above permit. Dr. Gretchen Padgett-Flohr (California Environmental Services) will record data during the survey.

Number of Surveys

The project site will be trapped for a 5-night duration.

Dates of Survey

The survey is scheduled for October 24 through October 28, 2016.

Number of Acres Proposed for Surveys
Approximately 100 acres will be sampled immediately at and adjacent to the construction areas.

Number of Individuals Proposed to be Collected
Kangaroo rats will be trapped, identified, and released alive and unharmed during the survey. No kangaroo rats are proposed to be collected or taken during the survey.

Location of Traps
Approximately 100 traps will be run per night among the two areas where kangaroo rat burrows were observed (Attachment B). A group of ten traps will be placed at approximately 10 stations throughout the two areas.

Maps of Survey Locales
A map of the proposed trapping locales is depicted in Attachment B.

Trap Checking
Trap checking will be conducted as per the U. S Fish and Wildlife's (2013) "Survey Protocol for Determining Presence of San Joaquin Kangaroo Rats."

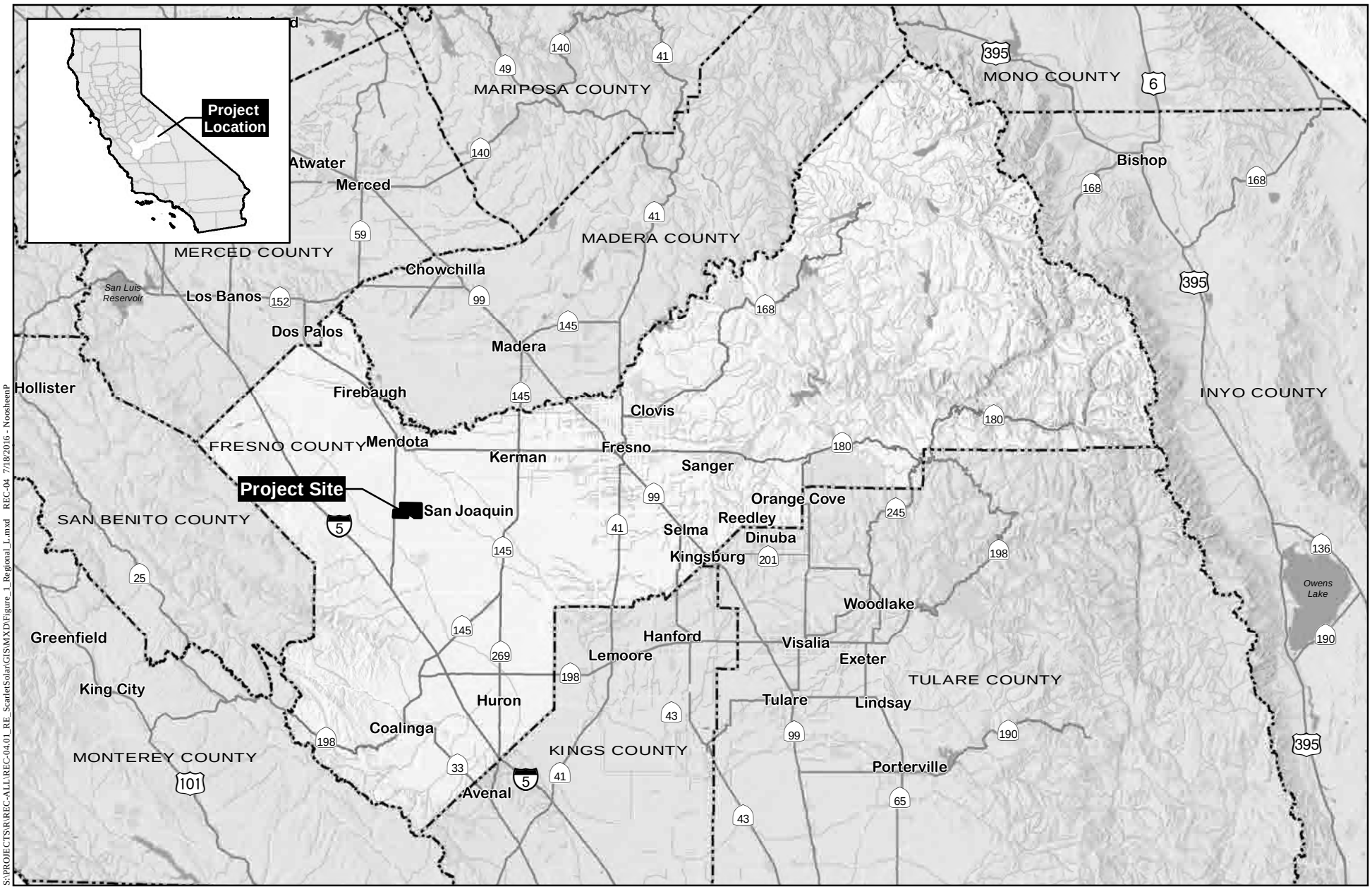
Sincerely,

Jeffrey A. Halstead

Cc: Dr. Gretchen Padgett-Flohr (gpf@calenv.com)
California Environmental Services Inc., 4127 Bay Street, Suite B, Fremont, CA 94538)

Mr. Stephen Stringer (StephenS@helixepi.com)
(HELIX Environmental Planning, Inc., 11 Natoma Street, Suite 155, Folsom, CA 95630)

ATTACHMENT A



S:\PROJECTS\R\REC-ALL\REC-04.01_RE_ScarletSolar\GIS\MXD\Figure_1_Regional_1.mxd REC-04 7/18/2016 - NoosheenP

Project Location Map

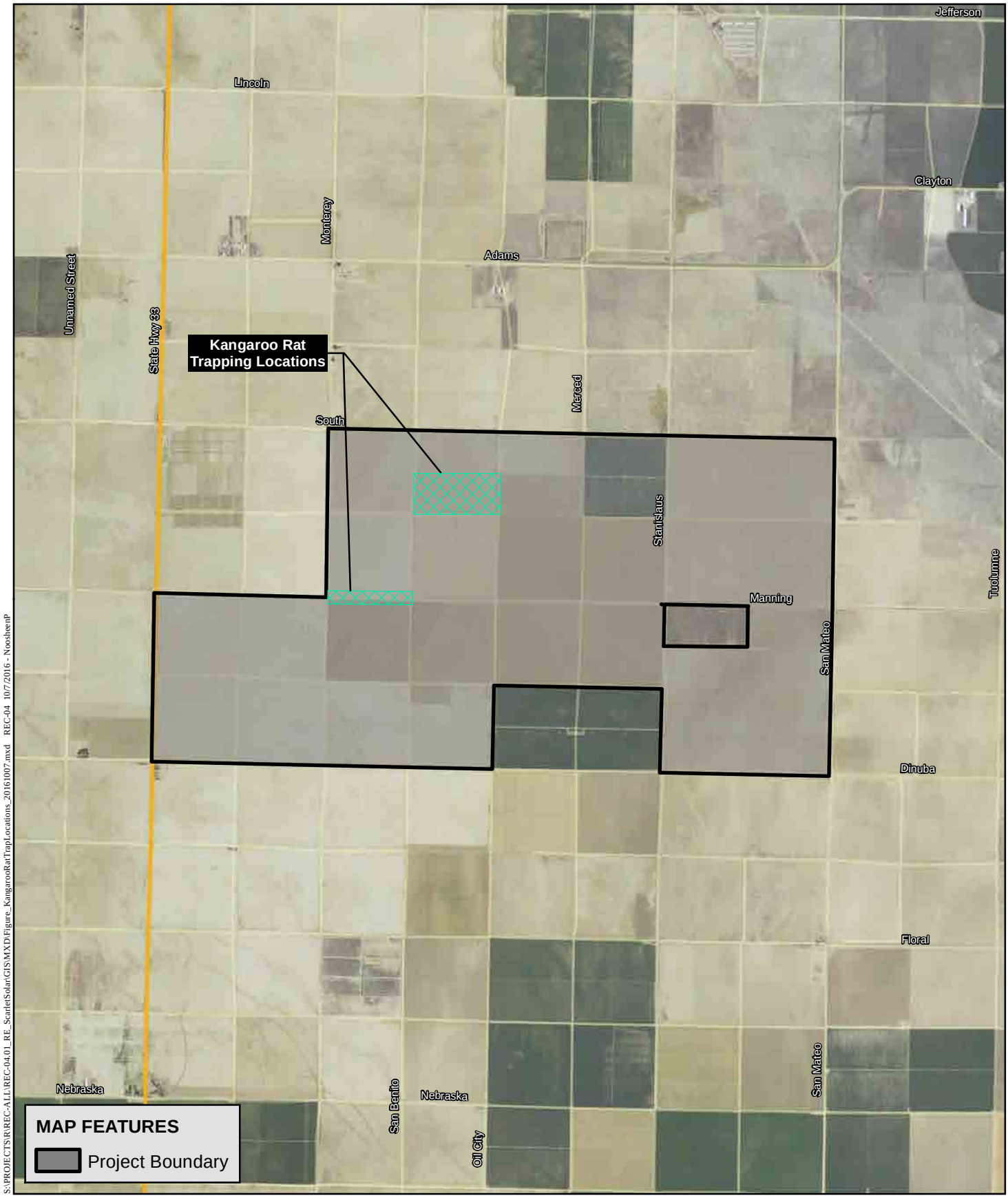
RE SCARLET SOLAR PROJECT

HELIX Environmental Planning

N 0 20 Miles 1 inch = 20 miles

Figure 1

ATTACHMENT B



S:\PROJECTS\R\REC-ALL\REC-04.01_RE_ScarletSolarGIS\MXD\Figure_KangarooRatTrapLocations_20161007.mxd REC-04 10/7/2016 - NoosheenP

Proposed Kangaroo Rat Trapping Locations

RE SCARLET SOLAR PROJECT

HELIX Environmental Planning

N

0 5,000 Feet

1 inch = 4,166.67 feet

Print Clear

California Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE

NOTIFICATION OF INTENT TO COLLECT FOR SCIENTIFIC PURPOSES

Regional Office: Please forward this notification to the appropriate biological and law enforcement staff covering the locations below.

Instructions: **It is mandatory to complete all items.** Type or print clearly in ink. You must notify the Department of Fish and Wildlife regional office by noon one (1) business day prior to scientific collecting activity authorized, and no more than two weeks in advance or your activity. Collectors: Use the map on the back of this form to determine the regional office whose boundaries surround the area where you will be collecting and the appropriate fax number. If you are unable to fax this form, you must telephone the office directly during business hours and provide this information.

# OF PAGES (including this form)	TODAY'S DATE	PERMANENT ID NUMBER
1 of 2	10/21/2016	SC- 001100

TO: Department of Fish and Wildlife regional office	FAX NUMBER OR EMAIL
Central Region - Fresno	(559) 243-4022 / Central Region (Fresno)

FROM: PERMITTEE'S FIRST NAME	LAST NAME	DAY TELEPHONE
Jeffrey	Halstead	(559) 298-2334

INSTITUTION/ENTITY'S NAME	E-MAIL ADDRESS
Halstead & Associates	halsteadenv@aol.com

1st DATE COLLECTING	2nd DATE COLLECTING	3rd DATE COLLECTING	4th DATE COLLECTING	5th DATE COLLECTING
10/24/2016	10/25/2016	10/26/2016	10/27/2016	10/28/2016
TIME COLLECTING	TIME COLLECTING	TIME COLLECTING	TIME COLLECTING	TIME COLLECTING
6AM-8AM	6AM-8AM	6AM-8AM	6AM-8AM	6AM-8AM
SPECIFIC LOCATION	SPECIFIC LOCATION	SPECIFIC LOCATION	SPECIFIC LOCATION	SPECIFIC LOCATION
Manning Ave. near Levis, CA	Manning Ave. near Levis, CA	Manning Ave. near Levis, CA	Manning Ave. near Levis, CA	Manning Ave. near Levis, CA
COUNTY	COUNTY	COUNTY	COUNTY	COUNTY
Fresno	Fresno	Fresno	Fresno	Fresno
NUMBER IN PARTY	NUMBER IN PARTY	NUMBER IN PARTY	NUMBER IN PARTY	NUMBER IN PARTY
2	2	2	2	2
YEAR/MAKE OF VEHICLE	YEAR/MAKE OF VEHICLE	YEAR/MAKE OF VEHICLE	YEAR/MAKE OF VEHICLE	YEAR/MAKE OF VEHICLE
2004/Chevy	2004/Chevy	2004/Chevy	2004/Chevy	2004/Chevy
COLOR/LICENSE PLATE #	COLOR/LICENSE PLATE #	COLOR/LICENSE PLATE #	COLOR/LICENSE PLATE #	COLOR/LICENSE PLATE #
Green/ 7M38114	Green/ 7M38114	Green/ 7M38114	Green/ 7M38114	Green/ 7M38114
DESCRIPTION OF BOAT	DESCRIPTION OF BOAT	DESCRIPTION OF BOAT	DESCRIPTION OF BOAT	DESCRIPTION OF BOAT
--	--	--	--	--
BOAT CF #	BOAT CF #	BOAT CF #	BOAT CF #	BOAT CF #
--	--	--	--	--
GEAR TYPE TO BE USED	GEAR TYPE TO BE USED	GEAR TYPE TO BE USED	GEAR TYPE TO BE USED	GEAR TYPE TO BE USED
Sherman Live Traps	Sherman Live Traps	Sherman Live Traps	Sherman Live Traps	Sherman Live Traps
SPECIES TO BE COLLECTED	SPECIES TO BE COLLECTED	SPECIES TO BE COLLECTED	SPECIES TO BE COLLECTED	SPECIES TO BE COLLECTED
(Live-trap Release) Deer Mouse Heermann's Kangaroo Rat	(Live-trap Release) Deer Mouse Heermann's Kangaroo Rat	(Live-trap Release) Deer Mouse Heermann's Kangaroo Rat	(Live-trap Release) Deer Mouse Heermann's Kangaroo Rat	(Live-trap Release) Deer Mouse Heermann's Kangaroo Rat

Print Clear

California Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE

NOTIFICATION OF INTENT TO COLLECT FOR SCIENTIFIC PURPOSES

Regional Office: Please forward this notification to the appropriate biological and law enforcement staff covering the locations below.

Instructions: **It is mandatory to complete all items.** Type or print clearly in ink. You must notify the Department of Fish and Wildlife regional office by noon one (1) business day prior to scientific collecting activity authorized, and no more than two weeks in advance or your activity. Collectors: Use the map on the back of this form to determine the regional office whose boundaries surround the area where you will be collecting and the appropriate fax number. If you are unable to fax this form, you must telephone the office directly during business hours and provide this information.

# OF PAGES (including this form)	TODAY'S DATE	PERMANENT ID NUMBER
1 of 2	10/21/2016	SC- 11954

TO: Department of Fish and Wildlife regional office	FAX NUMBER OR EMAIL
Central Region - Fresno	(559) 243-4022 / Central Region (Fresno)

FROM: PERMITTEE'S FIRST NAME	LAST NAME	DAY TELEPHONE
Jeffrey	Halstead	(559) 298-2334

INSTITUTION/ENTITY'S NAME	E-MAIL ADDRESS
Halstead & Associates	halsteadenv@aol.com

1st DATE COLLECTING	2nd DATE COLLECTING	3rd DATE COLLECTING	4th DATE COLLECTING	5th DATE COLLECTING
10/24/2016	10/25/2016	10/26/2016	10/27/2016	10/28/2016
TIME COLLECTING	TIME COLLECTING	TIME COLLECTING	TIME COLLECTING	TIME COLLECTING
6AM-8AM	6AM-8AM	6AM-8AM	6AM-8AM	6AM-8AM
SPECIFIC LOCATION	SPECIFIC LOCATION	SPECIFIC LOCATION	SPECIFIC LOCATION	SPECIFIC LOCATION
Manning Ave. near Levis, CA	Manning Ave. near Levis, CA	Manning Ave. near Levis, CA	Manning Ave. near Levis, CA	Manning Ave. near Levis, CA
COUNTY	COUNTY	COUNTY	COUNTY	COUNTY
Fresno	Fresno	Fresno	Fresno	Fresno
NUMBER IN PARTY	NUMBER IN PARTY	NUMBER IN PARTY	NUMBER IN PARTY	NUMBER IN PARTY
2	2	2	2	2
YEAR/MAKE OF VEHICLE	YEAR/MAKE OF VEHICLE	YEAR/MAKE OF VEHICLE	YEAR/MAKE OF VEHICLE	YEAR/MAKE OF VEHICLE
2004/Chevy	2004/Chevy	2004/Chevy	2004/Chevy	2004/Chevy
COLOR/LICENSE PLATE #	COLOR/LICENSE PLATE #	COLOR/LICENSE PLATE #	COLOR/LICENSE PLATE #	COLOR/LICENSE PLATE #
Green/ 7M38114	Green/ 7M38114	Green/ 7M38114	Green/ 7M38114	Green/ 7M38114
DESCRIPTION OF BOAT	DESCRIPTION OF BOAT	DESCRIPTION OF BOAT	DESCRIPTION OF BOAT	DESCRIPTION OF BOAT
--	--	--	--	--
BOAT CF #	BOAT CF #	BOAT CF #	BOAT CF #	BOAT CF #
--	--	--	--	--
GEAR TYPE TO BE USED	GEAR TYPE TO BE USED	GEAR TYPE TO BE USED	GEAR TYPE TO BE USED	GEAR TYPE TO BE USED
Sherman Live Traps	Sherman Live Traps	Sherman Live Traps	Sherman Live Traps	Sherman Live Traps
SPECIES TO BE COLLECTED	SPECIES TO BE COLLECTED	SPECIES TO BE COLLECTED	SPECIES TO BE COLLECTED	SPECIES TO BE COLLECTED
(Live-trap Release) Deer Mouse Heermann's Kangaroo Rat	(Live-trap Release) Deer Mouse Heermann's Kangaroo Rat	(Live-trap Release) Deer Mouse Heermann's Kangaroo Rat	(Live-trap Release) Deer Mouse Heermann's Kangaroo Rat	(Live-trap Release) Deer Mouse Heermann's Kangaroo Rat

From:	Markegard, Sarah
To:	Halstead
Cc:	Osborn, Scott@Wildlife; Burkett, Esther@Wildlife; Gretchen Flohr; Stephen Stringer; Thomas Leeman
Subject:	Re: Halstead - Authorization Request for Fresno Kangaroo Rat Live Trapping (Levis, Fresno County)
Date:	Friday, October 21, 2016 7:14:23 AM

Jeff Halstead,

This message is authorization from the Sacramento Fish and Wildlife Office to conduct a 2016 trapping survey for the Fresno kangaroo rat pursuant to permit TE-769304-9 and as stated in your electronic mail request with attached maps, dated October 10, 2016. Trapping surveys will occur on the Scarlet Solar Project study site, located approximately 10 miles west of the City of San Joaquin near the unincorporated town of Levis, Fresno County, California.

Please ensure that all surveys are conducted in accordance with the *Survey Protocol for Determining Presence of San Joaquin Kangaroo Rats* (USFWS, 2013). Please also remember to carry a copy of your permit while independently conducting kangaroo rat surveys, and ensure all reporting required by the permit is completed.

Electronic copies of the reports should be provided to myself and Thomas Leeman (Chief of the San Joaquin Valley Division). In your reports, please include which surveys were authorized, the names of all persons involved in the surveys, their recovery permit numbers, if applicable, and the date of this authorization, to help ensure that we correctly record the fulfillment of the reporting requirement under this authorization. Please let us know if the surveys are not performed as authorized, or if they are done by a different permittee under a separate authorization.

This authorization does not include access to properties which must be gained in advance from the appropriate land owner or manager. We ask that you use UTM coordinates to relay spatial information, and in all future correspondence regarding these surveys please use Service Reference #: **2017-TA-0138.**

To ensure the accuracy and data integrity of your project, it is requested that you provide spatial information (boundaries, study areas, parcels, point locations, etc.) in the form of an ESRI shape file with projection, a GPS file with projection, or locations in an Excel spreadsheet with projection information. The preferred projection is UTM, Zone 10S, NAD83; the Sacramento Fish and Wildlife Office (SFWO) standard. FGDC compliant metadata must accompany each file. Please include any USFWS File Numbers associated with the data in your documentation. For additional information regarding metadata standards refer to: http://www.fgdc.gov. For more information regarding spatial data please contact: Cheryl L. Hickam, GIS Branch Chief, U.S. Fish and Wildlife Service, 2800 Cottage Way, Suite W-2605, Sacramento, Ca 95825-1846, office: 916-414-6708.

On Mon, Oct 10, 2016 at 9:17 AM, Halstead <halsteadenv@aol.com> wrote:

> Dear Sarah, Scott, and Esther:
>
> Attached is our request for authorization to conduct a live trapping survey for the Fresno Kangaroo Rat for the Scarlet Solar Project. The project is located approximately 10 miles west of the City of San Joaquin near the unincorporated town of Levis (Fresno County, California).
>
> Thanks,

Jeff Halstead
Halstead & Associates, Environmental/Biological Consultants
296 Burgan Avenue
Clovis, CA 93611

Office (559) 298-2334
Cell (559) 903-5703
HalsteadEnv@aol.com

10/10/16

--
Sarah Markegard
Recovery Biologist
Sacramento Fish and Wildlife Office
2800 Cottage Way W-2605
Sacramento, CA 95825-1888

phone: 916-414-6492
email: sarah_markegard@fws.gov

Attachment B: Field Forms

Day #1

Kangaroo Rat Trapping Data Sheet Project: Scarlet Solar Project

Parameter	Trap Opening	Trap Checking/Closing
Date	10-23-16	10-24-16
Time	5:20-6:15 pm	6:45AM - 8:15AM
Weather/Temperature	89°F	63°F
Staff	JH, AR, Gretchen Elchr	

NN = NON NURSING

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
1	1	✓	MUMU	M		18	NS	NA	NA
"	2	✓	MUMU	F		15	non nursing	NA	NA
"	3	✓	DIHE	F		72	non nursing	5	40
"	4	✓	DIHE	M	AD.	68	scrotal	5	43
"	5	✓	DIHE	F	JUV	34	NA	5	34
"	6	✓	DIHE	F		65	NN	5	38
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓	NO CAPTURE						
2	1	✓	MUMU	M	AD	14	NS	NA	NA
"	2	✓	MUMU	F	AD	15	NN	NA	NA
"	3	✓	MUMU	M	AD	13	NS	NA	NA
"	4	✓	PEMA	M	AD	22	NS	NA	NA
"	5	✓	PEMA	F	AD	15	NN	NA	NA
"	6	✓	DIHE	F	JUV	38	NN	5	37
"	7	✓	MUMU	M	AD	12	NS	NA	NA
"	8	✓	PEMA	F	AD	13	NN	NA	NA
"	9	✓	MUMU	M	AD	11	NS	NA	NA
"	10	✓	MUMU	F	AD	16	NN	NA	NA

parasite

3 Captures

11 - HKR = DIHE
13 - HM = MUMU
7 - DM = PEMA

31

PAGE 2

Kangaroo Rat Trapping Data Sheet Project: Scarlet 10/24/16

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
~~3~~ 4	1	✓	MUMU	M	AD	12	NS	NA	NA
"	2	✓	~~REMA~~	F	AD	19	NN	NA	NA
"	3	✓	DIHE	F	AD	45	NN	5	37
"	4	✓	MUMU	F	AD	15	NN	NA	NA
"	5	✓	MUMU	F	AD	13	NN	NA	NA
"	6	✓	DIHE	M	AD	39	NS	5	41
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
~~4~~	1								
"	2								
"	3								
"	4		V0 ID						
"	5								
"	6								
"	7								
"	8								
"	9								
"	10								

PAGE 3

Kangaroo Rat Trapping Data Sheet Project: Scalp 10/24/16

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
5	1	✓	PEMA	F	AD	25	Nursing	NA	NA
"	2	✓							
"	3	✓							
"	4	✓							
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
6	1	✓	DIHE	F	AD	52	Nursing	5	41
"	2	✓							
"	3	✓							
"	4	✓							
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							

PAGE 4

Kangaroo Rat Trapping Data Sheet Project: Scarlet 10/24/16

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
7	1	✓	DIHE	F	AD	60	NN	5	38
"	2	✓	MUMU	F	AD	10	NN	NA	NA
"	3	✓							
"	4	✓							
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
8	1								
"	2								
"	3								
"	4								
"	5								
"	6								
"	7								
"	8								
"	9								
"	10								

NO CAPTURES

PAGE 5

Kangaroo Rat Trapping Data Sheet Project: Scarlet 10/24/16

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
9	1	✓	PEMA	F	AD	19	NN	NA	NA
"	2	✓	DIHE	M	AD	84	NS	5	43
"	3	✓	PEMA	F	AD	16	NN	NA	NA
"	4	✓							
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
10	1	✓	DIHE	F	AD	64	NN	5	39
"	2	✓	MUMU	M	AD	16	NS	NA	NA
"	3	✓							
"	4	✓							
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							

DAY #2

Kangaroo Rat Trapping Data Sheet Project: Scarlet Solar Project

Parameter	Trap Opening	Trap Checking/Closing
Date	10-24-16	10-25-16
Time	5:15 - 6:15 pm	6:25AM - 8:15AM
Weather/Temperature	65°F partly cloudy	55°F - partly cloudy
Staff	AR	JH, AR

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
1	1	✓	HM	F	A	11	NN	–	–
"	2	✓							
"	3	✓							
"	4	✓							
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
2	1	✓	HM	F	A	12	NN	–	–
"	2	✓	HM	M	A	17	S	–	–
"	3	✓	HM	F	A	18	NN	–	–
"	4	✓	HM	F	A	15	NN	–	–
"	5	✓	HM	M	A	15	NS	–	–
"	6	✓	HM	F	A	14	NN	–	–
"	7	✓	HM	M	A	14	NS	–	–
"	8	✓							
"	9	✓							
"	10	✓							

HKR - 8
DM - 11
HM - 14

PAGE 2

Kangaroo Rat Trapping Data Sheet Project: Scarlet 10/25/16

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
3	1	✓	DM	M	A	15	NS	—	—
"	2	✓	HM	F	A	18	NN	—	—
"	3	✓	DM	F	A	14	NN	—	—
"	4	✓	HKR	F	A	63	PN	5	39
"	5	✓	HM	M	A	13	NS	—	—
"	6	✓	HM	F	A	13	NN	—	—
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
4	1	✓	HM	M	A	13	PS	—	—
"	2	✓	HM	F	A	14	NN	—	—
"	3	✓	HKR	M	J	35	NS	5	40
"	4	✓	DM	F	A	18	NN	—	—
"	5	✓	DM	F	A	11	NN	—	—
"	6	✓	HKR	F	A	47	PN	5	38
"	7	✓	HKR	M	A	72	PS	5	42
"	8	✓	DM	F	A	13	NN	—	—
"	9	✓							
"	10	✓							

PAGE 3

Kangaroo Rat Trapping Data Sheet Project: Scarb f 10/25/16

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
5	1	✓	DM	F	A	22	PN	—	—
"	2	✓							
"	3	✓							
"	4	✓							
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
6	1	✓	DM	F	A	18	NN	—	—
"	2	✓	HKR	F	A	55	NN	5	37
"	3	✓	HM	M	A	13	NS	—	—
"	4	✓	DM	M	A	27	NS	—	—
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							

PAGE 4

Kangaroo Rat Trapping Data Sheet Project: Scalf 10/25/16

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
7	1	✓	HKR	F	A	53	NN	5	37
"	2	✓	DM	F	A	17	NN	—	—
"	3	✓							
"	4	✓							
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
8	1	✓							
"	2	✓							
"	3	✓							
"	4	✓							
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							

PAGE 5

Kangaroo Rat Trapping Data Sheet Project: Scarlet 10/25/16

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
9	1	✓	DM	F	J	15	NN	–	–
"	2	✓	DM	F	A	14	NN	–	–
"	3	✓							
"	4	✓							
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
10	1	✓	HM	F	A	18	NN	–	–
"	2	✓	HM	M	A	18	PS	–	–
"	3	✓	HKR	F	A	65	NN	5	40
"	4	✓	HKR	M	A	69	PS	5	40
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							

DAY #3

Kangaroo Rat Trapping Data Sheet Project: Scarlet Solar Project

Parameter	Trap Opening	Trap Checking/Closing
Date	10-25-16	10/26/16
Time	5:15-6:20pm	6:40 - 8:20
Weather/Temperature	78°F clear	clear 54 18°C -
Staff	AR	AIR/JAH

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
1	1	✓	DM	M	A	16	NS	—	—
"	2	✓	HKR	F	J	37	NN	5	40
"	3	✓	DM	M	A	20	NS	—	—
"	4	✓	HKR	F	A	65	NN	5	39
"	5	✓	HM	M	A	14	PS	—	—
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
2	1	✓	HM	F	A	16	NN	—	—
"	2	✓	HM	F	A	11	NN	—	—
"	3	✓	DM	M	A	17	NS	—	—
"	4	✓	HM	M	A	15	PS	—	—
"	5	✓	HKR	M	J	40	NS	5	38
"	6	✓	HM	M	A	11	NS	—	—
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							

- 18c+

HKR - 11
DM - 18
HM - 9

(38)

10/26/16

PAGE 2

Kangaroo Rat Trapping Data Sheet Project: Scalt

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)	
3	1	✓	Hm	M	A	11	NS	—	—	
"	2	✓	Hm	F	A	15	NN	—	—	
"	3	✓	DM	F	A	15	NN	—	—	
"	4	✓								
"	5	✓								
"	6	✓								
"	7	✓								
"	8	✓								
"	9	✓								
"	10	✓								
4	1	✓	DM	M	A	18	NS	—	—	
"	2	✓	DM	F	J	10	NN	—	—	
"	3	✓	DM	F	J	10	NN	—	—	
"	4	✓	DM	M	A	22	NS	—	—	Bo+
"	5	✓	HKR	F	J	38	NN	5	38	
"	6	✓	HKR	F	A	38	PN	5	39	
"	7	✓								
"	8	✓								
"	9	✓								
"	10	✓								

10/26/16

PAGE 3

Kangaroo Rat Trapping Data Sheet Project: Scarlet

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
5	1	✓	DM	F	A	20	NN	—	—
"	2	✓	DM	F	A	15	NN	—	—
"	3	✓							
"	4	✓							
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
6	1	✓	DM	F	A	16	NN	—	—
"	2	✓	DM	F	A	16	NN	—	—
"	3	✓	HKR	F	A	49	NN	5	30
"	4	✓	DM	M	A	13	NS	—	—
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							

10/26/16

PAGE 4

Kangaroo Rat Trapping Data Sheet Project: Scarlet

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
7	1	✓	DM	F	A	15	NN	—	—
"	2	✓	1+KR	F	J	42	NN	5	40
"	3	✓							
"	4	✓							
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
8	1	✓							
"	2	✓							
"	3	✓							
"	4	✓							
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							

10/26/16

PAGE 5

Kangaroo Rat Trapping Data Sheet Project: Scarlet

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
9	1	✓	HKR	M	A	61	S	5	38
"	2	✓	HKR	F	A	46	NN	5	40
"	3	✓	DM	F	A	14	NN	—	—
"	4	✓	DM	F	A	13	NN	—	—
"	5	✓	DM	M	A	19	NS	—	—
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
10	1	✓	HKR	F	A	61	PN	5	38
"	2	✓	HKR	F	A	50	NN	5	39
"	3	✓	HM	M	A	16	PS	—	—
"	4	✓	HM	M	A	16	NS	—	—
"	5	✓	DM	M	A	15	NS	—	—
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							

DAY #4

Kangaroo Rat Trapping Data Sheet Project: Scarlet Solar Project

Parameter	Trap Opening	Trap Checking/Closing
Date	10-26-16	10-27-16
Time	5-6:05pm	6:30AM-8:30AM
Weather/Temperature	79° clear	52°F - 57°F cloudy
Staff	AR	JH, AR

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
1	1	✓	HKR	F	J	35	—	5	37
"	2	✓	HM	F	A	18	NN	7	—
"	3	✓	HM	M	A	15	NS	—	—
"	4	✓	DM	F	A	15	NN	—	—
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
2	1	✓	HM	F	J	3	—	—	—
"	2	✓	HM	F	A	11	NN	—	—
"	3	✓	HM	M	A	14	NS	—	—
"	4	✓	HM	M	A	11	PS	—	—
"	5	✓	DM	M	A	20	NS	—	—
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							

HKR - 11
DM - 23
HM - 9

(43)

10/27/16

PAGE 2

Kangaroo Rat Trapping Data Sheet Project: Scarlet

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
3	1	✓	HM	M	A	10	NS	—	—
"	2	✓	DM	M	A	15	NS	—	—
"	3	✓	DM	F	A	12	NN	—	—
"	4	✓	HM	F	A	17	NN	—	—
"	5	✓	DM	F	A	11	PN	—	—
"	6	✓	DM	M	A	19	PS	—	—
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
4	1	Bot	DM	F	A	17	NN	—	—
"	2	✓	DM	F	A	18	PN	—	—
"	3	✓	HKR	F	A	43	NN	5	37
"	4	✓	HKR	M	A	36	PS	5	39
"	5	✓	DM	M	A	17	NS	—	—
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							

10/27/16

PAGE 3

Kangaroo Rat Trapping Data Sheet Project: Scarlet

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
5	1	✓	HKR	F	A	52	NN	5	35
"	2	✓	DM	M	A	23	NS	–	–
"	3	✓							
"	4	✓							
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
6	1	✓	HKR	M	A	69	PS	5	40
"	2	✓	HKR	F	A	68	PN	5	37
"	3	✓	DM	M	A	16	NS	–	–
"	4	✓	HKR	F	A	48	NN	5	40
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							

-Bo+

10/27/16

PAGE 4

Kangaroo Rat Trapping Data Sheet Project: Scarlet

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
7	1	✓	DM	M	A	14	NS	–	–
"	2	✓	DM	F	A	17	NN	–	–
"	3	✓	DM	M	A	16	NS	–	–
"	4	✓	DM	F	A	15	NN	–	–
"	5	✓	DM	F	A	14	NN	–	–
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
8	1	✓	0		/				
"	2	✓							
"	3	✓							
"	4	✓							
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							

10/27/16

PAGE 5

Kangaroo Rat Trapping Data Sheet Project: Scarlet

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
9	1	✓	DM	F	A	15	NN	—	—
"	2	✓	HKR	M	A	48	S	5	37
"	3	✓	DM	M	A	19	DS	—	—
"	4	✓	DM	M	A	20	NS	—	—
"	5	✓	DM	F	A	16	NN	—	—
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
10	1	✓	DM	F	A	15	NN	—	—
"	2	✓	HKR	M	A	69	NS	5	38
"	3	✓	HM	F	A	17	NN	—	—
"	4	✓	DM	M	A	16	NS	—	—
"	5	✓	DM	F	A	16	NN	—	—
"	6	✓	HKR	F	A	58	NN	5	38
"	7	✓	HKR	M	A	68	NS	—	40
"	8	✓							
"	9	✓							
"	10	✓							

DAY #5

Kangaroo Rat Trapping Data Sheet Project: Scarlet Solar Project

Parameter	Trap Opening	Trap Checking/Closing
Date	10-28-16	10-29-16
Time	4:45-5:45pm	6:50AM-8:40AM
Weather/Temperature	73°F cloudy	57°F-
Staff	JH, AR	JH, AR

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
1	1	✓	DM	M	A	15	NS	—	—
"	2	✓	DM	F	A	14	NN	—	—
"	3	✓	HKR	M	A	73	PS	5	40
"	4	✓	HKR	M	J	40	NS	5	37
"	5	✓	HM	F	A	16	NN	-	—
"	6	✓	HKR	F	A	75	PS	5	41
"	7	✓	HM	M	A	18	NS	—	—
"	8	✓	HKR	F	A	78	NN	5	37
"	9	✓							
"	10	✓							
2	1	✓	HM	F	A	13	NN	—	—
"	2	✓	HKR	M	A	73	PS	5	40
"	3	✓	DM	M	A	19	NS	—	—
"	4	✓	HM	M	A	17	NS	—	—
"	5	✓	HKR	M	A	68	PS	5	40
"	6	✓	DM	M	A	20	NS	—	—
"	7	✓	HKR	M	J	35	NS	5	36
"	8	✓	HM	M	A	18	PS	—	—
"	9	✓							
"	10	✓							

HKR - 13
DM - 21
HM - 5

(39)

10/29/16

PAGE 2

Kangaroo Rat Trapping Data Sheet Project: Scarlet

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
3	1	✓	HM	M	A	20	NS	—	—
"	2	✓	DM	M	A	20	DS	—	—
"	3	✓	HKR	F	A	60	NN	5	40
"	4	✓	DM	F	A	15	PN	—	—
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
4	1	✓	DM	F	A	17	NN	—	—
"	2	✓	DM	F	A	15	NN	—	—
"	3	✓	HKR	M	J	40	NS	5	40
"	4	✓	DM	M	A	20	NS	—	—
"	5	✓	HKR	M	A	40	NS	5	36
"	6	✓	HKR	F	A	54	NN	5	38
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							

10/29/16

PAGE 3

Kangaroo Rat Trapping Data Sheet Project: Scarlet

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
5	1								
"	2								
"	3								
"	4								
"	5								
"	6								
"	7								
"	8								
"	9								
"	10								
6	1								
"	2								
"	3								
"	4								
"	5								
"	6								
"	7								
"	8								
"	9								
"	10								

NO Traps Set *

NO Traps Set *

* Stations and traps destroyed by disking.

10/28/16

PAGE 4

Kangaroo Rat Trapping Data Sheet Project: Scarlet

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
7	1	✓	DM	M	A	20	NS	—	—
"	2	✓	HKR	M	A	48	NS	5	40
"	3	✓	DM	F	A	15	NN	—	—
"	4	✓	DM	F	J	12	NN	—	—
"	5	✓	DM	F	A	18	NN	—	—
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							
8	1	✓	DM	M	A	15	NS	—	—
"	2	✓	HKR	M	J	45	NS	5	39
"	3	✓	DM	F	A	15	NN	—	—
"	4	✓							
"	5	✓							
"	6	✓							
"	7	✓							
"	8	✓							
"	9	✓							
"	10	✓							

10/29/16

PAGE 5

Kangaroo Rat Trapping Data Sheet Project: Scarlet

Station #	Trap #	Checked (✔)	Species	Sex	Age	Weight (gms)	Repro Cond	# HF Toes	Hind Foot Length (mm)
9	1	✓	DM	M	A	15	NS	—	—
"	2	✓	DM	F	A	15	NN	—	—
"	3	✓	DM	M	A	17	PS	—	—
"	4	✓	DM	M	A	18	NS	—	—
"	5	✓	HM	M	A	13	NS	—	—
"	6	✓	DM	M	A	17	NS	—	—
"	7	✓	DM	F	J	15	NN	—	—
"	8	✓							
"	9	✓							
"	10	✓							
10	1								
"	2								
"	3					NO TRAPS Set			
"	4								
"	5								
"	6								
"	7								
"	8								
"	9								
"	10								

* Stations and Traps deactivated by disking.

Attachment C: Representative Photographs

Representative Photographs

Photograph 1

October 25, 2016.

Disked field along Manning Avenue.

Photograph 2:

October 26, 2016.

Fallow field habitat on the project site.

Photographs Continued

Photograph 3:

October 26, 2016.

Fallow field habitat on the Property.

Photograph 4:

October 26, 2016.

Fallow field habitat on the Property.

Photographs Continued

Photograph 1

October 26, 2016.

Example of kangaroo rat burrow observed on the Property.

Photograph 2:

October 26, 2016.

Example of kangaroo rat burrow observed on the Property.

Photographs Continued

Photograph 3:

October 26, 2016.

Example of kangaroo rat burrow observed on the Property.

Photograph 4:

October 26, 2016.

Example of kangaroo rat burrow observed on the Property.

Photograph 1

October 25, 2016.

Station #1 along Manning Avenue.

Photograph 2:

October 26, 2016.

Station #3 along Manning Avenue.

Photographs Continued

Photograph 3:

October 26, 2016.

Station #6 on a fallow field on the project site.

Photograph 4:

October 26, 2016.

Station #9 on a fallow field on the project site.

Photograph 1

October 27, 2016.

Example of Heermann's kangaroo rat captured during trapping survey.

Photograph 2:

October 25, 2016.

Example of Heermann's kangaroo rat captured during trapping survey.

Photographs Continued

Photograph 3:

October 26, 2016.

Example of deer mouse captured during trapping survey.

Photograph 4:

October 27, 2016.

Example of house mouse captured during trapping survey.

Appendix E2

Biological Resources Evaluation Letter Report

HELIX Environmental Planning, Inc.
11 Natoma Street
Folsom, CA 95630
916.365.8700 tel
www.**helixepi**.com

November 6, 2018 REC-04.01

Ms. Christy Herron
Recurrent Energy
300 California Street, 7th Floor
San Francisco, CA 94104

Subject: Biological Resources Evaluation Letter Report for the RE Scarlet Solar Project, Fresno County, California

Dear Ms. Herron:

This biological resources evaluation letter report was prepared as an update to the RE Scarlet Solar Project Biological Resources Technical Report prepared by HELIX Environmental Planning, Inc (HELIX) in May 2017 on behalf of RE Scarlet LLC. At the time of report production in May 2017, construction of the project was expected to commence in early 2018. Construction of the project did not commence in early 2018 and is currently anticipated to commence by mid-2020. Additional biological studies were conducted in 2018 to assess current site conditions and use of the site by special-status species as well as the current knowledge of special-status species distribution in the project region. An analysis of potential impacts to Swainson's hawk (SWHA; *Buteo swainsoni*) foraging is also included in this report. This letter summarizes the results of those studies and provides an update on site conditions and special-status species with the potential to occur in the project site and/or be impacted by project construction and decommissioning activities.

PROJECT DESCRIPTION

The RE Scarlet Solar Project (proposed project) is a proposed 400 megawatt solar photovoltaic (PV) generating facility and an electrical substation to be constructed on approximately 4,089 acres of agricultural land in unincorporated western Fresno County. The project site is comprised of agricultural land, with associated unpaved farm roads and equipment staging areas. There are no residences or other permanent structures in the project site. The site is bisected by West Manning Avenue, which is the only paved road in the site. Figures are in Attachment A. Figure 1 is a project location map. Figure 2 depicts the project site on an aerial map.

The PV arrays would be mounted in rows on steel posts approximately 4 feet above grade with approximately 14 feet between rows. Collection lines would be underground, and the substation would connect to the regional electrical grid at the Pacific Gas and Electric Company's (PG&E) 230 kilovolt (kV) Tranquillity Switching Station located west of State Route 33 and south of Manning Avenue. An

overhead generation tie (gen-tie) line would run through easements across the existing Tranquillity Solar Generating Facility. Construction of the proposed project would take place in one phase beginning in 2020 and is expected to continue for 18 months.

Construction activities would take place during daylight hours, approximately 7 a.m. to 5 pm., and would be continuous unless prevented by rain. Construction would include establishment of access roads with dirt or decomposed granite surfaces, trenching for underground collection lines, boring for posts to support solar arrays, installation of posts and solar arrays, and construction of an electrical substation consisting of above-ground facilities mounted on concrete pads. Equipment used would be standard construction equipment such as excavators, loaders, graders, cranes, forklifts, container trucks, and water trucks. The site will not require mass grading or cut and fill, as it is already flat and level. Existing shallow earthen ditches along field margins would be filled. The project would be constructed in a single phase; however, activities would occur in stages throughout the site.

STUDY METHODS

Studies conducted in 2018 included updated database queries for regionally-occurring special-status species, an analysis of the potential of those species to occur in the project site and/or be impacted by the project, biological reconnaissance surveys to assess current site conditions, and assessments of current habitat conditions for burrowing owl (BUOW; *Athene cunicularia*), San Joaquin kit fox (SJKF; *Vulpes macrotis mutica*), and SWHA. HELIX also conducted protocol presence/absence surveys for BUOW and SWHA between April and July 2018, representing the second complete set of protocol surveys conducted by HELIX for these species. Results of the BUOW and SWHA surveys are summarized briefly in this letter and the survey reports are included as attachments.

Updated Database Queries and Special-Status Species Review

Updated lists of regionally-occurring special-status species with the potential to occur in the project site and vicinity were obtained from the following databases:

- The Sacramento Fish and Wildlife Office list of threatened and endangered species that may occur in the project site and/or may be affected by the project.
- The California Native Plant Society (CNPS) list of special-status plants documented in the "Cantua Creek" quad and the eight surrounding 7.5-minute quads (Coit Ranch, Tranquillity, Jamesan, Levis, San Joaquin, Lillis Ranch, Tres Pecos Farms, Westside).
- The California Natural Diversity Database (CNDDB) list of special-status species documented within 10 miles of the project site.

The results of the database query were compared to the database query results conducted in preparation of the May 2017 BTR and were substantially the same. One new special-status plant species was documented by CNPS (Hall's tarplant [*Deinandra hallii*]) in the region; however, there is no potential for this species to occur in the project site. The results of these queries are provided as Attachment B. An updated analysis of potential for special-status species to occur in the project site is provided as Attachment C.

Biological Surveys

Biological surveys conducted by HELIX in 2018 included a biological reconnaissance survey of the project site to document current conditions, protocol surveys for SWHA, a habitat assessment and protocol surveys for BUOW, and habitat assessments for SJKF and special-status kangaroo rats. Table 1 provides a summary of survey dates and personnel for all biological resources surveys conducted in 2018.

Biological Reconnaissance Survey

The biological reconnaissance survey was conducted on April 16, 2018 and included an assessment of current habitats present on the site, documentation of plant and animal species observed (if a species was observed that had not been previously documented on the site), and photos of current site conditions. The habitat assessments for SJKF and special-status kangaroo rats were conducted simultaneously with the biological reconnaissance and included searching for suitable burrows or sign of these species within uncultivated portions of the site. A list of species observed in the project site is included as Attachment D.

Table 1
SUMMARY OF BIOLOGICAL SURVEYS CONDUCTED FOR THE RE SLATE SOLAR PROJECT IN 2018

Survey	Survey Dates	Personnel
Biological Reconnaissance, Habitat Mapping, Floral and Faunal Inventories	April 16, 2018	George Aldridge, Dan Van Essen
SWHA Protocol Surveys	April 16 and 18, June 20, 21, 25, July 8	George Aldridge, Dan Van Essen, Stephen Stringer
BUOW Habitat Assessment and Protocol Surveys	April 16, May 9, June 5, 20, and 21	George Aldridge, Dan Van Essen
SJKF Habitat Assessment	April 16, 2018	George Aldridge, Dan Van Essen
Kangaroo Rat Habitat Assessment	April 16, 2018	George Aldridge, Dan Van Essen

SWHA Protocol Surveys

Focused surveys for SWHA were conducted by HELIX biologists on six occasions during the breeding season (Table 1), in accordance with the most recent published protocols (SHTAC 2000). Surveys covered the project site and all lands within 0.5 mile of the project site. All suitable trees were examined using binoculars, and the status of any suitable nest was determined (i.e., occupied, vacant, occupied by another species). Detailed methods are described in the *Swainson's Hawk Survey Report for the RE Scarlet Solar Project, Fresno County, California* (HELIX 2018a) included as Attachment H.

BUOW Habitat Assessment and Protocol Surveys

A habitat assessment and focused surveys for BUOW were conducted by HELIX biologists on five occasions during the breeding season (Table 1), in accordance with the latest published protocols (CDFW 2012). During each survey, transects were walked in all areas of the site identified as habitat for BUOW in the habitat assessment (i.e., field edges in the northeastern corner of the site). The majority of the site's acreage is unsuitable for BUOW nesting due to regular disking and intensive cultivation of row crops. As an additional means to cover the remainder of the site, HELIX drove the site's existing access roads searching for BUOWs and stopped every 100 meters or less to scan the surrounding area for BUOW presence with binoculars. Detailed methods are described in the *Burrowing Owl Survey Report for the RE Scarlet Solar Project, Fresno County, California* (HELIX 2018b) which is included as Attachment E.

RESULTS

Site Conditions

The entire site is comprised of agricultural land. Agricultural land comprises a range of active and fallow agricultural fields including row crops, small grain crops, and recently disked land bare of vegetation, as well as dirt roads, field margins, and temporary ditches excavated to drain actively irrigated fields.

Actively used dirt roads are generally graded and bare, while unused roads are mostly overgrown with the same vegetation found in the adjacent fallow fields. Agricultural operations in the project site change from year to year, resulting in a shifting mosaic of crops, irrigation, drainage, road use, sheep grazing, and fallowing throughout the site. Crops observed at the site include tomatoes, garlic, alfalfa, and wheat. There is no natural topography in the site and no permanent features such as dikes, berms, canals, or structures that imply a consistent land use that exists for long enough to warrant definition as something other than agriculture.

Agricultural activity at the site has increased since 2016, with all portions of the site appearing to have been disked/cultivated within the last 12-24 months. As of spring/summer 2018, approximately half of the site is now either freshly disked or irrigated alfalfa fields. Previously, the northwest portion of the site near the intersection of Monterey Avenue and South Avenue appeared to have been inactive for several years and supported extensive areas of Russian thistle (*Salsola tragus*), as well as many small mammal burrows. At the time of the biological surveys in 2018, all fallow fields with mammal burrows in the interior have been eliminated by disking. The entire site now provides little or no potential wildlife habitat with the exception of foraging habitat for birds. Site photos are included as Attachment F.

Special-Status Species

Based on documented species occurrences, species ranges and habitat affinities, and observations during biological surveys, a total of six regionally-occurring special-status species were identified as occurring or having the potential to occur in the project site (Table 2) and are discussed below. One species [short-eared owl (*Asio flammeus*)] that was considered to have the potential to occur in the project site in the May 2017 BTR no longer has the potential to occur on the site due to the increased agricultural activity and is not discussed. Special-status species occurrences documented during 2018 surveys are shown on Figure 3.

Table 2
SPECIAL-STATUS SPECIES WITH THE POTENTIAL TO OCCUR IN THE RE SCARLET SOLAR PROJECT SITE

Scientific Name/ Common Name	Regulatory Status[1]	Status in the Project Site[2]	Suitable Habitat in the Project Site
Birds			
Athene cunicularia burrowing owl	--/--/SSC	Present (transient)	Disturbed areas at the margins of agricultural fields provide potential nesting and agricultural fields provide potential foraging habitat. One breeding pair with a juvenile observed occupying a culvert on the north side of Manning Avenue, 300 feet west of San Mateo Avenue.
Buteo swainsoni Swainson's hawk	--/ST/--	Present (foraging)	There are no trees on the project site; therefore, there is no suitable nesting habitat for this species on the site. Agricultural fields provide suitable foraging habitat for individuals nesting in the region. A SWHA was observed foraging in an irrigated alfalfa field on the site during biological surveys.
Circus cyaneus northern harrier	--/--/SSC	Present (foraging)	Observed in the project site during biological surveys. Agricultural fields provide suitable foraging habitat for individuals nesting in wetland habitat northeast of San Joaquin.
Eremophila alpestris actia California horned lark	--/--/WL	Present (foraging)	Disturbed areas along roads and field margins provide suitable foraging and nesting habitat.
Lanius ludovicianus loggerhead shrike	--/--/SSC	Present (foraging)	Observed in the project site during biological surveys. There is no nesting habitat for this species on the project site. Fallow fields provide suitable foraging habitat for individuals nesting in shrubs in off-site parcels.
Mammals			
Vulpes macrotis mutica San Joaquin kit fox	FE/SE/--	Presumed Absent	Marginal dispersal and foraging habitat is present on the project site. However, this species was not observed in the project site during protocol surveys or any other biological surveys conducted for the proposed project and is presumed absent.

[1] Regulatory Status is ESA listing/CESA listing/Other state status. FE = Federal Endangered; SE = State Endangered; ST = State Threatened; SSC = CDFW Species of Special Concern; WL = CDFW Watch-list.
[2] Status in the project site is based on results of surveys summarized in Table 1 and/or prior surveys documented in HELIX (2017) and CNDDB reported occurrences.

Burrowing Owl (Athene cunicularia)

Federal status – none
State status – species of concern

Species Description

BUOWs are often found in open, dry grasslands, agricultural and range lands, and desert habitats. They can also inhabit grass, forb, and shrub stages of pinyon and ponderosa pine habitats. BUOWs occur at elevations ranging from 200 feet below mean sea level to over 9,000 feet amsl. In California, the highest elevation where BUOWs are known to occur is 5,300 feet amsl in Lassen County. In addition to natural habitats, BUOWs can be found in urban habitats such as at the margins of airports and golf courses and in vacant urban lots. BUOWs forage in adjacent grasslands and other suitable habitats primarily for insects and small mammals, and less often for reptiles, amphibians, and other small birds.

BUOWs nest in burrows in the ground and commonly perch on fence posts or mounds near the burrow. The owls often use ground squirrel burrows or badger dens or artificial burrows such as abandoned pipes or culverts. Although the more northern BUOW populations migrate seasonally, BUOWs are year-round residents of the San Joaquin Valley. BUOWs often form loose colonies, with nest burrows 46 to 2,952 feet apart (Ross 1974; Gleason 1978). In the San Joaquin Valley, the nesting season for BUOW can begin as early as February 1 and continues through August 31.

Survey History

The nearest CNDDB reported occurrence of BUOW is from canal banks along W. Adams Avenue, approximately 1.5 miles east of the project site. Eight BUOWs were observed using burrows at this location in 2006; nesting was not confirmed at this location but can be assumed. Other CNDDB occurrence records in the region are from canal banks south of the Mendota Wildlife Area, approximately 5 miles northeast of the project site where BUOWs were observed nesting at multiple locations in the late 1980's and early 1990's.

A habitat assessment and protocol surveys for BUOW were conducted in 2016 and again in 2018. Transient BUOWs and BUOW sign (whitewash, pellets) have been observed on and adjacent to the site on multiple occasions (HELIX 2017). During surveys in 2018, a pair of adult BUOWs and a juvenile were observed occupying a concrete culvert under Manning Avenue approximately 300 feet west of San Mateo Avenue within the road right-of-way (Figure 3). The burrow is located outside of the proposed project's perimeter fencing and would not be directly impacted by the project. Adults from this burrow were observed foraging in fallow fields in the project site and immediately to the east, within 500 feet of the burrow location. No other BUOWs or sign were observed anywhere in the project site or adjacent lands within 200 meters.

Habitat Suitability

Most of the project site provides potential foraging habitat for BUOW. Disking and other soil disturbance associated with on-going agricultural activities limits the potential for this species to occupy the agricultural fields within the project site, but potential habitat is present around the perimeter of fields or along roads and other uncultivated areas.

Potential for Significant Adverse Effects

Activities associated with construction and/or decommissioning could result in direct impacts to BUOW individuals occupying burrows in or adjacent to the project site and/or indirect impacts as a result of habitat destruction or loss of burrows. Direct impacts could occur as a result of construction activities in the vicinity of occupied burrows resulting in disturbance of BUOW by driving individuals from their burrows or nest disturbance such as forced fledging or nest abandonment. Direct impacts could also occur as a result of contact with construction equipment or personnel. Project construction activities that could occur in the vicinity of occupied burrows would include access road construction, trenching for low-voltage collection lines, boring for support posts, installation of solar panel arrays, and site decommissioning. These activities would be considered low-intensity impacts because the construction disturbance (noise, presence of equipment and personnel) would be comparable in nature to the agricultural practices in the region.

Disturbance of burrows occupied by BUOW and/or loss of foraging habitat for BUOW adjacent to occupied burrows would be a significant impact and implementation of appropriate mitigation measures would be required.

Swainson's Hawk (*Buteo swainsoni*)

Federal status – none
State status – Threatened

Species Description

SWHA was state listed as a California threatened species on April 17, 1983. This species has no federal listing status.

SWHA is an uncommon breeding resident and migrant in the Central Valley, Klamath Basin, Northeastern Plateau, Lassen County, and the Mojave Desert. There has been very limited SWHA breeding reported from Lanfair Valley, Owens Valley, Fish Lake Valley, Antelope Valley, and in eastern San Luis Obispo County. SWHA breeds in stands with few trees in juniper-sage flats, riparian areas, and in oak savannah in the Central Valley and forages in adjacent grasslands or suitable grain or alfalfa fields, or livestock pastures. SWHAs breed in California and winters in Argentina, Mexico, and South America. SWHAs usually arrive in the Central Valley between March 1 and April 1 and migrate south between September and October. SWHAs usually nest in trees adjacent to suitable foraging habitat. SWHA nests are usually located in trees near the edges of riparian stands, in lone trees or groves of trees in agricultural fields, and in mature roadside trees. Valley oak, Fremont cottonwood, walnut, and large willow with an average height of about 58 feet, and ranging from 41 to 82 feet, are the most commonly used nest trees in the Central Valley. Suitable foraging areas for SWHA include native grasslands or lightly grazed pastures, alfalfa and other hay crops, idle land, certain grain and row croplands, and ruderal lands. SWHAs primarily feed on voles; however, they will feed on a variety of prey including small mammals, birds, and insects.

Survey History

CNDDB reported occurrences within 10 miles of the project site are all located near Mendota and north of Tranquillity, northeast of the project site. These records are associated with trees in the Mendota Wildlife Area, Fresno Slough, and isolated trees near residences.

The project site does not support suitable nesting habitat for SWHA, as the site is treeless. As of 2018, the nearest trees are a stand of eucalyptus surrounding a house at Dinuba Avenue and Highway 33, which is adjacent to the southwest corner of the project site. The only other trees within 0.5-mile of the project site are a stand of salt cedar (*Tamarix ramosissima*) on Monterey Avenue 0.4-mile north of the site. These trees have been closely inspected by HELIX biologists in 2016 and 2018, and do not support any hawk nests. Therefore, there are no SWHA nests within a 0.5-mile radius of the site. During surveys by HELIX biologists in 2016, a pair of SWHAs was observed nesting in eucalyptus trees along West Dinuba Avenue west of SR-33 and a second pair was observed nesting in a willow tree along W. Rose Avenue between San Bernardino Avenue and Ohio Avenue. These nest locations, which are 0.4 and 2 miles from the project site, respectively, have been abandoned.

Habitat Suitability

The project site does not support suitable nesting habitat for SWHA, as the site is treeless.

It is assumed that the project site could be used by foraging SWHA in the region. However, documented use of the site by SWHA was very low in 2018. HELIX biologists surveyed the project site for SWHA a total of six times during the nesting season between mid-April and early July (HELIX 2018a) and only one SWHA was observed during the surveys. A single SWHA was observed perched on a post at the corner of an irrigated alfalfa field near San Benito Avenue, south of Manning Avenue (Figure 3). After perching for a few minutes, the bird flew off-site to the south until it disappeared from view. No other observations of SWHA were recorded in the site during biological surveys.

SWHA Foraging Use of Developed Solar Sites

Lands supporting linear rows lined with tall vegetation (e.g., vineyards) have been typically considered unsuitable foraging habitat because the extent to which SWHAs would attempt to capture prey between rows of tall vegetation is considered negligible (Estep 2013). Similarly, solar generation facilities – which are generally similar to vineyards in overall structure – are typically considered unsuitable foraging habitat. However, recent studies indicate that both vineyards and solar generation facilities provide some foraging habitat value for SWHAs (Estep 2013; Swolgaard et al. 2008).

In 2018, HELIX conducted a SWHA foraging study to determine use of large-scale SGF (>1,000 acres) located in an agricultural landscape (Attachment G). The study expanded on a prior study conducted in 2012 that documented SHWA use of small-scale solar facilities (100-200 acre solar arrays) within a diverse agricultural matrix (Estep 2013). The 2018 HELIX study compared SWHA foraging use of the 1,100-acre RE Mustang Solar Facility in Kings County near Lemoore to an approximately 4,800-acre off-site area that included active agricultural lands. HELIX found that SWHAs foraged in the operational RE Mustang Solar Solar Facility at a higher intensity (determined by the minutes of forage per unit area) than in surrounding lands. This result is consistent with the findings of Estep (2013), suggesting that

solar facilities managed to promote SWHA foraging may provide higher-value foraging habitat than active and idle agricultural lands.

Potential for Significant Adverse Effects

Because there are no trees in the project site, the proposed project would not remove SWHA nesting habitat. There are two locations of trees suitable for SWHA nesting within a 0.5-mile radius of the project site: the eucalyptus trees at Dinuba Avenue and Highway 33 and the tamarisk trees north of South Avenue. However, HELIX has not observed SWHAs nesting in these trees in the 2015, 2016, or 2018 breeding seasons. Project construction and decommissioning activities within 0.25 mile of suitable trees could potentially disturb nesting SWHAs, if they were to begin nesting in those trees. Disturbance leading to nest abandonment, forced fledging, or other harm of SWHA or nestlings would be a significant impact.

An analysis of potential impacts of the proposed project on SWHA foraging habitat is presented in Attachment G. Therefore, this biological resources evaluation letter report does not evaluate potential impacts to SWHA foraging habitat and potential impacts to SWHA foraging habitat are not discussed further in this document.

Northern Harrier (*Circus cyaneus*)

Federal status – none
State status – species of special concern

Species Description

Northern harrier is widespread throughout North America from southern Canada to northern Mexico and is a year-round resident in California. Population sizes increase during the non-breeding season due to over-wintering migrants. Northern harriers breed in a variety of open habitats including marshes, wet meadows, weedy shorelines, grasslands, weed fields, pastures, sagebrush flats, desert sinks, and croplands. Northern harriers nest on the ground in patches of dense, tall vegetation in undisturbed areas. Breeding occurs from March to August. Northern harriers feed on a wide variety of vertebrate prey, including rodents, songbirds, waterfowl, and lizards.

Survey History

Northern harrier was observed foraging in the project area during biological surveys in 2016 and 2018. Individuals were regularly observed near the center of the site and at the eastern edge. No nests or nesting pairs were observed. There are no CNDDB reported occurrences of nesting northern harrier within 10 miles of the project site.

Habitat Suitability

Fallow agricultural fields in the project site provide suitable foraging habitat for northern harrier. The project site does not support patches of dense, tall, undisturbed vegetation suitable for nesting.

Potential for Significant Adverse Effects

The proposed project would have no effect on nesting northern harrier, as there is no suitable nesting habitat in or adjacent to the project site. The nearest suitable nesting habitat for northern harrier is in the Mendota Wildlife Area, approximately 2.5 miles northeast of the project site. All intervening land is agricultural fields similar to the project site and provides similar foraging habitat. Converting the project site to solar PV generation would not have a significant adverse effect on northern harrier foraging habitat in the region of the Mendota Wildlife Area due to the abundance of similar agricultural fields in the area. No mitigation is necessary for northern harrier.

California Horned Lark (*Eremophila alpestris actia*)

Federal status – none
State status – watch list

Species Description

Horned lark is a common to abundant resident of a variety of open habitats from coastal grasslands to alpine dwarf shrub habitats. Horned larks usually leave mountainous areas in winter and gather in deserts and lowlands where they form large flocks, augmented by migrants from outside California.

Horned larks forage on the ground for insects, snails, spiders, and seeds. Nests are built on the ground in areas of low, sparse vegetation; breeding occurs from March through July (CDFW 1990).

Survey History

Horned larks were observed in the project site regularly during surveys in 2016 and 2018. Individuals were seen along roads and in disturbed areas at the margins of fallow fields. The only CNDDB reported occurrence of horned lark within 10 miles of the project site is located 0.5 mile west of Interstate 5 at Mountain View Avenue, which is over 5 miles west of the project site.

Habitat Suitability

Disturbed areas at the margins of fallow fields provide open, sparsely vegetated habitat suitable for horned lark nesting and foraging. Horned larks were observed in these habitats during the breeding season in 2016 and 2018, although nesting was not directly observed.

Potential for Significant Adverse Effects

In the absence of proposed mitigation measures, potential adverse effects of the proposed project could include direct or indirect impacts to horned lark. Construction and decommissioning activities during the horned lark breeding season (March – July) would have the potential to disturb nests both directly and indirectly through nest destruction and/or construction equipment and/or personnel causing noise or other disturbance near nests. Disturbance could lead to destruction of nests, eggs, or chicks, or to abandonment of active nests. This would be a significant impact and implementation of appropriate mitigation measures would be required.

Loggerhead Shrike (*Lanius ludovicianus*)

Federal status – none
State status – species of special concern

Species Description

The range of the loggerhead shrike extends throughout the United States and southern Canada, and it is a year-round resident throughout most of its California range. This species prefers open habitats with scattered shrubs, trees, posts, or other perches. It can be found in shrublands or open woodlands with bare ground, or sparse herbaceous cover and is often found in open cropland. Loggerhead shrikes hunt in open areas of short grasses, forbs, or bare ground, and impale prey on thorns or barbed wire. Prey includes large insects, as well as various small reptiles, amphibians, rodents, and birds.

Suitable breeding habitat includes shrublands or open woodlands with grass cover or bare ground. Loggerhead shrikes in the Central Valley typically use riparian edges where they generally place their nests 1 to 2 meters (3.3 to 6.6 feet) above ground in shrubs or trees. Loggerhead shrike habitat includes alfalfa fields, grasslands, non-rice crops, oak groves, orchards, pastures, ponds and seasonally wet areas, riparian areas, disturbed areas, rural residential development, tree groves, and canals.

Survey History

Loggerhead shrike was observed foraging in the project site during surveys in 2016 and 2018, near the center of the site and at the eastern edge. These individuals were associated with remnant patches of alkali sink scrub dominated by Mojave saltbush (*Atriplex spinifera*) and allscale (*Atriplex polycarpa*) that are located on off-site parcels. These thorny shrubs offer suitable nesting and perching habitat for loggerhead shrike that is not available in the project site, and shrikes were not observed more than a few hundred feet inside the project site boundary. There are no CNDDB reported occurrences of loggerhead shrike within 10 miles of the project site.

Habitat Suitability

The project site does not provide suitable nesting or perching/hunting habitat for loggerhead shrike but does provide foraging habitat for individuals residing in shrubby habitats just outside the project site boundary. Periodic disking of fields in the project site likely reduces the suitability of those areas as foraging habitat for neighboring shrikes.

Potential for Significant Adverse Effects

There is no suitable nesting habitat in the project site, however, project activities related to construction and decommissioning have a low potential to affect loggerhead shrike nesting adjacent to the project site by causing noise or other disturbance near nests. Disturbance could lead to destruction of nests, eggs, or chicks, or to abandonment of active nests. Loggerhead shrike is a highly mobile bird species and individual birds foraging or otherwise occurring in the site could readily avoid construction areas or contact with construction equipment or personnel. Therefore, no direct impacts to loggerhead shrike individuals is anticipated. Potential impacts to shrikes nesting adjacent to the site would be a significant impact and implementation of appropriate mitigation measures would be required.

San Joaquin Kit Fox (*Vulpes macrotis mutica*)

Federal status – Endangered
State status – Endangered

Species Description

SJKF was listed as "threatened with extinction" under the Endangered Species Preservation Act of October 15, 1966 (16 U.S.C. 668aa(c); 32 FR 4001) and is currently listed as "Endangered" under the Endangered Species Act of 1973 (16 U.S.C. 1531-1544).

SJKF inhabits a wide range of open and shrubby habitats, including grassland, scrublands, agricultural areas where dens are available (e.g., unplowed fields, row crops, vineyards, or orchards), non-irrigated pastures, vernal pool grasslands, playas, and alkali meadows. SJKF dens are typically located on slopes less than 40 degrees, and pupping dens are usually on level ground; den entrances are typically 8 – 10 inches in diameter. SJKF use many dens in a season, and occupied dens often show no signs of use. Common signs of use include a dirt ramp leading to the entrance, flattened grass around the entrance, scat, tracks, and prey remains.

The largest extant populations of SJKF are at the western margins of the Central Valley and the eastern Coast Ranges. Population centers occur in western Kern County (Elk Hills and Pixley National Wildlife Refuge), eastern San Luis Obispo County (Carrizo Plain), western Fresno County and eastern San Benito County (Ciervo – Panoche Natural Area), Southern Monterey County (Fort Hunter-Liggett and Camp Roberts), western Merced County, and eastern Contra Costa County. These population centers generally form a metapopulation lying west of Interstate 5 and/or south of Allensworth, with only isolated occurrences in the remainder of the valley. By 2006, SJKF was determined to be largely eliminated from the central San Joaquin Valley (USFWS 2010).

Survey History

There are four CNDDB reported occurrences of SJKF within 10 miles of the project site, three of which are west of the California Aqueduct. The only reported occurrence not separated from the project site by more than 5 miles and a major movement barrier is a record from the town of Mendota dated 1947.

SJKF was not observed in the project site during protocol-level surveys conducted for the project (HELIX 2017). The project site contains no suitable dens and no sign of this species has been observed on the site during habitat assessments in 2016 or 2018. In 2018, small mammal burrows were present along the northern edge of the project site north of South Avenue, where adjacent lands have been inactive for several years; however, most of these areas were burned in June 2018.

Habitat Suitability

The entire project site, and all lands surrounding it south of Manning Avenue, are currently or recently active fields with no suitable burrows for kit fox. Small mammal burrows are abundant around the margins of the project site north of Manning Avenue, but absent from the interior and edges of active agricultural fields. Frequent disking and cultivation of fields eliminates burrows and discourages occupancy by burrowing mammals. SJKF have the low potential to occur in the site as transient

individuals dispersing from population centers many miles distant but has no potential to reside or breed in the site.

Potential for Significant Adverse Effects

No kit foxes or sign were observed in the project site during protocol surveys in 2016 or during biological surveys in 2018; however, because SJKF is a highly mobile animal, there is low potential for SJKF to occupy the project site prior to commencement of the project or to occur in the project site as transient individuals either foraging or dispersing through the site during construction, operation, and decommissioning. In the absence of proposed mitigation measures, the project would have low potential for adverse effects on SJKF. This would be a significant impact and implementation of appropriate mitigation measures would be required.

DISCUSSION

HELIX conducted an updated evaluation of potential impacts to biological resources resulting from the proposed project to supplement the evaluation conducted in 2017 (HELIX 2017). No new special-status species were identified as having the potential to occur in the project site and/or be impacted by the proposed project. A nesting pair of BUOW was observed adjacent to the project site in the Manning Avenue right-of-way that was not present during surveys conducted in preparation of the 2017 report. There were no other new sightings of special-status species. The most notable change in conditions in the project site since 2016 is an overall reduction in the wildlife habitat value of the site due to an increase in agricultural activity. Portions of the site that had not been active for several years prior to 2016 and had developed some vegetative and topographic diversity that provided some wildlife habitat have been disked and rendered uniformly flat and largely bare. In addition, removal of eucalyptus trees along Dinuba Avenue approximately 0.25-mile west of the project site and other tree removal as a result of construction of adjacent solar facilities has reduced the available nesting habitat for SWHA in the vicinity.

If you have any questions regarding this update to the biological resources reports for the RE Scarlet project, please contact me by phone at (916) 365-8712, or by e-mail at StephenS@helixepi.com.

Sincerely,

Stephen Stringer,
Biology Group Manager

Attachments:

Attachment A – Figures
Attachment B – Regionally-Occurring Special-Status Species Database Queries
Attachment C – Potential to Occur Analysis
Attachment D – Species Observed
Attachment E – Burrowing Owl Survey Report
Attachment F – Site Photographs
Attachment G – SWHA Foraging Study
Attachment H – SWHA Protocol Survey Report

REFERENCES

California Department of Fish and Wildlife (CDFW). 1990. California Wildlife Habitat Relationships System – Horned lark (*Eremophila alpestris*).

1994. Staff report regarding mitigation for impacts to Swainson's hawk (*Buteo swainsoni*) in the Central Valley of California. November 1.

2012. Staff Report on Burrowing Owl Mitigation. March 7.

California Native Plant Society, Rare Plant Program. 2018. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website http://www.rareplants.cnps.org [accessed 19 June 2018].

Endangered Species Recovery Program (ESRP). 2016a. California State University Stanislaus. Species Profile for Ciervo aegilian scarab beetle. Available at: http://esrp.csustan.edu/speciesprofiles/profile.php?sp=aeco

2016b. California State University Stanislaus. Species Profile for San Joaquin dune beetle. Available at: http://esrp.csustan.edu/speciesprofiles/profile.php?sp=cogr

Estep, J.A. 2013. Swainson's hawk and other raptor foraging use of solar array fields within an agricultural landscape in Sacramento County. Prepared for Recurrent Energy, San Francisco, CA.

Gleason, R. S. 1978. Aspects of the breeding biology of Burrowing Owls in southeastern Idaho. Thesis. University of Idaho, Moscow, USA.

HELIX Environmental Planning, Inc. (HELIX). 2017. RE Slate Solar Project Biological Resources Technical Report. Prepared for Recurrent Energy, San Francisco, CA. July.

2018a. Swainson's Hawk Survey Report for the RE Scarlet Solar Project, Fresno County, California. Prepared for Recurrent Energy, San Francisco, CA. July.

2018b. Burrowing Owl Survey Report for the RE Scarlet Solar Project, Fresno County, California. Prepared for Recurrent Energy, San Francisco, CA. July.

2018c. Swainson's Hawk Foraging Use of a Large-scale Solar Generating Facility in an Agricultural Landscape. Prepared for Recurrent Energy, San Francisco, CA. February.

Holland, Robert F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. Prepared for the State of California, The Resources Agency, and Department of Fish and Game. Sacramento, CA. October 1986.

Jennings, M.R., and M.P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. California Department of Fish and Game, Inland Fisheries Division. Rancho Cordova, CA.

National Oceanic and Atmospheric Administration (NOAA). 2005. 50 CFR Part 226 [Docket No. 41123329 5202–02; I.D. No.110904F] RIN 0648–AO04 Endangered and Threatened Species; Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Federal Register Vol. 70, No. 170. September 2.

Pierson, E.D. and W.E. Rainey. 1998. Western mastiff bat (Eumops perotis). In: Terrestrial Mammal Species of Special Concern in California, B.C. Bolster, ed.

Ross, P. V. 1974. Ecology and behavior of a dense colony of burrowing owls in the Texas Panhandle. M. S. Thesis. West Texas State University, Canyon.

Shuford, W.D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Smallwood, K.S. 1995. Scaling Swainson's hawk population density for assessing habitat use across an agricultural landscape. Journal of Raptor Research, 29(3): 172-178.

Swainson's Hawk Technical Advisory Committee (SHTAC). 2000. Recommended timing and methodology for Swainson's hawk surveys in California's Central Valley. May 31.

U.S. Fish and Wildlife Service (USFWS). 1995. Sacramento – San Joaquin Delta Native Fishes Recovery Plan. U.S. Fish and Wildlife Service, Portland, OR.

1996. California Condor Recovery Plan, Third Revision. Portland, OR. 62 pp.

1999a. San Joaquin Kit Fox Protocol for the Northern Range. Sacramento Fish and Wildlife Office. June.

1999b. Draft Recovery Plan for the Giant Garter Snake (Thamnophis gigas). U.S. Fish and Wildlife Service, Portland, Oregon.

2001. 50 CFR Part 17 RIN–1018–AG32 Endangered and Threatened Wildlife and Plants; Final Determination of Critical Habitat for the California Redlegged Frog. Federal Register Vol. 66, No. 49. March 13.

2005. Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. Region 1, U.S. Fish and Wildlife Service, Portland, OR. December 15.

2010a. San Joaquin Kit Fox (*Vulpes macrotus mutica*) 5-Year Review: Summary and Evaluation. Prepared by the Sacramento Fish and Wildlife Office.

2010b. Blunt-nosed Leopard Lizard (Gambelia sila) 5-Year Review: Summary and Evaluation. Sacramento Fish and Wildlife Office. February.

2011. U.S. Fish and Wildlife Service Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior To Or During Ground Disturbance. Available online at

https://www.fws.gov/sacramento/es/Survey-Protocols-guidelines/Documents/kitfox_standard_rec_2011.pdf

2015. Bay Delta Fish & Wildlife Office Species Account for Longfin Smelt (Spirinchus thaleichthys). Available at http://www.fws.gov/sfbaydelta/species/longfin_smelt.pdf.Obtained online in December 2015.

2016a. Species Profile for Giant Kangaroo Rat (*Dipodomys ingens*), Environmental Conservation Online System. Available at: http://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A08P.

2016b. Environmental Conservation Online System (ECOS). Accessed March 28, 2016.

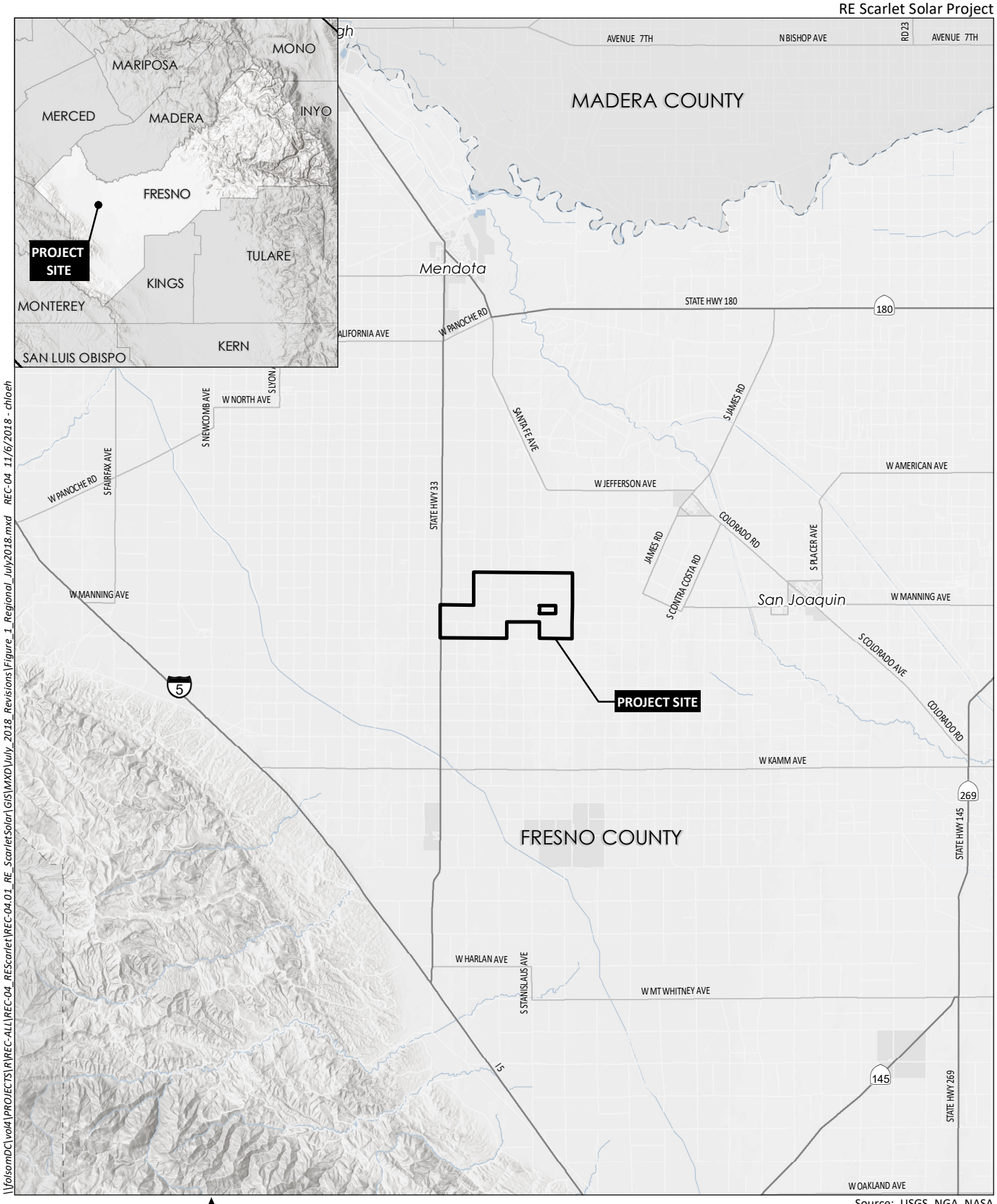
Swolgaard, C.A., K.A. Reeves, and D.A. Bell. 2008. Foraging by Swainson's hawks in a vineyard-dominated landscape. Journal of Raptor Research, 42(3):188-196.

Williams, D.F. 1986. Mammalian species of special concern in California. Wildlife Management Division Administrative Report 86-1. June.

Zeiner, D.C., W.F. Laudenslayer, K.E. Meyer, and M. White, eds. 1990. California's Wildlife, Vol's I-III. California Department of Fish and [Wildlife].

Attachment A

Figures



\\FolsomDC\vol4\PROJECTS\R\REC-ALL\REC-04_RESCarlet\REC-04.01_RE_ScarletSolar\GIS\MXD\July_2018_Revisions\Figure_1_Regional_July2018.mxd REC-04 11/6/2018 - chloeh

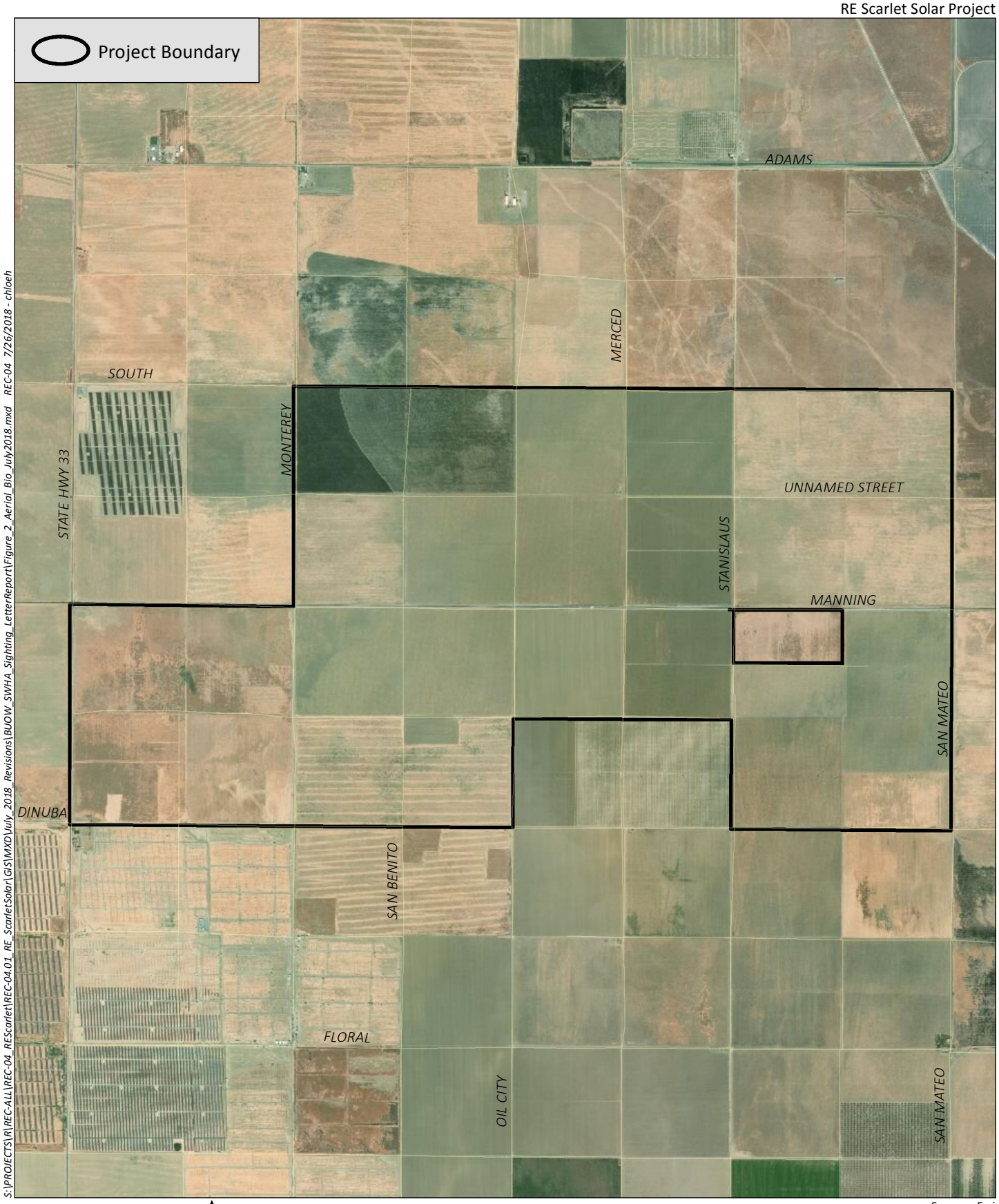
0 5 Miles

Source: USGS, NGA, NASA

HELIX Environmental Planning

Regional Location

Figure 1



S:\PROJECTS\R\REC-ALL\REC-04_REScarlet\REC-04.01_RE_ScarletSolar\GIS\MXD\July_2018_Revisions\BUOW_SWHA_Sighting_LetterReport\Figure_2_Aerial_Bio_July2018.mxd REC-04 7/26/2018 - chloeh

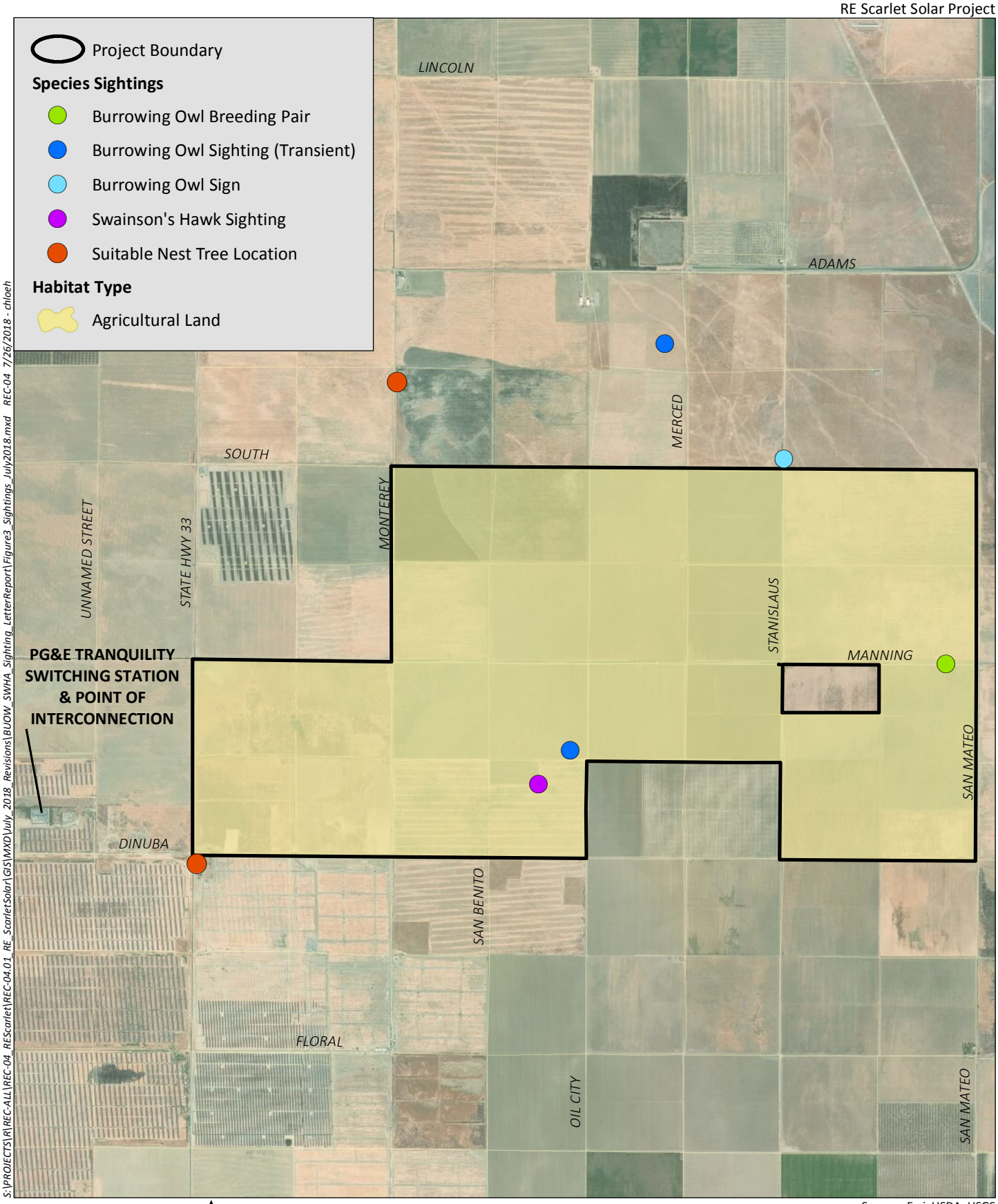
0 4,000 Feet

Source: Esri

HELIX Environmental Planning

Site Location Map

Figure 2



S:\PROJECTS\R\REC-ALL\REC-04_REScarlet\REC-04.01_RE_ScarletSolar\GIS\MXD\July_2018_Revisions\BUOW_SWHA_Sighting_LetterReport\Figure3_Sightings_July2018.mxd REC-04 7/26/2018 - chloeh

HELIX Environmental Planning

Habitat Map and Special-Status Species Sightings

Figure 3

Attachment B

Regionally-Occurring Special-Status Species Database Queries

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
Phone: (916) 414-6600 Fax: (916) 414-6713

In Reply Refer To:
Consultation Code: 08ESMF00-2016-SLI-1111
Event Code: 08ESMF00-2018-E-05578
Project Name: Scarlet Solar

April 20, 2018

Subject: Updated list of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, under the jurisdiction of the U.S. Fish and Wildlife Service (Service) that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Please follow the link below to see if your proposed project has the potential to affect other species or their habitats under the jurisdiction of the National Marine Fisheries Service:

http://www.nwr.noaa.gov/protected_species/species_list/species_lists.html

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
(916) 414-6600

Project Summary

Consultation Code: 08ESMF00-2016-SLI-1111

Event Code: 08ESMF00-2018-E-05578

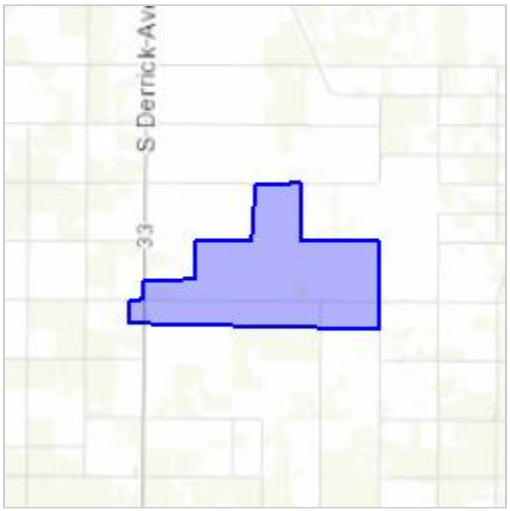
Project Name: Scarlet Solar

Project Type: POWER GENERATION

Project Description: Solar photovoltaic facility

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/36.614285443631076N120.34421848432795W



Counties: Fresno, CA

Endangered Species Act Species

There is a total of 11 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Fresno Kangaroo Rat *Dipodomys nitratoides exilis* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5150 Species survey guidelines: https://ecos.fws.gov/ipac/guideline/survey/population/37/office/11420.pdf	Endangered
Giant Kangaroo Rat *Dipodomys ingens* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6051	Endangered
San Joaquin Kit Fox *Vulpes macrotis mutica* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2873	Endangered

Birds

NAME	STATUS
California Condor *Gymnogyps californianus* Population: U.S.A. only, except where listed as an experimental population There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8193	Endangered

Reptiles

NAME	STATUS
Blunt-nosed Leopard Lizard *Gambelia silus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/625	Endangered
Giant Garter Snake *Thamnophis gigas* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4482	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog *Rana draytonii* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2891	Threatened

Fishes

NAME	STATUS
Delta Smelt *Hypomesus transpacificus* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/321	Threatened

Crustaceans

NAME	STATUS
Vernal Pool Fairy Shrimp *Branchinecta lynchi* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/498	Threatened

Flowering Plants

NAME	STATUS
Palmate-bracted Bird's Beak *Cordylanthus palmatus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1616	Endangered
San Joaquin Wooly-threads *Monolopia (=Lembertia) congdonii* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3746	Endangered

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: BIOS selection

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Agelaius tricolor tricolored blackbird	ABPBXB0020	None	Candidate Endangered	G2G3	S1S2	SSC
Ammospermophilus nelsoni Nelson's antelope squirrel	AMAFB04040	None	Threatened	G2	S2S3	
Asio flammeus short-eared owl	ABNSB13040	None	None	G5	S3	SSC
Athene cunicularia burrowing owl	ABNSB10010	None	None	G4	S3	SSC
Atriplex cordulata var. cordulata heartscale	PDCHE040B0	None	None	G3T2	S2	1B.2
Atriplex coronata var. vallicola Lost Hills crownscale	PDCHE04250	None	None	G4T2	S2	1B.2
Atriplex depressa brittlescale	PDCHE042L0	None	None	G2	S2	1B.2
Atriplex minuscula lesser saltscale	PDCHE042M0	None	None	G2	S2	1B.1
Branchinecta longiantenna longhorn fairy shrimp	ICBRA03020	Endangered	None	G1	S1S2	
Branchinecta lynchi vernal pool fairy shrimp	ICBRA03030	Threatened	None	G3	S3	
Buteo swainsoni Swainson's hawk	ABNKC19070	None	Threatened	G5	S3	
Charadrius montanus mountain plover	ABNNB03100	None	None	G3	S2S3	SSC
Chloropyron palmatum palmate-bracted bird's-beak	PDSCR0J0J0	Endangered	Endangered	G1	S1	1B.1
Coastal and Valley Freshwater Marsh Coastal and Valley Freshwater Marsh	CTT52410CA	None	None	G3	S2.1	
Dipodomys ingens giant kangaroo rat	AMAFD03080	Endangered	Endangered	G1G2	S1S2	
Dipodomys nitratoides exilis Fresno kangaroo rat	AMAFD03151	Endangered	Endangered	G3TH	SH	
Emys marmorata western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
Eremophila alpestris actia California horned lark	ABPAT02011	None	None	G5T4Q	S4	WL
Eriastrum hooveri Hoover's eriastrum	PDPLM03070	Delisted	None	G3	S3	4.2
Eumops perotis californicus western mastiff bat	AMACD02011	None	None	G5T4	S3S4	SSC

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Falco columbarius merlin	ABNKD06030	None	None	G5	S3S4	WL
Falco mexicanus prairie falcon	ABNKD06090	None	None	G5	S4	WL
Gambelia sila blunt-nosed leopard lizard	ARACF07010	Endangered	Endangered	G1	S1	FP
Lasiurus blossevillii western red bat	AMACC05060	None	None	G5	S3	SSC
Lasiurus cinereus hoary bat	AMACC05030	None	None	G5	S4	
Layia munzii Munz's tidy-tips	PDAST5N0B0	None	None	G2	S2	1B.2
Lepidium jaredii ssp. album Panoche pepper-grass	PDBRA1M0G2	None	None	G2G3T2T3	S2S3	1B.2
Madia radiata showy golden madia	PDAST650E0	None	None	G3	S3	1B.1
Masticophis flagellum ruddocki San Joaquin coachwhip	ARADB21021	None	None	G5T2T3	S2?	SSC
Monolopia congdonii San Joaquin woollythreads	PDASTA8010	Endangered	None	G2	S2	1B.2
Myotis yumanensis Yuma myotis	AMACC01020	None	None	G5	S4	
Perognathus inornatus San Joaquin Pocket Mouse	AMAFD01060	None	None	G2G3	S2S3	
Phrynosoma blainvillii coast horned lizard	ARACF12100	None	None	G3G4	S3S4	SSC
Plegadis chihi white-faced ibis	ABNGE02020	None	None	G5	S3S4	WL
Sagittaria sanfordii Sanford's arrowhead	PMALI040Q0	None	None	G3	S3	1B.2
Spea hammondii western spadefoot	AAABF02020	None	None	G3	S3	SSC
Taxidea taxus American badger	AMAJF04010	None	None	G5	S3	SSC
Thamnophis gigas giant gartersnake	ARADB36150	Threatened	Threatened	G2	S2	
Thamnophis hammondii two-striped gartersnake	ARADB36160	None	None	G4	S3S4	SSC
Valley Sink Scrub Valley Sink Scrub	CTT36210CA	None	None	G1	S1.1	
Vulpes macrotis mutica San Joaquin kit fox	AMAJA03041	Endangered	Threatened	G4T2	S2	

Record Count: 41

CNPS California Native Plant Society

Inventory of Rare and Endangered Plants

Plant List

18 matches found. *Click on scientific name for details*

Search Criteria

California Rare Plant Rank is one of **[1A, 1B, 2A, 2B, 3]**, Found in Quads **3612064, 3612063, 3612062, 3612054, 3612053, 3612052, 3612044 3612043** and **3612042**;

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
Atriplex cordulata var. cordulata	heartscale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G3T2
Atriplex coronata var. vallicola	Lost Hills crownscale	Chenopodiaceae	annual herb	Apr-Sep	1B.2	S2	G4T2
Atriplex depressa	brittlescale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G2
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
Caulanthus lemmonii	Lemmon's jewelflower	Brassicaceae	annual herb	Feb-May	1B.2	S3	G3
Chloropyron palmatum	palmate-bracted bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	May-Oct	1B.1	S1	G1
Deinandra halliana	Hall's tarplant	Asteraceae	annual herb	(Mar)Apr-May	1B.1	S1	G1
Delphinium recurvatum	recurved larkspur	Ranunculaceae	perennial herb	Mar-Jun	1B.2	S2?	G2?
Layia heterotricha	pale-yellow layia	Asteraceae	annual herb	Mar-Jun	1B.1	S2	G2
Layia munzii	Munz's tidy-	Asteraceae	annual herb	Mar-Apr	1B.2	S2	G2

	tips						
Lepidium jaredii ssp. album	Panoche pepper-grass	Brassicaceae	annual herb	Feb-Jun	1B.2	S2S3	G2G3T2T3
Madia radiata	showy golden madia	Asteraceae	annual herb	Mar-May	1B.1	S2	G2
Malacothamnus aboriginum	Indian Valley bush-mallow	Malvaceae	perennial deciduous shrub	Apr-Oct	1B.2	S3	G3
Monolopia congdonii	San Joaquin woollythreads	Asteraceae	annual herb	Feb-May	1B.2	S2	G2
Puccinellia simplex	California alkali grass	Poaceae	annual herb	Mar-May	1B.2	S2	G3
Sagittaria sanfordii	Sanford's arrowhead	Alismataceae	perennial rhizomatous herb (emergent)	May-Oct(Nov)	1B.2	S3	G3
Senecio aphanactis	chaparral ragwort	Asteraceae	annual herb	Jan-Apr(May)	2B.2	S2	G3

Suggested Citation

California Native Plant Society, Rare Plant Program. 2018. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website http://www.rareplants.cnps.org [accessed 20 April 2018].

Attachment C

Potential to Occur Analysis

TABLE C - 1

Potential for Special-Status Species and Critical Habitats in the Region to Occur in the RE Scarlet Solar Project Site[1]

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other[2]	General Habitat Description	Status in the Project Site[3]	Rationale
Invertebrates				
Aegialia concinna Ciervo aegilian scarab beetle	--/--/--; G1; S1	This small, flightless beetle inhabits sand dunes in the San Joaquin Valley; it is currently known from 4 locations in Contra Costa, San Benito, San Joaquin, and Fresno counties (ESRP 2016a).	Will not occur	The project site does not contain suitable sand dune habitat.
Branchinecta longiantenna longhorn fairy shrimp	FE/--/--	Occurs in warm, alkaline or sandstone vernal pools in 4 locations in the interior Coast Ranges: Contra Costa County (2), Merced County, and San Luis Obispo County (USFWS 2005).	Will not occur	The project site does not contain suitable vernal pool habitat.
Branchinecta lynchi vernal pool fairy shrimp	FT/--/--	Occurs in vernal pools ranging from small, clear, sandstone rock pools to large, turbid, alkaline, grassland valley floor pools. It is most frequently found in pools measuring less than 0.05 acre; although has been collected from vernal pools exceeding 25 acres. The known range within California includes the Central Valley and southern California (USFWS 2005).	Will not occur	The project site does not contain suitable vernal pool habitat.
Coelus gracilis San Joaquin dune beetle	--/--/--; G1; S1	Inhabits sand dunes in the western San Joaquin Valley; historically found from eastern Contra Costa County to southern Kern County (ESRP 2016b).	Will not occur	The project site does not contain suitable sand dune habitat.
Fishes				
Hypomesus transpacificus Delta smelt	FT/--/--	Delta smelt spawn in shallow, fresh or slightly brackish water in tidally-influenced backwater sloughs and channel edgewaters. The eggs are thought to attach to substrates such as cattails, tules, tree roots and submerged branches. Delta smelt are found only from the Suisun Bay upstream through the Delta in Contra Costa, Sacramento, San Joaquin, Solano and Yolo counties (USFWS 1995).	Will not occur	No suitable aquatic habitat is present in the project site.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other[2]	General Habitat Description	Status in the Project Site[3]	Rationale
Oncorhynchus mykiss irideus Central Valley steelhead	FT, CH/--/--	Steelhead spawn in rivers and streams with cool, clear, water and suitable substrate. This distinct population segment includes all naturally spawned anadromous *O. mykiss* (steelhead) populations below natural and manmade impassable barriers in the Sacramento and San Joaquin Rivers and their tributaries, excluding steelhead from San Francisco and San Pablo Bays and their tributaries, as well as two artificial propagation programs: the Coleman NFH, and Feather River Hatchery steelhead hatchery programs (NOAA 2005).	Will not occur	No suitable aquatic habitat is present in the project site.
Spirinchus thaleichthys Longfin smelt	FC/ST/--	The longfin smelt is a pelagic estuarine fish that spawns in freshwater and then moves downstream to brackish water to rear. They usually live for 2 years, spawn, and then die, although some individuals may spawn as 1- or 3-year-old fish before dying. Longfin smelt in the Bay-Delta may spawn as early as November and as late as June, although spawning typically occurs from January to April. The known range of the longfin smelt extends from the San Francisco Bay-Delta in California northward to the Cook Inlet in Alaska. Longfin smelt have been observed as far upstream as Isleton in the Sacramento River, Santa Clara shoal in the San Joaquin system, Hog Slough off the South-Fork Mokelumne River, and in Old River south of Indian Slough (USFWS 2015).	Will not occur	No suitable aquatic habitat is present in the project site.
Amphibians				
Spea hammondii western spadefoot	--/SSC/--	Spadefoot toads are generally restricted to vernal pools and seasonal ponds, including many constructed stock ponds, in grassland and oak savannah plant communities (Jennings and Hayes 1994).	Will not occur	The project site does not contain suitable vernal pools or seasonal ponds to provide breeding and larval habitat.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other[2]	General Habitat Description	Status in the Project Site[3]	Rationale
Rana draytonii California red-legged frog	FT/SSC/--	The California red-legged frog occupies a fairly distinct habitat, combining both specific aquatic and riparian components. The adults require dense, shrubby or emergent riparian vegetation closely associated with deep (greater than 2 1/3-foot deep) still or slow moving water. The largest densities of California red-legged frogs are associated with deep-water pools with dense stands of overhanging willows (Salix spp.) and an intermixed fringe of cattails (Typha latifolia). Well-vegetated terrestrial areas within the riparian corridor may provide important sheltering habitat during winter. California red-legged frogs aestivate (enter a dormant state during summer or dry weather) in small mammal burrows and moist leaf litter. They have been found up to 100 feet from water in adjacent dense riparian vegetation. Studies have indicated that this species cannot inhabit water bodies that exceed 70° F, especially if there are no cool, deep portions (USFWS 2001).	Will not occur	The project site does not contain suitable water sources with shrubby or emergent riparian vegetation. In addition, this species is considered extirpated from the floor of the Central Valley.
Reptiles				
Emys marmorata western pond turtle	--/SSC/--	Western pond turtle occurs from the west coast of North America from southern Washington, USA to northern Baja California, Mexico. Many populations have been extirpated and others continue to decline throughout the range, especially in southern California. This species requires aquatic habitats with suitable basking sites. Nest sites most often characterized as having gentle slopes (<15%) with little vegetation or sandy banks (Jennings and Hayes 1994).	Will not occur	The project site contains no suitable open water habitat.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other[2]	General Habitat Description	Status in the Project Site[3]	Rationale
Gambelia sila blunt-nosed leopard lizard	FE/SE/--	Blunt-nosed leopard lizard is endemic to the southern Coast Ranges and Central Valley, from Santa Clara and Merced Counties south to Ventura and Los Angeles Counties. Occurs in alkali sink, playa, and saltbush scrub habitats in the Central Valley, and grassland habitats in the foothills. The principal threat to the species is loss of habitat to agriculture and urban development (USFWS 2010a).	Will not occur	The project site consists of agricultural fields and disturbed areas that are not suitable habitat for blunt-nosed leopard lizard.
Masticophis flagellum ruddocki San Joaquin whipsnake	--/SSC/--	Occurs in dry, open habitats including grassland and shadscale scrub. Requires a large prey base of burrowing rodents. The species is threatened by loss of habitat to agriculture (Jennings and Hayes 1994).	Will not occur	Conversion of land to agriculture is the principal threat to this species; the project site is entirely agricultural land with no suitable habitat.
Phrynosoma blainvillii coast horned lizard	--/SSC/--	Occurs in the Coast Ranges, southwestern Sierra Nevada, Transverse and Peninsular Ranges, and the southern deserts. Requires sandy soils, chaparral vegetation, and native ant prey (Jennings and Hayes 1994).	Will not occur	The project site does not contain suitable sandy soils or chaparral vegetation.
Thamnophis gigas giant garter snake	FT/ST/--	The giant garter snake is endemic to the San Joaquin and Sacramento Valley floors. Counties include Butte, Colusa, Contra Costa, Fresno, Glenn, Kern, Madera, Merced, Sacramento, San Joaquin, Solano, Sutter, Yolo, and Yuba. Inhabits agricultural wetlands and other waterways such as irrigation and drainage canals, sloughs, ponds, small lakes, low gradient streams, and adjacent uplands. Requires adequate water during its active season (early spring through mid-fall) to provide food and cover, emergent, herbaceous wetland vegetation for foraging and cover, grassy banks and openings in waterside vegetation for basking, and higher elevation uplands for cover and refuge from flood waters during its dormant season (winter). Inhabits small mammal burrows and other soil crevices with sunny exposure	Will not occur	The project site does not contain suitable marsh or irrigation canal habitat.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other[2]	General Habitat Description	Status in the Project Site[3]	Rationale
		along south and west facing slopes, above prevailing flood elevations when dormant. Primarily found in marshes and sloughs as well as slow-moving creeks but are absent from large rivers. Often bask on emergent vegetation such as cattails and tules (USFWS 1999).		
Thamnophis hammondii two-striped garter snake	--/SSC/--	A highly aquatic snake rarely found far from water; inhabits perennial or intermittent streams with rocky beds and borders of dense willows or other vegetation. Will use stock ponds and other artificial ponds if they are bordered by dense vegetation. Snakes are not found where dense riparian vegetation is absent. Known from eastern San Benito County (Jennings and Hayes 1994).	Will not occur	The project site does not contain suitable streams or other aquatic habitat with dense riparian vegetation.
Birds				
Agelaius tricolor tri-colored blackbird	FC/SC/--	Common locally throughout central California. Nests and seeks cover in emergent wetland vegetation, specifically cattails and tules. Nesting area must be large enough to support a minimum colony of 50 pairs as they are a highly colonial species. Forages on ground in croplands, grassy fields, flooded land, and edges of ponds (Shuford and Gardali 2008).	Will not occur	There is no suitable nesting habitat in the project site. The nearest suitable nesting habitat is over 2 miles from the project site.
Asio flammeus short-eared owl	--/SSC/--	Nests on the ground in tall herbaceous vegetation and feeds almost exclusively on voles (*Microtus* spp.). Range and abundance are linked closely to cycles in vole populations (Shuford and Gardali 2008).	Will not occur	The entire site is being used for agriculture and lacks undisturbed vegetation to provide habitat for this species.
Athene cunicularia **burrowing owl**	**--/SSC/--**	**Forages in grasslands, agricultural fields, and disturbed places where burrowing mammals are abundant. Nests in burrows, especially those of California ground squirrel (*Spermophilus beecheyi*; Shuford and Gardali 2008).**	**Present**	**One breeding pair with a juvenile observed occupying a culvert on the north side of Manning Avenue, 300 feet west of San Mateo Avenue.**

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other[2]	General Habitat Description	Status in the Project Site[3]	Rationale
Buteo swainsoni **Swainson's hawk**	**--/ST/--**	**Forages in grasslands, suitable grain or alfalfa fields, or livestock pastures adjacent to nesting habitat. Nests on large trees in open areas (CDFW 1994).**	**Present (foraging only)**	**No nesting habitat is present. The project site provides suitable foraging habitat. One observation of foraging by an individual SWHA at an irrigated alfalfa field.**
Charadrius montanus Mountain plover	--/SSC/--	A winter resident of the Central Valley, southern deserts, and southern coast, as well as Texas, Arizona, and northern Mexico; does not breed in California. Found in places with sparse, low-growing vegetation such as fallow or burned agricultural fields, heavily grazed pastures, and playas (Shuford and Gardali 2008).	Will not occur	Fallow fields in the site are densely vegetated; the site does not include playas or open habitats.
Circus cyaneus **Northern harrier**	**--/SSC/--**	**Northern harrier is widespread throughout North America from southern Canada to northern Mexico and is a year-round resident in California. Population sizes increase during the non-breeding season due to over-wintering migrants. Northern harriers breed in a variety of open habitats including marshes, wet meadows, weedy shorelines, grasslands, weed fields, pastures, sagebrush flats, desert sinks, and croplands. Northern harriers nest on the ground in patches of dense, tall vegetation in undisturbed areas. Breeding occurs from March to August. Northern harriers feed on a wide variety of vertebrate prey, including rodents, songbirds, waterfowl, and lizards.**	**Present (foraging only)**	**Observed in the project site during biological surveys.**
Eremophila alpestris actia **California horned lark**	**--/WL/--**	**A year-round resident of grasslands and other herbaceous communities along the coast, the transverse ranges, and in the Central Valley. Nests on the ground (Zeiner *et al.* 1990).**	**Present**	**Agricultural fields in the project site provide suitable nesting habitat when inactive as well as foraging habitat. This species was observed in the project site numerous times during biological surveys; no nest sites were**

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other[2]	General Habitat Description	Status in the Project Site[3]	Rationale
				confirmed.
Falco columbarius merlin	--/WL/--	An uncommon winter migrant in California; breeds in Alaska and Canada. Uses a variety of habitats but requires trees close to water for cover and is usually found near coastlines, lakeshores, and wetlands (Zeiner et al. 1990).	Will not occur	The project site does not contain suitable trees or aquatic habitats.
Falco mexicanus prairie falcon	--/WL/--	An uncommon permanent resident of the deserts, Central Valley, inner Coast Ranges, and Sierra Nevada in California. Primarily found in grasslands, rangelands, desert scrub, and some agricultural areas. Requires sheltered cliffs and ledges for cover. Dives from a perch or from flight to take prey on the ground (Zeiner et al. 1990).	Will not occur	The project site does not contain suitable nesting or perching sites. Individuals may soar over the project site, but will not be present as residents.
Gymnogyps californianus California condor	FE/SE/--	The largest land bird in North America, with a wingspan of 9.5 feet, this scavenger requires large areas of remote country. Condors roost in large trees and nest in shallow caves and rock crevices on cliffs. Scavenges carcasses of large mammals such as deer, cattle, and seals. Currently known from the southern Coast Ranges, Transverse Ranges, southwest Sierra Nevada, and northern Arizona (USFWS 1996).	Will not occur	The project site is not within the current range of condors and does not provide large mammal carcasses such as deer or cattle for scavenging.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other[2]	General Habitat Description	Status in the Project Site[3]	Rationale
Lanius ludovicianus **loggerhead shrike**	**--/SSC/--**	**Suitable breeding habitat includes shrublands or open woodlands with grass cover or bare ground. Loggerhead shrikes in the Central Valley typically use riparian edges where they generally place their nests 1 to 2 meters (3.3 to 6.6 feet) above ground in shrubs or trees. Loggerhead shrike habitat includes alfalfa fields, grasslands, non-rice crops, oak groves, orchards, pastures, ponds and seasonally wet areas, riparian areas, disturbed areas, rural residential development, tree groves, and canals.**	**Present (foraging only)**	**Observed in the project site during biological surveys. There is no nesting habitat for this species on the project site. Fallow fields provide suitable foraging habitat for individuals nesting in shrubs in off-site parcels.**
Plegadis chihi white faced ibis	--/WL/--	This species nests sporadically in the Sacramento-San Joaquin Valley, but occurs as a transient throughout California. This species requires extensive marshes for nesting and forages in marshes, pastures, and croplands. It no longer nests regularly in the Central Valley (Zeiner *et al.* 1990).	Will not occur	There is no nesting habitat for this species on the site. Unlikely to be present even as a transient; no extensive marshes with suitable nesting habitat are present in or near the project site.
Mammals				
Ammospermophilus nelsoni Nelson's antelope squirrel	--/ST/--	Found in areas of dry, sparsely vegetated, loamy soils in the western San Joaquin Valley. Prefers areas of broken terrain with small gullies and washes. Uses kangaroo rat burrows, digs its own burrow, or uses rocks for cover. Cultivation has eliminated over 80 percent of natural habitat (Zeiner *et al.* 1990).	Will not occur	The project site does not contain suitable loamy soils or broken terrain with washes and gullies.
Dipodomys ingens giant kangaroo rat	FE/SE/--	Inhabits annual grasslands with well-drained sandy-loam soils. Currently known from 6 major population centers, the closest of which is the Ciervo-Panoche hills over 10 miles west of the project site (USFWS 2016a).	Will not occur	The project site does not contain suitable well-drained sandy-loam soils, and is separated from known populations of the species by Interstate 5, the California Aqueduct, and over 10 miles of unsuitable agricultural habitats.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other[2]	General Habitat Description	Status in the Project Site[3]	Rationale
Dipodomys nitratoides exilis Fresno kangaroo rat	FE/SE/--	Historically found in the southern San Joaquin Valley between the Merced River and Tulare Lake, as far west as Fresno Slough. No longer known from its historic range, and with no confirmed extant populations (USFWS 2010b).	Will not occur	The project site is outside the historic range of the species and there are no known extant populations of the species.
Eumops perotis californicus western mastiff bat	--/SSC/--	Found throughout California and the southwestern U.S. to west Texas. Roosts in natural crevices in large outcrops of granite, sandstone, or basalt, on cliff faces, among boulders, and in appropriately proportioned cracks in buildings. Roosts are at least 10 feet above the ground (Pierson and Rainey 1998).	Will not occur	The project site does not contain suitable large rock outcrops or buildings, nor are there suitable roost sites within several miles.
Lasiurus blossevillii western red bat	--/SSC/--	Insectivorous bat closely associated with well-developed riparian habitats, typically Fremont cottonwood/western sycamore and/or valley oak. Use a variety of mature trees for breeding roosts. In the Central Valley, breeds along the Sacramento and San Joaquin Rivers. Breeds from May through August (Williams 1986).	Will not occur	The project site does not support suitable well-developed riparian habitat with mature trees.
Lasiurus cinereus hoary bat	--/--/--; G5, S4	Insectivorous bat, roosts in dense foliage of medium to large trees. Suitable breeding habitats include woodlands and forests with medium to large trees and dense foliage. Winters along the coasts and in southern California, and breeds inland and north of the winter range. Breeds from May through August (Zeiner *et al.* 1990).	Will not occur	The project site does not support suitable dense woodland or forest habitat.
Perognathus inornatus San Joaquin pocket mouse	--/--/--; G2G3, S2S3	Widely distributed from Lake and Tehama counties, south to the Mojave Desert. Inhabits arid grasslands and weedy areas; excluded by agriculture (IUCN 2018).	Will not occur	The project site is entirely active agriculture, which is unsuitable for the species.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other[2]	General Habitat Description	Status in the Project Site[3]	Rationale
Taxidea taxus American badger	--/SSC/--	Inhabits drier open stages of most shrub, forest, and herbaceous habitats with loose, friable soils. Preys on a wide variety of mammals, reptiles, birds, and carrion, and hunts mostly by digging out fossorial prey. Also occasionally takes prey on the surface. Not tolerant of cultivation. No longer occur in the Central Valley except in the extreme western edge (Williams 1986).	Will not occur	Badgers do not persist in agricultural fields and were regarded as no longer extant in the Central Valley except for the extreme western edge as of 1986.
Vulpes macrotis mutica **San Joaquin kit fox**	**FE/ST/--**	**Inhabits grasslands, agricultural areas, playas, and scrublands. Formerly widespread in the Central Valley; now primarily found in foothills at the margins of the Central Valley and in the interior Coast Ranges. Uses natural and artificial burrows with entrances between 8 and 10 inches in diameter, and occupies many different burrows in a single season (USFWS 1999).**	**Presumed Absent**	**Marginal denning (in fields during periods of inactivity) and foraging habitat for this species is present on the project site, however, this species was not observed during protocol surveys. The project site contains a low abundance of small mammal prey, and does not contain suitable burrows. The nearest reported occurrences of SJKF are over 7 miles from the project site and separated from it by the California Aqueduct. This species has a low potential to use the site for dispersal or foraging.**
Plants				
Atriplex cordulata var. *cordulata* heartscale	--/--/1B.2	An annual herb found in chenopod scrub, meadows and seeps, and valley and foothill grassland within saline and alkaline soils from 0 to 560 meters in elevation. Currently known to occur in Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kern, Madera, Merced, San Joaquin, San Luis Obispo, Solano, Stanislaus, Tulare, and Yolo counties. Blooms April to October (CNPS 2018).	Will not occur	There is no suitable alkaline or saline soil and chenopod scrub, meadow, or grassland habitat in the project site.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other[2]	General Habitat Description	Status in the Project Site[3]	Rationale
Atriplex coronata var. *vallicola* Lost Hills crownscale	--/--/1B.2	An annual herb found on alkaline soils in chenopod scrub, valley and foothill grassland, and vernal pools from 50 to 635 meters in elevation. Currently known to occur in Fresno, Kern, Kings, Merced, San Luis Obispo, and Tulare counties. Blooms April to September (CNPS 2018).	Will not occur	There is no suitable alkaline soil and chenopod scrub, vernal pool, or grassland habitat in the project site.
Atriplex depressa brittlescale	--/--/1B.2	An annual herb found on alkaline and clay soils in chenopod scrub, meadows and seeps, playas, valley and foothill grassland, and vernal pools from 1 to 320 meters in elevation (CNPS 2018). Currently known to occur in Alameda, Contra Costa, Colusa, Fresno, Glenn, Kern, Merced, Solano, Stanislaus, Tulare, and Yolo counties. Blooms April to October.	Will not occur	There is no suitable alkaline or clay soil and chenopod scrub, meadow, playa, vernal pool, or grassland habitat in the project site.
Atriplex minuscula lesser saltscale	--/--/1B.1	An annual herb found in alkaline and sandy habitats in chenopod scrub, playas, and valley and foothill grassland from 15 to 200 meters in elevation. Currently known to occur in Alameda, Butte, Fresno, Kern, Merced, and Tulare counties. Blooms May to October (CNPS 2018).	Will not occur	There is no suitable alkaline or sandy soil and chenopod scrub, playa, or grassland habitat in the project site.
Atriplex subtilis subtle orache	--/--/1B.2	An annual herb found in alkaline habitats in valley and foothill grassland from 40 to 100 meters in elevation. Currently known to occur in Butte, Fresno, Kings, Kern, Madera, Merced, Stanislaus, and Tulare counties. Blooms June to October (CNPS 2018).	Will not occur	There is no suitable alkaline soil and grassland habitat in the project site.
Caulanthus lemmonii Lemmon's jewelflower	--/--/1B.2	An annual herb found in pinyon-juniper woodland and valley and foothill grassland from 80 to 1580 meters in elevation. Currently known to occur in Fresno, Kings, Kern, Merced, Monterey, San Benito, San Joaquin, and Stanislaus counties. Blooms February to May (CNPS 2018).	Will not occur	There is no suitable woodland or grassland habitat in the project site.
Chloropyron palmatum	FE/SE/1B.1	A hemiparasitic annual herb found on alkaline soils in	Will not occur	There is no suitable alkaline soil

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other[2]	General Habitat Description	Status in the Project Site[3]	Rationale
(*Cordylanthus palmatus*) palmate-bracted bird's-beak		chenopod scrub and valley and foothill grassland from 5 to 155 meters in elevation. Currently known to occur in Alameda, Colusa, Fresno, Glenn, Madera, San Joaquin, and Yolo counties. Blooms May to October (CNPS 2018).		and chenopod scrub, or grassland habitat in the project site.
Deinandra halliana Hall's tarplant	--/--/1B.1	An annual herb found on clay soils in chenopod scrub, cismontane woodland, and valley and foothill grassland from 260 to 950 meters in elevation. Currently known to occur in Fresno, Monterey, San Benito, and San Luis Obispo counties. Blooms April to May (CNPS 2018)	Will not occur	There is no suitable chenopod scrub, woodland, or grassland habitat in the project site.
Delphinium recurvatum recurved larkspur	--/--/1B.2	An annual herb found on alkaline soils in chenopod scrub, cismontane woodland, and valley and foothill grassland from 3 to 790 meters in elevation. Currently known to occur in Alameda, Contra Costa, Fresno, Glenn, Kings, Kern, Madera, Merced, Monterey, San Joaquin, San Luis Obispo, Solano, Sutter, and Tulare counties. Blooms March to June (CNPS 2018).	Will not occur	There is no suitable alkaline soil and chenopod scrub, woodland, or grassland habitat in the project site.
Layia heterotricha pale-yellow layia	--/--/2B.21	An annual herb found on clay soils in cismontane woodland, coastal scrub, pinyon-juniper woodland, and valley and foothill grassland from 300 to 1705 meters in elevation. Currently known to occur in Fresno, Los Angeles, Monterey, Santa Barbara, and Ventura counties. Blooms March to June (CNPS 2018).	Will not occur	There is no suitable clay soil and woodland, scrub, or grassland habitat in the project site; the project site is outside the elevation range for this species.
Layia munzii Munz's tidy-tips	--/--/1B.2	An annual herb found on clay soils in chenopod scrub and valley and foothill grassland from 150 to 700 meters in elevation. Currently known to occur in Fresno, Kern, San Benito, and San Luis Obispo counties. Blooms March to April (CNPS 2018).	Will not occur	There is no suitable clay soil grassland or chenopod scrub habitat in the project site.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other[2]	General Habitat Description	Status in the Project Site[3]	Rationale
Lepidium jaredii ssp. *album* Panoche pepper-grass	--/--/1B.2	An annual herb found in clay soils on steep slopes in valley and foothill grassland from 185 to 275 meters in elevation. Currently known to occur in Fresno, San Benito, and San Luis Obispo counties. Blooms February to June (CNPS 2018).	Will not occur	There is no suitable clay soil and steep slope grassland habitat in the project site; the project site is outside the elevation range for this species.
Madia radiata showy golden madia	--/--/1B.1	An annual herb found in cismontane woodland and valley and foothill grassland from 25 to 1215 meters in elevation. Currently known to occur in Fresno, Kern, San Benito, San Luis Obispo, Santa Clara, and Stanislaus counties. Blooms March to May (CNPS 2018).	Will not occur	There is no suitable woodland or grassland habitat in the project site.
Malacothamnus aboriginum Indian Valley bush-mallow	--/--/1B.2	A perennial shrub found in rocky granitic soils in chaparral and cismontane woodland often after a fire, from 150 to 1700 meters in elevation. Currently known to occur in Fresno, Kings, Monterey, San Benito, San Mateo, and Santa Clara counties. Blooms April to October (CNPS 2018).	Will not occur	There is no suitable rocky chaparral or woodland habitat in the project site; the project site is outside the elevation range for this species.
Monolopia congdonii San Joaquin woollythreads	FE/--/1B.2	An annual herb found in sandy soils in valley and foothill grassland and chenopod scrub from 60 to 800 meters in elevation. Currently known to occur in Fresno, Kern, Kings, San Benito, San Luis Obispo, and Santa Barbara counties. Blooms February to May (CNPS 2018).	Will not occur	There is no suitable grassland or chenopod scrub habitat in the project site.
Puccinellia simplex California alkali grass	--/--/1B.2	An annual herb found in alkaline, vernally mesic areas within chenopod scrub, meadows and seeps, valley and foothill grassland and vernal pools from 2 to 930 meters in elevation. Currently known to occur in Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kings, Kern, Lake, Los Angeles, Madera, Merced, Napa, San Bernardino, Santa Clara, Santa Cruz, San Luis Obispo, Solano, Stanislaus, Tulare, and Yolo counties. Blooms March to May (CNPS 2018).	Will not occur	There is no suitable vernally mesic habitat in the project site.

Scientific Name/ Common Name	Federal/ State/ CNPS Status; Other[2]	General Habitat Description	Status in the Project Site[3]	Rationale
Sagittaria sanfordia Sanford's arrowhead	--/--/1B.2	A perennial rhizomatous herb found in marshes and swamps from 0 to 650 meters in elevation. Currently known to occur in Butte, Del Norte, El Dorado, Fresno, Merced, Mariposa, Placer, Sacramento, San Bernardino, San Joaquin, Shasta, Solano, Tehama, and Yuba counties. Blooms May to November (CNPS 2018).	Will not occur	There is no suitable marsh or swamp habitat in the project site.
Senecio aphanactis chaparral ragwort	--/--/2B.2	An annual herb found in chaparral, cismontane woodland and coastal scrub from 15 to 800 meters in elevation. Currently known to occur in Alameda, Contra Costa, Fresno, Los Angeles, Merced, Monterey, Orange, Riverside, San Benito, San Bernardino, San Diego, San Francisco, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Santa Clara, Solano, Tulare, and Ventura counties. Blooms January to April (CNPS 2018).	Will not occur	There is no suitable chaparral, woodland, or coastal scrub habitat in the project site.
Sensitive Natural Habitats				
Coastal and Valley Freshwater Marsh	--/--/--; G3; S2.1	A community dominated by perennial emergent monocots 4-5 meters tall, often forming a completely closed canopy. It occurs in permanently flooded sites with little or no current. Characteristic species include bulrushes (*Schoenoplectus* spp.), cattails (*Typha* spp.), and common reed (*Phragmites australis*; Holland 1986).	Will not occur	This community is not present in the project site.
Valley Sink Scrub	--/--/--; G1; S1.1	An open to dense community of low-growing, succulent alkali-tolerant species in the goosefoot family (Chenopodiaceae), especially iodine-bush (*Allenrolfea occidentalis*) and seepweed (*Suaeda* spp.) It occurs in heavy clay soils in lakebeds and playas with shallow groundwater and a salt crust on the surface. Once widespread in the San Joaquin and southern Sacramento Valleys; now essentially extirpated by agriculture and flood control (Holland 1986).	Will not occur	This community is not present in the project site.

Note: Bold font indicates a species with the potential to occur in the project site; these species are evaluated in detail in the body of the report.
[1]Special-status species reported in California Natural Diversity Database, CNPS, or USFWS database queries or observed in the site during biological surveys.

*FE – federally endangered; FT – federally threatened; FC – federally candidate; FD – federally delisted; SE – state endangered; ST – state threatened; SSC – state species of special concern; CNPS – California Native Plant Society (see definitions of CNPS rankings below)
CNPS ratings:
1B = Rare, threatened, or endangered in California and elsewhere
1B.1 = Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)
1B.2 = Fairly endangered in California (20-80% occurrences threatened)
2 = Rare, threatened, or endangered in California but more common elsewhere.
2.2 = Fairly endangered in California (20-80% occurrences threatened)
Global and State rankings in descending order of sensitivity (1=critically imperiled; 5=demonstrably secure)
[3]Status in the project site is assessed as follows. **Will Not Occur**: Species is either sessile (*i.e.* plants) or so limited to a particular habitat that it cannot disperse on its own and/or habitat suitable for its establishment and survival does not occur on the project site; **Not Expected**: Species moves freely and might disperse through or across the project site, but suitable habitat for residence or breeding does not occur on the project site, potential for an individual of the species to disperse through or forage in the site cannot be excluded with 100% certainty; **Presumed Absent:** Habitat suitable for residence and breeding occurs on the project site; however, focused surveys conducted for the current project were negative; **High**: Habitat suitable for residence and breeding occurs on the project site and the species has been recorded recently on or near the project site, but was not observed during surveys for the current project; **Present**: The species was observed during biological surveys for the current project and is assumed to occupy the project site.

Attachment D

Species Observed

TABLE D - 1

Plant Species Observed in the RE Scarlet Solar Project Site

Family	Species Name	Common Name	Status*
Native			
Asteraceae	*Helianthus annuus*	western sunflower	--
Non-native			
Alliaceae	*Allium sativum*	garlic	--
Asteraceae	*Lactuca serriola*	wild lettuce	--
Brassicaceae	*Brassica nigra*	black mustard	Moderate
	Sisymbrium altissimum	tumble mustard	--
Chenopodiaceae	*Chenopodium album*	lamb's quarters	--
	Salsola tragus	Russian thistle	Limited
Convolvulaceae	*Convolvulus arvensis*	bindweed	--
Fabaceae	*Medicago sativa*	alfalfa	--
Malvaceae	*Malva parviflora*	cheeseweed	--
Poaceae	*Avena fatua*	wild oats	Moderate
	Festuca myuros	fescue	--
	Hordeum murinum	hare barley	Moderate
	Hordeum vulgare	common barley	--
	Triticum aestivum	wheat	--

*Status for Native Species is federal or state listing, or California Rare Plant Rank (CRPR).
Status for Non-native Species is invasiveness rating by the California Invasive Plant Council (Cal-IPC 2016).

TABLE D - 2

Wildlife Species Observed in the RE Scarlet Solar Project Site

Order/Family	Species Name	Common Name	Status*
Birds			
Accipitriformes			
Accipitridae	*Buteo jamaicensis*	red-tailed hawk	--
	Buteo swainsoni	Swainson's hawk	ST
	Circus cyaneus	northern harrier	CDFW:SSC
	Cathartes aura	turkey vulture	--
Anseriformes			
Anatidae	*Anas platyrhynchos*	mallard	--
Charadriiformes			
Charadriidae	*Charadrius vociferus*	killdeer	--
Scolopacidae	*Numenius americanus*	long-billed curlew	--[1]
Columbiformes			
Columbidae	*Zenaida macroura*	mourning dove	--
Passeriformes			
Alaudidae	*Eremophila alpestris actia*	horned lark	CDFW:WL
Corvidae	*Corvus corax*	common raven	--
Emberizidae	*Passerculus sandwichensis*	savannah sparrow	--
Icteridae	*Agelaius phoeniceus*	red-winged blackbird	--
	Sturnella neglecta	western meadowlark	--
Laniidae	*Lanius ludovicianus*	loggerhead shrike	CDFW:SSC
Tyrannidae	*Tyrannus verticalis*	western kingbird	--
Strigiformes			
Strigidae	*Athene cunicularia*	burrowing owl	CDFW:SSC
	Bubo virginianus	great horned owl	--
	Tyto alba	barn owl	--
Mammals			
Rodentia			
Geomyidae	*Thomomys bottae*	Botta's pocket gopher	--
Heteromyidae	*Dipodomys heermanni*	Heermann's kangaroo rat	--
Sciuridae	*Otospermophilus beecheyi*	California ground squirrel	--

*Status for animal species: ST=State Threatened; CDFW=California Department of Fish and Wildlife; WL= Watch-List; SSC= Species of Special Concern.

[1]CDFW:WL only when breeding; species does not breed in the project area.

Attachment E

Burrowing Owl Survey Report

Memorandum

HELIX Environmental Planning, Inc.
11 Natoma Street, Suite 155
Folsom, CA 95630
916.365.8700 **tel**
www.**helixepi**.com

Date: 11/05/2018

To: Christy Herron, Recurrent Energy

From: Stephen Stringer

Subject: Burrowing Owl Survey Report for the RE Scarlet Solar Generation Project, Fresno County, California

HELIX Project: REC-04.01

INTRODUCTION

On behalf of RE Scarlet LLC, HELIX Environmental Planning, Inc. (HELIX) conducted breeding season surveys for burrowing owl (*Athene cunicularia*) for the RE Scarlet Solar Project. The surveys were conducted according to the guidelines prepared by the California Department of Fish and Wildlife (CDFW) in the *Staff Report on Burrowing Owl Mitigation* (CDFW 2012).

The RE Scarlet Solar Project is a proposed 400 megawatt solar photovoltaic (PV) generating facility and an electrical substation to be constructed on approximately 4,089 acres of agricultural land in unincorporated western Fresno County. The Fresno County Department of Public Works and Planning is processing the proposed project as a Conditional Use Permit and requires analysis of potential environmental impacts in accordance with the California Environmental Quality Act (CEQA). The surveys described in this report were undertaken to determine the potential of the proposed project for significant impacts to burrowing owl.

This report describes the methods used to conduct the burrowing owl surveys and summarizes the findings.

PROJECT LOCATION AND EXISTING CONDITIONS

The project site is located in western Fresno County, 4 miles southwest of the town of Tranquillity, 6.9 miles west of the town of San Joaquin, and 6.6 miles northwest of Interstate-5 (Attachment A, Figure 1). The site is bounded by West South Avenue on the north, South San Mateo Avenue on the east, West Dinuba Avenue on the South, and South Derrick Avenue (State Route 33) on the west (Attachment A, Figure 2). The proposed project is located adjacent to and in the immediate vicinity of the existing RE Adams and RE Tranquillity Solar Projects. The project would connect to the existing PG&E Tranquillity Switching Station located 0.75-mile west of the project site via an overhead 230 kV gen-tie line.

The project site is in the west-central San Joaquin Valley, and terrain in the site is flat and level, draining naturally to the east at a very shallow gradient. There is no natural or artificial topographic relief in the site; elevations range from 172 to 209 feet above mean sea level.

The project site is currently used for agricultural activities including intensive cultivation. Crops grown in the site include alfalfa, wheat, garlic, and tomatoes. Large portions of the site were disked during the course of the surveys conducted for this report, and other portions were planted with alfalfa. Only one 640-acre portion of the site in the northeast corner had been undisturbed for more than two years at the time of the surveys.

There are no structures in the project site, and no paved roads except for West Manning Avenue, which bisects the site east-west. Farm roads in the site border individual fields and are at-grade, with unimproved surfaces. Temporary ditches are excavated as-needed along the edges of irrigated fields and function to hold metal irrigation pipes or to drain irrigation runoff. There are no permanent canals or ditches in the site. Overall, the project site is a mosaic of agricultural uses that change with the seasons.

METHODS

Breeding season burrowing owl surveys were conducted according to the guidelines prepared by CDFW in the *Staff Report on Burrowing Owl Mitigation* (CDFW 2012). The project site was surveyed a total of five times during the burrowing owl breeding season (Table 1) by HELIX biologists with extensive experience at burrowing owl surveys.

Table 1
SURVEY DATES AND TIMES
(All Surveys Conducted in 2018)

Date	Start/End Time	Start/End Temp (°F)	Wind Speed (mph)	Weather	Personnel
Habitat Assessment					
April 16	1100-1600				G. Aldridge, D. Van Essen
Surveys					
April 16	1800-2000	58/55	3-5	Cloudy	G. Aldridge, D. Van Essen
May 9	1800-2030	87/83	2-6	Clear	G. Aldridge
June 5	0600-1000	57/64	0-2	Clear	G. Aldridge
June 20	1900-2100	95/90	0-3	Clear	G. Aldridge
June 21	0600-1000	59/80	0	Clear	G. Aldridge

An initial habitat assessment was performed by car and on foot. Fields fallow at the time of the initial assessment were inspected on foot to characterize the ground surface, which was found to be uniformly furrowed and devoid of burrows of any kind. Nearly all fields that were fallow at the beginning of the survey period were disked before the end of the surveys in July; only 640 acres at the northeastern corner of the site were undisturbed during the survey. The habitat assessment included adjoining lands to a distance of at least 200 meters. Conditions in surrounding lands were found to be the same as in the project site. No ground squirrel burrows were observed anywhere except along roads in the

northeast corner of the site. Because of the presence of mammal burrows at the field margins and the time since last cultivation, lands in the northeastern corner of the site were the only potentially suitable habitat for burrowing owl in the project site. Roads next to actively cultivated fields typically appeared to have been scraped to accommodate higher volumes of car traffic or compacted by heavy machinery, which removed all rodent holes.

During each survey, transects were walked in all areas of the site identified as habitat for burrowing owl in the habitat assessment (i.e., field edges in the northeastern corner of the site). As an additional means to cover the remainder of the site, HELIX drove the site's existing access roads searching for burrowing owls and stopped every 100 meters or less to scan the surrounding area for burrowing owl presence with binoculars. The majority of the site's acreage is unsuitable for burrowing owl nesting due to recent disking and intensive cultivation of row crops.

Surveys were timed to allow for comprehensive coverage of this site and a high detection probability. The morning surveys started after morning civil twilight to allow ambient temperatures to increase to a level more suitable for burrowing owl detection and ended at 10:00 a.m. The evening surveys were conducted between roughly two hours before sunset and shortly before the end of evening civil twilight.

RESULTS

A pair of adult burrowing owls and one juvenile were observed occupying a concrete culvert under Manning Avenue 300 feet west of South San Mateo Avenue during burrowing owl surveys in 2018 (Attachment A, Figure 3). Previous burrowing owl sightings at the site include a transient burrowing owl that was sighted in the southern portion of the project site and burrowing owl sign that was observed in the northern portion of the site adjacent to West South Avenue during other biological surveys conducted for the project. These sightings are also shown on Figure 3.

Potential predators of burrowing owl observed in the project site and immediate vicinity included red-tailed hawk (*Buteo jamaicensis*) and barn owl (*Bubo virginianus*). Barn owls are ubiquitous in the project site and surrounding lands. Barn owls were regularly seen perched on metal irrigation pipes alongside irrigated fields at night after the conclusion of burrowing owl surveys. The high density of barn owls in the area may be a significant deterrent to burrowing owls. No signs of burrowing owl predation were observed in the project site.

SUMMARY/CONCLUSION

Protocol surveys of the project site were conducted by qualified biologists in accordance with CDFW's Staff Report on Burrowing Owl Mitigation (CDFW 2012). One active breeding burrow, occupied by a pair of adults and a juvenile, was documented near the eastern edge of the project site in a culvert under Manning Avenue. The burrow is located outside of the proposed project's perimeter fencing and would not be directly impacted by the project. Adults from this burrow were observed foraging in fallow fields in the project site and immediately to the east, within 500 feet of the burrow location. A transient burrowing owl was sighted in the southern portion of the project site and burrowing owl sign was observed in the northern portion of the site adjacent to West South Avenue during other biological surveys conducted for the project.

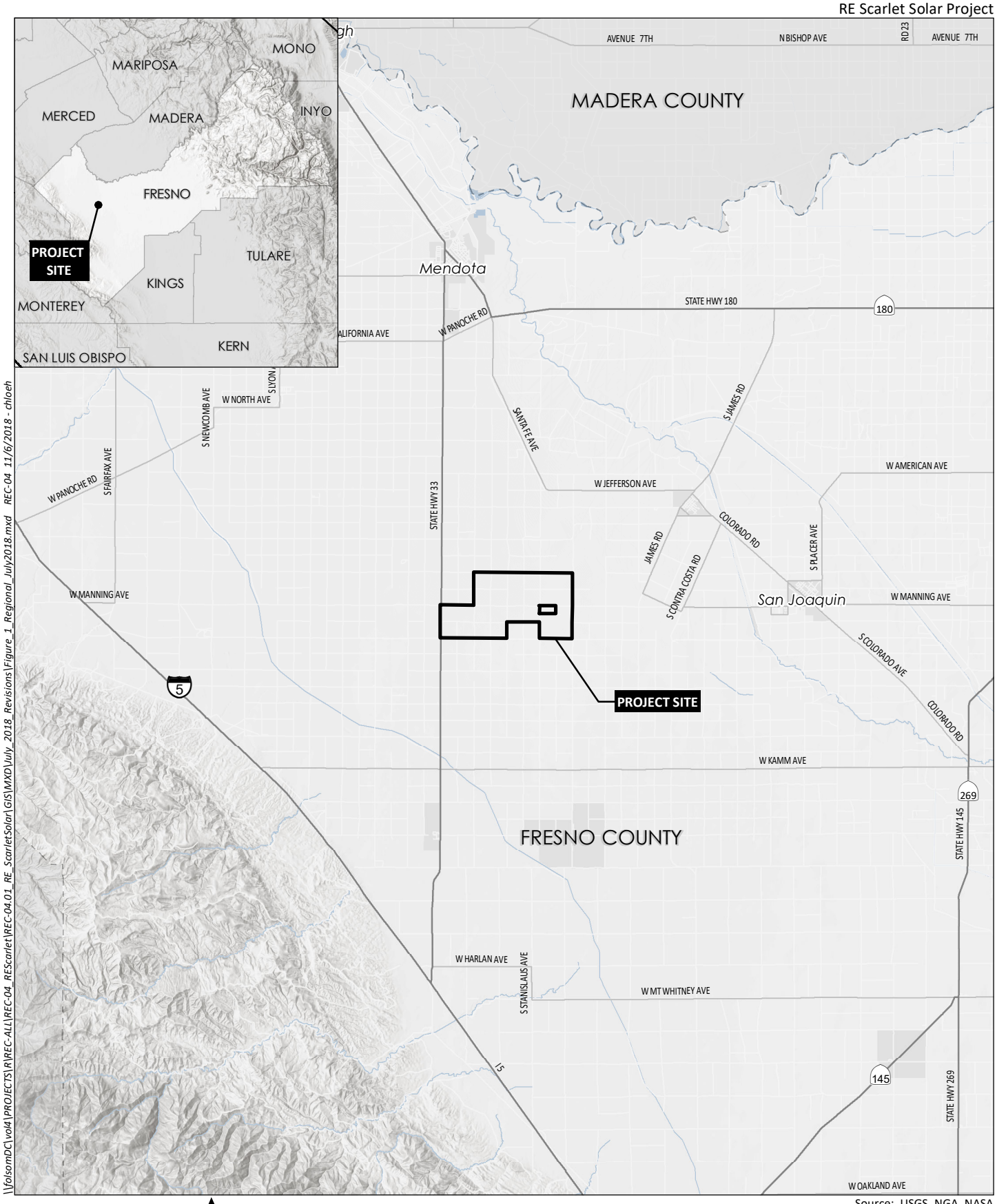
Attachments:

Attachment A – Figures
- Figure 1: Regional Location Map
- Figure 2: Site Location Map
- Figure 3: Habitat Map and Special-Status Species Sightings

Attachment B – Site Photographs
Attachment C – CNDDB Form

Attachment A

Figures



\\FolsomDC\vol4\PROJECTS\R\REC-ALL\REC-04_RESCarlet\REC-04.01_RE_ScarletSolar\GIS\MXD\July_2018_Revisions\Figure_1_Regional_July2018.mxd REC-04 11/6/2018 - chloeh

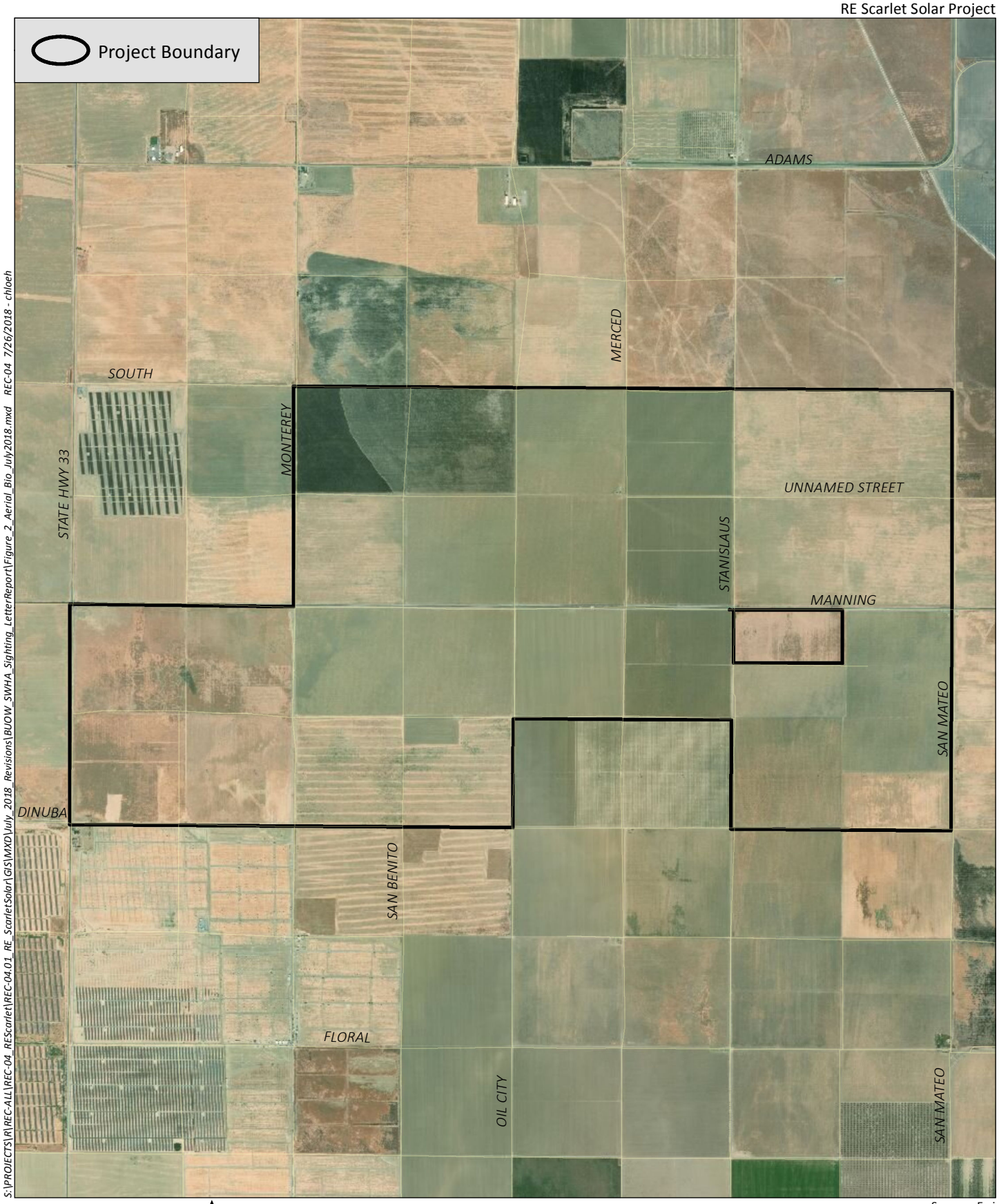
0 5 Miles

Source: USGS, NGA, NASA

HELIX Environmental Planning

Regional Location

Figure 1



S:\PROJECTS\R\REC-ALL\REC-04_REScarlet\REC-04.01_RE_ScarletSolar\GIS\MXD\July_2018_Revisions\BUOW_SWHA_Sighting_LetterReport\Figure_2_Aerial_Bio_July2018.mxd REC-04 7/26/2018 - chloeh

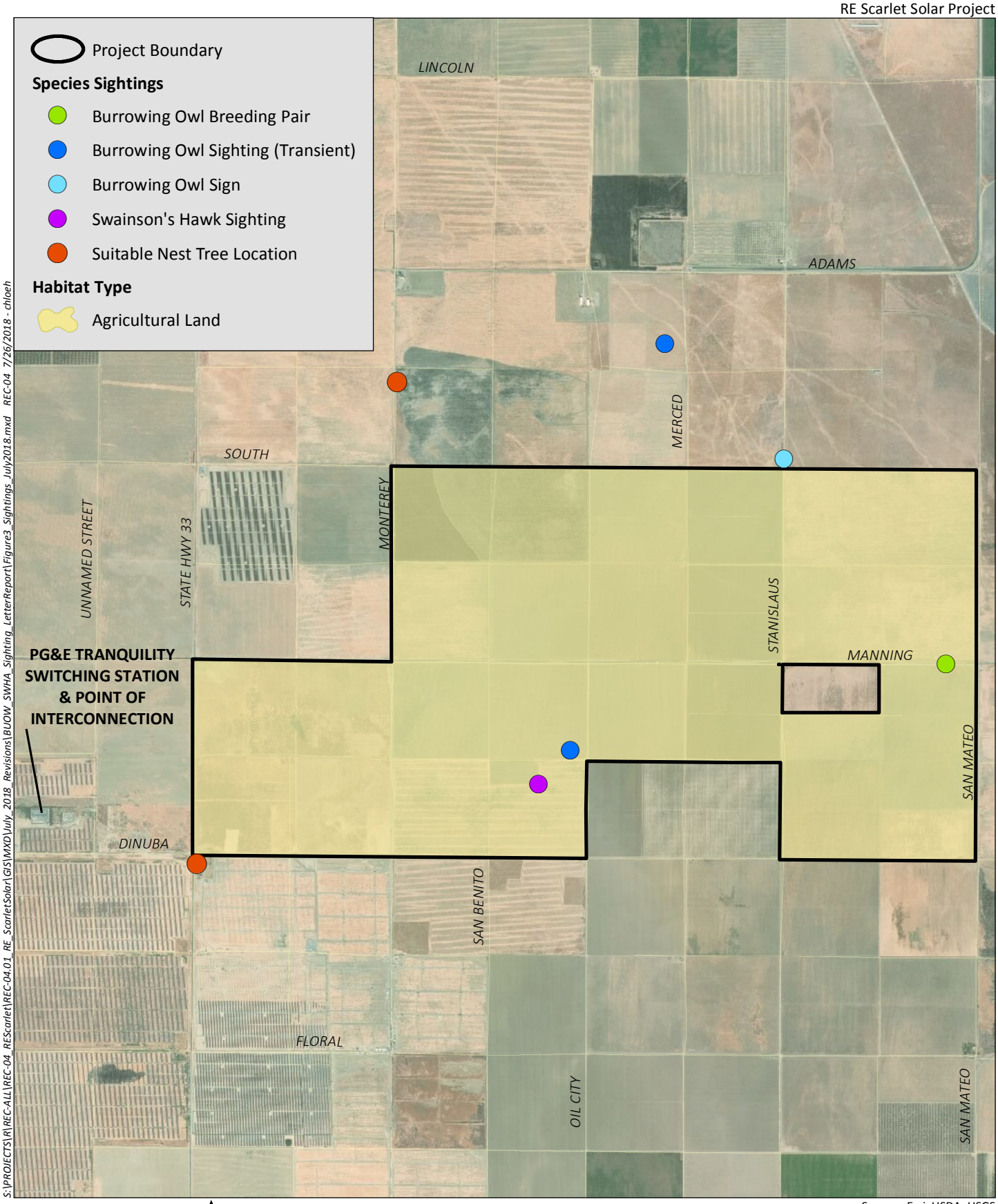
0 4,000 Feet

Source: Esri

HELIX Environmental Planning

Site Location Map

Figure 2



S:\PROJECTS\R\REC-ALL\REC-04_REScarlet\REC-04.01_RE_ScarletSolar\GIS\MXD\July_2018_Revisions\BUOW_SWHA_Sighting_LetterReport\Figure3_Sightings_July2018.mxd REC-04 7/26/2018 - chloeh

HELIX Environmental Planning

Habitat Map and Special-Status Species Sightings

Figure 3

Attachment B

Site Photographs

Photo 1. One of the pair of burrowing owls breeding in a culvert under Manning Avenue near South San Mateo Avenue.

Photo 2. The location of the breeding burrow near South San Mateo Avenue.

Photo 3. View of the fields in the northeast corner of the site. This is the only portion of the site not disked or cultivated within the last 2 years.

Photo 4. Recently disked fields north of Manning Avenue.

Photo 5. A disked field being prepared with irrigation lines north of Manning Avenue.

Photo 6. An irrigated alfalfa field south of Manning Avenue.

Attachment C

CNDDB Form

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 04/21/2018

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Athene cunicularia*

Common Name: burrowing owl

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 3 Subsequent Visit? ( ) Yes (●) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☒ No ☐ Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: HELIX Environmental Planning
Address: 11 Natoma Street Ste 155
Folsom, CA 95630
E-mail Address: GeorgeA@helixepi.com
Phone: 916.365.8714

Plant Information
Phenology:
_____ % vegetative _____ % flowering _____ % fruiting

Animal Information
2 # adults 1 # juveniles _____ # larvae _____ # egg masses _____ # unknown
☐ wintering ☒ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description ***(please attach map AND/OR fill out your choice of coordinates, below)***

A concrete culvert under Manning Avenue, 300 feet west of S. San Mateo Avenue, immediately adjacent to the shoulder of Manning Avenue on the north side of the roadway.

County: Fresno Landowner / Mgr: Private
Quad Name: Cantua Creek Elevation: 168 ft
T 15S R 15E Sec 22 , SE 1/4 of SE 1/4, Meridian: H ( ) M (●) S ( ) Source of Coordinates (GPS, topo. map & type): Google Earth
T ___ R ___ Sec ___ , ___ 1/4 of ___ 1/4, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: _____
DATUM: **NAD27** ( ) **NAD83** (●) **WGS84** ( ) Horizontal Accuracy: _____ meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) ( )
Coordinates: 36 deg, 31 min, 11.12 sec North; 120 deg, 19 min, 00.69 sec West

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

The "burrow" is a concrete culvert under a 2-lane highway. The immediate surroundings are the highway embankment and right-of-way. The setting is a fallow agricultural field with a short cover of weeds and remnant crop species. Owls perched on posts along Manning Avenue and on top of the culvert headwall.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): ( ) Excellent ( ) Good ( ) Fair (●) Poor
Immediate AND surrounding land use: Highway right-of-way, agriculture, stormwater management/drainage
Visible disturbances: trash, high-speed traffic, agricultural activities on surrounding lands
Threats: high-speed vehicle traffic may strike birds; disking/burning/cultivation of land may remove foraging habitat
Comments: In its current state the site is good habitat; however, the population is only 1 breeding pair and there is no suitable breeding habitat nearby for other pairs or to allow this one to relocate in case a change in agricultural land use removes the foraging habitat.

Determination: *(check one or more, and fill in blanks)*
☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☒ Other: personal experience identifying burrowing owls

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☒
Habitat	☐	☐	☒
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? (●) yes ( ) no

Attachment F

Site Photos

Photo 1. Looking north on Monterey Avenue from Dinuba Avenue.

Photo 2. Looking south on San Mateo Avenue from South Avenue.

Photo 3. Looking north on Stanislaus Avenue from 0.5 mile south of Manning Avenue.

Photo 4. Looking south on Stanislaus Avenue from South Avenue.

Photo 5. Looking northeast from Monterey Avenue 0.5 mile south of Manning Avenue

Photo 6. Looking southeast from Stanislaus Avenue 0.5 mile south of Manning Avenue.

Attachment G

SWHA Foraging Study

Memorandum

HELIX Environmental Planning, Inc.
11 Natoma Street, Suite 155
Folsom, CA 95630
916.365.8700 **tel**
www.**helixepi**.com

Date: 11/05/2018

To: Christy Herron, Recurrent Energy

From: Stephen Stringer

Subject: RE Scarlet Solar Generation Project, Fresno County – Analysis of Impacts to Swainson's Hawk Foraging Habitat

HELIX Project: REC-04.01

INTRODUCTION

HELIX Environmental Planning, Inc. (HELIX) has prepared this memorandum on behalf of Recurrent Energy (Recurrent) to present an analysis of the potential impacts of the proposed RE Scarlet Solar Project on Swainson's hawk (SWHA; *Buteo swainsoni*), which is listed as threatened under the California Endangered Species Act (CESA), and to provide the Lead Agency, responsible agencies, and the public with information necessary to make findings pursuant to the requirements of the California Environmental Quality Act (CEQA). The proposed project is in unincorporated western Fresno County, and Recurrent is seeking a Conditional Use Permit from Fresno County (County). HELIX biologists have conducted a wide variety of biological surveys of the project site and surrounding areas beginning in 2015.

The analysis provided in this memorandum identifies potential project impacts to SWHA based on an approach that has been used elsewhere in the San Joaquin Valley to support approved CEQA documents, refined to provide additional analytical rigor. The methodological approach combines field observations, public and proprietary data, and desktop spatial analysis to estimate the acreage of suitable foraging habitat required to sustain the regional population of SWHA. Impacts are assessed at the project- and cumulative levels.

Project Site

The project site is an approximately 4,089-acre site in unincorporated Fresno County, east of the State Route 33 (SR-33) interchange with Manning Avenue. The site is on Manning Avenue 6.8 miles west of the town of San Joaquin and 11 miles east of Interstate 5 and is bisected east-west by Manning Avenue.

The project site consists entirely of actively farmed and fallow agricultural land, including active cultivation of alfalfa, tomatoes, garlic, wheat, and barley which has taken place within the previous two years. Fields are bordered by unpaved farm roads at grade. North-south running temporary drainage ditches are sometimes excavated along irrigated fields to drain irrigation runoff to off-site sumps. These

ditches are filled when no longer needed. The project site is in an area of active agricultural lands and existing and planned solar photovoltaic (PV) generating projects.

Summary of the Proposed Project

Overview

The RE Scarlet Solar Project is a proposed 400 mega-watt (MW) solar PV generating facility and an electrical substation to be constructed on approximately 4,089 acres of agricultural land. The substation would connect to the regional electrical grid at the Pacific Gas and Electric Company's (PG&E) 230 kilovolt (kV) Tranquillity Switching Station located west of State Route 33 and south of Manning Avenue. An overhead generation intertie electric transmission line (gen-tie) line would run through easements across the existing Tranquillity Solar Generating Facility and would result in a minor amount of new ground-disturbing impacts. Construction of the proposed project could take place in one phase beginning in mid-2020 and is expected to continue for up to 18 months.

Construction activities would take place during daylight hours, approximately 7 am to 5 pm, and would be continuous unless prevented by rain. Construction would include establishment of access roads with dirt or decomposed granite surfaces, trenching for underground collection lines, boring for posts to support solar arrays, installation of posts and solar arrays, construction of inverters, an electrical switching station and up to two electrical substations consisting of above-ground facilities mounted on concrete pads, and installation of a 400-MW energy storage system (an above-ground facility mounted on concrete pads). Equipment used would be standard construction equipment such as excavators, loaders, graders, cranes, forklifts, container trucks, and water trucks. The site will not require mass grading or cut and fill, as it is already flat and level. Internal retention basins would be constructed to control storm water runoff in the site. The project could be constructed in a single phase; however, activities would occur in stages throughout the site.

Solar PV generating facilities consist of individual solar panels (modules) which are arranged in rows to form solar arrays. The arrays are combined to form larger units called solar blocks or array blocks. For large-scale utility applications, hundreds of array blocks are interconnected as part of the solar power generation facility. Each array block is served by an electrical inverter, which can be located centrally within the array block or distributed within the array footprint. The inverters convert the direct current (DC) output from the array to alternating current (AC) which is then conveyed to the substation and switchyard which steps up the voltage to match the collection system.

Solar arrays are linear (approximately 300 feet long) rows of solar PV modules mounted on round shafts (torque tubes) that rotate to orient the modules east-west through the course of the day. The long axis of a tracker is oriented north-south. The torque tubes are supported approximately 4 feet above grade on steel posts, leaving a soil substrate underneath the trackers. At maximum tilt, the top edge of the modules on a tracker is approximately 10 feet above grade. Within an array block, trackers are spaced approximately 20 feet on center to reduce shading by neighboring modules at maximum tilt in the morning and evening when sun angle is low. When trackers are horizontal, the spacing between the edges of adjacent rows of modules is approximately 12 feet; this increases to slightly more than 14 feet at maximum tilt. This geometry results in a maximum of 40 percent of the area within a typical array block consisting of solar PV panel surface when viewed from above, and the other 60 percent remaining visible ground surface.

Impact Area

Approximately 265 acres of the 4,089-acre project site is public road rights-of-way that would be outside the facility's perimeter fence, leaving approximately 3,824 acres inside the facility. Buildings, internal driveways, equipment pads, and footings would total up to approximately 30 acres of impervious surfaces in the facility (approximately 0.7 percent of the site), depending on the final design of the project, which would leave approximately 3,794 acres of solar array blocks. The PV modules would cover approximately 40 percent of the array blocks (1,518 acres) from an aerial perspective when fully horizontal (parallel to the ground); however, it is noteworthy that the ground under the 1,518 acres of solar module surface would be undeveloped soil substrate that would support vegetation and wildlife. The potential for the undeveloped portion of the project site to provide suitable for habitat for SWHA foraging is considered in the **Discussion** section of this report.

Swainson's Hawk Use of the Project Site

HELIX biologists have observed SWHAs perched on power poles near the project site or flying over the site consistently since 2015. SWHAs have frequently been seen foraging in active fields along Manning Avenue west of SR-33, several miles west of the project site.

Protocol nesting surveys for SWHA were conducted by HELIX in and within 0.5 miles of the project site between April and June 2018. During those surveys, no active nests were documented. A regional study conducted by Estep (2016) on behalf of Recurrent Energy documented no active SWHA nests within 0.5 mile of the project site. There are 2 stands of trees potentially suitable for SWHA nesting within 0.5 mile of the site: a stand of eucalyptus at a farm house on Dinuba Avenue at SR-33, and a stand of tamarisk at a former farm house site on Monterey Avenue 1.5 mile north of Manning Avenue. HELIX has not observed SWHA nesting at either of these sites in the previous 4 years (HELIX, unpublished data). There are no trees in the project site.

REGULATORY GUIDANCE

The California Department of Fish and Wildlife (CDFW) has developed regional strategies to address land use issues related to SWHA conservation pursuant to both CESA and the CEQA process. The CDFW Region 2 guidelines (CDFW 1994) are often used during CEQA review of proposed projects in the Central Valley. The guidelines outline methods for conducting nest surveys and avoiding or minimizing impacts to active nests that may result in nest abandonment or otherwise cause injury or mortality to individual SWHA (*i.e.*, "take"), which would be regulated under CESA. To avoid impacts to nesting SWHA, the guidelines recommend that no intensive new disturbances or other project related activities that may cause nest abandonment or forced fledging should be initiated within 0.25-mile of an active nest between March 1 and September 15. The exclusion period may be reduced to March 1 to August 15 if a Management Authorization or Biological Opinion is obtained for the project. The exclusion buffer is extended to 0.5-mile in nesting areas away from urban development, where intensive disturbance is not a normal occurrence during nesting season. Examples of intensive disturbance cited in the guidelines include heavy equipment associated with construction, use of cranes and draglines, and rock crushing activities (CDFW 1994).

The guidelines also recommend acquisition of replacement lands (*i.e.*, compensatory mitigation) for projects meeting criteria for determining that a project would result in the loss of foraging habitat acreage sufficient to be considered a significant impact to the SWHA population pursuant to CEQA

definitions. The guidelines state that the determining criteria for CEQA significance is removal of any suitable foraging habitat within 10 miles of an active SWHA nest, which is defined as a nest active at any time in the previous 5 years. Compensatory mitigation is recommended at ratios ranging from 1:1 for projects within 1-mile of an active nest, 0.75:1 for projects 1-5 miles from an active nest, to 0.5:1 for projects 5-10 miles from an active nest (CDFW 1994). The guidelines do not consider the size of the potentially affected population, the amount and quality of existing foraging habitat, or the size of the project relative to the amount of available foraging habitat. However, the guidelines allow for independent assessment of impacts and development of a conservation strategy as an alternative to the guidelines. In order to more accurately assess the potential impacts of the project to SWHA, this study was undertaken to quantify the effects of the proposed project on the regional population of SWHA by analyzing data on land use, nest distribution and abundance, and to inform a CEQA significance determination based on a more robust biological rationale.

METHODS

Impacts to SWHA Nests

The potential for the RE Scarlet project to result in disturbance to SWHA nests is restricted to potential indirect impacts to active nests outside of the project site, as there are no trees inside the project site boundary. Project construction activities could create disturbances to nesting SWHA through noise, vibration, night lighting, or human presence leading to nest abandonment and mortality of chicks. The study included an analysis of the potential for project-related activities to meet the standard of intensive disturbance provided in the guidelines, and an assessment of the appropriate exclusion buffer distance.

Impacts to SWHA Foraging

The analysis of potential impacts of the RE Scarlet project on foraging habitat for the regional population of SWHA builds upon methods that have been used for the analysis of impacts to SWHA foraging habitat on several other approved utility-scale solar projects in the region (reviewed in Estep 2017). This method more effectively addresses CEQA-based impacts to SWHA than the simpler approach employed in the CDFW guidelines. In order to provide a more robust assessment of CEQA impacts, it is necessary to extend the analysis beyond the scale of the project site and the nearest active SWHA nest, which is the scale of analysis employed in the CDFW guidelines. The larger-scale analysis should consider the size and distribution of the regional population of SWHA, availability of suitable foraging habitat, and the effect of project implementation on the availability of resources to the regional population.

Regional Population and Study Area

For purposes of this analysis, the regional population of SWHA was defined as the number of nesting territories documented within 10 miles of the project site. The 10-mile radius standard was chosen based on telemetry studies that indicate SWHA will fly up to 10 miles from the nest to forage (Babcock 1995, Estep 1989). Consequently, the regional population for the study is equivalent to the SWHA that may potentially forage in the project site and thus be directly affected by the project through loss of foraging habitat. The minimum 10-mile radius around the project site boundary, smoothed to account for the uneven shape of the project site, also defines the study area for the analysis.

Foraging Habitat Availability

The amount, distribution, and quality of foraging habitat available to the regional population is a function of surrounding land use patterns. Historically, SWHA hunted in the grasslands of the Central Valley and coastal valleys, and the desert scrub and shrub lands of high desert regions. With the conversion of the Central Valley to agriculture, SWHA foraging has shifted to managed cultivated lands and the availability of foraging habitat is now largely dependent on agricultural practices (Babcock 1995, Woodbridge 1991, Estep 1989). The suitability of individual land cover types is largely a function of two factors: 1) prey abundance; and 2) prey accessibility, which is influenced by vegetation structure (Estep 2009, Bechard 1982). Land uses considered suitable for SWHA foraging include: alfalfa hay; irrigated cropland typically cultivated in a rotation of cotton, wheat, and tomatoes, but also including silage crops such as triticale, sorghum, and corn; irrigated pasture; and uncultivated land that has retained some natural soil and vegetation (Estep 2017). Land uses considered unsuitable for SWHA foraging include: developed land; orchards and vineyards; solar facilities; and open water (Estep 2017).

Suitable foraging habitat varies in quality also based on agricultural management. Crop types that support large numbers of rodent prey and consistently have a low, open vegetation structure provide the highest quality habitat, while crop types that support low numbers of prey or are characterized by tall and dense vegetation provide the lowest quality foraging habitat. Foraging studies indicate that SWHA preferentially forage in alfalfa, tomato, wheat, oat, and other annually rotated crops that maintain a relatively low vegetation profile and that are harvested during the breeding season. Alfalfa has been shown to provide particularly high value habitat due to its consistently low vegetation height and high frequency of mowing, and is used by SWHA at a significantly high rate relative to its availability in the landscape (Estep 2013, 2009, 1989; Swolgaard *et al.* 2008; Babcock 1995; Bechard 1982). Other grain crops (e.g., wheat, barley, sorghum), along with row crops (e.g., tomatoes, sugar beets) and irrigated pasture provide moderate value habitat, as they are harvested during the breeding season. Crops such as corn, cotton, safflower, melons, and vegetables provide low value habitat (Estep 2015).

Based on the factors discussed above, it is possible to categorize landscape-scale data on land use as suitable/unsuitable for SWHA foraging, and as High/Moderate/Low quality foraging habitat.

Foraging Habitat Requirements

Although SWHA do not defend a territory beyond the immediate vicinity of the nest, SWHA forage widely over a large area (Estep 2015). Data from two telemetry studies conducted in the Sacramento Valley indicate that SWHA home ranges vary from 830 acres to 21,543 acres (Estep 1989, Babcock 1995). The average home range size from Babcock (1995) was 9,978 acres (N=5) and from Estep (1989) was 6,820 acres (N=12). Smaller home ranges generally consist of high percentages of alfalfa, fallow fields, and dry pastures (Babcock 1995, Woodbridge 1991, Estep 1989). Where nests are located in the immediate vicinity of high value foraging habitat, home range sizes are as low as 830 acres (Estep 2015). This study used the average home range size of 6,820 acres from Estep (1989).

It is important to note that home range and foraging territory are not synonymous. The 6,820-acre home range is the average area that an individual hawk will occupy during the course of the breeding season; however, within this area, foraging occurs opportunistically where conditions provide accessible prey (Estep 2015). Furthermore, this area is not defended and SWHA often forage communally (Estep

1989, personal observation by the author[1]). Although average home range size may not be an accurate indicator of realized foraging habitat acreage, it is not feasible to precisely quantify the foraging area used by individuals of wide-ranging, opportunistic species such as SWHA; therefore, the average home range size is a useful baseline that can be adjusted to account for factors that affect the amount of the home range that provides the essential resource base for the SWHA nesting territory and thus determines the amount of habitat required to sustain a nesting pair (Estep 2015).

Factor One – Home range overlap. Home ranges within a population overlap, as SWHA forage opportunistically over a shared landscape and often gather in large numbers to forage during agricultural activities that expose prey such as harvest, disking, burning, or flooding. Estep (1989) found that average overlap among home ranges within a population was 40 percent. Adjusting the average home range size downward by the average amount of overlap partially accounts for the extent to which SWHA in a population share the available foraging habitat in the region.

Factor Two – Habitat suitability. While SWHA utilize a large home range, actual foraging takes place in a subset of the total home range, and most prey capture attempts are in moderate- or high-quality habitat areas (Estep 2105). Most SWHA home ranges are likely to contain some unsuitable and low-quality suitable land uses that do not contribute appreciably to the resource base available in the home range. In order to account for this, the average home range can be adjusted downward to reflect only the proportion of the suitable foraging habitat in the study area that is of Moderate or High quality (Estep 2015).

Factor Three – Foraging outside the study area. Because SWHA utilize land up to 10 miles from the nest for foraging, some portion of the potential foraging habitat available to a nesting pair in the regional population will be outside the study area, unless the nest is inside the project site boundary. If there are no trees in the project site, no nest in the regional population will have a potential foraging area entirely inside the study area. Comparing only the habitat available inside the study area to the total habitat requirements of the regional population would substantially underestimate the amount of habitat available to the regional population.

The amount of overlap between the study area and the potential foraging territory of a nest will decrease with distance from the project site. This relationship can be represented in a simplified manner with Equation 1, which is a trigonometric formula for the overlap (A) between two circles of unit radius (radius=1):

$$A = 2\,cos^{-1}\left(\frac{d}{2}\right) - \frac{d}{2}\sqrt{4 - d^2}\,,$$

where d=distance between the centers of the circles expressed as a proportion of the radius, and r=1. Although the study area is not a perfect circle, this is a suitable approximation of the amount of a given nest's potential foraging area as a function of its distance from the project site, as the study area is approximately a circle of radius 10 miles centered on the project site, and the potential foraging area available to a nesting pair of SWHA is a circle of radius 10 miles centered on the nest. After applying this equation to each nest location in the regional population and calculating the weighted average overlap of all nests, the total amount of foraging habitat required by the regional population can be adjusted to reflect the average proportion of all home ranges that is outside the study area. For this analysis, nest

[1] Author observed 30 SWHA foraging in a wheat field immediately north of SR-198 in Kings County during harvest in July 2017.

distances from the project site were binned in increments of 1 mile, and the value of d for each bin was the mid-point of the distance increment (e.g., the quantity A for all nests between 2 and 3 miles from the project site boundary was calculated using a value for d of 0.25).

Using all of the information discussed above, the acreage of suitable foraging habitat required in the study area to support the regional population of SWHA (Y) can be calculated using Equation 2:

$$Y = n \cdot 6{,}820 \cdot p \cdot q \cdot r \ ,$$

where n is the number of SWHA nesting pairs in the regional population; 6,820 is the baseline average home range size; p is the adjustment for average home range overlap (1-average overlap); q is the proportion of the suitable habitat in the study area that is moderate- or high-quality habitat; and r is the weighted average overlap between the study area and the potential foraging area available to the regional population. The quantity Y can be subtracted from the total existing acreage of suitable foraging habitat in the study area; a positive result would indicate that there is a surplus of foraging habitat available to SWHA in the study area; a negative result would indicate that there is a deficit of foraging habitat in the study area.

Thresholds of Significance

CEQA defines the significance of an impact on a state-listed species based on the following:

- Appendix G of the State CEQA guidelines states that a biological resource impact is considered significant (before considering offsetting mitigation measures) if the lead agency determines that project implementation would result in "substantial adverse effects, either directly or through habitat modifications, on any species identified as being a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFW or USFWS"; and

- CEQA Section 15065 (Mandatory Findings of Significance), a biological resource impact is considered significant if the project has the potential to "substantially reduce the number or restrict the range of an endangered, rare or threatened species".

Impacts to SWHA Nests

Any impact from project activities that results in abandonment or forced fledging of an active nest, or otherwise results in take of individual SWHA would be considered a significant impact under CEQA.

Impacts to SWHA Foraging

Based on the above-referenced definitions, the proposed project could be considered to have potential for a significant impact to SWHA if it resulted in a reduction of available foraging habitat below the amount required to sustain the regional population. If the proposed project would not result in a deficit of suitable foraging habitat in the study area, the project's impact could be considered less than significant under CEQA.

Because SWHA home ranges are different each year due to seasonal and annual changes in the crop matrix, it is difficult to predict or model the extent of the area likely to be used by a given pair of SWHA over a period of years (Estep 2015). In addition, although the method used to estimate the acreage of

available and required foraging habitat in the study area represents a robust and scientifically defensible analysis, it is necessarily dependent on a number of generalizations and assumptions. Therefore, the estimates in the study are only best approximations. In order to account for variation in the estimates due to interannual variation in the regional population caused by mortality and recruitment, allow for resilience in the population to environmental factors outside the scope of this analysis, and to account for other potential sources of error, the CEQA significance threshold should be set substantially higher than the minimum amount of foraging habitat required in the study area to sustain the regional population. For this analysis, the CEQA significance threshold was set at 70 percent of the existing surplus habitat. If the project would result in the surplus of suitable foraging habitat in the study area being reduced to less than 70 percent of the existing surplus, the project would be considered to have a significant impact on the regional population of SWHA under CEQA.

Data Acquisition and Processing

Data used in the analysis came from publicly-available datasets as well as proprietary data obtained during surveys performed by HELIX under contract with Recurrent. All public data sets were the most recent available as of August 2018.

Land Use Data

Land use data were taken from the 2017 U.S. Department of Agriculture (USDA) Crop Layer, which is available at: https://www.nass.usda.gov/Research_and_Science/Cropland/Release/index.php. The data were downloaded on August 21, 2018. The data set provides land cover data at a resolution of 30m x 30m for the entire U.S. The data were clipped to the study area boundary, and land cover types were characterized as suitable or unsuitable for SWHA foraging, and as High, Moderate, Low, or Unsuitable quality foraging habitat, according to a crosswalk derived from previous studies (Estep 2017, 2015). The crosswalk is provided in Appendix B. Land cover data were adjusted for existing solar projects that were classified as their former agricultural use in the USDA data set, which resulted in a minor increase in the acreage of unsuitable foraging habitat.

This method was used in a similar study performed in late 2016 for the RE Mustang 2 solar project in Kings County (HELIX, unpublished data). In that study, the USDA Crop Layer (2015 data were available at that time) was converted to suitable/unsuitable classifications and compared to data collected in 2016 in a ground survey of land covers in a 252,225-acre study area around the RE Mustang 2 project site (Estep 2017). The acreage of suitable foraging habitat calculated by HELIX differed from the acreage identified by Estep (2017) by -6,331 acres (-3.1 percent), which suggests that the desktop analysis provides a reliable and conservative indicator of the amount of suitable foraging habitat at a landscape scale.

Swainson's Hawk Nest Data

Spatially explicit data on SWHA nest locations in the study area were obtained from two sources: California Natural Diversity Database (CNDDB) records and a ground survey performed in 2016 in the study area (Estep 2016). Two additional ground surveys that overlapped the study area were consulted for comparison with the 2016 survey results: a survey of SWHA nests in the central San Joaquin Valley (Estep and Dinsdale 2012) and a ground survey conducted for the RE Tranquillity solar project which is adjacent to the proposed project to the southwest (Estep 2011). There were no CNDDB records dated later than 2016; consequently, only spatial data from Estep (2016) were used to determine the locations

of nests in the regional population. The number of nests documented in the survey for RE Tranquillity (Estep 2011) was 30; the number of nests documented by Estep and Dinsdale (2012) that were inside the study area for this project was also 30; Estep (2016) documented 29 nests in the study area. Based on the close agreement between the three surveys over a period of 5 years, we concluded that the regional population for this study is most likely 30 pairs. Only the 29 nests documented by Estep in 2016 are depicted in Figure 1 because the 1 additional nest territory assumed to be present in the regional population based on past surveys could be at any of several documented locations where no nest was observed in 2016. For purposes of the calculation of average potential foraging area overlap with the study area described previously under *Factor Three – Foraging outside the study area*, the additional nest was conservatively assumed to be within 1 mile of the project site.

Because SWHA exhibit a high degree of nest site fidelity, it is unlikely that this method resulted in a significant underestimate of the current number of active nest territories in the study area; however, any potential underestimate of the regional population would be accommodated by the elevated CEQA significance threshold discussed previously.

Cumulative Projects

Data on other existing, planned, and reasonably foreseeable solar projects (cumulative projects) in the study area were obtained from Fresno County. Cumulative projects were classified as Constructed/Not Constructed for purposes of analysis.

RESULTS

Regional Population and Habitat Requirements

The regional population of SWHA that would potentially be directly affected by the RE Scarlet project is 30 nesting pairs in a 279,495-acre study area. The nest locations are concentrated in the northern half of the study area (Figure 1). A total of 173,936 acres of suitable foraging habitat were identified in the study area; the remaining 105,559 acres were unsuitable land uses (Figure 2). Orchards and vineyards made up 74.5 percent of the unsuitable land uses. Of the suitable foraging habitat in the study area, 11,561 acres were High quality (alfalfa), 143,436 acres were Moderate quality, and 18,939 acres were Low quality (Figure 3). Overall, 89.1 percent of the suitable foraging habitat was Moderate- or High-quality habitat. Land uses in the study area are summarized in Table 1.

Table 1
SWHA FORAGING HABITAT IN THE STUDY AREA

Habitat Type	Area (ac)	% of Total
Grand Total	**279,495**	**100.0**
Suitable Habitat	173,936	63.4
High Quality (alfalfa)	11,561	6.6
Moderate Quality	143,436	82.5
Low Quality	18,939	10.9
Unsuitable Habitat	105,559	37.7
Orchards/Vineyards	78,667	74.5
Other	26,892	25.5

Most nests (77 percent) were more than 4 miles from the project site boundary (Figure 4), and the largest number (7 nests) were 4-5 miles from the project site. The approximate overlap of the potential foraging area and the study area was calculated for each nest using Equation 1. The weighted average overlap of all nests with the study area was 0.67 (Table 2).

Table 2
PROPORTION OF POTENTIAL FORAGING AREA INSIDE THE STUDY AREA

Distance Increment (mi)	Number of Nests	Overlap
0-1	2	0.968
1-2	2	0.905
2-3	3	0.841
3-4	0	0.778
4-5	7	0.716
5-6	4	0.654
6-7	4	0.594
7-8	4	0.534
8-9	2	0.476
9-10	2	0.419
	Weighted Average	**0.673**

Using the results discussed above, the total acreage of foraging habitat required in the study area to sustain the regional population of SWHA was calculated using Equation 2:

$$Y = 30 \cdot 6{,}820 \cdot 0.6 \cdot 0.89 \cdot 0.67 = 73{,}201,$$

where 30 is the size of the regional population (n); 6,820 is the baseline average home range size; 0.6 is the correction for 40 percent overlap among home ranges (p); 0.89 is the proportion of the suitable foraging habitat in the study area that is Moderate- or High-quality (q); and 0.67 is the weighted average proportion of potential foraging area for all nest territories in the regional population that is inside the study area (r).

According to Equation 2, the total amount of foraging habitat in the study area required by the regional SWHA population is 73,201 acres. The total amount of suitable foraging habitat in the study area is 173,936 acres; therefore, there is a surplus of 100,735 acres of suitable foraging habitat in the study area. The CEQA significance threshold is 70 percent of the existing surplus, or 70,514 acres (Table 3).

Table 3
PROJECT IMPACTS AND CEQA SIGNIFICANCE THRESHOLD

		Remaining After Impact					
	Existing	Project 4,089	% of Existing	Cumm. 14,037	% of Existing	Cumm. 8,072	% of Existing
Foraging Habitat Required	76,492	--	--	--	--	--	--
Suitable Foraging Habitat	173,936	169,847	97.7	159,899	91.9	165,864	95.4
Surplus	100,735	96,646	95.9	86,698	86.1	92,663	91.9
CEQA Significance Threshold	70,514	--	--	--	--	--	--
Less than Significant Impact[1]	30,221	26,132	86.5	16,184	53.6	22,149	73.3

[1]Impact acreage that would be below the CEQA threshold of significance, or 100,735-70,514=100,735·0.3=30,221

Project Impacts and Mitigation

Nesting

Impacts

Because there are no trees in the project site, the project would not remove SWHA nesting habitat. Project construction/decommissioning activities within 0.25-mile of suitable trees could potentially disturb nesting SWHA using those trees. There were no documented active SWHA nests within 0.5-mile of the project site in 2018.

CDFW management protocols for SWHA (CDFW 1994) stipulate a 0.25-mile buffer for "intensive new disturbances" around active nests, extended to 0.5-mile outside urban areas where disturbance is not a normal occurrence during the nesting season. CDFW (1994) cites heavy equipment operation, use of cranes or draglines, and rock crushing as examples of "intensive disturbance". Normal agricultural operations in the vicinity of the project site include disking and plowing of fields by large (6-8 wheel) tractors and combine harvesters, and periodic presence of scores of agricultural laborers during planting and harvest. Equipment used for construction of the proposed project would include road graders (bladers), small self-contained drill rigs for boring support post holes, front loaders and fork lifts, semi-trucks, and small truck-mounted cranes for placing transformers on pads. These vehicles and activities would not cause noise, dust emissions, or vibration greater than that typical of large agricultural equipment used in the region. Consequently, an extended (0.5-mile) buffer would not be warranted for the project, and a 0.25-mile buffer would be sufficient to protect active SWHA nests from disturbance. Project activities negatively affecting nesting SHWA would be a potentially significant impact and implementation of appropriate mitigation measures would be required.

Foraging

Project-Level Impacts

The proposed project would result in conversion of 4,089 acres of active agricultural land in the study area into a solar PV generating facility. For purposes of this analysis, solar facilities are considered a land use unsuitable for SWHA foraging. Removal of 4,089 acres of habitat would reduce the surplus SWHA foraging habitat in the study area to 96,646 acres, which is 95.9 percent of the existing surplus, and well above the 70-percent CEQA significance threshold (Table 3). The project impact to the regional population of SWHA through foraging habitat loss would be less than significant, and no compensatory mitigation would be required.

Cumulative Impacts

Including the proposed RE Scarlet project, there are approximately 18 existing, planned, or reasonably foreseeable solar projects in the study area (Figure 5). The total area of these cumulative projects is 14,037 acres. The proposed project contributes 29.1 percent of the cumulative impact. Development of the cumulative projects would reduce the surplus SWHA foraging habitat in the study area to 86,698 acres, which is 86.1 percent of the existing surplus and above the 70-percent CEQA significance threshold (Table 3).

Some of the land proposed for development under the cumulative projects is already in unsuitable land uses. Of the 14,037 acres of cumulative projects, 1,061 acres are currently unbuilt and unsuitable for SWHA foraging and 4,904 acres are existing solar facilities already classified as unsuitable foraging habitat in this analysis. The remaining 8,072 acres of unbuilt cumulative projects, including 4,089 acres of the proposed project, are suitable foraging habitat (Figure 6). Considering only future impacts to suitable foraging habitat, the cumulative impact would be 8,072 acres and the surplus remaining after development would be 92,663 acres, which is 92.0 percent of the existing surplus (Table 3).

The project would contribute to a less than significant cumulative impact to the regional population of SWHA through foraging habitat loss, and no compensatory mitigation would be required.

DISCUSSION

Conclusions

The proposed RE Scarlet solar project would potentially result in significant impacts to nesting SWHA if an active nest were to be established within 0.25-mile of the project site prior to initiation of construction activities. This potential impact could be less than significant after implementation of appropriate mitigation.

The proposed RE Scarlet solar project would not result in a significant impact to the regional population of SWHA through loss of suitable foraging habitat, nor would it contribute to a significant cumulative impact in concert with other existing, planned, or reasonably foreseeable projects. After project development, the amount of surplus suitable foraging habitat in the study area would remain greater than 70 percent of the existing surplus and therefore provide sufficient surplus foraging habitat to allow for population growth and resiliency to disturbance, as well as to changes to the foraging landscape through changes in agricultural land uses.

The analysis performed for this study represents a robust, scientifically defensible rationale for assessing potential project impacts to a wide-ranging, opportunistic forager such as SWHA. The method is based on previously accepted methods (Estep 2017, 2015, 2011) and makes use of the best available data. The analysis considers impacts to SWHA at a more biologically realistic scale than the method employed in the 1994 CDFW guidelines while remaining logistically feasible as well as generalizable to a wide range of projects and locations. The most limiting factor in the analysis is the need for a suitably current and accurate census of active SWHA nest territories in the study area. The CDFW guidelines define an active SWHA nest location as one that has been active in any of the previous 5 years; therefore, primary nest data for the study area should come from a ground survey within the previous 5 years. In this case, the survey data from Estep (2016) were the primary source of nest locations, as that survey covered the entire study area. Data from CNDDB and Estep and Estep and Dinsdale (2012) were used to supplement the primary data from 2016 (Estep 2016).

Swainson's Hawk Use of Solar Facilities

It has been previously thought that lands supporting linear rows lined with tall vegetation (e.g., vineyards) are considered unsuitable foraging habitat because the extent to which SWHAs would attempt to capture prey between rows of tall vegetation is considered negligible (Estep 2013). Similarly, solar generation facilities – which are generally similar to vineyards in overall structure – are typically considered unsuitable foraging habitat. This assumption was applied to the analysis presented in this

study; however, recent studies indicate that both vineyards and solar generation facilities provide some foraging habitat value for SWHAs (Estep 2013; Swolgaard *et al.* 2008).

Because much of the typical solar generation facility is composed of open areas, there is potential for use of solar projects by SWHA and other raptors for foraging, particularly if the facility is managed to optimize habitat for prey and the area between the panels is managed as perennial grassland vegetation of a suitable height. As previously mentioned, other land uses with a similar structure, such as vineyards, have also been demonstrated to be used by foraging SWHA, so this concept is not completely new. To test the hypothesis that solar arrays provide foraging habitat for SWHA, Estep (2013) conducted a pilot study in Sacramento County in 2012 to evaluate the foraging use of solar arrays by SWHAs and other raptor species relative to the surrounding agricultural landscape.

In that study, three PV solar generation facilities in Sacramento County, ranging from 105 to 200 acres in size, were evaluated for foraging use by SWHAs and other raptors. All three of the solar generation facilities evaluated in the foraging study are located within a diverse agricultural landscape of similarly sized parcels to the solar facilities. The study was conducted after the three facilities had been constructed, operation had commenced, and grass cover had been established. The three facilities were being managed to allow establishment of grasses beneath and between the solar panels. The grass cover at these sites is maintained between 4 and 12 inches in height through a sheep grazing program. The grass ground cover is managed to promote the establishment of rodent populations to provide foraging habitat for raptors as well as refugia for rodents to assist with re-establishment of rodent populations on adjacent farmlands following cultivation.

Results of the study indicated that the solar array fields were used for foraging by SWHA similar to other moderate to high value agricultural cover types and the presence of the solar facilities did not appear to affect the overall use of the landscape by SWHAs or other raptors. As one element of an otherwise diverse agricultural matrix, the solar array fields provided a consistent and an apparently reasonably accessible source of prey, particularly for SWHAs and American kestrels. Surprisingly, the study also indicated that the solar arrays were used at a higher rate than would be expected based on their availability in the landscape, meaning that SWHAs appeared to be selectively foraging within solar arrays over other crop types. The key to this was the fact that the solar sites were managed to provide a continual source of prey that was accessible to the hawks consistently throughout the spring and summer breeding season versus the seasonal availability of prey in agricultural crops due to the planting, growth, and harvesting regime.

Although this was a relatively simple short-term study (*i.e.*, a 5-month study) designed to determine foraging use by SWHAs in 100-200-acre solar arrays within a diverse agricultural matrix, it demonstrated that solar arrays do provide available foraging habitat for SWHAs and are used by this species for foraging. The study also suggests that conversion of otherwise suitable foraging habitat to solar arrays does not necessarily constitute a complete loss of foraging habitat for SWHA and that properly managed solar arrays could provide important foraging habitat for SWHA during periods when surrounding agricultural crops are not suitable.

In 2017, HELIX biologists conducted a study of SWHA foraging at the RE Mustang Solar Generation Facility, which is an operational solar facility in Kings County near the intersection of SR-198 and Avenal Cutoff Road (HELIX 2018). The study expands on the Estep study and shows that SWHAs will forage in a large-scale solar generation facility (>1,000 acres). The study compared SWHA foraging use of the 1,100-acre solar facility to an approximately 4,800-acre off-site area that included active and fallow

agricultural lands. HELIX found that SWHAs foraged in the operational RE Mustang Solar Generation Facility at a higher intensity (determined by the minutes of forage per unit area) than in surrounding lands and observed no foraging behavior on the fallow portion of the survey area. This result is consistent with the findings of Estep (2013), suggesting that solar generation facilities managed to promote SWHA foraging may provide higher-value foraging habitat than active and idle agricultural lands.

The results of these studies indicate that solar generation facilities are used for foraging by SWHA similar to other moderate to high value agricultural cover types. As one element of an otherwise diverse agricultural matrix, the solar generation facilities provided a consistent and an attractive source of prey. The key to this was the fact that the solar generation facilities were managed to provide a continual source of prey that was accessible to the hawks consistently throughout the spring and summer breeding season versus the seasonal availability of prey in agricultural crops due to the planting, growth, and harvesting regime (Estep 2013).

Standard compensatory mitigation ratios for loss of SWHA foraging habitat (CDFW 1994) are based on land use changes that do not retain habitat value. In the case of standard SWHA mitigation, complete loss of foraging value is assumed. However, because there are opportunities to retain value through land management practices within solar facilities and the solar facilities are temporary (typical lifespan of approximately 40 years), solar projects should not be analyzed using the same impact assumptions as other forms of development that eliminate foraging habitat on a permanent scale (e.g., residential or commercial development).

Estep (2013) notes that to encourage raptor foraging use of solar arrays, the management of a grassland substrate to promote rodent populations, including maintaining vegetation at a height that promotes visibility and access to prey, is of key importance. Most crop types are available for a short period of time during the breeding season due to the planting, growing and harvesting regime, whereas a managed grassland can provide a consistent and available source of prey throughout the spring and summer breeding season.

Potential On-Site Enhancement of Foraging Value

The analysis conducted for this study assumed that development of the project would result in a complete (100%) loss of foraging value at the site for SWHA. However, as discussed above, there is evidence that conversion of otherwise suitable foraging habitat to solar facilities does not constitute a complete loss of foraging habitat for SWHA. As indicated by Estep (2013) and Helix (2018), it is clear that typical management of solar arrays promotes continued wildlife use and at least maintains, and may enhance, overall ecological value.

The project site currently consists of active agricultural land. The proposed project would include constructing up to approximately 30 acres of structures and paved surfaces (e.g., internal driveways, buildings, equipment pads) on the 4,089-acre project site; additionally, approximately 265 acres of the project site consists of public road rights-of-way that would be outside the facility's perimeter fence. The remaining approximately 3,794 acres of the project site would be in solar array blocks, which would consist of vegetated undeveloped land with solar panels installed at a height of 4 feet above grade. The aerial coverage of the solar panels when horizontal would be approximately 1,518 acres (approximately 40 percent of the total acreage of array blocks).

Assuming that SWHA would not forage under solar panels but would forage between trackers, a total of approximately 2,276 acres (55.7 percent) of the 4,089-acre project site would be suitable for SWHA foraging. In summary, while the proposed project would result in a reduction of foraging habitat for SWHA for the operational life of the facility, there would be foraging opportunities for the hawk over most (55.7 percent) of the site area, which could have the potential to provide ecological benefits to the site and adjacent areas. As such, conversion of otherwise suitable foraging habitat to solar arrays does not constitute a complete loss of foraging habitat for SWHA.

Based on preliminary design, approximately 44 percent of the project site (1,813 acres) would be directly impacted by structures, paved surfaces, and solar array modules, and therefore be considered inaccessible to foraging SHWA. The remaining approximately 56 percent of the project site (2,276 acres) would remain accessible to foraging SWHAs as dryland pasture between solar arrays and in open space areas on the site during project operation. Given that the approximately 2,276 acres of the site that would remain in dryland pasture would provide an equivalent (or greater) foraging value to SWHA when compared to baseline conditions, the true project impact to SWHA foraging habitat could be as little as 1,813 acres.

Attachments:
Attachment A – Figures
Attachment B – Land Use Crosswalk

REFERENCES

Babcock, K.W. 1995. Home range and habitat use of breeding Swainson's hawks in the Sacramento Valley of California. Journal of Raptor Research, 29(3): 193-197.

Bechard, M. J. 1982. Effect of Vegetative Cover on Foraging Site Selection by Swainson's Hawk. Condor 84:153–159.

California Department of Fish and Wildlife (CDFW). 1994. Staff Report Regarding Mitigation for Impacts to Swainson's Hawks (*Buteo swainsoni*) in the Central Valley of California. November 1.

Estep, J. 2017. The Distribution and Abundance of Nesting Swainson's Hawks in the Vicinity of the Proposed RE Mustang 2 Solar Generating Facility. Prepared by Estep Environmental Consulting, Sacramento, CA, for RE Mustang Two LLC, San Francisco, CA. January.

2016. The Distribution and Abundance of Nesting Swainson's Hawks in the Vicinity of the Proposed RE Scarlet Solar Generation Facility. Prepared by Estep Environmental Consulting, Sacramento, CA. September.

2015. A Proposed Conservation Strategy for the Swainson's Hawk in Yolo County. Prepared for the Yolo County Natural Heritage Program. March 20, 2015.

2013. Swainson's hawk and other foraging raptor use of solar array fields within an agricultural landscape in Sacramento County. Prepared for Recurrent Energy, San Francisco, CA. October.

2011. The distribution and abundance of nesting Swainson's hawks in the vicinity of the proposed RE Tranquillity LLC solar generating facility. Prepared by Estep Environmental Consulting, Sacramento, CA, for RE Tranquillity LLC, San Francisco, CA. November.

2009. The influence of vegetation structure on Swainson's Hawk (*Buteo swainsoni*) foraging habitat suitability in Yolo County, CA. Yolo County Habitat- Natural Community Conservation Plan (http://www.yoloconservationplan.org /.2013).

1989. Biology, movements, and habitat relationships of the Swainson's hawk in the Central Valley of California, 1986-1987. California Department of Fish and Game, Wildlife Management Division, Nongame Bird and Mammal Section, Sacramento, CA.

Estep, J.A. and J.L. Dinsdale. 2012. Distribution, abundance, and habitat associations of nesting Swainson's hawks in the central San Joaquin Valley, California. CVBC Bulletin, 15(4): 84-106.

HELIX Environmental Planning, Inc. (HELIX). 2018. Swainson's Hawk Foraging Use of a Large-scale Solar Generating Facility in an Agricultural Landscape. February.

Smallwood, K.S. 1995. Scaling Swainson's hawk population density for assessing habitat use across an agricultural landscape. Journal of Raptor Research, 29(3): 172-178.

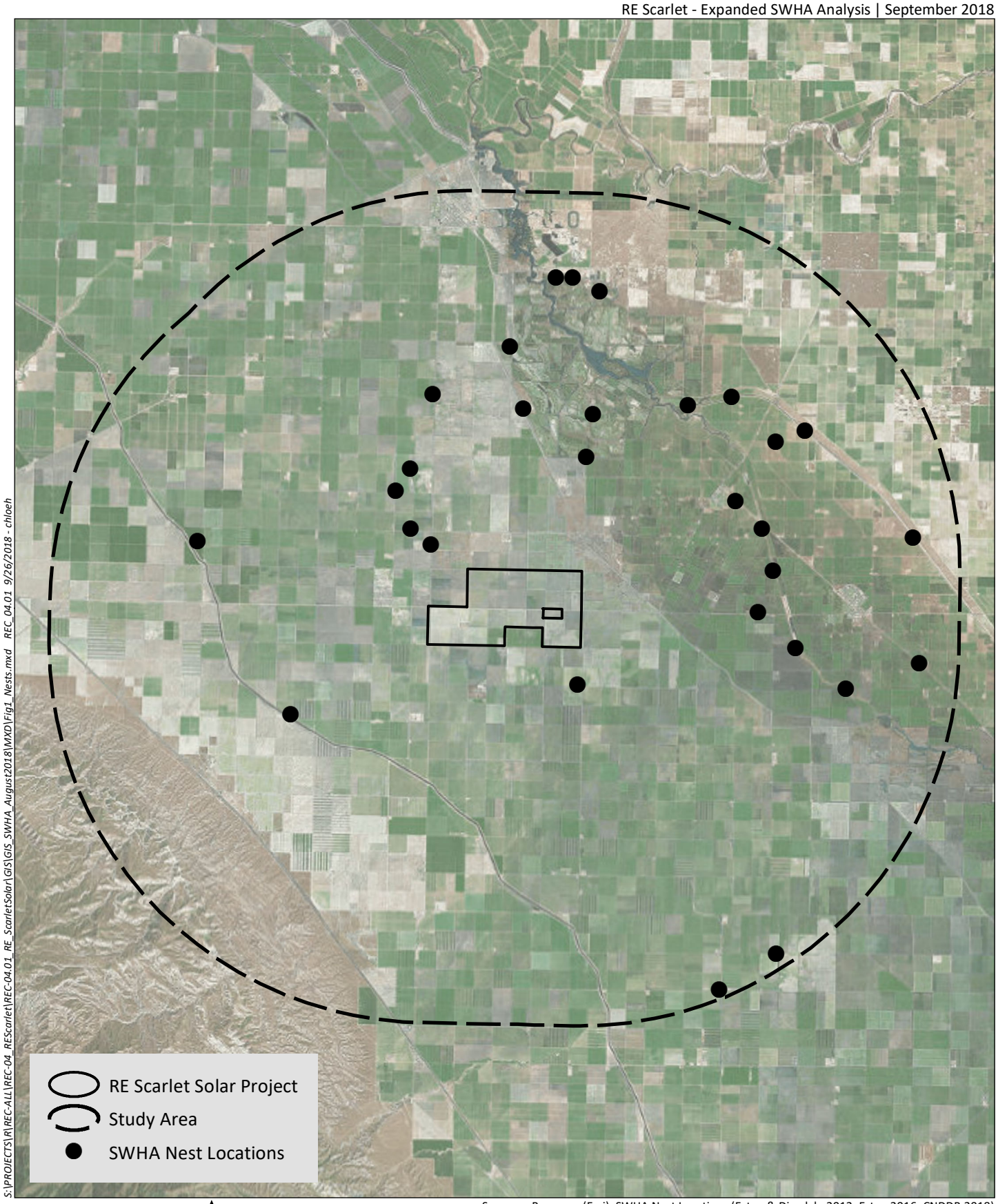
Swainson's Hawk Technical Advisory Committee (SHTAC). 2000. Recommended timing and methodology for Swainson's hawk nesting surveys in California's central valley. May 31.

Swolgaard, C.A., K.A. Reeves, and D.A. Bell. 2008. Foraging by Swainson's hawks in a vineyard-dominated landscape. Journal of Raptor Research, 42(3): 188-196.

Woodbridge, B. 1991. Habitat selection by nesting Swainson's hawks: a hierarchical approach. M.S. thesis, Oregon State University., Corvallis.

Attachment A

Figures

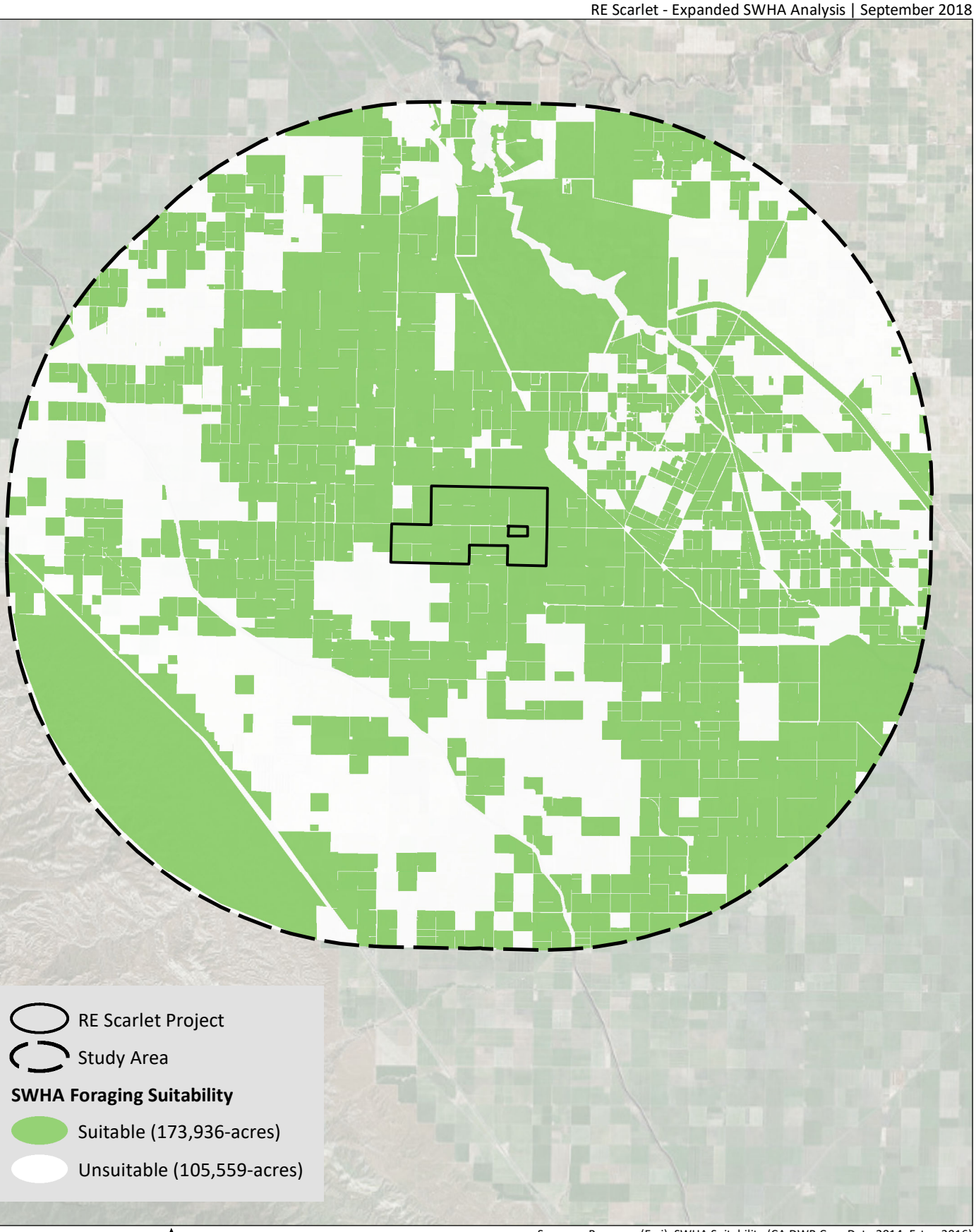


Sources: Basemap (Esri), SWHA Nest Locations (Estep & Dinsdale 2012, Estep 2016, CNDDB 2018)

HELIX Environmental Planning

Swainson's Hawk Nest Locations

Figure 1



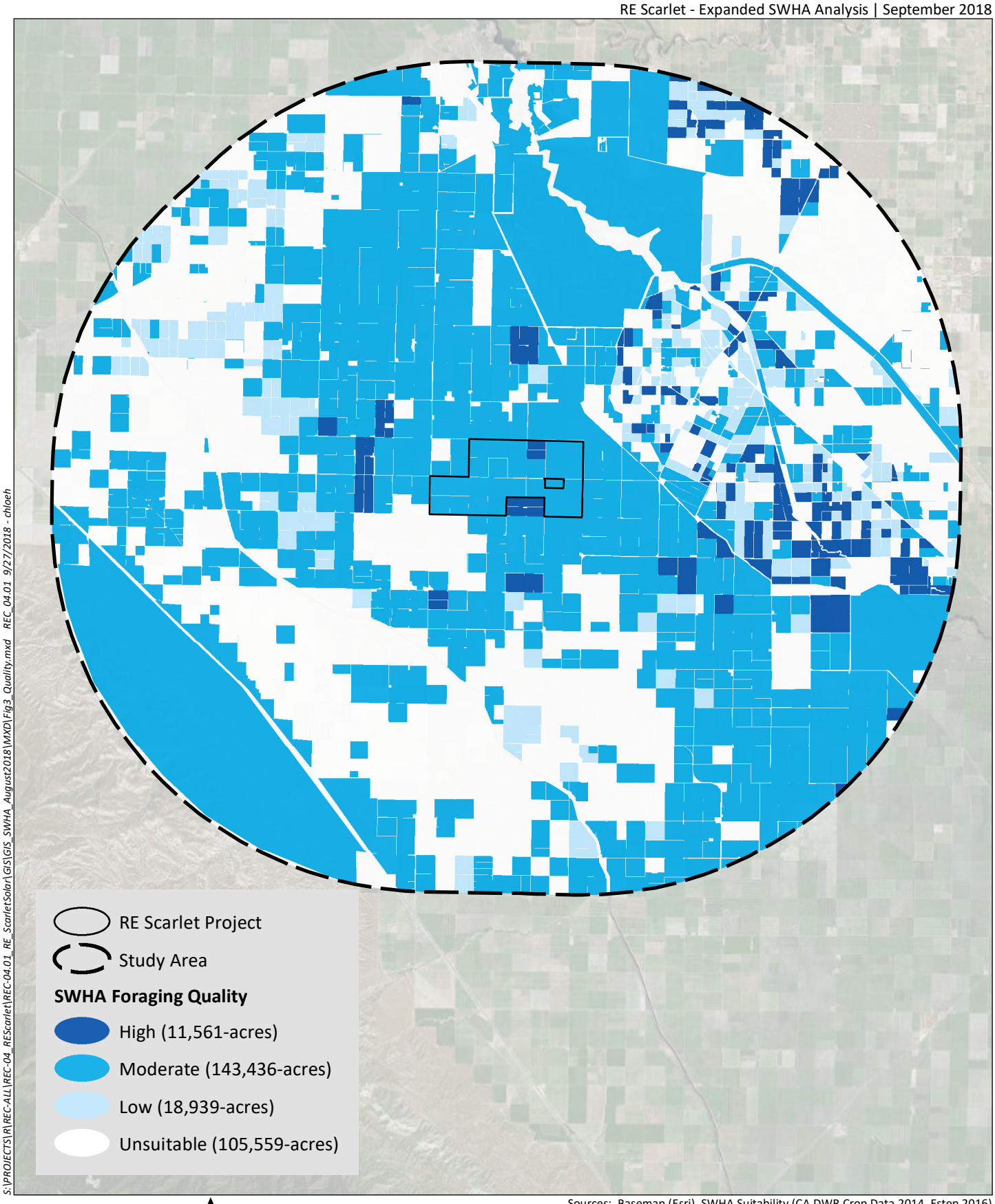
S:\PROJECTS\R\REC-ALL\REC-04_RESCarlet\REC-04.01_RE_ScarletSolar\GIS\GIS_SWHA_August2018\MXD\Fig2_Suitability.mxd REC_04.01 9/27/2018 - chloeh

Sources: Basemap (Esri), SWHA Suitability (CA DWR Crop Data 2014, Estep 2016)

HELIX Environmental Planning

Swainson's Hawk Suitable Foraging Habitat

Figure 2



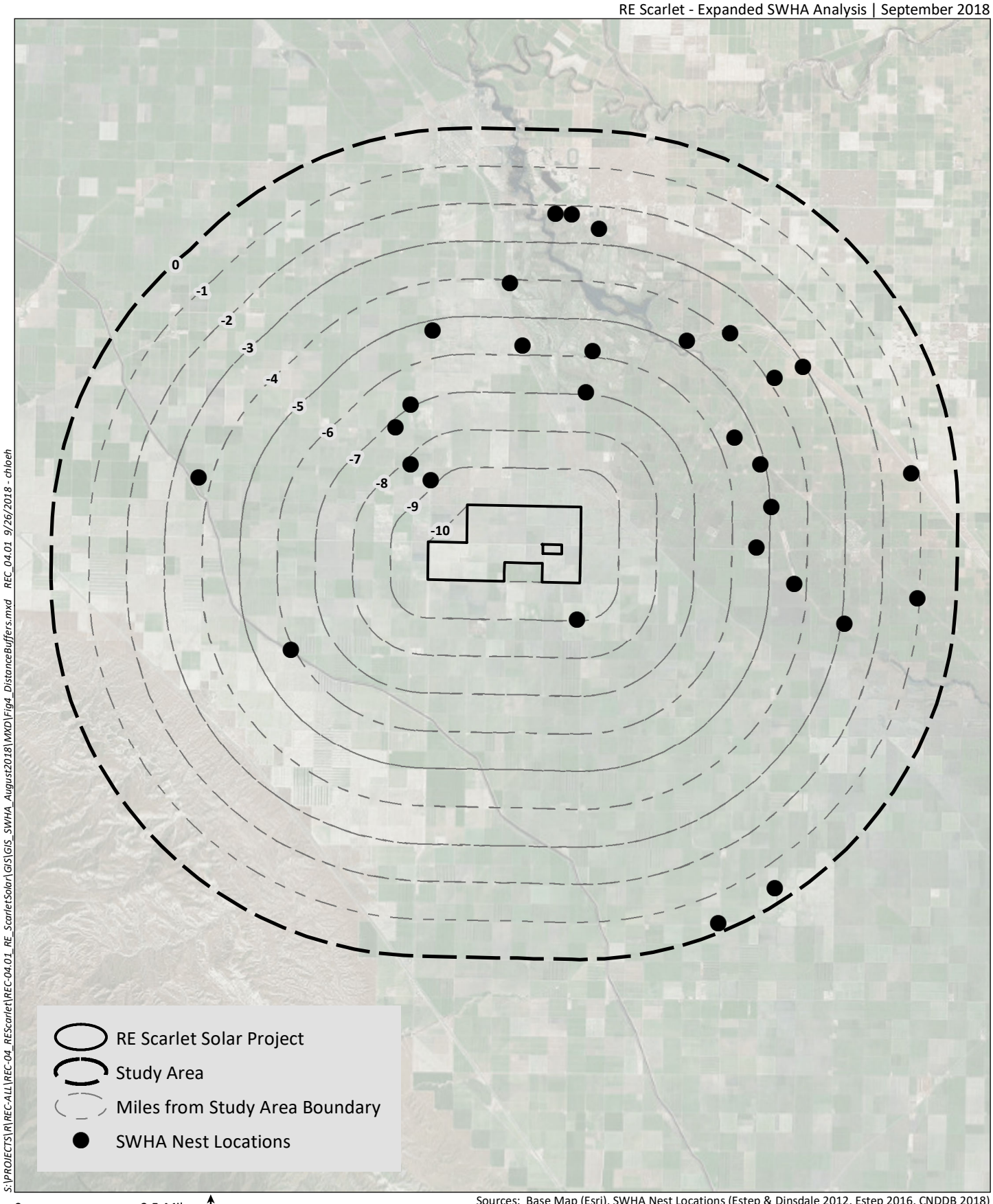
S:\PROJECTS\R\REC-ALL\REC-04_RESCarlet\REC-04.01_RE_ScarletSolar\GIS\GIS_SWHA_August2018\MXD\Fig3_Quality.mxd REC_04.01 9/27/2018 - chloeh

Sources: Basemap (Esri), SWHA Suitability (CA DWR Crop Data 2014, Estep 2016)

HELIX Environmental Planning

Swainson's Hawk Foraging Habitat Quality

Figure 3

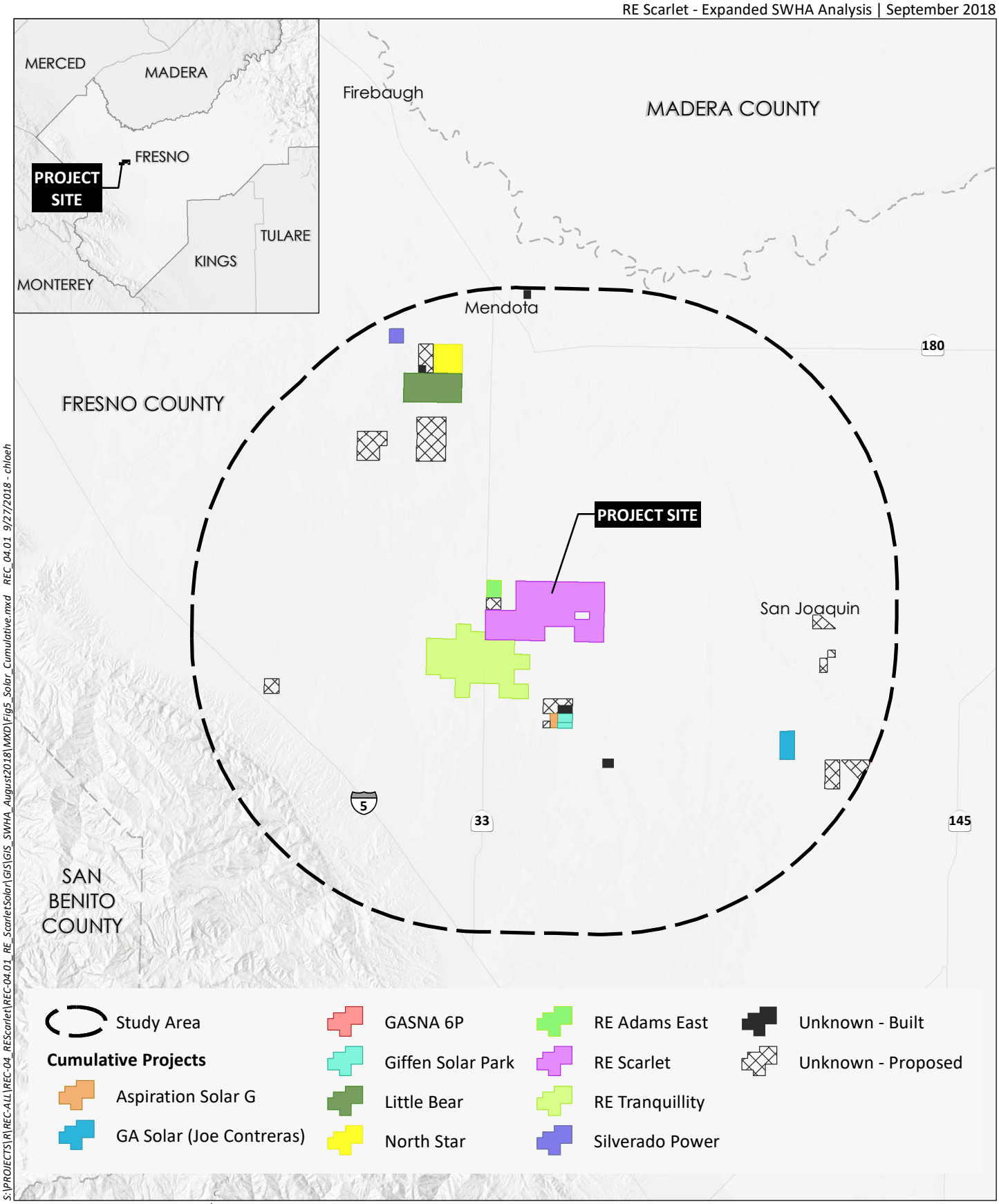


Sources: Base Map (Esri), SWHA Nest Locations (Estep & Dinsdale 2012, Estep 2016, CNDDB 2018)

HELIX Environmental Planning

Swainson's Hawk Nest Distances from Study Area

Figure 4

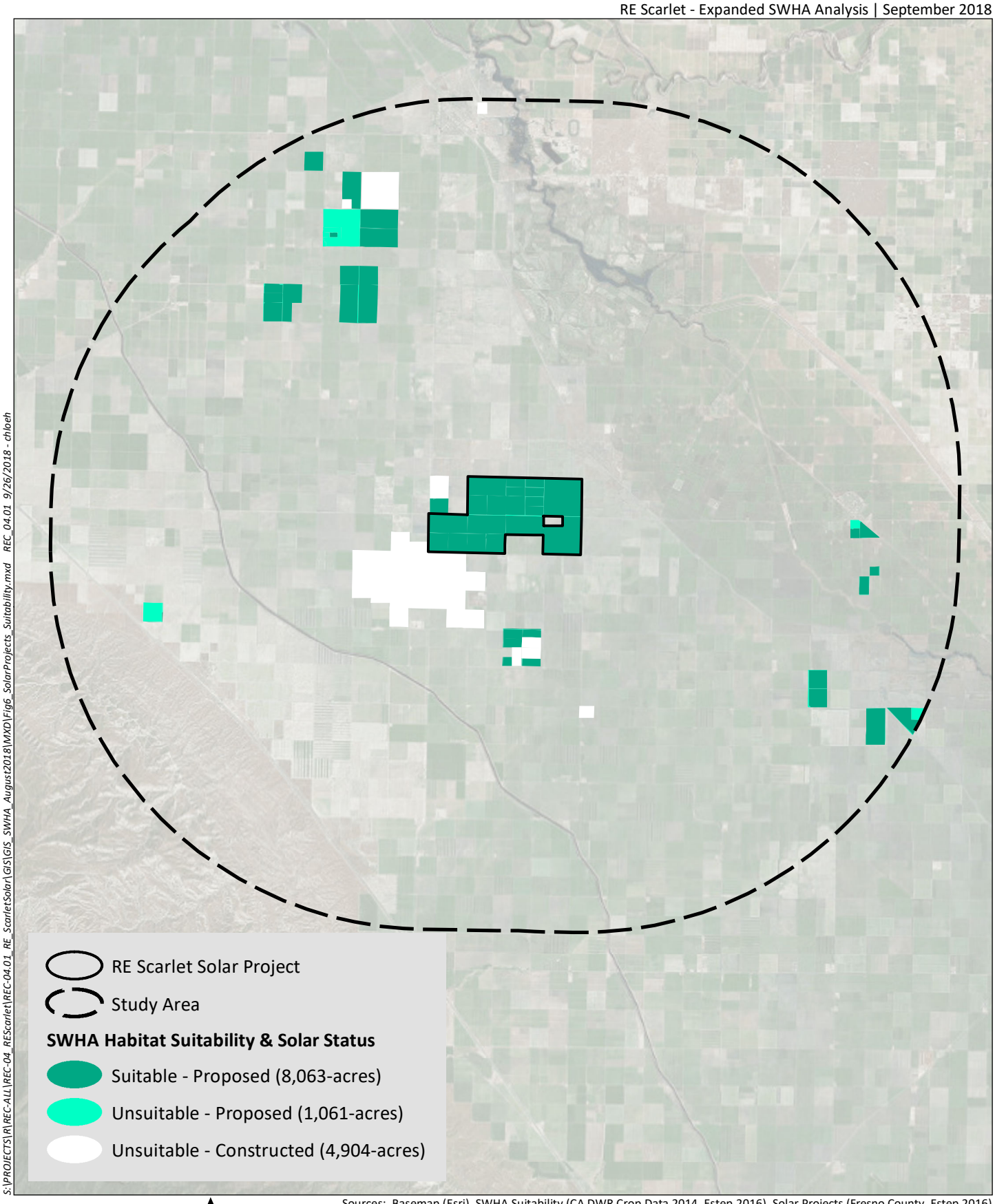


S:\PROJECTS\R\REC-ALL\REC-04_REScarlet\REC-04.01_RE_ScarletSolar\GIS\GIS_SWHA_August2018\MXD\Fig5_Solar_Cumulative.mxd REC_04.01 9/27/2018 - chloeh

HELIX Environmental Planning

Cumulative Projects

Figure 5



S:\PROJECTS\R\REC-ALL\REC-04_REScarlet\REC-04.01_RE_ScarletSolar\GIS\GIS_SWHA_August2018\MXD\Fig6_SolarProjects_Suitability.mxd REC_04.01 9/26/2018 - chloeh

Sources: Basemap (Esri), SWHA Suitability (CA DWR Crop Data 2014, Estep 2016), Solar Projects (Fresno County, Estep 2016)

HELIX Environmental Planning

Cumulative Projects & Foraging Suitability

Figure 6

Attachment B

Land Use Crosswalk

CLASS_NAME	LandType	Foraging (Y or N)	Quality	
developed	Developed/urban	N		0
Freshwater Forested/Shr*	Riparian/wetland/open water	N		0
Riverine	Riparian/wetland/open water	N		0
Corn	Irrigated Cropland	Y	Low	
Cotton	Irrigated Cropland	Y	Low	
Sorghum	Irrigated Cropland	Y	Mod	
Sweet Corn	Irrigated Cropland	Y	Low	
Barley	Irrigated Cropland	Y	Mod	
Durum Wheat	Irrigated Cropland	Y	Mod	
Spring Wheat	Irrigated Cropland	Y	Low	
Winter Wheat	Irrigated Cropland	Y	Mod	
Rye	Irrigated Cropland	Y	Mod	
Rice	Irrigated Cropland	N		0
Oats	Irrigated Cropland	Y	Mod	
Safflower	Irrigated Cropland	Y	Low	
Alfalfa	Alfalfa and hay crop	Y	High	
Other Hay/Non Alfalfa	Alfalfa and hay crop	Y	Mod	
Sugarbeets	Irrigated Cropland	Y	Mod	
Dry Beans	Irrigated Cropland	Y	Low	
Potatoes	Irrigated Cropland	Y	Mod	
Other Crops	Irrigated Cropland	Y	Low	
Watermelons	Irrigated Cropland	Y	Low	
Onions	Irrigated Cropland	Y	Mod	
Cucumbers	Irrigated Cropland	Y	Low	
Peas	Irrigated Cropland	Y	Low	
Tomatoes	Irrigated Cropland	Y	Mod	
Herbs	Irrigated Cropland	Y	Mod	
Fallow/Idle Cropland	Irrigated Cropland	Y	Mod	
Cherries	Orchard/vineyard	N		0
Pears	Orchard/vineyard	N		0
Peaches	Orchard/vineyard	N		0
Grapes	Orchard/vineyard	N		0
Other Tree Crops	Orchard/vineyard	N		0
Citrus	Orchard/vineyard	N		0
Pecans	Orchard/vineyard	N		0
Almonds	Orchard/vineyard	N		0
Walnuts	Orchard/vineyard	N		0
Open Water	Riparian/wetland/open water	N		0
Developed/Open Space	Developed/urban	N		0
Developed/Low Intensity	Developed/urban	N		0
Developed/Med Intensity	Developed/urban	N		0
Developed/High Intensity	Developed/urban	N		0
Barren	Developed/urban	N		0
Deciduous Forest	Forest/shrubland	N		0
Evergreen Forest	Forest/shrubland	N		0
Mixed Forest	Forest/shrubland	N		0
Shrubland	Natural lands	Y	Mod	
Grassland/Pasture	irrigated pasture	Y	Mod	
Woody Wetlands	Riparian/wetland/open water	N		0
Herbaceous Wetlands	Natural lands	Y	Mod	
Pistachios	Orchard/vineyard	N		0
Triticale	Irrigated Cropland	Y	Mod	
Carrots	Irrigated Cropland	Y	Mod	
Garlic	Irrigated Cropland	Y	Mod	
Cantaloupes	Irrigated Cropland	Y	Low	
Olives	Orchard/vineyard	N		0

Oranges	Orchard/vineyard	N		0
Honeydew Melons	Irrigated Cropland	Y	Low	
Broccoli	Irrigated Cropland	Y	Low	
Peppers	Irrigated Cropland	Y	Low	
Pomegranates	Orchard/vineyard	N		0
Nectarines	Orchard/vineyard	N		0
Plums	Orchard/vineyard	N		0
Dbl Crop WinWht/Corn	Irrigated Cropland	Y	Mod	
Dbl Crop Oats/Corn	Irrigated Cropland	Y	Mod	
Lettuce	Irrigated Cropland	Y	Mod	
Dbl Crop WinWht/Sorghum	Irrigated Cropland	Y	Mod	
Dbl Crop Barley/Corn	Irrigated Cropland	Y	Mod	
Dbl Crop WinWht/Cotton	Irrigated Cropland	Y	Mod	
Blueberries	Orchard/vineyard	N		0
Freshwater Emergent Wet*	Natural lands	N		0
Freshwater Pond	Riparian/wetland/open water	N		0
Lake	Riparian/wetland/open water	N		0
Sod/Grass Seed	Developed/urban	N		0

Attachment H

SWHA Protocol Survey Report

Memorandum

HELIX Environmental Planning, Inc.
11 Natoma Street, Suite 155
Folsom, CA 95630
916.365.8700 **tel**
www.**helixepi**.com

Date: 11/06/2018

To: Christy Herron, Recurrent Energy

From: Stephen Stringer

Subject: Swainson's Hawk Survey Report for the RE Scarlet Solar Generation Project, Fresno County, California

HELIX Project: REC-04.01

INTRODUCTION

On behalf of RE Scarlet LLC, HELIX Environmental Planning, Inc. (HELIX) conducted protocol surveys for Swainson's hawk (SWHA; *Buteo swainsoni*) for the RE Scarlet Solar Project. The surveys were conducted according to the guidelines prepared by the SWHA Technical Advisory Committee (TAC) in the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (TAC 2000).

The RE Scarlet Solar Project is a proposed 400 megawatt solar photovoltaic (PV) generating facility and an electrical substation to be constructed on approximately 4,089 acres of agricultural land in unincorporated western Fresno County. The Fresno County Department of Public Works and Planning is processing the proposed project as a Conditional Use Permit and requires analysis of potential environmental impacts in accordance with the California Environmental Quality Act (CEQA). The surveys described in this report were undertaken to determine the potential of the proposed project for significant impacts to burrowing owl.

This report describes the methods used to conduct the SHWA surveys and summarizes the findings.

PROJECT LOCATION AND EXISTING CONDITIONS

The project site is located in western Fresno County, 4 miles southwest of the town of Tranquillity, 6.9 miles west of the town of San Joaquin, and 6.6 miles northwest of Interstate-5 (Attachment A, Figure 1). The site is bounded by West South Avenue on the north, South San Mateo Avenue on the east, West Dinuba Avenue on the South, and South Derrick Avenue (State Route 33) on the west (Attachment A, Figure 2). The proposed project is located adjacent to and in the immediate vicinity of the existing RE Adams and RE Tranquillity Solar Projects. The project would connect to the existing PG&E Tranquillity Switching Station located 0.75-mile west of the project site via an overhead 230-kV gen-tie line.

The project site is located in the west-central San Joaquin Valley, and terrain in the site is flat and level, draining naturally to the east at a very shallow gradient. There is no natural or artificial topographic relief in the site; elevations range from 172 to 209 feet above mean sea level.

The project site is currently used for agricultural activities including intensive cultivation. Crops grown in the site include alfalfa, wheat, garlic, and tomatoes. Large portions of the site were disked during the course of the surveys conducted for this report, and other portions were planted with alfalfa. Only one 640-acre portion of the site in the northeast corner had been undisturbed for more than two years at the time of the surveys.

There are no structures in the project site, and no paved roads except for West Manning Avenue, which bisects the site east-west. Farm roads in the site border individual fields and are at-grade, with unimproved surfaces. Temporary ditches are excavated as-needed along the edges of irrigated fields and function to hold metal irrigation pipes or to drain irrigation runoff. There are no permanent canals or ditches in the site. Overall, the project site is a mosaic of agricultural uses that change with the seasons.

There are no trees in the project site. The locations of suitable SWHA nest trees within 0.5-mile of the project site boundary are described in Table 1 and depicted in Attachment A – Figure 3.

Table 1
SUITABLE SWHA NEST TREES WITHIN 0.5-MILE OF THE PROJECT SITE

Stand No.	Location Description	Distance from Site	Notes
1	SE corner of West Dinuba Avenue and State Route 33	220 feet	Stand of eucalyptus trees near a house. Only 1 large nest – occupied by common ravens in 2018.
3	Monterey Avenue 0.5-mile north of South Avenue	2,250 feet	Stand of tamarisk trees near a former home site. Several active barn owl nests in 2018.

METHODS

SWHA surveys were conducted in accordance with the guidelines prepared by the TAC in the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (TAC 2000). The project site was surveyed a total of six times during survey periods III and V (Table 2) by HELIX biologists with extensive experience at SWHA surveys.

Surveys were at times of day prescribed in the survey protocol (TAC 2000) to allow for maximum probability of detection. The morning surveys started after morning civil twilight when birds become active, and ended by 12 pm. The evening surveys were conducted between roughly one hour before sunset and shortly after sunset. Each survey began with close observation of the two suitable nest locations within 0.5-mile of the project site. Given the small number of possible nest locations in the survey area, much of the survey time was spent watching for individuals foraging in the project site itself rather than monitoring potential nest locations.

Table 2
SURVEY DATES AND TIMES (ALL SURVEYS CONDUCTED IN 2018)

Date	Start / End Time	Start/End Temp (° F)	Wind Speed (mph)	Weather	Personnel
Period III (April 5 – April 20)					
April 16	1700-1830	55/55	1-5	Partly cloudy	G. Aldridge, D. Van Essen
April 18	1000-1200	56/50	2-7	Partly cloudy	G. Aldridge, D. Van Essen
Period V (June 10 – July 30)					
June 20	1800-1930	95/93	0-3	Clear	G. Aldridge
June 21	0530-0700	57/59	0	Clear	G. Aldridge
June 25	1800-2000	97/93	3-7	Clear	G. Aldridge
July 8	0800-1200	--	--	--	S. Stringer

RESULTS

There are no trees in the project site, and therefore no possibility for SWHA to nest in the project site. There are trees suitable for SWHA nesting at two locations within 0.5-mile of the project site and both locations were monitored during surveys. SWHA were not observed using trees at either location.

A single SWHA was observed perched on a post next to an irrigated alfalfa field south of Manning Avenue on June 21. After a few minutes of perching, this individual flew off-site to the south until disappearing from view. No other SWHA were observed in the project site.

SUMMARY/CONCLUSION

Protocol surveys of the project site were conducted by qualified biologists in accordance with the SWHA Technical Advisory Committee's *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (TAC 2000). There are no trees in the project site and, therefore, no possibility for SWHA to nest in the project site. Potentially suitable nesting sites were identified at two locations within 0.5-mile of the project site (Table 1). Neither of these locations was used by SWHA during the 2018 breeding season. HELIX has monitored these locations for SWHA occupancy since 2015 and has not observed any SWHA use in that time. A single SWHA was observed foraging in the project site on one day.

Attachments:

Attachment A – Figures
- Figure 1: Regional Location
- Figure 2: Site Location
- Figure 3: Suitable Nest Tree Locations within 0.5 Mile

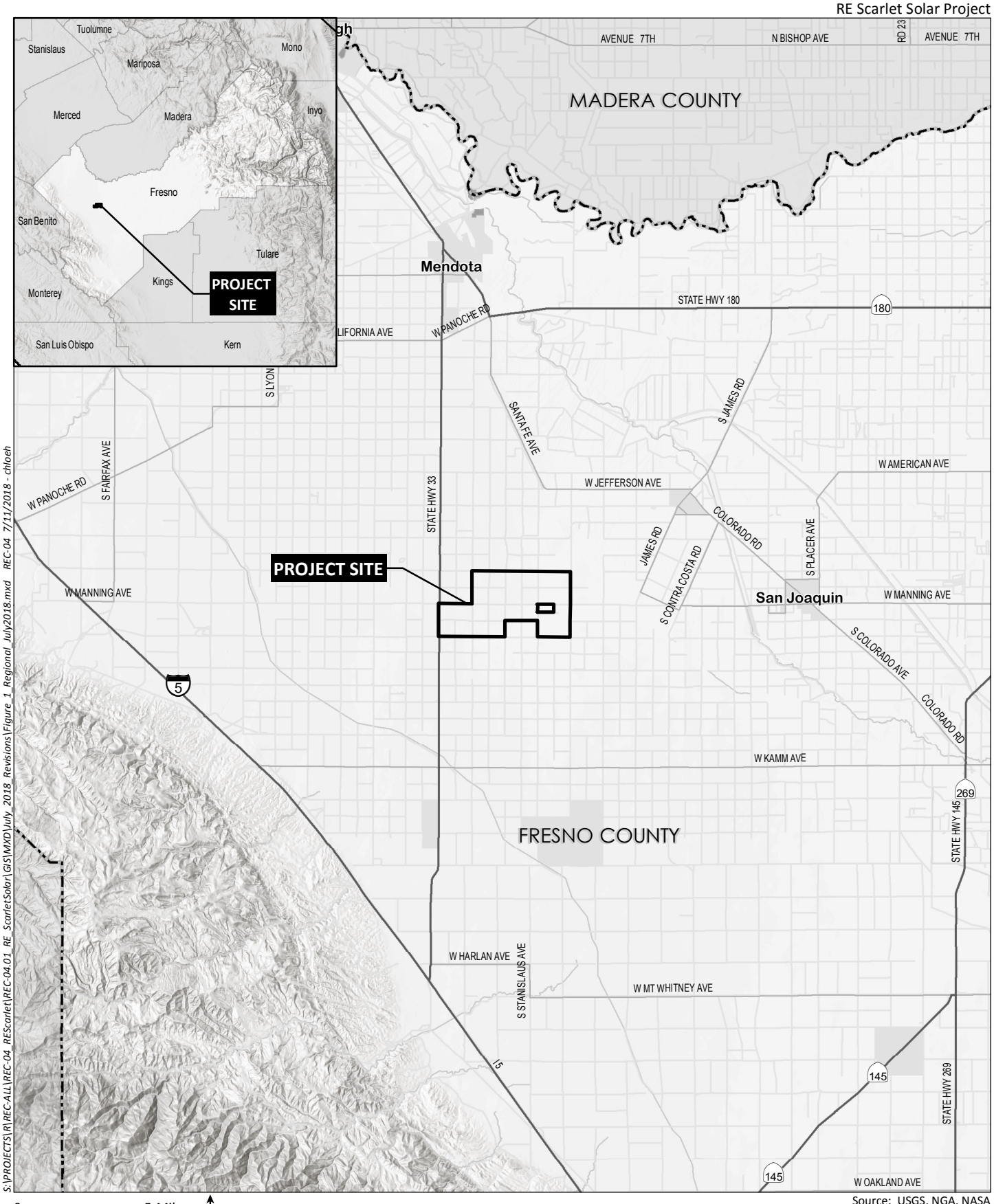
Attachment B – Site Photographs

REFERENCE

Swainson's Hawk Technical Advisory Committee (TAC). 2000. Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley. May 31.

Attachment A

Figures



S:\PROJECTS\R\REC-ALL\REC-04_REScarlet\REC-04.01_RE_ScarletSolar\GIS\MXD\July_2018_Revisions\Figure_1_Regional_July2018.mxd REC-04 7/11/2018 - chloeh

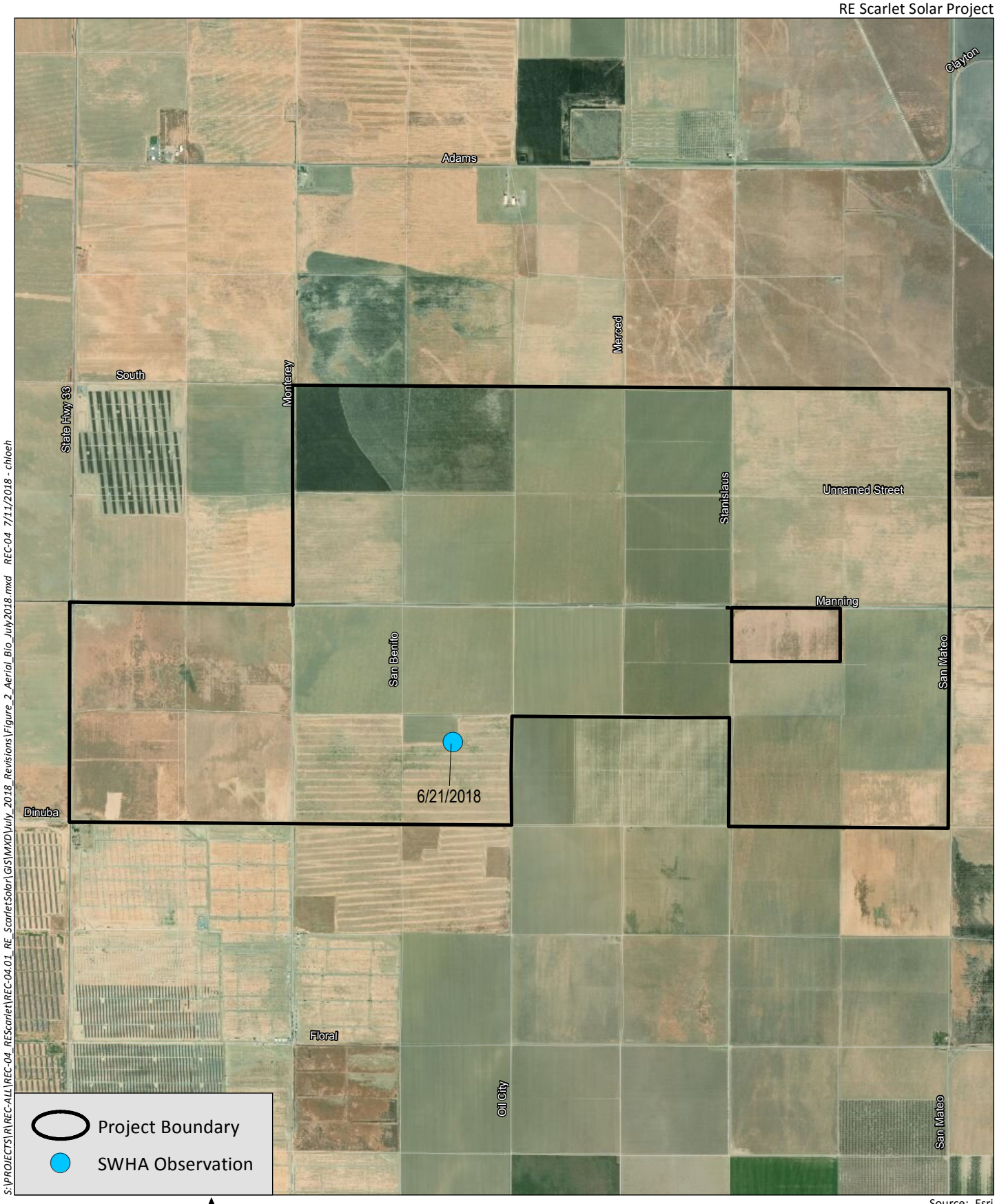
0 5 Miles

Source: USGS, NGA, NASA

HELIX Environmental Planning

Regional Location

Figure 1

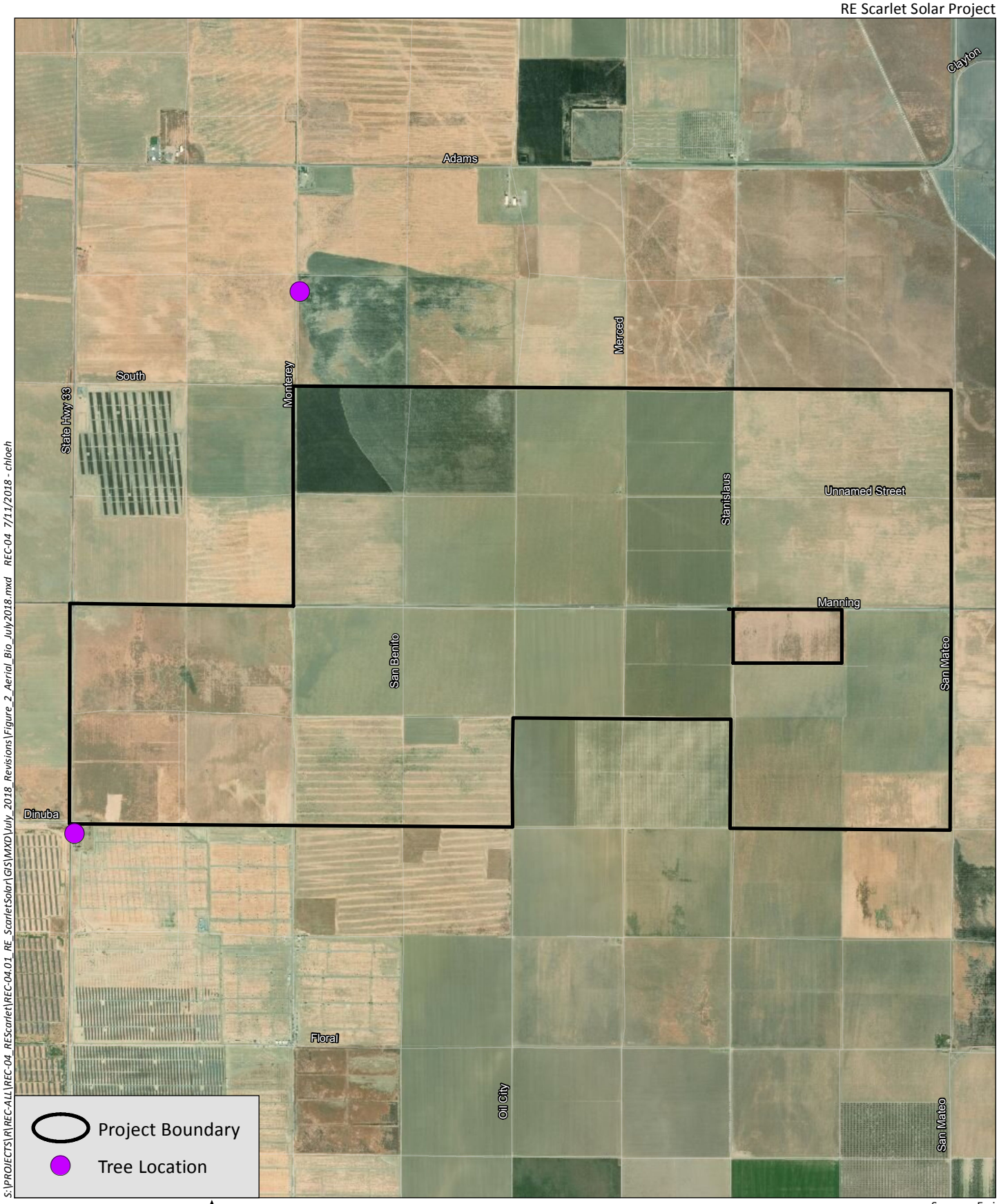


Source: Esri

HELIX Environmental Planning

Site Location

Figure 2



S:\PROJECTS\R\REC-ALL\REC-04_REScarlet\REC-04.01_RE_ScarletSolar\GIS\MXD\July_2018_Revisions\Figure_2_Aerial_Bio_July2018.mxd REC-04 7/11/2018 - chloeh

HELIX Environmental Planning

Suitable Nest Tree Locations within 0.5 Mile

Figure 3

Attachment B

Site Photographs

Photo 1. Trees at nest Location 2 on West Dinuba Avenue west of State Route 33. The SWHA nests are in the two trees at the left of the picture. These are the only active SWHA nests within 0.5-mile of the project site.

Photo 2. Wheat and alfalfa fields typical of the treeless project site.

Appendix F

Cultural Resources Study (Confidential)

The Cultural Resources Assessment Report contains confidential information regarding the location of cultural resources and is therefore not available for public review. The report can be provided to qualified archaeologists upon request.

Appendix G

Energy Calculations

RE Solar Scarlet Project - 400 MW

On-Site Construction Equipment Fuel Use [1]

Solar Facility Phase 1 - Site Prep					Fuel Consumption	
Equipment	**Number of Units**	**Daily Hours**	**Days in Use**	**Total Hourly Usage (units*hours per day*days)**	Quantity (gallons)	Fuel Type
Bulldozer, large	82	7	80	45,920	205,023.74	diesel
Water Truck	53	4	80	16,960	80,356.99	diesel
Grader	2	7	64	896	1,254.55	diesel
Skid Steer	2	7	12	168	225.59	diesel
FE Loader	4	7	32	896	1,423.17	diesel
Roller	5	7	70	2,450	6,829.90	diesel
Backhoe	4	7	16	448	711.58	diesel
Instrument/Signal Board	12	7	78	6,552	5,982.98	diesel
Gravel Truck (Dumper)	127	4	80	40,640	131,772.12	gasoline
					301,808.51	**Total Diesel**
					131,772.12	**Total Gasoline**

Energy Storage Phase 1 - Site Prep					Fuel Consumption	
Equipment	**Number of Units**	**Daily Hours**	**Days in Use**	**Total Hourly Usage (units*hours per day*days)**	Quantity (gallons)	Fuel Type
Bulldozer, large	12	7	22	1,848	8,250.96	diesel
Water Truck	72	4	22	6,336	30,020.16	diesel
Grader	6	7	21	882	1,234.95	diesel
Skid Steer	1	7	12	84	112.79	diesel
FE Loader	4	7	20	560	889.48	diesel
Roller	5	7	20	700	1,951.40	diesel
Instrument/Signal Board	8	7	22	1,232	1,125.01	diesel
Gravel Truck (Dumper)	104	4	22	9,152	29,674.67	gasoline
					43,584.74	**Total Diesel**
					29,674.67	**Total Gasoline**

Solar Facility Phase 2 - Photovoltaic Array Installation					Fuel Consumption	
Equipment	**Number of Units**	**Daily Hours**	**Days in Use**	**Total Hourly Usage (units*hours per day*days)**	Quantity (gallons)	Fuel Type
Water Truck	8	4	280	8,960	42,452.75	diesel
Skid Steer	10	7	140	9,800	13,159.35	diesel
Pile Driver (excavator mount)	7	4	7	196	345.10	diesel
Forklift	18	4	4	288	246.47	diesel
Trencher	12	4	105	5,040	11,006.67	diesel
					67,210.34	**Total Diesel**
					0.00	**Total Gasoline**

Energy Storage Phase 2 - Foundations, Structures and DC Electrical System Installation					Fuel Consumption	
Equipment	**Number of Units**	**Daily Hours**	**Days in Use**	**Total Hourly Usage (units*hours per day*days)**	Quantity (gallons)	Fuel Type
Water Truck	8	4	102	3,264	15,464.93	diesel
Skid Steer	4	7	102	2,856	3,835.01	diesel
Trencher	3	4	74	888	1,939.27	diesel
Crane	5	4	170	3,400	7,451.08	diesel
					28,690.29	**Total Diesel**
					0.00	**Total Gasoline**

Solar Facility Phase 3 - Inverters, Substation, and Connection	Fuel Consumption

Equipment	Number of Units	Daily Hours	Days in Use	Total Hourly Usage (units*hours per day*days)	Quantity (gallons)	Fuel Type
Bulldozer, large	1	7	4	28	125.01	diesel
Water Truck [2]	18	4	120	8,640	40,936.58	diesel
Grader	1	7	4	28	39.20	diesel
Skid Steer	3	7	62	1,302	1,748.31	diesel
FE Loader	1	7	4	28	44.47	diesel
Roller	1	7	4	28	78.06	diesel
Pile Driver (excavator mount)	3	7	62	1,302	2,292.44	diesel
Trencher	10	4	95	3,800	8,298.68	diesel
Backhoe	3	7	121	2,541	4,036.02	diesel
Crane	6	4	91	2,184	4,786.22	diesel
Aerial Lift	8	4	78	2,496	5,189.34	diesel
Concrete Truck [3]	21	4	1	84	397.99	diesel
					67,972.34	**Total Diesel**
					0.00	**Total Gasoline**

Energy Storage Phase 3 - Inverters, Substation, and AC					Fuel Consumption	
Equipment	**Number of Units**	**Daily Hours**	**Days in Use**	**Total Hourly Usage (units*hours per day*days)**	Quantity (gallons)	Fuel Type
Water Truck	6	4	146	3,504	16,602.06	diesel
Skid Steer	2	7	64	896	1,203.14	diesel
Pile Driver (excavator mount)	2	7	64	896	1,577.59	diesel
Trencher	7	4	146	4,088	8,927.63	diesel
Backhoe	3	7	47	987	1,567.71	diesel
Crane	4	4	121	1,936	4,242.73	diesel
Aerial Lift	3	4	70	840	1,746.41	diesel
Concrete Truck	3	4	1	12	56.86	diesel
					35,924.13	**Total Diesel**
					0.00	**Total Gasoline**

	Total Fuel Consumption	
Solar Facility Fuel Use for Construction Equipment	Quantity (gallons)	Fuel Type
	545,190.36	**Diesel**
GRAND TOTAL	**161,446.79**	**Gasoline**

PG&E Improvements					Fuel Consumption	
Equipment	**Number of Units**	**Daily Hours**	**Days in Use**	**Total Hourly Usage (units*hours per day*days)**	Quantity (gallons)	Fuel Type
Phase 1: Site Work						
Crane	1	8	4	32	70.13	diesel
Excavator	1	8	15	120	518.05	diesel
Forklift	1	8	30	240	205.39	diesel
Generator Set	1	8	20	160	224.03	diesel
Water Truck	1	8	20	160	758.08	diesel
Surface Equipment/Pavers	1	8	15	120	208.02	diesel
Grader	1	8	20	160	224.03	diesel
Roller	1	8	2	16	44.60	diesel
Concrete Truck	1	4	1	4	18.95	diesel
Scraper	1	8	7	56	127.00	diesel
Phase 2: Electrical						
HD Truck (worker-lift) (MDV)	1	8	25	200	947.61	diesel
HD Truck (Auger) (MDV)	1	8	25	200	947.61	diesel
HD Truck (Wire reel) (MDV)	1	8	25	200	947.61	diesel
HD Truck (line puller) (MDV)	1	8	25	200	947.61	diesel
HD Truck (tensioner) (MDV)	1	8	25	200	947.61	diesel
Concrete Truck [3]	1	4	1	4	18.95	diesel
					7,155.27	**Total Diesel**
					0.00	**Total Gasoline**

	Total Fuel Consumption	
Total Project Fuel Use for Construction Equipment	Quantity (gallons)	Fuel Type
	552,345.63	**Diesel**
GRAND TOTAL	**161,446.79**	**Gasoline**

Notes:

1. Equipment list supplied in section 2.0, *Project Description* , by Applicant

RE Solar Scarlet Project - 400 MW

On-Road Mobile Fuel Use (55 mph)[1]

Solar Facility Phase 1 - Site Prep						Fuel Consumption	
Vehicle Type	Trips To Site	Trips from Site	No. of Trips (one-way)	Average Miles per Trip (one-way)[3,4,5]	Vehicle Miles Traveled	Quantity (gallons)	Fuel Type
Within SJVAPCD							
Truck, mobilization							
Water trucks (HHD)	4,282	4,282	8,564	5	42,820	101.59	Diesel
Equipment (HHD)	253	0	253	50	12,650	30.01	Diesel
Heavy Duty Diesel Truck (module and foundation delivery)	822	822	1,644	50	82,200	195.03	Diesel
Heavy Duty Diesel Truck (module and foundation delivery)	274	274	548	50	27,400	346.47	Diesel
Gasoline Passenger Vehicles	18,772	18,772	37,544	50	1,877,175	2,277.90	Gasoline
						673.11	**Total Diesel**
	No. of Days:	81				**2,277.90**	**Total Gasoline**

Energy Storage Phase 1 - Site Prep						Fuel Consumption	
Vehicle Type	Trips To Site[2]	Trips from Site[2]	No. of Trips (one-way)	Average Miles per Trip (one-way)[3,4,5]	Vehicle Miles Traveled	Quantity (gallons)	Fuel Type
Within SJVAPCD							
Truck, mobilization							
Water trucks (HHD)	1,584	1,584	3,168	5	15,840	37.58	Diesel
Equipment (HHD)	143	0	143	50	7,150	16.96	Diesel
Heavy Duty Diesel Truck (battery, container and foundation delivery)	722	722	1,444	50	72,200	171.30	Diesel
Heavy Duty Diesel Truck (battery, container and foundation delivery)	241	241	482	50	24,100	304.75	Diesel
Gasoline Passenger Vehicles	1,221	1,221	2,442	50	122,100	148.17	Gasoline
						530.59	**Total Diesel**
	No. of Days:	22				**148.17**	**Total Gasoline**

Solar Facility Phase 2 - Photovoltaic Array Installation						Fuel Consumption	
Vehicle Type	Trips To Site[2]	Trips from Site[2]	No. of Trips (one-way)	Average Miles per Trip (one-way)[3,4,5]	Vehicle Miles Traveled	Quantity (gallons)	Fuel Type
Within SJVAPCD							
Truck, mobilization							
Water trucks (HHD)	2,141	2,141	4,282	5	21,410	50.80	Diesel
Equipment (HHD)	79	241	320	50	16,000	37.96	Diesel
Heavy Duty Diesel Truck (module, tracker, foundation and inverter delivery)	4,178	4,178	8,356	50	417,800	991.27	Diesel
Heavy Duty Diesel Truck (module, tracker, foundation and inverter delivery)	1,393	1,393	2,786	50	139,300	1,761.45	Diesel
Gasoline Passenger Vehicles	121,824	121,824	243,648	50	12,182,400	14,783.03	Gasoline
						2,841.48	**Total Diesel**
	No. of Days:	282				**14,783.03**	**Total Gasoline**

Energy Storage Phase 2 - Foundations, Structures and DC Electrical System Installation						Fuel Consumption	
Vehicle Type	Trips To Site[2]	Trips from Site[2]	No. of Trips (one-way)	Average Miles per Trip (one-way)[3,4,5]	Vehicle Miles Traveled	Quantity (gallons)	Fuel Type
Within SJVAPCD							
Truck, mobilization							
Water trucks (HHD)	792	792	1,584	5	7,920	18.79	Diesel
Equipment (HHD)	14	142	156	50	7,800	18.51	Diesel
Heavy Duty Diesel Truck (battery and container delivery)	654	654	1,308	50	65,400	155.17	Diesel
Heavy Duty Diesel Truck (battery and container delivery)	218	218	436	50	21,800	275.66	Diesel
Gasoline Passenger Vehicles	8,222	8,222	16,443	50	822,150	997.66	Gasoline
						468.13	**Total Diesel**
	No. of Days:	174				**997.66**	**Total Gasoline**

Solar Facility Phase 3 - Inverters, Substation, and Connection						Fuel Consumption	
Vehicle Type	Trips To Site[2]	Trips from Site[2]	No. of Trips (one-way)	Average Miles per Trip (one-way)[3,4,5]	Vehicle Miles Traveled	Quantity (gallons)	Fuel Type
Within SJVAPCD							
Truck, mobilization							
Water trucks (HHD)	2,141	2,141	4,282	5	21,410	50.80	Diesel
Equipment (HHD)	68	159	227	50	11,350	26.93	Diesel
Heavy Duty Diesel Truck (inverter delivery)	93	93	186	50	9,300	22.07	Diesel
Heavy Duty Diesel Truck (inverter delivery)	31	31	62	50	3,100	39.20	Diesel
Gasoline Passenger Vehicles	9,529	9,529	19,058	50	952,875	1,156.29	Gasoline
						138.99	**Total Diesel**
	No. of Days:	121				**1,156.29**	**Total Gasoline**

Energy Storage Phase 3 - Inverters, Substation, and AC	Fuel Consumption

Vehicle Type	Trips To Site[2]	Trips from Site[2]	No. of Trips (one-way)	Average Miles per Trip (one-way)[3,4,5]	Vehicle Miles Traveled	Quantity (gallons)	Fuel Type
Within SJVAPCD							
Truck, mobilization							
Water trucks (HHD)	792	792	1,584	5	7,920	18.79	Diesel
Equipment (HHD)	40	62	102	50	5,100	12.10	Diesel
Heavy Duty Diesel Truck (inverter delivery)	123	123	246	50	12,300	29.18	Diesel
Heavy Duty Diesel Truck (inverter delivery)	41	41	82	50	4,100	51.84	Diesel
Gasoline Passenger Vehicles	5,913	5,913	11,826	50	591,300	717.53	Gasoline
						111.92	**Total Diesel**
	No. of Days:	146				**717.53**	**Total Gasoline**

Solar Facility On-road Mobile Fuel Consumption	Quantity (gallons)	Fuel Type
	4,764.22	**Diesel**
	20,080.58	**Gasoline**

PG&E Improvements						**Fuel Consumption**	
Vehicle Type	**Trips To Site[2]**	**Trips from Site[2]**	**No. of Trips (one-way)**	**Average Miles per Trip (one-way)[3,4,5]**	**Vehicle Miles Traveled**	Quantity (gallons)	Fuel Type
Within SJVAPCD							
Truck, mobilization							
Concrete truck (MHDT)	189	189	378	50	18,900	44.84	Diesel
Heavy Duty Diesel Truck (material delivery)	2,079	2,079	4,158	115	478,170	1,134.50	Diesel
Gasoline Passenger Vehicles	2,126	2,126	4,253	50	212,625	258.02	Gasoline
						1,179.34	**Total Diesel**
	No. of Days:	189				**258.02**	**Total Gasoline**

Total On-road Mobile Fuel Consumption For Project	Quantity (gallons)	Fuel Type
	5,943.56	**Diesel**
	20,338.59	**Gasoline**

Operation						**Fuel Consumption**	
Vehicle Type	**Trips to Site (Daily)[2]**	**Trips from Site (Daily)[2]**	**No. of Daily Trips (one-way)**	**Average Miles per Trip (one-way)[3,4,5]**	**Vehicle Miles Traveled**	Quantity (gallons)	Fuel Type
Water trucks (HHD)	65	65	130	5	650	1.54	Diesel
Gasoline Passenger Vehicles	33	33	66	50	3,300	4.00	Gasoline
						400.97	**Annual diesel usage**
						1041.16	**Annual gasoline usage**

Note: 1 lb = 453.59 grams; MT = metric tons

1. On-road emissions use mileage to determine running emissions from associated with vehicles vehicle. Starting and resting emissions are not included here, and are included with on-site emissions.
2. Trip data source: Peters Engineering Group, 2018. Traffic Impact Study: Proposed Recurrent Energy Scarlet Solar Project. Appendix T
3. All equipment except for water trucks were "delivered" to the site from Fresno area (50 miles). After delivery equipment stays on site.
4. Water for construction will be trucked to the site from a well within 5 miles of the site.
5. Employee transport to site assumes accounts for 25% carpooling reduction and assumes round trip of 100 miles from surrounding area of Fresno.
6. Delivery of equipment takes a total of 22 days. Therefore worst case daily emissions are based on days equipment delivery trucks are on the road in addition to all other on-road vehicle use during the phase.
7. Delivery and return of equipment occurs sequentiallly during phase, each occurring for 22 days. Therefore worst case daily emissions are based on days equipment delivery trucks are on the road (i.e. 44 days) in addition to all other on-road vehicle use during the phase.
8. A delivery equipment schedule for the PG&E Switching facility has not been established, therefore only average daily emissions is estimated.
9. Annual operation assumes there are 260 operation days/yr. Estimate is conservative as it assumes all employee trips and water truck trips take place every work day, however daily water needs and staffed employees would vary based on maintenance requirements.

RE Solar Scarlet Project - 400 MW

On-site Mobile Fuel Use (max 10 mph)

Solar Facility Phase 1 - Site Prep					Fuel Consumption	
Vehicle Type	No. Units	Days Operating	Miles Traveled per Unit per Day [4]	Total Onsite Vehicle Miles Traveled	Quantity (gallons)	Fuel Type
Water Truck (HHD)[2]	53	81	6	25,690	805.81	Diesel
Pickup Truck/ Buggy (LDT2)[2]	12	78	6	5,616	1,184.52	Gasoline
Flatbed truck (LHD2)[2]	23	72	6	9,936	2,837.15	Diesel
Dumper/Tender (Gravel Truck - 20 CY) (MHDT)[2]	127	80	6	60,960	56,518.19	Gasoline
Equipment Deliveries (HHD)[1]	12	22	0.50	127	3.97	Diesel
Frieght Deliveries 5-axle (HHD)[1]	822	1	0.50	411	0.03	Diesel
Freight Deliveries 2 axle (MHDT)[1]	274	1	0.50	137	6.10	Diesel
Gasoline Passenger Vehicles [3]	232	81	0.25	4,693	359.22	Gasoline
					3,653.06	**Total Diesel**
					58,061.93	**Total Gasoline**

Energy Storage Phase 1 - Site Prep					Fuel Consumption	
Vehicle Type	No. Units	Days Operating	Miles Traveled per Unit per Day [4]	Total Onsite Vehicle Miles Traveled	Quantity (gallons)	Fuel Type
Water Truck (HHD)[2]	72	22	6	9,504	298.11	Diesel
Pickup Truck/ Buggy (LDT2)[2]	8	22	6	1,056	222.73	Gasoline
Flatbed truck (LHD2)[2]	4	18	6	432	123.35	Diesel
Dumper/Tender (Gravel Truck - 20 CY) (MHDT)[2]	104	22	6	13,728	12,727.72	Gasoline
Equipment Deliveries (HHD)[1]	7	22	0.50	72	2.24	Diesel
Frieght Deliveries 5-axle (HHD)[1]	722	1	0.50	361	0.02	Diesel
Freight Deliveries 2 axle (MHDT)[1]	241	1	0.50	121	5.37	Diesel
Gasoline Passenger Vehicles [3]	56	22	0.25	305	23.37	Gasoline
					429.10	**Total Diesel**
					12,973.81	**Total Gasoline**

Solar Facility Phase 2 - Photovoltaic Array Installation					Fuel Consumption	
Vehicle Type	No. Units	Days Operating	Miles Traveled per Unit per Day [4]	Total Onsite Vehicle Miles Traveled	Quantity (gallons)	Fuel Type
Water Truck (HHD)[2]	8	282	6	12,859	403.35	Diesel
Flatbed truck (LHD2)[2]	62	282	6	104,904	29,954.53	Diesel
Equipment Deliveries (HHD)[1]	4	22	0.50	39	1.24	Diesel
Equipment Returns (HHD)[1]	12	22	0.50	132	4.14	Diesel
Frieght Deliveries 5-axle (HHD)[1]	4178	1	0.50	2,089	0.14	Diesel
Freight Deliveries 2 axle (MHDT)[1]	1393	1	0.50	697	31.03	Diesel
Gasoline Passenger Vehicles [3]	432	282	0.25	30,456	2,331.27	Gasoline
					30,394.43	**Total Diesel**
					2,331.27	**Total Gasoline**

Energy Storage Phase 2 - Foundations, Structures and DC Electrical System Installation					Fuel Consumption	
Vehicle Type	No. Units	Days Operating	Miles Traveled per Unit per Day [4]	Total Onsite Vehicle Miles Traveled	Quantity (gallons)	Fuel Type
Water Truck (HHD)[2]	5	174	6	4,750	149.00	Diesel
Pickup Truck/ Buggy (LDT2)[2]	5	102	6	3,060	645.41	Gasoline
Equipment Deliveries (HHD)[1]	1	22	0.50	7	0.22	Diesel
Equipment Returns (HHD)[1]	7	22	0.50	77	2.42	Diesel
Frieght Deliveries 5-axle (HHD)[1]	654	1	0.50	327	0.02	Diesel
Freight Deliveries 2 axle (MHDT)[1]	218	1	0.50	109	4.86	Diesel
Gasoline Passenger Vehicles [3]	47	174	0.25	2,055	157.33	Gasoline
					156.51	**Total Diesel**
					802.74	**Total Gasoline**

Solar Facility Phase 3 - Inverters, Substation, and Connection					Fuel Consumption	
Vehicle Type	No. Units	Days Operating	Miles Traveled per Unit per Day [4]	Total Onsite Vehicle Miles Traveled	Quantity (gallons)	Fuel Type
Water Truck (HHD)[2]	18	121	6	12,843	402.84	Diesel
Flatbed truck (LHD2)[2]	1	4	6	24	6.85	Diesel
Concrete Truck (MHDT)[2]	21	1	6	126	5.61	Diesel
Equipment Deliveries (HHD)[1]	4	22	0.50	44	1.38	Diesel
Equipment Returns (HHD)[1]	8	22	0.50	88	2.76	Diesel
Frieght Deliveries 5-axle (HHD)[1]	93	1	0.50	47	0.00	Diesel
Freight Deliveries 2 axle (MHDT)[1]	31	1	0.50	16	0.69	Diesel
Gasoline Passenger Vehicles [3]	79	121	0.25	2,382	182.35	Gasoline
					420.14	**Total Diesel**
					182.35	**Total Gasoline**

Energy Storage Phase 3 - Inverters, Substation, and AC					Fuel Consumption	
Vehicle Type	No. Units	Days Operating	Miles Traveled per Unit per Day [4]	Total Onsite Vehicle Miles Traveled	Quantity (gallons)	Fuel Type
Water Truck (HHD)[2]	5	146	6	4,730	148.38	Diesel
Concrete Truck (MHDT)[2]	1	1	6	6	0.27	Diesel
Equipment Deliveries (HHD)[1]	2	22	0.50	20	0.62	Diesel
Equipment Returns (HHD)[1]	3	22	0.50	31	0.97	Diesel

Frieght Deliveries 5-axle (HHD)[1]	123	1	0.50	62	0.00	Diesel
Freight Deliveries 2 axle (MHDT)[1]	41	1	0.50	21	0.91	Diesel
Gasoline Passenger Vehicles [3]	41	146	0.25	1,478	113.15	Gasoline
					151.15	**Total Diesel**
					113.15	**Total Gasoline**

Onsite Mobile Construction Use For Solar Facility	**Total Fuel Consumption**	
	Quantity (gallons)	Fuel Type
	35,204.39	**Total Diesel**
	74,465.25	**Total Gasoline**

PG&E Improvements					**Fuel Consumption**	
Vehicle Type	**No. Units**	**Days Operating**	**Miles Traveled per Unit per Day [4]**	**Total Onsite Vehicle Miles Traveled**	Quantity (gallons)	Fuel Type
Water Truck (HHD)[2]	1	20	6	120	3.76	Diesel
Concrete Truck (MHDT)[2]	1	2	6	12	0.53	Diesel
Pickup Truck/ Buggy (LDT2)[2]	1	25	6	150	31.64	Gasoline
Mechanic and Service HD Truck (MDV)	6	25	6	900	254.71	Gasoline
Equipment Deliveries (HHD)[1]	11	189	0.50	1,040	32.61	Diesel
Equipment Returns (HHD)[1]	11	189	0.50	1,040	32.61	Diesel
Gasoline Passenger Vehicles [3]	12	189	0.25	567	43.40	Gasoline
					69.51	**Total Diesel**
					329.75	**Total Gasoline**

Total Onsite Mobile Construction Use For Project	**Total Fuel Consumption**	
	Quantity (gallons)	Fuel Type
	35,273.90	**Total Diesel**
	74,795.00	**Total Gasoline**

Operational					**Fuel Consumption**	
Equipment Type	**No. Units**	**Days Operating**	**Hours Operating**	**Annual Hourly Use**	Quantity (gallons)	Fuel Type
ATVs	4	5	4	80	233.40	Gasoline
Kubota Tractor (50 hp or less)	4	100	8	3,200	9,335.96	Gasoline
Portable Generator	4	60	8	1,920	1,711.69	Diesel
Portable water trailer (water buffalo)	10	80	8	6,400	3,533.18	Gasoline
Vehicle Type	**No. Units**	**Days Operating**	**Miles Traveled per Unit per Day [4]**	**Total Onsite Vehicle Miles Traveled**		
LDT2 Trucks - O&M	8	130	30	31,200	6,580.64	Gasoline
LDT2 Trucks - Water Wash Trucks	15	80	40	48,000	10,124.06	Gasoline
Gasoline Passenger Vehicles [3]	25	260	0.25	1,609	123.14	Gasoline
					1,711.69	**Annual Diesel**
					29,930.38	**Annual Gasoline**

Note: 1 lb = 453.59 grams; MT = metric tons

1. Assumes that deliveries will travel minimal distances on-site to reach staging area, which will exist near primary access point to project site.

2. Conservatively assumes that 6 miles is the max round trip distance a unit could travel from main staging area located near West Manning Ave at western end of site to furthest point of site.

3. Wokers passenger vehicles are assumed to not be driven on the project site accept for accessing the on-site parking lots that will encompass up to 10 acres (per PD) at or near the main access site for the project, thus only 0.25 mile is assumed to account for transit to and in on-site parking lots.

4. Miles traveled per unit per day are based on the following assumptions based on max round trip distance unit could travel from main staging area located near West Manning Ave at western end of site to furthest point of site employee vehicles

RE Solar Scarlet Project - 400 MW
Decommissioning Activites

Off-road Equipment Emission Factors[1]

Exhaust Emissions Factors for Equipment in San Joaquin Valley Unified APCD			
Equipment	Fuel Type	Consumption (gallons/hr)	Max HP
Crawler Tractors	Diesel	0.2658	300
Crushing/Proc. Equipment	Diesel	0.1736	175
Tractors/Loaders/Backhoes	Diesel	0.1952	175
Welders (cutting)	Diesel	0.0561	50
Crane	Diesel	0.0162	300

Notes:
1. CARB November 2017. OFFROAD2017 - ORION Web Database. Lifetime is anticipated to be 40 yrs (i.e. 2061), however 2050 is last year availble via OFFROAD therefore emission factors for diesel operated equipment for Year 2050 were used.

On-Road Mobile Vehicle Emission Factors[1]

Vehicle Type	Fuel Consumption (gallons/miles)
HHD, dsl	0.020
LDT2, gas	0.102
HHD, dsl	0.002
LDT2, gas	0.002
LDA, gas	0.001

Notes:
1. Source: San Joaquin Valley APCD Region, EMFAC 2014 Annual Average, Year 2050. Lifetime is anticipated to be 40 yrs (i.e. 2061), however 2050 is last year availble via EMFAC therefore emission factors for on-road vehicles for Year 2050 were used.

On-Site Equipment Fuel Consumption

Decommissioning of Solar Facility: Demolition of Solar Panels					Fuel Consumption	
Equipment[1]	Number of Units[1]	Usage (hours/day)[1]	Total Days of Use[2]	Total Hourly Usage (units*hours per day*days)	Quantity (gallons)	Fuel Type
Crawler Tractors	10	7	400	28000	7441.825407	Diesel
Crushing/Proc. Equipment	15	7	400	42000	7292.942956	Diesel
Tractors/Loaders/Backhoes	25	7	240	42000	8198.899015	Diesel
Welders (cutting)	40	4	400	64000	3589.242156	Diesel

On-Site Mobile Fuel Consumption

Decommissioning of Solar Facility: Demolition of Solar Panels					Fuel Consumption	
Vehicle Type	Number of Units	Days Operating	Miles Traveled per Unit per Day	Total Onsite Vehicle Miles Traveled	Quantity (gallons)	Fuel Type
Onsite HHD, dsl	6	520	6	18720	383.0898704	Diesel
Onsite LDT2, All	15	520	6	46800	4774.075954	Gasoline

Off-Site Mobile Fuel Consumption

Decommissioning of Solar Facility: Demolition of Solar Panels					Fuel Consumption	
Vehicle Type	Trips per Day	Days Operating	Miles Traveled per Trip	Total Off-site Vehicle Miles Traveled	Quantity (gallons)	Fuel Type
Offsite HHD, dsl	6	520	100	312000	475.5898088	Diesel
LDA, All	75	520	100	3900000	3468.755643	Gasoline

Total Fuel Use for Decommissioning Activities of Solar Facility and Energy Storage	Fuel Consumption	
	Quantity (gallons)	Fuel Type
	27381.58921	Diesel
	8242.831597	Gasoline

On-Site Equipment Fuel Consumption

Decommissioning of PG&E Switching Station: Removal of bus bars, transformers, batteries, etc.					Fuel Consumption	
Equipment[1]	Number of Units[1]	Usage (hours/day)[1]	Total Days of Use[2]	Total Hourly Usage (units*hours per day*days)	Quantity (gallons)	Fuel Type
Crane	1	6	4	24	0.388213452	Diesel
Crushing/Proc. Equipment	1	7	40	280	48.61961971	Diesel
Tractors/Loaders/Backhoes	1	7	40	280	54.65932676	Diesel
Welders (cutting)	1	4	40	160	8.973105389	Diesel

On-Site Mobile Fuel Consumption

Decommissioning of PG&E Switching Station: Removal of bus bars, transformers, batteries, etc.					Fuel Consumption	
Vehicle Type	Number of Units	Days Operating	Miles Traveled per Unit per Day	Total Onsite Vehicle Miles Traveled	Quantity (gallons)	Fuel Type
Onsite HDD, dsl	3	40	0.25	30	0.613926074	Diesel

Off-Site Mobile Fuel Consumption

Decommissioning of PG&E Switching Station: Removal of bus bars, transformers, batteries, etc.					Fuel Consumption	
Vehicle Type	**Number of Units**	**Days Operating**	**Miles Traveled per Unit per Day**	**Total Onsite Vehicle Miles Traveled**	Quantity (gallons)	Fuel Type
Offsite HHD, dsl	3	40	100	12000	18.29191572	Diesel
LDA, All	23	40	100	92000	81.82705619	Gasoline

Total Fuel Use for Decommissioning Activities of PG&E Improvements	Fuel Consumption	
	Quantity (gallons)	Fuel Type
	131.5461071	Diesel
	81.82705619	Gasoline

Total Fuel Use for Projects Decommissioning Activities	Fuel Consumption	
	Quantity (gallons)	Fuel Type
	27513.13532	Diesel
	8324.658653	Gasoline

Notes:

1. Types, number of equipment, and hours of use were assumed to be the same as estimated for RE Tranquility Solar Facility as the two Solar facilities are similar in size.
2. Decommissioning of Solar Facility will take 2 years (260 working days assumed per year = 520 days); decommissioning of switching stations estimated based on Tranquility decomissioning timeline
3. Assumed transit of 0.5 mile per day for construction equipment

4. Conservatively assumes untreated soil although per PD all onsite roads will at minimum have been compacted and likely treated with a palliative or gravel.

Total Fuel Use

Source	Fuel Consumption (gallons)	
	Diesel	Gasoline
Solar Facility and Energy Storage		
Construction	585,158.96	255,992.62
Operation (Annual)	2,112.65	30971.54
Decommissioning	27,381.59	8242.83
TOTAL	**614653.21**	**295206.99**
PG&E Improvements		
Construction	8,404.12	587.76
Decommissioning	131.5461071	81.82705619
TOTAL	**8,535.67**	**669.59**
Project Total		
Construction	593,563.08	256,580.38
Operation (Annual)	2,112.65	30971.54
Decommissioning	27,513.14	8324.66
TOTAL	**623188.87**	**295876.58**

RE Solar Scarlet Project - 400 MW

Displaced Energy Production during 40-year Project life

Annual Energy Production	
Grid Size (MW)	400
Total hrs/year	8760
% Operational time [1]	*23%*
Operational hours/year	2,015
KWh produced per year	805,920,000
Assumed Heat Rate (Btu/KWh)	10,000
Annual Fuel Equivalent (MMBtu)[2]	8,059,200

	California Power Mix[3]	Annual Fuel Displacement (MMBtu)
Coal[4]	4.13%	332,845
Large Hydro	14.72%	1,186,314
Natural Gas[4]	33.67%	2,713,533
Nuclear	9.08%	731,775
Oil	0.01%	806
Other (petroleum coke/waste heat)	0.14%	11,283
Renewables	29.00%	2,337,168
Unspecified sources of Power	9.25%	745,476
Total	**100.00%**	**8,059,200**

Solar Scarlet O&M Building Operation

Fresno County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	2.00	1000sqft	0.05	2,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	45
Climate Zone	3			**Operational Year**	2020
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 -

Table Name	Column Name	Default Value	New Value

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	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					
Area	9.2000e-003	0.0000	2.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-005	4.0000e-005	0.0000	0.0000	4.0000e-005
Energy	1.4000e-004	1.2800e-003	1.0700e-003	1.0000e-005		1.0000e-004	1.0000e-004		1.0000e-004	1.0000e-004	0.0000	6.6990	6.6990	2.7000e-004	8.0000e-005	6.7281
Mobile	6.5100e-003	0.0764	0.0601	2.8000e-004	0.0154	3.3000e-004	0.0157	4.1400e-003	3.1000e-004	4.4500e-003	0.0000	26.1357	26.1357	2.9400e-003	0.0000	26.2091
Waste						0.0000	0.0000		0.0000	0.0000	0.3776	0.0000	0.3776	0.0223	0.0000	0.9354
Water						0.0000	0.0000		0.0000	0.0000	0.1128	0.7814	0.8942	0.0116	2.8000e-004	1.2683
Total	**0.0159**	**0.0777**	**0.0612**	**2.9000e-004**	**0.0154**	**4.3000e-004**	**0.0158**	**4.1400e-003**	**4.1000e-004**	**4.5500e-003**	**0.4903**	**33.6161**	**34.1065**	**0.0371**	**3.6000e-004**	**35.1409**

2.2 Overall Operational

Mitigated Operational

	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					
Area	9.2000e-003	0.0000	2.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-005	4.0000e-005	0.0000	0.0000	4.0000e-005
Energy	1.4000e-004	1.2800e-003	1.0700e-003	1.0000e-005		1.0000e-004	1.0000e-004		1.0000e-004	1.0000e-004	0.0000	6.6990	6.6990	2.7000e-004	8.0000e-005	6.7281
Mobile	6.5100e-003	0.0764	0.0601	2.8000e-004	0.0154	3.3000e-004	0.0157	4.1400e-003	3.1000e-004	4.4500e-003	0.0000	26.1357	26.1357	2.9400e-003	0.0000	26.2091
Waste						0.0000	0.0000		0.0000	0.0000	0.3776	0.0000	0.3776	0.0223	0.0000	0.9354
Water						0.0000	0.0000		0.0000	0.0000	0.1128	0.7814	0.8942	0.0116	2.8000e-004	1.2683
Total	**0.0159**	**0.0777**	**0.0612**	**2.9000e-004**	**0.0154**	**4.3000e-004**	**0.0158**	**4.1400e-003**	**4.1000e-004**	**4.5500e-003**	**0.4903**	**33.6161**	**34.1065**	**0.0371**	**3.6000e-004**	**35.1409**

	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**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	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					
Mitigated	6.5100e-003	0.0764	0.0601	2.8000e-004	0.0154	3.3000e-004	0.0157	4.1400e-003	3.1000e-004	4.4500e-003	0.0000	26.1357	26.1357	2.9400e-003	0.0000	26.2091
Unmitigated	6.5100e-003	0.0764	0.0601	2.8000e-004	0.0154	3.3000e-004	0.0157	4.1400e-003	3.1000e-004	4.4500e-003	0.0000	26.1357	26.1357	2.9400e-003	0.0000	26.2091

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	22.06	4.92	2.10	40,052	40,052
Total	22.06	4.92	2.10	40,052	40,052

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.481390	0.032808	0.168621	0.127212	0.018382	0.004997	0.032622	0.122881	0.002369	0.001675	0.005261	0.001115	0.000667

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	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					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	5.3062	5.3062	2.4000e-004	5.0000e-005	5.3270
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	5.3062	5.3062	2.4000e-004	5.0000e-005	5.3270
NaturalGas Mitigated	1.4000e-004	1.2800e-003	1.0700e-003	1.0000e-005		1.0000e-004	1.0000e-004		1.0000e-004	1.0000e-004	0.0000	1.3928	1.3928	3.0000e-005	3.0000e-005	1.4011
NaturalGas Unmitigated	1.4000e-004	1.2800e-003	1.0700e-003	1.0000e-005		1.0000e-004	1.0000e-004		1.0000e-004	1.0000e-004	0.0000	1.3928	1.3928	3.0000e-005	3.0000e-005	1.4011

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	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
Land Use	kBTU/yr	tons/yr										MT/yr					
General Office Building	26100	1.4000e-004	1.2800e-003	1.0700e-003	1.0000e-005		1.0000e-004	1.0000e-004		1.0000e-004	1.0000e-004	0.0000	1.3928	1.3928	3.0000e-005	3.0000e-005	1.4011
Total		**1.4000e-004**	**1.2800e-003**	**1.0700e-003**	**1.0000e-005**		**1.0000e-004**	**1.0000e-004**		**1.0000e-004**	**1.0000e-004**	**0.0000**	**1.3928**	**1.3928**	**3.0000e-005**	**3.0000e-005**	**1.4011**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	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
Land Use	kBTU/yr	tons/yr										MT/yr					
General Office Building	26100	1.4000e-004	1.2800e-003	1.0700e-003	1.0000e-005		1.0000e-004	1.0000e-004		1.0000e-004	1.0000e-004	0.0000	1.3928	1.3928	3.0000e-005	3.0000e-005	1.4011
Total		**1.4000e-004**	**1.2800e-003**	**1.0700e-003**	**1.0000e-005**		**1.0000e-004**	**1.0000e-004**		**1.0000e-004**	**1.0000e-004**	**0.0000**	**1.3928**	**1.3928**	**3.0000e-005**	**3.0000e-005**	**1.4011**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Office Building	18240	5.3062	2.4000e-004	5.0000e-005	5.3270
Total		**5.3062**	**2.4000e-004**	**5.0000e-005**	**5.3270**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Office Building	18240	5.3062	2.4000e-004	5.0000e-005	5.3270
Total		**5.3062**	**2.4000e-004**	**5.0000e-005**	**5.3270**

6.0 Area Detail

6.1 Mitigation Measures Area

	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					
Mitigated	9.2000e-003	0.0000	2.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-005	4.0000e-005	0.0000	0.0000	4.0000e-005
Unmitigated	9.2000e-003	0.0000	2.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-005	4.0000e-005	0.0000	0.0000	4.0000e-005

6.2 Area by SubCategory

Unmitigated

	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
SubCategory	tons/yr										MT/yr					
Architectural Coating	1.3900e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	7.8100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	2.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-005	4.0000e-005	0.0000	0.0000	4.0000e-005
Total	**9.2000e-003**	**0.0000**	**2.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**4.0000e-005**	**4.0000e-005**	**0.0000**	**0.0000**	**4.0000e-005**

Mitigated

	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
SubCategory	tons/yr										MT/yr					
Architectural Coating	1.3900e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	7.8100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	2.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-005	4.0000e-005	0.0000	0.0000	4.0000e-005
Total	**9.2000e-003**	**0.0000**	**2.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**4.0000e-005**	**4.0000e-005**	**0.0000**	**0.0000**	**4.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.8942	0.0116	2.8000e-004	1.2683
Unmitigated	0.8942	0.0116	2.8000e-004	1.2683

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Office Building	0.355467 / 0.217867	0.8942	0.0116	2.8000e-004	1.2683
Total		**0.8942**	**0.0116**	**2.8000e-004**	**1.2683**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Office Building	0.355467 / 0.217867	0.8942	0.0116	2.8000e-004	1.2683
Total		**0.8942**	**0.0116**	**2.8000e-004**	**1.2683**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.3776	0.0223	0.0000	0.9354
Unmitigated	0.3776	0.0223	0.0000	0.9354

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Office Building	1.86	0.3776	0.0223	0.0000	0.9354
Total		**0.3776**	**0.0223**	**0.0000**	**0.9354**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Office Building	1.86	0.3776	0.0223	0.0000	0.9354
Total		**0.3776**	**0.0223**	**0.0000**	**0.9354**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Appendix H

Geology and Soils Reports

Appendix H1

Preliminary Geotechnical Desktop Review

October 1, 2015
Kleinfelder Project No.: 20161048.001A

Ms. Anuradha Dhavala and Mr. Charles Anderson
RE Scarlet, LLC c/o Recurrent Energy
300 California Street, 7th Floor
San Francisco, California 94104

SUBJECT: Geotechnical Desktop Review: Phase A
Solar Photovoltaic (PV) Site
Scarlet Solar Site
West of Tranquillity, Fresno County, California

Dear Ms. Dhavala and Mr. Anderson:

Kleinfelder is pleased to present our geotechnical desktop study for the Scarlet property located near the town of Tranquillity in central California. We completed our studies based on authorization of your Work Order dated September 23, 2015. We understand that Recurrent Energy (Recurrent) is considering this property for future Solar PV development. Data summary tables and location and geologic maps for the site are presented in the Appendices. We recommend reviewing the information presented in the Appendices in conjunction with this letter.

PROJECT UNDERSTANDING

We understand that Recurrent is considering developing the Scarlet site located in central California near the town of Tranquillity. At this stage of development, Recurrent has requested a desktop review of readily available information for the property to screen for possible geotechnical and geologic conditions that could affect solar PV development. The site name, approximate coordinates, and nearest street/town are presented in Table 1.

We anticipate the PV plant will consist of solar arrays supported on steel post foundations. Appurtenant construction will likely consist of switchgears, transformers, inverters, and overhead and underground electrical utilities. Gen-tie infrastructure and possible new substations may also accompany each project.

Table 1
Site Name and Location

Site Name	Latitude, Longitude	Nearest Street / Town
Scarlet	36.605763 °, -120.342875°	Tranquillity, California

PV FOUNDATION DESIGN CONSIDERATIONS

The primary geotechnical design considerations for PV development at the location are subsurface soils, expansive clayey soils, seismic ground shaking, shallow groundwater,

3880 Lemon Street, 3rd Floor, Riverside, CA 92501 p | 951.801.3681 f | 951.682.0192

potentially liquefiable soils, and corrosive soils. Snow load, frost heave and karst deposits are not applicable at the California location.

Subsurface Conditions

The Scarlet site is anticipated to be underlain by fine-grained clays and silts with some sands. Soft clays and silts may be compressible and should be considered in the design of the project. These clayey soils are anticipated to be moderately to highly expansive.

Seismic Ground Shaking

The site is located in the highly seismic California region within the influence of several fault systems which are considered to be active or potentially active. It is anticipated that the study area will periodically experience ground acceleration as the result of moderate to large magnitude earthquakes. Seismic site parameters for design established by the 2013 California Building Code (2013 CBC) should be incorporated in project design.

Fault Rupture

The site is not located in an Earthquake Fault Rupture hazard zone and therefore the risk of surface ground rupture due to faulting is considered low.

Shallow Groundwater

The Scarlet site is located in an area of historic shallow groundwater. Shallow ground water may have an effect on foundation design and construction.

Corrosive Soils

Based on our familiarity of the region the corrosion potential for the soils underlying the site is anticipated to be medium to high.

Snow Load, Frost Heave and Karst Deposits

Snow load, frost heave forces and karst deposits are not anticipated at the California location.

Other Considerations

Scarlet: Portions of the eastern portion of the site are located within a flood hazard zone and may be subject to flood hazard.

GEOTECHNICAL DESKTOP REVIEW

As part of our scope of services for this portfolio of projects, Kleinfelder reviewed available information through “desktop” resources to assess the potential geotechnical and geologic conditions that could impact solar PV development. Our review included a review of information available from:

- California Geological Survey;
- Available Kleinfelder geotechnical reports for sites near the project sites;

- FEMA flood hazard maps; and
- Google Earth aerial imagery.

The desktop review is preliminary and considers the following geotechnical and geologic conditions to the practical extent they can be determined from the above sources:

- Near-surface obstructions (caliche, hardpans, rocky soils, etc.);
- Expansive soils;
- Collapsible soils;
- Corrosive soils;
- Seismic ground shaking;
- Ground surface fault rupture;
- Liquefaction;
- Karst;
- Undulating or high-relief terrain;
- Shallow groundwater;
- Frost depth and freeze effects; and
- Other geotechnical or geological potential hazards, should they become evident during our review.

The results of our review for each site are included in the Appendices.

SUMMARY

Table 2 summarizes the identified geotechnical and geologic risks for the site. The Development Category Rating (A, B or C) indicates our opinion of the relative favorability of site development based on the reviewed information. In general, Category A sites are likely favorable for solar development from a geotechnical/geologic perspective and are likely void of high-risk geotechnical or geologic hazards. Categories A sites do not readily appear to contain near-surface obstructions or resistant soils that could require predrilling, but may contain other hazards, such as corrosive or expansive soils. Category B sites appear to have some resistant soils and predrilling risk, but less than Category C sites. Category C sites likely contain near surface obstructions and resistant soils that will require predrilling to install steel post or helical pier solar array foundations. Category C sites may also contain expansive and corrosive soils that could require mitigation.

Table 2
Summary of Identified Geotechnical / Geologic Hazards

	Geotechnical / Geologic Hazard											Development Category	
Site Name	Resistant Soils (potential predrilling)	Corrosive Soils	Expansive Soils	Shallow Groundwater or Flooding	Karst (sinkholes) / Frost Heave	Liquefaction Potential	Shallow Bedrock	Seismic Shaking	Sloping Terrain	Active Faults Onsite	Other (buried stream channel, peat/organics	Rating	Comments
Slate	L	H	H	H	NA	M-H	L	M	L	L	L	**C**	Shallow GW; expansive soils

L= Low; M= Medium; H= High; NA = Not Applicable

LIMITATIONS

We performed our work in a manner consistent with that level of care and skill ordinarily exercised by other members of Kleinfelder's profession practicing in the same locality, under similar conditions and at the date these services are provided. We based our conclusions, opinions and recommendations on a limited number of observations and data. Conditions could vary between or beyond the data evaluated. Kleinfelder makes no other representation, guarantee or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

Our work was preliminary in nature and performed solely from a review of available public information. No interviews were conducted, regulatory agency personnel contacted or consulted, site reconnaissance performed, samples obtained, and no form of site or laboratory testing completed. Therefore, the term "Desktop" strictly applies to the work performed.

Kleinfelder offers various levels of investigative and engineering services to suit the varying needs of different clients. Although risk can never be eliminated, more detailed and extensive studies will yield more information, which may help understand and manage the level of risk involved. Since detailed study and analysis involves greater expense, our clients participate in determining levels of service that provide adequate information for their purposes at acceptable levels of risk. More extensive studies could be performed to reduce these uncertainties. The Limitations of this letter apply to any electronic data submitted to the client that is associated with this desktop review.

CLOSING

We appreciate the opportunity to serve you on this portfolio of projects. If you have questions regarding this letter or if we may be of further assistance, please contact the undersigned.

Sincerely,

KLEINFELDER

Richard F. Escandon, PG, CEG
Principal Engineering Geologist

Eric W. Noel, PE, GE
Principal Geotechnical Engineer

Attachments: Appendix A: Scarlet Site

KLEINFELDER 3880 Lemon Street, 3rd Floor, Riverside, CA 92501 p | 951.801.3681 f | 951.682.0192

APPENDIX A
SCARLET SITE

KLEINFELDER
Bright People. Right Solutions.

SITE INFO	PROJECT	
	SITE NAME:	**Scarlet**
	LOCATION:	West of Tranquillity, Central Valley, California
	COORDINATES (Lat, Long):	36.605763º, -120.342875º
	AREA (m^2):	unknown
	APPROXIMATE ELEVATION RANGE (ft):	171 to 209
	AVERAGE FROST DEPTH FOR HEATED STRUCTURES *(ft):	NA

GEOTECHNICAL RISKS	SITE DEVELOPMENT			
	HAZARD	**RISK LEVEL**	**PERCENT AREA HIGH RISK**	**DISCUSSION**
	Restrictive Layer:	Low	0%	
	Corrosive Soils:	High	100%	
	Expansive Soils:	High	100%	Predominantly fine-grained soils
	Flooding / Groundwater:	High	100%	Shallow groundwater/ flood hazard eastern portions of site
	Liquefaction Potential	Mod -High	100%	

*PV structures are not heated and therefore frost protection depth may be greater than indicated; however, this is indicative of the relative risk between sites.

SITE DESCRIPTION

Based on a review of aerial photographs, the site is relatively flat, vacant farmland.

QUATERNARY GEOLOGY

AREA (km^2)	PERCENT AREA	UNIT	NAME	GEOLOGIC AGE	MATERIAL DESCRIPTION
unknown	100%		Quaternary alluvial valley/basin deposits	Holocene	Primarily silts and clays, silty sands

BEDROCK GEOLOGY

AREA (km^2)	PERCENT AREA	UNIT	NAME	GEOLOGIC AGE	ROCK DESCRIPTION
			NA	NA	NA

DRILL HOLE DATABASE

HOLE NAME	AFRI_FID	YEAR DRILLED	TOTAL LENGTH (m)	OVERBURDEN DEPTH (m)
None				

WATER WELL SUMMARY

WELL ID	DATE COMPLETED	TOTAL DEPTH (m)	DEPTH TO ROCK (m)	STATIC GROUNDWATER (m)
None				

ATTACHMENTS

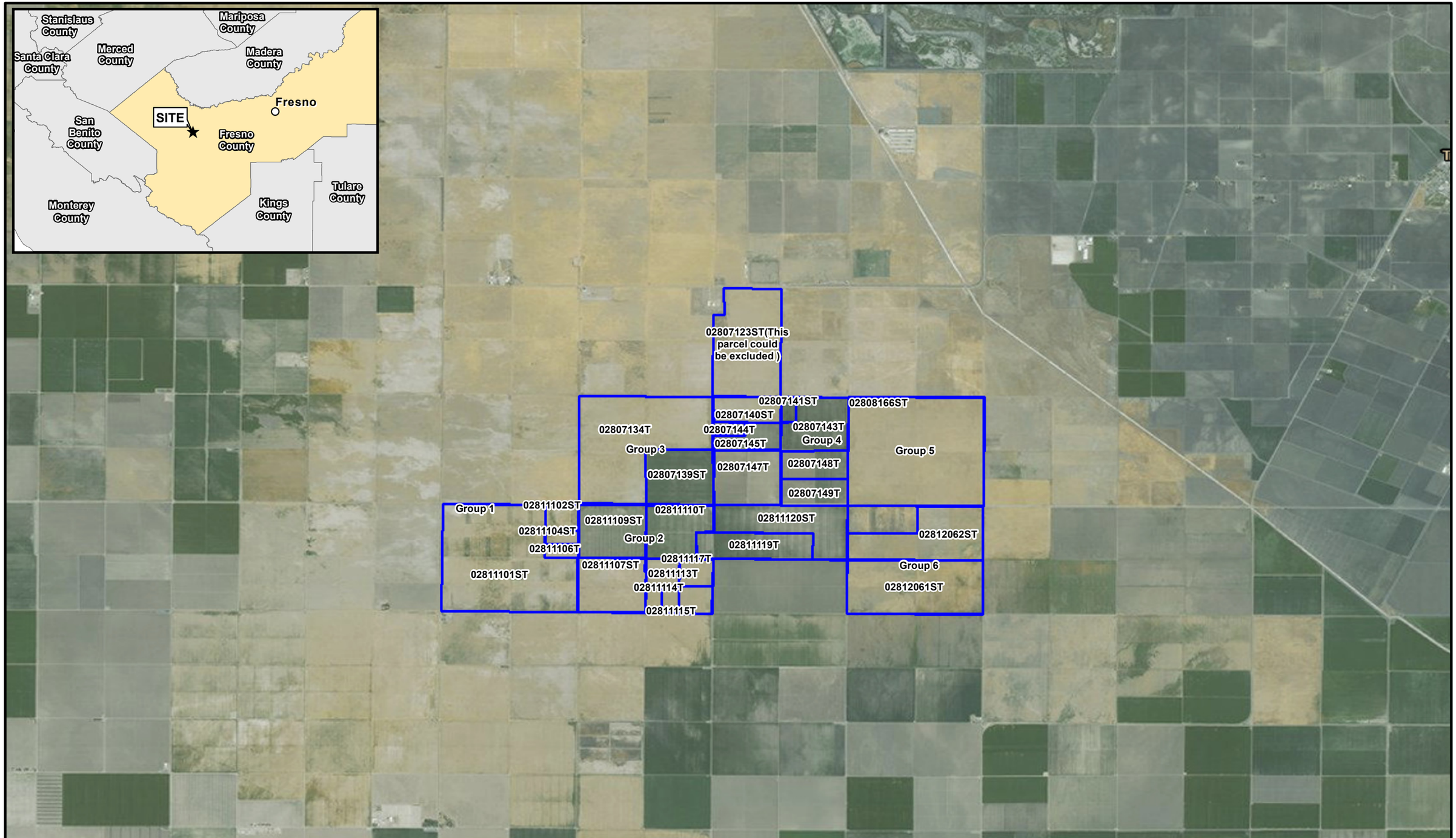
Figure A-2: Site Location Map
Figure A-3: Site Geologic Map
Figure A-4: FEMA Flood Hazard Map

REFERENCES

Jennings, C. W. and Strand, R.G., 1958, Geologic Map of California, Santa Cruz Sheet, Geological Division of Mines.
Jennings, C. W., et al., 2000, Geologic Map of California. Geologic Data Map No. 2. California Geological Survey.

FIGURE

A-1



References:
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

0 2,500 5,000 7,500 10,000 Feet

N

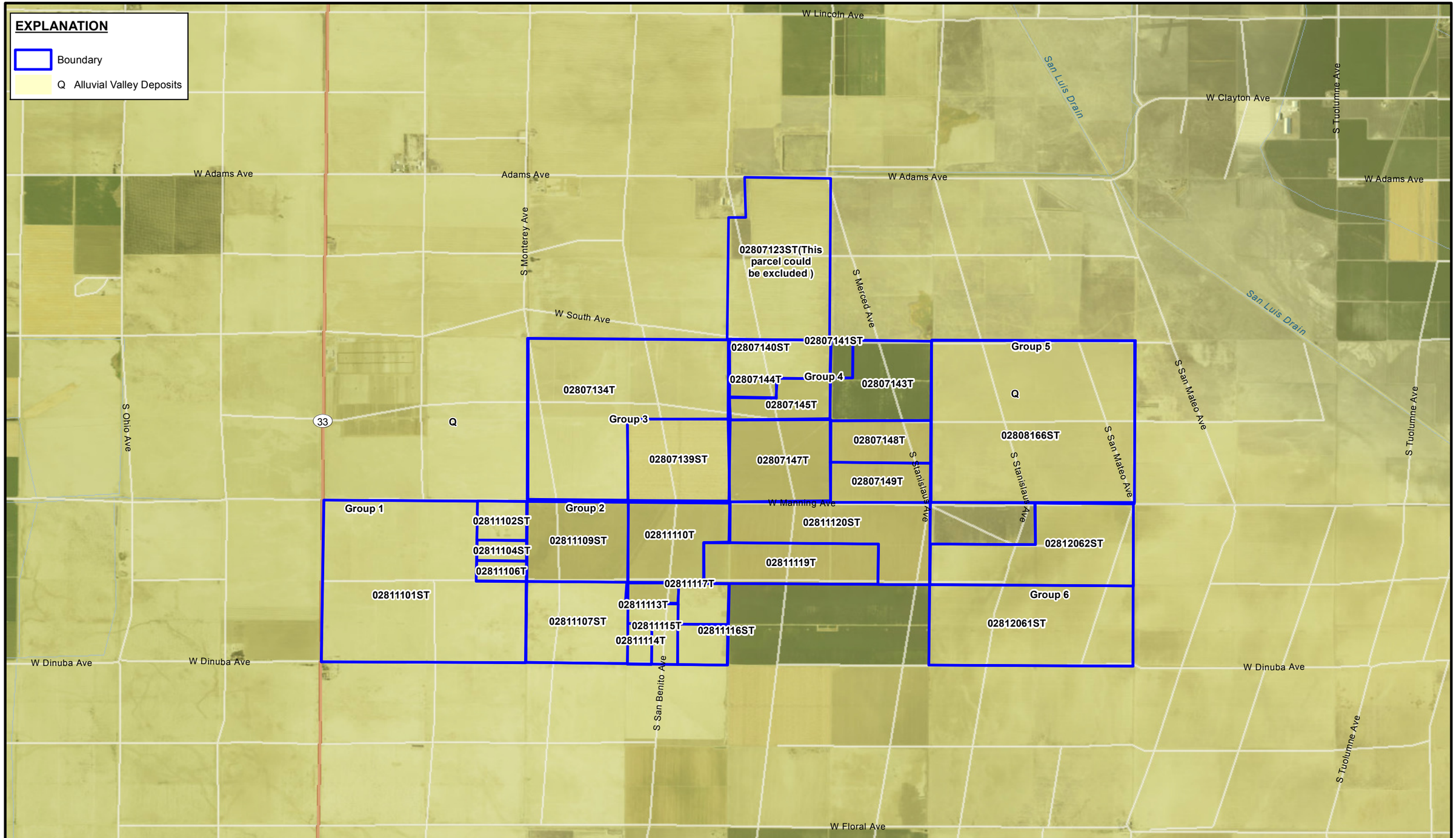
KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.	20161048.001A
DRAWN:	September 30, 2015
DRAWN BY:	RA
CHECKED BY:	RE
FILE NAME:	Scarlet_site.mxd

SITE LOCATION MAP

SCARLET SITE OPTION
PROPOSED PHOTOVOLTAIC SOLAR SITE
CALIFORNIA

FIGURE
A-2



References:
2000 Geologic Map of California, California Geological Survey, 2000
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

0 1,500 3,000 4,500 6,000 Feet

N

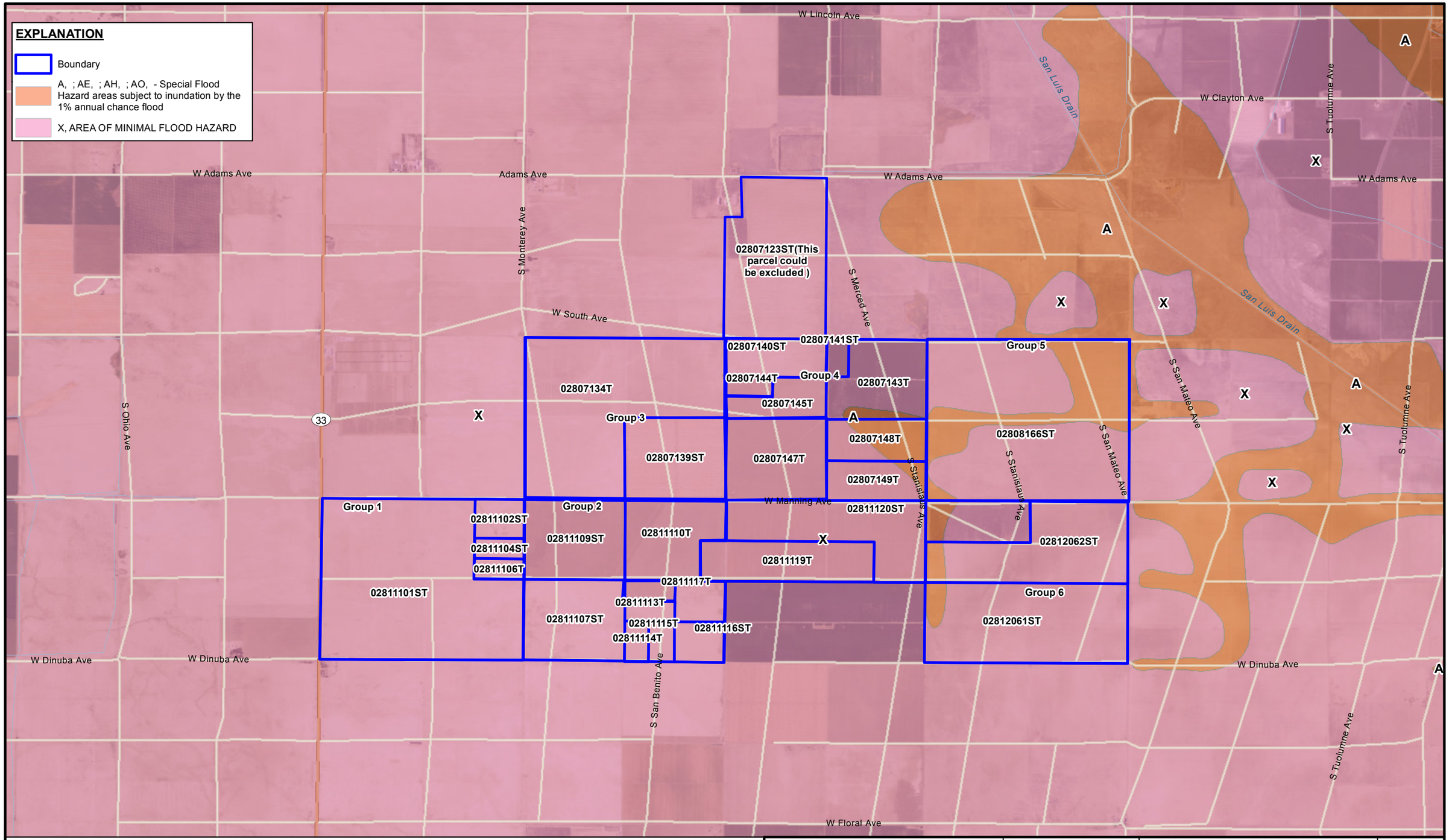
KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.	20161048.001A
DRAWN:	September 30, 2015
DRAWN BY:	RA
CHECKED BY:	RE
FILE NAME:	Royal.mxd

SITE GEOLOGIC MAP

SCARLET SITE OPTION
PROPOSED PHOTOVOLTAIC SOLAR SITE
CALIFORNIA

FIGURE
A-3



References:
Flood Hazard Zones from FEMA FIRM database, 2013.
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

0 1,500 3,000 4,500 6,000 Feet

N

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.	20161048.001A
DRAWN:	September 30, 2015
DRAWN BY:	RA
CHECKED BY:	RE
FILE NAME:	Scarlet_FEMA.mxd

FEMA FLOOD HAZARD AREAS

SCARLET SITE OPTION
PROPOSED PHOTOVOLTAIC SOLAR SITE
CALIFORNIA

FIGURE
A-4

Appendix H2

Preliminary Screening of On-site Septic Disposal Feasibility

SALEM
engineering group, inc.

4729 W. Jacquelyn Avenue
Fresno, California 93722
(559) 271-9700 Office
(559) 275-0827 Fax

August 16, 2018 **Project No. 1-218-0739**

Ms. Shauna Callery
Rincon Consultants, Inc.
7080 North Whitney, Suite 101 scallery@rinconconsultants.com Email
Fresno, California 93720 (805) 704-5860 Mobile

Subject: **PRELIMINARY REVIEW FOR SCREENING OF ON-SITE SEPTIC DISPOSAL FEASIBILITY**
SCARLET SOLAR PROJECT
WEST MANNING AVENUE AND HIGHWAY 33
MENDOTA, FRESNO COUNTY, CALIFORNIA

Dear Ms. Callery:

At your request and authorization, Salem Engineering Group, Inc. (SALEM) has prepared this letter to provide a preliminary review for screening of on-site septic disposal for the proposed Operations and Maintenance Buildings planned as part of the Scarlett Solar project planned near Mendota, Fresno County, California.

It is our understanding that the site will include an approximate 4,200 acre ground mounted solar installation with associated operations and maintenance (O&M) buildings. Based on discussions with Ms. Callery, it is our understanding that the O&M buildings will require an on-site septic disposal system. The location of the proposed O&M buildings are unknown.

The purpose of this investigation is to perform a desktop review of the site utilizing public documents, NRCS Web Soil Survey, Geotracker Well Logs, geologic maps, and our experience within the region to provide an opinion on whether a conventional on-site septic disposal system is feasible for the site.

Based on our review of the NRCS Web Soil Survey Maps, the soils within the limits of the solar project include lean clay and fat clay soils, described as Tranquility clay, Ciervo clay, and Calflax clay. The plan included at the end of this letter depicts the coverage areas of the soils reported by NRCS. In general, the soils reported by NRCS appear to be consistent with our experience in the Mendota region. These soils are described as having drainage class ranging from "somewhat poorly drained" to "moderately well drained". In addition, the NRCS reports these soils will have saturated hydraulic conductivity ranging from about 0.5 micrometers per second to 3 micrometers per second (about 0.07 to 0.43 inches per hour). The following Table includes a summary of the soil type, percent of project site where these soils occur, drainage class, and estimated hydraulic conductivity (infiltration rate).

NRCS Unit Name (Unit Symbol)	USCS Soil Classification	Drainage Class	Infiltration Rate (Ksat), inches per hour	Estimated Percolation Rate
Tranquility Clay (286)	Fat Clay (CH)	Somewhat Poorly Drained	0.07	50 to >60 minutes per inch
Ciervo Clay (461)	Fat Clay (CH)	Moderately Drained	0.14	30 to 40 minutes per inch
Claflax Clay (482)	Lean Clay (CL)	Moderately Drained	0.42	20 to 30 minutes per inch

Based on review of the Department of Water Resources On-Line Water Well Database, groundwater depths in the vicinity of the site are reported to be greater than 50 feet BSG. Therefore, groundwater mounding due to shallow groundwater conditions are not anticipated.

Soils with percolation rates greater than 60 minutes per inch and less than 5 minutes per inch would generally not be considered suitable for on-site septic disposal. Based on our review, areas mapped as Tranquility Clay would not be considered suitable for planning of on-site septic disposal systems. However, the areas mapped as Ciervo Clay and Claflax Clay, could be considered for future on-site septic disposal field investigations.

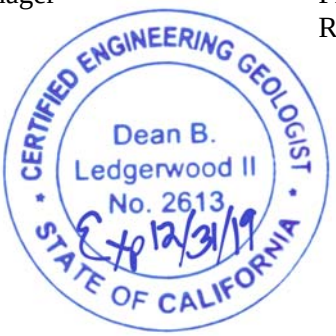
In accordance with Fresno County requirements, a site specific investigation including approximately 3 percolation tests performed in backhoe pit excavations should be performed in the areas being considered for on-site septic disposal. In addition, it is recommended a soil test boring be performed to depths extending at least 10 feet below the bottom of the proposed septic disposal system. If desired, when the planned Operations and Maintenance buildings are known, SALEM should be contacted to provide a site specific evaluation for on-site septic disposal,

If you have any questions, or if we can be of further assistance, please do not hesitate to contact our office at (559) 271-9700.

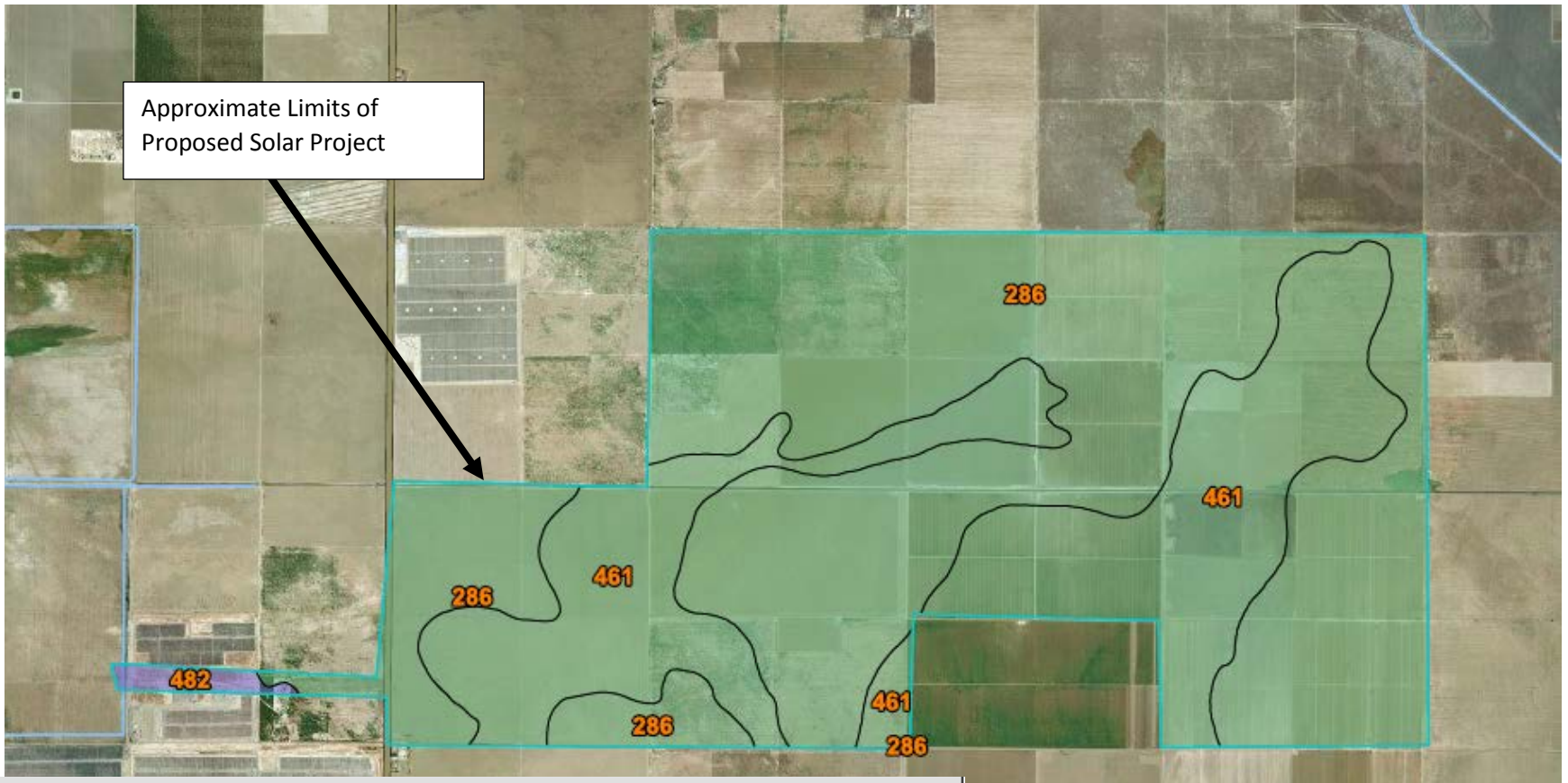
Respectfully submitted,
Salem Engineering Group, Inc.

Dean B. Ledgerwood II, CEG
Northern California Geotechnical Manager
CEG 2613

R. Sammy Salem, MS, PE, GE
Principal Managing Engineer
RCE 52762 / RGE 2549



Attachment: NRCS Web-Soil Survey Map



Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
286	Tranquillity clay, saline-sodic, wet, 0 to 1 percent slopes	CH	2,826.6	65.3%
461	Ciervo clay, saline-sodic, wet, 0 to 1 percent slopes	CH	1,466.6	33.9%
482	Calflax clay loam, saline-sodic, wet, 0 to 1 percent slopes, MLRA 17	CL	38.1	0.9%
Totals for Area of Interest			4,331.3	100.0%

Soil Type Map

PRELIMINARY REVIEW FOR SCREENING OF ON-SITE SEPTIC DISPOSAL FEASIBILITY
SCARLET SOLAR PROJECT
WEST MANNING AVENUE AND HIGHWAY 33
MENDOTA, FRESNO COUNTY, CALIFORNIA

SCALE:	DATE:
NOT TO SCALE	08/2018
DRAWN BY:	APPROVED BY:
DL	DL
PROJECT NO.	FIGURE NO.
1-218-0739	1

LEGEND:

Source: NRCS WebSoil Survey

SALEM engineering group, inc.

Appendix I

Paleontological Resources Assessment Report

RE Scarlet Solar Project

Paleontological Resources Assessment Report

prepared by

RE Scarlet LLC
3000 Oak Road, Suite 300
Walnut Creek, California 94597

prepared with the assistance of

Rincon Consultants, Inc.
180 North Ashwood Avenue
Ventura, California 93001

April 2020

Rincon Consultants, Inc.
Environmental Scientists Planners Engineers
www.rinconconsultants.com

Table of Contents

Tables

Figures

This page intentionally left blank.

Executive Summary

Purpose and Scope

Rincon Consultants, Inc. (Rincon) was retained by Recurrent Energy (RE) Scarlet to conduct a desktop paleontological resources assessment for the Scarlet Solar Energy Project. The project is located in unincorporated Fresno County approximately four miles southwest of Tranquillity, California and encompasses approximately 4,089 acres. This study has been prepared in conformance with the California Environmental Quality Act and includes a records search, literature review, paleontological sensitivity assessment, and reporting consistent with the professional standards of the Society of Vertebrate Paleontology (SVP) and uses the U.S. Bureau of Land Management (BLM) Paleontological Fossil Yield Classification (PFYC) system to characterize paleontological sensitivity of geologic units within the project site (BLM 2016; SVP 2010).

Results of Investigation

Alluvial surficial deposits (map unit = Qa) are mapped at the surface within the project boundaries. Surficial deposits throughout the San Joaquin Valley are mainly Holocene in age (11,700 years to present), having been deposited since the end of the last Ice Age. These have low paleontological sensitivity (PFYC *Class 2*); however, potential underlying Pleistocene-aged (2.58 million years ago to 11,700 years ago) alluvial deposits have moderate paleontological sensitivity (PFYC *Class 3*). No records of previously recorded fossil occurrences were identified during a records search of the project area or the near vicinity. Pleistocene-aged alluvial deposits within the San Joaquin Valley and throughout southern California are known to contain scientifically significant non-renewable paleontological resources including vertebrate, invertebrate, and plant fossils. Ground disturbing activity exceeding 5 feet in depth has the potential to disturb geologic units with moderate paleontological sensitivity and could impact scientifically significant paleontological resources.

Recommendations

Proposed mitigation measures would reduce to a less than significant level potential direct, indirect, and cumulative adverse environmental impacts on paleontological resources from this project. The mitigation measures are consistent with SVP standard guidelines for mitigating adverse construction-related impacts on paleontological resources (SVP 2010). Should project construction activity include excavations that exceed 5 feet in depth, mitigation measures include the development of a Paleontological Mitigation and Monitoring Program, paleontological training for construction staff (to be included within the project's Worker Environmental Awareness Program), paleontological monitoring for those excavations greater than 5 feet in depth, salvage, preparation and curation of recovered fossils, and preparation of a final Paleontological Mitigation and Monitoring Report.

1 Introduction

Paleontological resources (i.e., fossils) are the remains or traces of prehistoric life. Fossils are typically preserved in layered sedimentary rocks and the distribution of fossils across the landscape is controlled by the distribution and exposure of the fossiliferous sedimentary rock units at and near the surface. Construction related impacts that typically affect or have the potential to affect paleontological resources include mass excavation operations, drilling/borehole excavations, trenching/tunneling, and grading. Specific details on excavations for this project are not currently available; however typical excavations associated with solar development projects include excavations for substation foundations, drilling/grading for transmission line foundations, and trenching for electrical and telecommunications lines. This Paleontological Resources Assessment (hereinafter PRA) provides a list of the formations mapped at the surface within the project site and formations that underlie those mapped at the surface which may be impacted by construction excavations. The PRA also provides a description of the formations, including types of fossils known to occur within the formations (if any), the paleontological sensitivity for each formation, an assessment of potential impacts from project development, and recommended mitigation measures for the protection and recovery of significant fossils that may be impacted.

1.1 Project Location and Description

The project site is located in unincorporated Fresno County, approximately 3.5 miles west-southwest of the community of Tranquillity and approximately 6.5 miles east of Interstate 5. The project site encompasses approximately 4,089 acres and includes up to 33 parcels located generally south of West South Avenue, north of West Dinuba Avenue, east of South Ohio Avenue and State Route 33 (SR 33, South Derrick Avenue), and west of South San Mateo Avenue. See Figure 1, Scarlet Solar Project Site Location. Figure 1 and Figure 2 show the location of the project site on regional and local scales, respectively.

The project will involve the construction, operation, maintenance, and future decommissioning of a solar photovoltaic (PV) electricity generating and energy storing facility and associated infrastructure. This facility would be constructed in phases and would generate up to 400 megawatts (MW) of alternating current at the point of electrical grid interconnection on the 4,089-acre project site. The project would provide solar power to utility customers by interconnecting to the regional electricity grid at Pacific Gas & Electric Company's (PG&E) existing Tranquillity Switching Station located west of the project site. The facility would operate year-round to generate solar electricity during daylight hours, and would store and dispatch power at the energy storage system during both daylight and non-daylight hours.

The Project is anticipated to be constructed in continuous phases, with the first phase beginning in mid-2020. The exact timing of the last phase is dependent on opportunities in the solar market, but it is currently anticipated to be online as early as late 2021.

Components of the Project would include the following:

- Groups of solar arrays (arrays include PV modules and steel support structures, electrical inverters, transformers, cabling, and other infrastructure);
- Two electrical substations;

- A switchyard, including one high-voltage 230 kilowatt voltage (kV) utility switchyard, telecommunications infrastructure, and two 150-foot high dead-end structures;
- Approximately 3.1 miles of 230 kV generator intertie (gen-tie) transmission line (from the substations and the Project 230 kV switchyard) to connect to PG&E's existing Tranquillity Switching Station;
- Improvements to PG&E electrical infrastructure, including a minor expansion of PG&E's Tranquillity Switching Station and approximately 1,900 feet of PG&E 230 kV transmission line to connect the 230 kV gen-tie line to the Tranquillity Switching Station;
- A 400 MW energy storage system, consisting of battery or flywheel enclosures and electrical cabling; and

Other necessary infrastructure, including one permanent operation and maintenance building, a septic system and leach field, a supervisory control and data acquisition system, a meteorological data system, buried conduit for electrical wires, overhead collector lines, on-site access roads, a shared busbar, lighting, and wildlife-friendly security fencing.

Project related ground disturbance activities would include grubbing, grading, and trenching. Grubbing would remove non-native vegetation and active field crops within the project site. As the site is nearly flat and has been historically graded/tilled, project-related grading would be minimal and occur only as necessary to level dips and rises. The site cut and fill would be approximately balanced, and minimal import/export would be necessary. During site preparation, an average of 35 acres in various portions of the site would be disturbed daily at any given time. During Phase 2 an average of 25 acres would be undergoing installation at any one time, with an estimated maximum active disturbance area of up to 90 acres when Phase 1 and 2 overlap. Trenching activities are anticipated for the placement of cables at a maximum depth of 10 feet, and excavation activities anticipated for the placement of the gen-ties structures, including tubular steel poles and H-frame structure foundations, may require excavations reaching or exceeding 20 feet in depth. Additional trenching activities may be required for the project but are not anticipated to exceed a maximum of 20 feet.

Figure 1 Project Regional Location

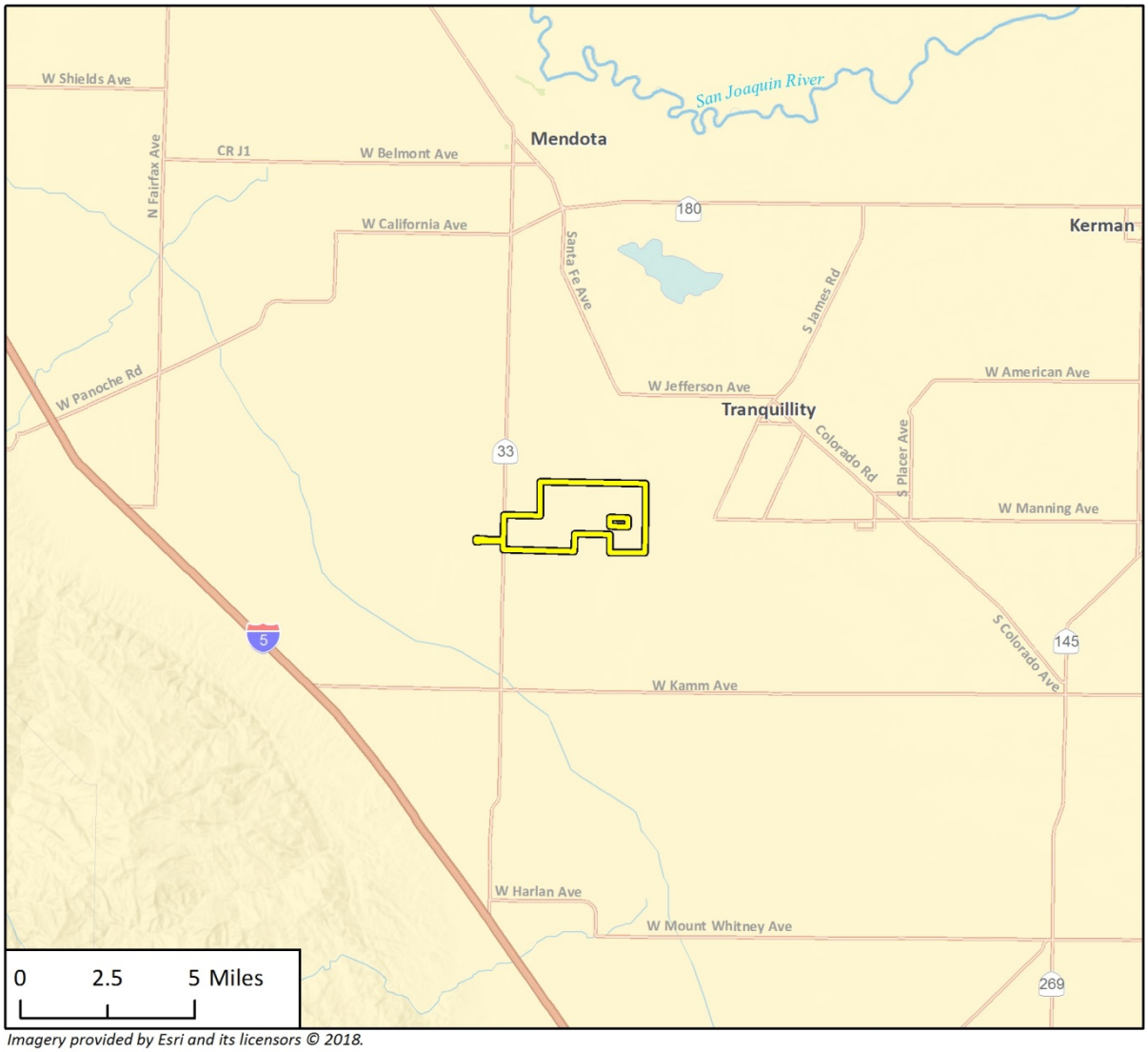
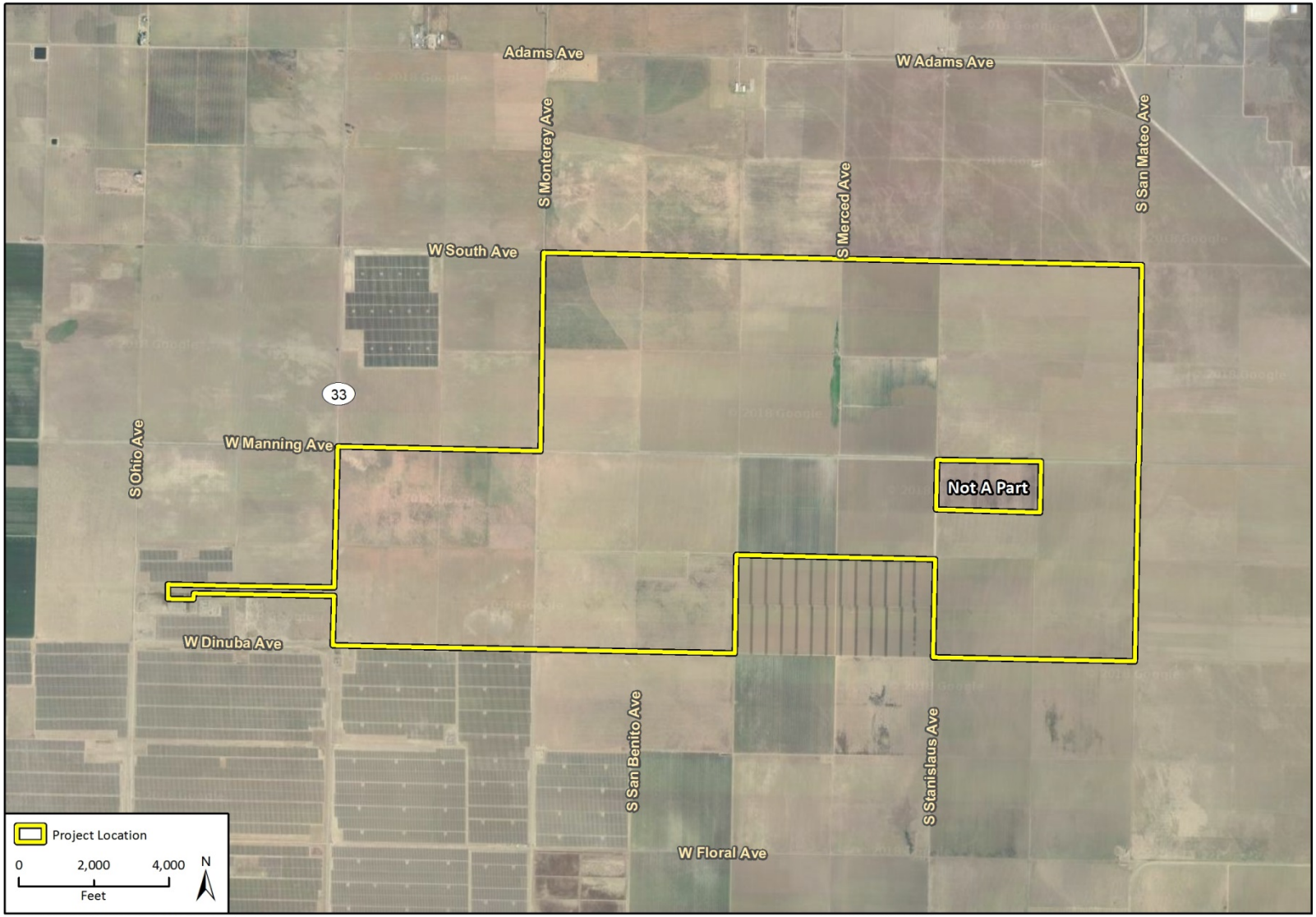


Figure 2 Project Location



2 Regulations

2.1 Federal

Federal regulatory protection for significant paleontological resources would apply if a specific project involves federally owned or managed lands, a federal license, permit, approval or funding, and/or crosses federal lands. The current project boundary does not cross federally owned or managed lands, thus, federal protection does not apply to this project.

2.2 State

The following California state regulation provides guidance with respect to paleontological resources:

California Environmental Quality Act (CEQA). CEQA requires that a determination be made as to whether a project would directly or indirectly destroy a unique paleontological resource or site or a unique geological feature (CEQA Guidelines, Appendix G (VII)f). If an impact is significant, the State CEQA Guidelines require that feasible measures which could minimize significant adverse impacts (State CEQA Guidelines Section 15126.4) be implemented. State CEQA Guidelines Section15370 includes mitigation guidelines to avoid, minimize, rectify, reduce/eliminate or compensate for impacts to paleontological resources.

Public Resources Code Section 5097.5 (Stats 1965, c1136, p. 2792), Section 5097.5 of the California Public Resources Code (PRC) states:

a. No person shall knowingly and willfully excavate upon, or remove, destroy, injure, or deface, any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, rock art, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over the lands. Violation of this section is a misdemeanor.
b. As used in this section, “public lands” means lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, or public corporation, or any agency thereof.

2.3 Regional and Local

Fresno County addresses Paleontological Resources within the Fresno County General Plan, Open Space and Conservation Element, Section J. Historical, Cultural, and Geologic Resources. In areas of known paleontological resources, the County is to identify and protect these resources when feasible.

3 Resource Assessment Guidelines

Paleontological resources are limited, nonrenewable resources of scientific, cultural, and educational value and are afforded protection under state and local laws and regulations. This Paleontological Resources Analysis satisfies CEQA (13 PRC, 2100 et seq.) and Public Resources Code Section 5097.5 (Stats 1965, c 1136, p. 2792) requirements, follows guidelines and significance criteria specified by the Society of Vertebrate Paleontology (SVP) (2010), and assesses paleontological sensitivity following the U.S. Bureau of Land Management (BLM) Paleontological Fossil Yield Classification (PFYC) system (BLM 2016).

3.1 Paleontological Sensitivity

Paleontological sensitivity refers to the potential for a geologic unit to produce scientifically significant fossils. Direct impacts to paleontological resources occur when earthwork activities, such as grading or trenching, cut into the geologic deposits (formations) within which fossils are buried and physically destroy the fossils. Since fossils are the remains of prehistoric animal and plant life, they are considered to be nonrenewable. Such impacts have the potential to be significant and, under CEQA guidelines, may require mitigation.

Paleontological Sensitivity is determined by rock type, past history of the geologic unit in producing significant fossils, and previously recorded fossil localities from that unit. Paleontological sensitivity is derived from the known fossil data collected from the entire geologic unit, not just from any one specific survey. Currently, two generally accepted paleontological sensitivity classifications are used: the SVP (2010) *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources* and the PFYC system outlined in the *BLM Instruction Memorandum (IM) No. 2016-124* (BLM 2016). The Fresno County General Plan does not provide specific guidance on characterizing paleontological sensitivity; therefore, Rincon has characterized paleontological sensitivity for this project as described below.

For the purposes of this report, the BLM PFYC system guidelines are used to characterize paleontological sensitivity within the project area. The PFYC system allows for a finer detail in the characterization of paleontological sensitivity as compared to the SVP (2010) guidelines. Affected geologic formations are classified based on the relative abundance of vertebrate fossils and significant non-vertebrate fossils using a sensitivity scale of Very Low (*Class 1*), Low (*Class 2*), Moderate (*Class 3*), High (*Class 4*), Very High (*Class 5*), and Unknown (*Class U*) depending upon the resource sensitivity of the impacted geologic formations. The specific criteria applied for each sensitivity category are presented below and have been extracted directly from the BLM Guidelines (BLM 2016):

Class 1 – Very Low. Geologic units that are not likely to contain recognizable paleontological resources. Units assigned to Class 1 typically have one or more of the following characteristics:

- Geologic units are igneous or metamorphic, excluding air-fall and reworked volcanic ash units.
- Geologic units are Precambrian in age.

(1) Management concerns for paleontological resources in Class 1 units are usually negligible or not applicable.

(2) Paleontological mitigation is unlikely to be necessary except in very rare or isolated circumstances that result in the unanticipated presence of paleontological resources, such as unmapped geology contained within a mapped geologic unit. For example, young fissure-fill deposits often contain fossils but are too limited in extent to be represented on a geological map; a lava flow that preserves evidence of past life, or caves that contain important paleontological resources. Such exceptions are the reason that no geologic unit is assigned a Class 0.

Overall, the probability of impacting significant paleontological resources is very low and further assessment of paleontological resources is usually unnecessary. An assignment of Class 1 normally does not trigger further analysis unless paleontological resources are known or found to exist. However, standard stipulations should be put in place prior to authorizing any land use action in order to accommodate an unanticipated discovery.

Class 2 – Low. Geologic units that are not likely to contain paleontological resources. Units assigned to Class 2 typically have one or more of the following characteristics:

- Field surveys have verified that significant paleontological resources are not present or are very rare.
- Units are generally younger than 10,000 years before present.
- Recent aeolian deposits.
- Sediments exhibit significant physical and chemical changes (i.e., diagenetic alteration) that make fossil preservation unlikely.

(1) Except where paleontological resources are known or found to exist, management concerns for paleontological resources are generally low and further assessment is usually unnecessary except in occasional or isolated circumstances.

(2) Paleontological mitigation is only necessary where paleontological resources are known or found to exist.

The probability of impacting significant paleontological resources is low. Localities containing important paleontological resources may exist, but are occasional and should be managed on a case-by-case basis. An assignment of Class 2 may not trigger further analysis unless paleontological resources are known or found to exist. However, standard stipulations should be put in place prior to authorizing any land use action in order to accommodate unanticipated discoveries.

Class 3 – Moderate. Sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence. Units assigned to Class 3 have some of the following characteristics:

- Marine in origin with sporadic known occurrences of paleontological resources.
- Paleontological resources may occur intermittently, but abundance is known to be low.
- Units may contain significant paleontological resources, but these occurrences are widely scattered.

- The potential for an authorized land use to impact a significant paleontological resource is known to be low-to-moderate.

(1) Management concerns for paleontological resources are moderate because the existence of significant paleontological resources is known to be low. Common invertebrate or plant fossils may be found in the area, and opportunities may exist for casual collecting.
(2) Paleontological mitigation strategies will be proposed based on the nature of the proposed activity.

This classification includes units of moderate or infrequent occurrence of paleontological resources. Management considerations cover a broad range of options that may include record searches, pre-disturbance surveys, monitoring, mitigation, or avoidance. Surface-disturbing activities may require assessment by a qualified paleontologist to determine whether significant paleontological resources occur in the area of a proposed action, and whether the action could affect the paleontological resources.

Class 4 – High. Geologic units that are known to contain a high occurrence of paleontological resources. Units assigned to Class 4 typically have the following characteristics:

- Significant paleontological resources have been documented, but may vary in occurrence and predictability.
- Surface disturbing activities may adversely affect paleontological resources.
- Rare or uncommon fossils, including nonvertebrate (such as soft body preservation) or unusual plant fossils, may be present.
- Illegal collecting activities may impact some areas.

(1) Management concerns for paleontological resources in Class 4 are moderate to high, depending on the proposed action.
(2) Paleontological mitigation strategies will depend on the nature of the proposed activity, but field assessment by a qualified paleontologist is normally needed to assess local conditions.

The probability for impacting significant paleontological resources is moderate to high, and is dependent on the proposed action. Mitigation plans must consider the nature of the proposed disturbance, such as removal or penetration of protective surface alluvium or soils, potential for future accelerated erosion, or increased ease of access that could result in looting. Detailed field assessment is normally required and on-site monitoring or spot-checking may be necessary during land disturbing activities. In some cases, avoidance of known paleontological resources may be necessary.

Class 5 – Very High. Highly fossiliferous geologic units that consistently and predictably produce significant paleontological resources. Units assigned to Class 5 have some or all of the following characteristics:

- Significant paleontological resources have been documented and occur consistently.
- Paleontological resources are highly susceptible to adverse impacts from surface disturbing activities.
- Unit is frequently the focus of illegal collecting activities.

(1) Management concerns for paleontological resources in Class 5 areas are high to very high.
(2) A field survey by a qualified paleontologist is almost always needed. Paleontological mitigation may be necessary before or during surface disturbing activities.

The probability for impacting significant paleontological resources is high. The area should be assessed prior to land tenure adjustments. Pre-work surveys are usually needed and on-site monitoring may be necessary during land use activities. Avoidance or resource preservation through controlled access, designation of areas of avoidance, or special management designations should be considered.

Class U – Unknown Potential. Geologic units that cannot receive an informed PFYC assignment. Characteristics of Class U may include:

- Geological units may exhibit features or preservational conditions that suggest significant paleontological resources could be present, but little information about the actual paleontological resources of the unit or area is known.
- Geological units represented on a map are based on lithologic character or basis of origin, but have not been studied in detail.
- Scientific literature does not exist or does not reveal the nature of paleontological resources.
- Reports of paleontological resources are anecdotal or have not been verified.
- Area or geologic unit is poorly or under-studied.
- BLM staff has not yet been able to assess the nature of the geologic unit.

(1) Until a provisional assignment is made, geologic units that have an unknown potential have medium to high management concerns.
(2) Lacking other information, field surveys are normally necessary, especially prior to authorizing a ground-disturbing activity.

An assignment of “Unknown” may indicate the unit or area is poorly studied, and field surveys are needed to verify the presence or absence of paleontological resources. Literature searches or consultation with professional colleagues may allow an unknown unit to be provisionally assigned to another Class, but the geological unit should be formally assigned to a Class after adequate survey and research is performed to make an informed determination.

4 Methods

Published and unpublished maps, locality data, and literature were reviewed to identify the geologic units present at, and below the surface within the project area boundaries to determine the paleontological sensitivity of the geologic units identified, and to assess the potential impacts to non-renewable paleontological resources from project development. Primary literature and maps reviewed included: Bartow (1996), Dibblee (1955), Dibblee and Minch (2007), Dundas et al. (1996), Ferguson (1943), Goudkoff (1943), Israelsky (1951), Jefferson (1991a, 1991b), Jennings and Strand (1958), Lettis and Unruh (1991), Marchand and Allwardt (1981), Miller (1971), Nomland (1917), Page (1983), Porter (1943), Reynolds and Reynolds (1991), Weissmann et al. (2002), Weissmann et al. (2005), Woodring and Bramlette (1950), Woodring et al. (1932), Woodring et al (1941), and Young (1943). The online paleontological collections database of the University of California Museum of Paleontology (UCMP) was reviewed to identify known fossil localities in or near the project site, or regionally within the identified geologic formations present in the project area. Rincon conducted a formal paleontological locality search at the Natural History Museum of Los Angeles County (LACM) in August of 2013 for the adjacent RE Tranquillity Project. Because the Scarlet and Tranquillity projects share a quadrangle (Levis; Scarlet also occurs on the adjacent Cantua Creek quadrangle), the locality search results for RE Tranquillity are directly applicable to the RE Scarlet project site and no additional locality search requests were submitted. Collections database reviews and literature search results included all fossil types (vertebrate, invertebrate, plant, microfossils, and trace fossils).

Based on a review of aerial imagery, the project site is generally flat, lacking any significant topographic relief, and consists predominantly of fallow agricultural (grazing) areas, scattered residences, and smaller areas of undisturbed or recovering natural habitat. No Pleistocene or older sediments are mapped within the project site, and no bedrock is exposed at the surface within the project site; therefore, no paleontological field survey was conducted for this analysis.

Paleontological sensitivity ratings of the geological formations were assigned based on the findings of the record search and literature review, and on the potential impact to nonrenewable paleontological resources from project development following the BLM guidelines (BLM 2016). Results of the analysis were used to develop recommendations for this project in accordance with the professional standards of the SVP (2010).

5 Description of Resources

5.1 Geologic Setting

California is naturally divided into eleven geomorphic provinces, each distinguished from one another by unique topographic features and geologic formations: the Sierra Nevada, the Klamath Mountains, the Cascade Range, the Modoc Plateau, the Basin and Range, the Mojave Desert, the Colorado Desert, the Peninsular Ranges, the Transverse Ranges, the Coast Ranges, and the Great Valley (California Geological Survey 2002). The Scarlet Solar Generating Facility Project is located within the southern portion of the Great Valley geomorphic province.

The Great Valley is an elongate lowland approximately 50 miles wide and 400 miles long. It is bounded to the east by the Sierra Nevada Range and to the west by the Coast Range. A relatively undeformed basin, the Great Valley rises from about sea level to approximately 400 feet in elevation at the north and south ends. The northern portion of the valley, referred to as the Sacramento Valley, is drained by the Sacramento River, while the southern portion of the valley, referred to as the San Joaquin Valley, is drained by the San Joaquin River. Both rivers converge in the Central Valley and drain into San Francisco Bay and the Pacific Ocean via the Carquinez Strait. The Great Valley is predominantly alluvial, flood, and delta plains formed by these two major river systems.

Depositional Environment

During the entire Cenozoic and the later Mesozoic (see geologic timescale for reference), the region persisted as a shallow marine embayment or other lowland (Norris and Webb, 1990). Middle Tertiary deposition occurred in deeper water environments during the Oligocene and middle Miocene (Bandy and Arnel 1969; Norris and Webb 1990). By the late Cenozoic much of the region, especially in the San Joaquin Valley, consisted of shallow brackish and freshwater lakes. During the middle and late Pleistocene the now extinct Lake Corcoran covered much of the northern portion of the San Joaquin Valley.

The Great Valley is an asymmetrical synclinal trough with Mesozoic and Cenozoic aged sediments deposited on the Sierran (east side) and Franciscan (west side) granitic rock basement. The contact between the Sierran and Franciscan basement is concealed throughout virtually the entire Great Valley province, but is presumed to be a fault or subduction zone contact (Norris and Webb 1990). Most of the Great Valley was tectonically active throughout the Cenozoic resulting in a series of unconformities among sedimentary units. Similar to deposition within the Coast Range basins, deposition in the Great Valley center continued relatively unbroken throughout the Cenozoic, while deposition along the margins was frequently disrupted by tectonic activity and erosion (Norris and Web 1990).

Table 1 Geologic Timescale

Era	Period	Epoch	Age (millions of years ago)*
Cenozoic	Quaternary	Holocene	Recent – 0.0117
		Pleistocene	0.0117 – 2.58
	Neogene (Tertiary)	Pliocene	2.58 – 5.33
		Miocene	5.33 – 23.03
	Paleogene (Tertiary)	Oligocene	23.03 – 33.9
		Eocene	33.9 – 56.0
		Paleocene	56.0 – 66.0
Mesozoic	Cretaceous	Early/Late	66.0 – 145.0
	Jurassic	Early/Middle/Late	145.0 – 201.3
	Triassic	Early/Middle/Late	201.3 – 252.17

*Numerical ages based on Global Boundary Stratotype Section and Points (GSSP) for their lower boundaries, as ratified by the International Commission on Stratigraphy, in Cohen et al. (2013).

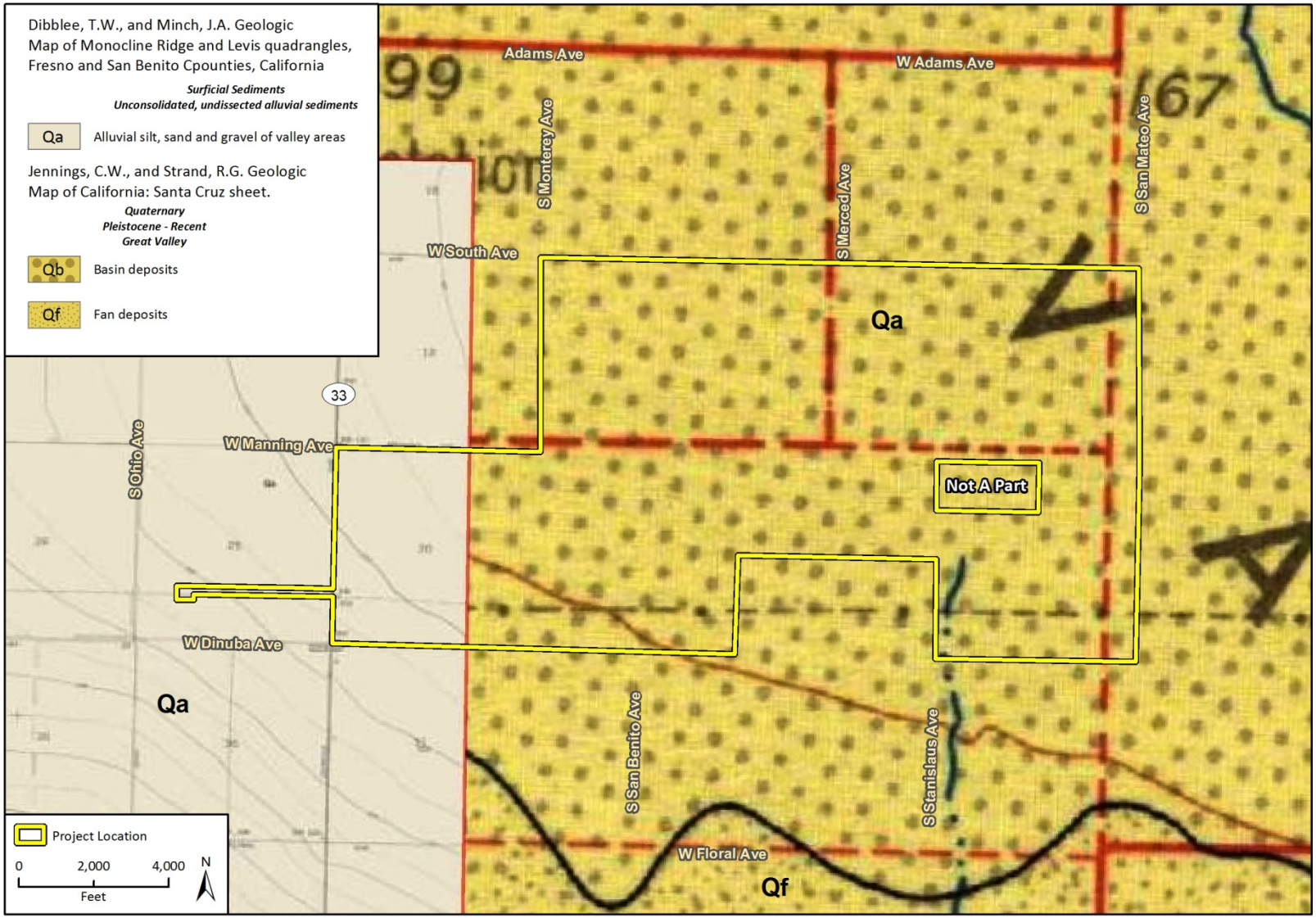
Sedimentary Record

The sedimentary record in the Great Valley includes typically shallow water marine units from the late Jurassic and Cretaceous, thick units of marine sediments from the Miocene, and brackish and freshwater lake deposits from the late Cenozoic. The San Joaquin Valley was likely an open deepwater marine embayment throughout the Oligocene and Miocene (Addicott 1970), and the thickest sequences of Miocene marine deposits were likely deposited in narrow, deep seaways extending into the Pacific across the site of the Coast Range in the southern portion of the San Joaquin Valley (Bandy and Arnel 1969; Norris and Webb 1990). By the Pliocene the southern connection to the Pacific had closed and uplift had drained the San Joaquin Valley to the north through the Carquinez Strait. Pliocene-Pleistocene deposits consist of alluvial deposits including those associated with a number of ancient lake systems, Tulare Lake in the central San Joaquin Valley being the most recent of the ancient systems.

5.2 Geologic Formations

Geologic studies and mapping of the San Joaquin Valley region have been conducted by a number of authors (Bartow 1996; Birkhauser 1943; Dibblee 1955; Galloway 1943; Goudkoff 1943; Lettis and Unruh 1991; McMasters 1943; Woodward 1943; and Young 1943). The project site occurs on the western side of the San Joaquin Valley, a broad sediment catchment basin. Based on the mapping of Jennings and Strand (1958), the project site contains two geologic units, Quaternary fan deposits (Qf) and Quaternary basin deposits (Qb). Dibble and Minch (2007) combined the fan and basin deposits into a single mapped unit, Quaternary alluvial gravel, sand and clay of valley areas (Qa). Bartow (1996) mapped the western border of the San Joaquin Valley, to the west of the project site, and named the surficial units on the Valley floor younger alluvial fan deposits (Qaf) of Holocene age. Bartow also maps older alluvial fan deposits (Qof) of Holocene and Pleistocene age along the base of the Diablo Range. Figure 3 provides a composite geologic map of the project vicinity recreated with data drawn from both Jennings and Strand (1958) and Dibblee and Minch (2007). Note that on Figure 3, the contact between Quaternary aged basin and fan alluvial deposits of Jennings and

Figure 3 Composite Geologic Map of Project Vicinity



Strand (1958) has been overlain onto the base map of Dibblee and Minch (2007) where these deposits are mapped as a single unit (Quaternary surficial deposits [Qs]).

Sediments at the surface within the project site consist of Holocene-aged alluvial deposits of unknown thickness. These sediments overlay older surficial sediments of late Pleistocene age (Qoa) at unknown depth, and at deeper depths Pleistocene and older formations such as the Tulare Formation, the Oro Loma Formation and other Cenozoic marine and non-marine deposits. The closest surficial occurrence of Pleistocene or older deposits are exposed along the eastern margin of the Diablo Range roughly 6 miles to the west of the project site and include the Tulare and Oro Loma Formations (Bartow 1996; Dibblee and Minch 2007). Excavations associated with project development are unlikely to be of sufficient extent to impact the Tulare or Oro Loma Formation; however, Pleistocene aged alluvial units may be present at 5 feet below ground surface below the Holocene sediments and overlying soil development (Soil Survey Staff 2003). Data on the thickness of the Holocene and Pleistocene units in the immediate vicinity of the project area is not available; however, it is generally recognized that Holocene units are a minimum of 5 feet thick.

Quaternary Alluvium (Qa)

(Dibble and Minch [2007]; equivalent to fan and basin deposits of Jennings and Strand [1958]). These sediments form an unconsolidated layer of sand, silt, clay and gravel that cover extensive areas of the San Joaquin Valley. These Holocene-aged units are too young to contain scientifically significant paleontological resources and are considered to have low paleontological sensitivity (PFYC *Class 2*).

Pleistocene Alluvium (Qoa)

Pleistocene sediments in the region of the project site have not been extensively studied and have a limited publication record. These sediments have been more fully studied in the northeast part of the San Joaquin Valley (Dundas et al. 1996; Marchand and Allwardt 1981), but the eastern San Joaquin experienced a distinctly unique sedimentary history from the western San Joaquin. In general these sediments consist of very fine to coarse sands, gravels, silts and clays, with various poorly to well-developed soil horizons. These units are known to contain widely scattered scientifically significant paleontological resources, and are considered to have a moderate paleontological sensitivity (PFYC *Class 3*).

No records of fossil localities were identified within the project site or near vicinity; however, Pleistocene alluvium of similar lithology elsewhere in the San Joaquin Valley and southern California in general has been reported to contain locally abundant and scientifically significant vertebrate, invertebrate and plant fossils (unpublished UCMP, SBCM, and LACM specimen and locality data; Dundas et al. 1996; Jefferson 1991a and 1991b; Miller 1971; Reynolds and Reynolds 1991). The databases of the UCMP and LACM include at least eight Pleistocene-aged fossil localities from within Fresno County (including the Scarlet locality in the general vicinity of the project site) that include a wide range of taxa including Proboscidea (elephants), *Lepus* and *Sylvilagus* (rabbits and hares), *Thomomys* (pocket gopher), *Perognathus* (pocket mice), *Dipodomys* (kangaroo rat), *Odocoileus* (deer), *Equus* (horse), *Taxidea* (badger), *Canis* (coyote and wolf), *Bison* (buffalo), *Cervus* (elk) and a number of lizards, snakes, birds, and invertebrates (UCMP and LACM unpublished locality data). Because Pleistocene-aged alluvial deposits are known to contain scientifically significant non-renewable paleontological resources that occur sporadically and often widely spaced, these units are considered to have moderate paleontological sensitivity (PFYC *Class 3*).

6 Evaluation, Impacts, and Recommendations

6.1 Paleontological Sensitivity Evaluation

Geologic deposits of low paleontological sensitivity (PFYC *Class 2*) are mapped at the surface within the project site and as such, fossils would not be expected at the surface; however, underlying Pleistocene-aged sediments with moderate paleontological sensitivity (PFYC *Class 3*) could be impacted if excavations were sufficiently deep to disturb these sediments. Holocene alluvial units in the San Joaquin Basin vary in thickness but are generally a minimum of 5 feet thick in the project vicinity. Ground disturbing activity associated with project development has the potential to expose sensitive Pleistocene-aged alluvial deposits and therefore may impact scientifically significant paleontological resources that could be present within those sediments.

6.2 Impacts

Paleontological resources are by nature nonrenewable and are, therefore, vulnerable to impacts from development related activities. Fossils provide important information for our understanding of past environments, the history of life, past species diversity, how species respond to climate change, and many other lines of scientific inquiry. Impacts to fossils and fossil localities, and loss of fossils from looting or other destructive activity at fossil sites results in the direct loss of scientific data and directly impacts the ability to conduct scientific research on evolutionary patterns and process. Construction and grading activities associated with any development that will impact previously undisturbed paleontologically sensitive geologic deposits have the potential for the destruction of significant paleontological resources.

Project related ground disturbance activities would include grubbing, minimal grading, and trenching. Trenching activities are anticipated for the placement of cables at a maximum depth of 10 feet and for the placement of the gen-ties which may require excavations up to 20 feet in depth. Within the project boundaries, where excavations are anticipated to reach 10-20 feet in depth, Pleistocene aged alluvial deposits present at unknown depth(s) may be exposed by construction activity. Excavations and ground disturbance of these geologic units has the potential to impact significant paleontological resources.

6.3 Recommendations

Recommendations presented in this section include mitigation measures that should be implemented to reduce or avoid project-related potentially adverse impacts to significant paleontological resources on a cumulative basis. The proposed mitigation measures would reduce to a less than significant level, any potential direct, indirect, and cumulative adverse environmental impacts on paleontological resources within Pleistocene alluvial deposits that could result from project construction. Paleontological sensitive geologic units are not present at the surface within the project site; however, geologic units with moderate (PFYC *Class 3*) paleontological sensitivity could be present within 5 feet below the surface. During all project excavations exceeding 5 feet in

depth, the following mitigation measures should be conducted. The proposed mitigation measures are consistent with SVP standard guidelines for mitigating adverse construction-related impacts on paleontological resources (SVP 2010):

- **Retain a Qualified Paleontologist.** Prior to initial ground disturbance, the applicant shall retain a project paleontologist, defined as a paleontologist who meets the SVP standards for Qualified Professional Paleontologist, to direct all mitigation measures related to paleontological resources. A qualified paleontologist (Principal Paleontologist) is defined by the SVP standards as an individual with an M.S. or Ph.D. in paleontology or geology who is experienced with paleontological procedures and techniques, who is knowledgeable in the geology of California and the San Joaquin Valley, and who has worked as a paleontological mitigation project supervisor for a least one year.
- **Paleontological Mitigation and Monitoring Program**. Prior to construction activity a qualified paleontologist should prepare a Paleontological Mitigation and Monitoring Program to be implemented during ground disturbance activity for the proposed project. This program should outline the procedures for construction staff Worker Environmental Awareness Program (WEAP) training, paleontological monitoring extent and duration, salvage and preparation of fossils, the final mitigation and monitoring report, and paleontological staff qualifications.
- **Paleontological Worker Environmental Awareness Program (WEAP).** Prior to the start of construction, the project paleontologist or his or her designee, shall conduct training for construction personnel regarding the appearance of fossils and the procedures for notifying paleontological staff should fossils be discovered by construction staff. The WEAP shall be fulfilled at the time of a preconstruction meeting at which a qualified paleontologist shall attend. In the event of a fossil discovery by construction personnel, all work in the immediate vicinity of the find shall cease and a qualified paleontologist shall be contacted to evaluate the find before restarting work in the area. If it is determined that the fossil(s) is (are) scientifically significant, the qualified paleontologist shall complete the following conditions to mitigate impacts to significant fossil resources.
- **Paleontological Monitoring**. Ground disturbing construction activities (including grading, trenching, foundation work and other excavations) exceeding 5 feet in depth shall be monitored on a full-time basis by a qualified paleontological monitor during initial ground disturbance. The implementation of the Paleontological Mitigation and Monitoring Program shall be supervised by the project paleontologist. Monitoring should be conducted by a qualified paleontological monitor, who is defined as an individual who has experience with collection and salvage of paleontological resources. The duration and timing of the monitoring will be determined by the project paleontologist. If the project paleontologist determines that full-time monitoring is no longer warranted, he or she may authorize, after approval of the Lead Agency, that monitoring be reduced to periodic spot-checking or ceased entirely. Monitoring would be reinstated if any new or unforeseen deeper ground disturbances are required and reduction or suspension would need to be reconsidered by the project paleontologist. Ground disturbing activity that does not exceed 5 feet in depth would not require paleontological monitoring.
- **Salvage of Fossils**. If fossils are discovered, the project paleontologist or paleontological monitor should recover them. Typically fossils can be safely salvaged quickly by a single paleontologist and not disrupt construction activity. In some cases larger fossils (such as complete skeletons or large mammal fossils) require more extensive excavation and longer

salvage periods. In this case the paleontologist should have the authority to temporarily direct, divert or halt construction activity to ensure that the fossil(s) can be removed in a safe and timely manner.

- **Preparation and Curation of Recovered Fossils**. Once salvaged, significant fossils should be identified to the lowest possible taxonomic level, prepared to a curation-ready condition and curated in a scientific institution with a permanent paleontological collection (such as the University of California Museum of Paleontology), along with all pertinent field notes, photos, data, and maps. Fossils of undetermined significance at the time of collection may also warrant curation at the discretion of the project paleontologist.
- **Final Paleontological Mitigation Report**. Upon completion of ground disturbing activity (and curation of fossils if necessary) the qualified paleontologist should prepare a final mitigation and monitoring report outlining the results of the mitigation and monitoring program. The report should include discussion of the location, duration and methods of the monitoring, stratigraphic sections, any recovered fossils, and the scientific significance of those fossils, and where fossils were curated.

7 References

Addicott, W. O. 1970. Tertiary paleoclimatic trends in the San Joaquin Basin, California. *U. S. Geological Survey Professional Paper*, 644-D, D1-D19.

Bandy, O. L., and Arnal, R. E . 1969. Middle Tertiary basin development, San Joaquin Valley, California. *Geological Society of America Bulletin*, 80, 783-820.

Bartow, J. A. 1996. Geologic map of the west border of the San Joaquin Valley in the Panoche Creek-Cantua Creek area, Fresno and San Benito Counties, California. *U. S. Geological Survey Miscellaneous Field Investigations.* Map. I-2430. 1:50,000.

Bureau of Land Management (BLM). 2016. Potential Fossil Yield Classification System (PFYC). *BLM Instruction Memorandum No. 2*016-124, available online at: https://www.blm.gov/policy/im-2016-124

Dibblee, T. W. Jr. 1955. Geology of the southeastern margin of the San Joaquin Valley, California. *California Division of Mines and Geology Bulletin,* 171.

Dibblee, T.W. and J.A. Minch. 2007. Geologic map of the Monocline Ridge and Levis quadrangles, Fresno and San Benito Counties, California. Dibblee Geological Foundation, Dibblee Foundation Map DF-315, scale 1:24,000.

Dundas, R. G., Smith, R. B., and Verosub, K. L. 1996. The Fairmead Landfill Locality Pleistocene, Irvingtonian, Madera County, California: preliminary report and significance. *PaleoBios*, 172-4, 50-58.

Ferguson, G. C. 1943. Correlation of the oil field formations on East Side San Joaquin Valley. Cal. Div. *Mines and Geology Bulletin,* 118, 239-246.

Gobalet, K. W., and Gerrit, L.F. 1993. Terminal Pleistocene-early Holocene fishes from Tulare Lake

Goudkoff P. P. 1943. Correlation of the oil fields formations on West Side San Joaquin Valley. Cal Div. *Mines and Geology Bulletin*, 118, 247-252.

Israelsky, M. C. 1951. *Foraminifera* of the Lodo Formation Central California. *U. S. Geological Survey Professional Paper*, 240-A. 29 pp. 10 Plates.

Jefferson, G. T. 1991. A Catalogue of Late Quaternary Vertebrates from California: Part One. Non-marine Lower Vertebrate and Avian Taxa. *Natural History Museum of Los Angeles County Technical Reports*, Number 5, Los Angeles.

____. 1991. A Catalogue of Late Quaternary Vertebrates from California: Part Two. Mammals. *Natural History Museum of Los Angeles County Technical Reports*, Number 7, Los Angeles.

Jennings, C. W., and Strand, R. G. 1958. Geologic atlas of California – Santa Cruz sheet. Map No. 020, 1:250,000. California Geological Survey. Available online at: http://www.quake.ca.gov/gmaps/GAM/santacruz/santacruz.html

Lettis, W. R., and Unruh, J. R. 1991. Quaternary Geology of the Great Valley, California. *In The Geology of North America, Volume K-2, Quaternary Non-Glacial Geology: Conterminous U. S.,* edited by R.B. Morrison, 164-176. Geological Society of America, Boulder, CO.

Marchand, D. E., and Allwardt, A. 1981. Late Cenozoic Stratigraphic Units, Northeastern San Joaquin Valley, California. *U.S. Geological Survey Bulletin*, 1470, 70.

Miller, W. E. 1971. Pleistocene Vertebrates of the Los Angeles Basin and Vicinity (Exclusive of Rancho La Brea), *Los Angeles County Museum of Natural History Bulletin, Science*, No. 10.

Nomland J. C. 1917. The Fauna of the Santa Margarita beds in the North Coalinga Region of California. *University of California Publications, Department of Geology Bulletin,* 10(18), 293-326.

Norris, R. M., and Webb, R.W. 1990. *Geology of California. 2d ed.* New York: John Wiley & Sons.

Page, R. W. 1983. Geology of the Tulare Formation and other continental deposits, Kettleman City area, San Joaquin Valley, California. *USGS Water Resources investigations*, Report 83-4000, 24.

Porter L. E. 1943. Elk Hills oil field (U.S. Naval Petroleum Reserve No 1). *California Division of Mines and Geology Bulletin*, 118, 512-516.

Reynolds, S. F. B., and Reynolds, R.L. 1991. The Pleistocene beneath our feet: near surface Pleistocene fossils in inland southern California basins. In M.O. Woodburn, SFB Reynolds, and DP Whistler (eds.) Inland Southern California: the Last 70 Million Years. *Redlands: San Bernardino County Museum Special Publication*, 383&4, 41-43.

Society of Vertebrate Paleontology (SVP). 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. *Society of Vertebrate Paleontology*, 1–11.

Soil Survey Staff. 2003. Natural Resources Conservation Service, United States Department of Agriculture: Official Soil Series Descriptions, https://websoilsurvey.sc.egov.usda.gov/app/WebSoilSurvey.aspx

Weissmann, G. S., Bennett G.L., and Lansdale, A.L. 2005. Factors controlling sequence development on Quaternary fluvial fans, San Joaquin Basin, California, USA. In: Harvey, A.M., A.E. Mather, and M. Stokes (eds.), Alluvial Fans: Geomorphology, Sedimentology, Dynamics. *Geological Society, London, Special Publications*, 251, 169-186.

Weissmann, G. S., Mount, J.F., and Fogg, G.E. 2002. Glacially driven cycles in accumulation space and sequence stratigraphy of a stream-dominated alluvial fan, San Joaquin Valley, California, U.S.A. *Journal of Sedimentary Research*, 722, 240-251.

Woodring, W. P., and Bramlette, M.N. 1950. Geology and paleontology of the Santa Maria district, California. *U.S. Geological Survey Professional Paper*, 222, 1-142.

Woodring, W. P., Roundy, P.V., and Farnworth, H.R. 1932. Geology and oil resources Elk Hills, California. *U.S. Geological Survey Bulletin,* 835, 1-82.

Woodring W. P., Stewart R., and Richards R. W. 1941. Geology of the Kettleman Hills oil field, California. *U.S. Geological Survey Professional Paper*, 195, 170.

Young, U. 1943. Republic area of the Midway-Sunset oil field. *California Division of Mines Bulletin,* 118, 522-525.