State Water Resources Control Board

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Arnold Schwarzenegger
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DRAFT

NEGATIVE DECLARATION
Pursuant to Section 21080(c)
Public Resources Code

To:	Office of Planning & Research State Clearinghouse 1400 Tenth Street Sacramento, CA 95814	From:	State Water Resources Control Board Division of Water Quality P.O. Box 100 Sacramento, CA 95812-0100

Project Title: 401 Water Quality Certification for the Vaca-Dixon-Birds Landing 230 kV Reconductoring Project

Applicant: Pacific Gas & Electric (PG&E)
Michael Gunby, Project Manager
2730 Gateway Oaks Drive, Room 220
Sacramento, CA 95833

Project Description: PG&E proposes to reconductor (replace the wires) on approximately 30 miles of the existing Vaca-Dixon 230 kilovolt transmission line and raise approximately 43 towers along the alignment to support new heavier conductors. No new towers will be constructed. The alignment is entirely within western Solano County, near the cities of Vacaville and Fairfield.

Determination: The State Water Resources Control Board has determined that although the above-proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent, and specified in the attached Initial Study.

Terms and Conditions:

BIO-1: To minimize effects of the proposed project on the California tiger salamander, Delta green ground beetle, vernal pool fairy shrimp, vernal pool tadpole shrimp, conservancy fairy shrimp, and Contra Costa goldfields, PG&E will purchase mitigation credits at an USFWS approved mitigation bank.

BIO-2: PG&E will purchase 0.152 acres of vernal pool preservation credits and 0.008 acres of vernal pool creation credits at a vernal pool conservation bank approved by USFWS prior to the start of earth-moving activities.

BIO-3: PG&E will restore the 40.21 acres of habitat temporarily affected by the project. PG&E will also permanently preserve an additional 4.02 acres of salamander habitat either by purchasing credits from a USFWS-approved conservation bank or by purchasing and placing a conservation-easement on a USFWS-approved parcel.

APM-AQ-1: Water all active construction areas at least twice daily during dry conditions.

APM-AQ-2: Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of free board.

APM-AQ-3: Pave, apply water three times daily (during dry conditions), or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites.

APM-AQ-4: Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas at construction sites.

APM-AQ-5: Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.

APM-AQ-6: Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more).

APM-AQ-7: Enclose, cover, water twice daily or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.).

APM-AQ-8: Limit traffic speeds on unpaved roads to 15 mph.

APM-AQ-9: Install sandbags or other erosion control measures to prevent silt runoff to public roadways.

APM-AQ-10: Replant vegetation in disturbed areas as quickly as possible.

APM-AQ-11: Encouraging the use of bio-diesel fuel for diesel-powered equipment and vehicles.

APM-AQ-12: Encouraging construction workers to carpool.

APM-AQ-13: Encouraging the recycling of construction waste.

APM-BIO-1: An employee education program will be conducted, consisting of a brief presentation to explain endangered species concerns to contractors,

their employees, and any other personnel involved in the Project. The program will include the following: a description of special-status species and their habitat needs; a report of the occurrence of these species in the Project area; an explanation of the status of these species and their protection under the Federal Endangered Species Act, California Endangered Species Act, and other statutes; and a list of measures being taken to reduce impacts to the species during Project construction and implementation. A fact sheet conveying this information will be prepared for distribution to the above-mentioned people and anyone else who may enter the Project site. Upon completion of training, employees will sign a form stating that they attended the training and understand all the conservation and protection measures. To the extent possible, nighttime construction will be minimized. Construction crews will be informed during the education program meeting that, to the extent possible, travel within the marked Project site will be restricted to established roadbeds. Established roadbeds include all pre-existing and Project-constructed unimproved, as well as, improved roads.

APM-BIO-2: A biological monitor will be onsite during all ground-disturbing work within sensitive biological areas. Off-road access routes will be clearly flagged and marked. All Project-related vehicle access to the guard structures at Creed Road and south of the Noonan Ranch corrals will be monitored by a biological monitor. Work within sensitive biological areas north of Creed Road and at the corral site (at the intersection of Canon Road and Vanden Road) will be conducted during the dry season. Additionally, no work activities will be allowed to occur north of Creed Road during the Delta green ground beetle flight season; work in this area can therefore only take place from May 15 to October 31.

APM-BIO-3: Geotextile fabric and a layer of gravel will protect the original contour of all wetland pools that cannot be avoided within identified temporary impact areas adjacent to or within the right of way with the possible exception of temporary access routes where overland travel in the dry season may have less impact than placement and removal of gravel, such as for the guard structure route at Creed Road. Using the geotextile fabric and gravel will minimize potential effects from compaction or other disturbance to areas that will have more frequent travel or heavier equipment, or be used on the wet season. After construction, the gravel and fabric will be removed. Alternative methods for protecting areas from vehicle movement will be discussed with USFWS. In areas of minimal effect such as temporary access at Creed Road, this measure could have greater impact on soil seed bank than overland driving in the dry season.

APM-BIO-4: Dust control measures will be implemented during construction in the dry season. Work areas and dirt access roads will be watered regularly to minimize airborne dust and soil particles generated by construction. Fly sites will be rocked when necessary.

APM-BIO-5: The potential for adverse effects to water quality in vernal pools or habitat within the Project area will be avoided by implementing temporary Best Management Practices outlined in the California Stormwater Quality Association's Construction Handbook (CASQA, 2003). PG&E's Storm Water Pollution Prevention Plan and erosion control Best Management Practices will be used to minimize any wind or water related erosion. Protective measures will include:

a. No discharge of pollutants from vehicle and equipment cleaning will be allowed into storm drains, wetlands, or water courses.
b. Vehicle and equipment fueling and maintenance operations must be at least 100 feet from vernal pools and other aquatic habitat.
c. Dust control will be implemented, including the use of water trucks to control dust in disturbed areas, rocking temporary access road entrances and exits, and placement of geotextile mats and rock on access road areas to be used in the wet season.
d. Disturbed work areas will be restored to pre Project conditions and will be reseeded, as appropriate.

APM-BIO-6: Project related vehicles shall observe a 15 mph speed limit in all Project areas, except on county roads and state and federal highways.

APM-BIO-7: The limits of the construction area throughout the Project will be flagged if not already marked by right of way or other fencing, and all activity will be confined within the marked area. A qualified biologist shall be onsite during all activities that could result in the take of a listed species.

APM-BIO-8: The Project proponent shall include a copy of the USFWS-issued Biological Opinion (BO) within its construction documents making the primary contractor responsible for implementing all requirements and obligations included within the BO, and to educate and inform all other contractors involved in the project as to the requirements of the BO.

APM-BIO-9: A biologist shall inspect construction-related activities at the proposed Project area to ensure that no unauthorized take of federally-listed species or destruction of their habitat occurs. The biologist shall be available for monitoring throughout all phases of construction that may result in adverse effects to listed crustaceans.

APM-BIO-10: The contractor will prepare a site-specific Stormwater Pollution Prevention Plan (SWPPP) for the Project to protect receiving waters from pollution. The SWPPP will include standard sediment and erosion control measures that include limiting soil disturbances during the winter rainfall season. Given the site-specific conditions of the Project area, the SWPPP for this Project will generally include limiting soil disturbances during the winter rainfall season of October 15 through April 15 and fully stabilizing disturbed areas prior to December 1. Standard sediment erosion control measures, such as silt fencing, straw bale barriers, and sediment traps shall be implemented to directly reduce the off-site transport of sediment from disturbed slopes. Existing vegetation that can be preserved will be identified and flagged or fenced to avoid disturbance. Erosion in disturbed areas will be controlled through the use of grading operations that eliminate direct routes for conveying runoff to drainage channels and use of soil stabilization Best Management Practices (BMPs), such as mulching, erosion control fabrics, and/or reseeding with grass or other plants where necessary.

APM-BIO-11: Prior to the initiation of ground disturbance on each individual impact area, preconstruction surveys shall be conducted by a biologist(s) for the salamander. These surveys shall consist of walking surveys of the site and adjacent areas accessible to the public to determine presence of the species. Salamanders will be removed by the biologist(s) and translocated under the direction and authorization of the Service.

APM-BIO-12: All salamanders captured on the Project site during monitoring and inspections conducted during construction shall be removed by a USFWS-approved biologist(s) and translocated under the direction and authorization of the USFWS.

APM-BIO-13: To prevent inadvertent entrapment of salamanders during construction, all excavated, steep-walled holes or trenches more than 2 feet deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they must be thoroughly inspected for trapped animals. If at any time a trapped listed animal is discovered, a biologist(s) should immediately place escape ramps or other appropriate structures to allow the animal to escape, or the USFWS and/or CDFG shall be contacted by telephone for guidance. The USFWS shall be notified of the incident by telephone and electronic mail within one (1) working day.

APM-BIO-14: If requested, before, during, or upon completion of ground breaking and/or construction activities, the Project proponents shall allow access by USFWS and/or CDFG personnel to the Project site to inspect Project effects to the salamander and associated habitats.

APM-BIO-15: All Project activities north of Creed Road will be limited to May 15 to October 31 to avoid the Delta green ground beetle flight season. The Environmental Monitor will be present for all work north of Creed Road.

APM-BIO-16: Prior to construction activities, a qualified botanist shall establish exclusion zones for special status plants within 50 feet of impact areas. These exclusion zones will include known populations and, where practicable, a 50-foot buffer zone. Construction equipment and personnel will be restricted from entering the exclusion zones, except where allowed under specific mitigation measures. An environmental monitor will be onsite during construction activities in the vicinity of sensitive biological resources. If direct or indirect impacts to special-status plant species are observed then the monitor shall notify the construction manager immediately. If any populations of special-status plants are impacted, work in that area will be halted. The environmental monitor, in consultation with PG&E, will contact the CDFG and/or the USFWS.

APM-BIO-17: Vehicle access north of Creed Road shall be limited to two total vehicle round-trips: one round-trip during guard structure installation, and one during removal. The speed limit on the temporary access route will be restricted to 2 mph. A qualified botanist will escort vehicles along the temporary access route. Ingress and egress to the guard structure site will occur along different routes (i.e. new tire tracks each trip) to minimize damages to individual plants. Pappose tarplant tolerates disturbance and the impacts would be temporary, with full recovery of disturbed areas within 1-2 years.

APM-BIO-18: A qualified botanist will conduct preconstruction surveys around the proposed fly site (F-8) for pappose tarplant to determine the population's extent. The location and/or dimensions of the fly site shall be altered to avoid pappose tarplant, and the population will be protected with high-visibility fencing or signage.

APM-BIO-19: A qualified botanist will conduct preconstruction surveys for brittlescale to determine the population's extent. The botanist will identify brittlescale plants in the immediate vicinity of the proposed guard structure north of Creed Road and will assist PG&E in adjusting the placement of the structure as necessary. If work occurs in the area in

May or June or before bracts necessary for identification are fully developed, all plants of genus Atriplex will be avoided.

APM-BIO-20: To avoid or minimize potential impacts to northwestern pond turtles, a qualified biologist shall conduct a pre-construction survey for pond turtles no more than 30 days prior to construction in suitable aquatic habitats within Project impact areas. If turtles are found in aquatic habitat, then clearance of the nearby (300 ft) terrestrial habitat that would be impacted shall occur prior to construction activities; the biologist(s) shall look for eggs and western pond turtle individuals including over-wintering hatchlings. If eggs are found, the monitor shall contact CDFG for the appropriate measures to relocate the eggs. If pond turtles are located near any proposed construction areas, impacts to individuals and their habitat will be avoided to the extent feasible. The Environmental Monitor will be onsite during all construction activity in the vicinity of individual pond turtles or their nests.

APM-BIO-21: For Project construction activities occurring during the bird nesting season of February 1 through August 31, a qualified ornithologist shall conduct pre-construction surveys for nesting birds within two weeks of construction. These surveys will cover the transmission line route, staging areas, pull sites, fly sites, and access routes. Additional pre-construction surveys shall be conducted for each new phase of Project implementation that occurs during the nesting season, no more than two weeks prior to construction. For any nests that are found, nest protection zones will be established. For passerine birds, a 50 to 100-foot protection zone shall be established around active nests; for raptors, a 300-foot protection zone and for golden eagles a 500-foot protection zone shall be established around active nests. These protection zones may be modified on a site-specific basis as determined by the Environmental Monitor or in coordination with CDFG. Active nests within the Project area would be monitored for signs of disturbance. If the biological monitor determines that a disturbance is occurring, construction shall be halted, and the agencies shall be contacted as to the measures that shall be implemented.

APM-BIO-22: Phase III Burrow Surveys (nesting season surveys) shall be conducted in five locations in accordance with the Burrowing Owl Survey Protocol and Mitigation Guidelines. No disturbance should occur within 50 meters (approx. 160 ft.) of occupied burrows during the non-breeding season of September 1 through January 31 or within 75 meters (approx. 250 ft.) during the breeding Season of February 1 through August 31. Burrowing owls shall not be relocated during the breeding season. During the non-breeding season, if avoidance requirements

can not be met, the applicant shall submit a site specific proposal for burrowing owl relocation and mitigation to CDFG and the State Water Resources Control Board for review and approval. The applicant shall be required to mitigate for impacts as 6.5 acres per relocation/burrow impact.

APM-CULT-1: If concentrations of prehistoric or historic-period materials are encountered during ground-disturbing work at any of the Project work sites, all work in the immediate vicinity of the discovery shall be halted until a qualified archaeologist can evaluate the significance of the find. If the find is determined to be significant, PG&E shall determine the appropriate avoidance measures or other appropriate mitigation in consultation with a qualified archaeologist and the State Water Resources Control Board. Significant cultural materials shall be curated according to current professional standards.

APM-CULT-2: If unanticipated paleontological resources are discovered during ground-disturbing activities during the Project, excavations in the immediate vicinity of the find shall be temporarily halted until the discovery is examined by a qualified paleontologist per Society of Vertebrate Paleontology standards. If the find is determined to be significant, PG&E shall determine the appropriate avoidance measures or other appropriate mitigation in consultation with a qualified paleontologist and the State Water Resources Control Board. Significant paleontological finds shall be curated according to current professional standards.

APM-CULT-3: If human remains are encountered, work in the immediate vicinity shall stop and the County Coroner shall be notified immediately. A qualified archaeologist shall be contacted immediately to evaluate the discovery. If the human remains are of Native American origin, the Coroner must notify the Native American Heritage Commission within 24 hours of this identification. The Native American Heritage Commission then has 48 hours to identify a Most Likely Descendent.

APM-WQ-1: No discharge of pollutants from vehicle and equipment cleaning are allowed into the storm drain or water courses.

APM-WQ-2: Vehicle and equipment fueling and maintenance operations must be at least 50 ft away from vernal pools and other aquatic habitat.

APM-WQ-3: Dust control will be implemented, including the use of water trucks to control dust in disturbed areas; rocking temporary access road

entrances and exits; and placement of geotextile mats and rock on access road areas to be used in the wet season.

APM-WQ-4: Disturbed work areas will be restored to pre-Project conditions, and reseeded if appropriate.

APM-NOI-1: Care of Equipment – Equipment engines shall be covered, and PG&E will ensure that mufflers are in good working condition. This measure can reduce equipment noise by 5 to 10 dBA.

APM-NOI-2: Restricted Work Hours – Work hours will be restricted for all noise generating construction activities from 7:00 A.M. to 7:00 P.M. Monday through Friday, and from 8:00 A.M. to 6:00 P.M. on Saturdays and Sundays whenever possible. As discussed in the Project description, reconductoring requires power outages that must be timed to meet restrictions imposed by Cal ISO.

APM-NOI-3: Equipment Location – All stationary equipment such as compressors and welding machines shall be located away from noise receptors to the extent practicable.

APM-NOI-4: Pneumatic Tools – Pneumatic tools to be used within 1,500 feet of a residence shall have an exhaust muffler on the compressed air exhaust. This shall be included in the construction specifications.

APM-NOI-5: Helicopter landing/staging areas will be sited along the existing alignment, away from residences.

APM T&T-1: The construction contractor will prepare a construction Traffic Management Plan (TMP) that addresses timing of heavy equipment and building material deliveries, signing, lighting, traffic control device placement, guard structures, onsite and offsite parking and staging, construction worker pedestrian public roadway crossing, and establishing work hours outside of peak traffic periods to the extent feasible. Emergency service providers will be notified of the timing, location and duration of construction activities.

Contact Person: Amna Hawatky	Telephone: (916) 341-5483 email: ahawatky@waterboards.ca.gov

Approved:

_____

Dorothy Rice Date
Executive Director

Initial Study and Environmental Analysis to Support the Proposed Mitigated Negative Declaration

Vaca Dixon–Birds Landing 230 kV Reconductoring Project to Support Issuance of 401 Certification

Prepared for

State Water Resources Control Board

P.O. Box 100
Sacramento, CA 95812-0100

November 2009

Prepared by
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A Mitigation Monitoring and Reporting Plan
B Construction Emission Calculations
C Biological Assessment Submitted to the USFWS in accordance with Section 7 of the Endangered Species Act

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1.0 Project Overview

Pacific Gas and Electric Company (PG&E) proposes to reconductor (replace the wires) on approximately 30 miles of the existing Vaca-Dixon 230 kilovolt (kV) transmission line and raise approximately 43 towers along the alignment to support new heavier conductors (hereinafter referred to as the 'Project'.) No new towers will be constructed. The alignment is entirely within western Solano County, near the cities of Vacaville and Fairfield.

The transmission line begins at the Vaca Dixon Substation northeast of Vacaville. The alignment crosses Interstate 80 and runs south approximately 4.5 miles through predominantly agricultural land to the Cypress Hills Golf Course where it branches into a "y." The westerly portion extends from the Cypress Hills Golf Course approximately 4 miles southwest to the Peabody Substation, northeast of the City of Fairfield. The easterly portion extends from the Cypress Hills Golf Course approximately 15 miles to the southeast through the Lambie Switching Station to the Birds Landing Substation. The majority of the transmission line runs through sparsely populated agricultural areas, except near the Vaca Dixon and Peabody Substations. Minor modifications will be made at Lambie Switching Station and Vaca Dixon, Birds Landing, and Peabody Substations to accommodate higher conductor ratings. General Project information is presented in Table 1-1. An overview of the alignment is shown on Figure 1-1 and additional details regarding the alignment and construction-related areas are shown on Figures 1-2 through 1-12.

TABLE 1-1
General Project Information

Project Title	Vaca Dixon-Birds Landing 230 kV Reconductoring Project to Support Issuance of State Water Resources Control Board 401 Certification
Lead Agency	State Water Resources Control Board P.O. Box 100 Sacramento, CA 95812-0100
Contact Person	Amna Hawatky Environmental Scientist 401 Certification & Wetlands Unit Division of Water Quality 1001 I Street, 15th floor Sacramento, CA 95814 (916) 341-5483 ahawatky@waterboards.ca.gov
Project Location	Solano County, California
Project Sponsor	Pacific Gas & Electric Michael Gunby (916) 207-7016
General Plan Designation	Multiple land use designations
Zoning	Multiple zoning districts

The purpose of the Project is to enhance transmission capacity to serve PG&E's electric customers in Solano and Contra Costa counties. The purpose of this IS/MND is to evaluate the potential impacts associated with the reconductoring activities to support issuance of a 401 Certification. Since the Project only involves upgrades to an existing transmission line, existing support towers, and existing substations, no alternatives were considered. Required agency approvals and applicable local plans and policies are listed at the end of Section 2.0.

1.1 IS/MND Overview

This IS/MND examines potential short-term and long-term impacts associated with the implementation of the Vaca Dixon-Birds Landing Reconductoring Project (Project.) These impacts were determined through an evaluation of the Project using the California Environmental Quality Act (CEQA) Initial Study Checklist, in which existing conditions are compared and contrasted with conditions that would exist once the Project is implemented.

The Initial Study checklist indicates the potential level of impact and is defined as follows:

Potentially Significant Impact: A fair argument can be made, based on the substantial evidence in the file, that an effect may be significant.

Less Than Significant Impact with Mitigation Incorporated: Incorporation of mitigation measures has reduced an effect from a Potentially Significant Impact to a Less Than Significant Impact.

Less Than Significant Impact: An impact is considered adverse but does not trigger a significance threshold.

No Impact: There is adequate support that the referenced information sources show that the impact simply does not apply to the subject project.

For potentially significant impacts that have been identified, mitigation measures designed to reduce impacts to less than significant levels are presented. The only proposed mitigation measures address biological resources impacts where specific compensation for Project-related habitat loss is needed. Avoidance and Protection Measures, which include all standard practices, best management practices (BMPs), and permit requirements (other than habitat compensation mitigation), have been incorporated into the Project Description to ensure that potential Project impacts are less than significant. The IS/MND also addresses potential cumulative impacts of the Project when added to other local proposed (i.e., reasonably foreseeable) or approved projects.

1.2 IS/MND Organization

This IS/MND contains the following sections:

Section 1.0: Introduction.

Section 2.0: Project Description.

Section 3.0: Environmental Setting, Impacts, and Mitigation details environmental setting information, Project impacts, as reviewed against the CEQA Initial Study

Checklist and proposed avoidance, protection and mitigation measures for a wide range of resources. For those issue areas with potentially significant impacts, a discussion of the potentially significant short- and long-term impacts of the reasonably foreseeable projects located in the vicinity of the Project and the cumulative impacts of these projects in combination with the Project are addressed.

Resource-specific analyses are included in the following sections:

3.1 – Aesthetics
3.2 – Agricultural Resources
3.3 – Air Quality
3.4 – Biological Resources
3.5 – Cultural Resources
3.6 – Geology/Soils
3.7 – Hazards and Hazardous Materials
3.8 – Hydrology and Water Quality
3.9 – Land Use and Planning
3.10 – Mineral Resources
3.11 – Noise
3.12 – Population and Housing
3.13 – Public Services
3.14 – Recreation
3.15 – Transportation/Traffic
3.16 – Utilities and Service Systems
3.17 – Mandatory Findings of Significance

Section 4.0: References lists all of the references relevant to preparation of the IS/MND

Section 5.0: List of Preparers lists all individuals involved with preparation of the IS/MND.

1.2.1 Mitigation Monitoring

CEQA requires that a public agency adopt a Mitigation Monitoring and Report Plan (MMRP) for mitigation measures required to reduce or avoid significant impacts to the environment. The Project-specific mitigation measures are designed to compensate for habitat loss and are discussed within the Section, 3.4 Biological Resources. As discussed in Section 3.0, the incorporation of avoidance and protection measures as part of Project design reduces potential impacts in all of the other issues areas to less than significant levels. The MMRP is designed to ensure compliance during Project implementation, as required by Public Resources Code (PRC) Section 21081.6. The MMRP is included as Attachment A.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED: The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture Resources	☐ Air Quality
☑ Biological Resources	☐ Cultural Resources	☐ Geology/Soils
☐ Hazards & Hazardous Materials	☐ Hydrology/ Water Quality	☐ Land Use/Planning
☐ Mineral Resources	☐ Noise	☐ Population/Housing
☐ Public Services	☐ Recreation	☐ Transportation/Traffic
☐ Utilities/Service Systems	☐ Mandatory Findings of Significance	

DETERMINATION: On the basis of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☑ I find that although the proposed Project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature: _____ Date: _____

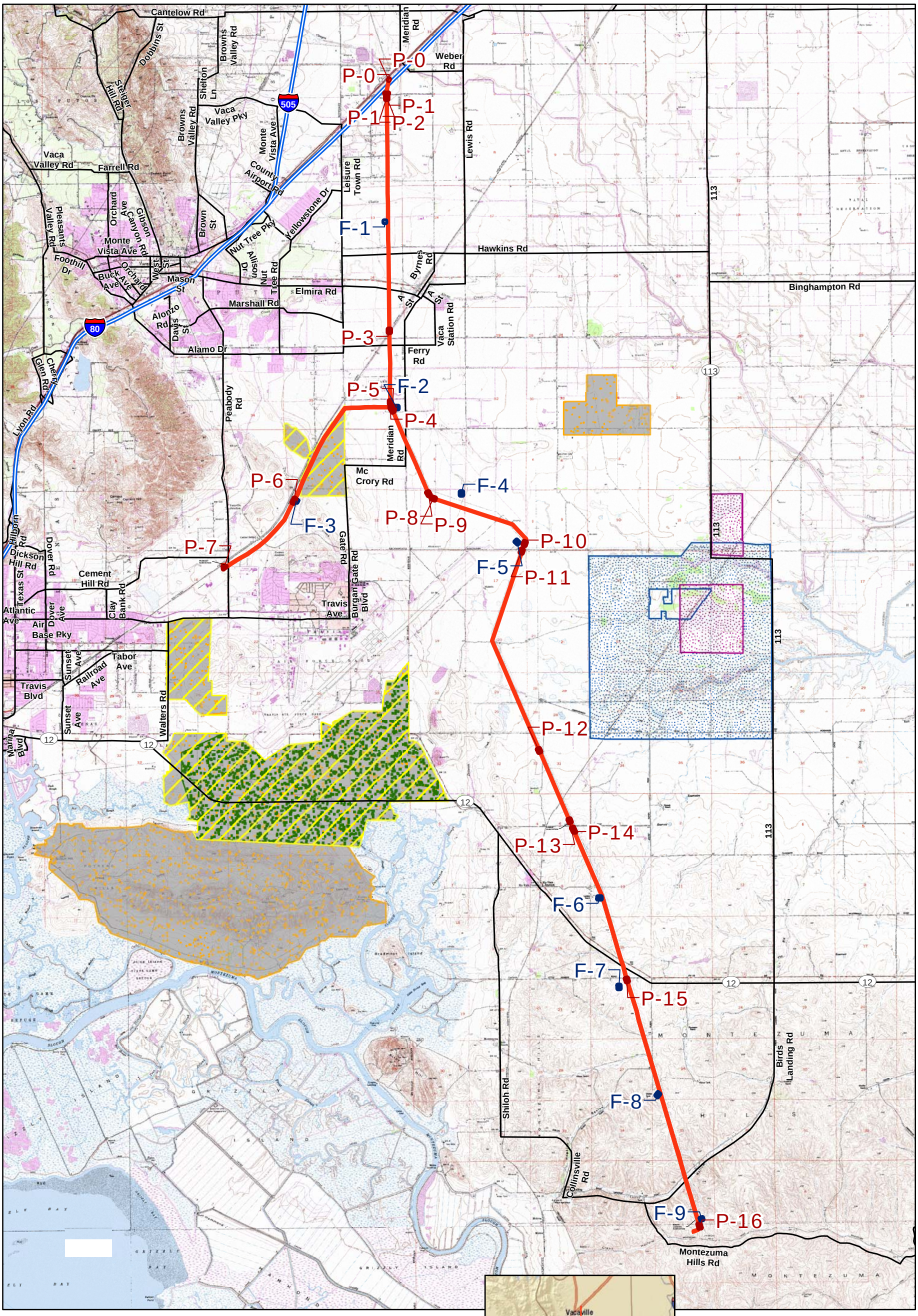
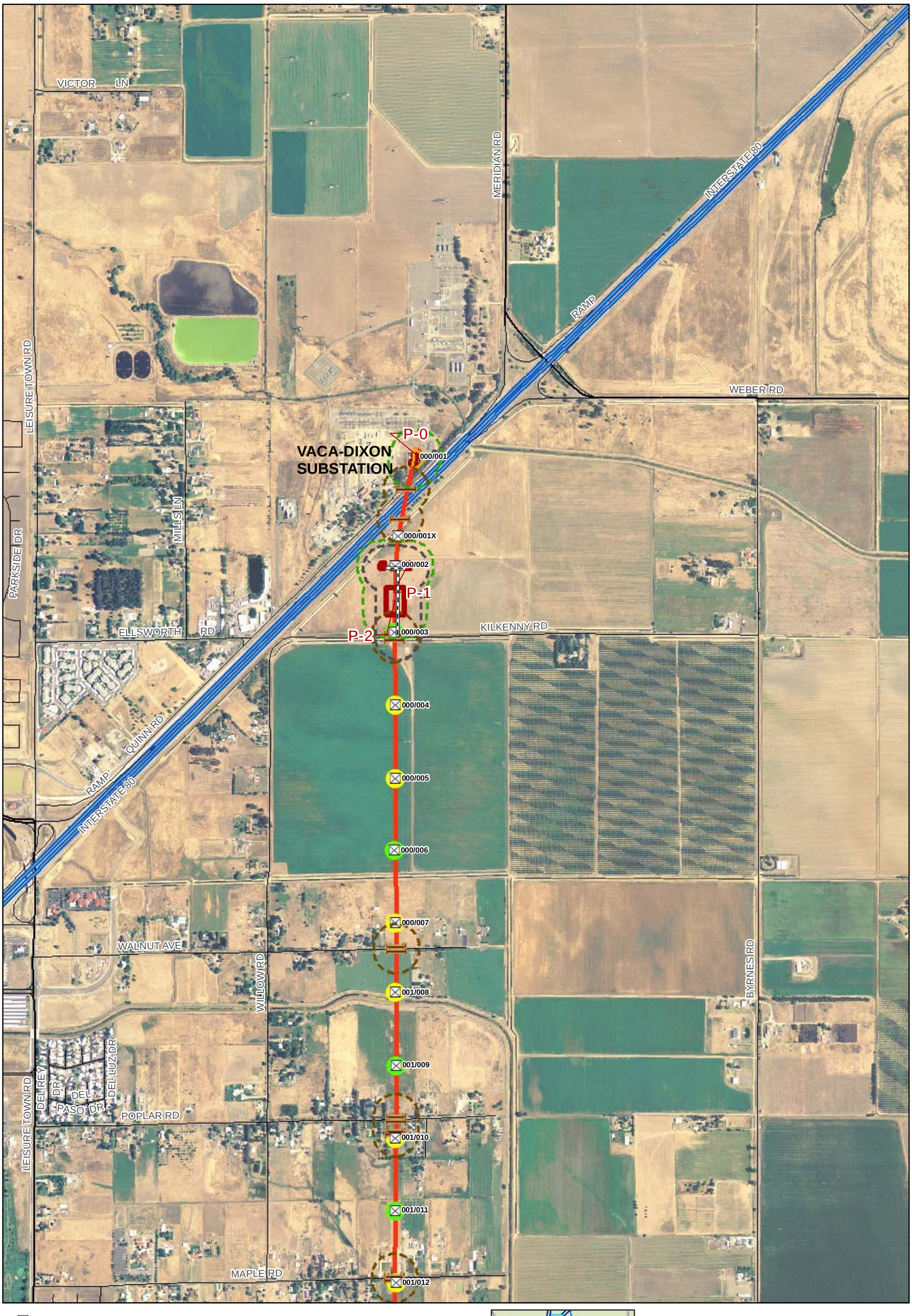


FIGURE 1-1
Project Location
Vaca Dixon – Birds Landing IS/MND



Structures
60kV Poles
Structure Modification Type
Stuctures Receiving Arm Extension By Helicopter
Stuctures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Stuctures Converted from Tangent to Dead-End
Transmission Lines
Pull Site
Fly Site
250' Distance fror Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance fron Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures

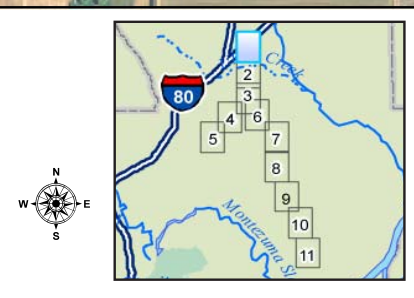


FIGURE 1-2
Project Area: Section 1 of 11
Vaca Dixon – Birds Landing IS/MND

Structures
60kV Poles
Structure Modification Type
Stuctures Receiving Arm Extension By Helicopter
Stuctures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Stuctures Converted from Tangent to Dead-End
Transmission Lines
Pull Site
Fly Site
250' Distance fro Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance fro Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures

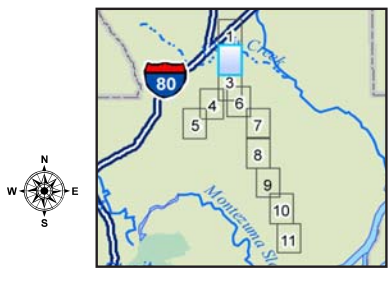
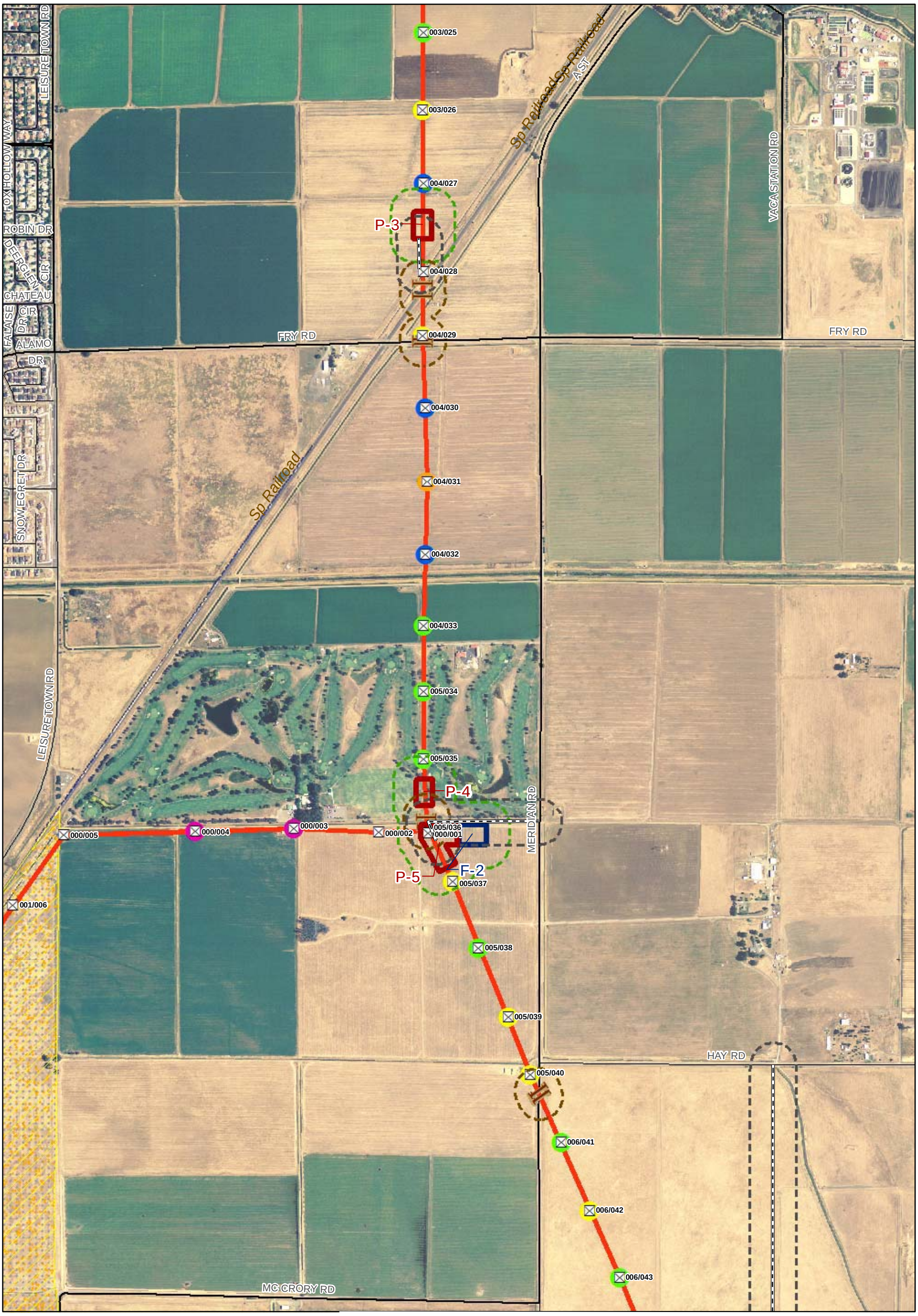
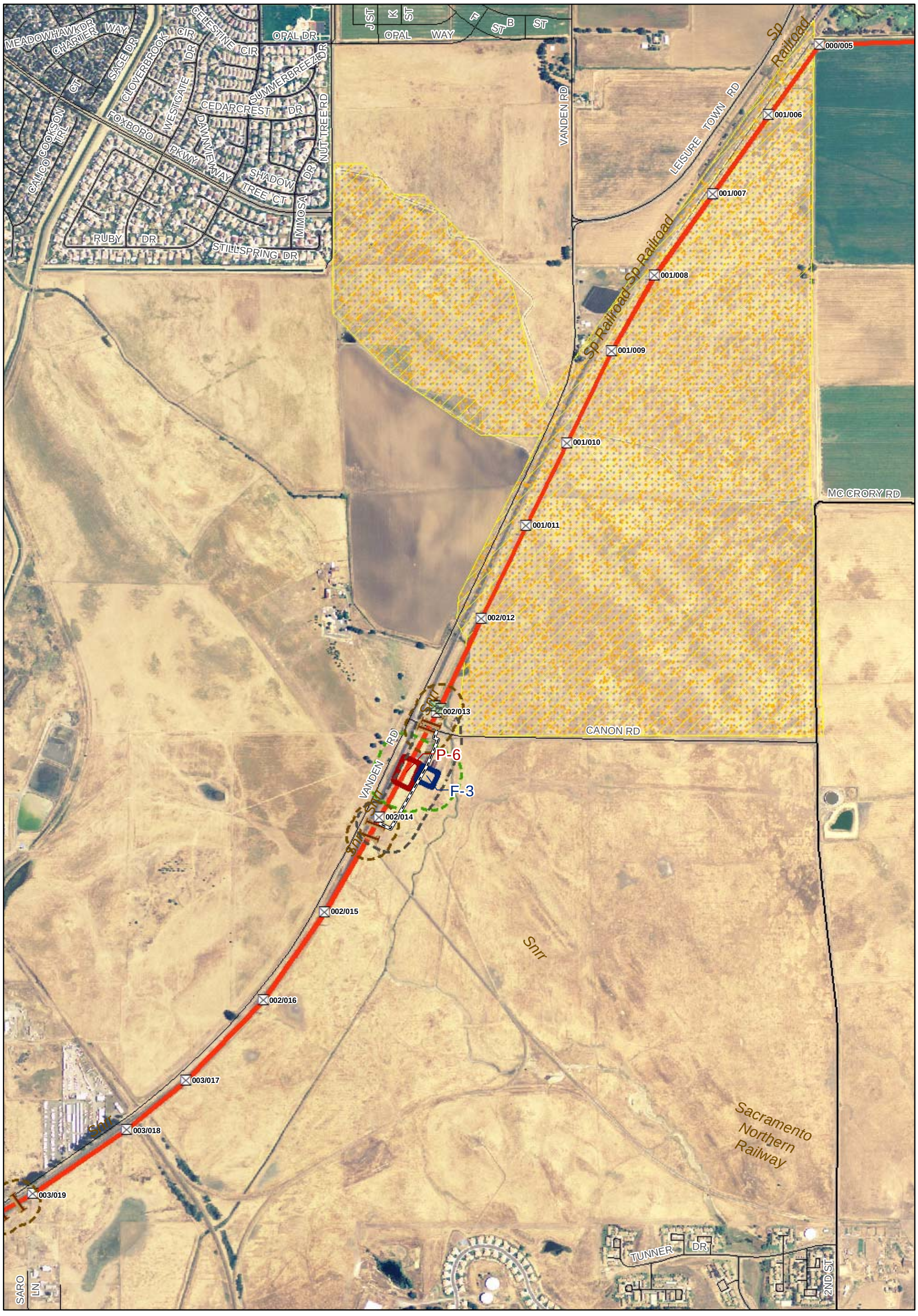


FIGURE 1-3
Project Area: Section 2 of 11
Vaca Dixon – Birds Landing IS/MND



Structures
60kV Poles
Structure Modification Type
Stuctures Receiving Arm Extension By Helicopter
Stuctures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Stuctures Converted from Tangent to Dead-End
Transmission Lines
Pull Site
Fly Site
Contra Costa Goldfield Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
250' Distance frc Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance fro Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures

FIGURE 1-4
Project Area: Section 3 of 11
Vaca Dixon – Birds Landing IS/MND



Structures
60kV Poles
Structure Modification Type
Structures Receiving Arm Extension By Helicopter
Structures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Structures Converted from Tangent to Dead-End
Transmission Lines
Pull Site
Fly Site
Contra Costa Goldfield Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
250' Distance fro Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance fro Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures

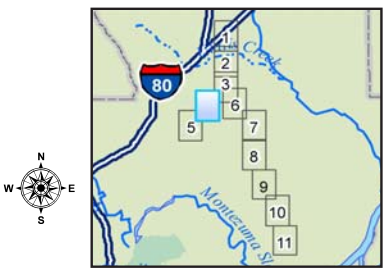


FIGURE 1-5
Project Area: Section 4 of 11
Vaca Dixon – Birds Landing IS/MND

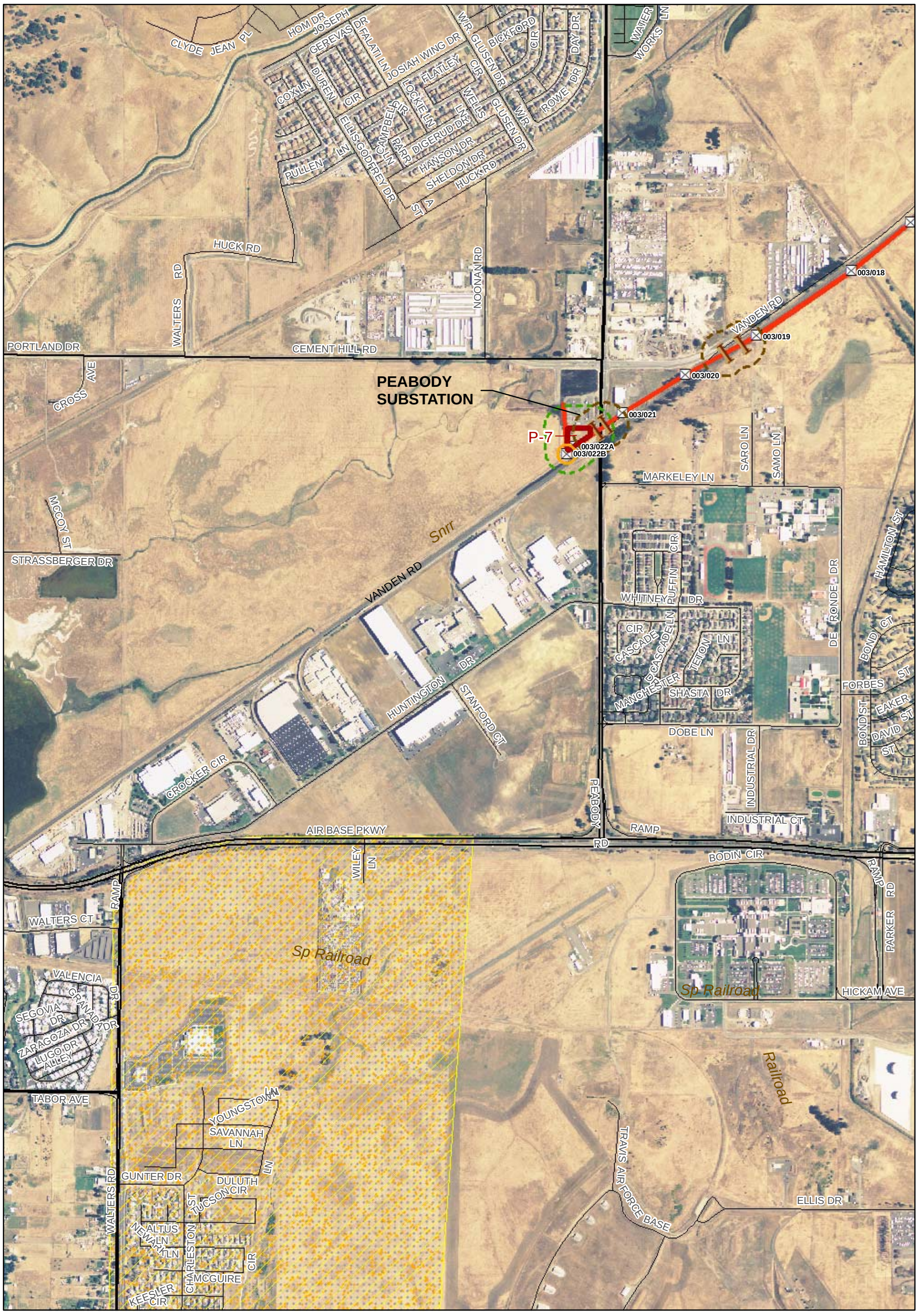
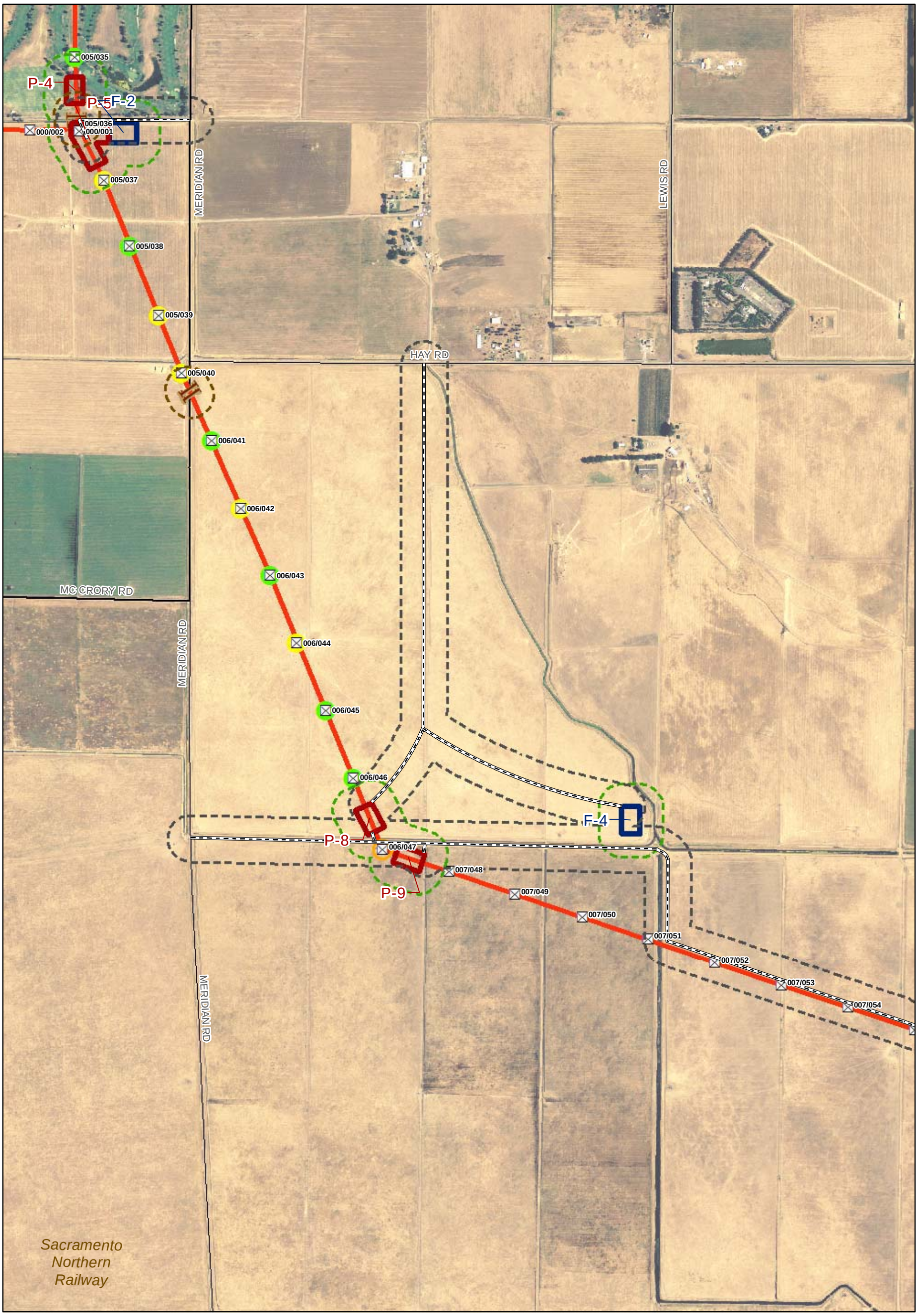


FIGURE 1-6
Project Area: Section 5 of 11
Vaca Dixon – Birds Landing IS/MND



Structures
60kV Poles
Structure Modification Type
Stuctures Receiving Arm Extension By Helicopter
Stuctures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Stuctures Converted from Tangent to Dead-End
Transmission Lines
Pull Site
Fly Site
250' Distance fro Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance fron Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures

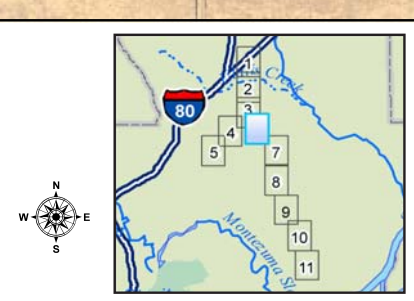


FIGURE 1-7
Project Area: Section 6 of 11
Vaca Dixon – Birds Landing IS/MND

Structures
60kV Poles
Structure Modification Type
Stuctures Receiving Arm Extension By Helicopter
Stuctures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Stuctures Converted from Tangent to Dead-End
Transmission Lines
Pull Site
Fly Site
250' Distance fro Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance fron Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures

FIGURE 1-8
Project Area: Section 7 of 11
Vaca Dixon – Birds Landing IS/MND

010/068
010/069
010/070
010/071
010/072
010/073
011/074
011/075
CREED RD
011/076
P-12
011/077
011/078
011/079
012/080
012/081
Sacramento Northern Railroad
012/082
012/083
BITHELL LN
012/084
P-13
012/085
P-14
LAMBIE SUBSTATION
012/086
LAMBIE RD
RIO VISTA RD
LAMBIE

Structures
60kV Poles
Structure Modification Type
Stuctures Receiving Arm Extension By Helicopter
Stuctures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Stuctures Converted from Tangent to Dead-End
Transmission Lines
Pull Site
Fly Site
250' Distance fror Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance fron Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures

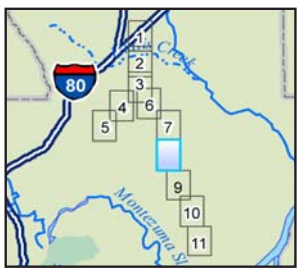


FIGURE 1-9
Project Area: Section 8 of 11
Vaca Dixon – Birds Landing IS/MND

Structures
60kV Poles
Structure Modification Type
Stuctures Receiving Arm Extension By Helicopter
Stuctures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Stuctures Converted from Tangent to Dead-End
Transmission Lines
Pull Site
Fly Site
250' Distance fro Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance fron Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures

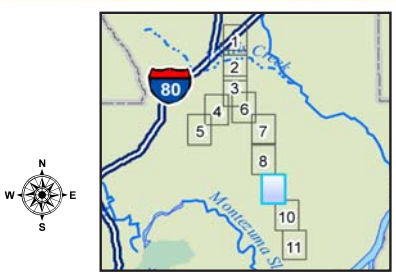
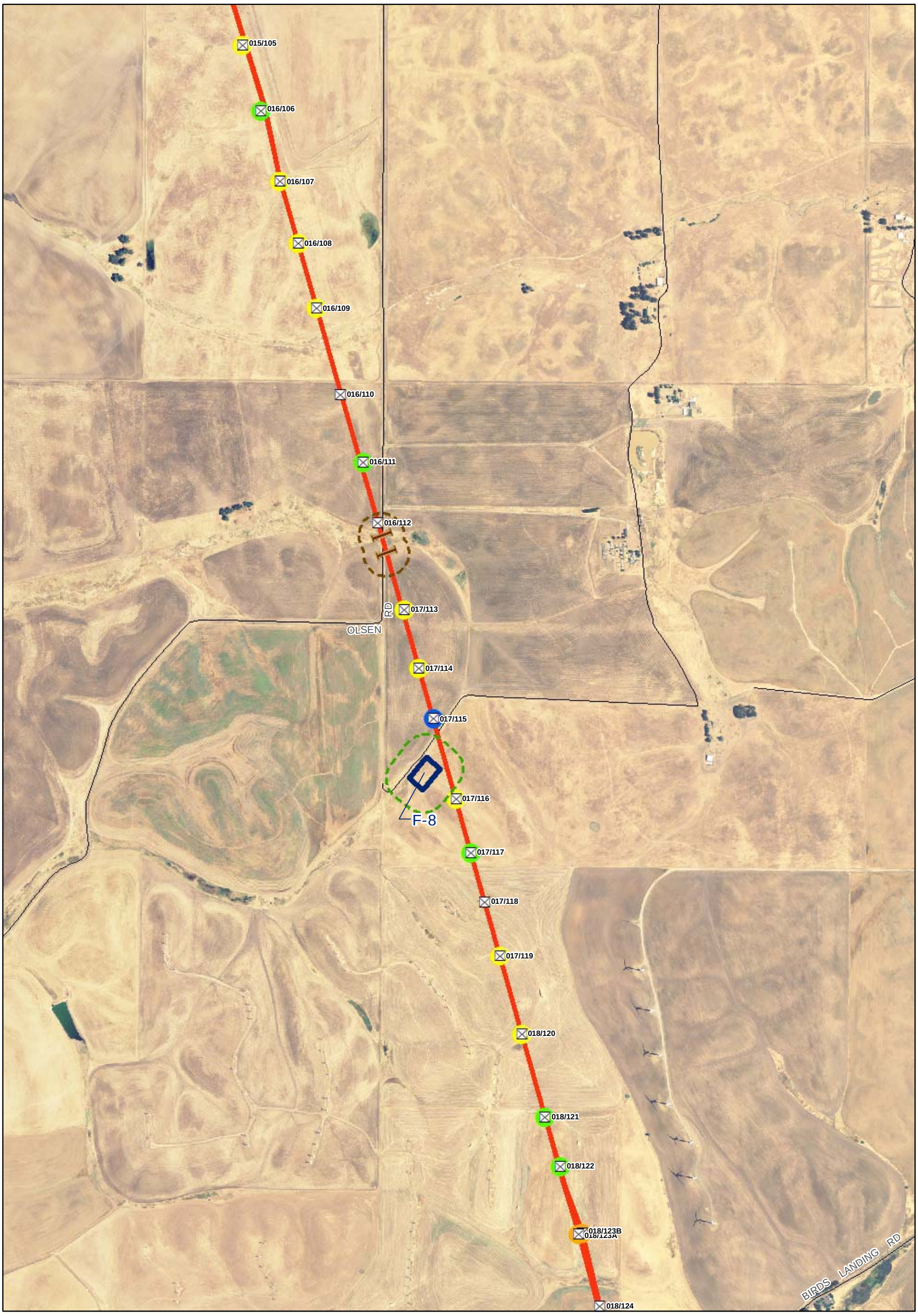


FIGURE 1-10
Project Area: Section 9 of 11
Vaca Dixon – Birds Landing IS/MND



Structures
60kV Poles
Structure Modification Type
Stuctures Receiving Arm Extension By Helicopter
Stuctures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Stuctures Converted from Tangent to Dead-End
Transmission Lines
Pull Site
Fly Site
250' Distance fror Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance fron Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures

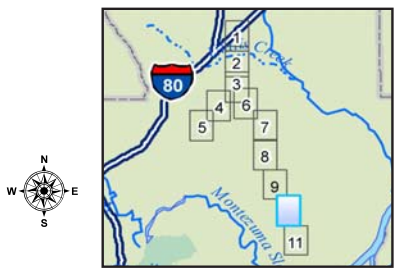


FIGURE 1-11
Project Area: Section 10 of 11
Vaca Dixon – Birds Landing IS/MND

018/123B
018/123A
018/124
018/125
018/126
BIRDS LANDING RD
019/127
019/128
019/129
019/130
F-9
BIRD'S LANDING SUBSTATION
P-16
019/131
MONTEZUMA HILLS RD

Structures
60kV Poles
Structure Modification Type
Stuctures Receiving Arm Extension By Helicopter
Stuctures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Stuctures Converted from Tangent to Dead-End
Transmission Lines
Pull Site
Fly Site
250' Distance fro Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance fron Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures

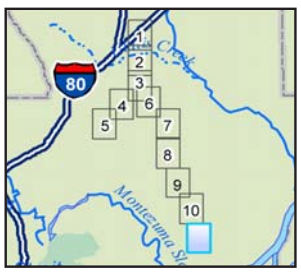


FIGURE 1-12
Project Area: Section 11 of 11
Vaca Dixon – Birds Landing IS/MND

2.0 Description of Project

2.1 Project Background

Pacific Gas and Electric Company (PG&E) proposes to reconductor (replace the wires) on approximately 30 miles of existing 230 kV transmission line as well as to raise approximately 43 towers to support new heavier conductors. No new towers will be constructed. In addition, minor modifications will be made at the existing Lambie Switching Station and the existing Vaca Dixon, Birds Landing, and Peabody Substations to accommodate higher conductor ratings. The purpose of the Vaca Dixon-Birds Landing 230 kV Reconductoring Project (Project) is to enhance transmission capacity to serve electric customers in Solano and Contra Costa counties. The Project is located entirely in Solano County, California. Figure 1-1 shows an overview of the Project area and all proposed work areas are shown on Figures 1-2 through 1-12.

As shown on Figure 1-1, modifications and improvements to the 230 kV transmission line extend from PG&E's Vaca Dixon Substation, located on Quinn Road, north of Interstate 80 (I-80), approximately 4.7 miles northeast of Vacaville (38.400645˚N; -121.920885˚W), south and west to Peabody Substation, located on Peabody Road at its intersection with Vanden Road between Fairfield and Vacaville (38.285410˚N; -121.970530˚W), and also south to Birds Landing Substation north of Montezuma Road (38.123625˚N; -121.829210˚W).

2.2 Project Description

A reconductoring project has two basic components:

1) Transmission line tower work consists of modifications and repairs to towers to allow towers to support new, heavier conductor while maintaining required ground clearances.

2) Transmission line work consists of installing new conductor and re-adjusting line tension. New insulators and hardware will also be installed during reconductoring.

Tower Work
In order to accommodate the heavier conductors, approximately 105 of the 163 towers within the Project will require some type of structural modification. Cage extensions will be added to approximately 43 towers to increase tower height; approximately 41 towers will be raised 15 feet, and approximately two towers will be raised 20 feet. Arm extensions will be installed on approximately 20 of the raised towers, as well as on other towers. Additionally, two towers will be converted from suspension to dead end structures, and two transposition towers will be reinforced. No foundation work or modifications to the base of the towers will be required at any tower location. Construction will be performed by helicopter except for a few towers near the golf course.

Line Work
The Project will increase transmission line capacity by replacing the existing 1,113 kcmil aluminum and 954 kcmil aluminum conductors with 1,113 kcmil steel-supported aluminum conductor for approximately 30 miles (50 circuit miles) of existing transmission line. Reconductoring activities are accomplished in transmission line sections of up to several miles. Seventeen proposed pull-and-tension sites have been identified as end points for these sections. These sites are shown on Figures 1-2 through 1-12. Transmission line work also includes replacing insulators and installing crossing structures to protect roadways and other power lines. Crossing structures consist of wood poles with netting strung between them. The structures are placed over overhead utilities and roadways at crossings to protect these features during cable pulling.

2.2.1 Construction Methods

Grounding

The first step in tower construction is the installation of grounding rods near the base of structures in active work areas. Grounding rods are an important safety measure for linemen and other construction personnel working in and around towers. They are copper rods, 5/8-inch in diameter, and long enough to be driven into firm ground, with approximately 1 foot protruding above ground. They are connected to the tower with clamps and a piece of conductor and are not removed until all Project activities are complete. Grounding rods are also attached to any equipment used near an energized conductor, including reel pullers and bullwheel tensioners.

Grounding rods will be installed on each end of designated pull sites prior to pulling and tensioning work and will be removed once work is complete in that area. Grounding will also be necessary at towers not accessible by helicopter (Towers 4/33, 4/34, 4/35, 0/03, and 0/04), as shown on Figure 1-4. A crane truck will used for tower modifications at these locations.

Tower Construction

Crews will prepare towers to accommodate the cage-top extensions by installing necessary braces and additional plates. In the most sensitive areas (Tower 9/65 through Tower 12/82, as shown on Figures 1-8 and 1-9) workers, tools, and equipment will be brought in by helicopter. The cage-top extensions will be assembled within the designated fly site boundaries. These tower numbers and work areas are also shown on these figures.

Except for the five towers adjacent to the Cypress Lakes Golf Course (Towers 4/33, 4/34, 4/35, 0/03, and 0/04, as shown on Figure 1-4), cage-top extensions will be delivered to the tops of the towers by helicopter and will be bolted to the existing towers. Arm extensions will be installed after cage extensions are completed. The existing conductors will be temporarily clipped to the side of the tower while the arm extensions are brought into place and installed.

Crossing Structure Installation

Guard structures are used to protect roads, railroad tracks, power lines, and the public should a line fall during reconductoring. Guard structures usually consist of one or two

wooden poles and a cross beam. They are installed in pairs with a net strung between the poles. A line truck is used to auger and set the poles. Guard structure poles will be removed following reconductoring, and the holes will be backfilled and compacted. In sensitive areas, guard structures will be installed and removed during the dry season to minimize ground disturbance and potential erosion.

Approximately 28 pairs of guard structures will be required, as shown on Figures 1-2 through 1-7 and 1-9 through 1-12. Almost all guard structures can be installed from existing paved or dirt roads. The only structure requiring off-road access is located north of Creed Road, within Wilcox Ranch as shown on Figure 1-9. This structure will protect an existing distribution line and will be accessed by a line truck following a disked firebreak through grazing land outside the Wilcox Ranch boundary. Access to this guard structure will require installing a new gate in the Wilcox Ranch fence to minimize the impacts to existing vernal pool habitat. However, this access route crosses a seasonal wetland that could potentially provide habitat for vernal pool invertebrates. Therefore, this guard structure will be placed and removed when soils are dry to avoid potential impacts to this habitat.

Unclipping and Traveler Installation

Conductor replacement begins with the installation of travelers, which are pulleys that allow the conductor to be pulled through each structure. Travelers will be installed on the tower arms, and the existing conductors will be unclipped from the insulators and will be placed in the travelers. Travelers and insulators will be transported to each tower by helicopter or by vehicle in areas where off-road travel is permitted. Helicopters may also assist in moving conductors to the travelers.

Pulling and Tensioning

The new conductor will be attached to one end of the existing conductor, and a cable from the puller will be attached to the existing conductor at the other end. As the puller rolls up the old conductor, the new conductor is pulled into place. The conductor will be pulled through each structure under controlled tension to keep it elevated and away from obstacles, thereby preventing damage to the line and protecting the public. After the new conductor is in place, it will be “sagged” (pulled to the appropriate height and tension.) Once the new conductor is sagged, it will be removed from the rollers and clipped permanently to the end of each insulator. The rollers will then be removed and vibration dampers and other accessories will be installed.

Substation Modifications

Equipment at the existing Lambie Switching Station and the existing Vaca Dixon, Birds Landing, and Peabody Substations will be modified to accommodate the higher conductor ratings. All work at the switching station and substations will occur within the existing fences; therefore, expansion of existing facilities will not be required. Similarly, work within the facilities will not include any ground disturbance other than vehicle and equipment access into the substation properties. Work at these facilities will include the modification and replacement of switches and cable drops; installation of new insulators and hardware; reinforcement of existing piers at new dead end structures; and removal of switches, cable, and tubular bus conductors. Relay settings for line terminals will be reviewed and reset as necessary.

2.2.2 Access

The main transportation corridors providing access to the Project area are Interstate 80 (I-80), State Route 12 (SR-12), and county roads. Existing paved roads will be used for general construction area access; some existing gravel roads (such as the access road for Birds Landing Substation) are all-weather roads that require no modification to provide access by construction vehicles and equipment.

Helicopter Access

Most construction activities will be carried out by helicopter to minimize ground-disturbing impacts and construction duration. In sensitive biological areas, workers and equipment will be flown to and from tower locations. Helicopters will typically hover at or above the tops of towers at heights of 80 to 120 feet, and workers will step onto towers directly from the helicopter. Helicopters will use designated fly sites as preliminarily identified on Figure 1-1.

Road Access

Figure 1-1 through 1-12 show existing roads and temporary access routes. Access to temporary construction areas (e.g., pull sites, guard structures, helicopter landing sites) will be limited, as much as possible, to existing access roads and temporary routes through agricultural fields. To avoid sensitive biological areas (the area north of Creed Road [Figure 1-5] and at the corral site at the intersection of Vanden Road and Canon Road [Figure 1-9]) will be accessed during the dry season to avoid potential impacts to these areas.

Wet season access to non-sensitive temporary construction areas may require improvements to existing dirt roads and temporary access routes to accommodate heavy equipment. Four to six inches of gravel will be placed on these roads where needed. No widening or grading will be needed. Temporary access routes through agricultural fields will be 12 feet wide or less. On off-road access routes, gravel will be underlain by geotextile fabric or matting to allow the gravel to be removed when the Project is completed.

2.2.3 Temporary Work Areas

Helicopter Landing Zones (Fly Sites)

Fly sites (landing zones) are used as landing sites and to stage materials, equipment, and crews during Project construction. A fuel truck will also be present for helicopter fueling. Nine fly sites, as preliminarily identified on Figure 1-1, with maximum dimensions of 200 feet by 300 feet, will be used during construction. They have been located to avoid all United States Army Corps of Engineers (USACE) jurisdictional areas. No mowing or grading of these sites is planned, but fly sites used during the rainy season may require gravel to provide a stable base. Fly site locations are identified on Figure 1-1; these areas are numbered from Vaca Dixon Substation south starting with F-1 and are shown in greater detail on Figures 1-3, 1-4, 1-5, 1-7, 1-8, 1-10, 1-11, and 1-12.

Helicopters will be used for the duration of the construction period, and will operate daily transporting equipment, supplies and personnel along the line. The flight path during daily construction operations will remain within close proximity to the existing transmission line alignment. The helicopters will return to the Vacaville airport, or on an appropriate paved area at the conclusion of each work day. Criteria for selection of non-work hours landing

zones include centralized location, large paved unobstructed area, creation of minimal dust, and separation from the public so as to not impede normal commerce or create a safety hazard.

Pull Sites

Pull-and-tension sites are placed in reasonably flat areas in line with the conductor. Seventeen of these sites are needed for Project construction. Their dimensions vary from 50 feet by 60 feet to 200 feet by 200 feet. Figure 1-1 shows their preliminary locations; the pull sites are numbered from Vaca Dixon Substation south, starting with P-0. Additional pull site details are shown on Figures 1-2, 1-4 through 1-10, and 1-12. If necessary for equipment stability, gravel will be spread over the sites and will be removed at the end of the Project. Erosion control measures such as silt fences or fiber rolls placed at the limits of work will be installed, for those sites where work is required during the wet season. No mowing or grading of pull sites is planned. After the completion of the Project, pull sites will be returned to pre-construction conditions and will be reseeded as necessary.

2.2.4 Construction Schedule

The Project schedule was developed to accommodate environmental considerations and restrictions imposed by the Independent System Operator (ISO) on the timing of outages to allow reconductoring activities to occur. An existing circuit must be removed from service during reconductoring, and this step must be coordinated with local demand for power. Outages typically are not planned for the summer when demand for electricity is at its highest and the consequences of a power outage are greatest

Work is scheduled to begin in September 2009 and to be completed by October 2010. Tower work will start first and is scheduled to finish by mid-June 2010. Line work will follow and will finish in July 2010. Work will start in the biologically-sensitive area east of the Travis AFB runway and north of Creed Road to take advantage of the dry seasons as shown on Figures 1-6 through 1-9. In general, Project construction is expected to occur five days per week and during daylight hours only. However, line outage restrictions imposed by the ISO or access limitations within state and county road rights-of-way may require as-needed weekend and/or night work. Scheduling is summarized below:

- **Fly sites and staging areas.** Crews will spend several days bringing equipment and materials to staging areas within the substations or fly site locations. A given fly site will be in use during work on that section of line. Helicopters will be used for both tower modification work and replacement of conductors.

- **Tower work.** Cage and arm replacement will occur along the line in advance of reconductoring. Towers will be visited several times during the construction process: first to prepare for and then install any required cage or arm extensions; again to install the new conductor, travelers, and insulators on all towers in advance of reconductoring; and finally to remove the travelers and to place the conductors on the insulators ("clip" the conductors) once the pull-and-tension activity has resulted in achievement of the correct tension.

- **Guard structures.** These poles (with or without nets) will be placed prior to pulling and tensioning. In biologically-sensitive areas, they can be placed and removed during the dry season to avoid access during the wet season.
- **Reconductoring.** Reconductoring can be performed from October to June and is planned to span approximately 7 months to avoid sensitive biological habitats. Approximately 200 days are planned for installing, pulling, and tensioning the new conductors on the entire length of the line. This work is accomplished in sections. If reconductoring work cannot be completed in this timeframe, work may be extended further into the summer months. Since the lines being worked on are active transmission lines, timing of the pull and tensioning is dependent on load conditions and the ability to remove the line from service, upon ISO concurrence. This activity will be restricted to lower-load conditions outside the summer months.
- **Restoration.** Restoration of any temporarily disturbed areas will occur within 1 year of disturbance for all sites.

2.2.5 Construction Management and Equipment

Construction contractors would prepare the Project area, deliver and install facilities, oversee construction, and complete final cleanup and restoration of the site. Equipment involved in construction would include typical construction equipment, as described in Table 2-1.

TABLE 2-1
Equipment Expected to be Used During Construction
Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Equipment	Activity	Description of Work
Huey 204 or Super 206 helicopter, 70-ton crane, 4X4 pickup, ATV.	Tower Modification	Towers to be raised for reinforcement. Cage top to be brought in by helicopter and placed on top of tower. Conductor will be raised up to the higher structure during the pull.
Line truck with boom, 4x4 pickup for pulling, rope truck, semi-truck trailer with conductor reels, 3-reel pullers, dual bull wheel tensioners and tensioners.	Pull and Tension Sites	Set up and pull conductor; lift pad required for pull. For sites where a level pad is needed, a rock pad will be placed on fabric and removed after Project implementation.
4X4 pickup, helicopter, ATV.	Install Pulleys and Insulators	Install pulleys and replace insulators. Two visits per tower for construction equipment.
4X4 pickup, line truck, or track vehicle.	Guard Structures	Line truck augers and sets poles.
4X4 pickup, helicopter.	Remove Pulleys and Clip Conductors	Two visits per tower to remove equipment.
Helicopter and fuel trucks.	Helicopter Landing Zones (fly sites)	Equipment re-fueling, as needed.
Back hoe or skiploader	As-needed improvements to temporary work areas	Placement of gravel or base rock for stabilization of access routes, fly sites, and staging areas.
Water truck	Fire control, dust control	Dust suppression, as needed.

2.2.6 Avoidance and Protection Measures

To avoid or minimize potential impacts on environmental resources, PG&E will implement avoidance and protection measures (APMs) during Project construction, which include PG&E best management practices (BMPs) and the requirements of applicable agency work authorization permits. These APMs, which will be incorporated into the Project's design and schedule, are listed below in the respective Initial Study check list sections.

2.2.7 Surrounding Land Uses and Setting

The Solano Plain is one of California's more important vernal pool/grassland regions where northern clay plan and hardpan vernal pools exist in a landscape spotted with mima mound formations. The Jepson Prairie Preserve situated about one mile east of the Project area is one of California's most important centers for native grassland and vernal pools. Much of the original prairie and vernal pool lands of the Solano Plain have been converted to farmland leaving scattered isolated areas where the original landscape features and unique prairie and vernal pool habitat remain.

The Project area is dominated by rural agricultural lands under private ownership. Figure 1-1 shows an overview of the environmental setting including the Project's proximity to the Jepson Prairie and other critical habitats.

The area between the Vacaville, Peabody, and Birds Landing Substations lies mostly within the Solano-Colusa Vernal Pool Region as defined in the Recovery Plan for Vernal Pool Ecosystems of Southern Oregon and California (FWS, 2005). About half the Project lies within the Jepson Prairie Core area of that Region, extending north of Travis AFB to an area just south of Little Honker Bay Road, on the edge of the Montezuma Hills. Refer to Sections 3.4 and 3.8 for additional information related to this area. Vegetation communities within the Project area include annual non-native grasslands, seasonal wetlands, agricultural crops (such as alfalfa, irrigated hay, and dry land wheat), and vernal pool plant communities. Northern claypan vernal pools are typical of the vernal pools found in the Jepson Prairie Core area. These can be smaller pools in mima mound topography, or larger playa pools such as the one found to the southeast of the guard structure north of Creed Road (Figures 1-9 and 3-8).

The southern portion of the Project is in the Montezuma Hills. Between Highway 12 (Rio Vista Road) and Birds Landing Substation, the existing transmission line crosses over the hilly landscape of the Montezuma Hills. This area is used primarily for dry farming and dryland pasture, and virtually all the surrounding land has been cultivated or disturbed at one time or another.

Almost the entire area from just north of Travis AFB to Vacaville Substation is in agricultural crops (Figure 1-6); this area is identified in the Solano County Draft Multispecies Habitat Conservation Plan [(Solano County HCP) SCWA, 2007] as developed, and is not within a designated vernal pool conservation area.

From Travis AFB east and south to Creed Road (Figures 1-8 and 1-9), and for the area in the vicinity of the corral at Canon Road and Vanden Road (Figure 1-5), the majority of the land is covered in a vernal pool grassland complex; these areas are identified as High Value Conservation Areas in the Solano County HCP. This area also includes the main playa pool

area. As shown on Figure 3-9. Only the guard structure work north of Creed Road (Figure 1-9) would take place in the playa pool area.

The area from Creed Road south to Bird's Landing Substation is identified as Medium Value Conservation Area, although only the area from Creed Road to Little Honker Bay is identified as being in the Jepson Prairie Vernal Pole Core Area.

2.2.8 Required Agency Approvals

The following agency approvals are required for Project implementation.

- The SWRCB must issue a water quality certification required under Section 401 of the Clean Water Act and is also serving as the Lead Agency under CEQA.
- A construction stormwater Notice of Intent (NOI) will be filed with the SWRCB and a Stormwater Pollution Prevention Plan (SWPPP) will be prepared by the construction contractor.
- In accordance with Section 7 of the Endangered Species Act, PG&E received a Biological Opinion (BO) (Ref #81420-2008-F-1725-2) for the Project from the U.S. Fish and Wildlife Service (USFWS) on November 20, 2008. The BO addresses the effects of the Project on seven federally-listed species: Conservancy fairy shrimp (*Branchinecta conservatio*), vernal pool fairy shrimp (*Branchinecta lynchi*), vernal pool tadpole shrimp (*Lepidurus packardi*), Delta green ground beetle (*Elaphrus viridis*), California tiger salamander (*Ambystoma californiense*), Contra Costa goldfields (*Lasthenia conjugens*), and showy Indian clover (*Trifolium amoenum*).
- PG&E submitted a Pre-Construction Notification to the U.S. Army Corps of Engineers (USACE) for Nationwide (NWP) Permit 12: Utility Line Activities in April 2008. As determined by USFWS, this NWP 12 was appended to the USFWS Programmatic BO (USFWS file number 1-1-97-F-0149) which addresses minor impacts to vernal pool crustacean habitat as well as a separate BO which addresses minor temporary impacts to California tiger salamander upland habitat.
- PG&E submitted an Archaeological Survey Report as part of the NWP Pre-Construction Notification package. Two potential historic resources were identified within the Project area that require further evaluation as to their potential for eligibility for listing in the National Register of Historic Places (NRHP)/California Register of Historical Resources (CRHR). The potential resources are the Ross Noonan Livestock Cannon Ranch and the Vaca Dixon-Peabody and Vaca Dixon-Birds Landing transmission lines. The eligibility of these resources is described in Section 3.5. These resources will be avoided during construction.
- No discretionary approvals are anticipated from any agencies of the State of California. The California Public Utilities Commission (CPUC) has exclusive jurisdiction over the siting and design of transmission line facilities. This Project, which is a modification of an existing transmission line, qualifies for an exemption from the CPUC's formal permitting requirements under the CPUC's General Order (GO) 131-D.

2.2.9 Relationship to Local Plans

The Project site is located within the County of Solano which has adopted the Solano County General Plan and Zoning Ordinance. Each county in California is required by State law to prepare and adopt a General Plan (California Government Code Section 65302). The primary function of the General Plan is to allow each county to consciously consider and shape its own future. The Solano County General Plan sets forth the County's goals, objectives, and policies regarding future growth and development for a range of subject areas, including land use, circulation, housing, open space, conservation, safety, seismic safety, noise, and scenic highways. Although PG&E's Project is within the exclusive siting and design authority of the CPUC, and not subject to local zoning regulations, certain regulations may provide information pertinent to the CEQA analysis.

The Solano County Water Agency (SCWA) and member agencies developed the Solano County HCP for the Solano contract service area (SCWA, 2007). The service area encompasses the entirety of Solano County and a portion of Yolo County, and accounts for all activities undertaken by or under the permitting authority and control of the member agencies. The plan area supports unique habitats, numerous vegetation communities, and 71 "covered species." The Project route traverses through all three zones of the plan: **Zone 1—Urban**; **Zone 2—SCWA and Irrigation Districts and Reclamation District Boundaries**; and **Zone 3—Remainder of the County**. In addition, some areas of the Project route occur in the high and medium value **Vernal Pool Conservation Areas**. While this HCP does not directly apply to PG&E's activities for this Project; as explained previously, PG&E has separately obtained a BO from the USFWS for this Project, which meets the intent of this HCP to protect sensitive habitats and species.

3.0 Initial Study Checklist and Environmental Analysis

3.1 Aesthetics

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
(a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☑
(b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☑
(c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☑	☐
(d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☑

PG&E is reconductoring the existing 230 kV line to accommodate increased load generated by wind farms in the Montezuma Hills area of Solano County. The Project includes 20 miles of modifications to a double circuit line from Vaca Dixon Substation and a single circuit from the Peabody Substation. The transmission right of way (ROW) passes through areas that include rural residential, cultivated, and grazing lands between Vaca Dixon and the Travis AFB. Figure 1-1 shows an overview of the Project area. Figures 3-1 through 3-3 show the locations of key observation points (KOPs) used in this analysis. Figures 3-4 through 3-6 show existing views from these KOPs, as well as simulated images depicting views of the reconductored towers.

The Vaca Dixon-Birds Landing reconductoring will require raising approximately 43 of the 163 existing towers, and adding 2-foot arm extensions on approximately 78 towers. This tower line runs parallel to a 500 kV tower line for much of the Project route. Existing towers on the Vaca Dixon-Birds Landing line range from 97 to 144 feet in height.

This section describes the existing physical environment within the Project area and the changes to the visual landscape that would result from implementation of the Project. It concludes that the impacts to the visual environment resulting from the reconductoring would be less-than-significant.

3.1.1 Setting

The Project area is within Solano County, along the western edge of the Sacramento Valley. It extends from I-80 to a point south of SR 12, in the Montezuma Hills. The Vaca Mountains lie to the general west of the Project area, beyond the urbanized areas of Vacaville, Fairfield and Suisun City. Travis AFB is adjacent to part of the western edge of the Project area. South of the Project area is Suisun Bay and the Bay Delta areas associated with the confluence of the Sacramento and San Joaquin Rivers. The land to the east of the Project area is mostly flat and characterized by a mix of agricultural, grazing and rural residential uses as the valley extends toward the Sacramento River. An existing 500 kV transmission line extends through the Project area, and appears parallel to the existing 230 kV line at certain locations.

For the purposes of this visual analysis, the land within the Project area is separated into three general sections ("Landscape Units") based on predominant conditions in terms of terrain and general land uses. The Northern Landscape Unit – the area north of Hawkens Road, as shown on Figures 1-2 and 1-3, is characterized by large swaths of agricultural and grazing land, interspersed with tracts of rural, non-farm residences on lots of varying sizes. A number of those properties include residences and areas devoted to storage of farm equipment or other machines and vehicles associated with agriculture operations, light industry, and/or the transportation of goods. All of the land in the vicinity of the transmission ROW is developed or disturbed to some extent, and the segment of I-80 that passes along the northern edge of the Project area includes eight travel lanes. Figure 3-4a shows the view to the southeast from the eastbound lane of I-80, which runs along the northern edge of the Project area. Both the 500 kV and 230 kV transmission lines are visible from I-80 (KOP 1.)

The Central Landscape Unit includes the portion of the Project area extending from Hawkins Road to approximately Creed Road, as shown on Figures 1-3 through 1-9. These lands consist of predominantly agricultural uses, such as field crops and grazing, that are large in scale relative to the surrounding area. These uses in this relatively flat area afford unobstructed views of the transmission line as it traverses the area, particularly from viewpoints that are close to the existing transmission line (e.g., from east/west roads that bisect the ROW). Located on the western periphery of the agricultural land are residential developments (namely those on the western side of Leisure Town Road), land for recreation use (Cypress Lakes Golf Course, through which the transmission line spur passes), and the Travis AFB airstrip, as shown on Figures 1-4, 1-6, and 1-7. Figure 3-5a shows the view to the southeast from the intersection of Hay Road and Meridian Road, where the ROW travels through an expansive, flat area mostly in agricultural use (KOP 2.)

The Southern Landscape Unit is characterized by the gradual transition from a landscape that is predominantly agricultural (including field crops and grazing lands) to one that, while still including such agricultural uses, is more of an energy landscape, dominated by transmission lines and wind turbines in the south. There is also a transition in topography in the southern portion of the Project area, as the land contains small hills and undulations, as

opposed to the flat, open space of the north. The Southern Landscape Unit is the least populated portion of the Project area. At the point where the transmission ROW intersects with SR 12, the 500 kV alignment rejoins the existing 230 kV alignment. In addition, the wind farm located among the Montezuma Hills is prominently visible in southward views from SR 12, as shown on Figures 1-10 through 1-12. Figure 3-6a shows the view to the northwest from the westbound lane of SR 12 (KOP 3.)

While there are no officially designated (or eligible) State Scenic Highways within the Project area, the segments of I-80 and SR-12 that are within the Project area are identified as scenic roadways by Solano County (Solano County, 1977). Among the general policies included in the Scenic Roadways Element of the Solano County General Plan is the policy that the number of man-made interruptions or incidents along a scenic roadway (housing, commercial uses, signs, driveways, etc.) be limited to maintain current visual values as the prevalent feature of the route.

3.1.2 Impact Discussion

As previously described, reconductoring of the existing transmission line would require the raising towers and/or extending the cross-arms of a number of the existing 230 kV transmission towers. Approximately 43 towers would be raised via the insertion of an additional segment into the tower's cage. Of the 43 towers to be raised, 41 will be raised by 15 feet and two will be raised by 20 feet. All but five of the of the towers to be raised by 15 feet are currently 97 feet tall; others range from approximately 99 to 105 feet tall. The two towers to be raised by 20 feet are currently 129 and 144 feet tall, respectively. Arm extensions will be installed on 20 of the raised towers, as well as on 58 otherwise unmodified towers. Additionally, two towers will be converted from suspension to dead end, and two transposition towers will be reinforced. No foundation work or modifications to the base of the towers will be required at any towers.

In 2008, CH2M HILL staff visited the Project area and drove the majority of the public roadways within its vicinity. Existing visual conditions within the Project area were documented and photographic images of representative views, given the location of towers proposed to be reconductored, were collected. The analysis of potential impacts was based on California Environmental Quality Act (CEQA) guidelines for the evaluation of aesthetic impacts on the environment from a proposed Project. These guidelines ask whether the project would:

- ***Have a substantial adverse effect on a scenic vista***
- ***Damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway***
- ***Substantially degrade the existing visual character or quality of the site and its surroundings***
- ***Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area***

While the Project will be visible from a number of heavily traveled roadways and residential areas, there are no established scenic vistas in the area. Further, there are no designated state scenic highways in the Project area, though I-80 and SR-12 are identified by Solano County

as scenic roadways. There is no lighting associated with the transmission line, and none will be installed as part of the Project. The transmission towers do not constitute a source of glare at present and will not constitute a source of glare after Project completion. Therefore, the analysis of visual impacts from the reconductoring Project is limited to a discussion of the Project's potential to substantially degrade the Project area's visual character and quality as viewed from three locations (KOPs) representative of visual conditions in the Project area, with specific attention to views from locally designated scenic roadways. As such, this analysis relies on simulated views of the Project from I-80 (KOP 1), a midway point along the transmission line (KOP 2), and from SR-12 (KOP 3).

Changes to Landscape Proposed by Project

Figure 3-4a shows the view to the southeast from I-80 (KOP 1), which is located within the Northern Landscape Unit. Farmland surrounds the transmission towers in the center of the view, and clusters of trees along the horizon indicate locations of residences. The Vaca Dixon–Birds Landing tower visible from this location is proposed to receive both arm and cage extensions, after which it would appear four feet wider and 15 feet taller than it currently appears. A tower associated with the adjacent 500 kV transmission line is visible beyond the 230 kV tower, appearing to its left. Figure 3-4b depicts the view of the reconductored 230 kV tower with both arm and cage extensions.

Figure 3-5a shows the view to the southeast from the intersection of Meridian Road and Hay Road (KOP 2), which is located within the Central Landscape Unit (Figure 1-7.) The existing transmission lines are prominent in views surrounding the ROW in this part of the Project area. Of the towers visible from KOP 2, the six closest to the viewer would be reconductored. The first, third, fifth and sixth towers are proposed to receive both arm and cage extensions, after which they would appear four feet wider and 15 feet taller than they currently appear. The second and fourth are proposed to receive only arm extensions, and would appear four feet wider than at present. Figure 3-5b depicts the view of these towers with reconductoring, in which the differences in height and width among the reconductored towers would be detectable.

Figure 3-6a shows the view to the north from KOP 3, which is located within the Southern Landscape Unit, along the westbound lane of SR 12, near the point where the transmission ROW crosses the highway (Figure 1-10.) Figure 3-6b depicts the view from KOP 3 with reconductoring. The two closest 230 kV towers in this view are proposed to receive arm extensions of two feet on either side, for a total increase in width of four feet. The third tower is proposed to receive a cage extension, which would increase the tower's height by 15 feet. The fourth tower is proposed to receive both an arm and cage extension. All other 230 kV towers visible from KOP 3 are proposed to receive arm extensions only. Arm and/or cage extensions are detectable in the four closest towers. Arm extensions on the more distant towers become increasingly difficult to discern as the transmission line recedes into the horizon.

Significance of Visual Impacts

The proposed reconductoring of the Vaca Dixon-Birds Landing transmission line would not result in any significant impacts to the existing visual environment. The existing visual character would not be substantially degraded by the Project.

Cage extensions of 15 feet would result in height increases of no more than approximately 15 percent (the percentage increase would be lower for existing towers greater than 97 feet in height). Cage extensions of 20 feet would result in height increases of approximately 16 and 14 percent for the 129- and 144-foot-tall towers, respectively. As demonstrated in the images of views from around the Project area, and participation in a field reconnaissance effort, the existing transmission line is an established feature in much of the landscape it traverses and from surrounding viewpoints is seen in the context of other transmission lines. Increases in height and width of selected towers would be nominal relative to their current appearance.

In views from residential areas, such as those in the northern segment of the Project area, increases in the height of select towers would be less likely to be noticed by viewers due to the obstructing effects of existing structures and vegetation. In addition, the increase in the height of towers in this area would appear less substantial in comparison with the existing 500 kV transmission line, which runs parallel to, and is much taller than, the existing 230 kV line.

Views of the reconductored towers from roadways would be intermittent. While some viewpoints such as those near the residential developments to the west, or those between residential areas, allow unobstructed views of the transmission line, it is expected that views from roadways would be of short duration, due to the speed of travel and to the need for drivers to maintain attention on the roadway. For this reason, views of the transmission line from I-80 and SR-12 are expected to be similarly discontinuous, and the increased height and/or width of certain towers as described would not be readily noticeable or substantially degrade the visual character and quality of views from viewpoints such as KOP 1 and KOP 3.

Change resulting from the proposed Project is most likely to be noticed from locations where unobstructed views of extended segments of the transmission line are available, such as from KOP 2 (Figure 3-5.) The transmission line in the existing view from KOP 2 exhibits a high degree of unity. The uniform height of the transmission towers lends to a consistent recession of the features into the horizon. The increase in height of some of these towers would partially disrupt the line's current visual unity. However, the visual effects of increased heights of individual towers would be offset by distance; taken as a whole, no reconductored tower would appear to detract substantially from the linear qualities of the overall view, and the transmission line would still appear to recede into the horizon in a generally uniform manner. It should also be noted that the slight increase in the height of towers visible from points within the golf course would not be readily noticeable or be expected to substantially degrade the character of the visual environment within the golf course.

Finally, because all changes would occur within the existing alignment, the proposed reconductoring would be consistent with Solano County policies on the protection of open space. The increases in width and/or height of specific towers as described above would not add to the number of man-made interruptions or incidents along the locally designated scenic roadways within the Project area (I-80 and SR-12).

For the reasons summarized here, impacts to the existing visual character and quality of the site and its surroundings would be less than significant and subsequently no impact minimization measures will be required.

3.2 Agriculture Resources

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
(a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☑
(b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☑
(c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?	☐	☐	☐	☑

The existing Vaca Dixon 230 kV line runs through land zoned by Solano County for agriculture. The California Department of Conservation (CDC) Farmland Mapping and Monitoring Program also defines the Montezuma Hills area as land with lower quality soils but that can be used for non-irrigated agricultural production (California Department of Conservation 2002a). However, the Project involves an existing transmission line so the Project is consistent with the existing zoning designation because both uses can co-exist without interrupting the others' operations. There are no new support towers or foundations required. Installation of the new conductor will be done by helicopters to minimize areas of disturbance to sensitive habitats, inaccessible areas, and existing residential and agricultural uses, as shown on Figures 1-1 through 1-12. There are existing agricultural operations adjacent to and under the transmission line; however, all reconductoring will take place from designated staging areas, pull areas or fly areas. These locations have been placed near existing access roads to minimize any impacts to agricultural operations. Reconductoring of the existing transmission line will not introduce a new use that could result in a conversion to a non-agricultural use. Therefore, no impacts to agricultural resources would result from implementation of the Project and subsequently no APMs are required.

3.3 Air Quality

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
(a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☑
(b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☑	☐
(c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☑	☐
(d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☑	☐
(e) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☑

3.3.1 Regulatory Setting

Federal

Federal air quality policies are regulated through the federal Clean Air Act. Pursuant to this act, the U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for the following air pollutants (called "criteria" pollutants): carbon monoxide, ozone, nitrogen dioxide, sulfur dioxide, PM_{10}, fine particulate matter (defined as particulate matter less than 2.5 microns in aerodynamic diameter [$PM_{2.5}$]), and lead. The ambient air quality standards represent levels established to avoid specific adverse health and welfare effects associated with each pollutant. Table 3-1 summarizes the ambient air quality standards.

The EPA has designated counties in California as either attainment or nonattainment for each NAAQS. A region that is meeting the air quality standard for a given pollutant is designated as being in "attainment" for that pollutant. If the region is not meeting the air quality standard, then it is designated as being in "nonattainment" for that pollutant. If a state is designated as nonattainment for a NAAQS, the CAA requires the state to develop a

State Implementation Plan (SIP) to demonstrate how the standard will be attained. The attainment status for Solano County is listed in Table 3-2.

TABLE 3-1
Ambient Air Quality Standards
Vaca Dixon-Birds Landing 230 kV Reconductoring Project

			NAAQS[b]	
Pollutant	**Averaging Time**	**CAAQS**	**Primary [c]**	**Secondary [d]**
Ozone	8 hours	0.070 ppm	0.075 ppm	0.08 ppm
	1 hour	0.09 ppm	—	—
Respirable Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 µg/m^3	—	—
	24 hours	50 µg/m^3	150 µg/m^3	150 µg/m^3
Fine Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12 µg/m^3	15 µg/m^3	15 µg/m^3
	24 hours	35 µg/m^3	35 µg/m^3	35 µg/m^3
Carbon Monoxide	8 hours	9.0 ppm	9 ppm	—
	1 hour	20 ppm	35 ppm	—
Nitrogen Dioxide	Annual Arithmetic Mean	0.030 ppm	0.053 ppm	0.053 ppm
	1 hour	0.18 ppm	—	—
Sulfur Dioxide	Annual Arithmetic Mean	—	0.03 ppm	—
	24 hours	0.04 ppm	0.14 ppm	—
	3 hours	—	—	0.5 ppm
	1 hour	0.25 ppm	—	—
Lead[e]	Calendar Quarter	—	1.5 µg/m^3	1.5 µg/m^3
	Rolling 3-month Average	—	0.15 µg/m^3	0.15 µg/m^3
	30-day Average	1.5 µg/m^3	—	—
Visibility-reducing Particles	8 hours	[f]	—	—
Sulfates	24 hours	25 µg/m^3	—	—
Hydrogen Sulfide	1 hour	0.03 ppm	—	—
Vinyl Chloride[e]	24 hours	0.01 ppm	—	—

[a] California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, and suspended particulate matter (PM_{10}, $PM_{2.5}$, and visibility-reducing particles) are values that are not to be exceeded. All others are not to be equaled or exceeded.

[b] National standards other than ozone, particulate matter, and those based on annual averages or annual arithmetic means are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than 1. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, is equal to or less than the standard.

[c] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[d] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[e] The ARB has identified lead and vinyl chloride as toxic air contaminants with no threshold level of exposure for adverse health effects determined. ARB made this determination following the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[f] Insufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent.

Source: ARB, 2009a
µg/m^3 = micrograms per cubic meter
ppm = parts per million (by volume)

TABLE 3-2
Federal and California Air Quality Attainment Status for Solano County
Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Pollutant	Averaging Period	Federal Status	California Status
Ozone	8 hours	Nonattainment	Nonattainment
	1 hour	—	Nonattainment
Carbon Monoxide	8 hours	Attainment	Attainment
	1 hour	Attainment	Attainment
Nitrogen Dioxide	1 hour	Attainment	Attainment
	Annual Arithmetic Mean	Attainment	—a
Sulfur Dioxide	24 hours	Attainment	Attainment
	1 hour	—	Attainment
	Annual Arithmetic Mean	Attainment	—
PM10	24 hours	Unclassified	Nonattainment
	Annual Arithmetic Mean	—	Nonattainment
PM2.5	24 hours	Nonattainmentb	Unclassified
	Annual Arithmetic Mean	Attainment	Unclassified

[a] Attainment status designations have not been made for the new California annual standard established in February 2007.
[b] Based on EPA PM2.5 designations released December 22, 2008.

Source: ARB, 2009b and Bay Area Air Quality Management District, Ambient Air Quality Standards and Bay Area Attainment Status, 2009.

State

The California Air Resources Board (ARB) oversees California air quality policies. The California Clean Air Act was approved in 1988, and as amended in 1992, established the California Ambient Air Quality Standards (CAAQS). These standards are generally more stringent and include more pollutants than the NAAQS. Similar to the EPA, ARB designates counties in California as attainment or non-attainment for the CAAQS.

The ARB has the primary responsibility and produces a major part of the SIP for nonattainment pollutants. However, the ARB also relies on the local air districts to provide additional strategies for sources under their jurisdiction. The ARB combines its data with local district data and submits the completed SIP to the EPA. The SIP consists of the emissions standards for vehicular sources and consumer products set by the ARB, and attainment plans adopted by the air districts and approved by the ARB.

The framework for regulating Green House Gas (GHG) emissions in California falls under the implementation requirements of Assembly Bill (AB) 32. In 2006, the California State Legislature signed the Global Warming Solutions Act of 2006 or AB 32. This law requires ARB to design and implement emission limits, regulations, and other measures such that statewide GHG emissions are reduced in a technologically feasible and cost-effective manner to 1990 levels by 2020. The statewide 2020 emissions limit is 427 million metric tons carbon dioxide equivalent (CO_2e) (ARB, 2007). Carbon dioxide emissions account for approximately 90 percent of the statewide GHG emissions (ARB, 2007). Methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride emissions account for the remainder of the statewide GHG emissions (ARB, 2007).

Local Air Districts

The Project is located in Solano County in the San Francisco Bay Area Air Basin. Solano County is split between two air districts, the Bay Area Air Quality Management District (BAAQMD) and the Yolo-Solano Air Quality Management District (YSAQMD). The BAAQMD has jurisdiction over the southwestern portion of Solano County and the YSAQMD has jurisdiction over the northeastern portion of Solano County. Both air districts are described in the following section.

Bay Area Air Quality Management District. The BAAQMD is the local agency charged with preparing, adopting, and implementing mobile, stationary, and area air emission control measures and standards for sources in the San Francisco Bay Area Air Basin. The BAAQMD works in cooperation with the Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC) to develop air quality plans. The BAAQMD prepares ozone attainment demonstrations for the federal ozone standard and clean air plans for the California ozone standard. The 2001 Ozone Attainment Plan is the BAAQMD contribution to the SIP for demonstrating attainment of federal ozone standard. The 2005 Bay Area Ozone Strategy is the currently approved ozone clean air plan. The 2005 Strategy shows how the Bay Area will make progress towards meeting the State 1-hour ozone standard and reduce transport of ozone and ozone precursors to neighboring air basins. Currently, the BAAQMD is preparing the 2009 Clean Air Plan. This plan will update the 2005 Ozone Strategy and will be a comprehensive plan addressing ozone precursors, particulate matter, toxic air contaminants, and greenhouse gases. This plan is scheduled for adoption in Fall 2009.

Since the BAAQMD currently attains the 24-hour PM10 standard, the BAAQMD is not required to develop a plan for this standard at this time. However, the BAAQMD was recently designated nonattainment of the new 24-hour standard for PM2.5. The BAAQMD is required to submit an attainment plan to EPA by April 2012 that demonstrates attainment of the new 24-hour PM2.5 standard by April 2014.

Yolo-Solano Air Quality Management District. The YSAQMD is the local agency charged with preparing, adopting, and implementing mobile, stationary, and area air emission control measures and standards for sources in Yolo County and the northeastern portion of Solano County. The 1994 Sacramento Area Regional Ozone Attainment Plan is the current federal ozone plan (SIP) for the YSAQMD, and sets out stationary source control programs and statewide mobile source control programs for attainment of the 1-hour ozone standard. In February 2009, the Board of Directors of the air districts in the Sacramento Federal Nonattainment Area, which includes the YSAQMD, adopted the Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan. The Plan will reduce emissions at the required rate of 3% per year so the region can attain the 8-Hour Ozone standard by 2018. Although the YSAQMD is in nonattainment for the state PM10 standard, a PM10 attainment plan is not required (YSAQMD, 2009).

During construction, portable equipment greater than 50 horsepower, other than vehicles, must be registered with either the ARB Portable Equipment Registration Program (PERP) or with air district. This requirement applies to equipment used in both the BAAQMD and the YSAQMD.

3.3.2 Environmental Setting

The Project is located in the Carquinez Strait Region (a sea-level gap between the San Francisco and the Central Valley) where cool air flows to lower areas in Solano County, where it mixes with warm summer air in the Sacramento Valley. The difference in temperature and atmospheric surface pressure circulation results in high wind speed in the Montezuma Hills. In addition to strong winds, the climatic transition also creates dry summers and rainy winters. Average temperatures recorded at Vacaville range from lows of 38º Fahrenheit (F) to 45º F and highs of 52º F to 64º F from November to March, and lows of 47º F to 57º F and highs of 68º F to 86º F from April to October. When temperatures are highest, precipitation is lowest, averaging 0.03 inch in July and August.

The primary pollutants of concern in the Project area are PM_{10}, $PM_{2.5}$, and ozone because the county is nonattainment for these pollutants. Five air monitoring stations operate in Solano County. Three of the five monitoring stations PM_{10} concentrations, two of the five stations measure $PM_{2.5}$ concentrations and four of the five stations measure ozone (O_3) concentrations. Table 3-3 summarizes ambient air monitoring data near the Project. Monitored concentrations of ozone have exceeded both federal and state standards during the period 2006 through 2008. Monitored concentrations of PM_{10} have exceeded the state 24-hour standard during the period 2006 through 2008 but have not exceeded the federal standard. Monitored concentrations of $PM_{2.5}$ have also exceeded the 24-hour standard during the period 2006 through 2008.

TABLE 3-3
Summary of Ambient Air Monitoring Data in the Project Area
Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Pollutant	Averaging Time	2006	2007	2008
Ozone (ppm)	1 Hour	0.108	0.103	0.113
	8 Hour	0.087	0.078	0.103
PM_{10} (µg/m^3)	Annual Arithmetic Mean	19	18	18
	24 Hour	60	42	61
$PM_{2.5}$ (µg/m^3)	Annual Arithmetic Mean	12	12	*
	24 Hour	44	42	51

Notes:
The PM2.5 data is from the Vallejo monitor, the PM10 data are from the Vacaville-Merchant Street monitor, and the ozone data are from the Vacaville-Ulatis Drive monitor.

ppm parts per million
µg/m^3 micrograms per cubic meter
* There was insufficient (or no) data to determine the value.

Source: ARB, 2009c

3.3.3 Significance Criteria

The CEQA checklist questions presented above were used to evaluate the impacts of the Project. In addition, both the BAAQMD and YSAQMD have recommended CEQA significance thresholds. However, the BAAQMD has not published significance thresholds for short-term construction emissions. The BAAQMD emphasizes implementation of effective control measures rather than detailed quantification of construction emissions (BAAQMD, 1999). The YSAQMD suggests implementing best management practices during

construction to reduce dust emissions even if the PM_{10} threshold is not exceeded (YSAQMD, 2007). Emissions exceeding the significance thresholds in Table 3-4 would be considered significant and would require mitigation.

TABLE 3-4
Significance Thresholds
Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Pollutant	BAAQMD Operation Thresholds (lbs/day)	YSAQMD Construction and Operation Thresholds
Reactive Organic Gases (ROG)	80	10 ton/yr
Nitrogen Oxides (NO_X)	80	10 ton/yr
PM_{10}	80	80 lbs/day
CO	NA	Violation of a state ambient air quality standard

NA = Significance threshold has not been established.
Source: BAAQMD, 1999 and YSAQMD, 2007

3.3.4 Impacts and Avoidance and Protection Measures

The following section addresses the responses to the CEQA checklist questions for air quality and uses the BAAQMD and YSAQMD significance thresholds to evaluate impacts as necessary. GHG impacts are also discussed. Incorporation of avoidance and protection measures into Project design will ensure that all impacts are less than significant.

Impacts

Would the project conflict with or obstruct implementation of the applicable air quality plan?

Construction of the Project would result in short-term emissions; however, these emissions would be consistent with the BAAQMD and YSAQMD air quality plans. Both the BAAQMD and YSAQMD air quality plans include construction equipment emissions (NO_X and ROG) in the emissions inventory that is the basis for developing the plans. Operation of the Project would result in minor air emissions from maintenance activities. However, these activities are already part of the maintenance and operation of the existing lines and towers. Therefore, operation emissions would not be expected to increase from existing conditions and the Project would not conflict with or obstruct implementation of the BAAQMD or YSAQMD air quality plans.

Since the Project will not conflict with or obstruct implementation of the applicable air quality plan, no impact will occur and subsequently, no mitigation is required.

Would the project violate any air quality standard or contribute substantially to an existing or projected air quality violation?

Construction Impacts

Potential short-term impacts from the Project may result from construction activities. In nonattainment areas, construction equipment exhaust emissions of ozone precursors (NOx and ROG), exhaust PM_{10}, and soil-disturbing activities may temporarily impact air quality.

According to the BAAQMD CEQA Guidelines, implementation of the measures identified in the CEQA Guidelines (see Avoidance and Protection Measures below) would reduce fugitive PM_{10} emissions during construction. Similarly, YSAQMD recommends implementing best management practices to reduce fugitive dust emissions (YSAQMD, 2007). Implementation of these measures will ensure that fugitive dust emissions will be less significant.

These fugitive dust APMs would not address exhaust emissions of NO_X or ROG. According to the BAAQMD CEQA Guidelines, construction equipment emissions (NO_X and ROG) are included in the emissions inventory that is the basis for the regional air quality plans and are not expected to impede attainment or maintenance of the ozone standards in the Bay Area (BAAQMD, 1999). However, to address emissions that may occur in the YSAQMD portion of the Project, exhaust emissions from construction equipment and trucks were estimated using URBEMIS2007 (version 9.2.4) and EMFAC2007 (version 2.3) and are provided in Attachment B-1. A summary of the construction emissions are presented in Table 3-5 and compared to the YSAQMD significance thresholds. Since the construction emissions would be less than the significance thresholds, the air quality impact would be less than significant.

TABLE 3-5
Construction Emissions
Vaca Dixon-Birds Landing 230 kV Reconductoring Project

	Emissions (tons/Project)		**Emissions (lbs/day)**	
	ROG	**NOx**	**Exhaust PM_{10}**	**Fugitive PM_{10}**
Total	0.4	3.8	1.2	35
YSAQMD Threshold	10 ton/yr	10 ton/yr	80 lbs/day	
Threshold Exceeded?	No	No	No	

Sources: URBEMIS2007, EMFAC2007, and Yolo-Solano Handbook for Assessing and Mitigating Air Quality Impacts, 2007.

Operational Impacts

Operation of the Project would result in minor air emissions from periodic operation and maintenance activities. However, these activities are already part of the maintenance and operation of the existing lines and towers. Therefore, operation emissions would not be expected to increase from existing conditions and the Project would not be expected to cause or contribute to an air quality violation. Since the Project will result in only limited air emissions during operations, no impact will occur and subsequently, no mitigation is required.

Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

Solano County is designated nonattainment for the state and federal ozone standards, the state PM_{10} standard, and the federal $PM_{2.5}$ standard. Construction of the Project would result

in emissions of ozone precursors (NOx and ROG), PM_{10}, and $PM_{2.5}$. However, these emissions would be temporary and would not be expected to result in a cumulatively considerable net increase in ozone, PM_{10}, or $PM_{2.5}$ concentrations. Therefore, the cumulative impact to air quality would be less than significant.

Would the project expose sensitive receptors to substantial pollutant concentrations?

Sensitive receptors are facilities such as hospitals, schools, convalescent facilities, or residential areas (YSAQMD, 2007). The Project is not expected to result in substantial pollutant concentrations as shown in the discussion of construction emissions above. Operation of the Project would not result in an increase in air emissions. Therefore, the air quality impact to sensitive receptors would be less than significant and no mitigation is required.

Would the project create objectionable odors affecting a substantial number of people?

Construction of the Project would not create objectionable odors affecting a substantial number of people. Exhaust emissions from construction equipment may result in temporary odors but would not affect a substantial number of people due to the remote location of the Project. Therefore, there would be no air quality impact. The types of facilities that could potentially generate odors during operation would be facilities such as wastewater treatment plants, food processing plants, or landfills (YSAQMD, 2007). Operation of the Project has no potential for generating odors; therefore, no air quality impacts would occur and subsequently no mitigation is required.

GHG Impacts

Exhaust GHG emissions from construction equipment and trucks were estimated using URBEMIS2007 (version 9.2.4) and EMFAC2007 (version 2.3) and are provided in Attachment B-2. The short-term increase in GHG emissions (498 metric tons CO_2) during construction is minimal when compared to the 2020 emission limit of 427 million metric tons CO_2e. Therefore, construction GHG emissions will not interfere with ARB's long-term goal to reduce GHG emissions to 1990 levels by 2020. PG&E's incorporation of avoidance and protection measures (discussed below) into Project design will further ensure that GHG emission impacts are less than significant.

Avoidance and Protection Measures

CEQA criteria included in Appendix G require the consideration of local, State and federal plans, policies and regulations when evaluating potential Project impacts and developing mitigation measures. These requirements are considered part of the Project as evaluated and are considered Avoidance and Protection Measures (APMs.) Upon evaluation of the Project in accordance with Appendix G criteria, additional APMs were identified to address State and local plans, policies and requirements. PG&E has incorporated these additional APMs into the Project description to minimize the Project's air emissions. All PG&E standard practices are also considered avoidance measures and are considered part of the Project.

Fugitive Dust

As stated previously, the BAAQMD and YSAQMD recommend implementing fugitive dust control measures for construction projects. The following control measures are based on the BAAQMD CEQA Guidelines for reducing PM10 emissions during construction. The

BAAQMD control measures include the most of the best management practices recommended by the YSAQMD. These measures will be incorporated into Project design.

Basic control measures. The following APMs will be implemented at all construction sites.

APM AQ-1: Water all active construction areas at least twice daily during dry conditions.

APM-AQ-2: Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of free board.

APM-AQ-3: Pave, apply water three times daily (during dry conditions), or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites.

APM-AQ-4: Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas at construction sites.

APM-AQ-5: Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.

Enhanced control measures. In addition to the "Basic" control measures listed above, the following control measures will be implemented at all construction sites greater than four acres in area.

APM-AQ-6: Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more).

APM-AQ-7: Enclose, cover, water twice daily or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.).

APM-AQ-8: Limit traffic speeds on unpaved roads to 15 mph.

APM-AQ-9: Install sandbags or other erosion control measures to prevent silt runoff to public roadways.

APM-AQ-10: Replant vegetation in disturbed areas as quickly as possible.

Optional control measures. Depending on the extent of dust generation, implementation of the following APMs may occur at larger construction sites, located near sensitive receptors, or which for any other reason may warrant additional emissions reductions.

- Install wheel washers for all existing trucks, or wash off the tires or tracks of all trucks and equipment leaving the site.
- Install wind breaks, or plant trees/vegetative wind breaks at windward side(s) of construction areas.
- Suspend excavation and grading activity when winds (instantaneous gusts) exceed 25 mph.
- Limit the area subject to excavation, grading and other construction activity at any one time.

With the implementation of these impact minimization measures (APMs and the optional control measures, as appropriate), dust related impacts from Project construction and operations will be less than significant.

GHG Emissions

The following company-wide standard APMs will be implemented by PG&E to reduce GHG emissions in the Project area:

Company-wide GHG Reduction APMs.
PG&E is an active member of the SF_6 Emission Reduction Partnership for Electric Power Systems, a voluntary program between the EPA and electric power companies that focuses on reducing emissions of sulfur hexafluoride (SF_6) from transmission and distribution operations. Since 1998, PG&E has reduced the SF_6 leak rate by 89 percent and absolute SF_6 emissions by 83 percent.

PG&E supports the Natural Gas STAR, a program promoting the reduction of methane (at least 21 times as potent as CO_2 on a per-ton basis) from natural gas pipeline operations. Since 1998, PG&G has avoided the release of thousands of tons of methane.

In June 2007, PG&E launched the ClimateSmart program, a voluntary GHG emission reduction program that allows its customers to balance out the GHG emissions that are produced by energy use, making their energy use "climate neutral." For ClimateSmart customers, PG&E calculates the amount needed to make the GHG emissions associated with the customer's energy use "climate neutral" and adds this tax-deductible amount to their monthly energy bill. One hundred percent of customer payments are applied to funding new GHG emission reduction projects in California, such as projects that capture methane gas from dairy farms and landfills and those that conserve and restore California's forests.

PG&E is offsetting all of the GHG emissions associated with the energy used in PG&E's buildings by participating in its ClimateSmart program. In 2007, this amounted to over 50,000 tons of CO_2 reductions.

ARB will review and adopt Early Action Measures (pursuant to the California Global Warming Solutions Act of 2006) by January 1, 2010, and equipment used during operation of the project facilities after 2010 will be subject to these requirements. PG&E will implement the ARB Early Action Measures for publicly-owned electric utilities as these policies become effective, and will continue its efforts with the EPA to identify and implement cost-effective operational and technical solutions to reduce SF6. These actions will further reduce company-wide GHG emissions for all PG&E projects.

Project-specific CO_2 Reduction Measures.
To further reduce GHG emissions from Project construction (specifically CO_2), the following APMs will be implemented:

APM-AQ-11: Encouraging the use of bio-diesel fuel for diesel-powered equipment and vehicles.

APM-AQ-12: Encouraging construction workers to carpool.

APM-AQ-13: Encouraging the recycling of construction waste.

Implementation of these measures would further reduce the CO_2 emissions from Project construction by 15 % from 498 lbs/day to 480 lbs/day.

3.4 Biological Resources

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
(a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☑	☐	☐	☐
(b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☑	☐
(c) 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?	☐	☐	☑	☐
(d) 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?	☐	☐	☑	☐
(e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☑

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
(f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☑

3.4.1 Setting

Regional

The proposed Project is located in Solano County, California. Solano County is located at the confluence of the San Francisco Bay and the Sacramento and San Joaquin river delta. The County encompasses a variety of habitat types, including grasslands and vernal pool complexes in the upland areas; riparian and freshwater marshes; forests; and coastal marshes and wetlands (Solano County 2008). These natural communities provide habitat for a variety of wildlife and plants including 40 special-status species (Solano County 2008). The County also includes agricultural land uses such as irrigated agriculture and pasture, as well as urban development (EDAW 2008).

Vegetation Communities and Wildlife Habitats

Eight vegetation types were identified within the Project area and the 250-foot buffer along Project components. Identified vegetation types included California annual grassland, grassland/vernal pool complex, northern claypan vernal pool, seasonal wetland, and coastal and valley freshwater marsh and three vegetation types that are associated with human activities, agriculture, developed/landscaped, and ruderal. The classification of the natural vegetation of the site is based primarily on the system described by Holland in Preliminary Descriptions of the Terrestrial Natural Communities of California (Holland, 1986), with additional reference to the series-based system of Sawyer and Keeler-Wolf, as described in A Manual of California Vegetation (Sawyer and Keeler-Wolf, 1995). Human-influenced vegetation types are not included in the Holland system; some of these, however, are included in the series described by Sawyer and Keeler-Wolf. Descriptions of the identified vegetation types follow. The approximate extent of each vegetation type is summarized in Table 3-6 (Garcia and Associates, 2008a). In order to ensure that adequate information is provided to assess potential impacts, the Biological Assessment Submitted to the USFWS in accordance with Section 7 of the Endangered Species Act for which PG&E received a Biological Opinion from the USFWS on November 20, 2008 is included as an electronic (on CD) reference in Attachment C.

TABLE 3-6
Extent of Vegetation Types within the Project Impact Areas
Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Vegetation Type	Area (acres)
Natural	
California Annual Grassland	104.7
Grassland/vernal pool complex	48.0
Northern Claypan Vernal Pool	3.1
Coastal and Valley Freshwater Marsh	0.2
Seasonal Wetland	—[a]
Other	
Agriculture	448.2
Developed/Landscaped	52.4
Ruderal	—[b]
Total	**656.6**

[a]Seasonal wetlands were scattered throughout the Project area occurring within pasture lands and California annual grasslands.

[b]Ruderal vegetation was found within larger areas of other vegetation types, frequently along roadsides and on the margins of industrial areas.

California Annual Grassland. California Annual Grassland is the current name for Holland's Non-native Grassland (Holland, 1986), an upland vegetation type composed of a dense to sparse cover of mainly introduced annual grasses, usually less than 3 feet (1 m) in height. California Annual Grassland sometimes includes remnant native perennial grasses, and native annual forbs (wildflowers). The equivalent series under the Sawyer and Keeler-Wolf system is similarly named the California Annual Grassland series. The species composition of annual grasses and forbs varies considerably between stands.

Within the Project area, as shown on Figure 1-1, California Annual Grassland is found along the transmission line to the Peabody substation, between Creed Road and SR-12, and in scattered patches throughout the rest of the project area (Figures 1-9 and 1-10.) Characteristic non-native annual grasses include wild oats (*Avena fatua*), ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), foxtail barley (*Hordeum murinum*), Italian ryegrass (*Lolium multiflorum*), and rattail fescue (*Vulpia myuros*). Native forbs are patchily distributed throughout this vegetation type in the Project area and include butter-and-eggs (*Triphysaria eriantha*), sky lupine (*Lupinus nanus*), and small flowered fiddleneck (*Amsinckia menziesii*) (Garcia and Associates, 2008a).

California annual grasslands can support a variety of small mammals and provide foraging habitat for raptors and other birds. Birds commonly found foraging in annual grasslands include the red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), and turkey vulture (*Cathartes aura*). California quail (*Callipepla californica*), mourning dove (*Zenaida macroura*), and meadowlarks (*Sturnella neglecta*) are common seed eaters that use grasslands for nesting. Insect eaters such as western scrub-jays (*Aphelocoma californica*), barn

swallows (*Hirundo rustica*) and northern mockingbirds (*Mimus polyglottos*) use the habitat only for foraging. Common mammals of annual grassland habitats include the California ground squirrel (*Spermophilus beechyi*), Botta's pocket gopher (*Thomomys bottae*), California vole (*Microtus californicus*), broad-footed mole (*Scapanus latimanus*), and black tailed jackrabbit (*Lepus californicus*). These small mammals use open grassland for both foraging and nesting opportunities. Burrows of Californian ground squirrels can provide important refuge sites for other species. Wildflowers in grasslands also provide foraging resources for butterflies, bees and other insects and Mule deer can use grasslands for grazing and resting at night (Garcia and Associates 2008b).

Grassland/Vernal Pool Complex. Networks of vernal pools (described below) and associated upland grasslands form habitat that are referred to by Holland as grassland/vernal pool complex (Holland, 1998). Within the Project area, the uplands surrounding identified vernal pool networks are classified as California annual grassland under both the Holland (1986) and Sawyer and Keeler-Wolf (1995) systems. Vernal pools and seasonal wetlands (described below) occur within the grassland matrix. Grasslands of the grassland/vernal pool complex are distinguished from California annual grassland for two reasons. First, grasslands and vernal pools in a complex are interconnected by a diverse microtopography of hillocks, swales, and depressions. Vernally wet areas in such landscapes can range from less than a square meter to several hectares wide. Therefore, it is difficult to separate upland grasslands and vernal pools in mapping and impact assessment. Secondly, the grasslands of the grassland/vernal pool complex contain a higher diversity of remnant native grasses and forbs than typical California annual grassland vegetation. These grasslands include species such as purple needlegrass (*Nassella pulchra*), Johnny jump-up (*Viola pedunculata*), crown brodiaea (*Brodiaea coronaria*), California goldfields (*Lasthenia californica*), butter-and-eggs, blue dicks (*Dichelostemma capitatum*) and common muilla (*Muilla maritima*). A large grassland/vernal pool complex occurs in the central portion of the Project area, between Meridian Road and Creed Road (Garcia and Associates, 2008a).

Northern Claypan Vernal Pool. Northern claypan vernal pools and swales are seasonal wetlands that occupy shallow basins or channels in clay soils in the Central Valley. These depressions hold water during the rainy season because the clay (or hardpan) substrate impedes water percolation (Keeley and Zedler, 1996). Pools may be as small as a few square meters or as large as several hectares. Northern claypan vernal pools support a distinctive flora composed mainly of native annual forbs adapted to inundation in the rainy season and hot, desiccating conditions in the dry season. Many of the characteristic plants germinate under water, then grow to maturity, flower, and set seed as the pools and swales dry. Examples of characteristic genera include: goldfields (*Lasthenia* spp.), downingias (*Downingia* spp.), popcorn flowers (*Plagiobothrys* spp.), meadowfoams (*Limnanthes* spp.) and button-celeries (*Eryngium* spp.). Many of the federal, state, or CNPS listed plants with potential to occur in the Project area are vernal pool species.

A large vernal pool complex occurs in the middle of the Project area between Meridian Road and Creed Road, as shown on Figures 1-7 through 1-9, and Figure 3-8, (Garcia and Associates, 2008a). Vernal pools within this complex exhibit a wide range of sizes, shapes, and soil conditions. Species associations and total vegetative cover are variable depending on the size of the pool, duration of inundation, and alkalinity of the soil. In the Project area common vernal pool species include stalked popcorn flower (*Plagiobothrys stipitatus* var. *stipitatus*), Fremont's goldfields (*Lasthenia fremontii*), smooth goldfields (*Lasthenia glaberrima*),

and semaphore grass (*Pleuropogon californicus*). Several vernal pools with highly alkaline soils occur in the vicinity of Creed Road. These pools have low total vegetative cover of halophytic (salt tolerant) species including saltgrass (*Distichlis spicata*), brittlescale (*Atriplex* sp.), bush seepweed (*Suaeda moquinii*), and spikeweed (*Hemizonia pungens*). A single, additional vernal pool of approximately 984 square feet (300 square meters) occurs next to the entry road at the Cypress Lake golf course (Figure 1-4.) This pool is dominated by stalked popcornflower and common spikerush (*Eleocharis macrostachya*) (Garcia and Associates, 2008a.)

Northern claypan vernal pool complexes provide habitat for unique and often rare species adapted to the seasonal inundation of water during the wet season and desiccation during the dry. During the wet season this habitat provides important foraging and breeding habitat for invertebrates, amphibians, reptiles, birds and mammals (Garcia and Associates, 2008b).

Coastal and Valley Freshwater Marsh. Freshwater marshes form in permanently flooded basins of relatively shallow, slow moving water. The vegetation in freshwater marshes is dominated by tall, emergent plants such as cattails (*Typha* spp.), tules (*Scirpus* spp.) and rushes (*Juncus* spp.). Rooted and floating aquatic plants such as spikerushes (*Eleocharis* spp.), knotweeds (*Polygonum* spp.) and pondweeds (*Potamogeton* spp.) are also common (Garcia and Associates, 2008b).

A small freshwater marsh approximately 2.47 acre is located in the Project area near the Vaca Dixon substation (Figures 1-2 and 3-7). Marsh vegetation at this location is poorly developed, but includes characteristic species such as cattails and nutsedge (*Cyperus eragrostis*). A much smaller strip of freshwater marsh approximately 1,312 ft^2 occurs on a creek margin near the intersection of Vanden and Canon roads, as shown on Figures 1-5, 1-6, and 3-8. Marsh species at this location include cattails and Mexican rush (*Juncus mexicanus*) (Garcia and Associates, 2008a).

Coastal and valley freshwater marshes are essential habitats for amphibians such as Pacific tree frog and mesic-adapted reptiles such as garter snakes. Common birds found in these habitats include water birds such as American coot (*Fulica americana*), mallards, and wading birds such as herons and egrets. Other common birds include songbirds such as marsh wren (*Cistothorus palustris*) and red-winged blackbird (*Agelaius phoeniceus*). In addition, freshwater marshes are often breeding grounds for insects that attract large numbers of foraging bats. The coastal and valley freshwater marsh on the Project site provides marginal benefits for wildlife primarily due to the limited size of this marsh and the overall poor condition of vegetation at this location (Garcia and Associates, 2008b).

Seasonal Wetland. Seasonal wetlands occur in low-lying areas such as ditches, swales and basins, in which the soil is inundated or saturated for part of the growing season. Seasonal wetlands are not described by Holland (1986) and are not included in the Sawyer and Keeler-Wolf system (1995). As described previously, seasonal wetlands do not include vernal pools. Although some seasonal wetlands are similar in physical features and hydrology to vernal pools, by definition they lack the distinctive community of native annual forbs that characterize vernal pools.

A common type of seasonal wetland within the study area consists of a shallow basin, ditch or swale with a relatively high level of human-caused disturbance that is dominated by non-

native annual and perennial grasses and forbs, including many that are invasive weeds. Seasonal wetlands are scattered throughout the Project area in pasture lands and California annual grasslands. A seasonal wetland of approximately 0.5 acre is located near the Bird's Landing substation (Figures 1-12 and 3-9.) It has been overplanted in wheat (and therefore typed as Agriculture), but contains remnant vernal pool species such as stalked popcorn flower and a button celery species. Common plant species which occur seasonal wetlands include: Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), Italian ryegrass, curly dock (*Rumex crispus*), and broad leaf filaree (*Erodium botrys*) (Garcia and Associates, 2008a).

Seasonal open water areas provide important habitat for several invertebrates, amphibians, reptiles, birds and small mammals. Some wildlife species are adapted to survive in this habitat throughout the year, while others are present only during the winter and spring when open water is present, such as amphibians and aquatic insects. Waterfowl and shorebirds nest and forage in seasonal wetlands and wetlands provide food or cover to small mammals and a water source for larger mammals. Typical wildlife species use the identified seasonal wetlands include the mallard, snowy egret (*Egretta thula*), great egret (*Ardea alba*), great blue heron (*Ardea herodias*), western meadowlark, Pacific treefrog, and gopher snake (*Pituophis melanoleucus*) (Garcia and Associates, 2008b).

Agriculture. Agricultural lands are planted areas that often supported productive and diverse habitat communities prior to cultivation. Plant communities on lands managed for agricultural purposes are not considered natural vegetation, and so are not included in the systems of Holland (1986) or Sawyer and Keeler-Wolf (1995).

Irrigated and dry-land pastures are common in the Project area (Garcia and Associates, 2008a). Pasture land supports a lower diversity of common plant species found in the California annual grassland described above. As defined here, pasture is more intensively managed than California annual grassland. Pasture in the Project area is commonly irrigated, tilled, and seeded with non-native annual grasses and forbs. It is used primarily for cattle and sheep grazing.

Much of the vegetative cover within the Project area is under agricultural management. The northern portion of the Project area, between Interstate 80 and the Cypress Lake Golf Course (Figure 1-4), is predominantly planted in row and field crops with some parcels used as pasture lands. Irrigated crops include grain hay, alfalfa and tomatoes. Wheat is the most commonly farmed dry-land crop in the Project area. The Montezuma Hills in the southern portion of the Project area (Figures 1-11 and 1-12) are used extensively for both wheat farming and pasture (Garcia and Associates, 2008a).

Typical wildlife species found in agricultural areas include red-tailed hawk, American crow (*Corvus brachyrhynchos*), Brewer's blackbird (*Euphagus cyanocephalus*), meadowlark, house finch (*Carpodacus mexicanus*), red-winged blackbird, California ground squirrel, and western harvest mouse (*Reithrodontomys megolotis*). Water bodies serve as habitats for amphibians such as Pacific tree frog and bullfrog (*Rana catesbeiana*), reptiles such as northwestern pond turtle (*Clemmys marmorata marmorata*), and a variety of water birds. Aquatic features such as creeks and ponds also provide an important source of water and refuge sites for many terrestrial wildlife species (Garcia and Associates, 2008b).

Developed/Landscaped. This vegetation type includes a wide variety of ornamental trees and shrubs planted and maintained as landscaping. Landscape plantings are not included in the vegetation classification systems of Holland (1986) or Sawyer and Keeler-Wolf (1995).

Within the Project area, stands of planted eucalyptus trees (*Eucalyptus* spp.) are found on the north side of I-80, and on the south side of the train tracks adjacent to the Peabody substation (Figure 1-6.) Rural/residential landscaping occurs within the Project area where the transmission line crosses Walnut Avenue, Poplar Road, and Maple Road (Figure 1-2.) Planted trees and shrubs in this area include Eucalyptus species, Fremont's cottonwood (*Populus fremontii*), California black walnut (*Juglans californica* var. *hindsii*), and Lady Banks' rose (*Rosa banksiae*). The Cypress Lakes Golf Course (Figure 1-4) also has extensive landscaped areas featuring irrigated lawns and planted trees including Eucalyptus species, Monterey pine (*Pinus radiata*) and weeping willow (*Salix* sp.) (Garcia and Associates, 2008a).

Developed areas, particularly areas with landscaping vegetation, can provide moderate habitat value for wildlife. The planting and maintenance of shrubs, trees, and other ornamental plants in developed and landscaped areas can enhance this habitat for opportunistic animal species that can coexist with humans. Examples of species found in this habitat type are the Northern mockingbird, house finch, Brewer's blackbird, raccoon (*Procyon lotor*), and opossum (*Didelphis virginianus*). Also, buildings and structures such as bridges, overpasses and transmission towers can provide shelter or roosting sites for species such as cliff swallow (*Petrochelidon pyrrhonota*), barn swallow, rock pigeon (*Columba livia*), and small mammals such as mice, rats, and a variety of bats (Garcia and Associates, 2008b);

Ruderal Vegetation. Ruderal vegetation is composed primarily of weedy non-native plants adapted to disturbed conditions. Ruderal vegetation is not a natural vegetation type, so it is not included in the vegetation classification system of Holland (1986) or Sawyer and Keeler-Wolf (1995). Within the Project area, ruderal vegetation is found within more widely occurring vegetation types, frequently along roadsides and on the margins of industrial areas. Common ruderal plants within the Project area include field mustard (*Brassica rapa)*, black mustard (*Brassica nigra*), and wild radish (*Raphanus sativus*) (Garcia and Associates 2008a).

Ruderal areas generally provide relatively low habitat value for wildlife because they are degraded communities dominated by non-native, weedy plants. These areas typically provide low-quality foraging habitat for most birds and small mammals, but can provide marginal habitat for some species depending on the type and amount of vegetation present. Common birds found in ruderal habitat include Brewer's blackbird and mourning dove. The western fence lizard (*Sceloporus occidentalis*), a common reptile, often utilizes ruderal areas such as roadsides and railroad berms for thermal basking (Garcia and Associates, 2008b).

3.4.2 Wetlands

Waters of the U.S., including Wetlands

The United States Army Corps of Engineers (USACE) jurisdictional waters within the Project area are seasonal wetlands, specifically consisting of vernal pools associated with Antioch-San Ysidro complex and Clear Lake Clay soils (CH2M HILL 2008a). Three of these seasonal wetlands fall within Project disturbance areas. A detailed discussion of the location

and hydrology of these seasonal wetlands is presented in Section 3.8, Hydrology and Water Quality. Vegetation in these seasonal wetland areas generally consists of Mediterranean barley with scattered slender popcorn flower, white hyacinth (*Triteleia hyacinthina*), annual hairgrass (*Deschampsia danthonioides*), and curly dock (CH2M HILL 2008c).

Non-USACE-Jurisdictional Features

Swale features identified in the Project area are associated with Clear Lake clay and Capay silty clay loam soils. As discussed in Section 3.8, several swale features were identified in close proximity to the proposed work areas. Swale areas located south of Creed Road, as shown on Figure 3-9, are similar to the seasonal wetlands dominated by Mediterranean barley (CH2M HILL, 2008a).

Several roadside and miscellaneous drainages are present along the Project route. These drainages are discussed in greater detail in Section 3.8. Several agricultural drainage ditches are also present near the work areas but would not be affected by the Project. Agricultural ditches are earthen channels that have been constructed for the localized conveyance of irrigation water to crops and pasture land. Most of the drainages are from 3 to 5 feet wide.

3.4.3 Special-Status Species

Prior to conducting field surveys, existing information on biological resources in the vicinity of the Project was reviewed. The following sources were investigated:

- California Department of Fish and Game (CDFG) RareFind 3.1.0 Natural Diversity Database (CNDDB)(CDFG 2008a);
- U.S. Fish and Wildlife Service (USFWS) species list website (USFWS 2008);
- California Wildlife Habitat Relationships System (CWHR) (CDFG 2008b); and
- Draft Solano County Multi-Species HCP (SCWA 2007)

Field site surveys were conducted in early 2008 to determine whether special-status species and sensitive biological resources are present or could potentially be present within the Project area. Reconnaissance-level surveys were conducted for all Project impact areas to identify and map potential special-status wildlife species habitat and to verify vegetation typing mapped using remote GIS sensing techniques. Protocol-level surveys were conducted for special-status plants and federally listed wildlife species.

Special-Status Plants

Surveys for special-status plants were conducted by Garcia and Associates (GANDA) in 2008 and included both reconnaissance-level habitat quality assessment as well as protocol-level surveys to search for and document special-status plant occurrences. Six special-status plant species were found at three sites in the Project area and are described in detail below.

Alkali milk-vetch (*Astragalus tener* var. *tener*) – CNPS 1B.2. Alkali milk-vetch is a diminutive annual herb with purple and white flowers in the Legume Family (Fabaceae). Alkali milk-vetch is endemic to California, and is restricted to alkaline flats and vernally moist grasslands in the Sacramento and San Joaquin valleys; as well as portions of the eastern Bay

Area, where it is mostly extirpated (Hickman, 1993; CNDDB, 2008c; Jepson Online Interchange, 2008).

Alkali milk-vetch was found in the Project area on the Wilcox Ranch property north of Creed Road within 250 feet of the guard structure site near existing tower 010/073, as shown on Figures 1-9 and 3-8. Thirty-four individuals were found in full bloom in an area measuring approximately 30 feet x 100 feet. A single individual was also located immediately east of tower 010/073. The plants were found at the edges of deep hoof-prints in the wide, drying margin of a large vernal pool (Garcia and Associates, 2008a).

Brittlescale (*Atriplex depressa*) – CNPS 1B.2. Brittlescale is a small annual herb with inconspicuous green flowers in the Goosefoot Family (*Chenopodiaceae*). Brittlescale is endemic to California, where it is restricted to low-lying areas, often in grassland or associated with vernal pools and alkaline or clay soils, in the San Joaquin and Sacramento valleys (Hickman, 1993; CNPS, 2008).

Brittlescale was found in the Project area north of Creed Road within 250 feet of the access road and guard structure sites near existing tower 010/073 (Figures 1-9 and 3-8.) During protocol level rare plant surveys conducted on July 15 and 16, 2008, approximately 730 individuals were identified in early flowering stage at the site. The majority of the plants (± 715 individuals) were located on the Wilcox Ranch property, within 250 feet of the guard structure site. A population of 15 individuals was also found within 250 feet of the access road, approximately 150 feet south of tower 011/074 (Garcia and Associates, 2008a).

Pappose tarplant (*Centromadia parryi* ssp. *parryi*) – CNPS 1B.2. Pappose tarplant is a low, spreading, spiny, yellow-flowered annual herb in the Sunflower Family (*Asteraceae*). pappose tarplant is endemic to California, where it is restricted to saline or alkaline grasslands and roadsides of the southern North Coast ranges, the southern Sacramento Valley, and the northern Central Coast (Hickman, 1993; CNPS, 2008; and CDFG, 2008a).

Within the Project area, pappose tarplant was found at three sites: near the intersection of Vanden and Canon roads (Figures 1-5, 1-6, and 3-8); near the guard structure and access road at Wilcox Ranch north of Creed Road; and at fly site F-8 (Figures 1-11 and 3-9.) Large, widely scattered populations were found at all three sites in California annual grassland, and in grassland/vernal pool complex vegetation (Garcia and Associates, 2008a).

Carquinez goldenbush (*Isocoma arguta*) – CNPS 1B.1. Carquinez goldenbush is a small shrub or sub-shrub that has golden yellow heads consisting only of disk flowers. Carquinez goldenbush is endemic to California, and is likely endemic to Solano County. It is restricted to low-lying areas on the north side of the Carquinez Strait. It grows in grasslands in alkaline flats and on low hills (CNPS, 2008; Hickman, 1993).

Carquinez goldenbush was found in the Project area north of Creed Road between existing towers 010/073 and 011/074 (Figures 1-9 and 3-8.) A total of approximately 430 individuals were located in seven subpopulations (Garcia and Associates, 2008a).

Contra Costa goldfields (*Lasthenia conjugens*) – Federally Endangered, CNPS 1B.1. Contra Costa goldfields is an annual herb in the Sunflower Family (Asteraceae) endemic to California. The historic and current center of distribution for Contra Costa goldfields is in Solano County, in the Solano-Colusa vernal pool region (USFWS, 2005). The habitat of

Contra Costa goldfields includes vernal pools, vernal swales, moist flats and depressions within a grassland matrix (CNDDB, 2008c).

One population of Contra Costa goldfields was found within the Project area near the intersection of Vanden and Canon roads (Noonan Ranch) during protocol-level rare plant surveys, as shown on Figures 1-5, 1-6, and 3-8, (Garcia and Associates, 2008a).

Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*) – CNPS 1B.1. Baker's navarretia is a small, low-growing, light blue to white-flowered annual herb in the Phlox Family (*Polemoniaceae*) (Jepson Online Interchange, 2008). It is endemic to the valleys of the inner North Coast Ranges and the western Sacramento Valley (Hickman, 1993), where it grows in alkaline or adobe clay soils of vernal pools and vernal swales within a grassland matrix, sometimes associated with oak woodlands (CNDDB, 2008c).

Within the Project area Baker's navarretia was found in two large vernal pools north of Creed Road on the Wilcox Ranch property, near existing tower 010/073 (Figure 3-8.) A population of approximately 1,230 plants was discovered in the drying mid-zone of a large vernal pool northwest of tower 010/073. Another population of approximately 800 plants was found in a much smaller area at the dry margin of a large vernal pool south of tower 010/073 (Garcia and Associates, 2008a).

Special-status Wildlife

Special-status species are defined in accordance with the CEQA Guidelines, Section 15380, and include species that are:

- Listed, proposed for listing, or candidates for listing as threatened or endangered under the federal Endangered Species Act;
- Listed or candidates for listing as threatened or endangered under the California Endangered Species Act;
- Designated as Species of Special Concern by the CDFG;
- "Special Animals" list (CDFG 2008d); or
- Species that otherwise meet the definition of rare, threatened or endangered, as described in the CEQA Guidelines, Section 15380.

Twenty-five special-status wildlife species were identified in the literature and database review as having the potential to occur on the Project site or in the vicinity (Garcia and Associates, 2008b). Based on the wildlife habitat assessment conducted during the reconnaissance field survey, sixteen of these species were determined to have moderate or high potential to occur on the site. Five of these species, the California horned lark (*Eremophila alpestris actia*), western burrowing owl (*Athene cunicularia hypugaea*), the white-tailed kite (*Elanus leucurus*), long billed curlew (*Numenius americanus*), and golden eagle (*Aquila chrysaetosi*) were observed either on the Project site and/or within the immediate vicinity of the Project site. Special-status wildlife species which were determined to have moderate or high potential to occur on the site are summarized below.

Invertebrates

*Delta green ground beetle (*Elaphrus viridis*) – Federally Threatened.* Delta green ground beetles appear to prefer grassland habitat that is interspersed with vernal pools or playa pools, which are larger vernal pools that typically hold water for long time periods. The Delta green ground beetle is generally restricted to the margins of vernal pools within grassland areas. This species is known to occur in the vernal pool area between the Jepson Prairie and Travis AFB (CDFG, 2008a). Delta green ground beetles typically prefer the sandy mud substrate where it slopes gently into the water, with low-growing vegetation consisting of 25-100 percent cover (CDFG, 2008b).

The Project area is within the known range of the Delta green ground beetle in the Solano-Colusa vernal pool region (USFWS, 2005). USFWS has designated critical habitat outside of the Jepson Prairie Preserve on the Wilcox Ranch property owned by the Nature Conservancy and Solano County. The Jepson Prairie Preserve, the sole known preserve for the Delta green ground beetle, is located approximately 1 mile east of the Project between structure 008/059 and structure 011/075 (Figures 1-8 and 1-9.) The Solano Multispecies HCP (SCWA, 2007) designates the Project area from structures 006/043 to structure 011/075 (Figures 1-7, 1-8, and 1-9) and from structures 001/009 through 003/019 of the west spur as High Value Conservation Areas (Figures 1-5 and 1-6), while structures 011/076 through structure 20/133 are in Moderate Value Conservation Areas (Figures 1-9.)

*Conservancy fairy shrimp (*Branchinecta conservatio*) – Federally Threatened*. Conservancy shrimp are endemic to the grasslands of the northern Central Valley. This branchiopod species is generally found in large, turbid pools but can inhabit astatic pools located in swales formed by old, braided alluvium. Pools are filled by winter and/or spring rains and last until June (CDFG, 2008b).

The Project area is within known range of the conservancy fairy shrimp in the Solano Colusa Vernal Pool Region, as defined in the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (USFWS, 2005). In the Solano Colusa region, conservancy fairy shrimp populations are protected from development on some locations at the Jepson Prairie Preserve. Approximately 10.5 linear miles of the Project area between structures 006/047 and 016/109 are located within the Jepson Prairie core area of the Solano- Colusa vernal pool region (Figures 1-6 through 1-11.) The Solano Multispecies Habitat Conservation Plan (HCP) (SCWA, 2007) designates the Project area from structure 006/043 to structure 011/075 (Figures 1-7 through 1-9) and from structures 001/009 through 003/019 (Figures 1-2 and 1-3) of the west spur as High Value Conservation areas, while structures 011/0176 through structure 20/133 (south of the Project area) are in Moderate Value Conservation Areas.

*Vernal pool fairy shrimp (*Branchinecta lynchi*) – Federally Threatened*. Vernal pool fairy shrimp typically inhabit small depression pools. Pool structure can range from a clear-water sandstone depression, to a grassland swale, or a basalt-flow depression.

The Project area is within the known range of the vernal pool fairy shrimp, in the Solano-Colusa vernal pool region (USFWS, 2005). Approximately 10.5 linear miles of the Project area between structures 006/047 through 016/109 (Figures 1-6 through 1-11) are located within the Jepson Prairie core area of the Solano-Colusa vernal pool region. The Solano Multispecies HCP (SCWA, 2007) designates the Project area from structure 006/043 to

structure 011/075 (Figures 1-7 through 1-9) and from structures 001/009 through 003/019 (Figures 1-2 and 1-3) of the west spur as High Value Conservation Areas, while structures 011/0176 through structure 20/133 (south of the Project area) are in Moderate Value Conservation Areas.

*Vernal pool tadpole shrimp (*Lepidurus packardi*) – Federally Endangered*. Vernal pool tadpole shrimp are found in pools and in grass bottomed swales of unplowed grasslands. Some pools are mud-bottomed and highly turbid (CDFG, 2008b).

The Project area is within known range of the vernal pool tadpole shrimp, in the Solano-Colusa vernal pool region (USFWS, 2005). Approximately 10.5 linear miles of the Project area between structures 006/047 through 016/109 (Figures 1-6 through 1-11) are located within the Jepson Prairie Core Area of the Solano-Colusa vernal pool region. Vernal pool tadpole shrimp occur in the vicinity of Jepson Prairie, Travis AFB, and Montezuma in Solano County, and on the Sacramento National Wildlife Refuge in Glenn County.

Portions of the Project area and adjacent properties between structures 006/047 and 016/109 are located within the Jepson Prairie core area of the Solano-Colusa vernal pool region. Approximately 1.5 miles of the west spur of the Project; the area between structures 001/006 and 002/013 is within designated Critical Habitat Unit 11B for this species. All other structures are located outside designated core areas and critical habitat for this species.

The Solano Multispecies HCP (SWCA, 2007) designates the Project area from structure 006/043 to structure 011/075 (Figures 1-7 through 1-9) and from structures 001/009 through 003/019 (Figures 1-2 and 1-3) of the west spur as High Value Conservation Areas, while structures 011/0176 through structure 20/133 (south of the Project area) are in Moderate Value Conservation Areas.

Amphibians

*California tiger salamander (*Ambystoma californiense*) – Federally Endangered*, *State candidate species*. The California tiger salamander (CTS) breeds in vernal pools and other seasonal or permanent ponds, and spends up to 90 percent its life underground in upland habitats. These salamanders typically occur in grassland and oak savanna habitats and utilize rodent burrows or deep soil crevices as long-term refuge sites. Individuals may move as far as 1.2 miles (2 km) between breeding ponds and upland refuge sites (USFWS, 2003; CDFG, 2008b). Adults migrate from upland habitats to breeding ponds during late fall and early winter. The aquatic larvae hatch and develop in pools during winter and spring, and require about ten weeks of surface water to complete their aquatic development. The juvenile metamorphs leave the pools to disperse into upland habitats during mid- to late spring. Adults and juveniles may also undergo dispersal movements within and between upland habitats at any time during the wet season, typically on rainy nights.

The Project area and adjacent properties within the Project area are located within the potential range of the Central Valley Distinct Population Segment of the California tiger salamander. Critical habitat for the California tiger salamander was finalized on August 23, 2005 (USFWS, 2005). USFWS divided the current range of the Central population into four regions: (1) Central Valley Region, (2) Southern San Joaquin Valley, (3) East Bay, and (4) Central Coast. The Project area is located in the Central Valley region.

The Project area is located more than 0.75 mile from the nearest California tiger salamander critical habitat unit, Unit 2 of the Central Valley Region. Unit 2, the Jepson Prairie Critical Habitat Unit in Solano County, is located approximately 1 mile east of the Project between structures 008/059 and structure 011/075 (Figures 1-8 and 1-9) and encompasses 5,699 acres. This unit is located south of Dixon, west of State Route 113, north of Creed Road, and east of Travis AFB. California tiger salamander occurrences have also been reported within 0.5 mile of structures 002/015 through 003/019 (Figure 1-3) of the west spur (CDFG 2008a).

Reptiles

*Northwestern pond turtle (*Clemmys marmorata*) – State species of special concern*. Pond turtles require still or slow-moving temporary and permanent waters such as ponds, freshwater marshes and pools in perennial streams. They may remain active all year and sometimes move overland for distances of more than 300 feet to find a suitable nesting areas site (Jennings and Hayes, 1994). Pond turtles generally lay their eggs in open areas that are on dry slopes with soils rich in silt and clay.

One pond turtle CNDDB occurrence was documented in the Project vicinity approximately 0.82 miles from the P-13 impact site (Figure 1-9) [CDFG, 2008a]. For the most part, the freshwater ponds, streams, and irrigation ditches within and adjacent to several of the impact areas provide poor to marginal habitat for this species. One pond within the guard structure impact area on Maple Road could provide suitable habitat for pond turtles; however, the size of this pond is relatively small and located within a somewhat urban area. Ulatis Creek also likely provides suitable habitat for pond turtles down stream from the Project site. However, within the F-1 (Figures 1-3 and 3-7) impact area where the creek crosses the Project corridor the stream is channelized with little to no vegetation or basking locations available. A large pond located approximately 50 feet from F-7 (Figures 1-10 and 3-9) provides suitable habitat for pond turtles and ponds throughout out the golf course adjacent to F-2 (Figures 1-4 and 3-8) also provide suitable pond turtle habitat (Garcia and Associates, 2008b).

Birds

*California horned lark (*Eremophilia alpestris actia*) – State species of special concern.* The California horned lark occurs in grasslands and other open habitats that lack trees or brush. They build their nests on the ground, usually near grass clumps or earth clods, and feed on seeds and insects (Kaufman, 1996). Grasslands within the study area provide suitable foraging and nesting habitat for this species. During the reconnaissance-level field surveys an adult horned lark was observed on the Project site along the access road leading to P-10, F-4 impact areas (Figures 1-7 and 1-8.) Furthermore, suitable nesting habitat is present throughout Project site in grasslands along access roads and impact areas.

Grasslands within the study area may provide suitable foraging and nesting habitat for this species. During the reconnaissance-level field surveys an adult horned lark was observed on the Project site along the access road leading to P-10, F-4 impact areas (Garcia and Associates, 2008b). Furthermore, suitable nesting habitat is present throughout Project site in grassland along access roads and impact areas.

*Golden Eagle (*Aquila chrysaetos*) – State species of special concern*. Golden Eagles occur in open rolling foothills and mountain areas. Typically they nest on cliff ledges or in large trees but they can also utilize transmission towers as nest sites. Golden eagles require open areas

such as grasslands for hunting (CDFG, 2008b). One adult golden eagle was observed during the reconnaissance-level field survey within the Project site in the Montezuma Hills. Suitable foraging habitat is found throughout the Project area, specifically within the southern vicinity where numerous California ground squirrels were also observed. Several large eucalyptus trees are located within and adjacent to Project impact areas and provide suitable nesting habitat for golden eagles. One adult golden eagle was observed during the reconnaissance level field survey within the Project site in the Montezuma Hills (Garcia and Associates, 2008b).

*Loggerhead shrike (*Lanius ludovicianus*) – State species of special concern*. The loggerhead shrike frequents open habitats with sparse trees and shrubs. They are known to utilize fences, trees, powerlines, and utility poles as lookout posts for scanning broad open areas where suitable prey abounds. Shrikes often nest in open fields with few trees or in open woodlands or scrub. There are no CNDDB records of this species nesting in the Project vicinity; however, suitable foraging and nesting habitat for this species is present in open grasslands throughout the Project area (Garcia and Associates, 2008b).

*Long-billed curlew (*Numenius americanus*) – State species of special concern*. The long-billed curlew typically is found on grasslands during the summer and on mudflats and flooded fields in the winters. Curlews generally nest in a dry scrape on the ground usually with a sparse lining of grass and weeds in a mostly open grassland habitat (CDFG, 2008b). During the reconnaissance field survey four adult long-billed curlews were observed foraging east of Meridian Road just northwest of P-9 impact area (Figure 1-7.) Suitable habitat exists throughout the grassland, marsh and vernal pool habitat within the Project area (Garcia and Associates, 2008b).

*Mountain plover (*Charadrius montanus*) – State species of special concern*. Mountain plovers generally summer on dry prairies and short-grass plains; during the winter they can be found on plowed agricultural fields. They nest in a scraped depression on bare ground lined with grasses, roots and cow manure (Kaufman, 1996). CNDDB records show an occurrence of mountain plover approximately 1.98 mile from P-14 impact area (Figure 1-9) [CDFG, 2008a.] The grassland habitat within the Project area provides suitable nesting and foraging opportunities for this species.

*Northern harrier (*Circus cyaneus*) – State species of special concern*. Northern harriers nest on the ground in marshes or dense fields and generally use grasslands for foraging. Their diet consists mostly of small mammals (up to the size of small rabbits) and small birds (Kaufman, 1996). Suitable foraging habitat exists for northern harriers in the grassland and marsh habitats throughout the Project area (Garcia and Associates, 2008b). However, there is limited suitable nesting habitat for this species within the Project area and there are no CNDDB records of northern harriers nesting in or near the Project area (CDFG, 2008a).

3.4.4 Regulatory Context

Federal

Federal Regulation of Waters of the U.S., including Wetlands. Section 404 of the Clean Water Act (CWA) regulates the discharge of dredged or fill materials into waters of the United States, including rivers, streams, natural ponds, and wetlands. The United States Army Corps of Engineers (USACOE) is the major regulatory agency involved in wetland

regulation under the CWA, and requires a permit before dredged or fill material may be discharged.

The State Water Resources Control Board (SWRCB) and its nine Regional Water Quality Control Boards (RWQCBs) have the primary responsibility to regulate water quality impacts under Section 401 of the CWA and the California Clean Water Act (Porter-Cologne Act). The SWRCB and the RWQCBs are authorized to ensure that actions permitted by USACOE under Section 404 also meet federal and state water quality standards.

Endangered Species Act. Under the Federal Endangered Species act (FESA), the Secretary of the Interior and the Secretary of Commerce have joint authority to list a species as Threatened or Endangered. Two federal agencies oversee the FESA: the USFWS has jurisdiction over plants, wildlife, and resident fish, while the National Marine Fisheries Service (NMFS) has jurisdiction over anadromous fish and marine fish and mammals. Section 7 of the FESA mandates that federal agencies consult with USFWS and/or NMFS to ensure that their actions do not jeopardize the continued existence of a listed species or destroy or adversely modify critical habitat for listed species. The FESA prohibits "take" of listed species, including the destruction of habitat that could hinder species recovery.

Federal Migratory Bird Treaty Act. The Migratory Bird Treaty Act (MBTA) makes it unlawful to pursue, hunt, take, capture, or kill any migratory bird without a permit issued by the U.S. Department of the Interior (16 United States Code § 703 Supp. I, 1989.) The MBTA also prohibits the killing, possessing, or trading of migratory birds, bird parts, eggs, and nests, except in accordance with regulations prescribed by the Secretary of the Interior.

Bald and Golden Eagle Protection Act. The Bald and Golden Eagle Protection Act makes it illegal to import, export, take (which includes molest or disturb), sell, purchase, or barter any bald eagle (*Haliaeetus leucocephalus*) or golden eagle or part thereof. The USFWS oversees enforcement of this act.

State

California Endangered Species Act. The California Endangered Species Act (CESA) prohibits the take of species listed as endangered or threatened by CDFG. Habitat destruction is not included as take under CESA; however, Section 2090 of the Act requires state agencies to comply with endangered species protection and recovery and to promote conservation of these species. CDFG administers the Act and authorizes take through CFGC Section 2081 agreements, except for species designated as "fully protected", for which no take can be authorized.

California Native Plant Protection Act. Section 1900-1913 of the CFGC, also known as the Native Plant Protection Act (NPPA), is intended to preserve, protect, and enhance endangered or rare native plants in California. Under Section 1901, a species is endangered when its prospects for survival and reproduction are in immediate jeopardy from one or more cause. A species is rare when, although not threatened with immediate extinction, it is in such small numbers throughout its range that it may become endangered if its present environment worsens.

The California Native Plant Society has established categories for vascular plants independent of their federal or state listing status as follows:

- List 1A: Presumed Extinct
- List 1B: Rare, Threatened, or Endangered in California and elsewhere
- List 2: Rare, Threatened, or Endangered in California but more numerous elsewhere
- List 3: Plants about which more information is needed—a Review List
- List 4: Plants of Limited Distribution—a Watch List

In general, plants appearing on CNPS Lists 1A, 1B, or 2 meet the definition of endangered, threatened, or rare under Section 1901 (the Native Plant Protection Act), and Sections 2062 and 2067 (California Endangered Species Act) of the CFGC. Plants on these lists also meet the criteria of CEQA Guidelines Section 15380, and impacts to these species are considered "significant" under CEQA.

CEQA Guidelines Section 15380(b). Although threatened and endangered species are protected by specific federal and state statutes, CEQA Guidelines Section 15380(b) provides that a species not listed on a federal or state list of protected species may be considered rare or endangered if the species can be shown to meet specific criteria. This section addresses situations in which an agency is reviewing a Project that may have a significant effect on a species that meets the criteria for threatened or endangered but has not yet been listed by CDFG or USFWS.

State Regulation of Waters. The State Water Resources Control Board (SWRCB) regulates waters of the state through the California Clean Water Act (Porter-Cologne Act). The SWRCB and its nine Regional Water Quality Control Boards must certify that a Project authorized under a USACOE Section 404 permit also meets federal and state water quality objectives.

Under Sections 1600-1607 of the California Fish and Game Code, CDFG regulates activities that would alter the bed, channel, or bank of any river, stream, or lake designated by the department in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit. CDFG is also authorized to develop mitigation measures and to enter into a streambed alteration agreement with applicants that propose a Project that would adversely affect a river or stream, including intermittent and ephemeral streams.

CEQA Guidelines Section 15206 specifies that a Project shall be deemed to have a significant impact if it would substantially affect sensitive wildlife habitats, including but not limited to riparian lands, wetlands, bays, estuaries, marshes, and habitats for rare and endangered species as defined by CFGC Section 903.

California Fish and Game Code Bird Protections. Section 3503 of the CFGC prohibits destruction of the nests or eggs of most native resident and migratory bird species. Section 3503.5 of the CFGC specifically prohibits the taking of raptors or destruction of their nests or eggs. Construction disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment and/or reproductive failure. Disturbance that causes nest abandonment or reproductive failure is considered "taking" by CDFG Any loss of eggs, nests, or young or any activities resulting in nest abandonment would constitute a significant impact. Project impacts to these species would

not be considered significant unless they are known or have high potential to nest in the Project area or to rely on it for its primary foraging.

*Short-eared owl (*Asio flammeus*) – State species of special concern*. Short-eared owls occur throughout North America and inhabit open country, marshes, tundra, and grasslands. Breeding birds require low ground cover for nesting and open foraging grounds with an abundance of small mammal prey (Clark, 1975). Although CNDDB does not report any occurrences of short-eared owls near or within the Project area, this species does have potential to occur in marshes, grasslands, and ruderal fields throughout much of the Project vicinity (CDFG, 2008a; Garcia and Associates, 2008b).

*Swainson's hawk (*Buteo swainsonii*) – State Threatened*. Swainson's hawks are found in open arid habitat, prairies, grasslands, and agricultural fields. Their diet consists of insects, small mammals (up to the size of small rabbits), frogs, lizards and small birds (Dunk, 1995; Kaufman, 1996). Swainson's hawks will nest in large isolated trees or on cliffs. CNDDB reports several occurrences of this species within 1.5 mile (2.41 km) of Project impact areas. Although no Swainson's hawks were observed during the reconnaissance field surveys, the Project site does provide both suitable nesting and foraging habitat for this species (Garcia and Associates, 2008b).

*White-tailed kite (*Elanus leucurus*) – State fully protected species*. White-tailed kites inhabit open lowland valleys and low, rolling foothills. They forage in grasslands, marshes, riparian edges, and cultivated fields where prey species (mainly small mammals but can include insects, frogs, lizards and birds) are relatively abundant (Kaufman, 1996). Kites typically nest on the tops of trees in close proximity to good foraging locations. There is a CNDDB record of white-tailed kites nesting within a half mile of P-3 impact area and a second record of kites nesting 1.73 miles from F-1 impact area. Furthermore, during the reconnaissance field surveys an adult white-tailed kite was observed foraging just adjacent to the P-6 impact area. Suitable nesting and foraging habitat for this species is present at several impact areas throughout the Project site, particularly in the grasslands and marshes. Western fence lizards and small mammal sign was observed during reconnaissance field surveys, which would provide prey for white-tailed kites (Garcia and Associates, 2008b).

*Western burrowing owl (*Athene cunicularia*) – State species of special concern*. Western burrowing owls prefer open, flat or gently sloped grasslands and require burrows for nesting. The open grasslands on the Project site provide favorable habitat for burrowing owls. CNDDB reports several occurrences of burrowing owl within 1.5 mile (2.41 km) of Project impact areas (CDFG, 2008a). California ground squirrels, which commonly shelter in abandoned owl burrows, were observed throughout the Project area. Four adult owls, and one active burrow, were observed 0.93 miles from P-10 impact area during the reconnaissance surveys (Garcia and Associates, 2008b). Phase II surveys, conducted in February 2009, identified 5 areas with burrowing owl habitat in the vicinity of Project impact areas (Garcia and Associates, 2009): a pull site off Fry Road; a pull and fly site off Vanden Road; a pull and fly site off Lambie Road; at guard structures off Birds Landing Road; and a pull and fly site within the Birds Landing substation off Montezuma Hills Road.

Local

Although PG&E's project is not subject to local planning regulations, the following information is provided for purposes of general background and environmental review.

Solano County General Plan. The 2008 Solano County General Plan includes certain goals and policies related to biological resources that fall under the strategic directions of "preserving the county's valued natural, cultural, and scenic resources" and "enhancing and restoring the natural environment and the county's diverse landscapes". Goals and policies relevant to biological resources include:

- RS.G-2: Ensure continued presence and viability of the county's various natural resources.
- RS.G-3: Repair environmental degradation that has occurred, and seek an optimum balance between the economic and social benefits of the county's natural resources.
- RS.G-4: Preserve, conserve, and enhance valuable open space lands that provide wildlife habitat; conserve natural and visual resources; convey cultural identity; and improve public safety.
- RS.P-1: Protect and enhance the county's natural habitats and diverse plant and animal communities, particularly occurrences of special-status species, wetlands, sensitive natural communities, and habitat connections.
- RS.P-2: Manage the habitat found in natural areas and ensure its ecological health and ability to sustain diverse flora and fauna.
- RS.P-3: Focus conservation and protection efforts on high-priority habitat areas.
- RS.P-4: Together with property owners and federal and state agencies, identify feasible and economically viable methods of protecting and enhancing natural habitats and biological resources.
- RS.P-5: Protect and enhance wildlife movement corridors to ensure the health and long-term survival of local animal and plant populations. Preserve contiguous habitat areas to increase habitat value and to lower land management costs.

Solano County Multi-Species Habitat Conservation Plan. The Solano County Multi-Species Habitat Conservation Plan (MSHCP) is an agreement between the Bureau of Reclamation; the Solano County Water Agency; the cities of Vacaville, Fairfield, Suisun City, and Vallejo; the Solano Irrigation District; and the Maine Prairie Water District to implement conservation measures to ensure the protection of federally listed species and their habitat within their service area. Although the MSHCP only applies to Projects by these agencies, the priority habitat areas identified in the MSHCP were used in the 2008 Solano County General Plan to create a Resource Conservation Overlay.

3.4.5 Biological Resources Impacts and Avoidance and Mitigation Measures

Biological impacts are evaluated in accordance with the significance criteria contained in Appendix G of CEQA. All avoidance and protection measures (APMs) are incorporated as part of Project design, reducing most impacts to less than significant levels.

Impacts

a) Does the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Six special-status plant species were identified within the Project area during protocol rare plant surveys. These species include:

- Contra Costa goldfields (*Lasthenia conjugens*) federally endangered
- Alkali milk-vetch (*Astragalus tener* var. *tener*) CNPS 1b
- Brittlescale (*Atriplex depressa*) CNPS 1b
- Carquinez goldenbush (*Isocoma arguta*) CNPS 1b
- Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*) CNPS 1b
- Pappose tarplant (*Centromadia parryi* ssp. *parryi*) CNPS 1b

Six federally listed wildlife species are known to occur or could potentially occur, in the vicinity of the Project. These are:

- Conservancy fairy shrimp (*Branchinecta conservatio*) **E**
- Vernal pool fairy shrimp (*Branchinecta lynchi*) **T**
- Vernal pool tadpole shrimp (*Lepidurus packardi*) **E**
- Delta green ground beetle (*Elaphrus viridis*) **T**
- California tiger salamander (*Ambystoma californiense*, central valley population) **T**

Several State special-status wildlife species are also known to occur, or could potentially occur, in the vicinity of the Project. These are:

- Northwestern pond turtle (*Clemmys marmorata marmorata*) **CSC**
- Swainson's hawk (*Buteo swainsonii*) **ST**
- Western burrowing owl (*Athene cunicularia hypugaea*) **CSC**
- White-tailed kite (*Elanus leucurus*) **CFP**
- Golden eagle (*Aquila chrysaetosi*) **CSC**
- Short-eared owl (*Asio flammeus*) **CSC**
- Northern harrier (*Circus cyaneus*) **CSC**
- California horned lark (*Eremophila alpestris actia*) **CSC**
- Long-billed curlew (*Numenius americanus*) **CSC**
- Loggerhead shrike (*Lanius ludovicianus*) **CSC**
- Mountain plover (*Charadrius montanus*) **CSC**

A total of six special-status plant species were identified during surveys. One population of the federally Endangered Contra Costa goldfields was found within the 250-foot buffer near the intersection of Canon and Vanden roads, but not within the impact area itself. A Biological Opinion (BO) for the Project has been issued by USFWS for the federally listed species. The BO concluded that the Project is not likely to adversely affect Contra Costa goldfields because there will be no permanent or temporary impacts to potential habitat and all construction activities that will occur within 250 feet of potential habitat will occur in the dry season. The Project is therefore expected to have a less than significant impact on Contra Costa goldfields.

Additionally, of the six federally listed wildlife species identified as potentially occurring in the vicinity of the Project, the BO concluded that the Project is not likely to adversely affect Conservancy fairy shrimp due to the lack of suitable habitat in the temporary construction areas.

Impact BIO-1: Construction activities associated with grounding, guard structure installation, and equipment access could result in temporary or permanent impacts to papoose tarplant.

Five populations of pappose tarplant (CNPS 1B) that were identified within Project impact areas. Most can be avoided through implementing APMs-BIO-1, BIO-2 and BIO-18. There is an extensive population located north of Creed Road surrounding a proposed guard structure, estimated at more than 12,000 individuals during 2008 surveys. This access route and impact area north of Creed Road is particularly sensitive because four other rare plant species were found there and it provides habitat for special-status wildlife species including vernal pool crustaceans. Access to the area has been limited to the dry season by USFWS BO. Vehicle access and installation of the guard structure site during this period would likely result in the destruction of some rare plants. Though four of the plant species could be avoided through implementing APMs-BIO-1 and BIO-2, pappose tarplant cannot be avoided because of the extent of the population and because it flowers between May and October. The impact will occur from vehicle tires driving over individual plants, which will affect less than one percent of plants in the impact area. Vehicle access could also damage the seed bed from soil disturbance, but soil compaction is not expected to occur due to the limited use of the route and because all work will occur during the dry season.

A population of approximately 4,800 individuals of pappose tarplant is located at the northern extent of Fly Site F-8. Because the plant is an annual, it is not clear where the boundaries of the population will be in 2009. Proposed construction activities at this site include temporarily placing geotextile fabric and 4-6 inches of gravel to improve stability if the site is used during the wet season. Placing gravel, along with helicopter and vehicle use, could impact pappose tarplant. Implementation of APM BIO-17 will ensure that Project impacts to this population will be less than significant.

Impact BIO-2: Construction activities associated with vehicle access and removal of the guard structure could result in temporary or permanent impacts to brittlescale.

A population of brittlescale was identified north of Creed Road in the immediate vicinity of the proposed guard structure. Brittlescale flowers between May and October; however, the bracts required for identification are usually not fully developed until July or later. Brittlescale individuals could be impacted by vehicle access and installation and removal of the guard structure. Brittlescale has specific microhabitat requirements and was found in association with hillocks in alkaline soils. Therefore, impacts to brittlescale are expected to be avoidable by slightly adjusting the location of the guard structure. Implementation of APM BIO-19 will ensure that Project impacts to brittlescale will be less than significant.

Impact BIO-3: Construction activities could result in temporary impacts to habitat for vernal pool crustaceans located within the vicinity of the project impact areas.

Vernal pool fairy shrimp and vernal pool tadpole shrimp were found within vernal pools within the Project area. The Project is expected to directly impact vernal pool fairy shrimp and vernal pool tadpole shrimp north of Creed Road, where a guard structure is needed to

protect an existing distribution line during cable pulling. This guard structure will be installed during the dry season and will require overland movement of a truck across seasonal wetlands (vernal pools). The proposed Project may also indirectly impact vernal pool habitats by affecting water quality through increased erosion and sedimentation within the Project area.

USFWS has appended the proposed Project to its programmatic consultation for vernal pool crustaceans, which includes vernal pool fairy shrimp and vernal pool tadpole shrimp. USFWS has determined that the Project has the potential to adversely affect vernal pool fairy shrimp by directly impacting 0.004 acres of habitat and indirectly impacting 0.034 acres of habitat.

The Project ROW also passes through designated critical habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp; however, none of the Project impact areas are in the vicinity of these critical habitat areas, and therefore critical habitat will not directly be impacted by the Project.

The BO included several conditions to ensure that effects to vernal pool crustaceans resulting from Project construction activities will be minimized. The BO conditions are incorporated into APMs BIO-1 though BIO-15 and mitigation measures BIO-1 through BIO-3. Implementation of these measures will ensure that Project impacts to vernal pool species will be less than significant.

Impact BIO-4: The project may result in temporary impacts to California tiger salamander dispersal and upland habitat and/or direct mortality, injury, or harassment of individual juveniles and adults.

Although there are no recorded CNDDB occurrences of California tiger salamander (CTS) within the Project impact areas, there are a total of 17 CNDDB occurrences within approximately 3.1 miles of the Project, and 6 of those are within CTS's maximum dispersal distance of 1.24 miles. There is a high volume of potential habitat for CTS within the Project area; drainages that provide suitable breeding habitat include Ulatis, Union, Denverton, and Gibson Canyon creeks, as well as many of the agricultural ditches and canals in the Project area.

Implementation of the Project would result in the temporary impact to 40.21 acres of suitable upland habitat for the salamander due to placement of pull sites; helicopter landing/staging areas (fly sites); temporary access routes; and guard structures over roads, railroads, and distribution lines at various locations along the transmission line. In addition, the Project will directly impact 0.004 acres of wetlands and indirectly impact 0.034 acres of wetlands. No seasonal wetlands or ponds appropriate for salamander breeding or associated suitable upland will be permanently impacted from implementation of the proposed Project.

The BO issued for this Project concluded that the Project as proposed is not likely to jeopardize the continued existence of California tiger salamanders. The BO included several conditions to ensure that effects to the salamander resulting from habitat modification, habitat loss, and Project construction activities will be minimized. These conditions are incorporated into APMs BIO-11 through BIO-14 and mitigation measure BIO-3.

Implementation of these measures will ensure that impacts to California tiger salamanders will be less than significant.

Impact BIO-5: Construction activities in the vicinity of streams or ponds occupied by Western pond turtle could harm individual turtles or temporarily impact their habitat.

Suitable aquatic habitat for pond turtle is found within the Project corridor. The following impact areas have potential for pond turtle: 1. Pond near guard structure on Maple Road; 2. Ulatis Creek near F-1; 3. Pond near F-7; 4. Ponds in the golf course near F-2. Project construction activities could result in mortality, harm or disturbance to northwestern pond turtle adults, juveniles or nests. Individual turtles could be crushed by construction vehicles and equipment, and their nests and eggs could be destroyed by ground disturbing activities, such as installation the of guard structures. The risk of these impacts would be greatest in and around permanent ponds, freshwater marshes, streams and drainage ditches in non-urban areas of the Project corridor.

The best management practices/avoidance and protection measures for stormwater pollution prevention listed in APM BIO-5 will protect water quality in potential pond turtle habitat. Implementation of APM BIO-10 will ensure that Project impacts to western pond turtle will be less than significant.

Impact BIO-6: Project construction activities, including use of helicopters, could disturb nesting birds, including raptors.

Use of helicopters to install cage and arm extensions to towers and to move equipment to and from sensitive areas could also impact nesting birds, including raptors. Use of helicopters in nesting areas could cause adult and juvenile birds to flush and abandon the nest.

Project activities within vegetated areas have the potential to cause nesting birds to flush from their nests, resulting in loss of eggs or nest abandonment. Helicopter operation, especially takeoff and landing, could also disturb nesting birds within or near the fly sites. Nesting birds, including raptors, are protected under various regulations, including the federal Migratory Bird Treaty Act and the California Fish and Game Code. Implementation of APMs BIO-9 and BIO-21 will ensure that Project impact to nesting birds will be less than significant.

Impact BIO-7: Project construction activities could adversely affect the Delta green ground beetle.

Delta green ground beetle habitat occurs between Tower 008/059 (Muzzy Ranch immediately east of Travis AFB) and Tower 011/075 (Creed Road). Within this span, the larger playa pools offer the best actual and potential habitat for the Delta green ground beetle. The smaller vernal pools within this span generally lack well defined shorelines (where the Delta green ground beetle larvae and adults forage and breed) and the springtails that they prey upon. The surrounding grassland matrix may be used for dispersal, and the watershed for each playa is important to maintain hydrological functionality. The smaller vernal pools between Towers 011/075 (Creed Road) and 012/086 (Lambie Road) generally lack well defined shorelines and springtails, so Delta green ground beetles are not likely to use these, especially since there are no playas interspersed among them.

Temporary access for the Wilcox Ranch guard structure is within the 300-foot buffer surrounding a potential Delta green ground beetle pool. The guard structure (located on the Wilcox Ranch) and the access road is within potential beetle dispersal habitat. This includes area located on either side of a fence separating the Wilcox Ranch (west of fence line) and an unknown property (east of fence line) north of Creed Road. The access path was selected to minimize direct effects on pools, and would only be used within the dry season. No rocking of this cross-country access is planned, since laying of gravel and removal would likely have more effect than movement of a vehicle across the flat land in the dry season, primarily along the fire break.

Implementation of APM BIO-15 will ensure that the impact to Delta green ground beetles will be less than significant.

Impact BIO-8: Project construction activities could cause harm to adult or juvenile burrowing owls or impact their habitat.

Burrowing owl habitat was identified in the vicinities of the following 5 impact areas: a pull site off Fry Road; a pull and fly site off Vanden Road; a pull and fly site off Lambie Road; at guard structures off Birds Landing Road; and a pull and fly site within the Birds Landing substation off Montezuma Hills Road (GANDA 2009). Construction activities could affect western burrowing owls that nest or winter in grasslands and pastures in the vicinity of the impact areas. Project activities could collapse burrows that provide breeding and/or wintering habitat. Construction activities, including noise, could cause nest abandonment and/or reproductive failure. Implementation of APMs BIO-21 and BIO-22 will ensure that Project impacts to western burrowing owls will be less than significant.

With the implementation of mitigation measures, the Project will not cause an adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations.

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Most Project work areas are in agricultural areas, such as cultivated fields and pasture lands not considered sensitive natural communities. No sensitive natural communities, with the exception of vernal pools, occur. Vernal pools are considered a sensitive natural community and are discussed further under (c), below. Potential impacts to federally listed vernal pool species are discussed under (a).

c) 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?

A total of approximately 0.05 acres of jurisdictional seasonal wetlands will be temporarily filled during construction. An additional 0.18 acres of non-jurisdictional swales and drainages would be affected. All of the seasonal wetlands are associated with the temporary access roads and work areas near Creed Road.

No permanent impacts to federally protected wetlands are anticipated to occur as a result of this Project. Temporary impacts to federally protected wetlands would result from vehicle travel during the dry season over seasonal wetlands located north of Creed Road. Seasonal wetlands (vernal pools) located within Pull Site 12 (VP07 and VP08) could be impacted by temporary fill of 0.05 acres of seasonal wetlands during construction. A third seasonal wetland was identified near the access route to Pull Site 12, but will be avoided by slightly re-routing the access route. No other Waters of the U.S. (including wetlands) are expected to be impacted by the Project.

In addition, PG&E will implement wetland mitigation through on-site restoration of temporarily filled areas.

The Project has been authorized under a USACE nationwide permit for compliance with Section 404 of the Clean Water Act (USACE, 2008). This authorization requires that all temporary fill will be removed and work areas returned to pre-Project conditions after Project construction. The authorization also requires full compliance with the USFWS Biological Opinion issued for this Project. It is anticipated that the RWQCB will issue a Section 401 Water Quality Certification for the Project; any mitigation measures or other requirements included in that certification will also be implemented.

d) 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?

No permanent new structures or other barriers are proposed as part of the Project, and all areas disturbed by the Project will be restored to their original condition. Potential impacts to nesting birds are discussed under (a), above.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Regulation RS.I-3 of the 2008 Solano County General Plan directed the County to develop an ordinance to protect oak woodlands and other heritage trees; however, this ordinance has not yet been implemented. There are no oak woodlands in the Project impact areas, and the Project description does not include the removal of any trees. The Project will therefore have no impact, and no additional mitigation is necessary or required.

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

The draft Solano County Multi-Species Habitat Conservation Plan (SCWA, 2007) includes the Project area from structure 006/043 to structure 011/075 and from structures 001/009 through 003/019 of the west spur as High Value Conservation Areas, while structures 011/0176 through structure 20/133 are in Moderate Value Conservation Areas. Although some data from this plan was used by Solano County to develop policies for the 2008 General Plan, the MSHCP itself is an agreement between the Bureau of Reclamation, the Solano County Water Agency, and several local cities and other districts to implement conservation measures to ensure the protection of federally listed species and their habitat within the MSHCP area, and does not apply to this Project. The Project will therefore have no impact, and no additional mitigation is necessary or required.

Avoidance and Protection Measures and Mitigation Measures

CEQA criteria included in Appendix G require the consideration of local, State and federal plans, policies and regulations when evaluating potential Project impacts and developing mitigation measures. The Biological Opinion (BO) prepared by US Fish and Wildlife Services (USFWS) for the Vaca Dixon Reconductoring Project includes measures to address federally-listed species under the jurisdiction of the Endangered Species Act. By virtue of the fact that PG&E has accepted the conditions of the BO, these requirements are considered part of the Project as evaluated and are considered Avoidance and Protection Measures. Those conditions of the BO that require compensatory habitat mitigation are the exception as they are instead considered mitigation measures under CEQA specifically addressing habitat loss.

Upon evaluation of the Project in accordance with CEQA Appendix G criteria, additional avoidance measures were identified to address State and local plans, policies and requirements. PG&E has incorporated these additional Avoidance and Protection Measures (APM) into the Project description to minimize impacts to biological resources that were not otherwise addressed through measures in the BO. All PG&E standard practices and BMPs are also considered avoidance measures and are considered part of the Project.

In order to simplify the future application of all Avoidance and Mitigation Measures, they are numbered sequentially by type of measure (i.e., APM or MM) and, if drawn from the Biological Opinion, the source of the measure is noted in parentheses.

Avoidance and Protection Measures

APM-BIO-1: An employee education program will be conducted, consisting of a brief presentation to explain endangered species concerns to contractors, their employees, and any other personnel involved in the Project. The program will include the following: a description of special-status species and their habitat needs; a report of the occurrence of these species in the Project area; an explanation of the status of these species and their protection under the Federal Endangered Species Act, California Endangered Species Act, and other statutes; and a list of measures being taken to reduce impacts to the species during Project construction and implementation. A fact sheet conveying this information will be prepared for distribution to the above-mentioned people and anyone else who may enter the Project site. Upon completion of training, employees will sign a form stating that they attended the training and understand all the conservation and protection measures. To the extent possible, nighttime construction will be minimized. Construction crews will be informed during the education program meeting that, to the extent possible, travel within the marked Project site will be restricted to established roadbeds. Established roadbeds include all pre-existing and Project-constructed unimproved, as well as, improved roads. (Biological Opinion)

APM-BIO-2**:** A biological monitor will be onsite during all ground-disturbing work within sensitive biological areas. Off-road access routes will be clearly flagged and marked. All Project-related vehicle access to the guard structures at Creed Road and south of the Noonan Ranch corrals will be monitored by a biological monitor. Work within sensitive biological areas north of Creed Road and at the corral site (at the intersection of Canon Road and Vanden Road) will be conducted during the dry season. Additionally, no work activities will be allowed to occur north of Creed Road during the Delta green ground beetle

flight season; work in this area can therefore only take place from May 15 to October 31. (Biological Opinion)

APM-BIO-3: Geotextile fabric and a layer of gravel will protect the original contour of all wetland pools that cannot be avoided within identified temporary impact areas adjacent to or within the right of way with the possible exception of temporary access routes where overland travel in the dry season may have less impact than placement and removal of gravel, such as for the guard structure route at Creed Road. Using the geotextile fabric and gravel will minimize potential effects from compaction or other disturbance to areas that will have more frequent travel or heavier equipment, or be used on the wet season. After construction, the gravel and fabric will be removed. Alternative methods for protecting areas from vehicle movement will be discussed with USFWS. In areas of minimal effect such as temporary access at Creed Road, this measure could have greater impact on soil seed bank than overland driving in the dry season. (Biological Opinion)

APM-BIO-4: Dust control measures will be implemented during construction in the dry season. Work areas and dirt access roads will be watered regularly to minimize airborne dust and soil particles generated by construction. Fly sites will be rocked when necessary. (Biological Opinion)

APM-BIO-5: The potential for adverse effects to water quality in vernal pools or habitat within the Project area will be avoided by implementing temporary Best Management Practices outlined in the California Stormwater Quality Association's Construction Handbook (CASQA, 2003). PG&E's Storm Water Pollution Prevention Plan and erosion control Best Management Practices will be used to minimize any wind- or water-related erosion. Protective measures will include:

a. No discharge of pollutants from vehicle and equipment cleaning will be allowed into storm drains, wetlands, or water courses.

b. Vehicle and equipment fueling and maintenance operations must be at least 100 feet from vernal pools and other aquatic habitat.

c. Dust control will be implemented, including the use of water trucks to control dust in disturbed areas, rocking temporary access road entrances and exits, and placement of geotextile mats and rock on access road areas to be used in the wet season.

d. Disturbed work areas will be restored to pre-Project conditions and will be reseeded, as appropriate. (Biological Opinion)

APM-BIO-6: Project-related vehicles shall observe a 20-mile-per-hour speed limit in all Project areas, except on county roads and state and federal highways. (Biological Opinion)

APM-BIO-7: The limits of the construction area throughout the Project will be flagged if not already marked by right of way or other fencing, and all activity will be confined within the marked area. A qualified biologist shall be onsite during all activities that could result in the take of a listed species. (Biological Opinion)

APM-BIO-8: The Project proponent shall include a copy of the USFWS-issued Biological Opinion (BO) within its construction documents making the primary contractor responsible

for implementing all requirements and obligations included within the BO, and to educate and inform all other contractors involved in the project as to the requirements of the BO. (Biological Opinion)

APM-BIO-9: A biologist shall inspect construction-related activities at the proposed Project area to ensure that no unauthorized take of federally-listed species or destruction of their habitat occurs. The biologist shall be available for monitoring throughout all phases of construction that may result in adverse effects to listed crustaceans. (Biological Opinion)

APM-BIO-10: The contractor will prepare a site-specific Stormwater Pollution Prevention Plan (SWPPP) for the Project to protect receiving waters from pollution. The SWPPP will include standard sediment and erosion control measures that include limiting soil disturbances during the winter rainfall season. Given the site-specific conditions of the Project area, the SWPPP for this Project will generally include limiting soil disturbances during the winter rainfall season of October 15 through April 15 and fully stabilizing disturbed areas prior to December 1. Standard sediment erosion control measures, such as silt fencing, straw bale barriers, and sediment traps shall be implemented to directly reduce the off-site transport of sediment from disturbed slopes. Existing vegetation that can be preserved will be identified and flagged or fenced to avoid disturbance. Erosion in disturbed areas will be controlled through the use of grading operations that eliminate direct routes for conveying runoff to drainage channels and use of soil stabilization Best Management Practices (BMPs), such as mulching, erosion control fabrics, and/or reseeding with grass or other plants where necessary. (Biological Opinion)

APM-BIO-11: Prior to the initiation of ground disturbance on each individual impact area, preconstruction surveys shall be conducted by a biologist(s) for the salamander. These surveys shall consist of walking surveys of the site and adjacent areas accessible to the public to determine presence of the species. Salamanders will be removed by the biologist(s) and translocated under the direction and authorization of the Service. (Biological Opinion)

APM-BIO-12: All salamanders captured on the Project site during monitoring and inspections conducted during construction shall be removed by a USFWS-approved biologist(s) and translocated under the direction and authorization of the USFWS. (Biological Opinion)

APM-BIO-13: To prevent inadvertent entrapment of salamanders during construction, all excavated, steep-walled holes or trenches more than 2 feet deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they must be thoroughly inspected for trapped animals. If at any time a trapped listed animal is discovered, a biologist(s) should immediately place escape ramps or other appropriate structures to allow the animal to escape, or the USFWS and/or CDFG shall be contacted by telephone for guidance. The USFWS shall be notified of the incident by telephone and electronic mail within one (1) working day. (Biological Opinion)

APM-BIO-14: If requested, before, during, or upon completion of ground breaking and/or construction activities, the Project proponents shall allow access by USFWS and/or CDFG personnel to the Project site to inspect Project effects to the salamander and associated habitats. (Biological Opinion)

APM-BIO-15: All Project activities north of Creed Road will be limited to May 15 to October 31 to avoid the Delta green ground beetle flight season. The Environmental Monitor will be present for all work north of Creed Road. (Biological Opinion)

APM-BIO-16: Prior to construction activities, a qualified botanist shall establish exclusion zones for special status plants within 50 feet of impact areas. These exclusion zones will include known populations and, where practicable, a 50-foot buffer zone. Construction equipment and personnel will be restricted from entering the exclusion zones, except where allowed under specific mitigation measures. An environmental monitor will be onsite during construction activities in the vicinity of sensitive biological resources. If direct or indirect impacts to special-status plant species are observed then the monitor shall notify the construction manager immediately. If any populations of special-status plants are impacted, work in that area will be halted. The environmental monitor, in consultation with PG&E, will contact the CDFG and/or the USFWS.

APM-BIO-17: Vehicle access north of Creed Road shall be limited to two total vehicle round-trips: one round-trip during guard structure installation, and one during removal. The speed limit on the temporary access route will be restricted to two miles per hour.
A qualified botanist will escort vehicles along the temporary access route. Ingress and egress to the guard structure site will occur along different routes (i.e. new tire tracks each trip) to minimize damages to individual plants. The plant tolerates disturbance and the impacts would be temporary, with full recovery of disturbed areas within 1-2 years.

APM-BIO-18: A qualified botanist will conduct preconstruction surveys around the proposed fly site for pappose tarplant to determine the population's extent. The location and/or dimensions of the fly site shall be altered to avoid pappose tarplant, and the population will be protected with high-visibility fencing or signage.

APM-BIO-19: A qualified botanist will conduct preconstruction surveys for brittlescale to determine the population's extent. The botanist will identify brittlescale plants in the immediate vicinity of the proposed guard structure and will assist PG&E in adjusting the placement of the structure as necessary. If work occurs in the area in May or June or before bracts necessary for identification are fully developed, all plants of genus *Atriplex* will be avoided.

APM-BIO-20: To avoid or minimize potential impacts to northwestern pond turtles, a qualified biologist shall conduct a pre-construction survey for pond turtles no more than 30 days prior to construction in suitable aquatic habitats within Project impact areas. If turtles are found in aquatic habitat, then clearance of the nearby (300 ft) terrestrial habitat that would be impacted shall occur prior to construction activities; the biologist(s) shall look for eggs and western pond turtle individuals including over-wintering hatchlings. If eggs are found, the monitor shall contact CDFG for the appropriate measures to relocate the eggs. If pond turtles are located near any proposed construction areas, impacts to individuals and their habitat will be avoided to the extent feasible. The Environmental Monitor will be onsite during all construction activity in the vicinity of individual pond turtles or their nests.

APM-BIO-21: For Project construction activities occurring during the bird nesting season of February 1 through August 31, a qualified ornithologist shall conduct pre-construction surveys for nesting birds within two weeks of construction. These surveys will cover the transmission line route, staging areas, pull sites, fly sites, and access routes. Additional pre-

construction surveys shall be conducted for each new phase of Project implementation that occurs during the nesting season, no more than two weeks prior to construction. For any nests that are found, nest protection zones will be established. For passerine birds, a 50 to 100-foot protection zone shall be established around active nests; for raptors, a 300-foot protection zone and for golden eagles a 500-foot protection zone shall be established around active nests. These protection zones may be modified on a site-specific basis as determined by the Environmental Monitor or in coordination with CDFG. Active nests within the Project area would be monitored for signs of disturbance. If the biological monitor determines that a disturbance is occurring, construction shall be halted, and the agencies shall be contacted as to the measures that shall be implemented.

APM-BIO-22: Phase III Burrow Surveys (nesting season surveys) shall be conducted in five locations in accordance with the Burrowing Owl Survey Protocol and Mitigation Guidelines. No disturbance should occur within 50 meters (approx. 160 ft.) of occupied burrows during the non-breeding season of September 1 through January 31 or within 75 meters (approx. 250 ft.) during the breeding Season of February 1 through August 31. Burrowing owls shall not be relocated during the breeding season. During the non-breeding season, if avoidance requirements can not be met, the applicant shall submit a site specific proposal for burrowing owl relocation and mitigation to CDFG and the SWRCB for review and approval. The applicant shall be required to mitigate for impacts as 6.5 acres per relocation/burrow impact.

Mitigation Measures

Mitigation Measure-BIO-1: To minimize effects of the proposed Project on the California tiger salamander, Delta green ground beetle, vernal pool fairy shrimp, vernal pool tadpole shrimp, conservancy fairy shrimp, and Contra Costa goldfields, PG&E will purchase mitigation credits at a USFWS-approved mitigation bank. (Biological Opinion)

Mitigation Measure-BIO-2: PG&E will purchase 0.152 acres of vernal pool preservation credits and 0.008 acres of vernal pool creation credits at a vernal pool conservation bank approved by USFWS prior to the start of earth-moving activities. (Biological Opinion)

Mitigation Measure-BIO-3: PG&E will restore the 40.21 acres of habitat temporarily affected by the Project. PG&E will also permanently preserve an additional 4.02 acres of salamander habitat either by purchasing credits from a USFWS-approved conservation bank or by purchasing and placing a conservation-easement on a USFWS-approved parcel. (Biological Opinion)

3.5 Cultural Resources

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
(a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☐	☐	☑
(b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☐	☑	☐
(c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☑	☐
(d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☑	☐

3.5.1 Setting

Cultural Resources

Prehistoric Context. In attempts to develop a chronology for the Central Valley, one of the world's largest intermontane basins, archaeologists have been confronted with challenges in documenting and analyzing the archaeological record due to the level of destruction of surface archaeological sites as a result of agricultural practices, levee building, erosion, and extensive looting. Rosenthal et al. (2007) conclude that the basic understanding of the cultural history in the region has progressed very little in the past 20 years and that well-grounded chronologies are still lacking; however, despite these limitations, the region's complex archaeological record has been important in understanding the causes and consequences of culture change in prehistoric California. In the early 1970s, Fredrickson (1973) proposed three basic periods for the Central Valley region: Paleo-Indian, Archaic, and Emergent. Rosenthal et al. (2007) further refined these time periods based on newly calibrated radiocarbon dates. These time periods are summarized as follows except where noted.

Paleo-Indian (11550 to 8550 cal B.C.). The Paleo-Indian Period has a relatively ephemeral archaeological footprint. The Central Valley Region may have been inhabited by humans as early as 10,000 years ago, but the evidence of early human use is likely buried by alluvial deposits that have accumulated during the last several thousand years (Moratto, 1984). The oldest recorded site, the Witt site of Tulare Lake (CA-KIN-32), is located in the southern San Joaquin Valley. Human bone radiocarbon dated from this site yielded dates of 11,379 to

15,802 radiocarbon years before present. Faunal material of unknown association returned even earlier dates. Currently, the earliest accepted evidence of human occupation in the Central Valley is from the basally thinned and fluted projectile points found at scattered surface locations, primarily in the southern portion of the Tulare lake basin. These projectile points resemble Clovis points, which have been dated to 11,550 and 9,550 cal B.C. from other North American contexts (Fiedel, 1999). To date, three localities in the San Joaquin Valley have produced early concave base points: Tracy Lake, the Woolfsen mound (CA-MER-215), and the Tulare Lake basin (Rosenthal et al. 2007).

Lower Archaic (8550 to 5,550 cal B.C.). Lower Archaic occupation in the Central Valley is mostly represented by isolated finds (Moratto, 1984; Rosenthal et al., 2007). The earliest documented human remains of west central California were recovered at the Los Vaqueros Reservoir site (CA-CC0-637), which returned a radiocarbon date of 6570 cal B.C. The Lower Archaic economy emphasized large game hunting and nut crop harvesting. Artifacts found in these sites include handstones, milling slabs, and various cobble tools.

Middle Archaic (5550 to 550 cal B.C.). More distinct cultural adaptations for the valley floor and foothill sites are visible in archaeological deposits dating to the Middle Archaic. Artifact assemblages for the Foothill Tradition comprise flaked stone dart points and cobble tools similar to those of the Lower Archaic for food processing. Artifacts such as tabular pendants, incised slate, and perforated stone plummets are rare but have wide distribution. Middle Archaic sites are also characterized by rock-filled hearths and ovens, and "cairn capped" graves. Sites of the Valley Tradition in the later Middle Archaic are fairly well represented in the archaeological record. The "archetypal middle archaic expression" is the Windmiller Pattern, but the genesis, spatial distribution, and variation across the regional landscape are not clearly defined at this time. Situated in riverine, marshland, or valley floor settings, as well as on small knolls above prehistoric seasonal floodplains, most Windmiller Pattern sites contain burials that are oriented to the west with extended burials. These sites contain large amounts of mortuary artifacts with indications of social hierarchy, and often include large projectile points and a variety of fishing gear such as net weights, bone hooks, and spear points.

Upper Archaic (550 cal B.C. to cal A.D. 1100). The technologies that existed in the Middle Archaic became highly specialized in the Upper Archaic as evidenced by new types of tools, as well as widely traded goods like saucer- and saddle-shaped *olivella* beads, *haliotis* ornaments, obsidian biface "roughouts," and ceremonial blades. The Native population focused on economies that included seasonally available resources that could be harvested and processed in large quantities, such as acorns. Although the Berkeley Pattern began to emerge during this time, as evidenced by large accumulations of habitation debris reflecting long-term habitation, the Windmiller Pattern continued as well. Unlike the Windmiller Pattern, Berkeley Pattern burials are tightly flexed and have no consistent orientation. Cemeteries with discrete populations of either flexed (Berkeley) or extended (Windmiller) burials can be found in the western parts of the San Joaquin Valley dating to the Upper Archaic. These likely represent alternating occupations by people of both cultural traditions.

Emergent (cal AD 1100 to historic). The Augustine Pattern coincides with the Late or Emergent Period (further divided into Lower and Upper), ranging from as early as AD 1100 to the time of European settlement of this general area in the late 1700s. The Augustine Pattern reflects a change in subsistence and land-use patterns to those of the

ethnographically known people (Patwin) of the time of contact with European and American settlers. Intensive fishing, hunting, and harvesting of acorns and small hard seeds typify this period (Moratto, 1984). A general increase in population and settlements, a more regularized exchange system, and an increase in evidence of ceremonialism characterize the Augustine Pattern. Distinctive artifacts in this pattern include small notched points that are indicative of the introduction and spread of bow-and-arrow usage, bone awls used in basketry, clay effigies, elaborately incised bone whistles, flanged soapstone stone pipes, and occasional pottery. Cremation was also practiced, in a limited way, for individuals of high status during the Lower Emergent period and more generally applied across the population during the Upper Emergent period.

Ethnographic Context. The Project area is situated within the ethnographic territory of the Patwin and the Bay Miwok. While the Patwin and Bay Miwok comprised distinct cultural groups, they inhabited similar environments and engaged in similar subsistence practices. Like other native Californians, they hunted and gathered in a seasonal round. The San Joaquin-Sacramento Delta encompassed a rich environment with an abundance of resources which the Patwin and Bay Miwok used for subsistence. They lived in settlements ranging from small clusters of family groups of thirty or so residents to large, semi-permanent villages with populations upward of five hundred people (Cook, 1976).

The Patwin and Bay Miwok maintained alliances with neighboring groups; however hostilities were not uncommon to both groups. According to ethnographic accounts, the reasons for an outbreak of hostilities were most often ties to poaching and territorial intrusion or a death linked to sorcery. Both the Patwin and Bay Miwok practiced inhumation, as well as cremation, when disposing of their dead (Johnson, 1978).

Historical Context. The first people of European descent to reach the Carquinez Strait were members of the Pedro Fages expedition of 1772. Four years later, the de Anza expedition also reached the strait while looking for a land route to Point Reyes. In 1817, another Spaniard, Jose Antonio Sanchez, was sent from the Presidio of San Francisco to combat the Suisun. According to some sources, Sanchez's group captured a small group of Suisun, including a young man named Sem-Yeto. Sem-Yeto, baptized Francisco Solano at the newly-founded Mission San Francisco Solano in 1824, became an influential figure in the county later named for him, due, in part, to his friendship with Mariano Guadalupe Vallejo (Keegan, 1989). In 1835, General Mariano Guadalupe Vallejo was ordered by the Mexican government to colonize the Fairfield/Suisun area to protect interior Spanish interests from the Russians at Fort Ross. The lower part of the Sacramento Valley and Delta areas were then settled rapidly as the Mexican government granted large tracts of land and access to the region's natural resources. Francisco Solano apparently allied himself and his group of Patwin with Vallejo to gain political advantage over rival native groups.

Solano County contained five confirmed Mexican land grants (Beck and Haase, 1974). The first of the land grants was Rancho Suisun. Rancho Tolenas, adjacent to Rancho Suisun, included part of Fairfield and extended north into Napa County. The patent was issued in 1840 to Jose Francisco and Antonio Armijo (Hoover et al., 1990). Juan Felipe Peña and Juan Manuel Vaca were granted Rancho Los Putos in the 1840s. Rancho Los Putos comprised almost 18,000 acres, including Lagoon Valley, Vaca Valley, and Vacaville. Rancho Rio de los Putos, adjacent to Puta Creek in the northwestern portion of the county, was granted to William Wolfskill in 1842. Also called the Wolfskill Grant, Rancho Rio de los Putos was

developed by four Wolfskill brothers, who planted extensive orchards, including a stand of olive trees that still remains today. Rancho Los Ulpinos was granted to John Bidwell in 1844. Bidwell's Rancho was adjacent to the Sacramento River. Also in 1844, General Mariano Vallejo established a settlement named Eureka in a portion of his unconfirmed Rancho Suscol; later, this settlement was renamed Vallejo in his honor. Benicia and Cordelia were also within Rancho Suscol. Rancho Sobrante, another unconfirmed rancho, included today's towns of Montezuma, Birds Landing, Collinsville, and Denverton (Marschner, 2000).

Solano County was one of the original counties created in California under the Act of February 18, 1850. During the creation of Solano County, the Legislative committee recommended the name of Benicia; however, at the request of General Mariano Vallejo the county was named Solano, after the previously mentioned Suisun Indian Chief with the baptismal name Francisco Solano (Bowen, 2005).

In the late 1840s and 1850s, former gold seekers and pioneers began settling Solano County, where they raised livestock and cultivated fruit orchards, vineyards, wheat, barley, and oats. Produce and livestock were transported overland by wagons to the many sloughs throughout the county, and then shipped by water to waiting markets. In 1868, the completion of the California Pacific Railroad through Solano County allowed the shipment of goods to East Coast markets, significantly bolstering economic development, agricultural production, and population growth.

Currently, Solano County's most prevalent economic activities continue to be agriculture and livestock. A wide variety of vegetables, fruit, and nuts are grown, with walnuts being the most recent crop that has gained favor. The county is in the top five California producers of corn, lamb, sheep, and Sudan grass hay. In 2000, Solano County celebrated its 150th anniversary.

Methods. A records search was conducted at the Northwest Information Center (NWIC) of the California Historical Resources Information System (CHRIS) at Sonoma State University. The NWIC is a repository of all archaeological site records, previously conducted cultural resources investigations, and historic information concerning cultural resources for 16 San Francisco Bay Area counties, including Solano County. The records search included a review of all site records and survey reports within a 0.5 mile radius of the Project area, on file at the NWIC. The records search and literature review for this study were conducted to determine whether known cultural resources had been recorded within or adjacent to the Project area, and to assess the likelihood of unrecorded cultural resources based on archaeological, ethnographic, and historical documents and literature, and on the environmental setting of nearby sites.

Included in the review were the *California Inventory of Historic Resources* (California Department of Parks and Recreation, 1976) and the California Office of Historic Preservation's *Five Views: An Ethnic Historic Site Survey for California* (CA-OHP 1988), *California Historical Landmarks* (CA-OHP 1990), *California Points of Historical Interest* (CA-OHP 1992), and the *Historic Properties Directory Listing by City* (CA-OHP 2003). The *Historic Properties Directory* includes the National Register of Historic Places and the California Register of Historical Resources, and the most recent listings of the California Historical Landmarks and California Points of Historical Interest.

An archaeological survey for the proposed Project was conducted during six days in February and March 2008. The surveys were conducted within the Project work sites, as well as a 100-foot radius surrounding each Project work site, in order to identify the presence or absence of cultural resources. In addition, letters requesting information about sacred lands that may be located within the Project area were sent to the Native American Heritage Commission (NAHC) and seven local organizations and individuals that might have knowledge of the area.

Results. No prehistoric archaeological resources were identified during the records search or the field survey of the Project area, including guard structure sites, fly sites, pull sites, and other areas.

Two historic resources that are more than 50 years in age were identified within the Project area: the Ross Noonan Livestock Cannon Ranch and the Vaca-Dixon Peabody and Vaca-Dixon Birds Landing 230 kV transmission lines. The Ross Noonan Livestock Cannon Ranch site includes historic farm equipment, movable stock, and other structures within impact areas F-3 and P-7. The structures at this ranch represent activities from at least the 1930s. The Vaca-Dixon Peabody and Vaca-Dixon Birds Landing 230 kV transmission lines were constructed in the 1940s. These lines were evaluated for their potential eligibility for listing in the CRHR, and were determined not to be eligible for listing.

Additionally, 22 other resources were identified outside of the Project area but within the 100-foot buffer of the Project area; however, these resources are not expected to be adversely affected by the proposed Project and hence are not discussed further. The full list of historic resources identified during surveys that occur outside of the Project area can be found in the Project Archaeological Survey Report (Garcia and Associates, 2008).

The Vaca-Dixon Substation was previously evaluated for its eligibility for listing in the NRHP and CRHR as part of a seismic retrofit of the substation by Baker and Bakic (2003). The Vaca-Dixon Substation was constructed by PG&E in 1921 as part of the Pit River/Hat Creek Hydroelectric Project and was crucial in permitting the transfer of hydroelectric energy generated from rivers in the Sierra Nevada and Cascade mountain ranges to coastal urban centers hundreds of miles away. Baker and Bakic (2003) found that the substation building individually, and the Substation Control Center, which includes the substation building and associated tunnels, a switchyard, a garage, an office and warehouse building, four small, retired pump house structures, and historic landscaping are eligible for listing on the NRHP and CRHR as a district. No modifications to the Vaca-Dixon Substation are included in this Project, and its potential eligibility for listing will not be affected.

Paleontologic Resources

Geologic/Paleontologic Context. The major topographic features in Solano County are the Vaca Mountains in the northwest portion of the County and the Montezuma Hills in the southeast. The Vaca Mountains consist of uplifted Cretaceous and Tertiary rocks of the Great Valley Sequence. The Montezuma Hills are poorly consolidated sediments from the Pleistocene Montezuma Formation. A large, predominantly Quaternary alluvial plain extends throughout the east-central and northeastern parts of the County (EDAW, 2008).

Soils within the Project area fall into one of two groups. The first can be described as nearly level to moderately sloping, well drained to somewhat poorly drained soils on alluvial fans.

The second group includes soils that are nearly level to gently sloping, moderately well drained to very poorly drained soils on basin, alluvial fans, salt marshes or delta deposits. The average depth of soils varies widely from a couple of inches to several feet (NRCS, 1977). The geologic units directly underlying the soil are late Pleistocene and Pliocene-aged alluvium, which is generally derived from the erosion of the Sierra Nevada Range to the east and the Coastal Range to the west. Similarly aged geologic units are distinct along the western and eastern sides of the Central Valley due to their varied provenance.

Methods. Background research conducted for this Project consisted of a literature review and a fossil locality search. This research identified the geologic units, previous paleontological studies, fossil localities (i.e., locations at which paleontological resources have been documented), and types of fossils that may be within or adjacent to the Project area. An online fossil locality search was done on March 3rd, 2009, using the Berkeley Natural History Museum (BNHM) online database, specifically using data from the University of California, Museum of Paleontology (UCMP) in Berkeley. This database provides fossil locality data at the County level.

Results. UCMP records document that Solano County contains 198 fossil localities: 46 from the Cretaceous period, 130 from the Tertiary period, and 19 from the Quaternary period. These fossil localities include invertebrate, vertebrate, and plant fossils from the geologic units discussed below. Geological units are described by project area in stratigraphic sequence from oldest to youngest. The paleontological sensitivity is mentioned for each geologic unit. The geologic unit descriptions are based on the Environmental Impact Report for the 2008 Solano County General Plan. The locations where the geologic unit will be impacted by Project activity are noted with their descriptions.

Late Cretaceous Sandstone (Late Cretaceous: 100 – 65 ma). The stratigraphically oldest geologic unit within the Project area is the unnamed Late Cretaceous age Sandstone, which consist of a brown to brownish-gray, fine- to medium-grained sandstone (Graymer et al., 2002). There are no known fossils in this formation. However, the formation is associated with the Great Valley Sequence and as such has a medium to low paleontological sensitivity. This unit appears just north-west of the Peabody Substation and is unlikely to be impacted because it lies at the perimeter of the 250-foot buffer surrounding the nearby pull site.

Domengine Sandstone (Eocene: 55 – 35 ma). The Domengine Sandstone is gray-weathered, locally crossbedded white sandstone. This sedimentary marine formation contains invertebrate shells, including the highest diversity of mollusks reported from the Pacific Coast (Graymer et al., 2002). Fossils are also abundant in the coarse- to medium-grained calcareous sandstone concretions common to the lower part of this formation (Bailey, 1897). This formation is paleontologically sensitive and contains 12 recorded invertebrate fossil localities within the county. Outcrops of Domengine Sandstone are located north-west and south-east of the Peabody Substation.

The Markley Shale (Eocene: 55 – 35 ma). The Markley shale occurs most commonly in a thin band between the Montezuma and Potrero Hills. This light grey or white shale weathers yellow and tan, and contains sandstone locally. The Markley Formation has produced carbonized plant remains and microfossils such as foraminifera and diatoms (Graymer et al., 2002). Fossils are relatively abundant in the Markley Formation and thus the formation

has a low paleontological sensitivity. There are 14 recorded fossil localities for this formation in Solano County. Assemblages of abundant fossils, however, can still be significant. Outcrops of this formation are located approximately 2 miles north of the Peabody Substation underneath the transmission line.

Montezuma Formation (Plio-Pleistocene: 3.6 ma – 10 ka). Montezuma Formation is one of the most prominent quaternary formations in the project area. This formation makes up the majority of the Montezuma Hills between Collinsville and the City of Rio Vista. The Montezuma Formation is a delta-deposited conglomerate consisting of poorly consolidated reddish-orange mudstone, sands, silts, and gravels. The Montezuma Formation is highly fossiliferous (Savage, 1951; Stirton, 1951). Sixteen vertebrate fossil localities have been recorded from this formation within the county. Fossils typical of this formation represent Rancholabrean aged terrestrial faunas, and range from microvertebrate tooth and limb fossils of rodents, birds, amphibians and reptiles, to larger fossils from animals such as horse, deer, bison, and mammoths (Savage, 1951; Stirton, 1951; Bell et al., 2004). This formation has high paleontological sensitivity. The formation underlies the Project area for approximately 8 miles north from the Birds Landing Substation.

Pleistocene Alluvium (Pleistocene: 1.8 ma – 10 ka). The majority of sediments found within the Project area are alluvium that consists of sedimentary deposits that are Plio-Pleistocene in age. These sediments are less permeable in that they originate from basin, landslide intertidal, terrace, or riverbank deposit. Vertebrate fossils found in Late Pleistocene alluvium are representative of the Rancholabrean land mammal age from which many taxa are now extinct and include, but are not limited to, bison, mammoth, ground sloths, saber-toothed cats, dire wolves, cave bears, rodents, birds, reptiles, and amphibians (Bell et al., 2004; Helley et al., 1979; Hertlein, 1951; Savage, 1951; Stirton, 1951). The UCMP lists 14 Plio-Pleistocene fossil localities for this unit in Solano County. These alluvial deposits have a high paleontological sensitivity. Pleistocene-age alluvium is found surrounding the Peabody Substation as well as the Vaca Dixon Substation. Also, this geologic formation is found from approximately 8 miles north of the Birds Landing Substation to 13 miles north of the Birds Landing Substation.

Holocene Alluvium (Holocene: 10,000 ka – Recent). These Late Holocene alluvial deposits overlie older Pleistocene alluvium and/or the upper Tertiary bedrock formations and are locally only a few feet thick. This geologic unit consists of sand, silt, and gravel deposited in fan, valley fill, terrace or basin environments. The Holocene alluvium is typically found in smooth, flat valley bottoms, in medium-sized drainages, and other areas where terrain allows a thin veneer of this geologic deposit to accumulate, generally in shallowly sloping or flat environments (Graymer et al., 2002). These alluvial deposits contain vertebrate and invertebrate fossils of extant, modern taxa (Helley et al., 1979), which are generally not considered paleontologically significant. This geologic formation is found within the Project area from pull site P-6 to approximately five miles north of this point.

3.5.2 Regulatory Context

Federal

Section 106 of the National Historic Preservation Act. Section 106 (36 CFR Part 800) of the National Historic Preservation Act (NHPA) requires federal agencies to consider the effects of projects under their jurisdiction on properties listed or eligible for listing in the Nation

Register of Historic Places (NRHP) (16 USC 470 et seq.). The proposed Project is subject to Section 106 of the NHPA because it will require a permit from the US Army Corps of Engineers (USACOE) under Section 404 of the Clean Water Act (CWA). To determine whether a project undertaking could affect NRHP-eligible properties, cultural resources (including archaeological, historical, and architectural properties) must be inventoried and evaluated for listing in the NRHP. For compliance with Section 106 of the NHPA, the lead federal agency is required to consult with the State Historic Preservation Officer (SHPO) before granting permits, funding, or other authorization of the undertaking. The Section 106 process entails the six primary steps listed below:

1. Initiate consultation and public involvement.
2. Identify and evaluate historic properties within the APE.
3. Assess effects of the Project on historic properties.
4. Consult with the State Historic Preservation Office (SHPO) regarding adverse effects on historic properties, if applicable to the project, resulting in a memorandum of agreement (MOA).
5. Submittal of the MOA by the agency official (in this case, USACE to the Advisory Council on Historic Preservation) if necessary.
6. Proceed in accordance with the MOA, if applicable to the project.

National Register of Historic Properties. The National Register of Historic Places (NRHP) is a listing of historic properties maintained by the Secretary of the Interior that have been deemed to be worthy of protection. Historic properties include artifacts, records, and remains that are related to and located within such properties. They also can include properties of traditional religious and cultural importance to Indian tribes or Native Hawaiian organizations that meet NRHP criteria. Historic properties eligible for inclusion in the NRHP include both properties formally listed in accordance with regulations of the Secretary of the Interior and all other properties that meet the NRHP criteria. An archaeological site's significance is determined using the NRHP's Criteria for Evaluation at 36 CFR 60.4, which state that a historic property is any district, site, building, structure, or object:

A. that is associated with events that made a significant contribution to the broad patterns of our history (Criterion A);

B. that is associated with the lives of persons significant to our past (Criterion B);

C. that embodies the distinctive characteristics of a type, period, or method of construction, or that represents the work of a master, or that possesses high artistic values; or that represent a significant and distinguishable entity whose components may lack individual distinction (Criterion C); and/or

D. that has yielded, or may be likely to yield, information important in prehistory or history (Criterion D).

Archaeologists generally evaluate archaeological resources using Criterion D in order to determine their potential to yield information. Criterion D emphasizes the importance of the

information encompassed in an archaeological site rather than its inherent value as a surviving example of a particular architectural type or its historical association with an important person or event.

Buildings and structures less than 50 years old do not meet the NRHP criteria unless they are of exceptional importance under Criteria Consideration G as described in the National Park Service Bulletin No. 22, "*How to Evaluate and Nominate Potential National Register Properties that Have Achieved Significance within the Last 50 Years*."

If a cultural resource is determined to be eligible for inclusion in the NRHP, then it is automatically eligible for inclusion in the California Register of Historical Resources (CRHR). If a resource does not have the level of integrity necessitated by the NRHP, it may still be eligible for the CRHR, which allows for a lower level of integrity.

State

Cultural Resources

California Environmental Quality Act. The California Environmental Quality Act (CEQA) requires that public projects or projects financed or approved by State agencies must assess the effects of the project on cultural resources, including historical, archaeological, and paleontological resources. The CEQA Statute and Guidelines include procedures for identifying, analyzing, and disclosing potential adverse impacts to historical resources, which include all resources listed in or formally determined eligible for the NHRP, the CRHR, or local registers. CEQA further defines a "historical resource" as a resource that meets any of the following criteria:

- A resource listed in, or determined to be eligible for listing in, the National Register of Historic Places or California Register of Historical Resources.
- A resource included in a local register of historical resources, as defined in Section 5020.1(k) of the Public Resources Code, unless the preponderance of evidence demonstrates that it is not historically or culturally significant.
- A resource identified as significant (e.g., rated 1-5) in a historical resource survey meeting the requirements of Public Resource Code Section 5024.1(g) (Department of Parks and Recreation Form 523), unless the preponderance of evidence demonstrates that it is not historically or culturally significant.
- Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the determination is supported by substantial evidence in light of the whole record. Generally, a resource is considered "historically significant" if it meets the criteria for listing on the California Register of Historical Resources (CEQA Guidelines Section 15064.5).

Under Section 21083.2 of CEQA, a unique archaeological resource is an object, artifact, or site that can be clearly shown to meet any of the following:

- It contains information needed to answer important scientific research questions and there is a demonstrable public interest in that information;

- It has a special and particular quality, such as being the oldest of its type or the best available example of its type; or
- It is directly associated with a scientifically recognized important prehistoric or historic event or person.

California Register of Historical Resources. All resources listed in or formally determined eligible for the NRHP are eligible for the California Register of Historical Resources (CRHR). The CRHR is a listing of State of California resources that are significant within the context of California's history. The CRHR is a state-wide program of similar scope to the NRHP. In addition, properties designated under municipal or county ordinances are also eligible for listing in the CRHR. An historic resource must be significant at the local, state, or national level under one or more of the following criteria that are defined in the California Code of Regulations Title 14, Chapter 11.5, Section 4850:

1. It is associated with events or patterns of events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States; or
2. It is associated with the lives of persons important to local, California, or national history; or
3. It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master, or possesses high artistic values; or
4. It has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California or the nation.

The CRHR criteria are similar to NRHP criteria, and are tied to CEQA, as any resource that meets the above criteria is considered a historical resource under CEQA.

Paleontological Resources

Public Resources Code § 5097.5. California Public Resources Code § 5097.5 prohibits excavation or removal of any "vertebrate paleontological site, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands." Public lands are defined to include lands owned by or under the jurisdiction of the state or any city, county, district, authority or public corporation, or any agency thereof. Section 5097.5 states that any unauthorized disturbance or removal of archaeological, historical, or paleontological materials or sites located on public lands is a misdemeanor.

Fossil Significance Criteria. The Society of Vertebrate Paleontology (SVP) identifies vertebrate fossils, their taphonomic and associated environmental data, and fossiliferous deposits as significant nonrenewable paleontological resources. Botanical and invertebrate fossils and assemblages may also be considered significant (Conformable Impact Mitigation Guidelines Committee, 1995). Due to the rarity of fossils and the scientific information they provide, a resource can be considered significant if it meets any one of the following criteria (Scott and Springer, 2003.)

- The paleontological resource provides data on the evolutionary relationships and developmental trends among organisms, both living and extinct;

- The paleontological resource provides data useful in determining the age(s) of the geologic unit or sedimentary stratum, as well as timing of associated geological events;
- The paleontological resource provides data on a community level;
- The paleontological resource demonstrates unusual or spectacular circumstances in the history of life; and / or
- The paleontological resource is not abundant or found in other geographic locations and may be in danger of being depleted or destroyed by the elements or vandalism.

Significant paleontological resources must be diagnostic, or identifiable, to determine if many of the criterion above are applicable. Proper identification of paleontological resources is often impossible in the field, therefore the recovery, preparation and analysis of paleontological resources is necessary to determine their significance (Scott and Springer, 2003). This process must be done by, or under the supervision of, a qualified paleontologist (Conformable Impact Mitigation Guidelines Committee, 1995). Microvertebrate fossils are generally not visible to the naked eye in the field and are recovered in the laboratory through processing of bulk samples from paleontologically sensitive geologic units (Conformable Impact Mitigation Guidelines Committee, 1995; Scott and Springer, 2003).

Regulations Concerning the Discovery of Human Remains. California Public Resources Code §5097.98 (Notification of Native American human remains, descendants; disposition of human remains and associated grave goods) mandates that the lead agency adhere to the following regulations when a project results in the identification or disturbance of Native American human remains:

a) Whenever the commission receives notification of a discovery of Native American human remains from a county coroner pursuant to subdivision (c) of Section 7050.5 of the Health and Safety Code, it shall immediately notify those persons it believes to be most likely descended from the deceased Native American. The descendents may, with the permission of the owner of the land, or his or her authorized representative, inspect the site of the discovery of the Native American remains and may recommend to the owner or the person responsible for the excavation work means for treating or disposing, with appropriate dignity, the human remains and any associated grave goods. The descendents shall complete their inspection and make their recommendation within 48 hours of their notification by the Native American Heritage Commission. The recommendation may include the scientific removal and nondestructive analysis of human remains and items associated with Native American burials.

b) Whenever the commission is unable to identify a descendent, or the descendent identified fails to make a recommendation, or the landowner or his or her authorized representative rejects the recommendation of the descendent and the mediation provided for in subdivision (k) of Section 5097.94 fails to provide measures acceptable to the landowner, the landowner or his or her authorized representative shall reinter the human remains an items associated with Native American burials with appropriate dignity on the property in a location not subject to further subsurface disturbance.

c) Notwithstanding the provisions of Section 5097.9, the provisions of this section, including those actions taken by the landowner or his or her authorized representative to implement this section and any action taken to implement an agreement developed

pursuant to subdivision (l) of Section 5097.94, shall be exempt from the requirements of the California Environmental Quality Act (Division 13 (commencing with Section 21000)).

d) Notwithstanding the provisions of Section 30244, the provisions of this section, including those actions taken by the landowner or his or her authorized representative to implement this section, and any action taken to implement an agreement developed pursuant to subdivision (1) of Section 5097.94 shall be exempt from the requirements of the California Coastal Act of 1976 (Division 20 (commencing with Section 30000)).

Local

Although PG&E's project is not subject to local planning regulations, the following information is provided for general background information and environmental review.

Solano County General Plan. The 2008 Solano County General Plan includes certain goals and policies related to biological resources that fall under the strategic directions of "preserving the county's valued natural, cultural, and scenic resources" and "enhancing and restoring the natural environment and the county's diverse landscapes". The Solano County General Plan policies and regulations related to cultural resources include the following:

- RS.P-38: Identify and preserve important prehistoric and historic structures, features, and communities.
- RS.P-39: Tie historic preservation efforts to the County's economic development pursuits, particularly those relating to tourism.
- RS.P-40: Consult with Native American governments to identify and consider Native American cultural places in land use planning.
- RS.I-25: Require cultural resources inventories of all new development projects in areas identified with medium or high potential for archeological or cultural resources. Where a preliminary site survey finds medium to high potential for substantial archaeological remains, the County shall require a mitigation plan to protect the resource before issuance of permits. Mitigation may include:
  - Having a qualified archaeologist present during initial grading or trenching (monitoring);
  - Redesign of the project to avoid archaeological resources (this is considered the strongest tool for preserving archaeological resources);
  - Capping the site with a layer of fill; and/or
  - Excavation and removal of the archaeological resources and curation in an appropriate facility under the direction of a qualified archaeologist.
  - Alert applicants for permits within early settlement areas to the potential sensitivity. If significant archaeological resources are discovered during construction or grading activities, such activities shall cease in the immediate area of the find until a qualified archaeologist can determine the significance of the resource and recommend alternative mitigation.

3.5.3 Cultural Resources Impacts and Avoidance and Protection Measures

Cultural resource impacts are evaluated in accordance with the significance criteria contained in Appendix G of CEQA. Impacts to cultural resources could result from ground-disturbing activities and/or damage, destruction, or alteration of historic buildings. Ground-disturbing activities include Project-related excavation, trenching, or other subsurface disturbance that could damage or destroy buried archaeological resources including prehistoric and historic sites, human burials, or paleontological resources. Mechanisms that would cause damage, destruction, or alteration of historic buildings include Project-related demolition, damage, or alteration of historic buildings or their immediate surroundings that could impair the significance of a historic resource or adversely alter those physical characteristics of a historical resource that convey its historical significance. All PG&E standard practices will be incorporated into Project design as avoidance and protection measures to ensure potential Project impacts will be less than significant.

Impacts

a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?

Two historic period resources were identified within the Project area: the Ross Noonan Livestock Cannon Ranch and the Vaca-Dixon Peabody and Vaca-Dixon Birds Landing 230 kV transmission lines. The Ross Noonan Livestock Cannon Ranch site includes historic farm equipment, movable stock, and other structures within impact areas F-3 and P-7. The structures at this ranch represent activities from at least the 1930s. These potentially CRHR-eligible structures will be avoided during Project construction activities. The Vaca-Dixon Peabody and Vaca-Dixon Birds Landing 230 kV transmission lines were constructed in the 1940s. The Project will require altering the transmission lines by modifying towers including arm and cage extensions, and by replacing the conductor. These lines were evaluated for their potential eligibility for listing in the CRHR and the NRHP and were found to be ineligible (Garcia and Associates, 2009). The proposed Project will therefore cause no substantial adverse change in the significance of a historical resource, and no mitigation measures are required.

b) Cause a substantial adverse change in the significance of a unique archaeological resource pursuant to §15064.5?

Impact CULT-1. The sensitivity for the discovery of buried archaeological resources within the Project area is considered low based on the combination of the extremely limited amount of Project-related ground disturbance and the limited portion of the Project area that is underlain by Holocene aged soils, soils which have the potential to contain prehistoric living surfaces. Background research, consultation, and pedestrian surveys did not result in the identification of any archaeological resources within the Project area. However, there is a possibility that previously unidentified archaeological resources will be encountered during Project-related ground-disturbing activities. Buried historic features could include filled privies, wells, trash and pits, along with concentrations of adobe, stone, or concrete walls or foundations, and concentrations of ceramic, glass, or metal materials. Native American archaeological materials could include obsidian and chert flaked stone tools (such as projectile points and knives), midden (darkened soil created culturally from

use and containing heat-affected rock, artifacts, animal bones, or shellfish remains), and/or groundstone implements (such as mortars and pestles). Incorporation of APM CULT-1 into the Project will ensure that potential impacts related to the discovery of buried archeological resources will be less than significant.

c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Impact CULT-2. The likelihood of discovery of paleontological resources for the Project is considered low based on the extremely limited horizontal parameters of Project related ground disturbance. However, given the high paleontological sensitivity of some of the stratigraphic units within the Project area, particularly Pleistocene alluvium, there is some, probably low, potential for encountering previously unidentified paleontological resources during Project-related ground-disturbing activities. Incorporation of APM CULT-2 into the Project will ensure that potential impacts related to the discovery of unanticipated paleontological resources will be less than significant.

d) Disturb any human remains, including those interred outside of formal cemeteries?

Impact CULT-3. There is no indication that the Project work areas have been used for burial purposes in the recent of distant past; it is therefore unlikely that human remains would be encountered during construction. However, archaeological materials, historical and prehistoric, may be present within the Project area and the possibility of encountering human remains cannot be discounted. Section 7050.5 of the California Health and Safety Code, states that it is a misdemeanor to knowingly disturb a human grave. Incorporation of APM CULT-3 into the Project will ensure that potential impacts related to the discovery of human remains will be less than significant.

Avoidance and Protection Measures

The avoidance and protection measures listed below are standard practices of PG&E. As all identified avoidance and protection measures, including those that are standard practices, will be implemented as part of Project design, potential impacts to cultural resources will be reduced to less than significant levels and no mitigation measures are required.

APM CULT-1. If concentrations of prehistoric or historic-period materials are encountered during ground-disturbing work at any of the Project work sites, all work in the immediate vicinity of the discovery shall be halted until a qualified archaeologist can evaluate the significance of the find. If the find is determined to be significant, PG&E shall determine the appropriate avoidance measures or other appropriate mitigation in consultation with a qualified archaeologist and the State Water Resources Control Board. Significant cultural materials shall be curated according to current professional standards.

APM CULT-2. If unanticipated paleontological resources are discovered during ground-disturbing activities during the Project, excavations in the immediate vicinity of the find shall be temporarily halted until the discovery is examined by a qualified paleontologist per Society of Vertebrate Paleontology standards (SVP 1995). If the find is determined to be significant, PG&E shall determine the appropriate avoidance measures or other appropriate mitigation in consultation with a qualified paleontologist and the State Water Resources Control Board. Significant paleontological finds shall be curated according to current professional standards.

APM CULT-3. If human remains are encountered, work in the immediate vicinity shall stop and the County Coroner shall be notified immediately. A qualified archaeologist shall be contacted immediately to evaluate the discovery. If the human remains are of Native American origin, the Coroner must notify the Native American Heritage Commission within 24 hours of this identification. The Native American Heritage Commission then has 48 hours to identify a Most Likely Descendent.

3.6 Geology and Soils

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
(a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
(i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☑	☐
(ii) Strong seismic ground shaking?	☐	☐	☑	☐
(iii) Seismic-related ground failure, including liquefaction?	☐	☐	☑	☐
(iv) Landslides?	☐	☐	☐	☑
(b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☑	☐
(c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☐	☑

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
(d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☑
(e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☑

3.6.1 Geologic Hazards

The Project site is in a seismically active area. Several active or potentially active faults occur in the Project vicinity. Closest to the line segments proposed for reconductoring are the Vacaville-Kirby Hills fault to the West and the Great Valley Thrust Segments 4 and 5 (Solano Co., 2008). The Vacaville-Kirby Hills fault has shown Holocene fault movement as recently as the 1970's and is considered an active fault (Ecology and Environment, 2006). The poorly mapped Great Valley Thrust fault may be a blind thrust fault and, therefore, does not show up on most geologic maps. The USGS has estimated the recurrence time of quakes on the Great Valley Thrust as 450 years. A number of large historic earthquakes have occurred on this fault system, and, as such, an earthquake on the Coast Range-Central Valley Faulty system could cause significant seismic shaking at the site. The potential for fault rupture under a portion of the transmission line could exist through a known or an unknown fault, or through sympathetic movement resulting from an event on another fault in the region (such as the currently inactive Midland-Rio Vista fault), but the likelihood is considered to be low as most earthquakes do not result in fault rupture. As the Project involves reconductoring existing transmission lines, no new impacts related to fault rupture, ground shaking, or seismic liquefaction will occur.

Landslide potential is high in steeply sloped areas with alluvial soils. As would be expected, the potential for landslides is greatest in areas underlain by or adjacent to previous landslides. Previous landslides in Solano County occurred along the Vaca and Sulphur Spring Mountains west of the Montezuma Hills (Ecology and Environment, 2006). The topography of the proposed Project area is considerably less steeply sloped than the areas where these landslides occurred. The Project is generally located on the western edge of the Great Valley ecological sub-region with the majority of the transmission lines located in the Sodic Claypan terraces subsection, which occur on the broad alluvial plains on the lower west side of the Sacramento Valley. Elevations in this region typically range from 20 to 120 feet and, in the Project area, have a slope less than 4% (Solano Co., 2008). A small section of the transmission line, as well as the Birds Landing Substation, are located in the Montezuma Hills subsection, which is characterized by low rolling hills with elevations up to 268 feet. As the Project involves the reconductoring of exiting transmission lines and is located

almost exclusively in a low elevation relatively flat plain, no impacts related to landslide hazards will occur.

3.6.2 Erosion

Construction of the Project involves minimal ground disturbance. Substation improvements will be restricted to areas within existing substation boundaries that have been previously disturbed and are now graded and graveled. Preventative BMPs will be implemented to protect against soil erosion and maintain water quality during construction. BMPs will be described in the Project Stormwater Pollution Protection Plan (SWPPP), and may include silt fences, straw wattles, or temporary berms, stockpiling soils at least 100 feet from drainages, and installing hydroseed and straw mulch after construction is completed. As a result, Project construction is not expected to be a significant source of erosion of exposed soils due to wind or water and potential erosion impacts will be less than significant.

3.6.3 Soils

Soils throughout the region are derived from marine and non-marine sediments deposited on the alluvial plain of the lower Sacramento River. Nine mapped soil units are associated with the 17 pull sites and 9 fly sites (Figure 1-1.) Soils units in the Project area include the Altamont–San Ysidro–San Benito Complex, Antioch–San Ysidro Complex, Capay Silty Clay Loam, Clear Lake Clay, Diablo–Ayar Clays, Rincon Clay Loam, San Ysidro Sandy Loam, Solano Loam, and Solano–Pescadero Complex. The Altamont and Diablo clays that occur throughout the Project region have a medium to high water capacity and, as such, are potentially expansive (Ecology and Environment, 2006). However, because the Project involves reconductoring an existing transmission line and requires no foundation work on existing poles or installation of new poles, no new on- or off-site impacts related to landslides, lateral spreading, subsidence, liquefaction, collapse, or expansive soils will occur.

The Project does not include or require septic tanks or other wastewater disposal systems. Construction workers will use contractor-supplied portable toilets, the wastewater from which will be taken off-site to a wastewater treatment facility for processing. Therefore potential impacts from these systems would not occur.

3.7 Hazards and Hazardous Materials

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
(a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☑	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
(b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☑	☐
(c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☑
(d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment? (2)	☐	☐	☐	☑
(e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☑
(f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☑
(g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☑	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
(h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☑	☐

3.7.1 Hazardous Materials Risks

The construction activities associated with this Project in general do not pose a hazardous materials risk; however, construction equipment will require refueling and maintenance. These activities would be done at the beginning or end of a workday when equipment is located in the staging area, where any accidental spills or releases would be easily contained and addressed through implementation of standard construction Best Management Practices. Operation of the Project would not require the transport, use, or disposal of hazardous materials.

The proposed Project is not located within one-quarter mile of any existing or proposed schools. The nearest school is Vanden High School, which is located approximately 0.33 miles southeast from the nearest stretch of line, just north of the Peabody Substation. Adjacent to the south and east of the high school are Golden West Middle School, Community Day School, Travis Education Center, and Travis Independent Study; all part of Travis ESD. Other than Center Elementary School and Sierra School of Solano County, all other schools are located more than a mile away from the Project. Please refer to the Noise discussion for a complete list of sensitive receptors.

Project construction will not require any grading or excavation. Ground disturbance will be limited to as-needed temporary improvements, such as those for stability and dust control along access routes and at laydown areas and fly sites. As no excavation or grading is planned, no impacts related to disturbance of existing ground contamination will occur.

3.7.2 Aviation Safety

Several airports occur in the Project vicinity. The Vacaville Nut Tree (VCB) Airport is located 2 miles from the transmission line, west of I-80 just south of Vaca Valley Parkway. This airport is open to public use. The Travis AFB Areo Club, which is located approximately 1 mile south of the Peabody Substation, closed to air traffic in 2006. The largest air strip in the Project vicinity is associated with Travis AFB. At the northeast runways nearest proximity, it is approximately 0.65 miles from the eastern leg of the Project (Figure 1-1.) This is a military facility and not available for to public air traffic.

As discussed in Section 2.0, the Project will require tower modifications to accommodate the new, heavier conductor. Structural modifications will include cage extensions, arm

extensions and the raising of some towers. All tower work will be preformed by helicopter with the exception of a few towers located near a golf course. In the most environmentally sensitive areas, helicopters will bring in workers, tools, and equipment. The use of helicopters for Project construction presents the greatest potential impact related to aviation hazards.

The Federal Aviation Administration (FAA) requires a Lift Plan for use of helicopters in populated areas. The Lift Plan includes identification of helicopter staging areas and flight paths with the least potential to affect populated areas within the distances specified by FAA. The helicopters will return to the Vacaville airport, or on an appropriate paved area at the conclusion of each work day. Criteria for selection of non-work hours landing zone include centralized location, large paved unobstructed area, minimal dust, and separation from the public so as to not impede normal commerce or create a safety hazard.

Prior to commencing reconductoring Project activities, as part of the reconductoring Project plans, PG&E would obtain all required FAA clearances and other aviation clearances as necessary to perform the activities requiring use of a helicopter. PG&E would adhere to any requirements of the FAA. As a result, this impact will be less than significant and no mitigation is required.

3.7.3 Interference with Emergency Plans

Some temporary lane or road closures of I-80 and SR 12 may be required during installation of guard structures or during reconductoring work over these roadways. A construction Traffic Management Plan will be developed and implemented to manage impacts related to potential road closures. The construction Traffic Management Plan, which will address the use of flaggers and coordination with Caltrans, local schools, and local businesses, is discussed in greater depth in the Traffic and Transportation section of this document. As a routine construction measure, emergency access and evacuation procedures will be developed and implemented as part of the on-site health and safety plan.

3.7.4 Wildfires

The Project area encompasses a mix of rural agricultural areas (in the northern portions of the Project) and open grassland areas (in the southern portion of the Project near Birds Landing Substation in the Montezuma Hills) that have the potential to experience wildland fires. No areas with extreme or high wildfire risk are located in or near the Project areas, including in the vicinity of the Montezuma Hills.

During construction, portions of the Project will be constructed in existing PG&E transmission ROW that traverses open grass areas and are susceptible to wildland fires as discussed above. Heat or sparks from vehicles or equipment have the potential to ignite dry vegetation and cause a fire. As part of the reconductoring Project design and plans, PG&E will require that vehicles and equipment primarily use existing roads to access the transmission tower sites. Project personnel will be directed to park away from dry vegetation and will be required to carry water, shovels, and fire extinguishers in times of high fire hazard. PG&E will also prohibit trash burning and restrict smoking to cleared areas. By implementing these preventative measures, the potential for fire will be reduced to less than significant levels and no mitigation is required.

During operation of transmission lines, lines may pose a fire hazard when a conducting object, such as a tree limb, comes into contact with a power line. However, PG&E will ensure electrical clearances are maintained during the life of the power line to reduce the fire hazard potential. Conductors can also be a fire hazard if they fall to the ground and create an electrical arc that ignites combustible material. During mechanical and structural design, selection of materials, and construction of power lines, PG&E takes into account normal and unusual structural loads, such as ice and wind that can break conductors. Also, PG&E installs high-speed relay equipment that senses a broken line and activates circuit breakers to quickly de-energize the line. These incorporated measures are proven safety measures and will ensure that the risk of fire during operation will be less than significant and therefore, no mitigation is required.

3.8 Hydrology and Water Quality

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
(a) Violate any water quality standards or waste discharge requirements?	☐	☐	☑	☐
(b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)? (3)	☐	☐	☑	☐
(c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☐	☑

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
(d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☐	☑
(e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☑
(f) Otherwise substantially degrade water quality?	☐	☐	☐	☑
(g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☑
(h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☑
(i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☑
(j) Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☑

3.8.1 Setting

Climate

Solano County has a Mediterranean climate characterized by warm, dry summers and cold, moist winters. The majority of annual precipitation in the County occurs as rain during the wet season which extends from October to April. The rainfall distribution in the County is

affected significantly by topography, with concentrated rainfall associated with the Vaca Mountains occurring near the County's western border and decreasing levels of precipitation to the east. The average annual precipitation for the County as a whole is 20 inches (West Yost, 1999).

Surface Water Resources

The Project is entirely within Solano County and lies within two major drainage provinces, the Sacramento River/Delta Drainage Province and the San Francisco Bay Drainage Province. Surface water resources in Solano County include creeks, drainages, sloughs, and other wetlands, as well as major water bodies including the Sacramento-San Joaquin Delta, Suisun Bay, and San Pablo Bay. Most of the County's water needs are supplied by Putah Creek and Lake Berryessa through the Solano Project, a Bureau of Reclamation water storage project. Solano County also contains Suisun Marsh, the largest contiguous brackish marsh remaining on the west coast of North America (EDAW, 2008).

The potential jurisdictional waters within the Project area are seasonal wetlands specifically consisting of vernal pools associated with Antioch-San Ysidro complex and Clear Lake Clay soils (CH2M HILL, 2008). The seasonal wetlands are all within approximately 0.7 mile of Calhoun Cut, a tributary to Lindsey Slough, which eventually flows into the Sacramento River. Overall landscape drainage in this area flows east-northeast into Calhoun Cut. While the vernal pools in this area do not have a direct hydrologic connection with Calhoun Cut, these and other wetlands throughout the Valley Putah-Cache Creek Watershed play a significant role in maintaining the chemical, biological, and physical properties of the waters in this area (Zedler, 2003; Rodriguez, 2007).

The seasonal wetlands located north of Creed Road, as shown on Figure 3-8, were mapped based on aerial photography and were subsequently verified by field reconnaissance surveys. The only wetland identified that falls within the proposed access road, is located less than one-quarter mile north of Creed Road. Two seasonal wetlands were identified within Pull Site 12 during the January and February 2008 surveys (CH2M HILL, 2008a).

Swale features identified in the Project area are associated with Clear Lake clay and Capay silty clay loam soils. Several swale features were identified in close proximity to the proposed work areas including the access road north of Kilkenny Road (Figure 3-7) and the access road and pull site south of Creed Road (Figure 3-9) (CH2M HILL, 2008).

Several roadside drainages are present along the Project route. Several guard structures would be located adjacent to these drainages but no Project-related impacts are expected to occur. Most of the roadside drainages are located in the mixed agricultural and residential areas. These drainages typically range from 1 to 3 feet wide and are either unvegetated or support sparse ruderal vegetation along their upper edges. The roadside drainage north of Maple Road appears to be a realigned and channelized natural drainage that is tributary to Ulatis Creek. It is approximately 5-feet wide and contains scattered ryegrass along the edges of the banks.

A few miscellaneous drainage features are present in the Project vicinity, including one drainage feature located within the work area for Pull Site 7. This drainage feature is a small channel (0.01 acre) formed as the result of discharge from the stormwater collection basin at the Peabody substation. Water flows to the southwest for a short distance and then dissipates as sheet flow through a grassland swale area characterized by ryegrass.

Groundwater Resources

Groundwater basins within Solano County include the Napa-Sonoma Lowlands subbasin of the Napa–Sonoma Valley basin, the Suisun–Fairfield Valley basin, and the Solano and Yolo Valley subbasins of the Sacramento Valley Basin (EDAW, 2008). The largest groundwater basin in the County is the Solano subbasin, located in the northeastern portion of the County. Groundwater in the Solano subbasin is generally of good quality, although concentrations of certain contaminants, including Total Dissolved Solids (TDS), boron, arsenic, and manganese, are at or near the appropriate Maximum Contaminant Level (MCL) in certain areas. The Suisun-Fairfield Valley basin is the second largest groundwater basin in the County but is not significantly relied upon for groundwater supply due to low yields and poor water quality (EDAW, 2008).

Historically, groundwater was used extensively in Solano County for both irrigation and municipal use. The resulting groundwater overdraft was a factor in the development of the Solano Project, the federal dam project that created Lake Berryessa. The County's groundwater levels have since rebounded and are generally stable. The Cities of Rio Vista, Dixon, and Vacaville still get all or part of their municipal water supply from groundwater (EDAW, 2008).

3.8.2 Regulatory Context

Federal

The Clean Water Act (CWA) is the major federal legislation relating to water quality. Implementation of the CWA is managed by the EPA; however, other agencies have been delegated primary regulatory responsibility for certain sections of the Act.

Section 401 of the CWA requires a project that discharges a pollutant into waters of the United States to obtain certification that the project will not violate water quality standards. In California, the State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs) have the primary responsibility for administering state and federal regulations related to water quality, including Section 401 water quality certification.

Section 402 of the CWA established the National Pollutant Discharge Elimination System (NPDES), which requires any discharge of pollutants into waters of the United States to be in compliance with a NPDES permit. In California, stormwater discharges associated with construction activities are covered by a statewide General Permit. This General Permit requires that a project with more than one acre of ground-disturbing activity:

- Develop and implement a Stormwater Pollution Prevention Plan (SWPPP) specifying Best Management Practices (BMPs) that will prevent all construction pollutants from contacting stormwater and with the intent of keeping all products of erosion from moving off site into receiving waters.
- Eliminate or reduce non-stormwater discharges to storm sewer systems and other waters of the nation.
- Perform inspections of all BMPs.

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP), which subsidizes flood insurance to communities that limit development in floodplains. As part of this program, FEMA maps all U.S. areas that fall within a 100-year floodplain, i.e. areas with a greater than 1% annual probability of flooding.

State

The Porter-Cologne Water Quality Act provides the basis for water quality regulation in California. The Act requires the nine RWQCBs to adopt water quality control plans that recognize the unique characteristics of each region with regard to natural water quality, actual and potential beneficial uses, and existing water quality problems. The SWRCB and the RWQCBs have the authority under this act to regulate waste discharge to surface waters or land, and also to provide the certification required by Section 401 of the CWA as described above.

Executive Order W-59-93, signed by Governor Pete Wilson, established a policy of no overall net loss and long-term net gain in the quantity, quality, and permanence of wetlands acreage and values in California. The 1993 California Wetlands Conservation Policy established a framework and strategy for fulfilling the objectives of the Executive Order (CWCP, 1993).

The SWRCB and RWQCBs are currently in the process of developing a Statewide Wetland and Riparian Area Protection Policy (SWRAPP). This policy is a response in part to the 2001 U.S. Supreme Court decision in *Solid Waste Agency of Northern Cook County (SWANCC) vs. U.S. Army Corps of Engineers* that certain isolated waters are not subject to CWA jurisdiction solely because they are frequented by migratory birds that cross state lines (Baggett 2004). The SWRAPP will provide consistent protection for all waters of the State regardless of whether they are USACE-jurisdictional. The first phase of the policy will be completed in 2009 and will: develop a definition of wetlands in California; develop a policy to provide protection from dredge and fill activities; design a wetland regulatory mechanism with a watershed focus based on CWA 404(b) (1) Guidelines; and design wetland assessment method(s) to monitor wetland protection and program effectiveness (Orne et al., 2008).

Under Sections 1600-1607 of the California Fish and Game Code, CDFG regulates activities that would alter the bed, channel, or bank of any river, stream, or lake designated by the department in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit. CDFG is also authorized to develop mitigation measures and to enter into a streambed alteration agreement with applicants that propose a project that would adversely affect a river or stream, including intermittent and ephemeral streams.

CEQA Guidelines Section 15206 specifies that a project shall be deemed to have a significant impact if it would substantially affect sensitive wildlife habitats, including but not limited to riparian lands, wetlands, bays, estuaries, marshes, and habitats for rare and endangered species as defined by CFGC Section 903.

Local

Solano County lies within two major drainage basins and the Project area is within the jurisdiction of both the San Francisco RWQCB and the Central Valley RWQCB. Water Quality Control Plans have been prepared for each region which define beneficial uses,

qualitative and quantitative water quality objectives, and implementation and monitoring programs (EDAW, 2008).

Solano County Water Agency (SCWA) is responsible for delivering water to water service agencies from the federal Solano Project and the North Bay Aqueduct. SCWA is also responsible for flood control and for monitoring efforts to mitigate stormwater runoff (EDAW, 2008; Solano County, 2008). SCWA's Integrated Regional Water Management Plan recommended strategies to address these and other issues related to water supply and water quality.

The Resources Chapter of the 2008 Solano County General Plan contains several policies related to hydrology and water quality:

- RS.P-65: Require the protection of natural water courses.
- RS.P-66: Together with the Solano County Water Agency, monitor and manage the county's groundwater supplies.
- RS.P-67: Encourage new groundwater recharge opportunities.
- RS.P-68: Protect existing open spaces, natural habitat, floodplains, and wetland areas that serve as groundwater recharge areas.
- RS.P-69: Preserve and maintain watershed areas characterized by slope instability, undevelopable steep slopes, high soil erosion potential, and extreme fire hazards in agricultural use. Watershed areas lacking water and public services should also be kept in agricultural use.
- RS.P-70: Protect land surrounding valuable water sources, evaluate watersheds, and preserve open space lands to protect and improve groundwater quality, reduce polluted surface runoff, and minimize erosion.
- RS.P-71: Ensure that land-use activities and development occur in a manner that minimizes the impact of earth disturbance, erosion, and surface runoff pollutants on water quality.
- RS.P-72: Preserve riparian vegetation along county waterways to maintain water quality.
- RS.P-73: Use watershed planning approaches to resolve water quality problems. Use a comprehensive stormwater management program to limit the quantity and increase the water quality of runoff flowing to the county's streams and rivers.
- RS.P-75: Require and provide incentives for site plan elements (such as permeable pavement, swales, and filter strips) that limit runoff and increase infiltration and groundwater recharge.
- RS.I-71: Require proposed projects located within the Putah Creek and Ulatis Creek watersheds to minimize project-related stormwater runoff and pollution. Stormwater runoff and pollution loads resulting after development of projects shall not exceed predevelopment conditions.

The Solano County Grading and Erosion Control Ordinance (Chapter 31 of the County Code) regulates construction and maintenance activities that involve ground disturbance to protect downstream waterways and wetlands by setting standards to control soil erosion, sedimentation, increased rates of water runoff, and related environmental damage.

3.8.3 Hydrology and Water Quality Impacts and Avoidance Measures

a) Would the project violate any water quality standards or waste discharge requirements?

PG&E has submitted an application for water quality certification pursuant to Section 401 of the Clean Water Act. The proposed Project's potential impacts to water quality will be regulated and any additional actions required by the SWRCB will be incorporated into the Project.

Potential water pollutants associated with the Project would be generated during the construction phase and could include soil sediment and petroleum-based fuels or lubricants. The Project involves ground-disturbing activities that could cause soil erosion and release of excess sediment into water courses, such as the establishment of fly sites and pull sites, installation of ground rods and crossing structures, and temporary road improvements. No mowing or grading has been proposed for temporary roads or works areas; however, areas used during the wet season may require placement of geotextile fabric and four to six inches of gravel to improve stability. Excess sediment in water courses can alter and degrade in-stream aquatic habitat. If construction equipment or workers inadvertently release pollutants such as hydraulic fluid or petroleum, these materials could be entrained by stormwater and discharged into surface waters, thereby degrading water quality. Potential pollutant sources would be present during the construction phase of the Project only, and would not be of concern during Project operation.

Potential adverse effects to water quality will be avoided by implementing construction Best Management Practices (BMPs) as outlined in the California Stormwater Quality Association's Construction Handbook (CASQA, 2003). These BMPs are standard in the construction industry and are commonly used to protect water quality. All standard practices and BMPs are being incorporated into Project design as avoidance and protection measures (APMs). PG&E's Stormwater Pollution Prevention Plan (SWPPP) and erosion control BMPs will be used to minimize any wind- or water-related soil erosion. Avoidance and protection measures will include:

1. No discharge of pollutants from vehicle and equipment cleaning are allowed into the storm drain or water courses.
2. Vehicle and equipment fueling and maintenance operations must be at least 50 ft away from vernal pools and other aquatic habitat.
3. Dust control will be implemented, including the use of water trucks to control dust in disturbed areas; rocking temporary access road entrances and exits; and placement of geotextile mats and rock on access road areas to be used in the wet season.
4. Disturbed work areas will be restored to pre-Project conditions, and reseeded if appropriate.

Implementation of these APMs will ensure that Project water quality impacts will be less than significant, and therefore, no additional mitigation measures are required.

b) Would the project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

The Project is not expected to deplete groundwater supplies. Some excavations may be required for installation of ground rods and crossing structures; it is possible that in areas where the water table is shallow, some groundwater seepage could occur, requiring dewatering prior to placement of ground rods or crossing structures. Excavation water would be discharged to open ground on site, in accordance with standard BMPs as outlined in the SWPPP. The dewatering process would be temporary, yielding only a small volume of groundwater, and therefore would not significantly impact groundwater supply.

The Project is not expected to interfere substantially with groundwater recharge. No new impervious surfaces are proposed for the Project. Temporary roads and work areas used during the wet season will be covered with a geotextile fabric and four to six inches of gravel, which is not expected to interfere with groundwater percolation. Therefore, impacts to groundwater would be less than significant.

c) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?

And

d) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

The Project will not permanently alter the drainage pattern of the site or area. The Project will temporarily alter the drainage pattern of the area by placing geotextile fabric and gravel in seasonal wetlands; however, this work will be conducted during the dry season and all temporary fill will be removed before the start of the wet season. Therefore, the temporary alteration of the drainage pattern of the site will not result in any increase in erosion or siltation or increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site. No impact is anticipated, and no mitigation measures are required.

e) Would the project create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

The Project will not create an increased volume of runoff water. No additional permanent paved surfaces will be required, and appropriate BMPs will be used during construction activities to control runoff. No impact is anticipated, and no mitigation measures are required.

f) Would the project otherwise substantially degrade water quality?

All areas of ground disturbance will be revegetated following construction. Temporary impacts to water quality will be avoided by implementation of a SWPPP and BMPs during construction as outlined in (a), above. Therefore, the Project will not create a substantial additional source of polluted runoff or substantially degrade water quality. No impact to water quality is anticipated, and no mitigation measures are required.

g) Would the project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

And

h) Would the project place within a 100-year flood hazard area structures which would impede or redirect flood flows?

And

i) Would the project expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

And

j) Would the project be exposed to inundation by seiche, tsunami, or mudflow?

The Project is a modification of an existing transmission line and does not include new housing or new above-ground structures. The Project will not expose people to risk related to the failure of any dams or levees. The Project site is inland and not in an area subject to seiche, tsunami, or mudflow and therefore no impacts would occur.

3.9 Land Use and Planning

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
(a) Physically divide an established community?	☐	☐	☐	☑
(b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☑

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
(c) Conflict with any applicable Habitat Conservation Plan or Natural Community Conservation Plan?	☐	☐	☐	☑

The Project will reconductor an existing 230 kV transmission line and will not modify the alignment in any manner that would impact any established communities.

Public utilities are not subject to local zoning and land use controls; nevertheless, the Project is consistent with local general plan requirements and zoning codes. The Solano County General Plan designated most of the land on which the transmission lines cross as "Agriculture." The western branch of the proposed reconductoring route (Cypress Hills Golf Course to Peabody substation) extends through land designated "Agriculture" and "Urban Industrial." The remaining portion of the transmission line runs through land designated "Agriculture."

There are scattered low density residential areas near the Vaca Dixon substation. The highest concentration of residences is near the Peabody substation. There are also three schools (Vanden High School, Golden West Middle School and Center Elementary School) less than one mile east of the Peabody substation. The transmission line already exists and as such, the reconductoring of the existing line is not expected to impact these residential or educational facilities. Additionally, the Project would not conflict with any adopted land use plans or policies.

The Solano County Water Agency (SCWA) and member agencies have developed a Multi-Species Habitat Conservation Plan (HCP) for the Solano Project contract service area (SCWA, 2007). The service area encompasses the entirety of Solano County and a portion of Yolo County, and accounts for all activities undertaken by or under the permitting authority and control of the member agencies. The plan area supports unique habitats, numerous vegetation communities, and 71 "covered species." The Project route traverses through all three zones of the plan: **Zone 1-Urban**; **Zone 2- SCWA and Irrigation Districts and Reclamation District Boundaries**; and **Zone 3-Remainder of the County**. In addition, some areas of the Project route occur in the high and medium value **Vernal Pool Conservation Areas**. Potential impacts to Biological Resources are discussed in the respective section. No impacts to Land Use are anticipated.

3.10 Minerals

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
(a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☑
(b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☑

According to the Solano County Land Use and Circulation Element, many significant mineral resources can be found in Solano County, including natural gas, sand, gravel, rock and other fill material, and sandstone (Solano County Planning Department 2003). Clay and gas are extracted from the Suisun Marsh and eastern County area, while salines are taken from the Napa Marsh area. Sand, crushed gravel, and stone are mined in the Vallejo-Benicia Hills, Potrero Hills, and Wolfskill and Putah Creek areas. There are also mercury deposits in the Vallejo-Benicia Hills area and a large gas field in Rio Vista (Shiloh II Wind Project Draft EIR, 2006). There are no known mineral resources within the Project area and therefore, no impacts will occur to mineral resources from implementation of the Project.

3.11 Noise

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
(a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☑	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
(b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☑	☐
(c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☑
(d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☑	☐
(e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☑
(f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☑

Noise sensitive receptors are facilities or areas (e.g., residential areas, hospitals, schools, etc.) where excessive noise may convey annoyance. Noise sensitive receptors are clustered in several distinct portions of the Project alignment. Single-family and multi-family homes are common primarily south and west of the Vaca-Dixon Substation associated with the City of Vacaville, and to the north and south of Peabody Substation associated with Vacaville Junction, Cordero Junction, and Travis AFB. Schools, religious facilities, hospitals, and parks are also present near the alignment in these suburban areas. Sensitive receptors within 1.5 miles of the Project are listed in Table 3-7.

TABLE 3-7
Sensitive Receptors within 1.5 miles of the Project area
Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Sensitive Receptor	Distance to Nearest Portion of Reconductored Line
Schools	
Fred Finch Youth Center	1.2 miles
Cooper ES	1.32 miles
Sierra School of Solano County	0.73 miles
Jean Callison Elementary	1.25 miles
Kindercare Learning Center	1.4 miles
La Petite Academy	1.4 miles
Foxboro ES	1.57 miles
Vanden HS	0.33 miles
Golden West MS & Travis Education Center/Community Day School/Travis Independent Study	0.35 miles
Center ES	0.58 miles
Travis Head Start Center	1.21 miles
Scandia ES	1.33 miles
Travis ES	1.34 miles
Medical Facilities	
Vacaville Convalescent & Rehab	1.55 miles*
Churches	
Faith Missionary Baptist Church	0.6 miles
Valley Evangelical Free Church	0.4 miles
Mission	0.8 miles
Faith Family Bible Church	1.2 miles
Word of Faith Christian Center & Calvary Chapel of Fairfield	1.2 miles
Son Rise Community Fellowship & Souls Ministries	1.3 miles
Restoration Praise & Worship	1.3 miles
Oasis foursquare church	0.68 miles
Covenant Community Church	0.9 miles
Base Chapel (TAFB)	0.68 miles
Parks	
Stonegate Park	0.95 miles
Cooper School Park	1.4 miles

TABLE 3-7
Sensitive Receptors within 1.5 miles of the Project area
Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Sensitive Receptor	Distance to Nearest Portion of Reconductored Line
Pocket Park	1.1 miles
Patwin Park	1.27 miles
Meadowlands Park	1.25 miles
Cambridge Park	1.1 miles
Cannon Station Park	1.03 miles
Arlington Park	1.46 miles
Nelson Park	1.55 miles*

Notes: Distance measurements are approximate and have been made using Google Earth.

* while this facility appears to be over 1.5 miles from the reconductored line or identified fly sites, the variance in measuring accuracy is likely enough that these sites have been included to be conservative.

Existing ambient noise in the Project vicinity has not been measured. Generally speaking, the Project falls within primarily rural and agricultural areas where the ambient noise levels are low and sensitive receptors are scarce. Identified sensitive receptors listed in Table 3-7 above, are concentrated in suburban and urban areas where ambient noise levels are expected to be higher.

According to the Solano County Health and Safety Element of the Solano County General Plan, interior noise levels for residences at or below 45 dB are acceptable, allowing for normal communication. Outside, noise levels can be slightly higher; the United States Environmental Protection Agency (EPA) has set the established outdoor noise level at 55 dB or below as acceptable. At this level, people can engage in normal conversation at distances of up to 6 feet but less than 12 feet. Louder noises may be categorized as a nuisance.

The use of construction equipment would generate noise that would be temporarily added to existing noise levels in the Project Area. Typical noise emission levels for heavy-duty construction equipment (by general type) that will be required for Project construction are presented in Table 3-8.

For the reconductoring activities, helicopters would also be used to facilitate construction. The typical sound level for a helicopter is 95 dBA at a distance of 150 feet.

TABLE 3-8
Typical Construction Equipment Noise Levels at 50 Feet from Sound Source
Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Equipment	Noise Level (Leq) (50 feet from Noise Source)
Backhoe	80
Bulldozer	85
Concrete Mixer	85

TABLE 3-8
Typical Construction Equipment Noise Levels at 50 Feet from Sound Source
Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Equipment	Noise Level (Leq) (50 feet from Noise Source)
Crane	85
Excavator	85
Generator	80
Pneumatic Tools	85
Scraper	85
Truck (concrete and supplies delivery)	84
Vibratory Compactor	85

Construction activities associated with proposed Project will require earth-moving equipment, trucks, helicopters and other equipment that could result in temporary increases in noise levels that exceed normal background levels and in temporary groundborne vibration. Project related activities occurring at substations, however, are not expected to generate significant noise levels. Construction equipment will be limited to smaller, lower noise generating equipment because space at the substation is limited. Due to the temporary nature of these impacts and considering wide range of applicant proposed mitigation measures PG&E will implement, construction impacts will be less than significant.

Operation of the reconductored transmission lines and modified substations would not result in any new, significant sources of long-term noise, other than what occurs as part of current operation of the transmission line. No permanent changes in ambient noise levels from implementation of the Project would occur.

PG&E will implement avoidance and protection measures as part of project design to reduce impacts to sensitive receptors to less than significant levels, including:

- Care of Equipment – Equipment engines shall be covered, and PG&E will ensure that mufflers are in good working condition. This measure can reduce equipment noise by 5 to 10 dBA.
- Restricted Work Hours – Work hours will be restricted for all noise generating construction activities from 7:00 A.M. to 7:00 P.M. Monday through Friday, and from 8:00 A.M. to 6:00 P.M. on Saturdays and Sundays whenever possible. As discussed in the Project description, reconductoring required power outages that must be timed to meet restrictions imposed by Cal ISO.
- Equipment Location – All stationary equipment such as compressors and welding machines shall be located away from noise receptors to the extent practicable.
- Pneumatic Tools – Pneumatic tools to be used within 1,500 feet of a residence shall have an exhaust muffler on the compressed air exhaust. This shall be included in the construction specifications.

- Helicopter landing/staging areas will be sited along the existing alignment, away from residences.

The increase in noise from construction of the reconductoring Project would be short-term. Thus, noise related impacts are less than significant, and no mitigation is required.

The Project is not located within the vicinity of a private air strip or within two miles of a public use airport and so will not expose people residing or working in the area to excessive noise levels. Therefore, noise impacts from implementation of the Project would be less than significant.

3.12 Population and Housing

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
(a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☑
(b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☑
(c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☑

The proposed Project does not include new housing or businesses or land use changes that would induce population growth in the area. Due to the statewide shortage of electricity, the Project is proposed to provide additional electricity to accommodate existing and planned growth within the service area and would not alter the location, distribution, density or growth rate of the population.

The proposed Project would require approximately eleven months and only require a small number of workers. The majority of construction workers are expected to come from the local area or commute from the neighboring counties and cities. Because the construction duration is short and the local workforce is anticipated to be sufficient, it is not expected that the construction workforce would relocate to the area causing a displacement of housing or people. The operation of the Project would not require any additional workers.

The Project is not expected to cause a displacement of housing or people and therefore the Project would not result in any impacts.

3.13 Public Services

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
(a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
(i) Fire protection?	☐	☐	☐	☑
(ii) Police protection?	☐	☐	☐	☑
(iii) Schools?	☐	☐	☐	☑
(iv) Parks?	☐	☐	☐	☑
(v) Other public facilities?	☐	☐	☐	☑

Construction of the Project would involve activities and equipment that temporarily could increase traffic on the surrounding local road network. However, the number and type of equipment will not be significant to cause transportation impacts.

Once constructed, the Project would rely upon existing fire, police, and medical services. The Project is proposed to provide additional electricity to accommodate existing and planned growth within the PG&E service area and would not alter the location, distribution, density, or growth rate of the population. Therefore, the Project would not adversely affect service ratios, response times, or other performance objectives for any of the public services. Therefore no impacts to public services would occur.

3.14 Recreation

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
(a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☑
(b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☑

The Project would occur in an agricultural and industrial area where recreational facilities are limited. It is proposed to provide additional electricity to accommodate existing and planned growth within the PG&E service area and would not alter the location, distribution, density or growth rate of the population. The Project would not create any new demand for existing public parks or recreational facilities or create new recreation facilities. Therefore no impacts would occur.

3.15 Traffic and Transportation

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
(a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?	☐	☐	☑	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
(b) Exceed, either individually or cumulatively, a level of service standard established by the County congestion management agency for designated roads or highways?	☐	☐	☑	☐
(c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☑	☐
(d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☑	☐
(e) Result in inadequate emergency access?	☐	☐	☑	☐
(f) Result in inadequate parking capacity?	☐	☐	☑	☐
(g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	☐	☐	☑	☐

3.15.1 Setting

The Vaca Dixon-Birds Landing Reconductoring Project is located in western Solano County near the cities of Fairfield and Vacaville. Although these cities are growing, the majority of the transmission line is located in rural, sparsely populated agricultural areas. The transportation network is consistent with a low density residential/ agricultural area. The areas near the Vaca Dixon and Peabody Substations are the most populated and therefore have the most extensive transportation network.

Regional Setting

The transportation system in the vicinity of the Project is composed of two state routes (State Route 12 and State Route 113), two freeways (Interstate 80 and Interstate 505), and various local roadways. These roadways would be used for access to the site during construction and operations. These roads are depicted on Figure 1-1. The following section discusses the characteristics of the major affected roadways in the vicinity of the Project.

State Highways

As shown in Figure 1-1, two interstate highways and two state routes serve the Vaca Dixon Project area, including I-80, I-505, SR-12 and SR-113. All of these highways are maintained by the California Department of Transportation (Caltrans). A description of each highway is provided below.

Interstate 80

I-80 connects Fairfield and Vacaville (the two nearest cities to the Project) to other metropolitan cities in the San Francisco Bay Area.

Interstate 505

I-505 is primarily a rural interstate, but travels through Vacaville and the town of Winters. I-505 is the primary route connecting the San Francisco Bay Area and the northern Sacramento Valley, bypassing Sacramento and its attendant city traffic.

State Route 12

SR-12 provides access to the Birds Landing Substation and south segment of the transmission line. SR-12 continues east of the Project area and connects to SR-113.

State Route 113

SR-113 provides access to Davis and Woodland to the north and turns into Birds Landing Road to the south.

Local Setting

The local circulation system in Solano County consists of a network of public surface streets providing two main functions: access to properties and movement of people and goods through the County. There are five functional classification categories for streets defined in the Transportation and Circulation Element of the Solano County General Plan:

- **Local Roads.** These roads are used primarily for access to residences, businesses, or other abutting properties. Ideally, these are paved roads with enough width to allow vehicles to operate in both directions.
- **Collector Roads.** These roads link local and collector roads with arterials, freeways, and other collector roads. They usually have moderate but not congested volume.
- **Minor Arterial Roads.** These roads provide a higher level of connectivity with the overall roadway system. They serve the same function as collectors but are intended to carry higher speeds of traffic. These typically will have signalized intersections with other minor arterials and more important roadways.
- **Major Arterial Roads.** These roads, often with multiple lanes, provide the highest level of connectivity with local land uses. These facilities are usually controlled by signal operations with multiple phases. Several roadways are designated as major arterials.
- **Freeways.** Also known as superhighways in the County's *Road Improvement Standards and Land Development Requirements*, these facilities provide interregional connectivity and are designed for limited access operation without any signalized controls. All roadway access is limited to ramps.

Due to the rural nature of Solano County, the Solano County General Plan Transportation and Circulation Element (SCGPTCE) also includes design considerations for rural roads to address the needs of farm equipment, transportation of agricultural goods, limited ROW and drainage challenges. (SCGPTCE, 2008).

Existing Operations

The 2000 Highway Capacity Manual (HCM) (Transportation Research Board [TRB], 2000) includes a set of criteria for assessing the performance of street and highway systems and the capacity of roadways by measuring the flow of traffic. Level of service (LOS) is a qualitative assessment of the quantitative effects of such factors as traffic volume, roadway geometrics, speed, delay, and maneuverability on roadway and intersection operations. Roadway traffic flow characteristics for different LOS values are described in Table 3-9.

TABLE 3-9
Level of Service Criteria for Roadways

LOS	V/C Ratio	Traffic Flow Characteristics
A	0.00 – 0.60	Free flow; insignificant delays
B	0.61 – 0.70	Stable operation; minimal delays
C	0.71 – 0.80	Stable operation; acceptable delays
D	0.81 – 0.90	Approaching unstable flow; queues develop rapidly but no excessive delays
E	0.91 – 1.00	Unstable operation; significant delays
F	> 1.00	Forced flow; jammed conditions

Source: TRB, 2000.
V/C Ratio – Traffic volume (demand) / roadway capacity ratio

According to Caltrans policy, LOS D is acceptable for planning purposes on highways and intersections that are located within the Caltrans jurisdiction. Solano County's Road Improvement Standards define LOS C as the design standard for the County (Solano County General Plan Final EIR, 2008).

Figure 3-10 depicts the Solano County General Plan Roadway diagram. A summary of the existing conditions on local roadways within the Vaca Dixon Project area is provided in Table 3-10.

TABLE 3-10
Summary of Affected Roadways

Roadway	Classification	Location where Project Crosses	Number of Lanes	AADT[a,b]	Peak Hour[a,b]
Regional Circulation System					
I-80	Freeway	South of Meridian Road overcrossing	6	101,000	6,900
SR-12	Freeway	Between Mauds Lane and Olsen Lane	2	14,000	840

TABLE 3-10
Summary of Affected Roadways

Roadway	Classification	Location where Project Crosses	Number of Lanes	AADT[a,b]	Peak Hour[a,b]
Local Circulation System					
Kilkenny Road	Local Road	Between Willow Road and Byrned Road	2	NA	NA
Walnut Road	Local Road	East of Willow Road	2	NA	NA
Poplar Road	Local Road	East of Willow Road	2	NA	NA
Maple Road	Local Road	East of Willow Road	2	NA	NA
Hawkins Road	Minor Arterial	Between Katlebalin Lane and Meridian Road	2	NA	NA
El Mira Road	Minor Arterial	West of Meridian Road	2	NA	NA
Fry Road	Minor Arterial	East of railroad tracks	2	NA	NA
Canon Road	Minor Arterial	East of Vanden Road	2	NA	NA
Peabody Road	Minor Arterial	North of Markeley Lane	2	NA	NA
Meridian Road	Collector	East of Willow Road	2	NA	NA
Creed Road	Local Road	East of Denverton Road	2	NA	NA
Lambie Road	Local Road	West of Bethell Lane	2	NA	NA
Little Honker Bay Road	Local Road	West of Olsen Road	2	97	NA
Olsen Road	Local Road	South of SR-12	2	42	NA
Birds Landing Road	Local Road	South of SR-12	2	285	NA

[a] Annual Average Daily Traffic. Average Daily Traffic is provided for local roads (based on Shiloh II Wind Project Draft EIR). NA=Not Available

[b] Caltrans, 2007 (Traffic Counts)

Intersection Operations

Given that the Project only includes reconductoring and replacement of existing support poles, intersection operations within the Project area not anticipated to be significantly impacted and therefore are not discussed.

Truck Routes, Weight, and Load Limitations

Caltrans weight and load limitations for state highways apply to all California state and local roadways. The weight and load limitations are specified in the California Vehicle Code Sections 35550 to 35559. The provisions from the California Vehicle Code discussed below apply to all roadways and, therefore, are applicable to this Project.

General Provisions

- The gross weight imposed upon the highway by the wheels on any axle of a vehicle shall not exceed 20,000 pounds and the gross weight upon any one wheel, or wheels, supporting one end of an axle, and resting upon the roadway, shall not exceed 10,500 pounds.

- The maximum wheel load is the lesser of the following: a) the load limit established by the tire manufacturer; or b) a load of 620 pounds per lateral inch of tire width, as determined by the manufacturer's rated tire width.

Vehicles with Trailers or Semi-trailers:

- The gross weight imposed upon the highway by the wheels on any one axle of a vehicle shall not exceed 18,000 pounds and the gross weight upon any one wheel, or wheels, supporting one end of an axle and resting upon the roadway, shall not exceed 9,500 pounds, except that the gross weight imposed upon the highway by the wheels on any front steering axle of a motor vehicle shall not exceed 12,500 pounds.

Public Transportation

Regional transit services include express bus, rail, and ferry. Each type of service features park-and-ride lots to accommodate riders from a nearby catchment area, and unincorporated Solano County residents may use them.

These services and major park-and-ride lots are as follows:

- *Ferry:* Vallejo Baylink Ferry—Vallejo Terminal
- *Rail:* Capitol Corridor (Amtrak)—Fairfield/Suisun City station
- *Express Bus:* Vallejo Transit Routes 80, 85, and 90—Curtola park-and-ride lot; Fairfield Transportation Center; Fairfield/Suisun City station—Davis Street park-and-ride lot; Fairfied Suisun Transit Routes 20, 30 and 40—Fairfield Transportation Center, Davis Street park-and-ride lot, Market Lane park-and-ride lot

Services are provided 7 days a week, although not all routes operate on Saturdays or Sundays. Hours of service and scheduled headways vary according to route and operator. (Solano County General Plan EIR, 2008).

Area Airports

Three airports operate in Solano County. The Nut Tree Airport and the Rio Vista Municipal Airport are public use facilities and Travis AFB is a military airfield.

The Nut Tree Airport is located in Vacaville and provides a facility for both general and business aviation use. The County owns and operates this airport, currently overseen by the General Services Department.

The Rio Vista Municipal Airport (Baumann Field) is located 3 miles northwest of Rio Vista in the unincorporated county. This general-aviation airport covers 273 acres and has two runways and one helipad.

Travis AFB is adjacent to the city of Fairfield and encompasses an area of about 5,025 acres. Travis AFB is a part of the Air Mobility Command and is host to the 60th Air Mobility Wing. The primary mission of the base is airlift of troops and freight. Some discussions have occurred regarding making Travis AFB a joint-use facility for military and civilian operations, but there are no adopted plans to enable this, nor are any proposed plans under active consideration by any of the local jurisdictions, including the County. (Solano County General Plan EIR, 2008).

Non-Motorized Transportation

Generally, roadways in unincorporated Solano County are not designed with sidewalks, because these roadways generally are located in areas with low population or employment density. The county's pedestrian connectivity consists primarily of short sidewalks and multiuse trails. Class I bicycle trails are usually designed as multiuse trails that can be shared with pedestrians. Pedestrian facilities also include crosswalks and pedestrian-actuated signals at major intersections near developed areas. There are

3.15.2 Impacts

Project activities include raising 43 towers, on which 20 arm extensions will also occur. An additional 58 arm extensions will be placed on towers requiring no other modifications. Additionally, two towers will be converted from suspension to dead end, and two transposition towers will be reinforced. No foundation work or modifications to the base of the towers will be required at any towers.

Work is anticipated to begin in September 2009 and to be completed by October 2010. Tower work will start first and is scheduled to finish by mid-June 2010. Line work will follow and will finish in July 2010. APM T&T-1 will be incorporated into the Project ensuring that impacts are less than significant.

Construction Phase

No specific guidance for the analysis of temporary construction impacts is available from the Solano County or Caltrans. As noted earlier, a standard of LOS D is used as the standard for state highways and standard of LOS C for Solano County.

Construction crews are estimated at peak operation during line clearance activities. The crews would carpool in two trucks per crew from the staging areas to the Project laydown areas. The trucks would not only transport the crews, but also the materials needed to perform the work. The majority of the workers are expected to come from Solano County and other nearby counties. Local collector roads are available to provide construction workers access to the staging areas, transmission line and towers. This level of Project-related traffic is considered negligible when added to the existing traffic on the area roadways (presented in Table 3-10). The limited amount of construction-related traffic would not cause area roadways to exceed the Caltrans threshold of LOS D (V/C ratio of 0.90) or the Solano County threshold of LOS C (V/C ratio of 0.80) during the peak hours or over the course of a day, since these roadways have adequate capacity to accommodate this minor increase in traffic. Therefore, this impact will be less than significant and no mitigation is required.

Construction equipment, such as long trucks carrying cable, could potentially conflict with local farm equipment or other vehicles. Additionally, emergency vehicles may be temporarily impeded while larger construction equipment is driving on rural roads. The smaller rural roads do not have shoulders sufficient to allow larger vehicles to pull off. However, traffic volumes on rural roads are minimal and would allow for construction equipment to safely pull to one side of the road and allow other vehicles to pass, if necessary.

Road widths near the substations (e.g., Peabody Road) are sufficient to accommodate construction equipment and therefore no impacts are anticipated to these roadways. However, construction activities will occur over freeways and other roadways, as shown in Table 3-10. Safety guard structures will be used at all highway and roadway crossings to protect the traveling public. With the incorporation of the mitigation measure, impacts to transportation and circulation would be less than significant.

Helicopter Access

Fly sites (landing zones) are used as landing sites and to stage materials, equipment, and crews during Project construction. A fuel truck will also be present for helicopter fueling. Nine fly sites, with maximum dimensions of 200-feet by 300-feet, will be used during construction.

Helicopters will be employed on the Project for the duration of the construction period, and will operate daily transporting equipment, supplies and personnel along the line. The flight path during daily construction operations will remain within close proximity to the transmission line alignment. The helicopters will return to the Vacaville airport, or on an appropriate paved area at the conclusion of each work day. Criteria for selection of non-work hours landing zone include centralized location, large paved unobstructed area, minimal dust, and separation from the public so as to not impede normal commerce or create a safety hazard.

The Federal Aviation Administration (FAA) requires a Lift Plan for use of helicopters in populated areas. The Lift Plan includes identification of helicopter staging areas and flight paths with the least potential to affect populated areas within the distances specified by FAA. The helicopters will return to the Vacaville airport, or on an appropriate paved area at the conclusion of each work day. Criteria for selection of non-work hours landing zone include centralized location, large paved unobstructed area, minimal dust, and separation from the public so as to not impede normal commerce or create a safety hazard.

Prior to commencing reconductoring Project activities, as part of the reconductoring Project plans, PG&E would obtain all required FAA clearances and other aviation clearances as necessary to perform the activities requiring use of a helicopter. PG&E would adhere to any requirements of the FAA. As a result, this impact will be less than significant and no mitigation is required.

Parking

Project related parking will be located at substations and staging areas. To the extent feasible, workers will carpool to the Project site from substation and staging areas. Given the rural location of the Project and the small number of workers and equipment, impacts to parking capacity are less than significant.

Conflicts with Applicable Policies

The Project will not conflict with any applicable policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks).

Operations and Maintenance

Operations and maintenance activities for the power line would include inspections to ensure that the system is in good condition and would not create hazards. Ongoing fire management and safety would include maintaining a 10-foot radial clearance of flammable

fuels (vegetation) as required under Public Resources Code, Section 4292. Project-related operation and maintenance activities would be no more intensive that current operations. No impacts are anticipated.

3.15.3 Avoidance and Protection Measures

As described above, traffic associated with Project operations is considered to be minimal, as state routes and local roadways have adequate capacity to accommodate anticipated traffic. Therefore, no mitigation during Project operations is required.

As discussed above, there is the potential for conflicts to develop between construction equipment and vehicles on roadways. Additionally, overhead work will occur across highways and roads. Incorporating the avoidance and protection measure listed below into The incorporation of avoidance and protection measures into Project design will ensure that impacts to traffic and transportation will be less than significant.

APM T&T-1

The construction contractor will prepare a construction Traffic Management Plan (TMP) that addresses timing of heavy equipment and building material deliveries, signing, lighting, traffic control device placement, guard structures, onsite and offsite parking and staging, construction worker pedestrian public roadway crossing, and establishing work hours outside of peak traffic periods to the extent feasible. Emergency service providers will be notified of the timing, location and duration of construction activities.

3.16 Utilities and Service Systems

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
(a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☑
(b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☑	☐
(c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☑

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
(d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☑	☐
(e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☑
(f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☑	☐
(g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☑

3.16.1 Water

Water quality and drainage control measures are discussed in Section 3.8 Hydrology and Water Quality. A minor amount of water may be brought to the Project site by truck for dust control during construction. The Project would not require the construction of new or expansion of existing water facilities; existing supplies are sufficient to provide water for dust control. Impacts will be less than significant and no mitigation measures are required.

3.16.2 Wastewater

Construction workers will require restroom facilities that can be addresses through portable toilets disposed of at appropriately licensed facilities offsite. There are no operational needs for wastewater disposal. There are no impacts anticipated.

3.16.3 Landfills

General types of solid nonhazardous waste produced during construction would include food, glass, paper, plastic, packing materials, and scrap wood. On average, approximately 2 cubic yards of food, glass, paper, plastic, packing materials, and scrap wood would be generated monthly during construction. Once the reconductoring Project is complete, no

waste is expected beyond what is currently generated. Landfills are present in Sacramento, Vacaville, and the East Bay and have adequate capacity.

No long-term increase in demand for utilities would result from the Project and therefore there are no impacts anticipated.

3.17 Mandatory Findings of Significance

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
(a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☑	☐	☐
(b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☑	☐
(c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☑	☐

Although there are federal and State special-status species within the Project vicinity, the Project would not degrade the quality of the biological environment, reduce the quality or quantity of wildlife habitat, adversely affect the population of a plant or animal community,

or otherwise impact a rare or endangered species. Compliance with the USFWS BO and implementation of Project avoidance and protection measures and mitigation measures for habitat loss will avoid potentially significant impacts. Prior to construction along the transmission line, applicable surveys will occur to further identify habitat to be protected. Biological monitoring will occur during construction activities thereby minimizing any potential impacts to less than significant levels.

The Project would not involve significant impacts to cultural resources representing important examples of the major periods of California history or prehistory. The results of the literature search conducted for the Project indicates that no previously recorded prehistoric archaeological sites exist within the Project area. Two historic resources were identified: the Ross Noonan Livestock Cannon Ranch and the Vaca-Dixon Peabody and Vaca-Dixon Birds Landing 230 kV transmission lines. The transmission lines are ineligible for listing in the CRHR and the NRHP. The ranch structures are potentially eligible but will not be impacted by Project activities. While unlikely, in the event that subsurface archaeological or paleontological resources or human remains are discovered during Project activities, appropriate mitigation measures have been identified in Section 3.5 to ensure that potential impacts will be less than significant.

Traffic and circulation within the Project vicinity generally will not be affected by the Project. There is the potential for conflicts to develop between construction equipment and vehicles on roadways. Additionally, overhead work will occur across highways and roads. With the incorporation of mitigation, impacts to traffic and circulation will be less than significant.

As discussed in the preceding sections, impacts to Aesthetics, Agricultural Resources, Air Quality, Geology and Soils, Hazards and Hazardous Materials, Hydrology and Water Quality, Land Use and Planning, Minerals, Noise, Population and Housing, Public Services, Recreation, and Utilities and Service Systems would be less than significant or have no impact resulting from the Project.

There are no impacts resulting from the Project expected to be cumulatively significant and no impacts to humans, directly or indirectly, will occur from the Project.

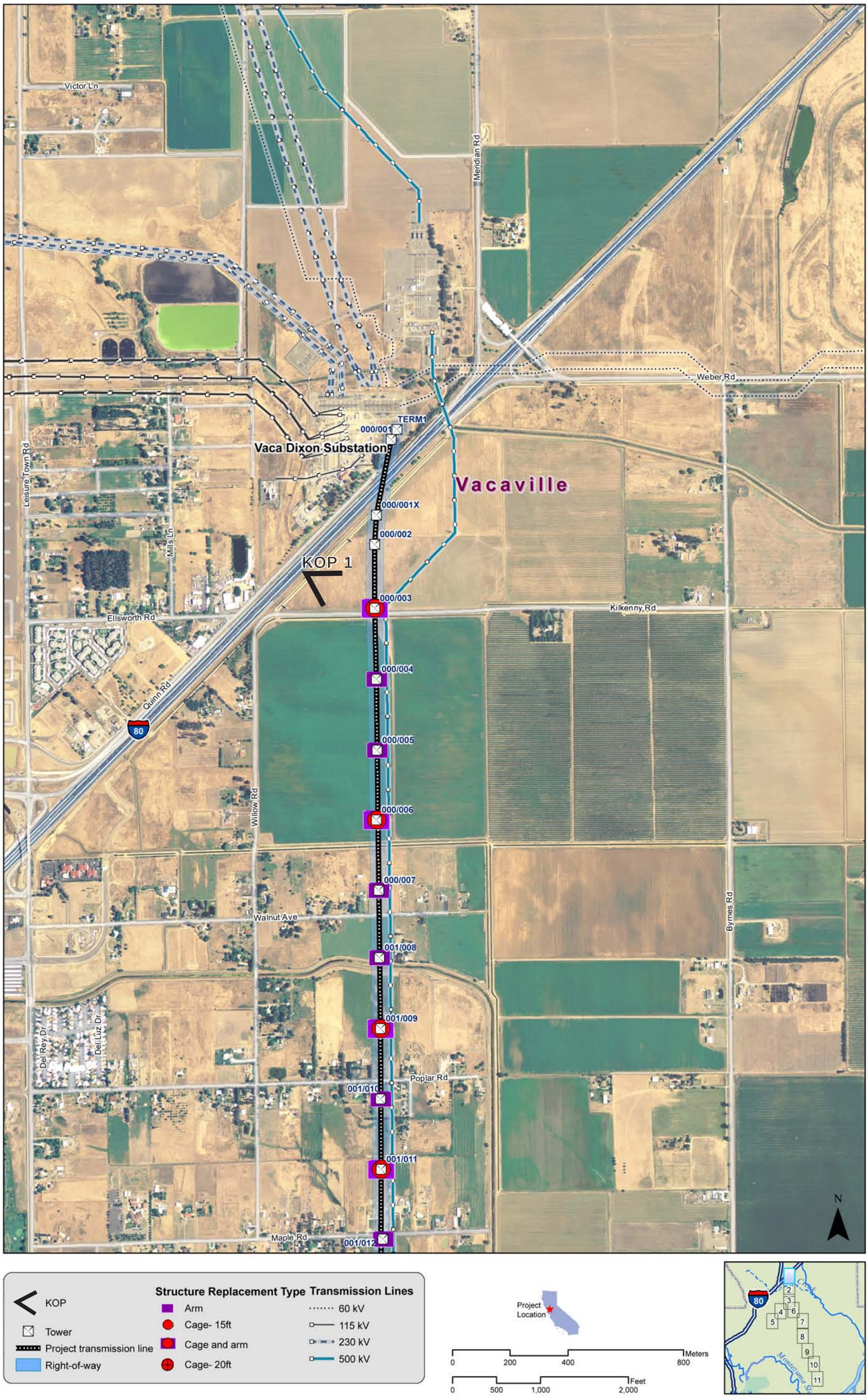
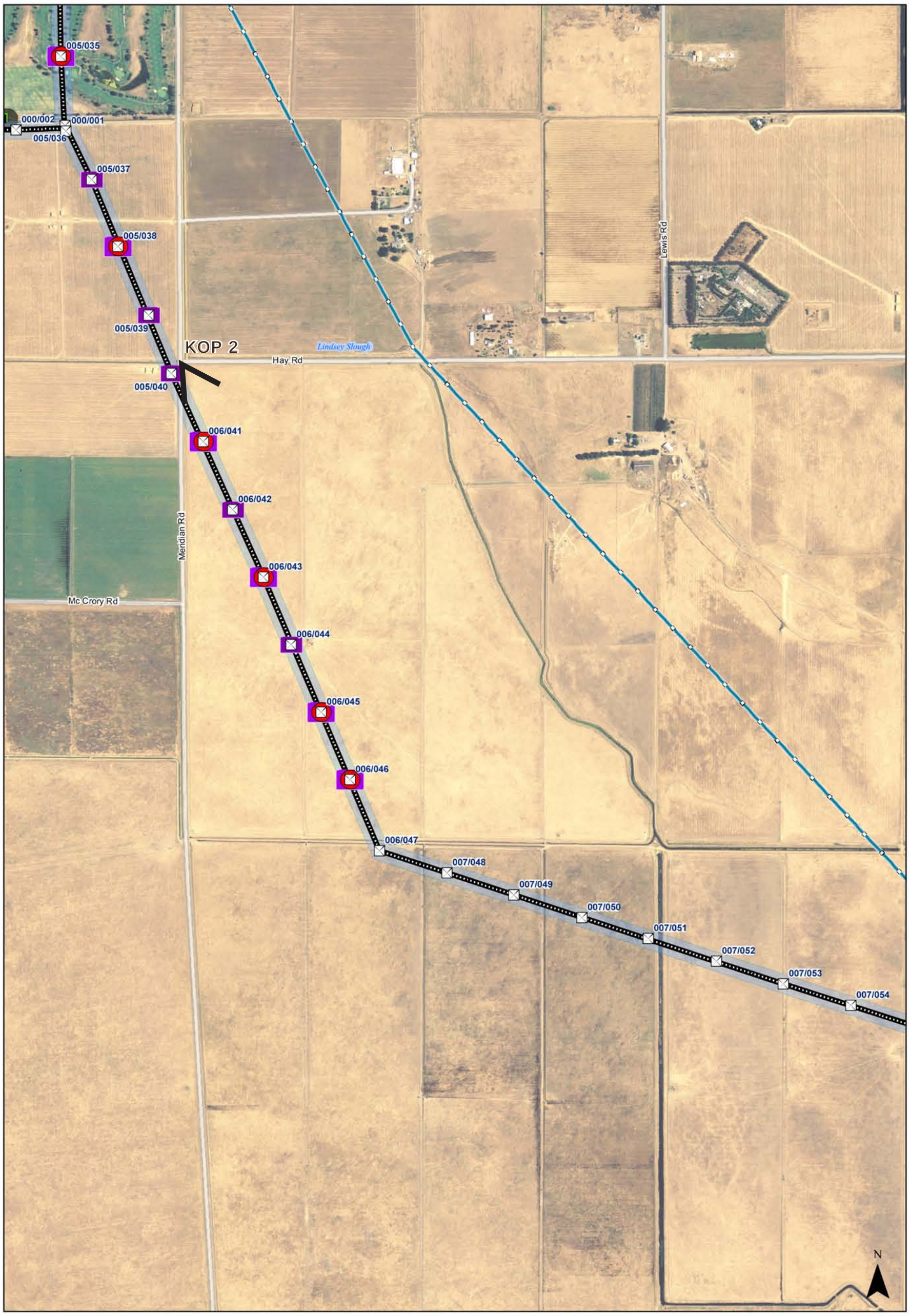


FIGURE 3-1
KOP 1 Location
Vaca Dixon – Birds Landing IS/MND
December 2008



KOP
Tower
Project transmission line
Right-of-way

Structure Replacement Type
Arm
Cage- 15ft
Cage and arm
Cage- 20ft

Transmission Lines
60 kV
115 kV
230 kV
500 kV

Visual resources- map 6 of 11

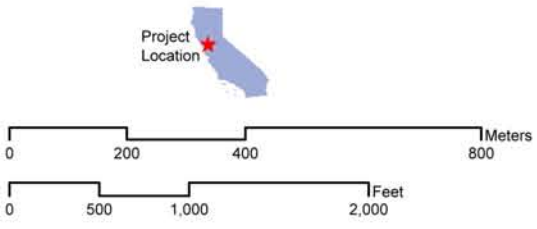


FIGURE 3-2
KOP 2 Location
Vaca Dixon – Birds Landing IS/MND
December 2008

KOP
Tower
Project transmission line
Right-of-way

Structure Replacement Type
Arm
Cage- 15ft
Cage and arm
Cage- 20ft

Transmission Lines
60 kV
115 kV
230 kV
500 kV

Visual resources- map 9 of 11

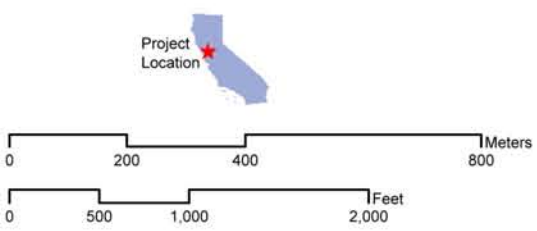


FIGURE 3-3
KOP 3 Location
Vaca Dixon – Birds Landing IS/MND
December 2008

Figure 2a: View to the southeast from the eastbound lane of I-80 (KOP 1). A tower associated with the nearby 500 kV transmission line is visible beyond and to the left of the 230 kV tower proposed to be reconductored.

Figure 2b: View from KOP 1 with reconductoring.

FIGURE 3-4
View from Key Observation Point 1
Vaca Dixon – Birds Landing IS/MND
December 2008

Figure 3a: View to the south-southeast from southbound lane of Meridian Road (KOP 2). The intersection of Meridian Road and Hay Road is visible in the left portion of this view.

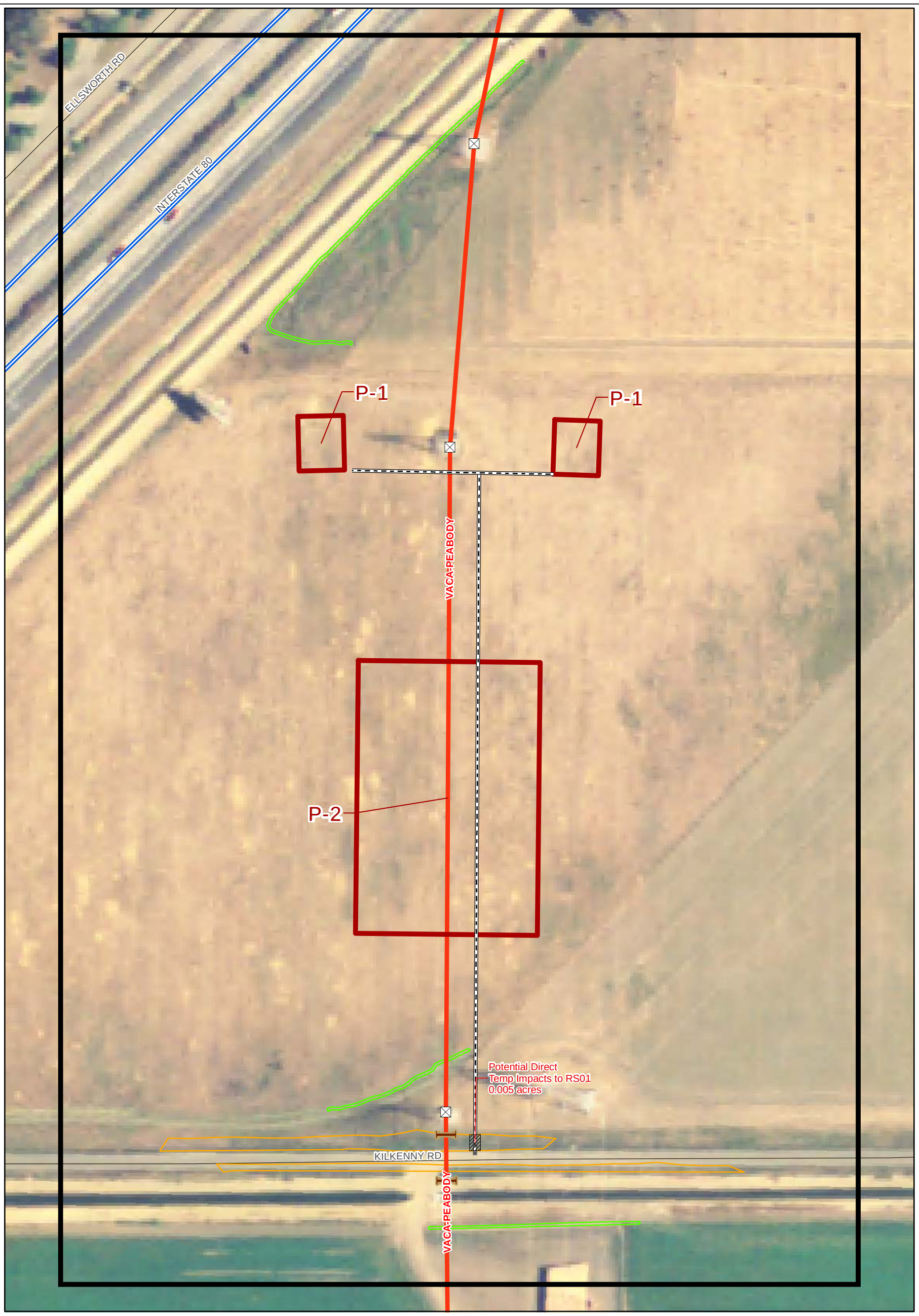
Figure 3b: View from KOP 2 with reconductoring.

FIGURE 3-5
View from Key Observation Point 2
Vaca Dixon – Birds Landing IS/MND
December 2008

Figure 4a: View to the north-northeast from State Route 12 (KOP 3). The 500 kV transmission line is parallel to the Vaca Dixon – Birds Landing line near State Route 12, and is closer to the viewer from this KOP.

Figure 4b: View from KOP 3 with reconductoring.

FIGURE 3-6
View from Key Observation Point 3
Vaca Dixon – Birds Landing IS/MND
December 2008



Potential USACE Jurisdictional Features Seasonal Wetlands
Non-Jurisdictional Features
Agricultural Ditch
Drainage Ditch
Roadside Ditch
Swale
USACE Verification Boundary
Impact Area
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
Access Road - 12 ' Disturbance
Guard Structures

0 100 200 Feet

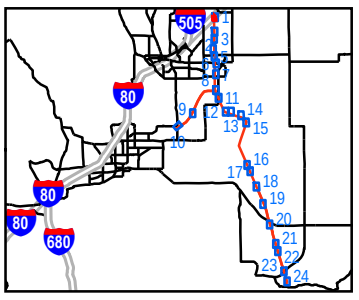
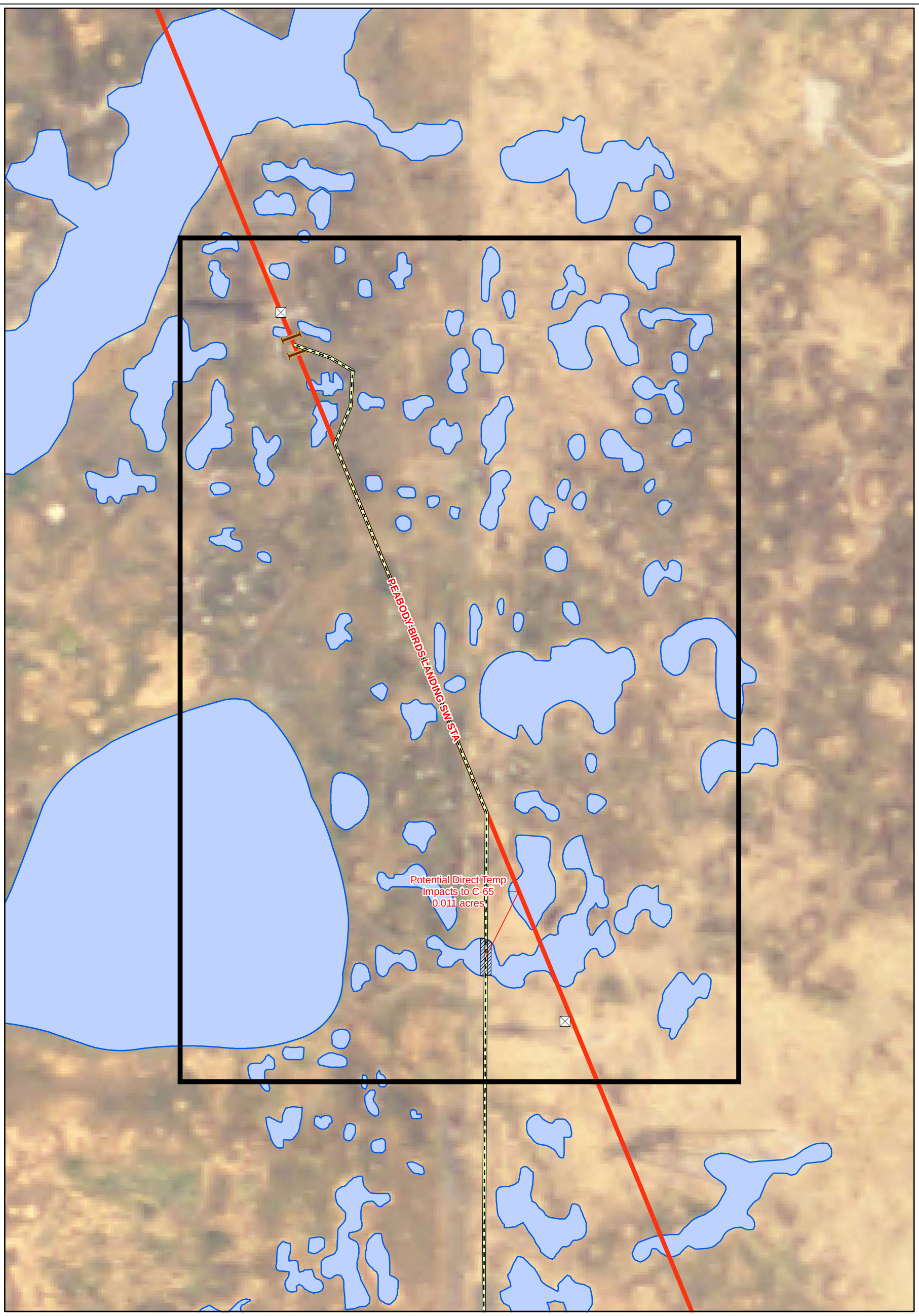


FIGURE 3-7
Potential Wetland Impacts North of Kilkenny Road
Vaca Dixon – Birds Landing IS/MND



Potential USACE Jurisdictional Features
Seasonal Wetlands
Non-Jurisdictional Features
Agricultural Ditch
Drainage Ditch
Roadside Ditch
Swale
USACE Verification Boundary
Impact Area
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
Temporary Light Use Access Road
Guard Structures

N
W E
S

0 100 200 Feet

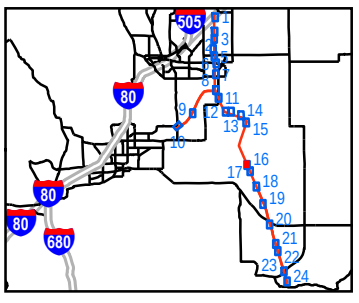
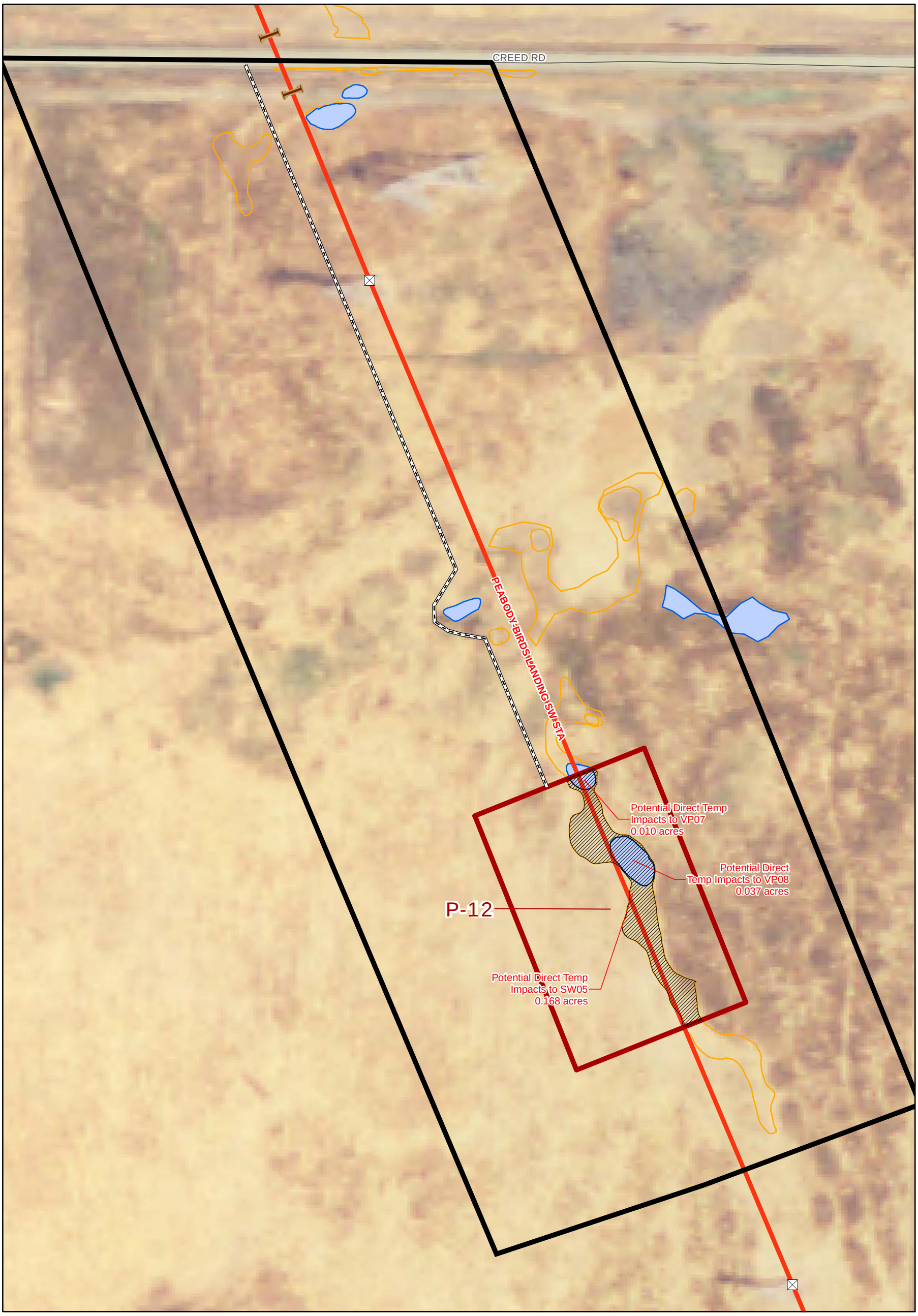


FIGURE 3-8
Potential Wetland Impacts North of Creed Road
Vaca Dixon – Birds Landing IS/MND



Potential USACE Jurisdictional Features Seasonal Wetlands
Non-Jurisdictional Features
Agricultural Ditch
Drainage Ditch
Roadside Ditch
Swale
USACE Verification Boundary
Impact Area
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
Temporary Access Road
Guard Structures

0 100 200 Feet

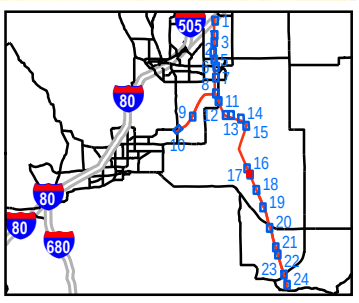
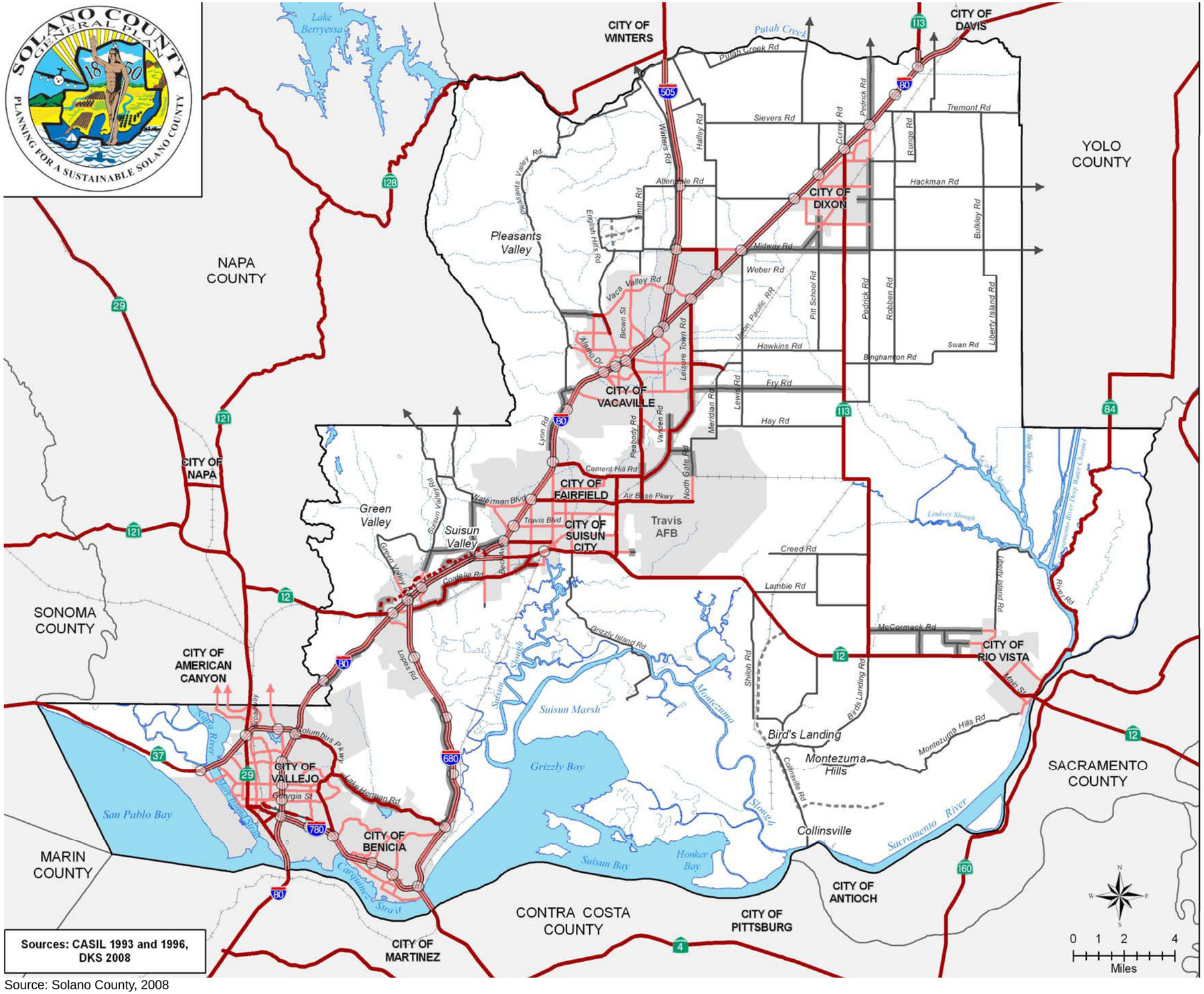


FIGURE 3-9
Potential Wetland Impacts South of Creed Road
Vaca Dixon – Birds Landing IS/MND



Source: Solano County, 2008

FIGURE 3-10
Solano County Roadway Diagram
Vaca Dixon – Bird's Landing IS/MND

CG032009001BAO PGE_vaca_dixon_fig3-11.ai 3-19-09 dash

CH2MHILL

4.0 References

ARB. 2007. California 1990 Greenhouse Gas Emissions Level and 2020 Limit." December. Available online at: http://www.arb.ca.gov/cc/inventory/1990level/1990level.htm. Accessed March 17, 2009.

Baggett, A. G. 2004. State Water Resources Control Board. Workplan: Filling in the Gaps in Wetland Protection. September 24.

Bailey, Thomas L. 1897. The geology of the Potrero Hills and Vacaville region, Solano County, California. In Bulletin of the Department of Geological Sciences. 19(15):324.

Bay Area Air Quality Management District (BAAQMD). 1999. BAAQMD CEQA Guidelines; Assessing the Air Quality Impacts of Projects and Plans. December.

Bay Area Air Quality Management District (BAAQMD). 2006. Bay Area 2005 Ozone Strategy. Adopted January 4.

Bay Area Air Quality Management District (BAAQMD). 2009. Ambient Air Quality Standards and Bay Area Attainment Status. Accessed on February 24.

Beck, Warren A., and Ynez D. Haase. 1974. Historical Atlas of California. University of Oklahoma Press. Norman, OK.

Bell, C.J., E.L. Lundelius, Jr., A.D. Barnosky, R.W. Graham, E.H. Lindsay, D.R. Ruez, Jr., H.S. Semken, Jr., S.D. Webb, and R.J. Zakrzewski. 2004. The Blancan, Irvingtonian, and Rancholabrean Mammal Ages. In Late Cretaceous and Cenozoic Mammals of North America, Edited by M.O. Woodburne, pp. 232–314. Columbia University Press. New York, NY.

Bowen, J. 2005. December 4, 2005. "Historic sites hidden by the veil of the past." Historical Articles of Solano County online Database (http://www.solanoarticles.com/history/index.php). Accessed on 11 Feb 2008.

California Air Resources Board (ARB). 2009a. Ambient Air Quality Standards. http://www.arb.ca.gov/research/aaqs/aaqs2.pdf. Accessed on February 23.

California Air Resources Board (ARB). 2009b. Area Designations. http://www.arb.ca.gov/desig/adm/adm.htm. Accessed on February 24.

California Air Resources Board (ARB). 2009c. Air Quality Data Statistics. http://www.arb.ca.gov/adam/cgi-bin/db2www/adamtop4b.d2w/start.

California Burrowing Owl Consortium (CBOC). 1993. Burrowing Owl Survey Protocol and Mitigation Guidelines. April 1993.

California Department of Fish and Game (CDFG). 2008a. Natural Diversity Database (RareFind3, version 3.0.5). Electronic database. Sacramento, CA.

California Department of Fish and Game (CDFG). 2008b. California Wildlife Habitat Relationships System. Electronic database. California Interagency Wildlife Task Group. Sacramento, CA. Special Animals.

California Department of Fish and Game (CDFG). 2008c. California Natural Diversity Database Special Vascular Plants, Bryophytes and Lichens List. Accessed at: www.dfg.ca.gov/whdab/pdfs/spplants.pdf

California Department of Fish and Game (CDFG). 2008d. Special Animals List.

California Native Plant Society (CNPS). 2008. Inventory of rare and endangered plants of California (online edition, version 6.3). Accessed at: http://www.cnps.web.aplus.net/cgi-bin/inv/inventory.cgi

California Stormwater Quality Association's Construction Handbook. 2003.

California Wetlands Conservation Policy. 1993.

CH2M HILL. 2008a. Section 401 Clean Water Act (CWA) Water Quality Certification Application for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project.

CH2M HILL 2008b. Draft Biological Assessment for the Vaca Dixon-Peabody-Lambie-Birds Landing 230 kV Reconductoring Project. Solano County, California. February.

CH2M HILL. 2008c. Delineation of Wetlands and Other Waters for the Vaca Dixon-Peabody-Lambie-Birds Landing 230 kV Project. Solano County, California. February.

Clark, R.J. 1975. A field study of the short-eared owl, Asio flammeus (Pontoppidan), in North America. Wildlife Monograph. 47.

Conformable Impact Mitigation Guidelines Committee. 1995. Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources: Standard Guidelines. Society of Vertebrate Paleontology News Bulletin 163:22-27.

Cook, S. F. 1976. The Conflict Between the California Indian and White Civilization. Berkeley, CA: University of California Press.

Dunk, Jeffrey R. 1995. White-tailed Kite (Elanus leucurus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/178

Ecology and Environment, Inc. 2006. Draft Environmental Impact Report, Shiloh II Wind Plant Project. Prepared for, Solano County Department of Resource Management, October.

EDAW. 2008. Environmental Impact Report for the 2008 Solano County General Plan.

Fredrickson, D.A. 1973. Early Cultures of the North Coast Ranges, California. Ph.D. dissertation, Department of Anthropology, University of California, Davis.

Fredrickson, D.A. 1974. Cultural Diversity in Early Central California: A View from the North Coast Ranges. Journal of California Anthropology 1(1):41-53.

Fredrickson, D.A. 1994. Archaeological Taxonomy in Central California Reconsidered. In Toward a New Taxonomic Framework for Central California: Essays by James A. Bennyhoff

and David A. Fredrickson, assembled and edited by Richard E. Hughes, pp. 91-103. Contributions of the University of California Archaeological Research Facility Number 52, Berkeley, California.

Garcia and Associates. 2008a. Special-Status Plant Surveys for the Pacific Gas and Electric Vaca Dixon-Peabody-Birds Landing 230 kV Reconductoring Project, Solano County, California.

Garcia and Associates. 2008b. General Wildlife Resources Technical Report: Vaca Dixon-Peabody-Lambie-Birds Landing 230 kV Reconductoring Project, Solano County, California.

Garcia and Associates. 2009. Burrowing owl protocol level phase II burrow surveys for the Vaca Dixon- Birds Landing 230 kV Reconductoring Project. Delivered to CH2M HILL. February 12, 2009

Garcia and Associates. 2008. Archaeological Survey Report for the PG&E Vaca-Dixon Reconductoring Project, Solano County, California. Prepared for PG&E. May.

Garcia and Associates. 2009. Site Records for the Vaca-Dixon–Peabody and Vaca-Dixon–Birds Landing 230-kV Transmission Lines. Prepared by Jennifer Lang. April.

Graymer, R.W., D.L. Jones, and E.E. Brabb. 2002. Geologic Map and Map Database of Northeastern San Francisco Bay Region, California. United States Department of the Interior, U.S. Geological Survey.

Helley, E.J, K.R. La Joie, W.E. Spangle, and M.L. Blair. 1979. Flatland Deposits of the San Francisco Bay Region – their geology and engineering properties, and their importance to comprehensive planning. Geological Survey Professional Paper 943. U.S. Geological Survey and Department of Housing and Urban Development, Washington, D.C.

Hertlein, L.G. 1951. Invertebrate Fossils and Fossil Localities in the San Francisco Bay Area. In Geology Guidebook of the San Francisco Bay Counties: History, Landscape, Geology, Fossils, Minerals, Industry, and Routes to Travel, prepared by Olaf P. Jenkins, pp. 187–192. Bulletin 154. California Division of Mines, San Francisco.

Hickman, J., ed. 1993. The Jepson Manual. University of California Press, Berkeley.

Holland, R. F. 1986. Preliminary descriptions of the terrestrial natural communities of California. California Department of Fish and Game. Unpublished report.

Hoover, M. B., H. E. Rensch, E. Rensch, and W. N. Abeloe. 1990. Historic Spots in California. 4th edition, revised by Douglas E. Kyle. Stanford University Press, Stanford, California.

Jennings, M.R. and M.P. Hayes. 1994. Amphibian and reptile species of special concern in California. California Department of Fish and Game, Sacramento, CA.

Jepson Online Interchange. 2008. An online database for California floristics. Available at: http://ucjeps.berkeley.edu/interchange.html

Johnson, P. J. 1978. Patwin. In California, edited by R. F. Heizer, pp. 350-360. Handbook of North American Indians, vol. 8, William C. Sturtevart, general ed. Smithsonian Institution, Washington D.C.

Kaufman, K. 1996. Lives of North American Birds. Houghton Mifflin Company, New York, New York. 675 pp.

Keegan, F. L. 1989. Solano: The Crossroads County, an Illustrated History. Windsor Publications, Inc. Chatsworth, CA.

Keeley, J. and P. Zedler. 1996. Characterization and global distribution of vernal pools. Pp. 1-14. In, C. Witham, E. Bauder, D. Belk, W. Ferren, and R. Ornduff, eds. Ecology, Conservation and Management of vernal pool Ecosystems. California Native Plant Society, Sacramento, California.

Marschner, J. 2000. California 1850: A Snapshot in Time. Coleman Ranch Press. Sacramento, CA.

Moratto, M. J. 2004. California Archaeology. Second Edition Academic Press, San Diego.

Natural Resources Conservation Service (NRCS). 1977. Soil Survey of Solano County, California. (Formerly the Soil Conservation Service) U.S. Department of Agriculture in cooperation with the University of California Agricultural Experiment Station.

Orne, B., Haven, L., White, D. Developing a Policy to Protect Wetlands and Riparian Areas. 2008. Accessed at: [http://www.waterboards.ca.gov/water_issues/programs/cwa401/docs/wrapp2008/stakeholders_presentation_1208final.pdf]

Rodriguez, Miguel. 2007. Hydrogeology of ponds, pools and playa lakes of southern Spain. Wetlands 27 (4): 819-830.

Rosenthal, J. S.; G. G. White, and M. Q. Sutton. 2007. The Central Valley: A View from the Catbird's Seat. In California Prehistory: Colonization, Culture, and Complexity. Jones, T. L. and K. A. Klar, eds, pp. 147–163. AltaMira Press, Rowman and Littlefield Publishers, Inc. New York.

Savage, Donald. 1951. Late Cenozoic Vertebrates of the San Francisco Bay Region. University of California Publications Bulletin of the Department of Geological Sciences 28(10):215–14.

Sawyer, J. and T. Keeler-Wolf. 1995. A Manual of California Vegetation. California Native Plant Society, Sacramento, CA.

Scott, E. and K. Springer. 2003. CEQA and Fossil Preservation in California. Environmental Monitor Fall 2003. Association of Environmental Professionals, Sacramento, California.

Solano County Water Agency (SCWA). 2007. Solano Multispecies Habitat Conservation Plan. Working Draft 2.2. Prepared by LSA. February.

Solano County. 1977. Scenic Roadways Element; A Part of the Solano County General Plan.

Solano County. 2008. General Plan, Chapter 5 – Public Health and Safety. Website: http://solanocountygeneralplan.net/GP%20Documents/12-15-08/Chapter_5%20-%20Public_Health_&_Safety.pdf Accessed February 12, 2009.

Solano County. 2008. Solano County General Plan. December.

Solano County. 2008. Solano County Zoning Ordinance. June.

Solano Draft HCP. 2007. Solano County Water Agency. February

State Water Resources Control Board (SWRCB) Order No. 99-08-DWQ National Pollutant Discharge Elimination System General Permit No. CAS0000002

Stirton, R.A. 1951. Prehistoric Land Animals of the San Francisco Bay Region. In Geology Guidebook of the San Francisco Bay Counties: History, Landscape, Geology, Fossils, Minerals, Industry, and Routes to Travel, prepared by Olaf P. Jenkins, pp. 177-186. Bulletin 154. State of California Division of Mines, San Francisco.

U.S. Fish and Wildlife Service (USFWS). 2003. Endangered and Threatened wildlife and plants; determination of endangered status for the Sonoma County Distinct Population Segment of the California tiger salamander; Final rule. Federal Register 68 (53):13497-13520. March 19, 2003.

U.S. Fish and Wildlife Service (USFWS). 2005. Recovery plan for vernal pool ecosystems of California and Southern Oregon. Region 1, Portland, Oregon.

U.S. Fish and Wildlife Service (USFWS). 2008. USFWS Endangered Species Program, Endangered and Threatened Species List website. Available at: http://www.fws.gov/endangered/wildlife.html March 18, 2008.

USACE. 2008. Authorization letter from Jane Hicks to Michael Gunby PG&E) for temporary fill under Nationwide 12 for the Vaca Dixon- Birds Landing Reconductoring Project. SPN-2008-00243-N. December 9, 2008.

West Yost & Associates. 1999. Solano County Water Agency: Hydrology Manual. June. Accessed at: http://www.scwa2.com/AboutUs_HydrologyManual.aspx

Yolo-Solano Air Quality Management District (YSAQMD). 2007. Handbook for Assessing and Mitigating Air Quality Impacts. July.

Yolo-Solano Air Quality Management District (YSAQMD). 2009. Air Quality Planning-State Plans. http://www.ysaqmd.org/state-plans.php. Accessed on February 26.

Zedler, Paul. 2003. Vernal Pools and the Concept of "Isolated Wetlands." Wetlands 23 (3): 597 607.

5.0 List of Preparers

This Initial Study for the Vaca Dixon-Birds Landing IS/MND was prepared by the following CH2M HILL staff and subcontractor:

Company/Affiliation	Name	Key Contribution/Responsibilities
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	Jennifer Scholl	Task Order Manager and Senior Review
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	Tom Priestly	Aesthetics Senior Review
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	Dana Larson	Hazards and Hazardous Materials, Noise, Staff Support for Biology, Hydrology and Water Quality
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Attachment A
Mitigation Monitoring and Reporting Plan

ATTACHMENT A

PG&E Vaca Dixon Birds-Landing 230 kV Reconductoring Project Draft Mitigation Monitoring and Reporting Plan

1.0 Introduction

Authority and Purpose of the Program

The State Water Resources Control Board (SWRCB) Initial Study/ Mitigated Negative Declaration (IS/MND) for the PG&E Vaca Dixon Birds-Landing 230kV Reconductoring Project (Project) includes a series of mitigation and avoidance and protection measures intended to minimize potential environmental impacts during project construction and restoration activities. Consistent with CEQA and SWRCB requirements these measures are incorporated into a Mitigation Monitoring and Reporting Plan (MMRP). This Attachment is intended to comply with these requirements.

The purpose of this MMRP is to document that the mitigation measures adopted by the SWRCB are implemented, and that potential environmental impacts are reduced to acceptable levels as identified in the Mitigated Negative Declaration (MND). In addition, the MMRP also includes PG&E avoidance and protection measures (APMs), which are incorporated into the PG&E project description.

As the CEQA lead agency, the SWRCB is required to monitor construction and restoration of the Project area to confirm implementation of mitigation and applicant-proposed avoidance and protection measures. In addition, the SWRCB is responsible to ensure compliance with the MMRP. As appropriate, the SWRCB will delegate duties and responsibilities for monitoring to other qualified entities or consultants hired by PG&E to implement the measures.

Program Adoption Process

As part of the adoption of the IS/MND, SWRCB will confirm that this MMRP complies with CEQA Guidelines Section 15074(d), which mandates the preparation of monitoring provisions for implementation of mitigation assigned as part of project approval or adoption. As the CEQA lead agency for this Project, the SWRCB intends to adopt this MMRP concurrent with the adoption of the IS/MND.

Organization of the MMRP

This MMRP is includes three sections: Section 1.0, provides information about the purpose of the MMRP and the agencies with permitting authority over the Project; Section 2.0 specifies the parties or agencies responsible for the implementing the MMRP; and, Section 3.0, identifies implementation and monitoring procedures.

2.0 Roles and Responsibilities

Mitigation Implementation

Implementing measures assigned to mitigate impacts associated with the Project is the SWRCB's responsibility, however, this responsibility will be delegated to PG&E, or its' designated representative during construction and restoration activities. Therefore, PG&E will be responsible for ensuring that the Project complies with the MMRP and other permit conditions imposed by other responsible agencies. A list of agencies with jurisdiction over the Project is included in Table A-1.

TABLE A-1
Agency Authority and Jurisdiction
Vaca Dixon – Birds Landing 230 kV Reconductoring Project MMRP

Agency	Jurisdiction within Project Area	Contact
USACE	Placement of temporary fill in waters of the U.S. located north of Kilkenny Road and north and south of Creed Road (IS/MND Figures 3-7 through 3-9.)	Philip Shannin Department of the Army San Francisco District U.S. Army Corps of Engineers 1455 Market Street San Francisco, CA, 94103-1398 (415) 503-6781
USFWS	Endangered Species Act consultation. Addresses potential Project impacts to federally-threatened vernal pool fairy shrimp (*Branchinecta lynchi*), vernal pool tadpole shrimp (*Lepidurus packardi*), and California tiger salamander (*Ambystoma californiense*) north of Kilkenny Road, and north and south of Creed Road (IS/MND Figures 3-7 through 3-9.)	Michelle Tovar, Endangered Species Program, Sacramento Fish and Wildlife Office (916) 414-6600
SWRCB	Compliance with Clean Water Act Section 401.	Amna Hawatky 401 Certification & Wetlands Unit Division of Water Quality SWRCB 1001 I Street, 15th Floor Sacramento, CA 95814 (916) 341-5483

Mitigation Monitoring

As discussed previously, the SWRCB is responsible for ensuring compliance with and implementation of the MMRP. Consistent with SWRCB practices, implementation and monitoring duties will be delegated to PG&E or its' designated environmental monitors or consultants. As a result, PG&E's monitors/consultants will be delegated authority by the SWRCB to enforce the MMRP and to authorize any variance or deviation from the procedures, as long as the variance is consistent with CEQA, approved by the SWRCB, and does not cause new significant impacts. Any proposed variance that could result in a potentially significant environmental effect will be evaluated to determine whether supplemental CEQA review and additional mitigation measures are needed. In the event of

the need for a proposed variance or deviation from the adopted MND or MMRP, the implementation of such deviation, shall be reported immediately to the SWRCB and the authorized construction monitor for review and approval.

Under this delegated responsibility, PG&E will designate specific personnel to ensure implementation of mitigation during construction activities**.** The designated personnel will be responsible for submitting all compliance documentation and reports to PG&E and the SWRCB in a timely manner and prepare required resource agency submittals. These personnel will also be delegated the authority to halt construction activities found to be inconsistent with the MMRP objectives or conditions of approval.

In addition, PG&E will be responsible for demonstrating compliance with other agencies' permit conditions. PG&E and the authorized personnel will ensure that its construction contractors understand and adhere to the MMRP performance requirements and other contractual requirements related to the implementation of the MMRP.

Table A-2 provides a summary of the MMRP. It lists each potential environmental impact, the corresponding monitoring activity/plan, and the party responsible for ensuring MMRP compliance.

Mitigation Enforcement

In addition to implementation of the MMRP, PG&E is also responsible for enforcing the established performance standards and reporting the success of their implementation to the SWRCB through a mutually agreed reporting program. This program will be finalized following adoption of the IS/MND and MMRP and in place prior to project construction. The PG&E onsite environmental monitor(s)/consultant (s) will enforce implementation of the MMRP. Due to the length of the reconductoring, construction activities may require one or more lead monitor/consultant per transmission line segment. The monitor will note problems, notify appropriate agencies or individuals about any problems, if required, and report problems to PG&E to inform the SWRCB. If alternative mitigation measures are identified that would be equally effective in mitigating the identified impacts, the implementation of these alternative measures will not occur until confirmation is received from the SWRCB.

The SWRCB has the authority to halt any construction, operation, or maintenance activity associated with the Project if the activity is determined to be a deviation from the approved project or adopted mitigation measures. The SWRCB may assign this authority to the environmental monitor for each construction phase or spread.

Mitigation Compliance

PG&E is responsible for successfully implementing all adopted mitigation measures in the MMRP. Performance standards for successful mitigation are included in each mitigation measure to include requirements for obtaining permits or avoiding a specific impact or area entirely.

Dispute Resolution

Disputes and complaints (including those of the public) will be directed to the SWRCB's designated Project Manager for resolution. The SWRCB Project Manager will attempt to resolve the dispute. In the event that this informal process fails, then the SWRCB Project Manager may initiate an enforcement or compliance action to address deviations from the permitted project and adopted MMRP.

3.0 General Monitoring Procedures

Lead Environmental Monitor

PG&E is responsible for ensuring coordination of mitigation monitoring procedures for the construction and restoration activities with the SWQCB and the authorized environmental monitors/consultants. The lead Environmental Monitor will oversee implementation of the monitoring procedures, coordinate with each environmental monitor assigned to each construction phase or spread, and be onsite during any project-related activity with the potential to result in a significant impact for which mitigation is required. The environmental monitor is also responsible to ensure that all MMRP procedures are followed.

Construction Personnel

Many of the mitigation measures require action compliance with MMRP requirements by construction personnel in order to achieve successful implementation. Successful implementation of the MMRP will include:

- ✓ Compliance procedures written into contracts between PG&E, authorized monitors/consultants, and construction contractors. Procedures for implementation by construction personnel will be compiled into a separate consent agreement for review and signature by each construction employee.
- ✓ Regular pre-construction meetings to inform and train all construction personnel about the MMRP requirements.
- ✓ Concise summaries of MMRP procedures provided to construction supervisors for measures requiring their attention (by segment, phase, or spread.)

General Reporting Procedures

Site visits and specified monitoring procedures will be reported by each environmental monitor assigned to the relevant construction phase or spread. A monitoring record form will be submitted to the environmental monitor by the individual conducting the visit or procedure so that details of the visit can be recorded and progress tracked by the environmental monitor. A checklist will be developed and maintained by the environmental monitor to track all procedures required for each mitigation measure and to ensure adherence to the timing specified for the procedures. The environmental monitor will note any problems that may occur and take appropriate action to rectify the problems. The Applicant shall provide the State Water Board with written quarterly reports of the project,

which shall include progress of any project-related activity, resulting impacts, mitigation implemented, and all other noteworthy elements of the project. Quarterly reports shall be required as long as mitigation measures are applicable.

Condition Effectiveness Review

As required by CEQA, the SWRCB must evaluate the effectiveness of implemented mitigation measures. In order to fulfill its statutory mandates to mitigate or avoid significant effects on the environment and to design a mitigation monitoring program to ensure compliance during Project implementation (CEQA 21081.6):

- ✓ SWRCB may conduct a comprehensive review of conditions which are not effectively mitigating impacts at any time it deems appropriate, consistent with standard SWRCB dispute resolution procedures; and
- ✓ SWRCB may determine that measures are not adequately mitigating environmental impacts, or that recent proven technological advances could provide more effective mitigation. If this occurs, then the SWRCB may impose additional reasonable conditions to effectively mitigate these impacts.

TABLE A-2
Vaca Dixon – Birds Landing 230 kV Reconductoring Project MMRP Summary

		Implementation Duration		Monitoring Duration		Responsibility[2]	
Issue Area/Impact	**Measure**	**One-time**	**Ongoing**	**One-time**	**Ongoing**	**Implementation**	**Monitoring**
		Mitigation Measures					
Biological Resources							
Have a substantial adverse effect, on any species identified as a candidate, sensitive, or special status species	BIO-1: To minimize effects of the proposed project on the California tiger salamander, Delta green ground beetle, vernal pool fairy shrimp, vernal pool tadpole shrimp, conservancy fairy shrimp, and Contra Costa goldfields, PG&E will purchase mitigation credits at an USFWS-approved mitigation bank.	Prior to construction		Prior to construction		PG&E	PG&E, reporting to SWRCB
	BIO-2: PG&E will purchase 0.152 acres of vernal pool preservation credits and 0.008 acres of vernal pool creation credits at a vernal pool conservation bank approved by USFWS prior to the start of earth-moving activities.	Prior to construction		Prior to construction		PG&E	PG&E, reporting to SWRCB
	BIO-3: PG&E will restore the 40.21 acres of habitat temporarily affected by the project. PG&E will also permanently preserve an additional 4.02 acres of salamander habitat either by purchasing credits from a USFWS-approved conservation bank or by purchasing and placing a conservation-easement on a USFWS-approved parcel	During Restoration Easement/ habitat credit purchase prior to start of project construction		During Restoration Easement/ habitat credit purchase prior to start of project construction		PG&E	PG&E, reporting to SWRCB

TABLE A-2
Vaca Dixon – Birds Landing 230 kV Reconductoring Project MMRP Summary

		Implementation Duration		Monitoring Duration		Responsibility[2]	
Issue Area/Impact	**Measure**	**One-time**	**Ongoing**	**One-time**	**Ongoing**	**Implementation**	**Monitoring**
	PG&E Avoidance and Protection Measures[1]						
Air Quality							
Temporary Construction related fugitive dust generation	**APM-AQ-1**: Water all active construction areas at least twice daily during dry conditions.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-AQ-2: Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of free board.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-AQ-3: Pave, apply water three times daily (during dry conditions), or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-AQ-4: Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas at construction sites.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-AQ-5: Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-AQ-6: Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more).		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-AQ-7: Enclose, cover, water twice daily or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.).		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB

TABLE A-2
Vaca Dixon – Birds Landing 230 kV Reconductoring Project MMRP Summary

		Implementation Duration		Monitoring Duration		Responsibility[2]	
Issue Area/Impact	**Measure**	**One-time**	**Ongoing**	**One-time**	**Ongoing**	**Implementation**	**Monitoring**
	APM-AQ-8: Limit traffic speeds on unpaved roads to 15 mph.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-AQ-9: Install sandbags or other erosion control measures to prevent silt runoff to public roadways.	During Construction	During Construction	During Construction	During Construction	PG&E	PG&E, reporting to SWRCB
	APM-AQ-10: Replant vegetation in disturbed areas as quickly as possible.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
Temporary Construction related GHG/ CO_2 emissions	**APM-AQ-11:** Encouraging the use of bio-diesel fuel for diesel-powered equipment and vehicles.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-AQ-12: Encouraging construction workers to carpool.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-AQ-13: Encouraging the recycling of construction waste.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
Biological Resources							
Potential impacts to any species identified as a candidate, sensitive, or special status species	**APM-BIO-1:** An employee education program will be conducted, consisting of a brief presentation to explain endangered species concerns to contractors, their employees, and any other personnel involved in the Project. The program will include the following: a description of special-status species and their habitat needs; a report of the occurrence of these species in the	Prior to construction		Prior to construction		PG&E	PG&E, reporting to SWRCB

TABLE A-2
Vaca Dixon – Birds Landing 230 kV Reconductoring Project MMRP Summary

		Implementation Duration		Monitoring Duration		Responsibility[2]	
Issue Area/Impact	**Measure**	**One-time**	**Ongoing**	**One-time**	**Ongoing**	**Implementation**	**Monitoring**
	Project area; an explanation of the status of these species and their protection under the Federal Endangered Species Act, California Endangered Species Act, and other statutes; and a list of measures being taken to reduce impacts to the species during Project construction and implementation. A fact sheet conveying this information will be prepared for distribution to the above-mentioned people and anyone else who may enter the Project site. Upon completion of training, employees will sign a form stating that they attended the training and understand all the conservation and protection measures. To the extent possible, nighttime construction will be minimized. Construction crews will be informed during the education program meeting that, to the extent possible, travel within the marked Project site will be restricted to established roadbeds. Established roadbeds include all pre-existing and Project-constructed unimproved, as well as, improved roads.						
	APM-BIO-2: A biological monitor will be onsite during all ground-disturbing work within sensitive biological areas. Off-road access routes will be clearly flagged and marked. All Project-related vehicle access to the guard structures at Creed Road and south of the Noonan Ranch corrals will be monitored by a biological monitor. Work within sensitive biological areas north of Creed Road and at the corral site (at the intersection of Canon Road and Vanden Road) will be conducted during the dry season. Additionally, no work activities will be allowed to occur north		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB

TABLE A-2
Vaca Dixon – Birds Landing 230 kV Reconductoring Project MMRP Summary

		Implementation Duration		Monitoring Duration		Responsibility[2]	
Issue Area/Impact	**Measure**	**One-time**	**Ongoing**	**One-time**	**Ongoing**	**Implementation**	**Monitoring**
	of Creed Road during the Delta green ground beetle flight season; work in this area can therefore only take place from May 15 to October 31.						
	APM-BIO-3: Geotextile fabric and a layer of gravel will protect the original contour of all wetland pools that cannot be avoided within identified temporary impact areas adjacent to or within the right of way with the possible exception of temporary access routes where overland travel in the dry season may have less impact than placement and removal of gravel, such as for the guard structure route at Creed Road. Using the geotextile fabric and gravel will minimize potential effects from compaction or other disturbance to areas that will have more frequent travel or heavier equipment, or be used on the wet season. After construction, the gravel and fabric will be removed. Alternative methods for protecting areas from vehicle movement will be discussed with USFWS. In areas of minimal effect such as temporary access at Creed Road, this measure could have greater impact on soil seed bank than overland driving in the dry season.	During Construction		During Construction		PG&E	PG&E, reporting to SWRCB
	APM-BIO-4: Dust control measures will be implemented during construction in the dry season. Work areas and dirt access roads will be watered regularly to minimize airborne dust and soil particles generated by construction. Fly sites will be rocked when necessary.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB

TABLE A-2
Vaca Dixon – Birds Landing 230 kV Reconductoring Project MMRP Summary

		Implementation Duration		Monitoring Duration		Responsibility[2]	
Issue Area/Impact	**Measure**	**One-time**	**Ongoing**	**One-time**	**Ongoing**	**Implementation**	**Monitoring**
	APM-BIO-5: The potential for adverse effects to water quality in vernal pools or habitat within the Project area will be avoided by implementing temporary Best Management Practices outlined in the California Stormwater Quality Association's Construction Handbook (CASQA, 2003). PG&E's Storm Water Pollution Prevention Plan and erosion control Best Management Practices will be used to minimize any wind- or water-related erosion. Protective measures will include: a. No discharge of pollutants from vehicle and equipment cleaning will be allowed into storm drains, wetlands, or water courses. b. Vehicle and equipment fueling and maintenance operations must be at least 100 feet from vernal pools and other aquatic habitat. c. Dust control will be implemented, including the use of water trucks to control dust in disturbed areas, rocking temporary access road entrances and exits, and placement of geotextile mats and rock on access road areas to be used in the wet season. d. Disturbed work areas will be restored to pre-Project conditions and will be reseeded, as appropriate.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB

TABLE A-2
Vaca Dixon – Birds Landing 230 kV Reconductoring Project MMRP Summary

		Implementation Duration		Monitoring Duration		Responsibility[2]	
Issue Area/Impact	**Measure**	**One-time**	**Ongoing**	**One-time**	**Ongoing**	**Implementation**	**Monitoring**
	APM-BIO-6: Project-related vehicles shall observe a 15 mph speed limit in all Project areas, except on county roads and state and federal highways.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-BIO-7: The limits of the construction area throughout the Project will be flagged if not already marked by right of way or other fencing, and all activity will be confined within the marked area. A qualified biologist shall be onsite during all activities that could result in the take of a listed species.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-BIO-8: The Project proponent shall include a copy of the USFWS-issued Biological Opinion (BO) within its construction documents making the primary contractor responsible for implementing all requirements and obligations included within the BO, and to educate and inform all other contractors involved in the project as to the requirements of the BO.	Prior to construction		Prior to construction		PG&E	PG&E, reporting to SWRCB
	APM-BIO-9: A biologist shall inspect construction-related activities at the proposed Project area to ensure that no unauthorized take of federally-listed species or destruction of their habitat occurs. The biologist shall be available for monitoring throughout all phases of construction that may result in adverse effects to listed crustaceans.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-BIO-10: The contractor will prepare a site-specific Stormwater Pollution Prevention Plan (SWPPP) for the Project to protect receiving waters from pollution. The SWPPP will include standard sediment and erosion control measures	During Construction		During Construction		PG&E	PG&E, reporting to SWRCB

TABLE A-2
Vaca Dixon – Birds Landing 230 kV Reconductoring Project MMRP Summary

		Implementation Duration		Monitoring Duration		Responsibility[2]	
Issue Area/Impact	**Measure**	**One-time**	**Ongoing**	**One-time**	**Ongoing**	**Implementation**	**Monitoring**
	that include limiting soil disturbances during the winter rainfall season. Given the site-specific conditions of the Project area, the SWPPP for this Project will generally include limiting soil disturbances during the winter rainfall season of October 15 through April 15 and fully stabilizing disturbed areas prior to December 1. Standard sediment erosion control measures, such as silt fencing, straw bale barriers, and sediment traps shall be implemented to directly reduce the off-site transport of sediment from disturbed slopes. Existing vegetation that can be preserved will be identified and flagged or fenced to avoid disturbance. Erosion in disturbed areas will be controlled through the use of grading operations that eliminate direct routes for conveying runoff to drainage channels and use of soil stabilization Best Management Practices (BMPs), such as mulching, erosion control fabrics, and/or reseeding with grass or other plants where necessary.						
	APM-BIO-11: Prior to the initiation of ground disturbance on each individual impact area, preconstruction surveys shall be conducted by a biologist(s) for the salamander. These surveys shall consist of walking surveys of the site and adjacent areas accessible to the public to determine presence of the species. Salamanders will be removed by the biologist(s) and translocated under the direction and authorization of the Service.	Prior to construction (i.e., ground disturbance)		Prior to construction (i.e., ground disturbance)		PG&E	PG&E, reporting to SWRCB

TABLE A-2
Vaca Dixon – Birds Landing 230 kV Reconductoring Project MMRP Summary

		Implementation Duration		Monitoring Duration		Responsibility[2]	
Issue Area/Impact	**Measure**	**One-time**	**Ongoing**	**One-time**	**Ongoing**	**Implementation**	**Monitoring**
	APM-BIO-12: All salamanders captured on the Project site during monitoring and inspections conducted during construction shall be removed by a USFWS-approved biologist(s) and translocated under the direction and authorization of the USFWS.	During Construction		During Construction		PG&E	PG&E, reporting to SWRCB
	APM-BIO-13: To prevent inadvertent entrapment of salamanders during construction, all excavated, steep-walled holes or trenches more than 2 feet deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they must be thoroughly inspected for trapped animals. If at any time a trapped listed animal is discovered, a biologist(s) should immediately place escape ramps or other appropriate structures to allow the animal to escape, or the USFWS and/or CDFG shall be contacted by telephone for guidance. The USFWS shall be notified of the incident by telephone and electronic mail within one (1) working day.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-BIO-14: If requested, before, during, or upon completion of ground breaking and/or construction activities, the Project proponents shall allow access by USFWS and/or CDFG personnel to the Project site to inspect Project effects to the salamander and associated habitats.		Before or throughout the construction period		Before or throughout the construction period	PG&E	PG&E, reporting to SWRCB

TABLE A-2
Vaca Dixon – Birds Landing 230 kV Reconductoring Project MMRP Summary

		Implementation Duration		Monitoring Duration		Responsibility[2]	
Issue Area/Impact	**Measure**	**One-time**	**Ongoing**	**One-time**	**Ongoing**	**Implementation**	**Monitoring**
	APM-BIO-15: All Project activities north of Creed Road will be limited to May 15 to October 31 to avoid the Delta green ground beetle flight season. The Environmental Monitor will be present for all work north of Creed Road.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-BIO-16: Prior to construction activities, a qualified botanist shall establish exclusion zones for special status plants within 50 feet of impact areas. These exclusion zones will include known populations and, where practicable, a 50-foot buffer zone. Construction equipment and personnel will be restricted from entering the exclusion zones, except where allowed under specific mitigation measures. An environmental monitor will be onsite during construction activities in the vicinity of sensitive biological resources. If direct or indirect impacts to special-status plant species are observed then the monitor shall notify the construction manager immediately. If any populations of special-status plants are impacted, work in that area will be halted. The environmental monitor, in consultation with PG&E, will contact the CDFG and/or the USFWS.	Prior to construction (i.e., ground disturbance)		Prior to construction (i.e., ground disturbance)		PG&E	PG&E, reporting to SWRCB
	APM-BIO-17: Vehicle access north of Creed Road shall be limited to two total vehicle round-trips: one round-trip during guard structure installation, and one during removal. The speed limit on the temporary access route will be restricted to 2 mph. A qualified botanist will escort vehicles along the temporary access route. Ingress and egress to the guard structure site will occur along different routes (i.e. new tire	During Construction		During Construction		PG&E	PG&E, reporting to SWRCB

TABLE A-2
Vaca Dixon – Birds Landing 230 kV Reconductoring Project MMRP Summary

		Implementation Duration		Monitoring Duration		Responsibility[2]	
Issue Area/Impact	**Measure**	**One-time**	**Ongoing**	**One-time**	**Ongoing**	**Implementation**	**Monitoring**
	tracks each trip) to minimize damages to individual plants. Pappose tarplant tolerates disturbance and the impacts would be temporary, with full recovery of disturbed areas within 1-2 years.						
	APM-BIO-18: A qualified botanist will conduct preconstruction surveys around the proposed fly site (F-8) for pappose tarplant to determine the population's extent. The location and/or dimensions of the fly site shall be altered to avoid pappose tarplant, and the population will be protected with high-visibility fencing or signage.	Prior to construction (i.e., ground disturbance) at this location		Prior to construction (i.e., ground disturbance) at this location		PG&E	PG&E, reporting to SWRCB
	APM-BIO-19: A qualified botanist will conduct preconstruction surveys for brittlescale to determine the population's extent. The botanist will identify brittlescale plants in the immediate vicinity of the proposed guard structure north of Creed Road and will assist PG&E in adjusting the placement of the structure as necessary. If work occurs in the area in May or June or before bracts necessary for identification are fully developed, all plants of genus *Atriplex* will be avoided.	Prior to construction (i.e., ground disturbance) at this location		Prior to construction (i.e., ground disturbance) at this location		PG&E	PG&E, reporting to SWRCB
	APM-BIO-20: To avoid or minimize potential impacts to northwestern pond turtles, a qualified biologist shall conduct a pre-construction survey for pond turtles no more than 30 days prior to construction in suitable aquatic habitats within Project impact areas. If turtles are found in aquatic habitat, then clearance of the nearby (300 ft) terrestrial habitat that would be impacted shall occur prior to construction activities; the	Prior to construction (i.e., ground disturbance)		Prior to construction (i.e., ground disturbance)		PG&E	PG&E, reporting to SWRCB

TABLE A-2
Vaca Dixon – Birds Landing 230 kV Reconductoring Project MMRP Summary

		Implementation Duration		Monitoring Duration		Responsibility[2]	
Issue Area/Impact	**Measure**	**One-time**	**Ongoing**	**One-time**	**Ongoing**	**Implementation**	**Monitoring**
	biologist(s) shall look for eggs and western pond turtle individuals including over-wintering hatchlings. If eggs are found, the monitor shall contact CDFG for the appropriate measures to relocate the eggs. If pond turtles are located near any proposed construction areas, impacts to individuals and their habitat will be avoided to the extent feasible. The Environmental Monitor will be onsite during all construction activity in the vicinity of individual pond turtles or their nests.						
	APM-BIO-21: For Project construction activities occurring during the bird nesting season of February 1 through August 31, a qualified ornithologist shall conduct pre-construction surveys for nesting birds within two weeks of construction. These surveys will cover the transmission line route, staging areas, pull sites, fly sites, and access routes. Additional pre-construction surveys shall be conducted for each new phase of Project implementation that occurs during the nesting season, no more than two weeks prior to construction. For any nests that are found, nest protection zones will be established. For passerine birds, a 50 to 100-foot protection zone shall be established around active nests; for raptors, a 300-foot protection zone and for golden eagles a 500-foot protection zone shall be established around active nests. These protection zones may be modified on a site-specific basis as determined by the Environmental Monitor or in coordination with CDFG. Active nests within the Project area would be monitored for signs of disturbance. If	2-weeks prior to start of each phase of project construction (i.e., ground disturbance) during nesting season			To coincide with the implementation of APM-21 pre-construction surveys as appropriate; and ongoing during construction if active nests are identified	PG&E	PG&E, reporting to SWRCB

TABLE A-2
Vaca Dixon – Birds Landing 230 kV Reconductoring Project MMRP Summary

		Implementation Duration		Monitoring Duration		Responsibility[2]	
Issue Area/Impact	**Measure**	**One-time**	**Ongoing**	**One-time**	**Ongoing**	**Implementation**	**Monitoring**
	the biological monitor determines that a disturbance is occurring, construction shall be halted, and the agencies shall be contacted as to the measures that shall be implemented.						
	APM-BIO-22: Phase III Burrow Surveys (nesting season surveys) shall be conducted in five locations in accordance with the Burrowing Owl Survey Protocol and Mitigation Guidelines. No disturbance should occur within 50 meters (approx. 160 ft.) of occupied burrows during the non-breeding season of September 1 through January 31 or within 75 meters (approx. 250 ft.) during the breeding Season of February 1 through August 31. Burrowing owls shall not be relocated during the breeding season. During the non-breeding season, if avoidance requirements can not be met, the applicant shall submit a site specific proposal for burrowing owl relocation and mitigation to CDFG and the SWRCB for review and approval. The applicant shall be required to mitigate for impacts as 6.5 acres per relocation/burrow impact.	Prior to construction (i.e., ground disturbance)		Prior to construction (i.e., ground disturbance)		PG&E	PG&E, reporting to SWRCB
Cultural Resources							
Possible impacts to previously unidentified archaeological resources that could be encountered during Project-related ground-disturbing activities	**APM-CULT-1:** If concentrations of prehistoric or historic-period materials are encountered during ground-disturbing work at any of the Project work sites, all work in the immediate vicinity of the discovery shall be halted until a qualified archaeologist can evaluate the significance of the find. If the find is determined to be significant, PG&E shall determine the appropriate avoidance measures or other appropriate mitigation in consultation with a qualified archaeologist and the State Water Resources Control Board. Significant cultural		During construction		During construction	PG&E	PG&E, reporting to SWRCB

TABLE A-2
Vaca Dixon – Birds Landing 230 kV Reconductoring Project MMRP Summary

		Implementation Duration		Monitoring Duration		Responsibility[2]	
Issue Area/Impact	**Measure**	**One-time**	**Ongoing**	**One-time**	**Ongoing**	**Implementation**	**Monitoring**
	materials shall be curated according to current professional standards.						
Possible impacts to previously unidentified paleontological resources that could be encountered during Project-related ground-disturbing activities	**APM-CULT-2:** If unanticipated paleontological resources are discovered during ground-disturbing activities during the Project, excavations in the immediate vicinity of the find shall be temporarily halted until the discovery is examined by a qualified paleontologist per Society of Vertebrate Paleontology standards. If the find is determined to be significant, PG&E shall determine the appropriate avoidance measures or other appropriate mitigation in consultation with a qualified paleontologist and the State Water Resources Control Board. Significant paleontological finds shall be curated according to current professional standards.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
Potential impacts related to the unanticipated discovery of human remains	**APM-CULT-3:** If human remains are encountered, work in the immediate vicinity shall stop and the County Coroner shall be notified immediately. A qualified archaeologist shall be contacted immediately to evaluate the discovery. If the human remains are of Native American origin, the Coroner must notify the Native American Heritage Commission within 24 hours of this identification. The Native American Heritage Commission then has 48 hours to identify a Most Likely Descendent.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB

TABLE A-2
Vaca Dixon – Birds Landing 230 kV Reconductoring Project MMRP Summary

		Implementation Duration		Monitoring Duration		Responsibility[2]	
Issue Area/Impact	**Measure**	**One-time**	**Ongoing**	**One-time**	**Ongoing**	**Implementation**	**Monitoring**
Hydrology and Water Quality							
Potential impacts related to ground-disturbing activities that could cause soil erosion and release of excess sediment into water courses	**APM-WQ-1**: No discharge of pollutants from vehicle and equipment cleaning are allowed into the storm drain or water courses.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-WQ-2: Vehicle and equipment fueling and maintenance operations must be at least 50 ft away from vernal pools and other aquatic habitat.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-WQ-3: Dust control will be implemented, including the use of water trucks to control dust in disturbed areas; rocking temporary access road entrances and exits; and placement of geotextile mats and rock on access road areas to be used in the wet season.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-WQ-4: Disturbed work areas will be restored to pre-Project conditions, and reseeded if appropriate.	Restoration at the conclusion of construction		During Restoration		PG&E	PG&E, reporting to SWRCB

TABLE A-2
Vaca Dixon – Birds Landing 230 kV Reconductoring Project MMRP Summary

		Implementation Duration		Monitoring Duration		Responsibility[2]	
Issue Area/Impact	**Measure**	**One-time**	**Ongoing**	**One-time**	**Ongoing**	**Implementation**	**Monitoring**
Noise							
Potential temporary construction related noise impacts to sensitive receptors	**APM-NOI-1**: Care of Equipment – Equipment engines shall be covered, and PG&E will ensure that mufflers are in good working condition. This measure can reduce equipment noise by 5 to 10 dBA.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-NOI-2: Restricted Work Hours – Work hours will be restricted for all noise generating construction activities from 7:00 A.M. to 7:00 P.M. Monday through Friday, and from 8:00 A.M. to 6:00 P.M. on Saturdays and Sundays whenever possible. As discussed in the Project description, reconductoring requires power outages that must be timed to meet restrictions imposed by Cal ISO.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-NOI-3: Equipment Location – All stationary equipment such as compressors and welding machines shall be located away from noise receptors to the extent practicable.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-NOI-4: Pneumatic Tools – Pneumatic tools to be used within 1,500 feet of a residence shall have an exhaust muffler on the compressed air exhaust. This shall be included in the construction specifications.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB
	APM-NOI-5: Helicopter landing/staging areas will be sited along the existing alignment, away from residences.		During Construction		During Construction	PG&E	PG&E, reporting to SWRCB

TABLE A-2
Vaca Dixon – Birds Landing 230 kV Reconductoring Project MMRP Summary

		Implementation Duration		Monitoring Duration		Responsibility[2]	
Issue Area/Impact	**Measure**	**One-time**	**Ongoing**	**One-time**	**Ongoing**	**Implementation**	**Monitoring**
Traffic and Transportation							
Potential temporary impacts related to construction traffic	**APM T&T-1:** The construction contractor will prepare a construction Traffic Management Plan (TMP) that addresses timing of heavy equipment and building material deliveries, signing, lighting, traffic control device placement, guard structures, onsite and offsite parking and staging, construction worker pedestrian public roadway crossing, and establishing work hours outside of peak traffic periods to the extent feasible. Emergency service providers will be notified of the timing, location and duration of construction activities.	Plan prepared prior to start of project construction	During Construction		During Construction	PG&E	PG&E, reporting to SWRCB

Notes:

[1] **PG&E avoidance and protection measures are included as part of the project description.**

[2] **PG&E will delegate responsibility to authorized representative.**

Attachment B
Construction Emission Calculations

Vaca Dixon-Birds Landing 230 kV Reconductoring Project
Attachment B-1

Emissions Summary

Table 1. Construction Emissions

	Emissions (tons/project)		Emissions (lbs/day)	
	ROG	NOx	Exhaust PM_{10}	Fugitive PM_{10}
TOTAL	0.4	3.8	1.2	35
YSAQMD Threshold	10 ton/yr	10 ton/yr	80 lbs/day	
Threshold Exceeded?	No	No	No	

YSAQMD, Handbook for Assessing and Mitigating Air Quality Impacts, July 2007.

Vaca Dixon-Birds Landing 230 kV Reconductoring Project
Attachment B-1

Construction Equipment Emissions

Table 2a. Construction Equipment Emission Summary (lb/day)

Construction Activity	Emissions (lb/day) Exhaust PM_{10}
Tower Work	0.30
As-needed Improvements	0.64

Table 2b. Construction Equipment Emission Summary (tons/activity)

Construction Activity	Emissions (ton/activity) ROG	NOx
Tower Work	0.15	1.09
As-needed Improvements	0.01	0.08

The URBEMIS2007 default of 22 days per month was used to calculate emissions in units of tons per activity.

Table 3. Construction Schedule and Equipment Summary

Construction Activity: Tower Work								
Duration: 7 months, September 2009 through mid-June 2010						**Emission Factors (g/bhp hr)**		
Equipment	**Fuel Type**	**Number of Equipment**	**Horsepower**	**Load**	**Operation (hours per day)**	**ROG**	**NOx**	**PM**
70-ton Crane	Diesel	1	399	0.43	8	0.260	2.549	0.099
Pulers and Tensioners	Diesel	2	106	0.48	8	0.614	3.614	0.325
Construction Activity: As-Needed Improvements								
Duration: 1 month, Year 2009[b]								
Equipment	**Fuel Type**	**Number of Equipment**	**Horsepower**	**Load**	**Operation (hours per day)**	**ROG**	**NOx**	**PM**
Backhoe/Skip Loader	Diesel	1	185	0.59	8	0.601	3.672	0.335

[a] It was assumed the emissions from air compressors would represent emissions from engines used to operate the puller or tensioners

[b] It was assumed that 1 month of emissions would represent the possible as-needed use of a backhoe or loader during construction. The emissions were conservatively assumed to occur in the year 2009.

Source: Emission factors, horserpower, and load factors from URBEMIS2007, version 9.2.4.

Vaca Dixon-Birds Landing 230 kV Reconductoring Project
Attachment B-1

Truck Emissions

Table 4. On-Site Truck Miles Traveled

Trucks	Number of Trucks	Average Roundtrip Distance Traveled (Miles per Day)	Total Vehicle Miles Traveled (VMT/day)	Emissions (ton/activity)		Emissions (lbs/day)	
Tower Work				**ROG**	**NOx**	**Exhaust PM_{10}**	**Fugitive PM_{10}**
Pick-up truck (gasoline)	1	8	8	0.000	0.001	0.00	3.52
Reconductoring (Pull and Tension, Install Pulleys and Insulators, Guard Structures, Remove Pulleys)							
Diesel Trucks (line trucks, semi truck, rope truck, water truck, fuel truck)	6	8	48	0.07	0.26	0.26	21.13
Pick-up truck (gasoline)	4	8	32	0.001	0.003	0.005	14.09

The distance traveled for trucks was estimated based on the maximum distance between pull sites (See Figure 1-1 Project Location).

The URBEMIS2007 default of 22 days per month was used to calculate emissions in units of tons per activity.

Fugitive emissions from roads assumes 60% of the miles travel would occur on paved roads and 40% of the miles traveled would occur on unpaved roads.

Table 5. Emission Factors (EF)

	ROG	NOx	PM_{10}
Heavy-duty diesel Emission Factor (g/mile)	8.829	31.876	2.475
Heavy-duty diesel Emission Factor (lb/mile)	0.0195	0.0703	0.0055
Gasoline pick-up Emission Factor (g/mile)	0.267	0.526	0.068
Gasoline pick-up Emission Factor (lb/mile)	0.0006	0.0012	0.0001

Emission factors from EMFAC2007 v 2.3 for Solano County for a heavy duty diesel truck traveling 10 miles per hour.

Vaca Dixon-Birds Landing 230 kV Reconductoring Project
Attachment B-1

Truck Emissions

Table 6. Fugitive Emissions from Roads

Travel on Unpaved Surfaces

Emission Factor (EPA AP-42 13.2.2):

$EF^{(1)}$ = k [(s/12)^a] [(W/3)^b] lb/vehicle mile traveled (vmt)

Travel on Paved Surfaces

Emission Factor (EPA AP-42 13.2.1):

$E = [k(sL/2)^{0.65} * (W/3)^{1.5}] - C$

Variables	PM_{10}	Variables	PM_{10}
k	1.5	k	0.016
a	0.9	sL (g/m2)	0.03
b	0.45	W (tons)	3
s (%)	8.5	C	0.0005
W (tons)	3	EF(lb/VMT) =	0.001
EF(lb/VMT) =	1.10		

1. Emission factors were calculated using EPA AP-42 13.2.2, equation 1b.
2. Silt content were obtained from EPA AP42 Table 13.2.2-1. The value of scraper routes of construction sites was used.

Vaca Dixon-Birds Landing 230 kV Reconductoring Project
Attachment B-1

Helicopter Emission Calculations

Table 7. Helicopter Emissions Summary

Daily Emissions (lb/day)				
CO	**HC**	**NOx**	**SOx**	**PM**
29.33	1.59	17.93	1.64	0
Annual Emissions (ton/yr)				
CO	**HC**	**NOx**	**SOx**	**PM**
3.871	0.210	2.367	0.216	0

Daily emissions calculated assuming 2 LTO per day and 12 hours for tower work per day.
Annual emissions calculated assuming 22 workdays per month for the duration of the project (September 2009 through October 2010).

Table 8. Helicopter Emission Factors

				Emission Factors (lbs/min)					
Helicopter	**Engine Type**	**Mode**		**CO**	**HC**	**NOx**	**SOx**	**PM**	**Minutes/LTO**
BELL 206	250B17B	1	Approach	0.0686777	0.007566187	0.0032011	0.0007857	0	6.50
	250B17B	2	Climb	0.0368677	0.001634931	0.0243605	0.0022072	0	4.33
	250B17B	3	Take-off	0.0345047	0.001325406	0.0291589	0.0023857	0	2.17
	250B17B	4	Idle	0.1013631	0.020899608	0.001045	0.0005643	0	7.00

It was assumed that the Bell 206 engine represents the emissions profile of a Huey 204 or Super 206 helicopter that would be used for tower work.
Emission factors for the Bell 206 engine are from the Federal Aviation Administration, Emissions and Dispersion Modeling System (EDMS).
Time per mode based on default times in EDMS.

Vaca Dixon-Birds Landing 230 kV Reconductoring Project
Attachment B-1

Helicopter Emission Calculations

Table 9. Landing/Take-Off Emissions

	Emissions (lbs/LTO)				
Engine Mode	**CO**	**HC**	**NOx**	**SOx**	**PM**
Approach	0.446	0.049	0.021	0.005	0
Climb	0.160	0.007	0.105	0.010	0
Take-off	0.075	0.003	0.063	0.005	0
Idle	0.710	0.146	0.007	0.004	0
	TOTAL:				
	1.390	**0.205**	**0.197**	**0.024**	**0**

2 LTO per day

Table 10. Helicopter Operation Emissions during Tower Work

Minutes operation per day 720

	Emissions (lbs/LTO)				
Engine Mode	**CO**	**HC**	**NOx**	**SOx**	**PM**
Climb	26.54	1.18	17.54	1.59	0

Assume helicopter operates for 12 hours per day when used for tower work.

Vaca Dixon-Birds Landing 230 kV Reconductoring Project
Attachment B-2

Emissions Summary

Table 1. Construction Emissions
Emissions Before Avoidance and Protection Measures

	Emissions (metric tons/project)
	CO_2
TOTAL	498

Emissions After Avoidance and Protection Measures

	Emissions (metric tons/project)
	CO_2
TOTAL	480

Reduction in emissions after implementation of avoidance and protection measures assumes a 15% reduction in CO2 emissions from construction equipment and vehicles. Emissions from helicopter use would not be reduced with implementation of the control measures.

Vaca Dixon-Birds Landing 230 kV Reconductoring Project
Attachment B-2

Construction Equipment Emissions

Table 2. Construction Equipment Emission Summary (tons/activity)

Construction Activity	Emissions (metric tons/activity) CO_2
Tower Work	85.93
As-needed Improvements	6.01

The URBEMIS2007 default of 22 days per month was used to calculate emissions in units of tons per activity.

Table 3. Construction Schedule and Equipment Summary

Construction Activity: Tower Work						
Duration: 7 months, September 2009 through mid-June 2010						Emission Factors (g/bhp hr)
Equipment	Fuel Type	Number of Equipment	Horsepower	Load	Operation (hours per day)	CO_2
70-ton Crane	Diesel	1	399	0.43	8	244.589
Pulers and Tensioners	Diesel	2	106	0.48	8	273.029
Construction Activity: As-Needed Improvements						
Duration: 1 month, Year 2009[b]						
Equipment	Fuel Type	Number of Equipment	Horsepower	Load	Operation (hours per day)	CO_2
Backhoe/Skip Loader	Diesel	1	185	0.59	8	312.846

[a] It was assumed the emissions from air compressors would represent emissions from engines used to operate the puller or tensioners

[b] It was assumed that 1 month of emissions would represent the possible as-needed use of a backhoe or loader during construction. The emissions were conservatively assumed to occur in the year 2009.

Source: Emission factors, horserpower, and load factors from URBEMIS2007, version 9.2.4.

Vaca Dixon-Birds Landing 230 kV Reconductoring Project
Attachment B-2

Truck Emissions

Table 4. On-Site Truck Miles Traveled

Trucks	Number of Trucks	Average Roundtrip Distance Traveled (Miles per Day)	Total Vehicle Miles Traveled (VMT/day)	Emissions (metric tons/activity)
Tower Work				**CO_2**
Pick-up truck (gasoline)	1	8	8	1.102
Reconductoring (Pull and Tension, Install Pulleys and Insulators, Guard Structures, Remove Pulleys)				
Diesel Trucks (line trucks, semi truck, rope truck, water truck, fuel truck)	6	8	48	23.40
Pick-up truck (gasoline)	4	8	32	4.860

The distance traveled for trucks was estimated based on the maximum distance between pull sites (See Figure 1-1 Project Location).

The URBEMIS2007 default of 22 days per month was used to calculate emissions in units of tons per activity.

Table 5. Emission Factors (EF)

	CO_2
Heavy-duty diesel Emission Factor (g/mile)	3165.447
Heavy-duty diesel Emission Factor (lb/mile)	6.9785
Gasoline pick-up Emission Factor (g/mile)	894.602
Gasoline pick-up Emission Factor (lb/mile)	1.9722

Emission factors from EMFAC2007 v 2.3 for Solano County for a heavy duty diesel truck traveling 10 miles per hour.

Vaca Dixon-Birds Landing 230 kV Reconductoring Project
Attachment B-2

Helicopter Emission Calculations

Table 6. Helicopter Emissions Summary

Fuel Use:	32	gallons per hour
Emission Factor:	9.56	kg CO_2/gallon Jet A fuel
Emissions (metric tons/project):	377	metric tons CO_2

Emissions calculated assuming 8 hours per day for 22 workdays per month for the duration of the project (September 2009 through October 2010).
CO2 emission factor from the ARB Mandatory Reporting Regulation, Appendix A, Table 4.

Attachment C
Biological Assessment Submitted to the USFWS in accordance with Section 7 of the Endangered Species Act

Attachment C1
Biological Assessment

Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Pacific Gas and Electric Company

Environmental Services
3400 Crow Canyon Road
San Ramon, CA 94583

April 2008

In Association with

CH2MHILL

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Acronyms and Abbreviations

AFB	Air Force Base
CDFG	California Department of Fish and Game
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
FESA	Federal Endangered Species Act
HCP	Habitat Conservation Plan
I-80	Interstate 80
kV	kilovolt
PG&E	Pacific Gas and Electric Company
USFWS	United States Fish and Wildlife Service

1.0 Introduction

The purpose of this biological assessment is to evaluate and document potential effects of the Vaca Dixon-Birds Landing 230 kilovolt (kV) Reconductoring Project (Project) on (1) federally-listed endangered or threatened species and (2) critical habitat listed by the United States Fish and Wildlife Service (USFWS) under the Federal Endangered Species Act (FESA) that occur within the Project area. This biological assessment has been prepared and submitted in compliance with the requirements of Section 7 of FESA (19 United States Code 1536[c], 50 Code of Federal Regulations 402.12[f], and 402.14[c]) in support of a Pre-Construction Notification submitted to the U.S. Army Corps of Engineers.

1.1 Project Purpose

The Pacific Gas and Electric Company (PG&E) is proposing to reconductor approximately 30 miles of power line to increase transmission capacity to serve electric customers in Solano and Contra Costa counties. The Project is needed to increase transmission capacity to serve electric customers in those counties, and will allow the increased use of alternative energy sources such as wind power as required by the California Public Utilities Commission (CPUC).

Seven federally-listed wildlife and plant species are known to occur, or could potentially occur, in the vicinity of the Project. These are:

- Conservancy fairy shrimp (*Branchinecta conservatio*) **E**
- vernal pool fairy shrimp (*Branchinecta lynchi*) **T**
- vernal pool tadpole shrimp (*Lepidurus packardi*) **E**
- Delta green ground beetle (*Elaphrus viridis*) **T**
- California tiger salamander (*Ambystoma californiense*, central valley population) **T**
- Contra Costa goldfields (*Lasthenia conjugens*) **E**
- showy Indian clover (*Trifolium amoenum*) **E**

1.2 Project Location

The Project is located entirely in Solano County, California, as shown in Figure 1-1. Upgrades and improvements to the 230 kV transmission line extend from PG&E's Vaca Dixon Substation, located on Quinn Road north of Interstate 80 (I-80) approximately 4.7 miles to the northeast of Vacaville (38.400645°N; -121.920885°W), south and west to Peabody Substation, located on Peabody Road at its intersection with Vanden Road between Fairfield and Vacaville (38.285410°N; -121.970530°W) and a second component extends from the Vaca Dixon Substation south to Birds Landing Substation north of Montezuma Road (38.123625°N; -121.829210°W).

1.3 Project Description

A reconductoring project has two basic components:

- Tower work, which consists of all necessary modifications and repairs to the towers to allow the towers to support the new, heavier conductor while maintaining required clearances from the ground.
- Line work, which consists of installing the new conductor and adjusting it to the correct tension. New insulators and hardware are also normally installed during reconductoring.

1.3.1 Tower Work

In order to accommodate the heavier conductors, 105 of the 163 towers on the Vaca Dixon-Birds Landing Project will require some sort of structural modification. Cage extensions will be added to 43 towers to increase tower height: 41 towers will be raised 15 feet, and two towers will be raised 20 feet. Arm extensions will be installed on 20 of the raised towers, as well as on 58 otherwise unmodified towers. Additionally, two towers will be converted from suspension to dead end, and two transposition towers will be reinforced. Table 1-1 lists the proposed modifications for each tower. No foundation work or modifications to the base of the towers will be required at any tower location. Construction will be performed by helicopter except for a few towers near the golf course.

1.3.2 Line Work

The proposed Project will increase transmission line capacity by replacing the existing 1,113 kcmil aluminum and 954 kcmil aluminum conductor steel-reinforced conductors with 1,113 kcmil steel-supported aluminum conductor on approximately 30 miles (50 circuit miles) of existing transmission line. Reconductoring is accomplished in sections of up to several miles. Seventeen pull-and-tension sites have been identified as end points for these sections. Line work also includes replacing insulators and installing crossing structures to protect roadways and other power lines. Crossing structures consist of wood poles with netting strung between them. The structures are placed over overhead utilities and roadways at crossings to protect them when pulling the cable.

1.4 Construction Methods

1.4.1 Grounding

The first step in any construction on towers is the installation of ground rods near the base of structures in active work areas. Ground rods are an important safety measure for linemen and other construction personnel working in and around towers. They are copper rods, 5/8-inch in diameter, and long enough to be driven into firm ground, with approximately 1 foot protruding above ground. They are connected to the tower with clamps and a piece of conductor and are not removed until Project activities are complete. Ground rods are also attached to any equipment used near an energized conductor, including reel pullers and bullwheel tensioners.

Ground rods will be installed on each end of designated pull sites prior to pulling and tensioning work and will be removed once work is complete in that area. Grounding will also be necessary at towers not accessible by helicopter (Towers 4/33, 4/34, 4/35, 0/03, and 0/04). A crane truck will used for tower modifications at these locations.

1.4.2 Tower Construction

Crews will prepare towers to accommodate the cage-top extensions by installing the necessary braces and additional plates. In the most sensitive areas (Tower 9/65 through Tower 12/82) workers, tools, and equipment will be brought in by helicopter. The cage-top extensions will be assembled within the designated fly site boundaries. Tower numbers can be seen on Figures 1-2 through 1-12

TABLE 1-1
Structure Modification Sheet
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Structures Being Raised with 15-foot Top Cage Extension by Helicopter				Structures W/X-ARM Being Replaced from 9 to 11 feet							
	Structure #	Type	Existing Height (ft)		Structure Number	Type	Height (ft)		Structure Number	Type	Height (ft)
1	STR 0/4	M	97	1	STR 0/3	M	97	41	STR 10/70	M	97
2	STR 0/6	M	97	2	STR 0/4	M	97	42	STR 10/72	M	97
3	STR 1/9	M	97	3	STR 0/5	M	97	43	STR 11/77	M	112.5
4	STR 1/11	M	97	4	STR 0/6	M	97	44	STR 11/79	M	102
5	STR 1/14	M	97	5	STR 0/7	M	97	45	STR 12/80	M	97
6	STR 3/21	M	97	6	STR 1/8	M	97	46	STR 12/81	M	97
7	STR 3/22	M	97	7	STR 1/9	M	97	47	STR 12/82	M	97
8	STR 3/25	M	102	8	STR 1/10	M	97	48	STR 12/83	M	112.5
9	STR 4/27	M	97	9	STR 1/11	M	97	49	STR 12/85	M	97
10	STR 4/30	M	97	10	STR 1/12	M	97	50	STR 12/86	M	97
11	STR 4/32	M	97	11	STR 1/13	M	97	51	STR 13/87	M	97
12	STR 5/38	M	97	12	STR 1/14	M	97	52	STR 13/88	M	97
13	STR 6/41	M	97	13	STR 2/15	M	102	53	STR 13/90	M	99.5
14	STR 6/43	M	97	14	STR 2/16	M	97	54	STR 14/94	M	97
15	STR 6/45	M	97	15	STR 2/17	M	97	55	STR 14/95	M	97
16	STR 8/57x	M	102	16	STR 2/18	M	97	56	STR 14/96	M	97
17	STR 9/66	M	97	17	STR 2/19	M	112.5	57	STR 14/97	M	97
18	STR 10/68	M	97	18	STR 2/20	M	112.5	58	STR 14/98	M	104.5
19	STR 10/70	M	97	19	STR 3/23	M	112.5	59	STR 15/100	M	97

TABLE 1-1
Structure Modification Sheet
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

20	STR 10/72	M	97	20	STR 3/25	M	102	60	STR 15/101	M	97
21	STR 11/74	M	104.5	21	STR 3/26	M	97	61	STR 15/103	M	102
22	STR 12/81	M	97	22	STR 4/29	M	112.5	62	STR 15/105	M	97
23	STR 14/98	M	97	23	STR 4/33	M	97	63	STR 16/106	M	97
24	STR 15/99	M	97	24	STR 5/34	M	97	64	STR 16/107	M	97
25	STR 15/104	M	97	25	STR 5/35	M	97	65	STR 16/108	M	97
26	STR 16/106	M	97	26	STR 5/37	M	97	66	STR 16/109	M	99.5
27	STR 16/111	M	97	27	STR 5/38	M	97	67	STR 16/111	M	97
28	STR 17/115	M	97	28	STR 5/39	M	97	68	STR 17/113	M	99.5
29	STR 18/121	M	99.5	29	STR 5/40	M	97	69	STR 17/114	M	97
30	STR 18/122	M	99.5	30	STR 6/41	M	97	70	STR 17/116	M	99.5
31	STR 1/13	M	97	31	STR 6/42	M	97	71	STR 17/117	M	97
32	STR 2/17	M	97	32	STR 6/43	M	97	72	STR 17/119	M	97
33	STR 6/46	M	97	33	STR 6/44	M	97	73	STR 18/120	M	104.5
34	STR 11/77	M	97	34	STR 6/45	M	97	74	STR 18/121	M	99.5
35	STR 11/78	M	97	35	STR 6/46	M	97	75	STR 18/122	M	99.5
36	STR 12/80	M	97	36	STR 9/65	M	99.5	76	STR 18/125	M	97
37	STR 13/90	M	97	37	STR 9/66	M	97	77	STR 19/128	M	102
38	STR 17/117	M	97	38	STR 9/67	M	97	78	STR 8/57X	M	102.5
39	STR 4/33	M*	97	39	STR 10/68	M	97				
40	STR 5/34	M*	97	40	STR 10/69	M	97				
41	STR 5/35	M*	97								
Structures Being Raised with 20-foot Cage Extension by Crane				**Structures Converted from Tangent to Dead-End or Needing Reinforcement**							
	Structure #	**Type**	**Existing Height (ft)**		**Structure Number**	**Type**	**Height (ft)**				
42	STR 0/003	BA*	129	1	STR 8/59X	MGX	95				
43	STR 0/004	BA*	144	2	STR 19/127	0-98	97.5				
				3	STR 4/031	Trans	110				
				4	STR 18/123	Trans	120				

Except for the five towers adjacent to the Cypress Lakes Golf Course (Towers 4/33, 4/34, 4/35, 0/03, and 0/04), cage-top extensions will be delivered to the tops of the towers by helicopter and will be bolted to the existing towers. Arm extensions will be installed after cage extensions are completed. The existing conductors will be temporarily clipped to the side of the tower while the arm extensions are brought into place and installed.

1.4.3 Crossing Structure Installation

Guard structures are used to protect roads, railroad tracks, power lines, and the public should a line fall during reconductoring. Guard structures usually consist of one or two wooden poles and a cross beam. They are installed in pairs with a net strung between the poles. A line truck is used to auger and set the poles. Guard structure poles will be removed following reconductoring, and the holes will be backfilled and compacted. In sensitive areas, guard structures will be installed and removed during the dry season to minimize ground disturbance and potential erosion.

Approximately 28 pairs of guard structures will be required, as shown in Figures 1-2 through 1-12. Almost all guard structures can be installed from existing paved or dirt roads. The only structure requiring off-road access is located north of Creed Road, within Wilcox Ranch. This structure will protect an existing distribution line and will be accessed by a line truck following a disked firebreak through grazing land outside the Wilcox Ranch boundary. Access to this guard structure will require installing a new gate in the Wilcox Ranch fence to minimize the impacts to existing vernal pool habitat. However, this access route crosses a seasonal wetland that could potentially provide habitat for vernal pool invertebrates and Contra Costa goldfields as discussed below. This guard structure will be placed and removed when soils are dry.

1.4.4 Unclipping and Traveler Installation

Conductor replacement begins with the installation of travelers, which are pulleys that allow the conductor to be pulled through each structure. Travelers will be installed on the tower arms, and the existing conductors will be unclipped from the insulators and will be placed in the travelers. Travelers and insulators will be transported to each tower by helicopter or by vehicle in areas where off-road travel is permitted. Helicopters may also assist in moving conductors to the travelers.

1.4.5 Pulling and Tensioning

The new conductor will be attached to one end of the existing conductor, and a cable from the puller will be attached to the existing conductor at the other end. As the puller rolls up the old conductor, the new conductor is pulled into place. The conductor will be pulled through each structure under controlled tension to keep it elevated and away from obstacles, thereby preventing damage to the line and protecting the public. After the new conductor is in place, it will be “sagged” (pulled to the appropriate height and tension).

Once the new conductor is sagged, it will be removed from the rollers and clipped permanently to the end of each insulator. The rollers will then be removed and vibration dampers and other accessories installed.

1.4.6 Substation Modifications

Equipment at Lambie Switching Station and Vaca Dixon, Birds Landing, and Peabody Substations will be upgraded to accommodate the higher conductor ratings. All work at the switching station and substations will occur within the existing fences; therefore, expansion of existing facilities will not be required. Outdoor work at these facilities will include upgrades and replacement of switches and cable drops; installation of new insulators and hardware; reinforcement of existing piers at new dead end structures; and removal of switches, cable, and tubular bus conductors. Relay settings for line terminals will be reviewed and reset as necessary.

1.5 Access

The main transportation corridors providing access to the project area are I-80, Highway 12, and county roads. Existing paved roads will be used for general construction area access; some existing gravel roads (such as the access road for Birds Landing Substation) are all-weather roads that require no modification to provide access construction vehicles and equipment.

1.5.1 Helicopter Access

Most construction activities will be carried out by helicopter to minimize ground-disturbing impacts and to maximize the speed of installation. In sensitive biological areas, workers and equipment will be flown to and from towers. Helicopters will typically hover at or above the tops of towers at heights of 80 to 120 feet, and workers will step onto towers directly from the helicopter. Helicopters will use designated fly sites.

1.5.2 Road Access

Figures 1-2 through 1-12 show existing roads and temporary access roads. Access to temporary construction areas (e.g., pull sites, guard structures, helicopter landing sites) will be limited as much as possible to existing access roads and temporary routes through agricultural fields. Sensitive biological areas (the area north of Creed Road and at the coral site at the intersection of Vanden Road and Canon Road) will be accessed during the dry season.

Wet season access to non-sensitive temporary construction areas may require improvements to existing dirt roads and temporary access routes to accommodate heavy equipment. Four to six inches of gravel will be placed on these roads where needed. No widening or grading will be needed. Temporary access routes through agricultural fields will be 12 feet wide or less. On off-road access routes, gravel will be underlain by geotextile fabric or matting to allow the gravel to be removed when the project is complete.

1.6 Temporary Work Areas

1.6.1 Helicopter Landing Zones (Fly Sites)

Fly sites (landing zones) are used as landing sites and to stage materials, equipment, and crews during project construction. A fuel truck will also be present for helicopter fueling.

Nine fly sites, with maximum dimensions of 200 feet by 300 feet, will be used during construction. They have been located to avoid all United States Army Corps of Engineers jurisdictional areas. No mowing or grading of the sites is planned, but fly sites used during the rainy season may require gravel to provide a stable base. Fly site locations are identified in Figures 1-2 through 1-12; these areas are numbered from Vaca Dixon Substation south starting with F-1.

The helicopters will return to the Vacaville airport, or on an appropriate paved area at the conclusion of each work day. Criteria for selection of non-work hours landing zone include centralized location, large paved unobstructed area, minimal dust, and separation from the public so as to not impede normal commerce or create a safety hazard.

1.6.2 Pull Sites

Pull-and-tension sites are placed in reasonably flat areas in line with the conductor. Seventeen of these sites are needed for Project construction. Their dimensions vary from 50 feet by 60 feet to 200 feet by 200 feet. Figures 1-2 through 1-12 show their locations; the pull sites are numbered from Vaca Dixon Substation south, starting with P-0. If necessary for equipment stability, gravel will be spread over the sites and will be removed at the end of the Project. Erosion control measures such as silt fences or fiber rolls placed at the limits of work will be installed, for those sites where work is required during the wet season. No mowing or grading of pull sites is planned. After the completion of the Project, pull sites will be returned to pre-construction conditions and will be reseeded as necessary.

1.7 Schedule

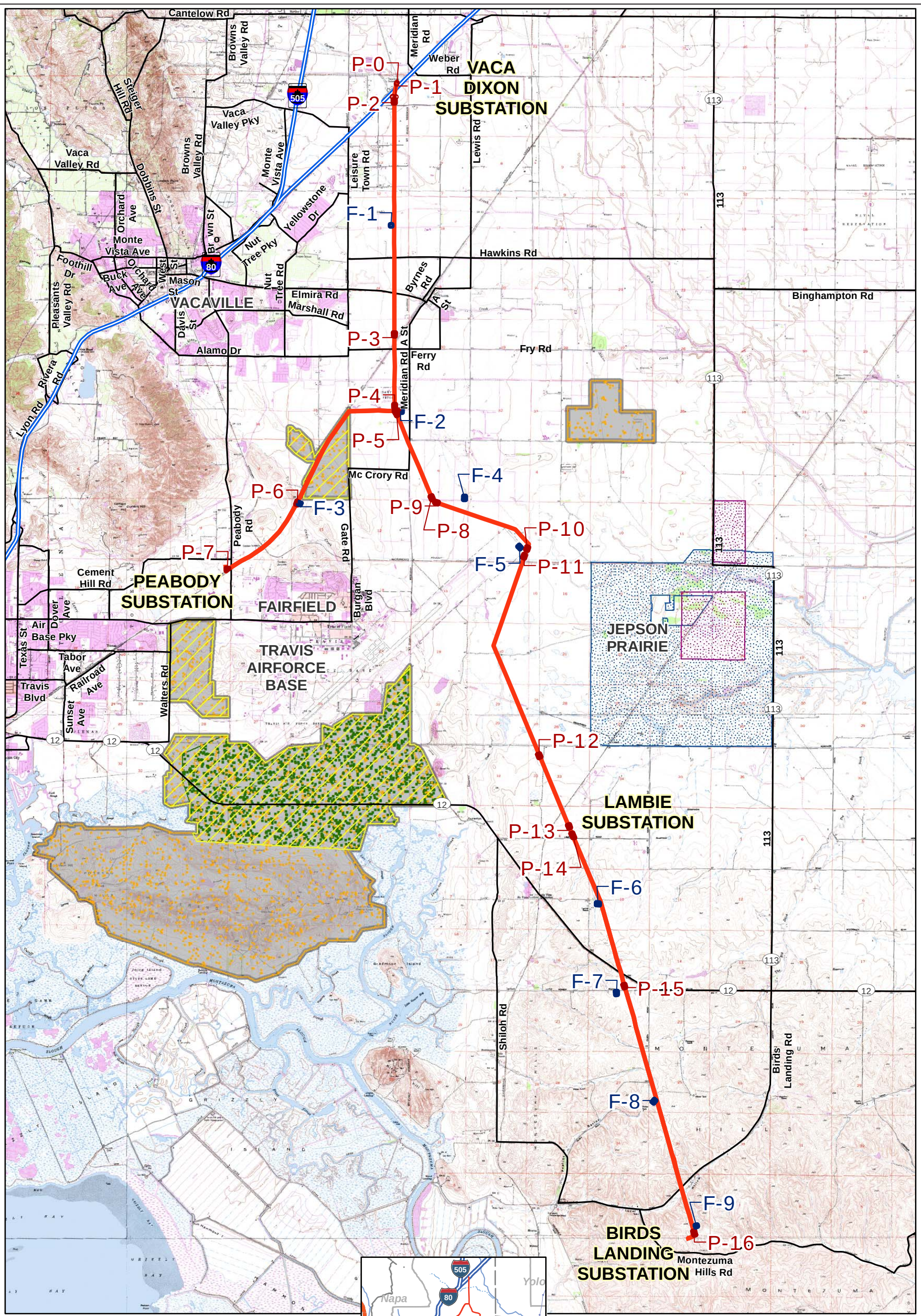
The Project schedule was planned to accommodate environmental considerations and restrictions imposed by the Independent System Operator on the timing of outages. An existing circuit must be removed from service during reconductoring, and this step must be coordinated with local demand for power. Outages typically are not planned for the summer when demand for electricity is at its highest and the consequences of a power outage are greatest.

Work is scheduled to begin in August 2008 and to be completed by June 2009. Tower work will start first and is scheduled to finish by mid-May 2009. Line work will follow and will finish in June 2009. Work starts in the biologically-sensitive area east of the Travis Air Force Base (AFB) runway and north of Creed Road to take advantage of the dry season. Scheduling is summarized below:

- **Fly sites and staging areas.** Crews will spend several days bringing equipment and materials to staging areas within the substations or fly site locations. A given fly site will be in use during work on that section of the line. Helicopters will be used for both tower modification work and replacement of conductors.
- **Tower work.** Cage and arm replacement will occur along the line in advance of reconductoring. Towers will be visited several times during the construction process: first to prepare for and then install any required cage or arm extensions; again to install the new conductor, travelers, and insulators on all towers in advance of reconductoring; and finally to remove the travelers and to place the conductors on the insulators ("clip"

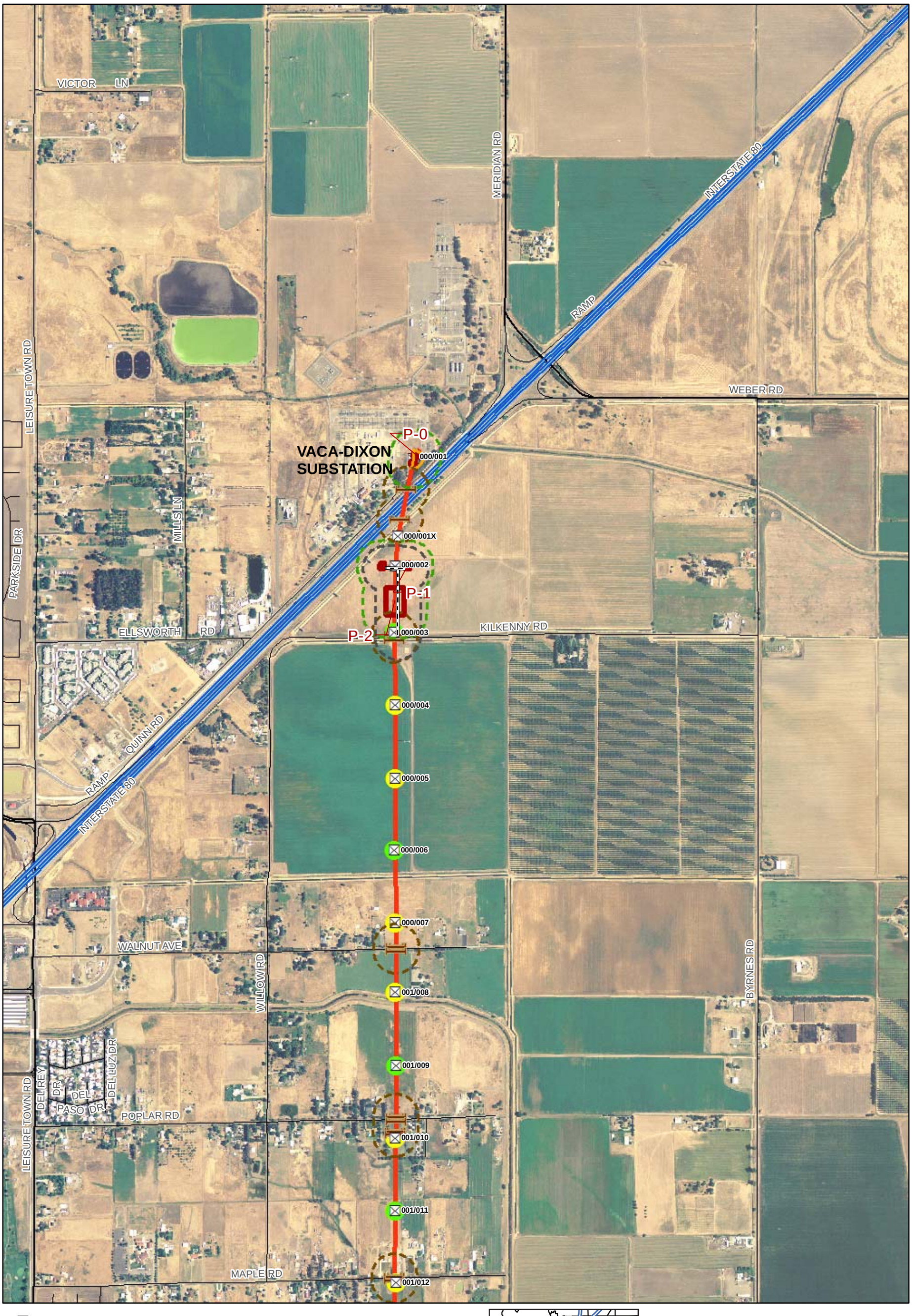
the conductors) once the pull-and-tension activity has resulted in achievement of the correct tension.

- **Guard structures.** These poles (with or without nets) will be placed prior to pulling and tensioning. In biologically-sensitive areas, they can be placed and removed during the dry season to avoid access during the wet season.
- **Reconductoring.** Reconductoring can be performed from October to June and is planned to span approximately 7 months. Approximately 200 days are planned for installing, pulling, and tensioning the new conductors on the entire length of the line; this work is accomplished in sections. If reconductoring work cannot be completed in this timeframe, work may be extended into the summer months. Since the lines being worked on are active transmission lines, timing of the pull and tensioning is dependent on load conditions and the ability to remove the line from service. This activity will be restricted to lower-load conditions outside the summer months.
- **Restoration.** Restoration of any temporarily disturbed areas will occur within 1 year of disturbance for all sites.



Transmission Lines
Pull Site
Fly Site
Vernal Pool Tadpole Shrimp Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
Contra Costa Goldfield Critical Habitat
Conservation Fairy Shrimp Critical Habitat
California Tiger Salamander Critical Habitat
Delta Green Ground Beetle Critical Habitat

FIGURE 1-1
Project Location
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project



Structures
60kV Poles
Structure Modification Type
Stuctures Receiving Arm Extension By Helicopter
Stuctures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Stuctures Converted from Tangent to Dead-End
Stuctures Receiving Cage Extension By Helicopter
Transmission Lines
Pull Site
Fly Site
250' Distance fror Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance fron Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures

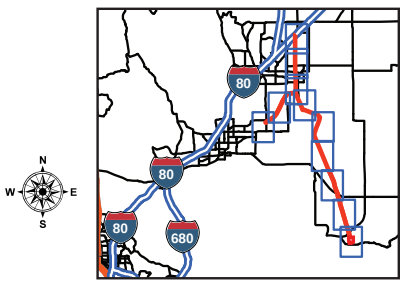


FIGURE 1-2
Project Overview
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Structures
60kV Poles
Structure Modification Type
Stuctures Receiving Arm Extension By Helicopter
Stuctures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Stuctures Converted from Tangent to Dead-End
Stuctures Receiving Cage Extension By Helicopter
Transmission Lines
Pull Site
Fly Site
250' Distance fro Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance fro Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures

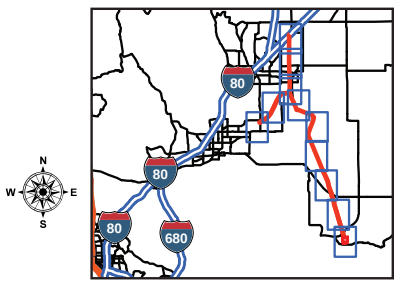
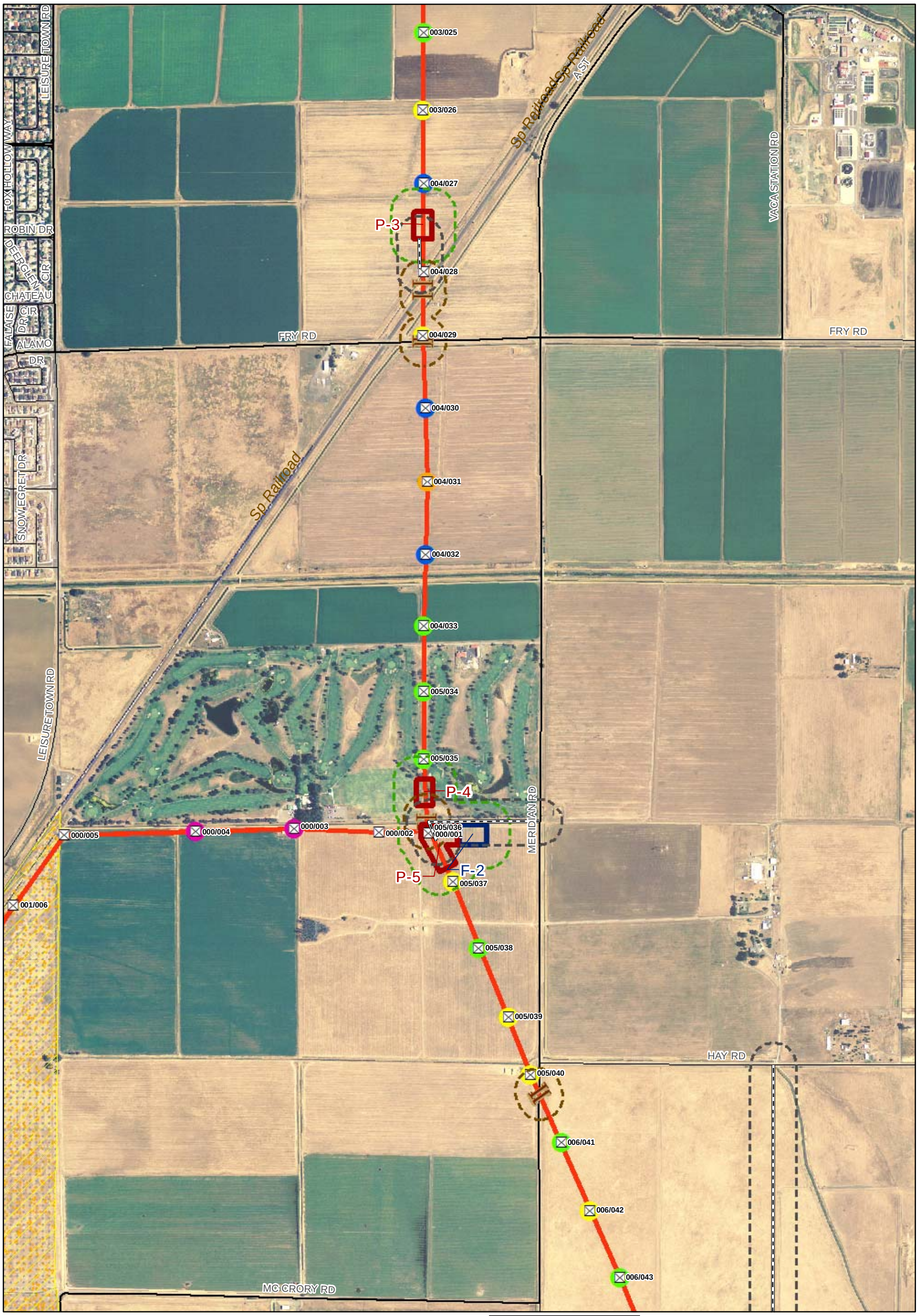


FIGURE 1-3
Project Overview
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project



Structures
60kV Poles
Structure Modification Type
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Stuctures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Stuctures Converted from Tangent to Dead-End
Stuctures Receiving Cage Extension By Helicopter
Transmission Lines
Pull Site
Fly Site
250' Distance fro Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance fro Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures

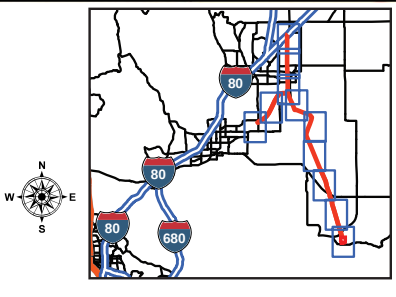
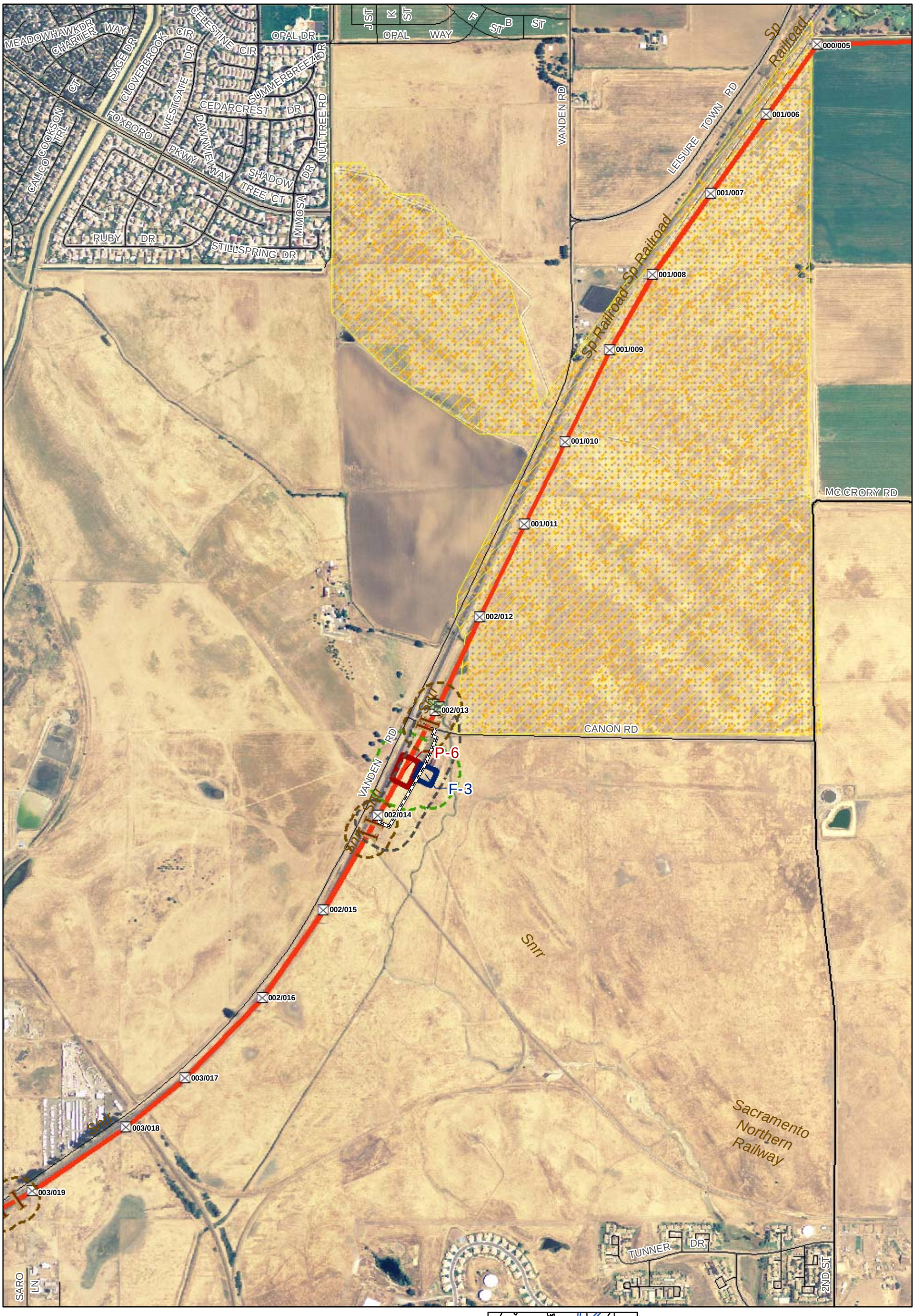


FIGURE 1-4
Project Overview
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project



Structures
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Structure Modification Type
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Structures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Structures Converted from Tangent to Dead-End
Structures Receiving Cage Extension By Helicopter
Transmission Lines
Pull Site
Fly Site
250' Distance fro Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance fro Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures

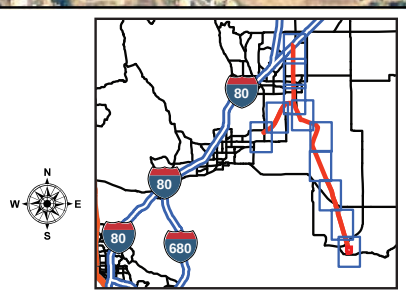


FIGURE 1-5
Project Overview
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

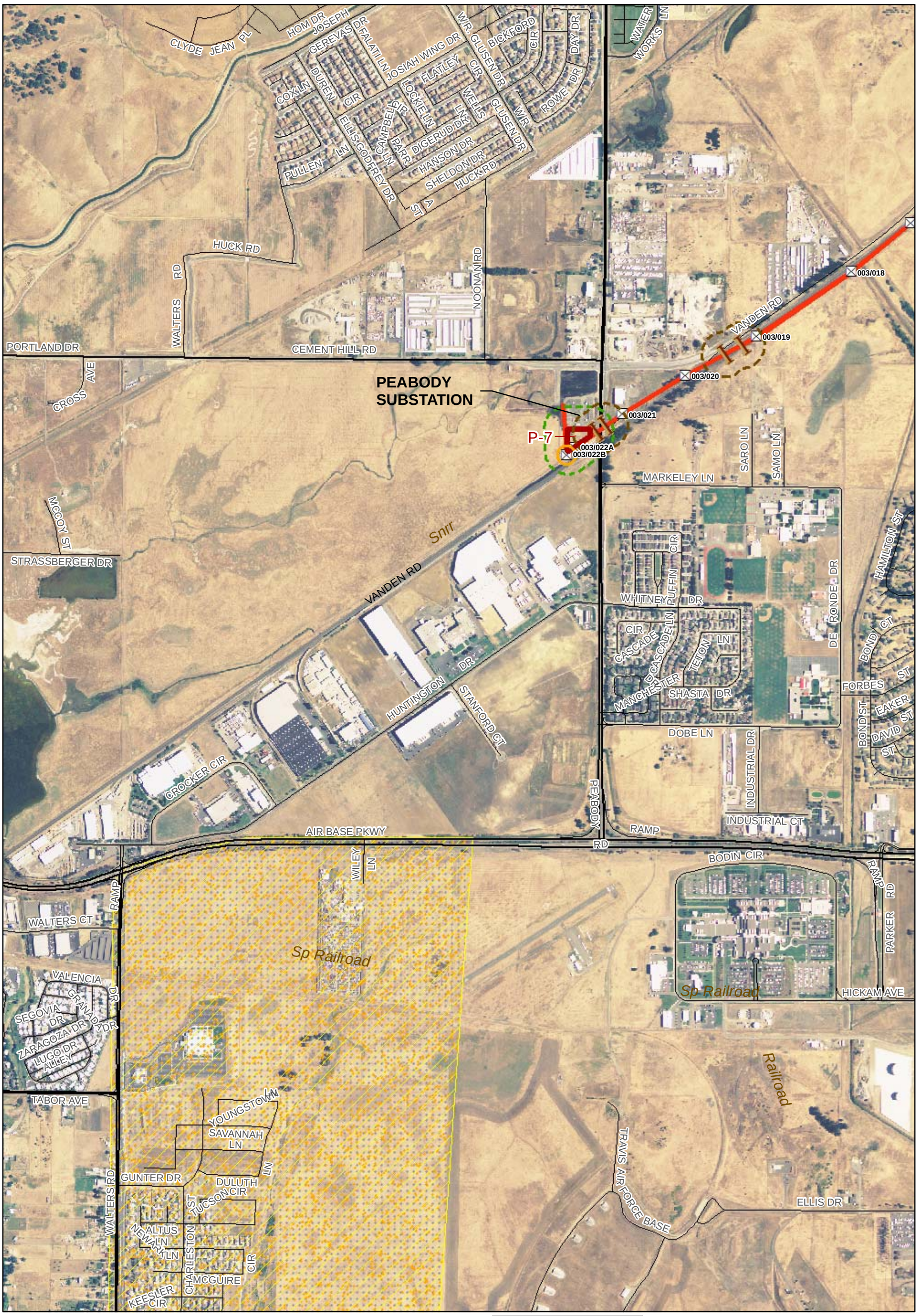
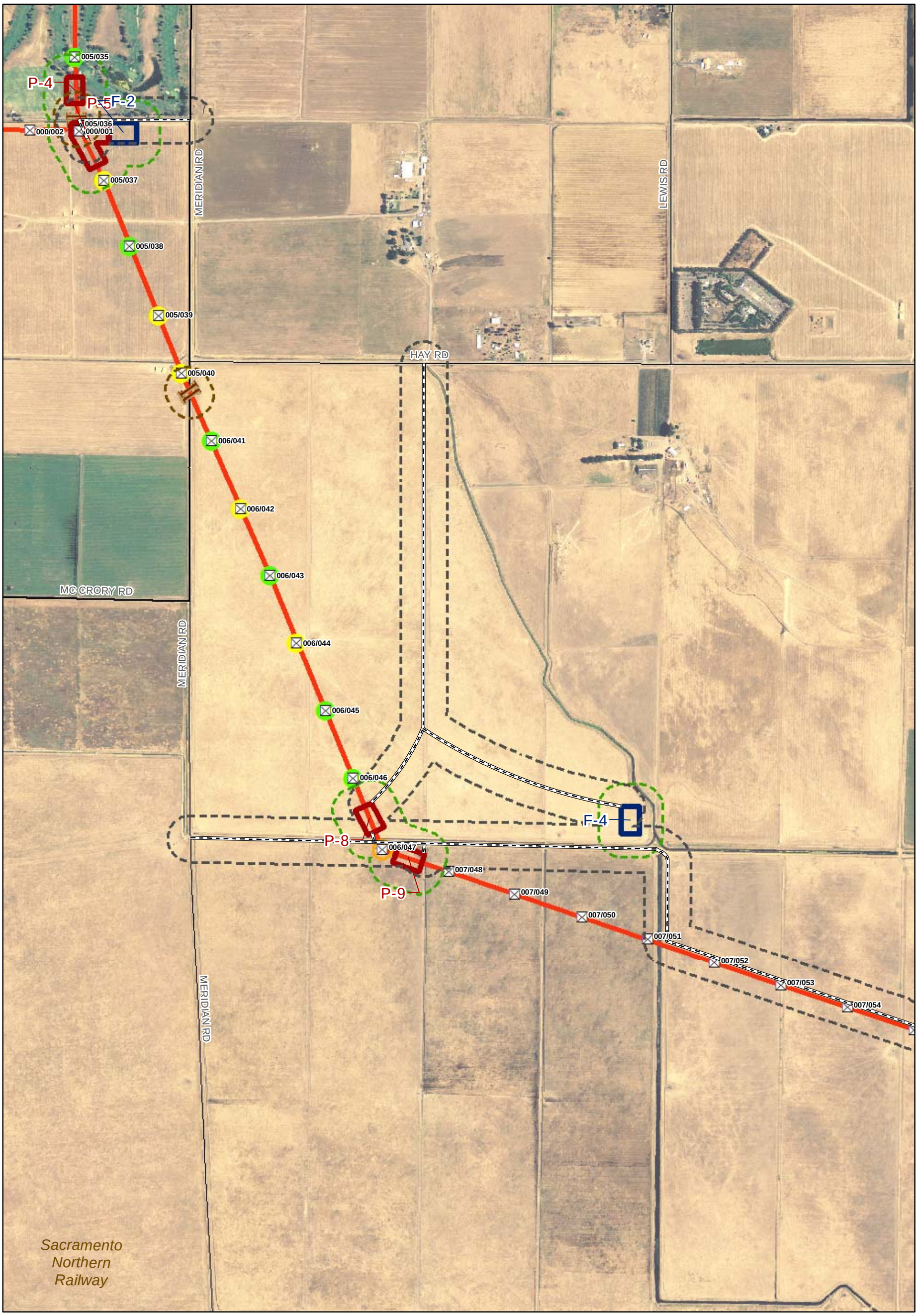


FIGURE 1-6
Project Overview
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project



Structures
60kV Poles
Structure Modification Type
Stuctures Receiving Arm Extension By Helicopter
Stuctures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Stuctures Converted from Tangent to Dead-End
Stuctures Receiving Cage Extension By Helicopter
Transmission Lines
Pull Site
Fly Site
250' Distance fror Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance fron Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures

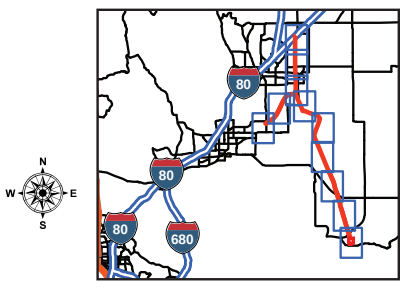


FIGURE 1-7
Project Overview
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Structures
60kV Poles
Structure Modification Type
Stuctures Receiving Arm Extension By Helicopter
Stuctures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Stuctures Converted from Tangent to Dead-End
Stuctures Receiving Cage Extension By Helicopter
Transmission Lines
Pull Site
Fly Site
250' Distance fror Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance fron Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures

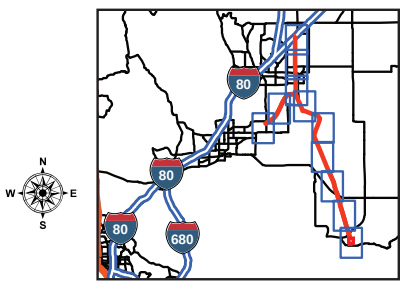


FIGURE 1-8
Project Overview
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

010/068
010/069
010/070
010/071
010/072
010/073
011/074
011/075
CREED RD
011/076
P-12
011/077
011/078
011/079
012/080
012/081
Sacramento Northern Railroad
012/082
012/083
BITHELL LN
012/084
P-13
012/085
P-14
LAMBIE SUBSTATION
012/086
LAMBIE RD
LAMBIE
RIO VISTA RD

Structures
60kV Poles
Structure Modification Type
Stuctures Receiving Arm Extension By Helicopter
Stuctures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Stuctures Converted from Tangent to Dead-End
Stuctures Receiving Cage Extension By Helicopter
Transmission Lines
Pull Site
Fly Site
250' Distance fror Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance fron Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures

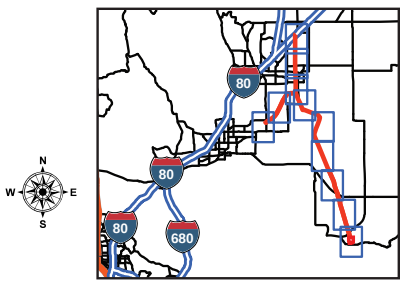
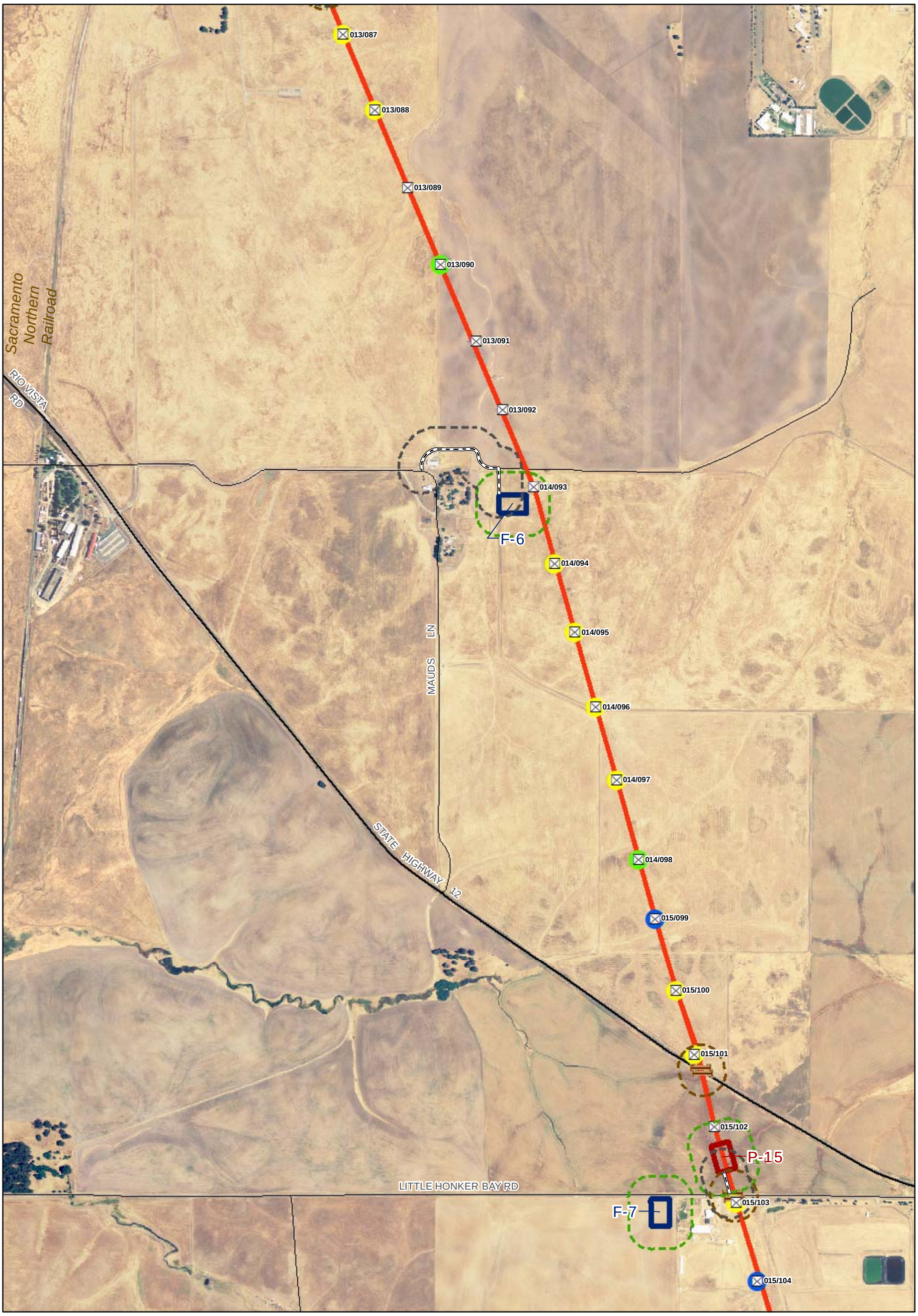


FIGURE 1-9
Project Overview
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project



Structures
60kV Poles
Structure Modification Type
Stuctures Receiving Arm Extension By Helicopter
Stuctures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Stuctures Converted from Tangent to Dead-End
Stuctures Receiving Cage Extension By Helicopter
Transmission Lines
Pull Site
Fly Site
250' Distance fror Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance fron Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures

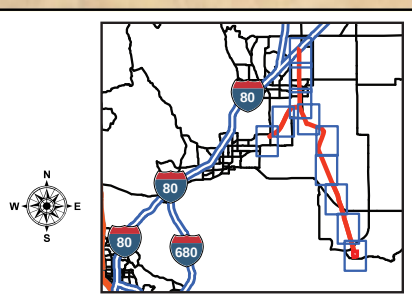


FIGURE 1-10
Project Overview
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

015/105
016/106
016/107
016/108
016/109
016/110
016/111
016/112
017/113
OLSEN RD
017/114
017/115
F-8
017/116
017/117
017/118
017/119
018/120
018/121
018/122
018/123B
018/123A
018/124
BIRDS LANDING RD

Structures
60kV Poles
Structure Modification Type
Stuctures Receiving Arm Extension By Helicopter
Stuctures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Stuctures Converted from Tangent to Dead-End
Stuctures Receiving Cage Extension By Helicopter
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Pull Site
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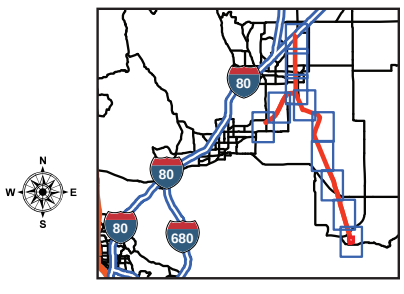

FIGURE 1-11
Project Overview
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

018/123B
018/123A
018/124
018/125
018/126
BIRDS LANDING RD
019/127
019/128
019/129
019/130
F-9
BIRD'S LANDING SUBSTATION
P-16
019/131
MONTEZUMA HILLS RD

Structures
60kV Poles
Structure Modification Type
Stuctures Receiving Arm Extension By Helicopter
Stuctures Receiving Cage Extension By Helicopter
Structures Receiving Cage & Arm Extension By Helicopter
Stuctures Converted from Tangent to Dead-End
Stuctures Receiving Cage Extension By Helicopter
Transmission Lines
Pull Site
Fly Site
250' Distance fror Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance fron Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures

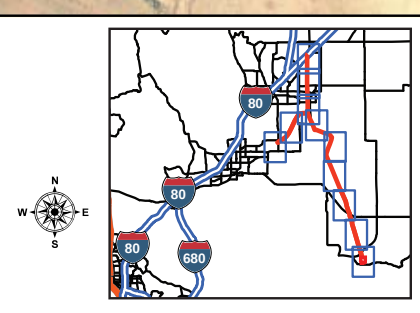

FIGURE 1-12
Project Overview
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

2.0 Environmental Setting

2.1 Regional Context

The Solano Plain is one of California's more important vernal pool/grassland regions where northern clay plan and hardpan vernal pools exist in a landscape spotted with mima mound formations. The Jepson Prairie Preserve situated about one mile east of the study area is one of the most important centers for native grassland and vernal pools in the state. Much of the original prairie and vernal pool lands of the Solano Plain have been converted to farmland leaving scattered isolated areas where the original landscape features and unique prairie and vernal pool habitat remain.

The study area is primarily in a rural agricultural setting under private ownership. Figure 1-1 (Project Location) and Figures 1-2 through 1-12 (Project Overview) show an overview of the environmental setting including the project's proximity to the Jepson Prairie and critical habitat.

The area between Vacaville Substation, Peabody Substation, and Birds Landing Substation lies mostly within the Solano-Colusa Vernal Pool Region as defined in the Recovery Plan for Vernal Pool Ecosystems of Southern Oregon and California (FWS, 2005). About half the project lies within the Jepson Prairie Core area of that Region, extending from north of Travis Air Force Base to an area just south of Little Honker Bay Road, on the edge of the Montezuma Hills. Vegetation communities within the project area and core area include annual non-native grasslands, seasonal wetlands, agricultural crops (such as alfalfa, irrigated hay, and dry land wheat), and vernal pool plant communities. Northern claypan vernal pools are typical of the vernal pools found in the Core area. These can be smaller pools in mima mound topography, or larger playa pools such as the one found to the southeast of the guard structure north of Creed Road (Figure 1-9).

The southern portion of the project is in the Montezuma Hills. Between Highway 12 (Rio Vista Road) and Birds Landing Substation, the project crosses over the hilly landscape of the Montezuma Hills. This area is used primarily for dry farming and dryland pasture, and virtually all the surrounding land has been cultivated or disturbed at one time or another.

Soils throughout the region are derived from marine and non-marine sediments deposited on the alluvial plain of the lower Sacramento River. Nine mapped soil units are associated with the 17 pull sites and 9 fly sites. The nine mapped soil units are provided in the following list:

1. Altamont–San Ysidro–San Benito Complex, 2- to 9-percent slopes
2. Antioch–San Ysidro Complex, 0- to 2-percent slopes
3. Capay Silty Clay Loam
4. Clear Lake Clay, 0- to 2-percent slopes
5. Diablo–Ayar Clays, 9- to 30-percent slopes
6. Rincon Clay Loam, 0- to 2-percent slopes

7. San Ysidro Sandy Loam, 0- to 2-percent slopes
8. Solano Loam
9. Solano–Pescadero Complex

Two of these mapped units, Clear Lake Clay and the Solano-Pescadero Complex, are poorly drained and some areas may be subject to frequent, long duration ponding. These soil units are included on the Solano County hydric soils list.

2.2 Project Setting

Almost the entire area from just north of Travis Air Force Base to Vacaville Substation is in agricultural crops (Figures 1-1 to 1-6); this area is identified in the Solano County Draft Multispecies Habitat Conservation Plan (Solano HCP, SCWA 2007) as developed, and is not within a designated vernal pool conservation area.

From Travis Air Force Base east and south to Creed Road (Figures 1-8 and 1-9), and for the area in the vicinity of the corral at Canon Road and Vanden Road (Figure 1-5), the majority of the land is covered in a vernal pool grassland complex; these areas are identified as High Value Conservation Areas in the Solano HCP. This area also includes the main playa pool area along the project alignment. Only the guard structure work north of Creed Road would take place in the playa pool area.

The area from Creed Road south to Bird's Landing Substation is identified as Medium Value Conservation Area, although only the area from Creed Road to Little Honker Bay is identified as being in the Jepson Prairie Vernal Pole Core Area.

2.3 Vegetation Communities

The predominant communities are agricultural lands and annual grasslands. Some native grassland components can be found in the area east of Travis Air Force Base, where no project work areas are planned.

2.3.1 Agricultural Lands

More than 60 percent of the land in Solano County is in agricultural production, approximately half of which is irrigated (Solano County Farm Bureau, 2008). Principal irrigated crops include grain hay, Sudan hay, alfalfa, and tomatoes. Wheat is the most common dry-land crop and is grown extensively throughout the Montezuma Hills.

Both irrigated and dryland pasture are also common throughout the area. These pasture lands support species commonly found in the annual grasslands described below. Much of the pasture within the project area is irrigated and is used primarily for cattle and sheep grazing.

2.3.2 Annual Grassland

Grassland habitat in the Project area is generally California annual grassland, as described in Barbour et al. (2007) and the "California Annual Grassland Series" per Sawyer and Keeler-Wolf (1995). Dominant species in these areas include non-native annual grasses such as medusa head (*Taeniatherum caput-medusae*), soft chess (*Bromus hordeaceus*), rip-gut brome

(*Bromus diandrus*), wild oat (*Avena fatua, A. barbata*), and ryegrass (*Lolium multiflorum*). Purple needlegrass (*Nassella pulchra*), a native perennial, is found in a few areas. Common herbs include broadleaf filaree (*Erodium botrys*), burclover (*Medicago polymorpha*), and geranium (*Geranium molle*).

2.4 Wetlands and Other Aquatic Resources

Seasonal wetlands, vernal pools, and numerous other aquatic habitat features occur at various locations within the Project area. A wetland delineation was conducted in February and March 2008 for this Project and is included in Appendix A. Many vernal pools do not meet the definition of a federally-regulated wetland under the USACE; these are mapped as habitat in Appendices B and C.

2.4.1 Seasonal Wetlands

At the time of the survey, the seasonal wetlands in the study area were characterized by non-native grasses and forbs such as ryegrass (*Lolium multiflorum*), Mediterranean barley (*Hordeum marinum* ssp. *gussonianum*), and curly dock (*Rumex crispus*). Several of the basins located south of Creed Road supported vernal pool vegetation including slender popcorn flower (*Plagiobothrys stipitatus*), annual hairgrass (*Deschampsia danthonioides*), and white hyacinth (*Triteleia hyacinthina*). A total of 0.64 acre of USACE Section 404 potentially jurisdictional seasonal wetlands was identified in the Project area, to be confirmed by USACE.

2.4.2 Other Aquatic Habitat

The Project consists of other aquatic habitat types including natural swales, roadside swales, roadside ditches, drainage ditches, and agricultural ditches. Please refer to the wetland delineation report provided in Appendix A for additional information and acreages of these other aquatic features. A total of 0.63 acre of non-jurisdictional aquatic features was identified in the Project area.

2.5 Wildlife Habitat

Wildlife habitats, as well as the common wildlife species associated with each habitat that occur within the Project area, are described below. While vegetation types are defined by species composition, wildlife habitats, although based on vegetation types, are modified to include other physical environmental characteristics (e.g., rock outcrops, etc.). The name of the corresponding vegetation type appears in parenthesis after each wildlife habitat.

2.5.1 Annual Grassland (California Annual Grassland)

Open grassland is an important habitat for raptors because they require unobstructed lines of sight for courtship, hunting, and territorial defense. Raptors that frequent this habitat type and that would be expected to occur in the Project area include the red-tailed hawk (*Buteo jamaicensis*) and American kestrel (*Falco sparverius*). California quail (*Callipepla californica*), mourning dove (*Zenaida macroura*), and meadowlarks (*Sturnella neglecta*) are a few seed eaters that use grasslands for nesting. Insect eaters such as scrub jays (*Aphelocoma*

californica), barn swallows (*Hirundo rustica*), and mockingbirds (*Mimus polyglottos*) use the habitat only for foraging. Mammals such as the California vole (*Microtus californicus*), broad-footed mole (*Scapanus latimanus*), and black tailed jackrabbit (*Lepus californicus*) forage and nest within grasslands. California ground squirrels (*Spermophilus beecheyi*) create burrows that also shelter other species. Mule deer (*Odocoileus* hemionus) use grasslands for grazing and resting at night.

Listed species that are known or expected to occur in this habitat include California tiger salamanders upland and dispersal habitats, and Delta green ground beetle in grassland areas adjacent to large playa pools.

2.5.2 Seasonal Wetlands

Seasonal wetlands and their associated seasonal open water habitat provide important habitat for several small mammals, birds, reptiles, amphibians, and invertebrates. Some wildlife species are adapted to survive in this habitat throughout the year, while others are present only during the winter and spring when open water is present, (e.g., amphibians and aquatic insects). Waterfowl and shorebirds nest and forage in seasonal wetlands. The wetlands provide food or cover to small mammals and a water source for larger mammals. Typical wildlife species using the seasonal wetlands in the Project area include the mallard (*Anas platyhynchos*), common egret (*Casmerodias albus*) western meadowlark (*Sturnella neglecta*), Pacific treefrog (*Hyla regilla*), and gopher snake (*Pituophis melanoleucus*).

Listed wildlife species that are known or could potentially occur in these habitats in the project area include listd branchiopods, California tiger salamanders (breeding and foraging), and Delta green ground beetle in the larger playa pool complexes.

3.0 Study Methodology

Special-status species that are known to occur or could potentially occur within the Project area were identified by querying the USFWS database, the California Department of Fish and Game (CDFG) California Natural Diversity Database (CNDDB) "Rarefind," and the California Native Plant Society (CNPS) Electronic Inventory for the Allendale, Elmira, Birds Landing, and Antioch North quadrangles. The potential for species occurrence was determined based on the results of literature reviews, consultations with experts, and field surveys. Descriptions of the field surveys that have been conducted within the Project area to date are provided below. Maps of known CNDDB species occurrences along the transmission line corridor are provided in Appendix G.

Protocol-level surveys are being conducted for rare plants and branchiopods in and around all work areas (pull sites, fly sites, access roads, and temporary structure work areas). The action area has been defined as these temporary work areas plus an area of potential indirect effects extending 250 feet from the temporary disturbance area. ,

The work area north of Creed Road (Figure 1-9) was identified after the beginning of the start of wet season protocol surveys for the vernal pool branchiopods. LSA Associates (LSA) has provided biological information for the area north of Creed Road based on surveys conducted for or associated with the Solano County HCP.

Rare plant surveys, vernal pool branchiopod surveys, and Delta green ground beetle surveys are ongoing. The proposed project schedule does not allow these surveys to be completed prior to the initiation of consultation, and presence of these species was inferred in all potentially suitable habitat for which protocol surveys have not been completed. Upon completion of those surveys, PG&E will reinitiate consultation based on those results.

3.1 Rare Plants

Proposed activity sites for the Project were evaluated to determine whether these sites contain suitable habitat for federally-listed plant species. The plant species included in this evaluation are those determined to have potential to occur within the Project sites based on habitat preferences and known geographic range. These include: Contra Costa goldfields (*Lasthenia conjugens*), showy Indian clover (*Trifolium amoenum*), Colusa grass (*Neostapfia colusana*), San Joaquin Valley orcutt grass (*Orcuttia inaequalis*), and Solano grass (*Tuctoria mucronata*). The field reconnaissance was completed for the entire action area shown in Figures 1-1 to 1-12, except for the 3 areas outlined in the next paragraph. On the ground access was available given PG&E's ability to access areas within and adjacent to their existing lines, however physical access across one railroad line was not possible, and two fly sites were located outside areas where access had originally been coordinated.

To determine whether suitable habitat is present at the Project activity sites, reconnaissance-level site visits were conducted on February 27 and 29, and March 3, 2008 by Ann Howald, Senior Botanist, and Eric Wrubel, Botanist, both of Garcia and Associates. All

of the proposed sites except three were visited. Some sites were examined by walking through a portion of the site. Some sites—especially those appearing to consist of plowed and planted agricultural fields, rural residential areas, and other vegetation and land cover types thought unlikely to be suitable for federally-listed plants (based on aerial photographs examined before the reconnaissance)—were viewed only from vantage points near roads. Access limitations prevented the viewing of three sites, as identified in Appendix B Habitat Suitability Table: the guard structure location for the railroad line north of Tower 12/83; Fly Site F-6; and Fly Site F-8 south of Tower 17/115. For those sites, potential habitat was identified from review of aerial photographs, including on-line review of Solano County winter aerials.

The evaluation of whether suitable habitat for federally-listed plant species is present was based partly on the type of vegetation found at each project site. All of the federally-listed plants included in this evaluation are known to occur in grassland or vernal pool vegetation types (CNPS, 2008; CNDDB, 2008; Jepson Online Interchange, 2007). Therefore, all Project sites with grassland vegetation, including grazed pastures that contained some native plants and appeared undisked or disked infrequently, and all project sites with vernal pools or with seasonal wetlands not overwhelmingly dominated by introduced invasive plants were given further analysis. The second step was to determine—for Project sites consisting entirely or partly of these vegetation types—the nearest known localities for the federally-listed plant species that grow in the type of vegetation found at a given Project site. For all of the species included in this analysis, except showy Indian clover, if the nearest known locality is approximately 5 miles or less and the Project site includes vegetation/ habitat known to support the species being evaluated, then that Project site was determined to contain suitable habitat for that species. For showy Indian clover, a nearest known locality distance of approximately 10 miles was used because all of the known locations for this species in Solano County are historic, meaning the plant has not been detected for more than 20 years (CNDDB, 2008), and the historic distribution of this species in Solano County is not well-understood. These distance limits were considered to be guidelines and were applied with flexibility.

A conservative approach was used for the habitat suitability evaluation, meaning that the analysis was inclusive in what was considered suitable habitat and did not attempt to make fine-scale distinctions that could not be supported by the limited information gathered during the reconnaissance. Likewise, the current understanding of the federally-listed species' habitat preferences was recognized as possibly incomplete, meaning that sites with degraded but still possibly suitable habitat were included as suitable habitat. For example, if a Project site contained California annual grassland and seasonal wetlands and was within 5 miles of a known location of Contra Costa goldfields, then that Project site was determined to have suitable habitat for that species, regardless of the quality or species composition of the grassland. Subareas within such a Project site would be deemed unsuitable only if the vegetation or land cover type was one clearly incapable of supporting federally-listed plant species such as industrial, rural residential, ruderal vegetation, or agriculture consisting of grain fields that are repeatedly disked and planted. All three of the sites that were not accessible during the reconnaissance appeared to have grassland but no wetlands and were within approximately 10 miles of a known location for showy Indian clover; therefore, all were described as sites where suitable habitat for showy Indian clover (only) may be present.

The results of this analysis are shown in the habitat suitability table provide in Appendix B. Appendix B includes descriptions of each Project site, organized by location from north to south along the transmission line; the results of the suitable habitat evaluation for each project site; and a summary of the key points used to make the determination of whether suitable habitat is present or not. Appendix B also includes maps that illustrate potential rare plant habitat within the Project area and a table that documents potentially occurring special-status plants in the Project vicinity. Effects to potentially suitable rare plant habitat are discussed in Section 5.3.

LSA has conducted extensive surveys for Contra Costa goldfields in Solano County. Appendix B includes LSA maps showing Contra Costa goldfields study locations, Contra Costa goldfields occurrences within the study sites, and known populations within the Noonan Ranch property where Pull Site 6 and Fly Site 3 are located.

3.2 Threatened and Endangered Wildlife Habitat Mapping and Surveys

3.2.1 Branchiopods

Protocol-level branchiopod wet season surveys were started during the first week of January, just after the first major precipitation event of the 2007/2008 winter rainy season (see FWS permission letter dated December 10, 2007, Appendix C). Habitat mapping and field sampling were conducted every other week for a total of eight sample periods prior to submittal of this Biological Assessment. All vernal pool resources within the proposed work areas and within 250 feet of proposed work areas were mapped via GPS by CH2M HILL field biologists Dan Weinberg, Todd Ellwood, and Ava Edens and were digitized by GIS staff.

Appendix C presents figures of vernal pool branchiopod habitat mapped within the Project work area and within the 250-foot buffer. The mapped habitat represents ponding that correlates to survey data collected during the week of February 25, 2008 through March 1, 2008 (Survey Visit 4, as shown in Table 3-1).

TABLE 3-1
Vaca Dixon – Birds Landing 230 kV Reconductoring Project Precipitation Data[ab]
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Survey Visit #	Survey Date(s)	Precipitation (cm)
Visit 1	1/3/08 and 1/9/08	10.37
Visit 2	1/15/08-1/17/08	1.78
Visit 3	1/29/08-2/4/08	13.02
Visit 4	2/11/08-2/15/08	0.10
Visit 5	2/25/08-2/28/08	4.22
Visit 6	3/11/08-3/13/08	0.07

TABLE 3-1
Vaca Dixon – Birds Landing 230 kV Reconductoring Project Precipitation Data[ab]
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Survey Visit #	Survey Date(s)	Precipitation (cm)
Visit 7	3/25/08-3/26/08	0.02
Visit 8	4/8/08	0.00

[a] precipitation data referenced from www.wunderground.com.

[b] precipitation data collected on last day of calendar week includes data for the week of survey visits plus the week of inactivity in-between survey visits

Based on precipitation data collected since January, field data from Survey Visit 5 best represents ponding that supports a typical vernal pool shrimp lifecycle. All vernal pools located within the Project area or pools located within a 250-foot buffer and downgradient from Project impact areas were inferred as habitat since protocol-level surveys were not completed prior to submittal of this Biological Assessment.

3.2.2 Delta Green Ground Beetle

Dr. Richard Arnold (Entomological Consulting Services, Ltd.) began protocol-level surveys for Delta green ground beetle in February 2008. For this submittal, potential suitable habitat for Delta green ground beetle was mapped based on analysis of aerial photography and field observations made during protocol-level surveys conducted to date. Appendix D provides a map of potential vernal pool habitat that could support Delta green ground beetles.

3.2.3 California Tiger Salamander

CH2M HILL prepared a habitat assessment for California tiger salamanders (*Ambystoma californiense*) following the joint USFWS/CDFG protocol *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (USFWS/CDFG, 2003). There are two procedures described therein to assess the likelihood of California tiger salamander presence in the vicinity of the Project site: (1) an assessment of California tiger salamander locality records and potential California tiger salamander habitat in and around the project area and (2) focused surveys of breeding pools and their associated uplands to determine whether California tiger salamanders are likely to be present. Since access to all potential CTS habitat could not be obtained, the first methodology was used.

CH2M HILL biologists queried the CNDDB (CNDDB, 2008) and USFWS species inventory (USFWS, 2008) for all known occurrences of California tiger salamanders within 5 kilometers (3.1 miles) of the Project site for the Elmira, Allendale, Denverton, Bird's Landing, Dozier, and Antioch North United States Geological Survey 7.5-minute topographic quadrangles. Appendix E, Figure 2 shows the location of all CNDDB record

sightings within the search area. In addition, aerial imagery within 2 kilometers (1.24 miles) from the Project and field observations were used determine the location of other potential California tiger salamander aquatic breeding sites. These sites included seasonal wetlands and vernal pools, stock ponds, drainages and ditches, and permanent water bodies.

Temporary loss of potential California tiger salamander upland habitat was quantitatively determined based on CNDDB and potential breeding sites. The acreage calculation included all affected project areas within the 2-kilometer (1.24-mile) dispersal buffer from each breeding site. At this time, barriers to California tiger salamander dispersal (e.g., road curbing) were not factored into the calculation. The Project, as proposed, will not result in a direct effect to California tiger salamander breeding habitat. The habitat assessment for California tiger salamanders can be found in Appendix E.

4.0 Species Accounts

This biological assessment addresses federally-listed threatened and endangered species that are known to occur or could potentially occur in the Project vicinity, as determined by the studies and surveys described in the previous section. They include: conservancy fairy shrimp (*Branchinecta conservatio*), vernal pool fairy shrimp (*Branchinecta lynchi*), vernal pool tadpole shrimp (*Lepidurus packardi*), Delta green ground beetle (*Elaphrus viridis*), California tiger salamander (*Ambystoma californiense*), showy Indian clover (*Trifolium amoenum*), and Contra Costa goldfields (*Lasthenia conjugens*). Each is described in detail below.

4.1 Conservancy Fairy Shrimp

4.1.1 Status and Description

The conservancy fairy shrimp was listed as a federally endangered species on September 19, 1994 (59 Federal Register 48153). The conservancy fairy shrimp is a small crustacean in the Branchinectidae family. The species has distinctly segmented elongate bodies, large-stalked compound eyes, no carapaces (hard protective outer covers), and 11 pairs of swimming legs (Eng et al., 1990; Johnson and Williams, 1996). Adult shrimp range between 0.6 to 1.1 inches in length (Eng et al., 1990). Conservancy fairy shrimp are similar in appearance to Lindahl's fairy shrimp (*Branchinecta lindahli*). However, the female brood pouch is cylindrical and usually ends under the fourth segment in Lindahl's fairy shrimp, while the pouch is tapered at both ends and usually ends under the eighth abdominal segment in the conservancy fairy shrimp (USFWS, 2001; Johnson and Williams, 1996). Both species have a similar large, oval pulvillus at the proximal end of the basal segment of the male antenna, but the ends of the antennae segments furthest from the body of the conservancy fairy shrimp are distinctive (Eng et al., 1990). The second pair of antennae in adult females are cylindrical and elongate. The males' second antennae are enlarged and specialized for clasping females during copulation.

4.1.2 Range, Populations, and Activity

The historic range of the conservancy fairy shrimp likely occurred throughout the Central Valley of California. Conservancy fairy shrimp populations are presently known from six localities: Vina Plains, Tehama County; south of Chico, Butte County; Jepson Prairie and near the Portrero Hills, Solano County; Sacramento National Wildlife Refuge, Glenn County; the Mapes Ranch in Stanislaus County; several in Merced County; and possibly, the Lockewood Valley in northern Ventura County (USFWS, 1999; Eriksen and Belk, 1999).

Female conservancy fairy shrimp carry their eggs in an oval or elongate brood sac on their abdomen. Eggs are either dropped to the pool bottom or remain in the brood sac until the female dies and sinks (Federal Register, 1994). Resting (summer) eggs are known as cysts and are capable of withstanding heat, cold, and prolonged dry periods. The cyst bank in the soil may comprise cysts from several years of breeding (Donald, 1983). As the vernal pools refill with rainwater, in the same or subsequent seasons, some of the cysts may hatch. Early

stages of fairy shrimp develop rapidly into adults. The shrimp take an average of 49 days to reach maturity (Helm, 1998). These non-dormant populations often disappear early in the season, long before the vernal pools dry up (Federal Register, 1994). The species is mostly observed from November to early April (Federal Register, 1994). The conservancy fairy shrimp is usually collected at cool temperatures and are relatively long-lived (Simovich et al., 1992; Federal Register, 1994). In a study by Helm (1998), the species had an average life span of 123 days.

The diet of conservancy fairy shrimp consists of algae, bacteria, protozoa, rotifers, and bits of organic detritus (Pennak, 1989). Conservancy fairy shrimp swim or glide upside down by means of beating movements that pass along their 11 pairs of swimming legs in a wave-like motion from head to tail.

4.1.3 Habitat Use

Conservancy fairy shrimp inhabit ephemeral or temporary pools of somewhat turbid fresh water (vernal pools) that form in the cool, wet months of the year (Johnson and Williams, 1996). The pools inhabited by the conservancy fairy shrimp are typically large, such as the 36-hectare (89-acre) Olcott Lake at Jepson Prairie (Federal Register, 1994). The pools at Jepson Prairie and Vina Plains inhabited by the conservancy fairy shrimp have neutral pH, very low conductivity, total dissolved solids (TDS), and alkalinity (Barclay and Knight, 1984; Eng et al., 1990). Fairy shrimp are not known to occur in permanent bodies of water and are dependent upon seasonal fluctuations in their habitat, such as the absence or presence of water during specific times of the year (Johnson and Williams, 1996).

4.1.4 Dispersal

Historically, conservancy fairy shrimp might have dispersed via large-scale flood events that allowed the species to colonize different individual pool or pool complexes (USFWS, 1999). Urban development and the construction of dams, levees, and other flood control measures have limited this dispersal method. Waterfowl and shorebirds, which ingest or transport the cysts while attached to their legs or feathers to new habitats (Krapu, 1974; Swanson et al., 1974; Driver, 1981; Ahl, 1991), are likely the shrimp's primary dispersal agent (Brusca, in litt., 1992; King, in litt., 1992; Simovich, in litt., 1992).

The ability of the species to disperse is important for the long-term survival and recovery of the species as the dispersing individuals can re-colonize areas subjected to localized extinctions.

4.1.5 Critical Habitat

The USFWS designated critical habitat for the Conservancy fairy shrimp in 2006 (USFWS, 2006). Approximately 10.5 linear miles of the project's action area between structures 006/047 through 016/109 are located within the Jepson Prairie core area of the Solano-Colusa vernal pool region.

4.1.6 Threats to the Species

Historically, this species is believed to have been found in vernal pool complexes throughout the Central Valley. According to Holland (1978), between 67 and 88 percent of

vernal pool habitat in the Central Valley was lost by 1973. USFWS analysis of Holland's report determined a more accurate historic loss estimate of 60 to 85 percent (USFWS, 1999). Since 1973, several more acres of conservancy fairy shrimp habitat, which are seasonal vernal pools, have been lost or altered by human activities. Between 1987 and 1992, 467 acres of wetlands in the Central Valley—the majority of which were vernal pools—were filled (USFWS, 1992). Holland (1999) estimated the average rate of loss of vernal pool habitat in California was 1.4 percent per year in the late 1980s to mid 1990s. Rapid urbanization of the Central Valley of California currently poses the most severe threat to the species (USFWS, 2001). Habitat loss and alteration due to water supply and flood-control projects, agriculture, and agricultural conversions (e.g., rangeland to leveled, irrigated crops, vineyards, or orchards) are also major threats to the species' existence. Other threats to the shrimp include off-road vehicle use, certain mosquito abatement measures, pesticides/ herbicide use, alterations in vernal pool hydrology, fertilizer contamination, invasive non-native plants, gravel mining, and contaminated stormwater runoff (USFWS, 1999).

These factors have resulted in the isolation and fragmentation of habitats, often precluding dispersal between populations or sub-populations. This fragmentation results in small isolated populations. Ecological theory suggests that these populations could be highly susceptible to extinction due to chance events, inbreeding depression, or additional environmental disturbance (Gilpin and Soule, 1986; Goodman, 1987a,b). Should extinction occur in a population that has been fragmented, the opportunities for recolonization could be greatly reduced due to geographical isolation from other populations (USFWS, 2001).

4.1.7 Conservation Issues

The primary threats to the conservancy fairy shrimp in the county are urban development, agricultural conversions, agricultural use, and water supply and flood-control projects. State and local laws and regulations have not been passed to protect the shrimp, and other regulatory mechanisms have proven ineffective (USFWS, 1999).

4.1.8 Known and Potential Habitat in the Project Vicinity

The Project action area is within known range of the conservancy fairy shrimp in the Solano-Colusa Vernal Pool Region, as defined in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS, 2005). In the Solano-Colusa region, conservancy fairy shrimp populations are protected from development on some locations at the Jepson Prairie Preserve. Approximately 10.5 linear miles of the Project's action area between structures 006/047 through 016/109 are located within the Jepson Prairie core area of the Solano-Colusa vernal pool region.

The Solano Multispecies Habitat Conservation Plan (HCP) (SCWA, 2007) includes the project area from structure 006/043 to structure 011/075 and from structures 001/009 through 003/019 of the west spur as High Value Conservation areas, while structures 011/0176 through structure 20/133 are in Moderate Value Conservation Areas.

4.2 Vernal Pool Fairy Shrimp

4.2.1 Status and Description

The vernal pool fairy shrimp was listed as a federally threatened species on September 19, 1994 (59 Federal Register 48153). The vernal pool fairy shrimp is a small crustacean in the Branchinectidae family. The species has elongate bodies, large-stalked compound eyes, no carapaces (hard protective outer covers), and 11 pairs of swimming legs (Eng et al., 1990). Adult shrimp range between 0.4 and 1.0 inch long (Eng et al., 1990). Vernal pool fairy shrimp are similar in appearance to Colorado fairy shrimp (*Branchinecta coloradensis*). However, the basal segment outgrowth below and posterior to the pulvillus of the antennae of male vernal pool fairy shrimp is ridge-like, while the basal segment outgrowth of the Colorado fairy shrimp is cylindrical and usually larger (Eng et al., 1990). The vernal pool fairy shrimp has a shorter, pyriform brood pouch, whereas the Colorado fairy shrimp has a longer, fusiform brood pouch (Eng et al., 1990).

4.2.2 Range, Populations, and Activity

The historic range of the vernal pool fairy shrimp likely occurred throughout the Central Valley of California. Vernal pool fairy shrimp populations are presently known from 32 localities in California, extending from Stillwater Plain in Shasta County through most of the length of the Central Valley to Pixley in Tulare County and along the central coast range from northern Solano County to Pinnacles National Monument in San Benito County (Eng et al., 1990; Fugate, 1992; Sugnet and Associates, 1993). Four other disjunct populations are located near Soda Lake in San Luis Obispo County, in the mountain grasslands of northern Santa Barbara County, on the Santa Rosa Plateau in Riverside County, and near Rancho California in Riverside County (Federal Register, 1994). In 1998, while conducting an Oregon Natural Heritage invertebrate inventory in the Agate Desert region, researchers discovered a population of vernal pool fairy shrimp within the Agate Desert Preserve and the Whetstone Savanna Preserve near Medford, Oregon. This population represents the northernmost known locality of vernal pool fairy shrimp, which were previously thought to only exist in California (Pacific Biodiversity Institute, 2001).

Simovich et al. (1992) reported that the vernal pool fairy shrimp typically is found at low population densities. Vernal pool fairy shrimp are rarely found with other fairy shrimp species, but where they do co-exist with other species, the vernal pool fairy shrimp is never the numerically dominant species (Eng et al., 1990). Vernal pool fairy shrimp mature quickly and can both persist in short-lived shallow pools and longer-lasting pools that remain later into the spring (Simovich et al., 1992).

Female vernal pool fairy shrimp carry their eggs in a pyriform brood pouch on their abdomen. Eggs are either dropped to the pool bottom or remain in the brood sac until the female dies and sinks (Federal Register, 1994). Resting (summer) eggs are known as cysts and are capable of withstanding heat, cold, and prolonged dry periods. The cyst bank in the soil may be comprised of cysts from several years of breeding (Donald, 1983). As the vernal pools refill with rainwater, in the same or subsequent seasons, some of the cysts may hatch. Early stages of fairy shrimp develop rapidly into adults. These non-dormant populations often disappear early in the season, long before the vernal pools dry up (Federal Register,

1994). The species has been collected from early December to early May (Federal Register, 1994).

The diet of vernal pool fairy shrimp consists of algae, bacteria, protozoa, rotifers, and bits of organic detritus (Pennak, 1989).

Vernal pool fairy shrimp swim or glide upside down by means of beating movements that pass along their 11 pairs of swimming legs in a wave-like motion from head to tail.

4.2.3 Habitat Use

Vernal pool fairy shrimp inhabit pools with clear to tea-colored water, most commonly in grass or mud bottomed swales, or basalt flow depression pools in unplowed grasslands, but sometimes in sandstone rock outcrops and alkaline vernal pools (Federal Register, 1994). The water in these pools has low total dissolved solids, conductivity, alkalinity, and chloride (Collie and Lathrop, 1976). Vernal pool fairy shrimp are sporadically distributed within vernal pool complexes (Federal Register, 1994), where some or many of the pools in a complex may not be inhabited during any one year.

4.2.4 Dispersal

Historically, vernal pool fairy shrimp might have dispersed via large-scale flood events that allowed the species to colonize different individual pools or pool complexes (USFWS, 1999). Urban development and the construction of dams, levees, and other flood-control measures have limited this dispersal method. Waterfowl and shorebirds, which ingest the diapaused eggs and transport the eggs to new habitats while attached to their legs or feathers (Krapu, 1974; Swanson et al., 1974; Driver, 1981; Ahl, 1991), are likely the shrimp's primary dispersal agent (Brusca, in litt., 1992; King, in litt., 1992; Simovich, in litt., 1992). Cysts may also be dispersed and transported in mud on cattle and on other livestock that graze in vernal pool areas.

The ability of the species to disperse is important for the long-term survival and recovery of the species as the dispersing individuals can re-colonize areas subjected to localized extinctions.

4.2.5 Critical Habitat

The USFWS designated critical habitat for the vernal pool fairy shrimp in 2003 (USFWS, 2006). The project site is located approximately 5.5 miles north of the Jepson Prairie Critical Habitat Unit (Unit 16, USFWS, 2006), a site known to support fairy shrimp. The project area is not located in designated critical habitat.

4.2.6 Threats to Species

Historically, this species is believed to have been found in vernal pool complexes throughout the Central Valley. According to Holland (1978), between 67 and 88 percent of vernal pool habitat in the Central Valley was lost by 1973. USFWS analysis of Holland's report determined a more accurate historic loss estimate of 60 to 85 percent (USFWS, 1999). Since 1973, several more acres of vernal pool fairy shrimp habitat, which are seasonal vernal pools, have been lost or altered by human activities. Between 1987 and 1992, 467 acres of wetlands in the Central Valley—the majority of which were vernal pools—were filled

(USFWS, 1992). Holland (1999) estimated the average rate of loss of vernal pool habitat in California was 1.4 percent per year in the late 1980s to mid 1990s. Rapid urbanization of the Central Valley of California currently poses the most severe threat to the species (USFWS, 2001). Habitat loss and alteration due to water supply and flood-control projects, agriculture, and agricultural conversions (e.g., from rangeland to leveled, irrigated crops, vineyards, or orchards) are also major threats to the species existence. Other threats to the shrimp include off-road vehicle use, certain mosquito abatement measures, pesticides/ herbicide use, alterations in vernal pool hydrology, fertilizer contamination, invasive non-native plants, gravel mining, and contaminated stormwater runoff (USFWS, 1999).

These factors have resulted in the isolation and fragmentation of habitats, often precluding dispersal between populations or sub-populations. This fragmentation results in small isolated populations. Ecological theory suggests that these populations could be highly susceptible to extinction due to chance events, inbreeding depression, or additional environmental disturbance (Gilpin and Soule, 1986; Goodman, 1987a,b). Should extinction occur in a population that has been fragmented, the opportunities for recolonization could be greatly reduced due to geographical isolation from other populations (USFWS, 2001).

4.2.7 Conservation Issues

The primary threats to the vernal pool fairy shrimp in the county are urban development, agricultural conversions, agricultural use, and water supply and flood-control projects. State and local laws and regulations have not been passed to protect the shrimp, and other regulatory mechanisms have proven ineffective (USFWS, 1999).

4.2.8 Known and Potential Habitat in the Project Vicinity

The Project action area is within known range of the vernal pool fairy shrimp, in the Solano-Colusa vernal pool region (USFWS, 2005). Approximately 10.5 linear miles of the Project's action area between structures 006/047 through 016/109 are located within the Jepson Prairie core area of the Solano-Colusa vernal pool region.

The Solano Multispecies HCP (SCWA, 2007) includes the Project area from structure 006/043 to structure 011/075 and from structures 001/009 through 003/019 of the west spur as High Value Conservation Areas, while structures 011/0176 through structure 20/133 are in Moderate Value Conservation Areas.

4.3 Vernal Pool Tadpole Shrimp

4.3.1 Status and Distribution

The vernal pool tadpole shrimp was listed as a federally endangered species on September 19, 1994 (59 Federal Register 48153). The vernal pool tadpole shrimp is a small crustacean in the Triopsidae family. The species has dorsal compound eyes, a large shield-like carapace covering most of the body, 35 pairs of legs, and two long cercopods at the end of the last abdominal segment (Linder, 1952; Longhurst, 1955; Pennak, 1989). Adult shrimp are 2 inches long. Vernal pool tadpole shrimp are similar in appearance to the ricefield tadpole shrimp (*Triops longicaudatus*).

4.3.2 Range, Populations and Activity

The historic range of the vernal pool tadpole shrimp likely occurred throughout the Central Valley of California. Vernal pool tadpole shrimp have been documented in 19 localities, from east of Redding in Shasta County south to Fresno County, and from the San Francisco Bay Wildlife Refuge in Alameda County (USFWS, 1999).

The life history of the vernal pool tadpole shrimp is linked to the seasonal cycle of its vernal pool habitat. Females deposit their eggs, which are sticky and adhere well to objects, on plant matter, sediment particles, and other objects on the vernal pool bottom (Simovich et al., 1992). The shrimp survive the dry summer months as cysts or diapaused eggs in pool sediments. After winter rains fill the pools, vernal pool tadpole shrimp populations are reestablished from cysts that lie dormant in the dry pool sediments (Lanaway, 1974; Ahl, 1991). Sexually mature adults have been observed in vernal pools three to four weeks after the pools had been filled (Ahl, 1991). Some cysts hatch immediately, while others remain dormant in the soil to hatch later in the rainy season or in the fall and winter of subsequent seasons (Ahl, 1991; USFWS, 1999). Vernal pool tadpole shrimp mature slowly and often survive and reproduce throughout the rainy season until the pools dry up in the spring (Ahl, 1991; Simovich et al., 1992). The diet of vernal pool tadpole shrimp consists of organic detritus, fairy shrimp, and other invertebrates (Pennak, 1989). Vernal pool tadpole shrimp are primarily a benthic species and swim with their legs down (USFWS, 1999). The shrimp also climb or scramble over objects and plow on top of or within bottom sediments (USFWS, 2001).

4.3.3 Habitat Use

Vernal pool tadpole shrimp inhabit seasonal, vernal pools or swales that form in slight depressions after being inundated following fall and winter rains. The pools contain clear to highly turbid water and have an impervious hardpan, claypan, or basalt layer beneath the soil surface that retains the water for a few months at a time (USFWS, 1999). Populations of vernal pool tadpole shrimp inhabit vernal pool complexes rather than individual pools (Fugate, 1992). These pools range in size from 54 square feet in the former Mather Air Force Base area of Sacramento County to 89 acres in Olcott Lake at Jepson Prairie (USFWS, 2001).

4.3.4 Dispersal

Historically, vernal pool tadpole shrimp might have dispersed via large-scale flood events that allowed the species to colonize different individual pools or pool complexes (USFWS, 1999). Urban development and the construction of dams, levees, and other flood-control measures have limited this dispersal method. Waterfowl and shorebirds, which ingest the diapaused eggs and transport the eggs while attached to their legs or feathers to new habitats (Krapu, 1974; Swanson et al., 1974; Driver, 1981; Ahl, 1991), are likely to be the shrimp's primary dispersal agent (Brusca, in litt., 1992; King, in litt., 1992; Simovich, in litt.; 1992).

The ability of the vernal pool tadpole shrimp to disperse is important for their long-term survival and recovery, as the dispersing individuals can re-colonize areas subjected to localized extinctions.

4.3.5 Critical Habitat

The USFWS (2006) designated critical habitat in Solano County in 2003. Critical Habitat Unit 11 (Jepson Prairie Unit) contains 12,571 acres and was known to be occupied at the time of listing.

4.3.6 Threats to Species

Historically, this species is believed to have been found in vernal pool complexes throughout the Central Valley. According to Holland (1978), between 67 and 88 percent of vernal pool habitat in the Central Valley was lost by 1973. USFWS analysis of Holland's report determined a more accurate historic loss estimate of 60 to 85 percent (USFWS, 1999). Since 1973, several more acres of vernal pool tadpole shrimp habitat, which are seasonal vernal pools, have been lost or altered by human activities. Between 1987 and 1992, 467 acres of wetlands in the Central Valley, the majority of which were vernal pools, were filled (USFWS, 1992). Holland (1999) estimated the average rate of loss of vernal pool habitat in California was 1.4 percent per year in the late 1980s to mid 1990s. Rapid urbanization of the Central Valley of California currently poses the most severe threat to the species (USFWS, 2001). Habitat loss and alteration due to water supply and flood-control projects and agriculture are also major threats to the species existence. Other threats to the shrimp include off-road vehicle use, certain mosquito abatement measures, pesticides/herbicide use, alterations in vernal pool hydrology, fertilizer contamination, invasive non-native plants, gravel mining, and contaminated stormwater runoff (USFWS, 1999).

These factors have resulted in the isolation and fragmentation of habitats, often precluding dispersal between populations or sub-populations. This fragmentation results in small isolated populations. Ecological theory suggests that these populations could be highly susceptible to extinction due to chance events, inbreeding depression, or additional environmental disturbance (Gilpin and Soule, 1986; Goodman, 1987a,b). Should extinction occur in a population that has been fragmented, the opportunities for recolonization could be greatly reduced due to geographical isolation from other populations (USFWS, 2001).

4.3.7 Conservation Issues

The primary threats to the vernal pool tadpole shrimp in the county are urban development, agricultural conversions, agricultural use, and water supply and flood-control projects. State and local laws and regulations have not been passed to protect the shrimp, and other regulatory mechanisms have proven ineffective (USFWS, 1999).

4.3.8 Known and Potential Habitat in the Project Vicinity

The Project action area is within known range of the vernal pool tadpole shrimp, in the Solano-Colusa vernal pool region (USFWS, 2005). Approximately 10.5 linear miles of the Project's action area between structures 006/047 through 016/109 are located within the Jepson Prairie core area of the Solano-Colusa vernal pool region. Vernal pool tadpole shrimp occur in the vicinity of Jepson Prairie, Travis AFB, and near Montezuma in Solano County, and on the Sacramento National Wildlife Refuge in Glenn County.

Portions of the project action area and adjacent properties between structures 006/047 and 016/109 are located within the Jepson Prairie core area of the Solano-Colusa vernal pool

region. Approximately 1.5 miles of the west spur of the Project, the area between structures 001/006 and 002/013 is within designated Critical Habitat Unit 11B for this species. All other structures are located outside designated core areas and critical habitat for this species.

The Solano Multispecies HCP (SWCA, 2007) includes the project area from structure 006/043 to structure 011/075 and from structures 001/009 through 003/019 of the west spur as High Value Conservation Areas, while structures 011/0176 through structure 20/133 are in Moderate Value Conservation Areas.

4.4 Delta Green Ground Beetle

4.4.1 Status and Description

The Delta green ground beetle was listed as a federally threatened species on August 8, 1980 (45 Federal Register 52807). These carabid beetles are colored metallic green and bronze and are approximately 0.6 centimeter (0.25 inch) long (USFWS, 1999). The beetle is distinguished from other carabid beetles by its size, color, and spotting patterns; lack or reduction of circular pits on the elytra (first pair of wings, which in beetles are hardened and act as a protective covering for the flight wings); and degree of hairiness (USFWS, 2001).

4.4.2 Range, Population, and Activity

The historic range of the Delta green ground beetle is unknown (USFWS, 1999). The widespread disruption of wetland and grassland habitat of the Central Valley since the mid-1800s suggests that the beetle's range has shrunk and become highly fragmented (USFWS, 2001). A single Delta green ground beetle specimen was collected in the 1800s in an unspecified area of California. The species was rediscovered in the greater Jepson Prairie area of Solano County in 1974, where it presently occurs (USFWS, 1999). The diking and plowing of one of the sites where the beetle was discovered in 1974 and 1975 has presumably caused the beetle to be extirpated from that site (USFWS, 1999).

The Delta green ground beetle's life history is somewhat unknown and is based on observations of other species and inferred from limited data (USFWS, 1999). Adult beetles seem to be active from the time they emerge in January until mid-May, after which they enter an inactive phase called a diapause. Female beetles probably reproduce only one time a year in early winter (USFWS, 1999). Captive-bred specimens have shown seven stages of its lifecycle, with each stage taking 5 to 7 days and a total of 35 to 45 days for complete development (USFWS, 1999). The seven stages include egg, three larval instars or molts, pre-pupa, pupa, and adult (USFWS, 1999). The beetle larvae often hide in dense vegetation or deep cracks (up to 15 to 18 inches) in the ground, where they presumably pupate and survive the hot Sacramento Valley summer and fall before they emerge as adults in the winter. Adults remain active during the wet season in winter and spring and may enter another diapause as adults in late spring or early summer (USFWS, 1999). The beetle's life span is estimated at 9 to 12 months or more, but whether adults live for more than 1 year is unknown (USFWS, 1999).

Delta green ground beetle adults and larvae are presumed to be predatory and feed by sight (USFWS, 2001). The diet of Delta green ground beetle most likely includes small soft-bodied

arthropods and invertebrates, such as springtails (order Collembola), terrestrial chironomid midges, and beetle larvae (USFWS, 1999).

Adult Delta green ground beetles are often found from early February to mid-May but have been seen as early as late fall. The beetle is largely diurnal but may be active during the evening (USFWS, 1999). Larvae of the beetle are rarely seen due to their small size and because they hide in dense vegetation and deep cracks in the ground (USFWS, 1999).

4.4.3 Habitat Use

Delta green ground beetles appear to prefer grassland habitat that is interspersed with vernal pools or playa pools, which are larger vernal pools that typically hold water for long time periods. The preferred habitat of the Delta green ground beetle is largely unknown. Some entomologists believe that the species prefers more open habitats along the edges of pools, trails, roads and ditches, where they often hide in cracks in the ground and vegetation (USFWS, 1999, 2001). However, the small size and elusive habits of the beetle often hinders observation in other more densely vegetated habitat types (USFWS, 2001). Adult beetles may also occur in the surrounding grasslands (USFWS, 2001).

4.4.4 Dispersal

Dispersal is commonly considered important for carabid beetles, but whether or not Delta green ground beetles disperse is uncertain (USFWS, 1999). Only seven observations of beetles in flight have been documented, all of which were for very short distances (USFWS, 1999). The beetles have also been seen swimming and moving in vernal pools. These activities are most likely not related to true dispersing or large migratory behavior, but rather may be an adaptation to changes in the season, time of day (or night), or other environmental conditions (USFWS, 1999).

4.4.5 Threats to Species

The Delta green ground beetle is believed to have been extirpated from much of its former range. Loss and alteration of vernal pool and grassland habitat in the mid-1800s were most likely significant factors in the species' decline (USFWS, 1999).

Known Delta green ground beetles are currently relatively secure. Most of the known habitat lies outside of the current urban boundaries, is owned by the Solano Land Trust/ The Nature Conservancy (Jepson Prairie, Wilcox Ranch), or is being considered for other conservation uses such as mitigation banks. Potential habitat that could support unknown populations occurs in the vernal pool areas north of Portrero Hills and north of Travis AFB. Other threats associated with declining populations of the Delta green ground beetle include introductions of invasive plants (such as the garden lippia [Phyla sp.]), urban and suburban development, alterations of vernal pool hydrology, incompatible grazing practices, pipeline and transmission line operation and maintenance, naturally occurring events, vandalism, illegal collecting, and potential exploratory drilling and sludge disposal activities (USFWS, 1999, 2001)

4.4.6 Critical Habitat

Critical habitat was designated for the Delta green ground beetle in Solano County on August 8, 1980 (45 Federal Register 52807--see Code of Federal Regulations 50:17.96). USFWS designated two areas, which are separated by 0.5 mile and total approximately 960 acres (USFWS, 1999). These areas include the Jepson Prairie Reserve and the western portions of the Gridley Mitigation Bank. Within the mapped critical habitat areas or map units, critical habitat for the Delta green ground beetle includes those areas possessing both of the primary constituent elements: (1) essential vernal pool and surrounding grassland habitat and (2) associated land areas that surround and drain into essential vernal pool habitat.

A recovery plan for the Delta green ground beetle (and Solano grass) was published on September 11, 1985 (USFWS, 1985). A revised recovery plan for the species will be included in the draft recovery plan for northern California vernal pool species.

4.4.7 Conservation Issues

Conservation of this beetle depends on the protection of its vernal pool habitat. The beetle's current range includes the Jepson Prairie Preserve, which is largely protected. However, other known sites nearby are on private land and require ongoing negotiations to ensure protection of the habitat.

4.4.8 Known and Potential Habitat in the Project Vicinity

The Project action area is within known range of the Delta green ground beetle in the Solano-Colusa vernal pool region (USFWS, 2005). USFWS has designated critical habitat outside of the Jepson Prairie Preserve on the Wilcox Ranch property owned by the Nature Conservancy and Solano County. The Jepson Prairie Preserve, the sole known preserve for the Delta green ground beetle, is located approximately 1 mile east of the project between structure 008/059 and structure 011/075.

The Solano Multispecies HCP (SCWA, 2007) includes the project area from structure 006/043 to structure 011/075 and from structures 001/009 through 003/019 of the west spur as High Value Conservation Areas, while structures 011/0176 through structure 20/133 are in Moderate Value Conservation Areas.

4.5 California Tiger Salamander

4.5.1 Status and Description

The Central Valley Distinct Population Segment of California tiger salamander is currently listed as a threatened species. In 1992, the California tiger salamander was petitioned as an endangered species, but the USFWS precluded its listing pending the listing of higher priority species (Long, 1992; Sorensen, 1994). In 2000, the Santa Barbara County population was listed as federally endangered as a distinct population segment. In 2002, the Sonoma County population was listed as federally endangered on an emergency basis. In 2003, that listing was made permanent (Federal Register, 2003a). Subsequently, the Central California Distinct Population Segment of the California Tiger Salamander was proposed for threatened status (Federal Register, 2003b), and the Santa Barbara and Sonoma county

populations were proposed for reclassification to threatened (Federal Register, 2003c). The Central California Distinct Population Segment occurs in Solano County.

Adult salamanders are 75 to 125 millimeters long and are colored jet-black with white or yellow spots or bars (Stebbins, 1985). Larvae are 10.5 millimeters in length when hatched and vary from 41 to 78 millimeters at metamorphosis. Larvae are usually a dull, yellowish, gray with broad, flat heads and large feathery gills. At metamorphosis, larvae weigh approximately 10 grams at (Jennings, 2000).

4.5.2 Range, Population, and Activity

The historic range of the California tiger salamander is believed to have included much of the Central Valley from the southern San Joaquin Valley into the southern Sacramento Valley, the foothills of the Coast Range from Monterey County to Santa Barbara County, and the areas around Petaluma in Sonoma County (Jennings and Hayes, 1994; Center for Biological Diversity, 2001). But according to the Jennings and Hayes (1994), California tiger salamanders have been extirpated from approximately 55 percent of this historic range.

Currently, the California tiger salamander occurs in grasslands and oak woodlands (Shaffer et al., 1993; LSA, 1994) in the central Coast Range of California, from southern Solano County to eastern Kern County, and in the Sierra Nevada foothills, from southern Sacramento County to northern Tulare County (LSA, 1994). The species occurs to an elevation of 3,000 feet in the Central Coast Range (LSA, 1994) but is considered uncommon at elevations over 1,500 feet (Shaffer et al., 1993).

The range of the species appears to approach, but not enter, the historical flood plain of the Central Valley of California (LSA, 1994; Kulcher, 1977). Shaffer et al. (1993) reported it was their opinion "California tiger salamander was probably never abundant in the San Joaquin saltbush community of the southern San Joaquin Valley, and the species was probably distributed intermittently in the Tule Marsh floodplain surrounding the major rivers, since these marshes probably supported fish." Several other species of California salamanders, including ensatina (*Ensatina eschscholtzi*), arboreal salamander (*Aneides luguberus*), California newt (*Taricha torosa*), and California slender salamander (*Batrachoseps attenuatus*), are similarly distributed on either side of the Central Valley.

In addition to the main Central Valley population, three apparent disjunct populations of California tiger salamander are recognized. The first is located on the Santa Rosa Plain of Sonoma County, the second in central Monterey County, and the third in central Santa Barbara County. The Santa Barbara and Sonoma populations have been determined to be genetically distinct and are likely to represent true naturally occurring isolates and may be considered a separate species (Shaffer et al., 1993). The central Monterey population is not genetically differentiated and may be a recent isolate or a documented population in an undocumented portion of the general range. Several authors have incorporated these disjunct populations into the general range of the California tiger salamander. However, no populations of California tiger salamander have ever been located in the areas between the isolated populations and the rest of the species range. More importantly, the genetic data indicates that at least the Santa Barbara and Sonoma populations have been isolated for upwards of 1 to 1.5 million years (Shaffer and McKnight, 1996).

An isolated population of unknown origin exists in the Dunnigan Hills of Yolo County. This population is genetically identical to animals in southern Solano County (Shaffer et al., 1993). The Dunnigan population breeds in a single man-made stockpond and no natural breeding sites appear to occur in the vicinity (LSA, 1994). There is also a record of an extirpated population from Gray Lodge at the base of the Sutter Buttes in Sutter County that disappeared in the 1960s (Hayes, date unknown). Several species of amphibians and reptiles—such as long-nosed snake, slender salamander, San Joaquin whipsnake, and foothill yellow-legged frog—have isolated populations associated with the Sutter Buttes. These two populations may be either isolates from a previously expanded range or introductions into these areas. Tiger salamander larvae have historically been used for fish bait and, in such manner, non-native species have been introduced into several locations in California (Shaffer et al., 1993). The native California tiger salamander may have been introduced outside of its naturally occurring range.

4.5.3 Habitat Associations

In Solano County, this species is associated with the Valley Floor Grassland and Vernal Pool Natural Community. Adults occupy grasslands and the grassy understory of open woodlands, with abundant small-mammal burrows, particularly, California ground squirrel burrows, usually within 1 mile of breeding sites. Typical breeding sites include vernal pools, seasonal or fishless natural ponds, intermittent streams, or stock ponds. A recent study by Trenham and Shaffer (In Press) hypothesized that contiguous upland habitat of 330 acres or more (2,100-foot radius) is needed to support a viable population and that multiple breeding sites need to be within 0.7 mile of each other (Trenham et al, 2000).

4.5.4 Dispersal

The ability for juveniles and adults to disperse and move between uplands and breeding habitats is important for the long-term survival of the species. California tiger salamanders are known to move through grasslands, agricultural areas, and across roads. Jennings and Hayes (1994) report the species moves in nocturnal migrations over distances in excess of 3,280 feet (1,000 meters). Trenham and Schaffer (In Press) in an extensive study at Olcott Lake in Solano County found that 95 percent of the adult salamanders were within 1,480 feet (450 meters) and 95 percent of the subadult salamanders were found within 2,100 feet (640 meters) of the breeding pond (Olcott Lake). From this data, they predicted the maximum movement distance for both adults and juveniles from the breeding habitat to be 2,790 feet (850 meters). However, other reports have identified adult CTS in locations up to 1.2 miles (2 kilometers) from suitable breeding habitat (Center for Biological Diversity, 2001).

4.5.5 Threats to Species

The land use practices or primary pressures that directly affect California tiger salamanders in Solano County are urbanization, intensive agriculture, cultivated grassland/dry-land farming, and livestock grazing. These threats are discussed below.

4.5.5.1 Urbanization and Intensive Agriculture

Urbanization and intensive agriculture or croplands results in direct habitat loss and fragmentation, decreased watershed area, altered hydrology, increased runoff, and

contaminants. Increased urban areas may also result in flood and mosquito control programs and increases in certain native predators and competitors and may facilitate the spread of exotic species, which may inadvertently affect California tiger salamanders.

4.5.5.2 Cultivated Grassland/Dry-land Farming

The direct affects of this practice on salamanders includes altered hydroperiod, reduced pool depth, periodically disking or tilling of the land, and rodent control programs.

4.5.5.3 Livestock Grazing

The effects of livestock grazing on California tiger salamanders are complex. Cattle may have a negative affect on juvenile and adult salamanders directly via trampling while migrating to and from breeding sites. Livestock grazing can have positive affects on salamanders by reducing thatch build up, which may hinder salamander movement. The reduction in thatch also benefits California ground squirrel populations, this could result in an increase in upland refuge sites (i.e., burrows) for adult and juvenile salamanders.

For larvae, livestock grazing can reduce water quality by increasing turbidity and nitrate levels and by decreasing dissolved oxygen levels. The negative effects of this are abnormally high larval densities and reduced water quality which may increase the populations' susceptibility to infectious diseases. Increased nitrate levels may have negative effects on embryo and larval development (Marco et al., 1999). Other populations outside of Solano County are threatened by hybridization with introduced eastern tiger salamanders. Hybrids appear to be more successful in stock ponds significantly impacted by cattle. Thus, if eastern tiger salamanders are introduced into Solano County, populations of native California tiger salamanders are more susceptible to invasion in habitats significantly altered by cattle (Fitzpatrick and Shaffer, unpublished). Cattle can draw down water levels in breeding sites, leaving eggs and larvae with insufficient water to successfully hatch, develop, and complete metamorphosis. The positive effects of this are decreased water quality can alter the structure of aquatic food webs by decreasing the abundance of aquatic invertebrate predators, thus having a positive affect on larval densities. Increased water turbidity may also decrease predation from birds and may reduce cannibalism levels.

4.5.5.4 Consequences of Land Use Practices

The consequences of the above land use practices (i.e., secondary pressures) on California tiger salamanders in Solano County are:

- **Habitat Loss and Fragmentation**. California tiger salamanders are most threatened by human activities that fragment and isolate breeding pools and refuge habitat (Jennings and Hayes, 1994). These factors include the conversion and isolation of vernal pool habitats and grasslands to agricultural and urban developments (Barry and Shaffer, 1994). However, all of the anthropogenic pressures discussed in this model may affectively result in the isolation and fragmentation of habitats, precluding the dispersal between sub-populations.

- **Roads.** Roads with projected night-time traffic volume of 20 cars per hour or greater act as significant barriers to migrating salamanders via direct mortality and by isolating adults from breeding sites (Twitty, 1941; Barry and Shaffer, 1994).

- **Decreased Watershed Area.** The surrounding watershed provides critical habitat for adult and juvenile California tiger salamanders. In addition, decreased watershed area can alter the hydroperiod of breeding sites, leaving eggs and larvae with insufficient water to successfully hatch, develop, and complete metamorphosis.

- **Altered Hydrology.** Alteration in pool hydrology from ephemeral to more permanent wetlands can promote the successful invasion of introduced predators such as fish, bullfrogs and crayfish and alter food web structure by increasing the abundance of aquatic invertebrate predators (Wellborn et al., 1996). Top invertebrate predators in permanent to semi-permanent fishless habitats have strong negative effects on very active, rapidly developing prey such as California tiger salamander larvae (Wellborn et al., 1996).

  Altered pool hydrology that decreases the length of the inundation phase can also negatively affect salamanders. If the inundation period of breeding sites is insufficient for egg and larval development then that pool would be a reproductive sink for the population. Drought or irregular rainfall patterns, such as an early rainfall event followed by a hot dry period, or erratic fluctuations in water levels from lack of subsurface flows, can also decrease reproductive success by causing pond levels to rapidly drop, thereby leaving eggs and larvae with insufficient water to successfully hatch, develop, and complete metamorphosis.

- **Chemical Contaminants.** Contaminants such as pesticides, heavy metals, treated effluent (estrogens), urban runoff, and agricultural runoff can affect embryo and larval development, potentially leading to malformations, increased susceptibility to disease, and death (; Marco et al., 1999).

- **Mosquito Control.** The use of oil and other chemical pesticides for mosquito control can indirectly affect salamanders by altering food web dynamics (i.e., can result in decreased prey availability for larvae). In addition, mosquito fish (*Gambusia* spp), can have negative affects on salamanders (Leyse and Lawler, 2000).

- **Rodent Control**. Adult and juvenile California tiger salamanders are predominantly terrestrial, living underground in burrows of California ground squirrels, gophers, and other burrowing mammals. Rodent control programs may kill California tiger salamanders directly, via gassing burrows or directly consuming poison, or may kill them indirectly through the contamination of their food resource. Reducing populations of burrowing mammals also negatively affects California tiger salamanders by reducing upland refuge sites (Loredo et al., 1996).

- **Disking or Tilling**. Disking or tilling may kill juvenile and adult salamanders in upland habitat and may also reduce burrowing mammal populations. The reduction in mammal burrows could indirectly affect salamanders by reducing upland refuge sites.

- **Introduced Predators and Competitors and Increased Densities of Native Predators or Competitors**. Increased predation pressure from natural predators such as raccoons and crows, whose populations are artificially inflated due to urbanization, could reduce juvenile, adult, and larval survival (Jennings and Hayes, 1994). Introduced predators such as fish, bullfrogs (*Rana catesbeiana*), and crayfish (such as *Procambarus clarkii*) negatively affect California tiger salamanders (Jennings and Hayes, 1994; Shaffer et al.,

1993). California tiger salamanders are also threatened by cross breeding with eastern tiger salamanders introduced into California for fish bait. Hybrids have been identified in a number of populations but are currently absent from Solano County (Shaffer et al., 1993).

- **Introduced Annual Plants**. Excess grass height may hinder the upland movement of juvenile and adult salamanders. The build up of thatch has negative affects on California ground squirrel populations, thus decreasing upland refuge sites for adults and juveniles.

4.5.6 Critical Habitat

On August 4, 2004, USFWS determined that the California tiger salamander was likely to become endangered within the foreseeable future throughout its range, which includes the Santa Barbara and Sonoma County populations formerly listed as endangered. USFWS listed the entire population of California tiger salamander as threatened. The final rule removed the Santa Barbara and Sonoma County populations as separately listed Distinct Vertebrate Population Segments. Designated critical habitat for the California tiger salamander is located approximately 8 miles southeast of the Vaca Dixon Substation within the Jepson Prairie Unit (Unit 2; USFWS, 2005). Located in Solano County, South of Dixon, west of State Route 113, north of Creed Road, and east of Travis AFB, Unit 2 encompasses 5,699 acres and is known to support California tiger salamanders (USFWS, 2005). No critical habitat occurs within the Project area.

4.5.7 Conservation Issues

4.5.7.1 Special Issues, Uncertainties, and Critical Assumptions

An important critical assumption in the conservation of this species is the ratio of upland habitat to breeding habitat required to support a viable population. Trenham and Shaffer (In Press) in an extensive study at Olcott Lake in Solano County found that juveniles were almost as abundant 2,200 feet from the pond as they were adjacent to the breeding pond. Adult abundance declined as distance from the breeding pond increased but were still present 2,200 feet away. From this study, Trenham and Shaffer (In Press) determined that 1,000-acre blocks of undeveloped upland habitat would be required around a breeding pond to support a viable population of California tiger salamanders. There is a considerable amount of uncertainty around the upland habitat requirements for this species. The conservation measures and management pertaining to upland habitat requirements for this species should be reevaluated upon release of additional information.

4.5.7.2 Issues Relating to Livestock Grazing

California tiger salamanders appear to be very successful in stock ponds with high turbidity and low biodiversity (i.e., very little vegetation and aquatic invertebrates). However, this environment does not manage for other sensitive species. The average lifespan of a natural vernal pool (thousands of years) is much longer than that of stock ponds (hundreds of years). In the conservation measures and management for this species, it is assumed that natural vernal pool complexes are more important for the long-term recovery of the species than stock ponds.

In general, grazing is compatible with the species' existence and, at proper levels, may even enhance the species' populations. It is the lack of grazing or allowing cattle to draw down water levels at critical developmental stages that is detrimental to this species. A grazing regime appropriate for the enhancement of this species will be incorporated into the management plans for the planned reserves and will be reevaluated annually based on the results of proposed monitoring activities.

4.5.7.3 Disease

Several wildlife species and domestic animals have been killed in large numbers in the past 10 years by emerging diseases. Emerging diseases are those that have increased in incidence, virulence ,or geographic range; have shifted hosts; or have recently evolved new strains. Specifically, disease has been implicated as a factor in the decline of amphibian populations worldwide. There is much uncertainty around which diseases may affect California tiger salamanders and how these diseases may work synergistically with other factors of decline. The factor of disease was incorporated into the model with the understanding that, at present, it is not known how disease impacts the different life stages, but that it inevitably plays a role in population dynamics and further research is required in this area to successfully manage for this species.

4.5.8 Known and Potential Habitat in the Project Vicinity

The Project area and adjacent properties within the action area are located within the potential range of the Central Valley Distinct Population Segment of the California tiger salamander. Critical habitat for the California tiger salamander was finalized on August 23, 2005 (USFWS, 2005). USFWS divided the current range of the Central population into four regions: (1) Central Valley Region, (2) Southern San Joaquin Valley, (3) East Bay, and (4) Central Coast. The Project area is located in the Central Valley region.

The Project area is located more than 0.75 mile from the nearest California tiger salamander critical habitat unit, Unit 2 of the Central Valley Region. That unit, the Jepson Prairie Critical Habitat Unit (Unit 2) in Solano County, is located approximately 1 mile east of the Project between structures 008/059 and structure 011/075 and encompasses 5,699 acres. It is located south of Dixon, west of State Route 113, north of Creed Road, and east of Travis AFB. California tiger salamander occurrences are also reported within 0.5 mile of structures 002/015 through 003/019 of the west spur (CNDDB, 2007).

4.6 Showy Indian Clover

4.6.1 Status and Description

Showy Indian clover was listed as endangered October 22, 1997 (Federal Register 62-54791) (ecos.fws.gov/docs/federal_register/fr3169.pdf). CNPS has placed the species on List 1B. Although it has not been officially listed by the State of California, CDFG considers showy Indian clover to be "very threatened."

Showy Indian clover is an annual plant in the pea family (*Fabaceae*). It is erect with hairy stems and leaves. It grows from 10 to 69 centimeters tall (4 to 27 inches). Flowers, which are purple with white tips, grow in dense round or ovoid heads that are approximately

2.5 centimeters in diameter. They bloom from April to June. The flowers are not subtended by the circular-toothed bract present in many other clovers.

4.6.2 Range and Distribution

Showy Indian clover was extirpated from all of its 24 historically known locations, which occurred in seven counties. Originally, it ranged from Mendocino County south to Sonoma, Marin, Alameda, and Santa Clara counties and east to Napa and Solano counties. The species was considered extinct until 1993, when a single plant was discovered on privately-owned property in Sonoma County. That site has since been developed, and the species is no longer present. Another natural population, consisting of about 200 plants, was discovered in 1996 in Marin County on privately-owned property.

4.6.3 Habitat and Ecology

The species was found in a variety of habitats including low, wet swales, grasslands, and grassy hillsides. It typically grows in moist, heavy soils below an altitude of 100 meters (328 feet).

4.6.4 Threats to Species

The soil seed bank in the remaining natural habitat within the species' historical range may contain viable seeds. Should the species be found in these areas, it is likely to be threatened by urbanization, competition from non-native plants, land conversion to agriculture, and livestock grazing.

4.6.5 Critical Habitat

Critical habitat has not been designated for this species.

4.6.6 Conservation Issues

Seeds of the single plant discovered in 1993 were germinated in a greenhouse. Seeds from the resulting plants are being collected for future reintroduction efforts.

4.6.7 Known and Potential Habitat in the Project Vicinity

Historically in Solano County, this species is known from a distance of approximately 10 miles but has not been observed in more than 20 years (CNDDB, 2008). The historic distribution of this species in Solano County is not well understood.

4.7 Contra Costa Goldfields

4.7.1 Status and Description

Contra Costa goldfields was federally-listed as endangered on June 18, 1997 (62 Federal Register 33029) and is a CNPS List 1B species. Critical habitat was designated for this species on August 6, 2003 (68 Federal Register 46683); however, Solano County is excluded. Contra Costa goldfields are 10 to 40 centimeters tall and are annual herbs in the sunflower tribe (*Heliantheae*) of the sunflower family (*Asteraceae*). The opposite leaves are sometimes divided into segments. Each plant bears one to several, all-yellow flowerheads, and the

individual flowers lack pappus (modified floral structures at the top of the fruit). The leaf-like phyllaries subtending the flowerheads are fused less than one-half of their lengths (Hickman, 1993; USFWS, 2001). The partially fused phyllaries and the lack of pappus distinguish this species from the common Fremont's goldfields (*Lasthenia fremontii*).

4.7.2 Range and Distribution

Historically, Contra Costa goldfields were found in the counties surrounding San Francisco Bay and along the coast, from Santa Barbara County to Mendocino County. Many historical occurrences are considered extirpated. Currently, this species is known from about 15 populations. The largest concentration and number of populations occur in the Fairfield-Suisun area in Solano County. Other presumably extant populations are in Alameda (one), Contra Costa (one), Napa (one), Marin, Mendocino, and Monterey counties (CNPS, 2001).

4.7.3 Habitat and Ecology

Contra Costa goldfields grow in vernal pools, swales, and other depressions in open grassland and woodland communities, often in alkaline soils. It blooms from March through June, depending on environmental conditions (CNDDB, 2003; CNPS, 2001). These goldfields are known to occur with other rare plants, including little mousetail (*Myosurus minimus* ssp. *apus*) (CNDDB, 2003).

Contra Costa goldfields occur under varying moisture, soil, and salinity conditions, indicating that different populations are ecologically unique. The potential variations in population characteristics suggest that conservation efforts should consider the potential differences in populations and attempt to preserve this diversity (Collinge et al., 2003).

Another important aspect of this species' ecology when considering its conservation is the fact that it is an annual plant, which means that seed production is the only way for new individuals to occur in the population and for new populations to be established. In addition, Contra Costa goldfields require insect visitors for successful pollination and seed production. Several species of bees in the family Andrenidae are associated with the pollination of vernal pool plants, including Contra Costa goldfields. (These species are described and discussed in the solitary bee species account.) The presence of the bees is likely to be critical for the long-term viability of Contra Costa goldfields and other vernal pool plant populations. Also, Contra Costa goldfields seeds are very small but are not adapted to long-distances dispersal via wind or water. As a result, animal seed-dispersers are probably important for the viability of goldfields populations. There is some evidence that jackrabbits, which forage in grasslands, may contribute significantly to long-distance dispersal of goldfields and other vernal pool plants (Zedler and Black, 1992; Collinge, unpublished data). The population and reproductive characteristics of Contra Costa goldfields (limited distance dispersal) make it likely that long distances between vernal pools have and will effectively isolate populations.

4.7.4 Threats to the Species

Loss of vernal pool communities through development and drainage of wet areas is the greatest threat to Contra Costa goldfields. Four of the five known Contra Costa goldfields populations in Solano County are found within the Fairfield and Suisun City urban

boundaries. Although goldfields can withstand some disturbance (i.e., grazing or disking), disturbance typically allows weeds to invade a habitat, thus increasing competition for water and nutrient resources. Repeated or severe disturbance will eliminate Contra Costa goldfields (CNDDB, 2003; CNPS, 2001; USFWS, 2001). In addition, habitat modification and destruction that reduce the presence of solitary bees that are important pollinators and other small mammals and birds that may be critical for seed dispersal could compromise the viability of existing and future goldfields populations.

4.7.5 Conservation Issues

The majority of the known populations of Contra Costa goldfields occur within the urban boundaries of Fairfield and Suisun City. If these cities expand across their designated urban boundary, the majority of the Contra Costa goldfields habitat in California would be converted to urban areas.

Other conservation issues pertain to the maintenance of the hydrology and pollinator populations of the stands of Contra Costa goldfields. In addition, maintaining connectivity between vernal pool complexes in the Jepson Prairie region (Zone 1A), McCoy Creek (Zone 1B), and Upper Union Creek (Zone 1E) watersheds is an important conservation issue.

4.7.6 Known and Potential Habitat in the Project Vicinity

Approximately 10.5 linear miles of the Project's action area between structures 006/047 through 016/109 are located within the Jepson Prairie core area of the Solano-Colusa vernal pool region. Approximately 1.5 miles of the west spur of the Project between structures 001/006 and 002/013 are within designated Critical Habitat Unit 4A for this species. All other structures are located outside designated core areas and critical habitat for this species.

The Solano Multispecies HCP (SCWA, 2007) includes the project area from structure 006/043 to structure 011/075 and from structures 001/009 through 003/019 of the west spur as High Value Conservation Areas, while structures 011/0176 through structure 20/133 are in Moderate Value Conservation Areas.

5.0 Project Effects

The proposed Project will require placement of pull-and-tension sites; helicopter landing/staging areas (fly sites); temporary access roads; and guard structures over roads, railroads, and distribution lines at various locations along the transmission line. These measures will result in temporary direct and indirect effects to special-status species. The following discussion describes potential effects on listed species within the Project areas.

5.1 Summary of Effects from Project Activities

The Project will result in approximately 43.03 acres of temporary disturbance resulting from the use of pull sites, fly sites, access roads, and guard structures. These impacts have been broken down by temporary construction areas in Table 5-1 below.

TABLE 5-1
Summary of Project Effects
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Temporary Construction Activities	Quantity	Maximum Affected Acreage
Access Roads	6.05 miles	8.85
Pull Sites	17	23.05
Fly Sites	9	11.1
Guards Structures[a]	28	0.03
Shoofly Poles	2	0.004
Total		**43.03**

[a] Assumes two wood poles per structures requiring 15 square feet per pole and four anchors requiring 2 square feet each per pole.

5.2 Summary of Effects to Waters of the U.S. (Including Wetlands)

Implementation of the proposed Project is anticipated to result in temporary impacts to two seasonal wetlands, VP07 and VP08. The proposed Project is expected to require placement of temporarily fill in 0.01 acre of seasonal wetland VP07 and 0.04 acre of seasonal wetland VP08, for a total of approximately 0.05 acre (2,178 square feet) of Waters of the U.S. (including wetlands), as shown in Table 5-2 below.

TABLE 5-2
Summary of Impacts to Jurisdictional Wetlands
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

	Permanent Impacts		Temporary Impacts		
Location of Seasonal Wetland	**Approximate Area of Fill (acres)**	**Approximate Volume of Fill (yd^3)**	**Approximate Area of Fill (acres)**	**Approximate Volume of Fill (yd^3)**	**Approximate Length (linear feet)**
Pull Site 12[a]: VP 07 and VP 08	0.0	0.0	0.05	27	0.0
Access north of Creed Road[b]: C-65	0.0	0.0	0.01	5	39
Total Impact to Jurisdictional Waters of the U.S. (including wetlands)	0.0	0.0	0.06	32	39

Notes:

Actual impact area to be measured after construction is expected to be less.

[a] Temporary impacts at Pull Site 12 include placement of gravel on geotextile fabric within seasonal wetlands VP07 and VP08.

[b] Temporary impacts to the seasonal features located north of Creed Road are anticipated to be temporary and represented in linear feet. If the USFWS determines that placement of gravel on geotextile fabric is required in this area, the area and volume of fill will be used to represent the temporary impacts.

North of Creed Road, a guard structure is needed to protect an existing distribution line during pulling. This guard structure will be installed during the dry season and will require overland movement of a truck across seasonal wetlands (vernal pools). Temporary impacts to 39 linear feet of seasonal wetlands are expected from the vehicle movement. It is not anticipated that these seasonal features will be filled with geotextile fabric and gravel; however, the USFWS may require these seasonal wetlands (vernal pools) to be temporarily filled during vehicle movement even in the dry season. If this is required by USFWS, an additional 0.01 acre may be filled in that area, for a total of 0.06 acre temporarily filled in both the area north of Creed Road and Pull Site 12.

PG&E will implement wetland mitigation through the purchase of mitigation credits at an established mitigation bank at a 2:1 ratio (approximately 0.12 acre) concurrent with Project construction to offset Project-related wetland effects.

5.3 Summary of Effects to Listed Species and their Habitat

The all pools resource table in Appendix F provides data for all pools within 250 feet of all work areas. As described earlier in the project description, no new permanent facilities or structures will be installed as part of the project. Structures and work areas will be temporarily disturbed. Project biologists worked with PG&E engineers and construction staff to minimize effects on threatened and endangered species and habitat.

5.3.1 Branchiopods

Protocol-level surveys are ongoing. To date, vernal pool fairy shrimp have been found within pools P-6.g.a and P-6.g.f on the Noonan Ranch property (see Appendix C, Map 9). In

addition, vernal pool tadpole shrimp have been found within pools Creed-84 and Creed-142 on the Wilcox Ranch property (see Appendix C, Map 16). Conservancy fairy shrimp have not been found during this survey effort, but are known to occur in the large playa pools on Wilcox Ranch.

The proposed Project will have temporary indirect effects on an estimated 5.33 acres of potential conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp habitat. The proposed Project will have temporary direct effects on an estimated 1.1 acres and temporary indirect effects on 3.8 acres of potential vernal pool fairy shrimp and vernal pool tadpole shrimp habitat. Appendix F provides detailed data for effects to branchiopod pool habitat.

5.3.2 Delta Green Ground Beetle

Delta green ground beetle habitat occurs between Tower 008/059 (Muzzy Ranch immediately east of Travis AFB) and Tower 011/075 (Creed Road). Within this span, the larger playa pools offer the best actual and potential habitat for the Delta green ground beetle (Dr. Richard Arnold, pers. comm.). The smaller vernal pools within this span generally lack well-defined shorelines (where the Delta green ground beetle larvae and adults forage and breed) and the springtails that they prey upon. The surrounding grassland matrix may be used for dispersal, and the watershed for each playa is important to maintain hydrological functionality. The smaller vernal pools between Towers 011/075 (Creed Road) and 012/086 (Lambie Road) generally lack well-defined shorelines and springtails, so Delta green ground beetles are not likely to use these, especially since there are no playas interspersed among them. The results of the ongoing Delta green ground beetle surveys are not available at this time, and based on information provided by Dr. Richard Arnold, this species is inferred to be present in the area north of Creed Road.

The proposed Project will have no direct effects on any Delta green ground beetle pool habitat. However, temporary access for the Wilcox Ranch guard structure is within the 300-foot buffer surrounding a potential Delta green ground beetle pool (see Appendix D). The guard structure (located on the Wilcox Ranch) and the access road area across which the truck would be required to drive to install and take down the guard structure (Figure 1-9) is within potential beetle dispersal habitat. This includes area located on either side of a fence separating the Wilcox Ranch (west of fence line) and an unknown property (east of fence line) north of Creed Road. The access path was selected to minimize direct effects on pools, and would only be used within the dry season. No rocking of this cross-country access is planned, since laying of gravel and removal would likely have more effect than movement of a vehicle across the flat land in the dry season, primarily along the fire break. All work in this area will be monitored by a qualified biologist as described in Section 6.0 Avoidance and Minimization Measures.

The proposed project will have temporary direct effects to 0.25 acre of Delta green ground beetle 300-foot buffer habitat. PG&E will install and remove the guard structure at this location only in the dry season. Table 5-3 provides a list of Project effects on the Delta green ground beetle.

TABLE 5-3
Delta Green Ground Beetle Effects
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Affected Area	Length (Feet)	Effect Type	Ft^2	Acreage
Creed Rd. Access Road	981	Temporary Direct to Upland Dispersal	11,776	0.270
Creed Rd. Access Road	153	Temporary Direct to Upland Dispersal	1,832	0.042
Creed Rd. Guard Structure	--	Temporary Direct to Upland Dispersal	92	0.002
		Total	**13,699**	**0.314**
Temporary Access	918	Temporary Direct effect to upland Delta Green Ground Beetle Habitat within 300-foot Buffer	11,020	0.253
		Total	**11,020**	**0.253**

5.3.3 California Tiger Salamander

CNDDB and other potential breeding sites occur within 2 kilometers (1.24 miles) of the project area. After mapping each California tiger salamander site within the 2 kilometers (1.24 miles) dispersal distance buffer, CH2M HILL determined that nearly all project impact areas fall within potential upland habitat for California tiger salamander. A short segment of proposed access road to Pull Site 8 lies outside the dispersal buffer. The analysis also quantified loss of California tiger salamander habitat within 500 feet of breeding sites (see Appendix E, Figure 2).

The proposed project will have temporary direct effects on 6.6 acres of California tiger salamander dispersal habitat (within 500 feet of a potential breeding pond) and on 36.5 acres of California tiger salamander upland dispersal habitat (between 500 feet and 1.24 miles from a potential breeding pond). Table 5-4 provides a list of the Project effects on California tiger salamander habitat.

TABLE 5-4
CTS Effects Summary Table
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Habitat	Disturbance Type	Area of Temporary Direct Effect (Acres)
CTS Upland Dispersal within 1.24 Miles	Guard Structures	0.027
	Tower Work Area	1.401
	Access Road	6.866
	Pull Site	20.112
	Fly Site	8.122
	Total	36.53
CTS Upland Dispersal within 500 Feet	Guard Structures	0.027
	Tower Work Area	0.380
	Access Road	1.273
	60 kV Shoofly Poles	0.004
	Pull Site	2.602
	Fly Site	2.356
	Total	6.642
CTS potential breeding habitat	None	None

5.3.4 Showy Indian Clover

Potentially suitable habitat for showy Indian clover (low, wet swales, grasslands, and grassy hillsides) does occur within the Project area. This habitat occurs in areas that are currently being surveyed for rare plants; given the timing of this BA submittal these results are not yet available. However, showy Indian clover is only known from one extant population in Marin County, is extremely limited in distribution, and is very unlikely to occur within the project area. Historically, in Solano County this species is known to occur within approximately 10 miles of the Project area but has not been observed in more than 20 years (CNDDB, 2008). The historic distribution of this species in Solano County is not well understood.

Showy Indian clover is therefore inferred to be absent in areas of unsurveyed suitable habitat within the Project area. Protocol-level surveys are ongoing and will continue throughout the appropriate flowering season. A discovery of showy Indian clover during these surveys would be very significant. Should showy Indian clover be identified during surveys, PG&E will reinitiate consultation with the USFWS and will implement reasonable and prudent measures to avoid take of this very rare plant.

5.3.5 Vernal Pool Grasses

The proposed Project will have no direct effects on suitable habitat for Colusa grass, San Joaquin Valley orcutt grass, and Solano grass. Approximately 1.87 acres of potential habitat for Colusa grass, San Joaquin Valley orcutt grass, and Solano grass occurs downgradient and within 250 feet of the temporary access route PG&E will use for accessing the Wilcox Ranch guard structures (see Map 16 in Appendix B). According to LSA, the Wilcox Ranch area has been surveyed for these species but none have been found to date (Steve Foreman, pers. comm.).The guard structure will be installed to protect an existing distribution line that crosses beneath the Vaca Dixon-Birds Landing 230 kV line on the Wilcox Ranch property. PG&E will install and remove the guard structure at this location during the dry season. All work in this area will be monitored by a qualified biologist.

5.3.6 Contra Costa Goldfields

Rare pant protocol level surveys are in progress. The first visit has been completed and no Contra Costa goldfields have been found. According to LSA Map 8 (see Appendix B), the Vaca Dixon - Birds landing Transmission Line is located outside of the known core population area. LSA was consulted for information on the area, since LSA has been working on the Solano County HCP for some time.

In addition, a baseline conditions report was conducted on the Wilcox Ranch, and none were found; however, surveys conducted for that report did not meet current protocol for rare plant surveys.

Based on information provided by LSA, authors of the Solano HCP, and after review of the project action area maps, Contra Costa goldfields are known in the vicinity of the Noonan Ranch corral southeast of the Canon Road/Vanden Road intersection (Figure 1-5), and in the field west of the Peabody substation. Direct effects to this species in these areas will be avoided. However, temporary indirect effects could occur to the Noonan Ranch populations as mapped by LSA in 2007 (see Appendix B, Map 9).

The proposed Project will have temporary indirect effects on 0.07 acres of identified Contra Costa goldfields pool habitat. Appendix F provides a table detailing Project effects on Contra Costa goldfields habitat. PG&E will install Environmentally Sensitive Area fencing between the work areas and the two pools where Contra Costa goldfields have been found (see Appendix B, Map 9) in the action area at Noonan Ranch.

Although potential to occur exists for the Contra Costa goldfields and the vernal pool grasses in areas surveyed once but not yet surveyed to protocol, it appears highly unlikely that Contra Costa goldfields or the vernal pool grasses occur in the project's action area, other than along the Peabody spur within the Noonan Ranch corral site. Protocol-level rare plant surveys are ongoing and the results will be provided to USFWS prior to the start of construction; should any of these species be found in addition to those already identified in the Noonan Ranch area, PG&E will reinitiate consultation.

5.4 Compensation for Effects to Listed Species

Table 5-5 summarizes the proposed compensation for federally-listed plant and wildlife species that could be affected during implementation of the Project. This table presents the compensation being proposed by PG&E to offset temporary, direct, and indirect effects to pool habitats as well as upland habitat, where applicable.

Use of a USFWS-approved mitigation bank (i.e., Wildlands, Inc. and/or Elsie Gridley) is proposed to compensate for the effects to vernal pool branchiopods, Delta green ground beetle, California tiger salamander, and Contra Costa goldfields.

TABLE 5-5
Proposed Compensation for Effects to Special-status Species
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Species Habitat	Type of Effect (Temporary)	Acreage Affected	Proposed Off-Site Mitigation Ratio	Mitigation Bank Credits
Vernal Pool Fairy Shrimp, Vernal Pool Tadpole Shrimp	Direct	1.1	3:1	3.3
	Indirect	3.8	0.1:1	0.38
Conservancy Fairy Shrimp, Vernal Pool Fairy Shrimp, Vernal Pool Tadpole Shrimp	Direct	0	3:1	0
	Indirect	5.33	0.1:1	0.53
California Tiger Salamander	Temporary within 500 feet of a pond	6.64	1.1:1	0.66
	Temporary between 500 feet and 1.24 miles from pond	36.5	1:1	0.37
Delta Green Ground Beetle	Indirect to pools + 300 feet	0.25	3:1	0.75
Contra Costa Goldfields	Direct to pools	0	9:1	0
	Indirect	0.07	3:1	0.22[1]

Notes:

[1] Combined fairy shrimp and Contra Costa goldfields credit

Actual impact area to be measured after construction is expected to be less.

6.0 Proposed Avoidance and Minimization Measures

In order to minimize the potential for the Project to adversely affect federally-listed species and their habitat, protective measures will be implemented during construction. These are summarized below.

1. Protocol-level rare plant surveys are ongoing. Should any showy Indian clover, or vernal pool grasses be found in any project area, these areas will be avoided and consultation with USFWS will be reinitiated by PG&E.

2. An employee education program shall be conducted, consisting of a brief presentation by persons knowledgeable in vernal pool biology and legislative protection to explain endangered species concerns to contractors, their employees, and any other personnel involved in the project. The program should include the following: a description of the species and their habitat needs; a report of the occurrence of these species in the project area; an explanation of the status of these species and their 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 should be prepared for distribution to the above-mentioned people and anyone else who may enter the project site. Upon completion of training, employees will sign a form stating that they attended the training and understand all the conservation and protection measures. To the extent possible, nighttime construction will be minimized. Construction crews will be informed during the education program meeting that, to the extent possible, travel within the marked project site will be restricted to established roadbeds. Established roadbeds include all pre-existing and project-constructed unimproved, as well as, improved roads.

3. A FWS approved biological monitor will be onsite during all ground-disturbing work within sensitive biological areas. Offroad access routes will be clearly flagged and marked. All project-related vehicle access to the guard structures at Creed Road and south of the Noonan Ranch corrals will be monitored by a FWS approved biological monitor. Work within sensitive biological areas north of Creed Road and at the corral site (at the intersection of Canon Road and Vanden Road) will be conducted during the dry season. Additionally, no work activities will be allowed to occur north of Creed Road during the Delta green ground beetle flight season. Work in this area can therefore only take place from May 15 to October 31 (Dr. Richard Arnold, pers. comm.).

4. Geotextile fabric and a layer of gravel will protect the original contour of all wetland pools that cannot be avoided within identified temporary impact areas adjacent to or within the right of way with the possible exception of temporary access routes where overland travel in the dry season may have less impact than placement and removal of gravel, such as for the guard structure route at Creed Road. Using the geotextile fabric and gravel will minimize potential effects from compaction or other disturbance to areas that will have more frequent travel or heavier equipment, or be used on the wet season.

After construction, the gravel and fabric will be removed. Alternative methods for protecting areas from vehicle movement will be discussed with USFWS. In areas of minimal effect such as temporary access at Creed Road, this measure could have greater impact on soil seed bank than overland driving in the dry season.

5. Dust control measures will be implemented during construction in the dry season. Work areas and dirt access roads will be watered regularly to minimize airborne dust and soil particles generated by construction. Fly sites will be rocked when necessary.

6. The potential for adverse effects to water quality in vernal pools or habitat within the action area will be avoided by implementing temporary Best Management Practices outlined in the California Stormwater Quality Association's Construction Handbook (CASQA, 2003). PG&E's Storm Water Pollution Prevention Plan and erosion control Best Management Practices will be used to minimize any wind- or water-related erosion. Protective measures will include:

    a. No discharge of pollutants from vehicle and equipment cleaning will be allowed into storm drains, wetlands, or water courses.

    b. Vehicle and equipment fueling and maintenance operations must be at least 100 feet from vernal pools and other aquatic habitat.

    c. Dust control will be implemented, including the use of water trucks to control dust in disturbed areas, rocking temporary access road entrances and exits, and placement of geotextile mats and rock on access road areas to be used in the wet season.

    d. Disturbed work areas will be restored to pre-project conditions and will be reseeded, as appropriate.

7. To minimize effects of the proposed Project on the California tiger salamander, Delta green ground beetle, vernal pool fairy shrimp, vernal pool tadpole shrimp, conservancy fairy shrimp, and Contra Costa goldfields, PG&E will purchase mitigation credits at a USFWS-approved mitigation bank.

8. Project-related vehicles shall observe a 20-mile-per-hour speed limit in all Project areas, except on county roads and state and federal highways.

9. The limits of the construction area throughout the Project will be flagged if not already marked by right of way or other fencing, and all activity will be confined within the marked area. A qualified biologist shall be onsite during all activities that could result in the take of a listed species.

7.0 Determination of Effects

7.1 Branchiopods

PG&E's proposed Vaca Dixon-Birds Landing 230 kV Reconductoring project is likely to adversely affect the federally-threatened vernal pool fairy shrimp and federally-endangered vernal pool tadpole shrimp. The proposed Project will have temporary direct effects on 1.1 acres and temporary indirect effects on 3.8 acres of potential vernal pool fairy shrimp and vernal pool tadpole shrimp habitat. Additionally, the proposed Project could have temporary indirect effects on 5.33 acres of potential conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp habitat (see Appendix C). Direct effects and indirect effects to listed species and their habitat will be compensated for through the purchase of conservation credits from an agency-approved conservation bank as discussed in Section 5.4 above.

As part of the Project plan, PG&E will implement the avoidance measures described above to avoid or minimize additional direct and indirect effects to the federally -listed species discussed in this Biological Assessment.

7.2 Delta Green Ground Beetle

With implementation of the proposed avoidance and minimization measures and compensation for indirect effects to potential habitat, PG&E's proposed Vaca Dixon–Birds Landing 230 kV Reconductoring project may affect, is likely to adversely affect the federally-threatened Delta green ground beetle. The proposed project will have temporary direct effects to 0.25 acre of area within 300 feet of Delta green ground beetle habitat outside of the flight season. PG&E will install and remove the guard structure at this location only in the dry season. Direct effects to Delta green ground beetle habitat will be compensated through the purchase of conservation credits from an agency-approved conservation bank as discussed in Section 5.4 above.

7.3 California Tiger Salamander

PG&E's proposed Vaca Dixon-Birds Landing 230 kV Reconductoring project may affect, likely to adversely affect, the federally-threatened California tiger salamander. The proposed project will have temporary direct effects on 6.64 acres of California tiger salamander dispersal habitat (within 500 feet of a potential breeding pond) and on 36.5 acres of California tiger salamander upland dispersal habitat (between 500 feet and 1.24 miles from a potential breeding pond). Direct effects to California tiger salamander dispersal habitat will be compensated through the purchase of conservation credits from an agency-approved conservation bank as discussed in Section 5.4 above.

7.4 Contra Costa Goldfields

With the implementation of avoidance and minimization measures at the corral site, including ESA fencing and worker training, as well as seasonal restrictions, PG&E's proposed Vaca Dixon–Birds Landing 230kV Reconductoring project may affect, not likely to adversely affect, the populations in the vicinity of the corral (Noonan Ranch). The proposed project could potentially have temporary indirect effects on 0.07acres of Contra Costa goldfields pool habitat. Indirect effects to vernal pool and seasonal wetland habitat will be compensated through the purchase of conservation credits from an agency-approved conservation bank as described in Section 5.4 above.

7.5 Showy Indian Clover

Given the extreme rarity of this species, it is highly unlikely that this species will be found during the on-going protocol level surveys. The project is assumed to have no effect on this species. Should any of this extremely rare species be found during these surveys, PG&E will reinitiate consultation and avoidance measures will be developed with the Service.

8.0 References

Ahl, J.S.B. 1991. Factors affecting contributions of the tadpole shrimp, *Lepidurus packardi*, to its oversummering egg reserves. *Hydrobiologia* 212:137-1 Mr. Champ 43.

Barbour, Michael, Todd Keeler-Wolf, and Allen Schoenherr (eds). 2007. *Terrestrial Vegetation of California*. University of California Press, Berkeley.

Barclay, W.R. and A.W. Knight. 1984. Physio-chemical processes affecting production in a turbid vernal pool. Pp. 126-142. In S. Jain and P. Moyle (eds.). Vernal pools and intermittent streams. *Inst. Ecol. Pub*. 28. Univ. Calif. Davis, California.

Barry, S.J. and H.B. Shaffer. 1994. The status of the California tiger salamander (*Ambystoma californiense*) at Lagunita: a 50-year update. *J. Herpetol*. 28:159-164

California Native Plant Society (CNPS). 2001. *Inventory of Rare and Endangered Plants of California* (sixth edition). Rare Plant Scientific Advisory Committee, David P. Tibor, Convening Editor. California Native Plant Society, Sacramento, CA x + 388 pp.

_____. 2008. *Inventory of Rare and Endangered Plants of California* (online edition, version 6.3). Accessed at: http://www.cnps.web.aplus.net/cgi-bin/inv/inventory.cgi.

California Natural Diversity Data Base (CNDDB). 2003. Database query for Contra Costa Goldfields in Solano County. California Department of Fish and Game, Sacramento California.

_____. 2008. Species account information from RareFind3, version 3.0.5, electronic database.

California Stormwater Quality Association (CASQA). 2003. *CASQA Construction Handbook*.

Center for Biological Diversity. 2001. Center for biological diversity files California endangered species act listing petition for imperiled California tiger salamander. Available on the Internet at: http://www.sw-center.org/swcbd/search.html.

Collie, N. and E.W. Lathrop. 1976. Chemical characteristics of the standing water of a vernal pool on the Santa Rosa Plateau, Riverside County, California. Pp. 27-31 In S. Jain (ed.). Vernal pools, their ecology and conservation. *Institute of Ecology Publication 9*. University of California, Davis, California.

Collinge, S.K., C.A. Wise, and B. Weaver. 2003. Germination, early growth, and flowering of a vernal pool annual in response to soil moisture and salinity. *Madrono*, Vol. 50. No. 2, pp 83-93.

Donald, D.B. 1983. Erratic occurrence of anostracans in a temporary pond: colonization and extinction or adaptation to variations in annual weather? *Can. J. Zool*. 61:1492-1498.

Driver, E.A. 1981. Caloric value of pond invertebrates eaten by ducks. *Freshwater Biology* 11:579-581.

Eng, L.L., D. Belk, and C.H. Eriksen. 1990. California Anostraca: Distribution, Habitat, and Status. *J. Crus. Biol.* 10:247-277.

Eriksen, C.H. and D. Belk. 1999. *Fairy Shrimps of California's Puddles, Pools, and Playas*. Mad River Press, Eureka, California.

Federal Register. 1980. 45 FR 528-07. August 8.

_____. 1994. *Endangered and threatened wildlife and plants; determination of endangered status for the Conservancy fairy shrimp, longhorn fairy shrimp, and the vernal pool tadpole shrimp; and the threatened status for the vernal pool fairy shrimp*. 58(180):48136-48153.

_____. 1997. *Endangered Status for Four Plants From Vernal Pools and Mesic Areas in Northern California, Final Rule*. FR 62 (117) 33029-33038.

_____. 2003a. *Determination of Endangered Status for the Sonoma County Distinct Population Segment of the California Tiger Salamander; Final Rule*. FR: 68 (53) 13497-13520.

_____. 2003b. *Listing of the Central California Distinct Population Segment of the California Tiger Salamander; Proposed Rule*. FR : 68 (100) 28647-28670

_____. 2003c. *Listing of the Central California Distinct Population Segment of the California Tiger Salamander, Reclassification of the Sonoma County and Santa Barbara County Distinct Populations From Endangered to Threatened; Special Rule*. FR: 68 (128) 39892-39893

Fugate, M.L. 1992. Speciation in the fairy shrimp genus *Branchinecta* (*Crustacea: Anostraca*) from North America. Ph.D. dissertation. Department of Biology, University of California, Riverside, California.

Gilpin, M.E. and M.E. Soule. 1986. Minimum viable populations of species extinction. Pp. 19-34 In M.E. Soule (ed.). Conservation biology: the science of scarcity and diversity. Sinauer Associates, Inc., Sunderland, Massachusetts.

Goodman, D. 1987a. The demography of chance extinction. Pp. 11-34. In M.E. Soule (ed.). *Viable populations for conservation*. Cambridge University Press, Cambridge, Great Basin.

_____. 1987b. How do any species persist? Lessons for conservation biology. *Conservation Biology* 1:59-62.

Helm, B. 1998. The biogeography of eight large branchiopods endemic to California. Pp. 124-139 In C.W. Witham, E. Bauder, D. Belk, W. Ferren, and R. Ornduff (eds.). *Ecology, Conservation, and Management of Vernal Pool Ecosystems – Proceedings from a 1996 Conference*. California Native Plant Society, Sacramento, California.

Hickman, J.C. Ed. 1993. *The Jepson Manual: Higher Plants of California*. University of California Press. Berkeley, California.

Holland, R.F. 1978. *The Geographic and Edaphic Distribution of Vernal Pools in the Great Central Valley, California*. California Native Plant Society, Special Publication 4:1-12.

_____. 1999. *Changes in Great Valley Vernal Pool Distribution from 1989 to 1997.*

Jennings, M.R. 2000. *California tiger salamander*. Pp. 193-196 In P.R. Olofson (ed.) Goals Project. Baylands Ecosystem and Community Profiles: Life histories and environmental requirements of key plants, fish, and wildlife. Prepared by the San Francisco Bay Area Wetlands Ecosystem Goals Project. San Francisco Bay Regional Water Quality Control Board, Oakland, California.

Jennings, M.R. and M.P. Hayes. 1994. *Amphibian and reptile species of special concern in California*. Final report to California Dept. of Fish and Game. Pp. 12-16.

Jepson Online Interchange. 2007. An online database for California floristics. Available at: http://ucjeps.berkeley.edu/interchange.html.

Johnson, C.D. and D.F. Williams. 1996. *Conservancy Fairy Shrimp.* Available on the Internet at: http://arnica.csustan.edu/esrpp/cfs.htm.

Krapu, G.L. 1974. Foods of Breeding Pintails in North Dakota. *J. Wild. Manag.* 38(3):408-417.

Kulcher, A.W. 1977. *The map of the natural vegetation of California.* Appendix In M.G. Barbour and J. Major (eds.). Terrestrial Vegetation of California. California Native Plant Society, Special Publication #9.

Lanaway, C.S. 1974. Environmental factors affecting crustacean hatching in five temporary ponds. M.S. thesis. Department of Biological Science, Chico State University, Chico, California.

Leyse, K. and Lawler, S.P. 2000. Effect of mosquitofish (*Gambusia affinis*) on California tiger salamander (*Ambystoma californiense*) larvae in permanent ponds. Mosquito Control Research, annual report 2000.

Linder, F. 1952. The morphology and taxonomy of the branchiopod *Nostraca*, with special reference to the North American species. *Proc. U.S. Nat. Mus.* 102:1-57.

Long, M.M. 1992. *Endangered and threatened wildlife and plants; 90-day finding and comment on status review for a petition to list the California tiger salamander*. FR 57(224):54545-54546. November 19.

Longhurst, A.R. 1955. A review of the *Nostraca*. *Bull. Brit. Mus. (Nat. Hist.) Zool.* 3:1-57.

Loredo, I., D. Van Vuren, and M.L. Morrison. 1996. Habitat use and migration behavior of the California tiger salamander. *J. Herpetology* 30(2): 282-285.

LSA Associates, Inc. 1994. *California tiger salamander distribution: 1994 survey results.* Pt. Richmond, California. 54 pp + maps.

Marco, A., C. Quilchano, and A.R. Blaustein. 1999. Sensitivity to nitrate and nitrite in pond-breeding amphibians from the Pacific Northwest, USA. Environmental Toxicology and Chemistry 18:2836-2839.

Pacific Biodiversity Institute. 2001. *Vernal pool fairy shrimp*. Pacific Biodiversity Institute. Available on the Internet at: http://www.pacificbio.org/ESIN/OtherInvertebrates/VernalPoolFairyShrimp/VernalFairyShrimp_pg.html.

Pennak, R.W. 1989. *Fresh-water Invertebrates of the United States: Protozoa and Mollusca*. Third Ed. 628 pp.

Sawyer, J.O. and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. California Native Plant Society. Sacramento, California. 471 pages.

Shaffer, H.B. and M.L. McKnight. 1996. The polytypic species revisited: genetic differentiation and molecular phylogenetics of the tiger salamander *Ambystoma tigrinum* (Amphibia: Caudata) complex. *Evolution* 50(1): 417-433.

Shaffer, H.B., R.N. Fisher, and S.E. Stanley. 1993. *Status Report: the California Tiger Salamander* (Ambystoma californiense). Final report for the California Department of Fish and Game.

Simovich, M., R. Brusca, and J. King. 1992. *Invertebrate survey 1991-1993 PGT-PGE/Bechtel pipeline expansion project*. University of San Diego, Alcala Park, San Diego, California.

Solano County Farm Bureau. 2008. Agricultural Information available on line at: http://www.cfbf.com/counties/. Site Accessed on 1/22/2008.

Solano County Water Agency (SCWA). 2007. Solano Multispecies Habitat Conservation Plan. Working Draft 2.2. Prepared by LSA. February.

Sorensen, P.C. 1994. *Endangered and threatened wildlife and plants; 12 month petition finding for the California tiger salamander*. FR 59 (74):18353-18354. April 18.

Stebbins, R.C. 1985. *A Field Guide to Western Amphibians and Reptiles*. Second edition, revised. Houghton Mifflin Company, Boston, Massachusetts. xiv+336 pp.

Sugnet and Associates. 1993. *Preliminary Compilation of Documented Distribution, Fairy Shrimp and Tadpole Shrimp Proposed for Listing*. Sugnets and Associates Environmental Consultants, Roseville, California. 22 pp. + 3 maps.

Swanson, G.A., M.I. Meyer and J.R. Serie. 1974. Feeding ecology of breeding blue-winged teals. *J. Wild. Mang.* 38:396-407.

Trenham, P. C. and H. B. Schaffer. Unpublished. *Upland spatial distribution and habitat use in a declining amphibian*. Submitted to Ecological Applications. Section of Evolution and Ecology and Center for Population Biology, UC Davis.

Trenham, P.C., H.B. Shaffer, W.D. Koenig, and M.R. Stromberg. 2000. Life history and demographic variation in the California tiger salamander (*Ambystoma californiense*). *Copeia* 2000(2): 365-377.

Twitty, V.C. 1941. Data on the life history of *Ambystoma tigrinum californiense* Gray. *Copeia* 1941(1): 1-4.

United States Fish and Wildlife Service (USFWS). 1985. *Delta Green Ground Beetle and Solano Grass Recovery Plan*. Portland, Oregon.

_____. 1992. *Wetland Losses within Northern California from Projects Authorized under Nationwide Permit No. 26. Sacramento Field Office*. Sacramento, California.

_____. 1999. *Biological Opinion for the Solano Project Water Service Contract Renewal*. Sacramento, California. 107 pp. + append.

_____. 2001. *Conservancy fairy shrimp*. Endangered Species Division, Sacramento Fish and Wildlife Service. Available on the Internet at: http://sacramento.fws.gov/es/animal_spp_acct/conserv_shrimp.htm.

_____. 2005. *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon*.

_____. 2006. Endangered and threatened wildlife and plants; critical habitat designation for four vernal pool crustaceans and eleven vernal pool plants; Final Rule. 50 CFR Part 17 Vol. 71 (28): 7117-7316.

_____. 2007. Listed species online content. http://www.fws.gov/

_____. 2008. Listed species online content. http://www.fws.gov/

United States Fish and Wildlife Service/California Department of Fish and Game (USFWS/CDFG). 2003. *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander*. October.

Wellborn, G. A., D. K. Skelly, and E. E. Werner. 1996. Mechanisms creating community structure across a freshwater habitat gradient. Annual Review of Ecology and Systematics 27:337-363.

Zedler, P. H. and C. Black. 1992. Seed Dispersal by a Generalized Herbivore: Rabbits as Dispersal Vectors in California's Semi-arid Vernal Pool Landscapes. *American Midland Naturalist*, 128:1-10.

Personal Communications

Arnold, Dr. Richard. 2008. Phone conversation with Craig Lawrence, CH2M HILL, regarding typical flight season for Delta green ground beetle. March.

Foreman, Steve. 2008. Personal Communication by phone to Craig Lawrence and Lynne Hosley, CH2M HILL. April.

Appendix A
Wetland Delineation Report

Draft Report

Delineation of Wetlands and Other Waters for the Vaca Dixon-Birds Landing 230kV Reconductoring Project

Prepared for

Pacific Gas and Electric Company

Environmental Services Department
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April 2008

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Draft Report

Delineation of Wetlands and Other Waters for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Submitted to

Pacific Gas and Electric Company

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Acronyms and Abbreviations

CWA	Clean Water Act
EPA	U.S. Environmental Protection Agency
GPS	Global Positioning System
LRR C	California Fruit and Crop Land Resource Region
OHWM	Ordinary High Water Mark
NRCS	The Natural Resources Conservation Service
PG&E	Pacific Gas and Electric Company
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey

SECTION 1

Introduction

This report presents the findings of a delineation of wetlands and other waters of the United States (U.S.) for Pacific Gas and Electric Company's (PG&E) proposed upgrades to the existing Vaca Dixon-Peabody and Vaca Dixon-Lambie-Birds Landing 230 kV transmission lines. The U.S. Army Corps of Engineers (USACE) is ultimately responsible for determining the limit of wetlands and waters subject to regulation under the federal Clean Water Act (CWA). This report is intended to provide information on the location of wetland resources in the project work areas, as well as provide information necessary for permit applications.

1.1 Project Location

The project area is located entirely in Solano County, California. Upgrades and improvements to the 230 kV transmission line and towers extend from PG&E's Vaca Dixon Substation (approximately 4.7 miles northeast of Vacaville at 38.400645°N; -121.920885°W) south and west to Peabody Substation at the intersection of Vanden and Peabody roads in Fairfield (38.285410°N; -121.970530°W), and to Birds Landing Substation north of Montezuma Road (38.123625°N; -121.829210°W) (Figure 1, all figures are at the end of this document).

1.2 Project Description

The purpose of the project is to increase transmission capacity to serve electric customers in Solano and Contra Costa counties. The project will increase transmission line capacity by replacing existing 1113 kcmil Al (aluminum) and 954 kcmil ACSR (aluminum conductor, steel reinforced) conductors with 1113 kcmil steel supported aluminum conductor (SSAC) on about 30 miles (50 circuit miles) of transmission line.

Because the new conductor is heavier than the existing conductor, some of the existing towers will need to be raised or have arms extended to meet electrical line clearance requirements. The raising of the towers and arm extensions will be done without modifying the base of the towers, and no new foundations or tower base work is required. The tower modification work and work to place new wire on the towers is planned to be done primarily by helicopter to minimize effects on sensitive biological resources and minimize erosion.

Work areas required for the tower and reconductoring work include: helicopter landing areas (fly sites) and staging areas for installation of tower extensions and the equipment needed to place new wires on the towers; pulling and tensioning sites where wire stringing equipment, new wire on reels, and take-up reels will be placed; installation of guard structures to protect roadways and existing infrastructure under the line during reconductoring; and temporary access to each of these sites (helicopter fly/staging sites, pull and tension sites, and guard structures. If additional temporary construction areas or fly sites are required, they will be placed in areas where there are no environmental concerns.

The proposed Project would consist of the following activities:

- **Tower Modifications.** 105 towers will require structural modifications (arm extensions and/or tower raising) to accommodate the heavier conductor. For all but a few towers near the golf course, this work is being done by helicopter.
- **Line Reconductoring Process.** Reconductoring (replacing the wires) will occur along approximately 30 miles of existing 230 kV transmission line.
- **Helicopter Landing Areas (fly site).** These are areas used for helicopter refueling, equipment and material staging and worker transport during tower modification work.
- **Construction Access.** Vehicle and helicopter access to certain towers will be necessary to install tower extensions and to place new wires on the towers.
- **Pull and Tension Sites.** These are areas used by the construction crews to pull and tension sock lines &/or conductors between towers.
- **Guard Structures.** Temporary poles will be installed next to major roads, distribution lines or railroads while the conductor is being pulled into place, as a safe guard in the event of a dropped wire.
- **Grounding Rods.** To comply with worker safety requirements, protection grounds will be temporarily attached to each tower where work is conducted.
- **Substation Upgrades.** Equipment at Lambie Switching Station and Vaca Dixon, Birds Landing, and Peabody Substations will be upgraded to accommodate the higher conductor ratings.

1.3 Environmental Setting

The project area is in the California Fruit and Crop Land Resource Region (LRR C) as defined by the Natural Resource Conservation Service (NRCS, 2006a). The project is located on the western edge of the Great Valley ecological sub-region with the majority of the transmission lines located in the Sodic Claypan terraces subsection, which occur on the broad alluvial plains on the lower west side of the Sacramento Valley. Elevations in this region typically range from 20 to 120 feet. A small section of the transmission line, as well as the Birds Landing Substation, are located in the Montezuma Hills subsection, which is characterized by low rolling hills with elevations up to 268 feet (Miles and Goudeay, 1997). The following sections provide an overview of the terrestrial habitats and land use, climate and hydrology, and soils in the project area.

1.3.1 Land Use and Terrestrial Habitats

Most of the project traverses rural areas where the most common land uses are cultivated agricultural fields and pasture lands. Portions also cross scattered residential areas, farms, and light industrial sites. A small section of the transmission line is located on the Cypress Lakes golf course. Most of the pasture lands, undeveloped areas and roadsides are characterized by annual grassland.

1.3.2 Agricultural Lands

More than 60 percent of the land in Solano County is in agricultural production, approximately half of which is irrigated (Solano County Farm Bureau, 2008). The principal irrigated crops are grain hay, Sudan hay, alfalfa, and tomatoes. Wheat is the most common dry-land crop and is grown extensively throughout the Montezuma Hills. Both irrigated and dry-land pasture are common. These pasture lands support species commonly found in the annual grasslands described below. Much of the pasture within the project area is irrigated and is used primarily for cattle and sheep grazing.

1.3.3 Annual Grassland

The annual grassland in the project area is generally typical of the California annual grassland described by Barbour et al. (2007) and Sawyer and Keeler-Wolf (1995). Common species include non-native annual grasses such as medusa head (*Taeniatherum caput-medusae*), soft chess (*Bromus hordeaceus*), rip-gut brome (*Bromus diandrus*), wild oats (*Avena fatua, A. barbata*), foxtail fescue (*Vulpia* sp.) and ryegrass (*Lolium multiflorum*). Common herbs include broadleaf filaree (*Erodium botrys*), burclover (*Medicago polymorpha*), geranium (*Geranium molle*, G. *dissectum*) and clover (*Trifolium* sp.).

1.4 Hydrology and Climate

Most of the project area is in the Valley Putah-Cache Creek Watershed (HUC 18020109) which drains approximately 305 square miles of the Lower Sacramento River basin area (CDFG, 2008). Drainages near the project include Gibson Canyon Creek, Ulatis Creek, Alamo Creek, Lindsey Slough, Calhoun Cut and Montezuma Slough (see Figures 2a through 2k). A small portion of the project is located in the Suisun Bay Watershed (HUC 1805001) in the San Francisco Bay Hydrologic Region. The Suisun Bay Watershed has a drainage area of 133 square miles. Only two drainages, Union Creek and an unnamed tributary to Hill Slough, are near the project area within this watershed (Figures 2d and 2e). Many natural drainages in the project area have been channelized, and the hydrology of the region has been significantly altered by water diversion through irrigation canals and agricultural drainages.

The region is characterized by a Mediterranean climate with cool, wet winters and warm, dry summers. Climate data from Vacaville (WRCC, 2008) indicates that average temperatures range from a low of 37°F in January to a high of 95°F in July. Average annual rainfall is 25.3 inches with 85 percent occurring between November and March (Figure 3).

1.5 Soils

Soils throughout the region are derived from marine and non-marine sediments deposited on the alluvial plain of the lower Sacramento River. Nine mapped soil units are associated with the 17 pull sites and 9 fly sites (see Figures 4a through 4x). The following sections briefly describe typical cross sections of these soils based on information provided by NRCS (1977, 2008a). All colors represent moist soil unless otherwise noted. Two of these mapped units, Clear Lake Clay and the Solano-Pescadero Complex are poorly drained and some

areas may be subject to frequent, long duration ponding. These soil units are included on the Solano County hydric soils list (NRCS, 2006b).

1.5.1 Altamont–San Ysidro–San Benito Complex, 2- to 9-percent slopes

Altamont clay soil comprises approximately 60 percent of this mapping unit and generally occurs on side slopes. Altamont soils are deep, well-drained soils that formed in material weathered from fine-grained sandstone and shale. The surface horizon is typically a dark brown (10 YR 3/3) clay to a depth of 8 inches. From 8 to 12 inches, the soil is a very dark grayish brown (10 YR 3/2) clay. From 12 to 24 inches, the soil is very dark grayish brown (10 YR 3/2) clay with very fine, faint, dark brown (10 YR 4/3) soft masses. San Ysidro soils account for 20 percent of this unit. These are deep and moderately well-drained soils that formed in alluvium from sedimentary rocks. The surface horizon is a brown (10 YR 3/3) sandy loam with few fine, distinct brownish yellow (10YR 6/6) (DRY) soft masses to a depth of 7 inches. From 7 to 14 inches, the soil is a brown (10 YR 3/3) fine sandy loam also with few fine, distinct, brownish yellow (10YR 6/6) (DRY) soft masses. Below 14 inches the soil is a dark brown (7.5 YR 4/4) heavy clay loam to clay. San Benito soils make up approximately 15 percent of this unit with the remaining 5 percent composed of inclusions of Diablo Clay and Ayar Clay soils. San Benito soils formed from weathered shale and sandstone are well drained with medium to very rapid runoff and moderately slow permeability. The surface horizon is a dark brown (10 YR 3/3) clay loam to a depth of approximately 17 to 25 inches.

1.5.2 Antioch–San Ysidro Complex, 0- to 2-percent slopes

This soil unit is composed of approximately 50 percent Antioch loam and 35 percent San Ysidro sandy loam, with the remaining 15 percent made up of inclusions of Solano loam and Pescadero clay loam. Antioch soils formed in alluvium derived from sedimentary materials. These soils are found on terraces and are moderately well drained but have very slow permeability. The surface horizon, to a depth of 19 inches, typically ranges from a dark grayish brown (10 YR 4/2) to dark brown (10 YR 3/3) loam with few to common strong brown (7.5 YR 5/6) concentrations. San Ysidro soils are similar to those described above.

1.5.3 Capay Silty Clay Loam

Capay soils formed in alluvium derived from sedimentary materials and occur on basin rims with nearly level topography. The surface horizon is typically a very dark grayish brown (10 YR 3/2) silty clay loam with few, fine strong brown (7.5 YR 5/6) concentrations present between 5 and 21 inches. These soils are well drained but surface runoff is very slow and permeability is slow. Included in this mapping unit are small areas of Rincon clay.

1.5.4 Clear Lake Clay, 0- to 2-percent slopes

Clear Lake soils occur in basins and are derived from mixed alluvium. The surface horizon is a dark gray (N 3/0) clay to a depth of 45 inches. This soil is naturally poorly drained with slow to very slow permeability and slow runoff, but leveling and constructed ditches have improved site drainage for agriculture such as irrigated pasture, sugar beets, tomatoes, and grain crops.

1.5.5 Diablo–Ayar Clays, 9- to 30-percent slopes

This mapped unit occurs on dissected terraces and consists of approximately 60 percent Diablo clay occurring on hill slopes, and 30 percent Ayar clay occurring on hill tops. The remaining 10 percent of the map unit contains inclusions of Altamont clay and San Benito clay loam. The surface horizon of the Diablo soil is a very dark gray (10 YR 3/1) clay with common, medium, dark yellowish brown (10 YR 4/4) concentrations from 7 to 17 inches. The Ayar soils consist of very dark grayish brown (10 YR 3/2) clay to a depth of 19 inches. These soils are both well drained but have slow permeability.

1.5.6 Rincon Clay Loam, 0- to 2-percent slopes

Rincon soils are formed in alluvium from sedimentary materials and are found on alluvial fans. The surface horizon is a very dark grayish brown (10 YR 3/2) clay loam to a depth of 22 inches. These soils are well drained with slow permeability and runoff. Included in this mapping unit are small areas of Brentwood clay loam and Capay silty clay loam.

1.5.7 San Ysidro Sandy Loam, 0- to 2-percent slopes

San Ysidro soils are formed in alluvium derived from sedimentary materials and are found on terraces. The surface horizon is a brown (10 YR 3/3) sandy loam with few, fine, brownish yellow (10 YR 6/6) [dry] concentrations in the upper 14 inches. Below 14 inches, the soil is a dark brown (7.5 YR 4/4) heavy clay loam. These soils are moderately well drained with very slow permeability and runoff. Included in this mapping unit are small areas of Antioch loam and San Ysidro sandy loam, thick surface.

1.5.8 Solano Loam

Solano soils occur on nearly level terraces and are formed in alluvium derived from sedimentary materials. The surface layer is a dark grayish brown (10 YR 4/2) loam with few, fine, yellowish red (5 YR 4/8) concentrations to a depth of 4 inches. From 4 to 9 inches, the soil is a dark grayish brown (10 YR 4/2) loam with few, fine, dark reddish brown (5 YR 3/4) concentrations. From 9 to 21 inches, the soil is a brown (10 YR 4/3) clay loam with dark grayish brown (10 YR 4/2) on the ped surfaces. This soil is somewhat poorly drained and has very slow permeability and runoff. Included in this mapping unit are small areas of Antioch loam, San Ysidro sandy loam, and Pescadero clay loam.

1.5.9 Solano–Pescadero Complex

This map unit consists of approximately 45 percent Solano loam occurring on rounded mounds and 45 percent Pescadero clay loam found in low swale areas. The remaining 10 percent is composed of small inclusions of Antioch loam and San Ysidro sandy loam. Solano soils are similar to those described above. The Pescadero soils occur in nearly level basins and have a saline-alkali substratum. The surface horizon is a grayish brown (10 YR 5/2) clay loam with common, fine, yellowish brown (10 YR 4/4) concentrations to a depth of 4 inches. Below 4 inches, the soil is a dark gray (10 YR 4/1) clay becoming dark grayish brown (2.5 Y 4/2) with depth. Pescadero soils are somewhat poorly drained and have slow permeability and runoff.

SECTION 2

Methods

Wetland delineation field surveys were conducted on January 25, February 4, February 13, and March 14, 2008, by CH2M HILL wetland ecologist Russell Huddleston. The purpose of the field surveys was to identify potential wetlands and other Waters of the U.S., and to collect data on vegetation, soils, and hydrologic conditions in the study area. The study area for the wetland survey included the 17pull sites (24.24 acres), 9 fly sites (10.54 acres), three tower work areas (1.82 acres), and 8.61 acres of temporary access roads for a total of 45.21 acres. While the wetland delineation included only those areas that were within the project footprint (direct work areas and temporary access roads), the entire wetland area was mapped. In addition potential wetland features that were observed either immediately adjacent to or in close to the temporary work areas were included on the maps, but were not examined in detail as part of this study (Figures 4 through 4x). The following sections document procedures used for field sampling and the methods used to determine and map wetland boundaries.

2.1 Pre-field Investigation

General information on hydrology, existing wetlands, and soils was reviewed prior to the field surveys. Data sources included the U.S. Geological Survey (USGS) topographic maps for the Allendale, Elmira, Dozier, Birds Landing, and Fairfield North USGS 7.5 quadrangles, National Wetlands Inventory data (USFWS, 2008), the Soil Survey of Solano County (NRCS, 1977), and aerial photographs.

2.2 Field Survey

The survey methodology followed the U.S. Army Corps of Engineers (USACE) 1987 Wetland Delineation Manual (Environmental Laboratory, 1987) and the Arid West Region Supplement (USACE, 2006). This methodology uses a three criteria approach (vegetation, soils, and hydrology) to determine the presence of wetlands. In most situations, evidence of a minimum of one positive indicator for each criterion is necessary to make a positive wetland determination. There are, however, certain wetland types and conditions that make application of typical indicators difficult. In these problem areas one or more of the wetland indicators may be lacking due to normal variation in environmental conditions that result from causes other than human activities or catastrophic natural events. For example, seasonal wetlands, such as those present in the study area, typically exhibit wetland hydrology only in the wet winter months, but are dry later in the spring and summer. Seasonal wetlands are, therefore, considered to be problem areas (Environmental Laboratory, 1987), and, in such cases, the lack of an indicator does not necessarily mean that wetland conditions do not exist. Problem areas require more careful analysis, including consideration of other site conditions to determine if one or more of the criteria are actually met.

Under normal circumstances, wetlands exhibit the following characteristics:

- **Hydrophytic Vegetation:** More than 50 percent of the dominant vegetation is composed of plant species that are adapted to survive and grow in hydrophytic (wet) conditions. Plants are assigned a wetland indicator status based on their probability of occurring in wetlands.
- **Hydric Soils:** The Natural Resources Conservation Service (NRCS) defines hydric soil as "soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part…" (Federal Register, July 13, 1994). The criteria for establishing the presence of hydric soils vary among soil types, drainage classes, and land resource regions. The NRCS, has developed field indicators for identification of hydric soils. These indicators are currently used by the USACE in the Arid West Regional Supplement to the 1987 Manual (USACE, 2006). They rely on soil characteristics such as texture, color, and the presence of redoximorphic features to determine if soils are hydric.
- **Hydrology:** Areas with wetland hydrology are defined as "…inundated either permanently or periodically at mean water depths less than 2 meters (6.6 feet), or the soil is saturated to the surface at some time during the growing season" (Environmental Laboratory, 1987). This saturation or inundation must be present for at least 5 percent of the growing season. The growing season for Solano County is 365 days (NRCS, 2008b) (see Appendix A). Therefore, an area must be saturated or inundated for a minimum of 18 consecutive days in most years (generally at least 5 out of 10) to meet the wetland hydrology criterion.

A total of 12 sample points were established in the project area. Sample locations are shown on Figures 4a through 4x, field data sheets are included in Appendix B, and representative photographs are included in Appendix C.

2.2.1 Vegetation

At each sample point, dominant plant species were identified to the extent possible given the seasonal timing of the surveys and percent cover was visually estimated. Vegetation at the time of the survey was limited to seedlings of early germinating grasses and forbs. As a result, species identification and composition of the annual species in the potential wetland areas is speculative based on seedling identification and remnant plants from the previous season. Later germinating and flowering annual plants were not evident at the time of the survey, precluding a comprehensive list of species for each sample area. Additional information on vegetation in these areas could be collected during a field verification of these areas during the spring months. Given the relatively small size of the sample areas and the general homogeneity of the vegetation, species cover was estimated for the entire feature rather than a defined sample plot size. The wetland indicator status of the plants observed at each location was determined using the *National List of Plant Species that Occur in Wetlands, Region 0* (Reed, 1988). Dominant species within each vegetation stratum included the most abundant species whose cumulative cover accounted for at least 50 percent of the total cover, as well as any single species that accounted for at least 20 percent of the total vegetative cover. Strata that contained less than 5 percent total cover were not considered in the dominance test. Table 1 lists plant species observed at the sample locations.

TABLE 1
Plant Species Observed at Sample Point Locations

Common Name	Scientific Name	Indicator Status[a]	Stratum
White Hyacinth	*Triteleia hyacinthina*[b]	FACW*	Herbaceous
Bermuda Grass	*Cynodon dactylon*	FAC	Herbaceous
Tall Flatsedge	*Cyperus eragrostis*	FACW	Herbaceous
Annual Hairgrass	*Deschampsia danthonioides*[b]	FACW	Herbaceous
Broadleaf filaree	*Erodium botrys*	NL	Herbaceous
Mediterranean Barley	*Hordeum marinum* ssp. *gussonianum*	FAC	Herbaceous
Hyssop Loosestrife	*Lythrum hyssopifolia*	FACW	Herbaceous
Slender Popcorn Flower	*Plagiobothrys stipitatus*[b]	OBL	Herbaceous
English Plantain	*Plantago lanceolata*	FAC-	Herbaceous
Curly Dock	*Rumex crispus*	FACW-	Herbaceous
Medusahead	*Taeniatherum caput-medusae*	NL	Herbaceous
Clover	*Trifolium* sp.	—	Herbaceous

Notes:

[a] Indicator status is based on Reed, 1988.

[b] Species identification is tentative, based on seedlings only at this time.
* Indicates tentative indicator status.
- Indicates frequency toward the lower end of the category (less often found in wetlands).
OBL = Obligate Wetland—Occurs with an estimated 99-percent probability in wetlands.
FACW = Facultative Wetland—Estimated 67- to 99-percent probability of occurrence in wetlands.
FAC = Facultative—Equally likely to occur in wetlands and non-wetlands (34 to 66 percent probability).
NL = Not Listed—Species has no indicator status and is considered to occur in uplands with 99 percent probability.

2.2.2 Soils

Soils were examined at each sample location by excavating soil pits to depths ranging from 16 to 22 inches using a tide spade or Dutch auger. Soil morphological features such as texture, color, and redoximorphic features (if present) were noted. Soils texture was determined in the field using the ribbon test and other field procedures for estimating the percentage of clay, silt, and sand. Moist soil colors were determined using Munsell® color charts. Determinations of hydric soils were based on *Field Indicators of Hydric Soils* (NRCS, 2006c).

2.2.3 Hydrology

Determination of wetland hydrology was based on observations of saturation or inundation during the field surveys. Since surveys were conducted during a season of high rainfall, the amount of rain prior to the survey, landscape drainage patterns and general site topography were also considered in determining wetland hydrology.

The wetland delineation was conducted between late January and March of 2008. Total precipitation in January was 8.19 inches compared to an average of 5.57 inches for this month (WRCC, 2008; UCIMP, 2008). After a series of heavy storms, ponded water and

flooding were widely observed during the initial site surveys. Follow-up surveys were conducted in mid-February after a week with no rain, and almost all of these areas were dry. In general, these ephemerally flooded areas were not considered wetlands and were not included in this evaluation. The exceptions were depressional basins that appear to exhibit a notable shift in vegetation toward more hydrophytic (predominantly facultative) plant species relative to the adjacent habitats. Nearby water features such as irrigation canals, creeks, and sloughs were noted on the maps, but were not included in this delineation because these areas were outside of the work areas and would not be affected by project activities.

2.2.4 Wetland Boundaries

Wetland boundaries were determined in the field based on apparent changes in plant species composition, vegetative cover, hydrologic conditions, and local microtopography. Soils were often similar between basins and adjacent upland areas and were therefore not used in the boundary determinations. The boundaries were mapped in the field using a Trimble® Geo-XT Global Positioning System (GPS) Unit. Data were differentially corrected to sub-meter accuracy and mapped on aerial photographs of the project area (Figures 4a through 4x).The exception is the vernal pool complex located on the north side of Creed Road. Wetlands in this area were mapped based on aerial photography and subsequently verified during a field survey.

SECTION 3

Results

3.1 Summary

Most project work areas are in agricultural areas, such as cultivated fields and pasture lands that lack wetlands or other waters. A total of approximately 0.06 acres of potentially jurisdictional seasonal wetlands were identified within the study area. An additional 0.185 acres of potentially non-jurisdictional swales and drainages are also present. All of the seasonal wetlands are associated with the temporary access roads and work areas near Creed Road. A number of other wetlands and other aquatic features were identified in proximity to the study area, but were located outside of the temporary work areas and would not be directly impacted by the project. These areas are included on the maps, but were not included in the formal wetland delineation for the project work areas (Figures 4a through 4x).

Other waters such as Gibson Canyon Creek, Ulatis Creek, Alamo Creek, Union Creek, Lindsey Slough, and Montezuma Slough are also located near the work areas, but would not be affected by the project. In addition, numerous irrigation canals occur throughout the project area, but would likewise not be affected by the project. Table 2 (located at the end of this section) lists project work areas, associated aquatic resources, and land use. General descriptions of the wetlands and other features are provided in the following sections.

3.1.1 Seasonal Wetlands

The proposed project would result in temporary impacts to 0.06 acres of seasonal wetlands in the vicinity of Creed Road between towers 010/073 (Figure 3p) and 011/077 (Figure 3q). At the time of the survey the seasonal wetlands in the study area appeared to be characterized by non-native grasses and forbs such as ryegrass (*Lolium multiflorum*), Mediterranean barley (*Hordeum marinum* ssp. *gussonianum*) and curly dock (*Rumex crispus*). Several of the basins located south of Creed Road also appeared to have at least some cover of slender popcorn flower (*Plagiobothrys stipitatus*), annual hairgrass (*Deschampsia danthonioides*) and white hyacinth (*Triteleia hyacinthina*).

The seasonal wetlands in the study area are associated with Antioch-San Ysidro complex and Clear Lake Clay soils. Surface soils were generally similar in both the basin and upland areas and range from dark gray (10 YR 4/1) fine sandy loams to very dark grayish brown (10 YR 3/2) clay loams. In some areas there are a few (less than 2 percent) dark brown (10 YR 3/3) concentrations in the matrix and few, fine, distinct, brown (7.5 YR 4/4) concentrations along the root channels.

Wetland hydrology in these areas appears to be highly ephemeral. During the February 4 field survey, nearly all of the basins were inundated with shallow water (1 to 3 inches) but by February 13 most all of the areas were dry. The seasonal wetlands are all within approximately 0.7 mile of Calhoun Cut, which is a tributary to Lindsey Slough, which flows into the Sacramento River. Overall landscape drainage in this area is to the east-northeast

into Calhoun Cut. While the vernal pools in this area do not have a direct hydrologic connection with Calhoun Cut, these and other wetlands throughout the Valley Putah-Cache Creek Watershed, undoubtedly play a significant role in maintaining the chemical, biological, and physical properties of the waters in this area (Zedler, 2003; Rodriguez, 2007).

3.1.2 Swales

A total of 0.175 acre of potentially non-jurisdictional swale features were identified in the work areas, including the access road north of Kilkenny Road (Figure 4a) and the access road and pull site south of Creed Road (Figure 3q). The swale north of Kilkenny Road is characterized by scattered nutsedge (*Cyperus eragrostis*) and curly dock, and appears to be routinely mowed for roadway maintenance. The swale areas south of Creed road are similar to the seasonal wetlands with Mediterranean barley apparently the dominant species.

Swale features are associated with Clear Lake clay and Capay silty clay loam soils. The surface soil ranged from a very dark grayish brown (10 YR 3/2) clay loam to a dark grayish brown (10 YR 4/2) clay loam. In a few areas less than two percent brown (7.5 YR 4/4) concentrations occur within the matrix and along the root channels in the upper few inches.

These swale features are generally weakly expressed and had only scattered, shallow areas of inundation (1 to 2 inches deep) during the February 4, field survey and were completely dry with no saturated soils were on February 13, 2008.

3.1.3 Roadside Ditches

Several roadside are present along the project route. Several guard structures would be located adjacent to these drainages but no project related impacts are expected to occur. Most of the roadside drainages are located in the mixed agricultural and residential areas. These drainages typically range from 1 to 3 feet wide and are either unvegetated or support sparse ruderal vegetation such as bristly ox-tongue (*Picris echioides*), ryegrass, wild oats, nutsedge, and wild radish (*Raphanus sativa*) along their upper edges. The roadside drainage north of Maple Road (Figure 4c), appears to be a realigned and channelized natural drainage that is tributary to Ulatis Creek. It is approximately 5 feet wide and contains scattered ryegrass along the edges of the banks.

3.1.4 Drainage Ditches

A few miscellaneous drainage features are present in the project vicinity, including one drainage feature (DD01) located within the work area for Pull Site 7 (Figure 3j). This drainage feature is a small channel (0.01 acre) formed as the result of discharge from the stormwater collection basin at the Peabody substation. Water flows to the southwest for a short distance and then dissipates sheet flow through a grassland swale area characterized by ryegrass. Other small drainages in this vicinity support scattered ryegrass and bristly ox tongue.

3.1.5 Agricultural Ditches

Several agricultural drainage ditches are present near the work areas but would not be affects by the project. Agricultural ditches are earthen channels that have been constructed for the localized conveyance of irrigation water to crops and pasture land. Most of the

drainages are from 3 to 5 feet wide and contained several inches of water at the time of the survey. Typical vegetation within and adjacent to the channels included Bermuda grass, nutsedge, bristly ox tongue, Johnson grass (*Sorghum halepense*), Mexican sprangle top (*Leptochloa uninervia*), and ryegrass.

TABLE 2
Summary of Work Areas

Project Feature	Map Page	Tower Numbers	Land Use/Habitat	Wetlands within Impact Area	Notes
Pull Site 0	3a	000/001	Ruderal, non-native grassland, landscape trees (*Eucalyptus*)	None	Large stormwater retention basin located west of the pull site; area supports emergent wetland vegetation (Cattails) and scattered willows. No impacts would occur in this area.
Guard Sites – Interstate 80	3a	000/001 – 000/001x	Ruderal, non-native grassland, landscape trees (*Eucalyptus*)	None	Cement-lined drainage channel on north side of I-80, two irrigation canals on the south side of I-80; all are located outside of the work areas; Gibson Canyon Creek is approximately 1,200 feet to the northeast of this area
Pull Site 1	3a	000/002	Fallow agricultural field (formerly row crops)	None	Irrigation canals and agricultural drainage ditch (AD01) are north of the site, outside of the work areas; Gibson Canyon Creek is approximately 1,500 feet northeast of this area
Pull Site 2	3a	000/002 – 000/003	Fallow agricultural field (formerly row crops)	None	Excavated farm drainage ditch south of this area, west of temporary access road
Access Road – Pull Sites 1 and 2	3a	000/002 – 000/003	Fallow agricultural field (formerly row crops)	Roadside swale (RS01)	Excavated agricultural drainage ditch west of the road. Gibson Canyon Creek is approximately 1,500 feet north of this area
Guard Sites – Kilkenny Road	3a	000/003	Non-native grassland/dirt access road	None	Roadside swales along Kilkenny Road; Irrigation canal and small agricultural ditch south side of Kilkenny road; all outside of the work area, Gibson Canyon Creek is approximately 2,300 feet northeast of this area.
Guard Sites – Walnut Ave	3b	000/007 – 001/008	Pasture land	None	Roadside ditches; Ulatis Creek is approximately 450 feet south of this area
Guard Sites – Poplar Road	3b	000/009 – 001/010	Annual grassland, residential, pasture land	None	Roadside ditches and small drainage ditch on north side of the road; Ulatis Creek is approximately 1,250 feet north of this area
Guard Sites – Maple Road	3c	001/011 – 001/012	Annual grassland, residential/light industry and pasture land	None	Roadside ditches, roadside ditch on north side of the road is a natural tributary to Ulatis Creek

TABLE 2
Summary of Work Areas

Project Feature	Map Page	Tower Numbers	Land Use/Habitat	Wetlands within Impact Area	Notes
Fly Site 1 and Access Road	3d	002/016	Agricultural field	None	Ulatis Creek (channelized) is approximately 50 feet south of the site; access to this site along existing farm road north o of the creek
Guard Site – Hawkins Road	3e	002/019 – 002/020	Alfalfa fields and annual grassland in the road right–of-way	None	Roadside swale and irrigation canal on south side of the road; would not be affected by the project
Guard Site – Elmira Road	3f	003/023 – 003/024	Non-native grassland, alfalfa/hay field	None	Roadside swale and agricultural drainage ditch on south side of road; agricultural ditch on north side of road; Alamo Creek is approximately 600 feet northeast of the work area
Pull Site 3 and Access Road	3g	004/027 – 004/028	Hay field	None	Two Irrigation canals approximately 150 feet southeast of the site, parallel to the railroad tracks; access to this area from existing farm roads
Guard Site – Southern Pacific Railroad – Fry Road	3g	004/028 – 004/029	Non-native grassland, alfalfa/hay fields	None	Two Irrigation canals parallel the railroad tracks; these would not be affected by the project
Guard Sites – Fry Road	3g	004/029	Non-native grassland, Hay field	None	Irrigation canal on the south side of Fry Road; outside of the work area
Pull Site 4	3h	005/035 – 005/036	Cypress Lakes Golf course	None	Large seasonal wetland immediately south of the site; swale partially within the work area, extends to the southeast of the work area; Both areas would be avoided during construction. Second vernal pool area is located approximately 135 feet southeast of site; agricultural Irrigation canal on the south side of the road; Lindsey slough is located approximately 0.9 miles to the southeast of this area
Guard Structure – Golf Course Road	3h	005/035 – 005/036	Cypress Lakes golf course, annual grassland, hay field	None	Large seasonal wetland north of road; agricultural irrigation canal on south side of road; these areas would not be affected

TABLE 2
Summary of Work Areas

Project Feature	Map Page	Tower Numbers	Land Use/Habitat	Wetlands within Impact Area	Notes
Pull Station 5 and Access Road	3h	005/036 000/001	Hay field	None	Irrigation ditch on north side of the site; access to this area along existing farm road
Fly Site 2 and Access Road	3h	005/036 000/001	Hay field	None	Irrigation ditch on north side of the site; access to this area along existing farm road
Guard Site 60 kV pole relocation site – Cannon Road	3i	002/013	Non-native grassland	None	Seasonal wetland located just west of Guard structure location and Union Creek is approximately 50 feet east of the work area
Guard Site – Cannon Road	3i	002/013 – 002/014	Non-native grassland	None	Union Creek is approximately 50 feet east of the work area
Pull Site 6	3i	002/013 – 002/014	Non-native grassland associated with cattle corrals and farm buildings	None	Union Creek is approximately 200 feet east of this site
Fly Site 3	3i	002/013 – 002/014	Non-native grassland / farm yard	None	Farm equipment yard, Union Creek is approximately 50 feet east of this site
Access Road to Pull Site 6, Fly Site 3 and Guard Structures	3i	002/013 – 002/014	Non-native grassland / farm yard	None	Farm equipment yard, Union Creek is approximately 50 feet east of this site
Guard Site – Northern Pacific Railroad	3i	002/014	Pasture, annual grassland	None	Union creek is over 500 feet east of this area
Guard Site – Vanden Road/Railroad	3j	003/019	Non-native grassland	None	No wetlands or waters near this work area
Guard Site – Peabody Road	3j	003/021 – 003/022A	Ruderal, non-native grassland	None	Two small drainage ditches on north side of Peabody Road; unnamed drainage, apparent tributary to Hill Slough, is approximately 1,000 feet to the northwest of this area
Pull Site 7	3j	003/021 – 003/022B	Non-native grassland	Drainage ditch (DD01) from substation stormwater basin becomes overland flow through weakly expressed swale to the southwest	Unnamed drainage, apparent tributary to Hill Slough, is approximately 1,000 feet northwest of this area

TABLE 2
Summary of Work Areas

Project Feature	Map Page	Tower Numbers	Land Use/Habitat	Wetlands within Impact Area	Notes
100-Foot Work Area Tower 003/002B	3j	003/002B	Non-native grassland	None	Upland swale in this area; unnamed drainage, apparent tributary to Hill Slough, is approximately 1,000 feet northwest
Guard Site – Meridian Road	3k	005/040 – 006/041	Hay fields/pasture	None	Small agricultural ditch and roadside ditch on west side of road; no drainage on the east side of road; irrigation canal north of Hay Road; Lindsey Slough is approximately 0.5 mile east of this area
Pull Site 8 and Access Road	3l	006/046 – 006/047	Irrigated pasture	None	Irrigation canals immediately south of the work area; would not be affected by the project
Pull Site 9 and Access Road	3l	006/047 – 007/048	Irrigated pasture	None	Two agricultural ditches east of this area; irrigation canals to the north of the work area; the features would not be affected by the project
Fly Site 4 and Access Road	3m	N/A	Irrigated pasture	None	Lindsey Slough is approximately 50 feet east of the site, irrigation canal approximately 50 feet to the south; neither feature would be affected by the project
Fly Site 5 and Access Road	3o	008/057X	Irrigated pasture	None	No wetlands or waters near this site; Lindsey Slough is approximately 3,500 feet north of this area
Pull Station 10 and Access Road	3o	008/058 – 008/058X	Irrigated pasture	None	No wetlands or waters near this site; Lindsey Slough is approximately 3,500 feet north of this area
Pull Station 11 and Access Road	3o	008/058X – 008/059	Irrigated pasture	None	Irrigation canal approximately 175 feet south of the work area; Lindsey Slough is approximately 3,500 feet north of this area
Guard Site - Distribution Line north of Creed Road	3p	010/073	Pasture	Seasonal Wetland C-134	Numerous seasonal wetlands throughout this area, Calhoun Cut is approximately 0.7 mile east of this area

TABLE 2
Summary of Work Areas

Project Feature	Map Page	Tower Numbers	Land Use/Habitat	Wetlands within Impact Area	Notes
Access Road north of Creed Road	3p	011/074	Pasture	Seasonal Wetland C-165	Numerous seasonal wetlands throughout this area, Calhoun Cut is approximately 0.7 mile east of this area
Guard Site – Creed Road	3q	011/075	Pasture	None	Seasonal wetlands and swales in proximity to this area, but would not be affected by the project; Calhoun Cut is approximately 0.7 mile east of this area
Pull Site 12 and Access Road	3q	011/076 – 011/0077	Pasture	Two shallow vernal pools (VP07 and VP08) are within the work area, Work area and access road also include portions of swale features (SW02 and SW05)	Additional vernal pools and swales north of the work area; Calhoun Cut is approximately 0.7 mile northeast of this area
Guard Sites – Southern Pacific RR and Access Road	3r	012/083	Non-native grassland, pasture	None	No wetlands or waters near this site; Calhoun Cut is approximately 0.6 mile east of this area
Pull Site 13 and Access Road	3r	012/084 – 012/085	Pasture	None	No wetlands or waters near this site; Calhoun Cut is approximately 0.4 mile east of this area
Pull Site 14 and Access Road	3r	012/085 – 012/086	Pasture	None	No wetlands or waters near this site; Calhoun Cut is approximately 0.4 mile east of this area.
Guard Site – Lambie Road	3r	012/086	Non-native grassland, pasture	None	No wetlands or waters near this site; Calhoun Cut is approximately 0.4 mile east of this area
Fly Site 6 and Access Road	3s	014/093	Pasture	None	No wetlands or waters near this site; remnant channel of Calhoun Cut is approximately 600 feet north of this area
Guard Site – Highway 12	3t	015/101	Pasture, wheat, hay	None	No wetlands or waters near this site; remnant of unnamed drainage approximately 0.3 mile east of this area

TABLE 2
Summary of Work Areas

Project Feature	Map Page	Tower Numbers	Land Use/Habitat	Wetlands within Impact Area	Notes
Pull Site 15 and Access Road	3t	015/102 – 015/103	Hay field	None	No wetlands or waters near this site; remnant of unnamed drainage approximately 0.15 mile east of this area
Guard Site – Little Honker Bay Road	3t	015/103	Hay field, annual grassland	None	No wetlands or waters near this site; remnant of unnamed drainage approximately 0.15 mile east of this area
Fly Site 7	3t	015/103	Hay field	None	No wetlands or waters near this site
Guard Sites – Olsen Road	3u	016/112	Non-native grassland; wheat	None	Two small depressional areas in non-native grassland area, these features would not be affected by the project
Fly Site 8	3v	017/115 – 017/116	Non-native grassland; wheat	None	Small depressional basin area to the west, would not be affected by project activities in this area; access to site along existing farm road
Guard Site – Birds Landing Road	3w	018/126 – 019/027	Pasture, wheat field	None	Montezuma Slough is approximately 160 feet south of work area; weakly expressed upland swale that appears to convey overland flow into the slough is approximately 100 feet west of this area
Fly Site 9	3x	019/130	Wheat	None	Farmed depressional basin southwest of this site would not be affected by the project; unnamed drainage on south side of Montezuma Hills Road, approximately 0.5 miles to the southeast of this area
Pull Site 16	3x	019/130 – 019/131	Wheat	None	Farmed depressional basin north of this site would not be affected by the project; unnamed drainage on south side of Montezuma Hills Road, approximately 0.5 miles to the southeast of this area

SECTION 4

Preliminary Jurisdictional Determinations

4.1 Regulatory Overview

Waters of the U.S. are defined as all navigable waters, including: (1) tidal waters; (2) interstate waters and wetlands; (3) other waters such as lakes, rivers, streams (perennial or intermittent), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds; the use, degradation, or destruction of which could affect interstate commerce; (4) impoundments of water mentioned above; (5) tributaries to waters mentioned above; (6) territorial seas; and (7) wetlands adjacent to waters mentioned above.

Wetlands are defined as areas that "are inundated by surface or ground water with a frequency sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (Environmental Laboratory, 1987).

The limit of jurisdictional Waters of the U.S. (including wetlands) in non-tidal waters extends to the ordinary high water mark (OHWM), to adjacent wetlands above the OHWM, or, if not adjacent, to the limit of the wetland. The OHWM mark is defined as the line on the shore established by the fluctuation of water and indicated by physical characteristics such as a natural line impressed on the bank, shelving, scouring, changes in the character of the soil, destruction of terrestrial vegetation, presence of litter or debris, or other appropriate evidence (33 CFR Section 328.4).

The term "adjacent" means bordering, contiguous, or neighboring. Wetlands separated from other Waters of the U.S. by man-made dikes or barriers, natural river berms, beach dunes, and the like are "adjacent wetlands." When Waters of the U.S. consist only of wetlands, the jurisdiction extends to the limit of the wetland (33 CFR Section 328.3(c)).

Preliminary jurisdictional determinations included in this report are based on guidelines for CWA jurisdiction issued by the USACE and U.S. Environmental Protection Agency (EPA) following the U.S. Supreme Court's Decision on the Rapanos and Carabell cases (USACE/EPA 2007). Under these guidelines swales and ditches excavated in uplands are generally not considered jurisdictional. Non-navigable tributaries and adjacent wetlands that do not support relatively permanent flow will be evaluated on a case–by-case basis to determine if such areas have a significant nexus with traditional navigable water (EPA/USACE, 2007).

4.2 Preliminary Jurisdictional Determinations

The wetland delineation for the Vaca Dixon-Birds Landing Project identified 0.06 acres of potentially jurisdictional wetlands that would be temporarily impacted by the project (Table 3). An additional 0.185 acres of potentially non-jurisdictional features occur in the temporary work areas and would also be impacted. Information presented in this report,

including wetland areas and preliminary jurisdictional determinations, is subject to review and verification by the USACE.

TABLE 3
Preliminary Jurisdictional Determinations*

Feature ID	Type	Wetland Area with the Study Limits (temporary work sites)	Total Wetland Area Delineated
Potential Jurisdictional Waters of the U.S.			
Creed 65	Seasonal Wetland	0.01	0.2
Creed 134	Seasonal Wetland	0.00	0.004
VP07	Seasonal Wetland	0.01	0.02
VP08	Seasonal Wetland	0.04	0.04
Total Jurisdictional Area		**0.06**	**0.64**
Potential Non-Jurisdictional Waters of the U.S.			
RS01	Swale	0.005	0.02
DD01	Drainage Ditch	0.01	0.01
SW02	Swale	0.00	0.06
SW05	Swale	0.17	0.35
Total Non-Jurisdictional Area		**0.185**	**0.63**

*Preliminary jurisdictional determinations only and are subject to verification by the USACE.

SECTION 5

References

Barbour, Michael, Todd Keeler-Wolf, and Allen Schoenherr (eds). 2007. *Terrestrial Vegetation of California*. University of California Press, Berkley.

California Department of Fish and Game (CDFG) 2008. Biogeographic Information and Observation System (BIOS). Available online at: http://bios.dfg.ca.gov/. (Site accessed 1/22/2008.)

Clausnitzer, David and J. Herbert Huddleston. 2002. *Wetland Determination of a Southeast Oregon Vernal Pool and Management Implications.* Wetlands 22 (4): 677-685.

Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual*. Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. Online Version Available at: http://www.wetlands.com/regs/tlpge02e.htm

Environmental Protection Agency/U.S. Army Corps of Engineers (EPA/USACE). 2007. *Memorandum on Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in Rapanos v. United States and Carabell V. United States.* Issued June 5, 2007. Available on line at: http://www.epa.gov/fedrgstr/EPA-WATER/2007/November/Day-28/w5867.htm

Federal Register. 1994. Vol. 59. No. 133. July 13. p. 35680.

Miles, Scott and Charles Goudey (editors). 1997. Ecological Subregions of California. United States Department of Agriculture, Forest Service. Pacific Southwest Division. R5-EM-TP-005. San Francisco, California.

Natural Resources Conservation Service (NRCS). 2008a. Official Soil Series Descriptions. U.S. Department of Agriculture. Available on line at: http://soils.usda.gov/technical/classification/

Natural Resources Conservation Service (NRCS). 2008b. Climate Analysis for Wetlands (WETS). U.S. Department of Agriculture. Available on line at: U.S. Geological Survey. 2007. Information online at: http://www.wcc.nrcs.usda.gov/climate/wetlands.html. (Site accessed on 2/17/2008.)

Natural Resources Conservation Service (NRCS). 2006a. *Land Resource Regions and Major Land Resource Area of the United States, the Caribbean, and the Pacific Basin*. U.S. Department of Agriculture. Agricultural Handbook 296.

Natural Resources Conservation Service (NRCS). 2006b. Hydric Soils List for Solano County, California. United States Department of Agriculture.

Natural Resources Conservation Service (NRCS). 2006c. *Field Indicators of Hydric Soil* (Version 6.0). U.S. Department of Agriculture in cooperation with the National Technical Committee on Hydric Soils.

Natural Resources Conservation Service (NRCS). 1977. Soil Survey of Solano County, California. (Formerly the Soil Conservation Service) U.S. Department of Agriculture in cooperation with the University of California Agricultural Experiment Station.

Reed, P.B. 1988. *Plants of the United States of America, Region 1 0A*. U.S. Fish and Wildlife Service, National Wetlands Inventory, St. Petersburg, FL.

Rodriguez-Rodriguez, Miguel. 2007. *Hydrogeology of ponds, pools and playa lakes of southern Spain.* Wetlands 27 (4): 819-830.

Sawyer, J. and Todd Keeler-Wolf. 1995. A Manual of California Vegetation. California Native Plant Society. Sacramento, California.

Solano County Farm Bureau. 2008. Agricultural Information available on line at: http://www.cfbf.com/counties/. Site Accessed on 1/22/2008.

U.S. Army Corps of Engineers (USACE). 2006. Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Arid West Region (ERDC/EL TR-060-16 Version 2.0). December.

U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency(EPA). 2007. Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in Rapanos v. United States & Carabell v. United States. Memorandum issued June 5, 2007.

U.S. Fish and Wildlife Service (USFWS). 2008. National Wetland Inventory. Digital Map Data available on line at: http://www.fws.gov/nwi/. (Site accessed on 1/22/2008.)

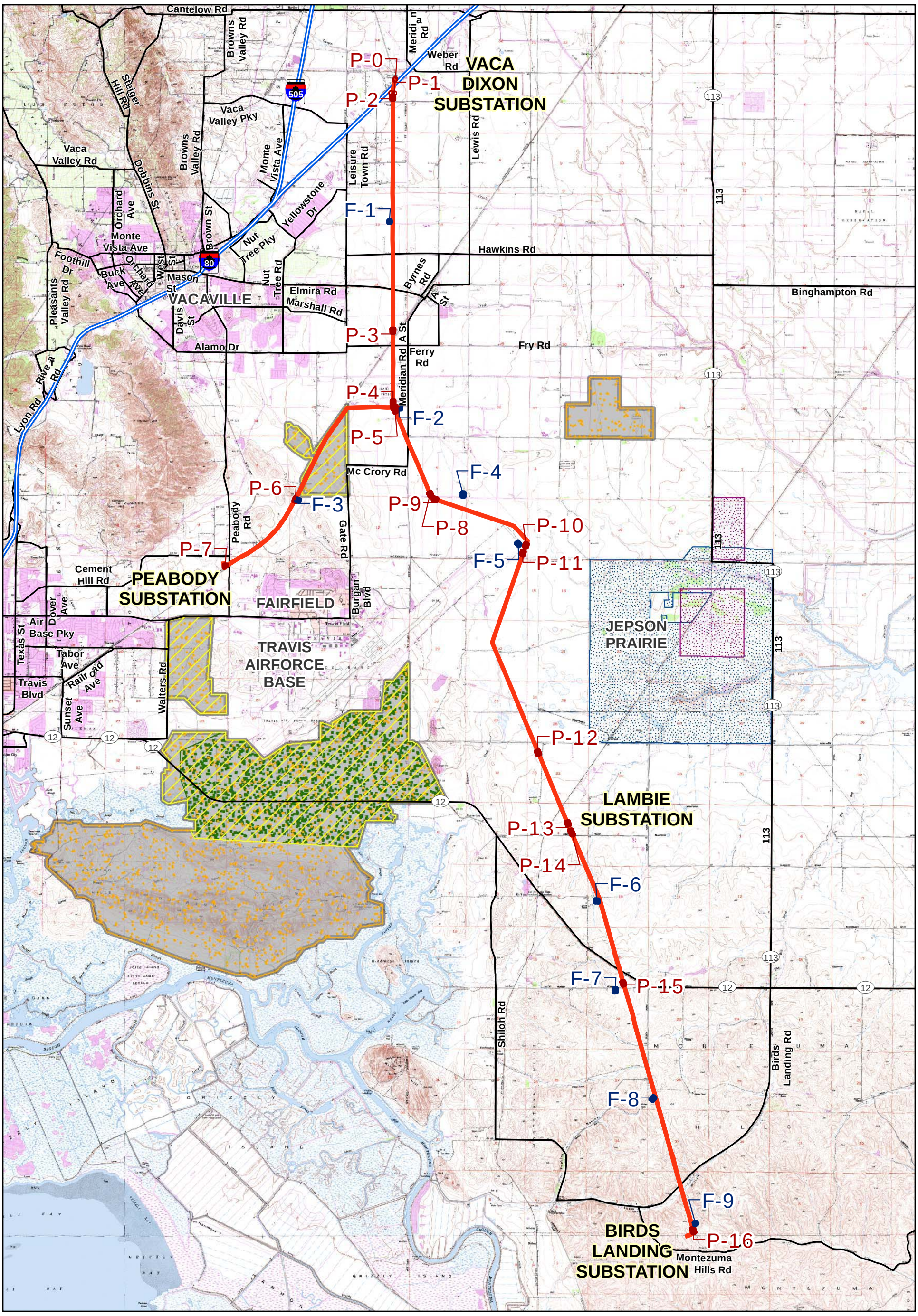
University of California Statewide Integrated Pest Management Program (UCIPM). 2008. Daily Climate Data for Sacramento, California (Station #7630). Available online at: http://www.ipm.ucdavis.edu/WEATHER/wxretrieve.html. (Site accessed on 2/14/2008.)

Western Regional Climate Center (WRCC). 2008. Monthly Climate Summary for Vacaville, California (Station # 049200) Available on line at: http://www.wrcc.dri.edu. (Site accessed on 1/22/08.)

Zedler, Paul. 1987. *The Ecology of Southern California Vernal Pools.* Biological Report No. 85(7.11) U.S. Department of the Interior, Fish and Wildlife Service, Washington D.C.

Zedler, Paul. 2003. Vernal Pools and the Concept of "Isolated Wetlands". Wetlands 23 (3): 597-607.

Figures



Transmission Lines
Pull Site
Fly Site
Vernal Pool Tadpole Shrimp Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
Contra Costa Goldfield Critical Habitat
Conservation Fairy Shrimp Critical Habitat
California Tiger Salamander Critical Habitat
Delta Green Ground Beetle Critical Habitat

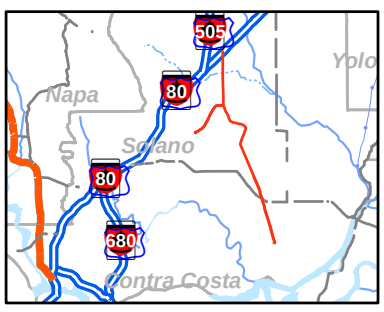
Figure 1 - Project Location
Vaca Dixon - Birds Landing 230kV Reconductoring Project

USACE Jurisdictional Determination
Solano County, CA

N W E S

0 1.5 3 Miles

Pacific Gas and Electric Company



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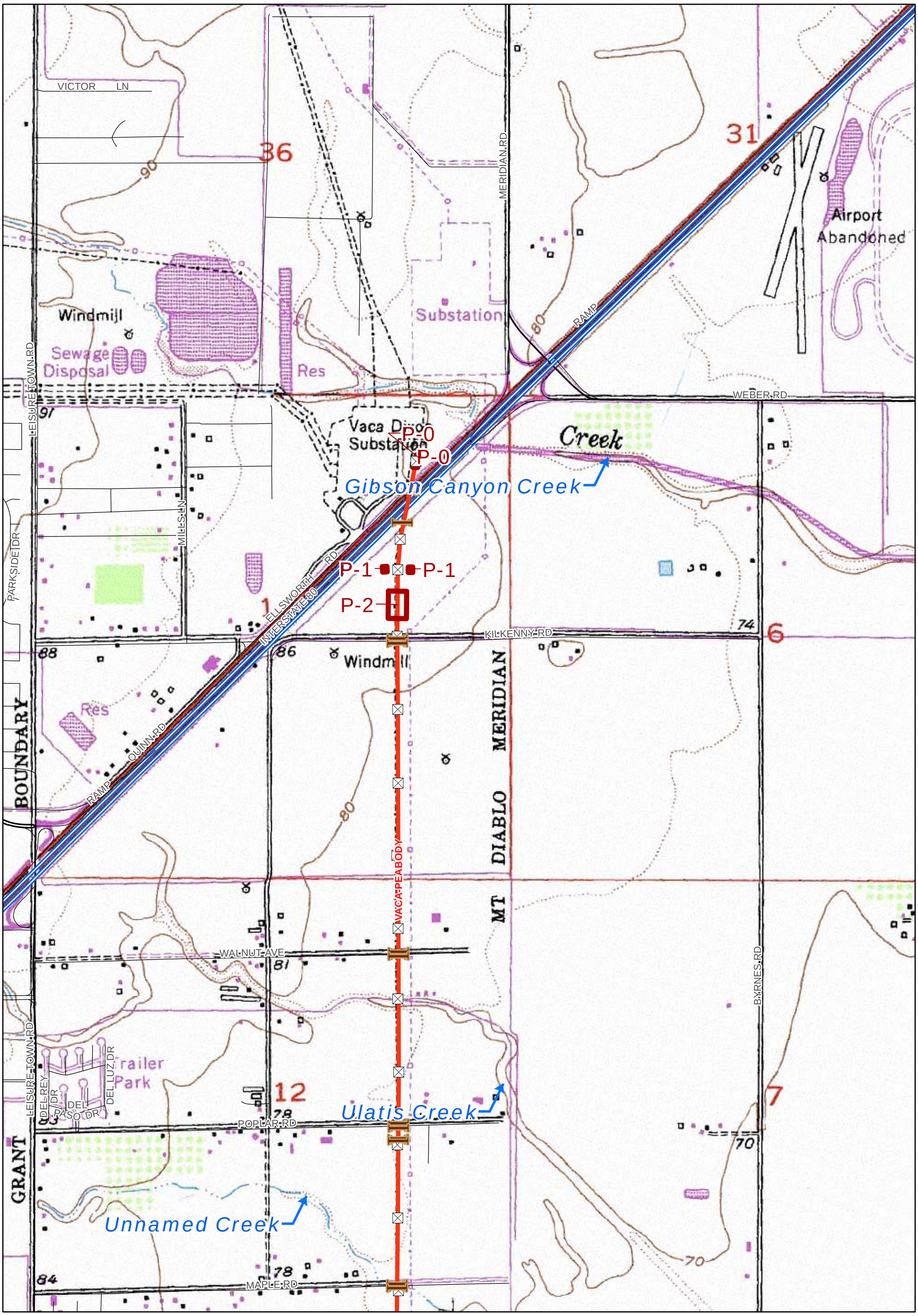

Structures
Transmission Lines
Pull Site
Fly Site
Guard Structures

Figure 2a - Project Overview
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation Report
Solano County, CA
Map 1 of 11

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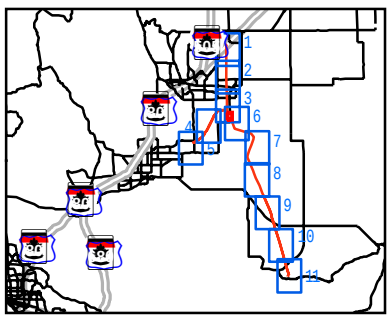

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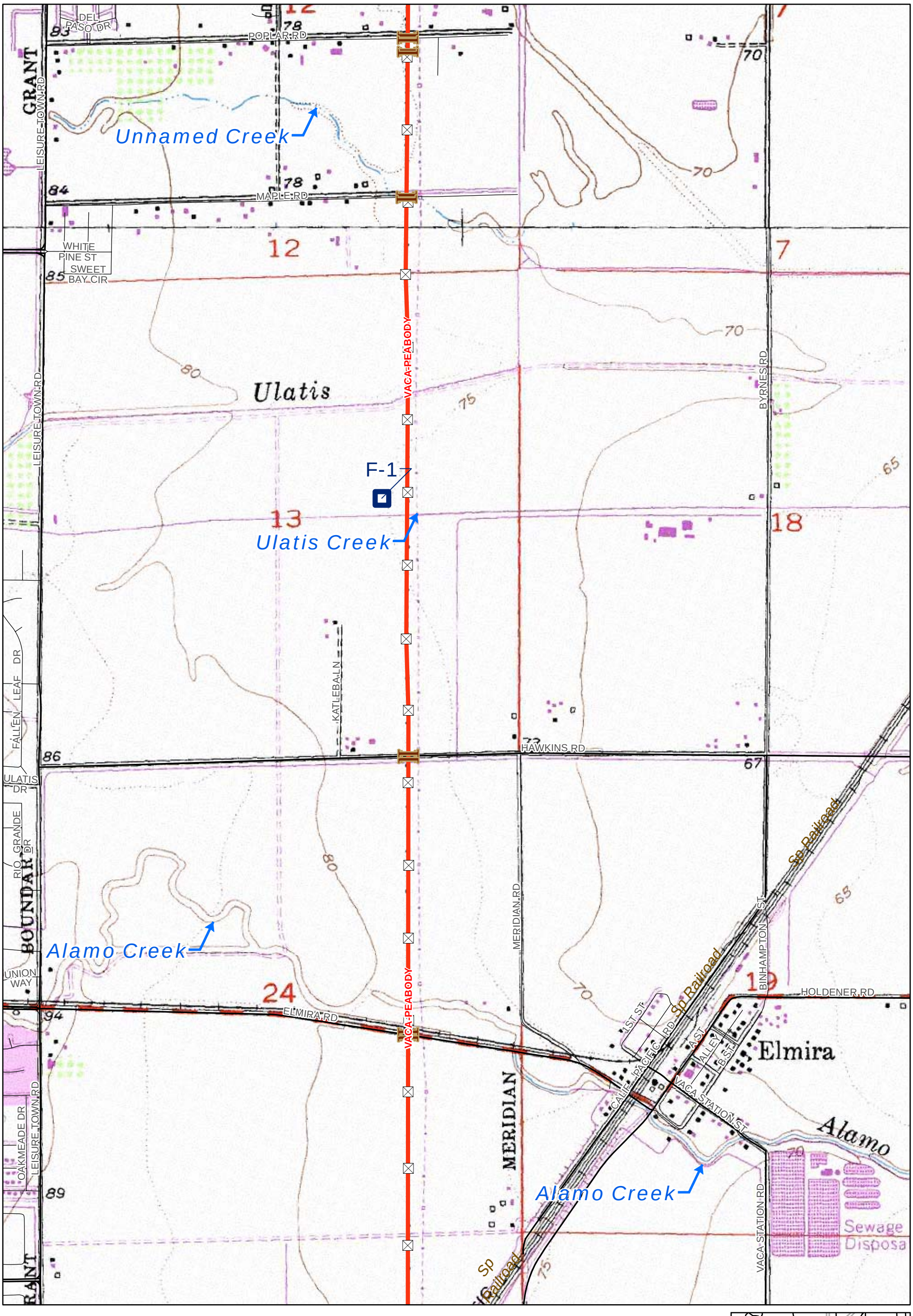
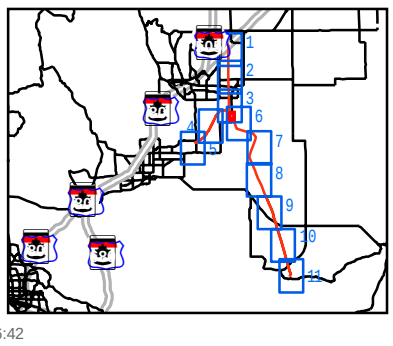


Structures
Transmission Lines
Pull Site
Fly Site
Guard Structures

Figure 2b - Project Overview
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation Report
Solano County, CA
Map 2 of 11

0 1,000 2,000 Feet



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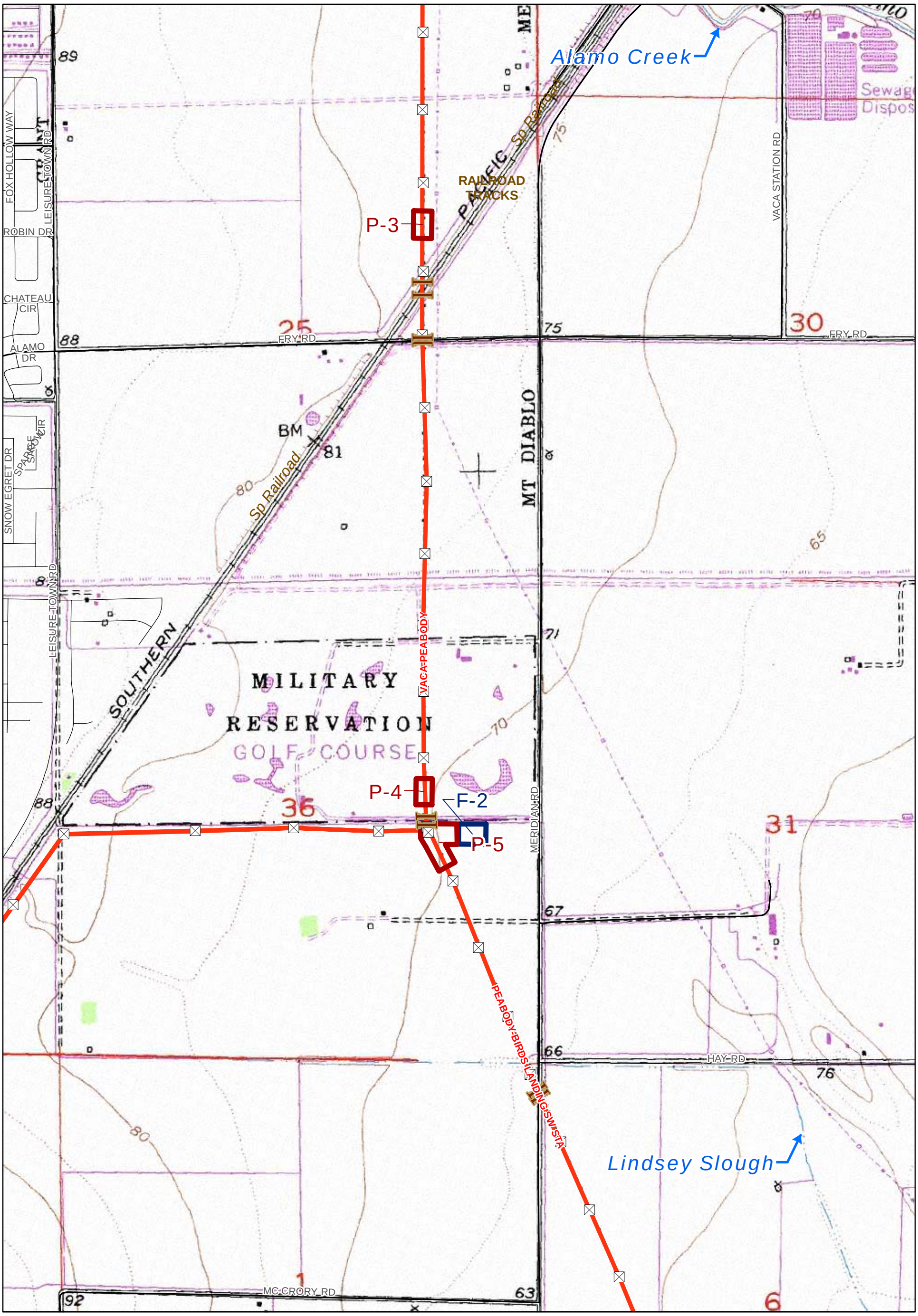
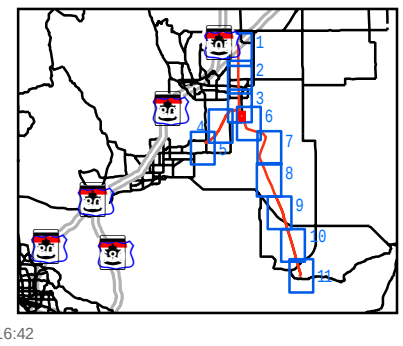


Structures
Transmission Lines
Pull Site
Fly Site
Guard Structures

Figure 2c - Project Overview
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Wetland Delineation Report
Solano County, CA
Map 3 of 11

0 1,000 2,000 Feet



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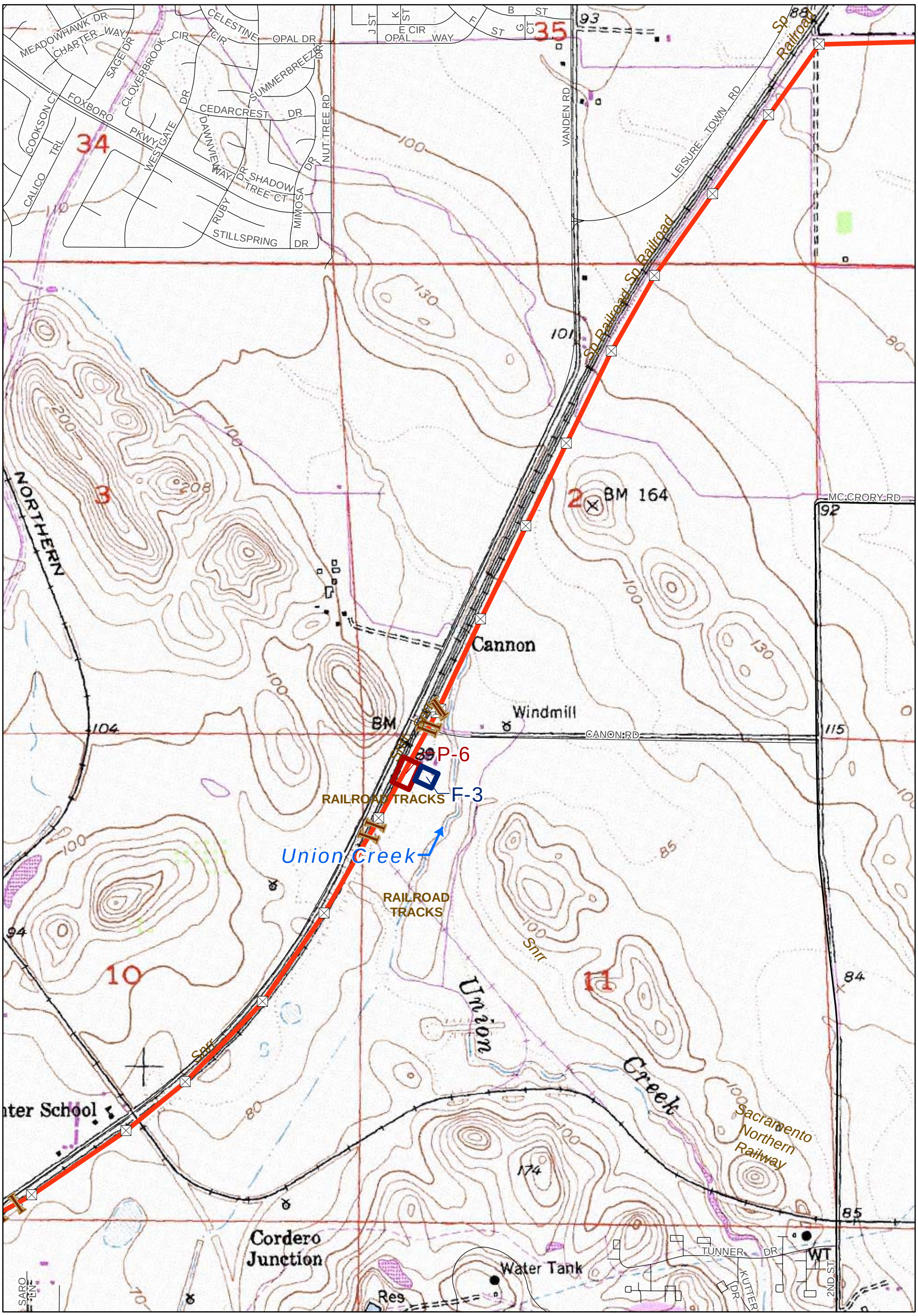
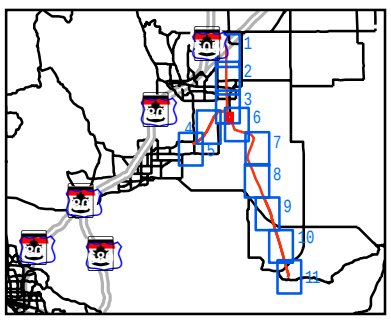


Structures
Transmission Lines
Pull Site
Fly Site
Guard Structures

Figure 2d - Project Overview
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Wetland Delineation Report
Solano County, CA
Map 4 of 11

0 1,000 2,000 Feet



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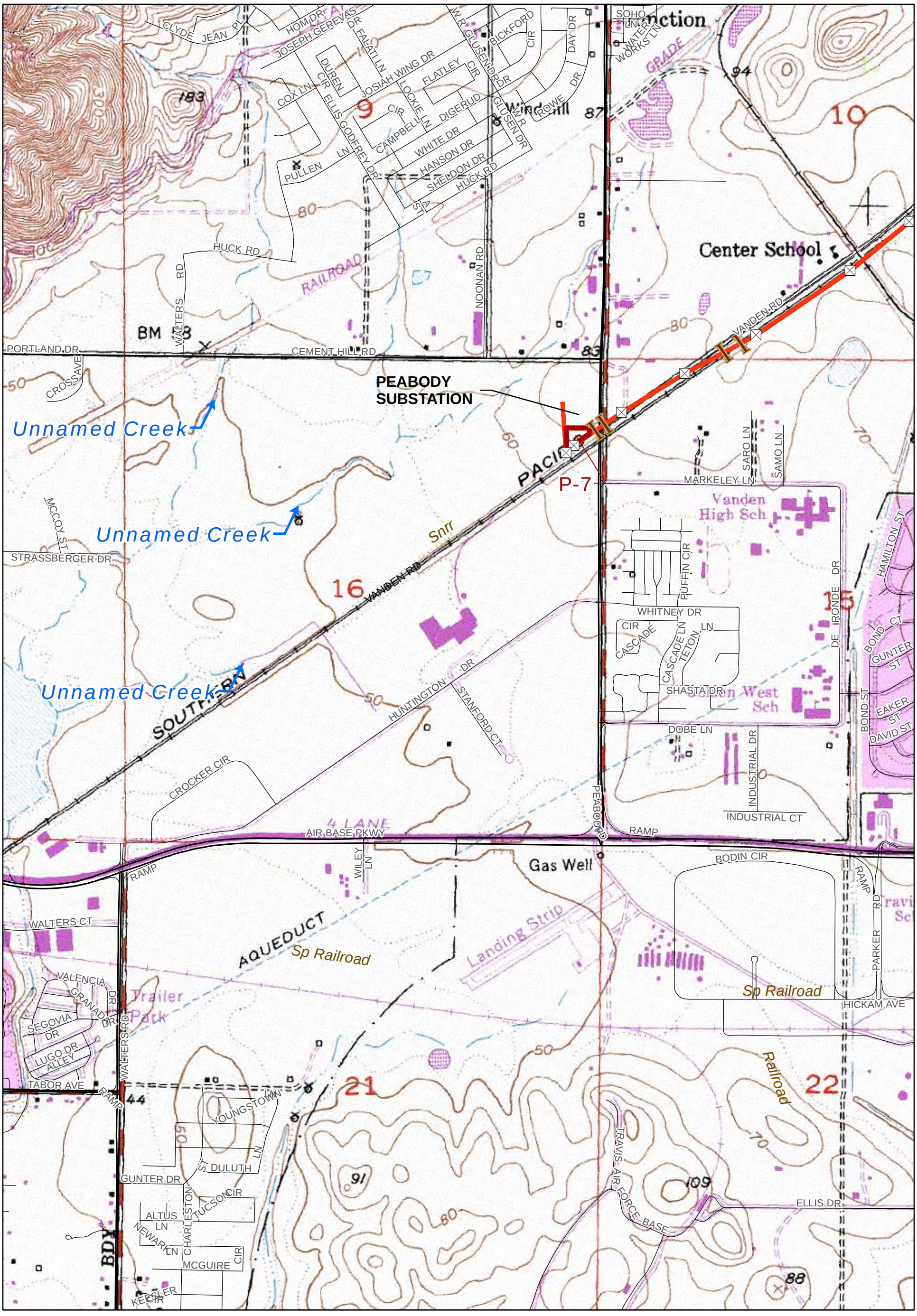
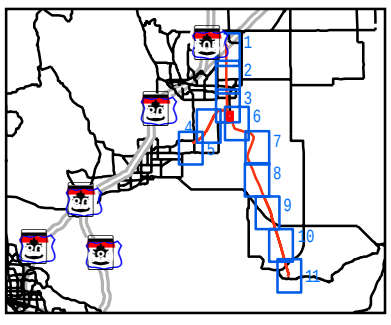


Structures
Transmission Lines
Pull Site
Fly Site
Guard Structures

Figure 2e - Project Overview
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Wetland Delineation Report
Solano County, CA
Map 5 of 11

0 1,000 2,000 Feet



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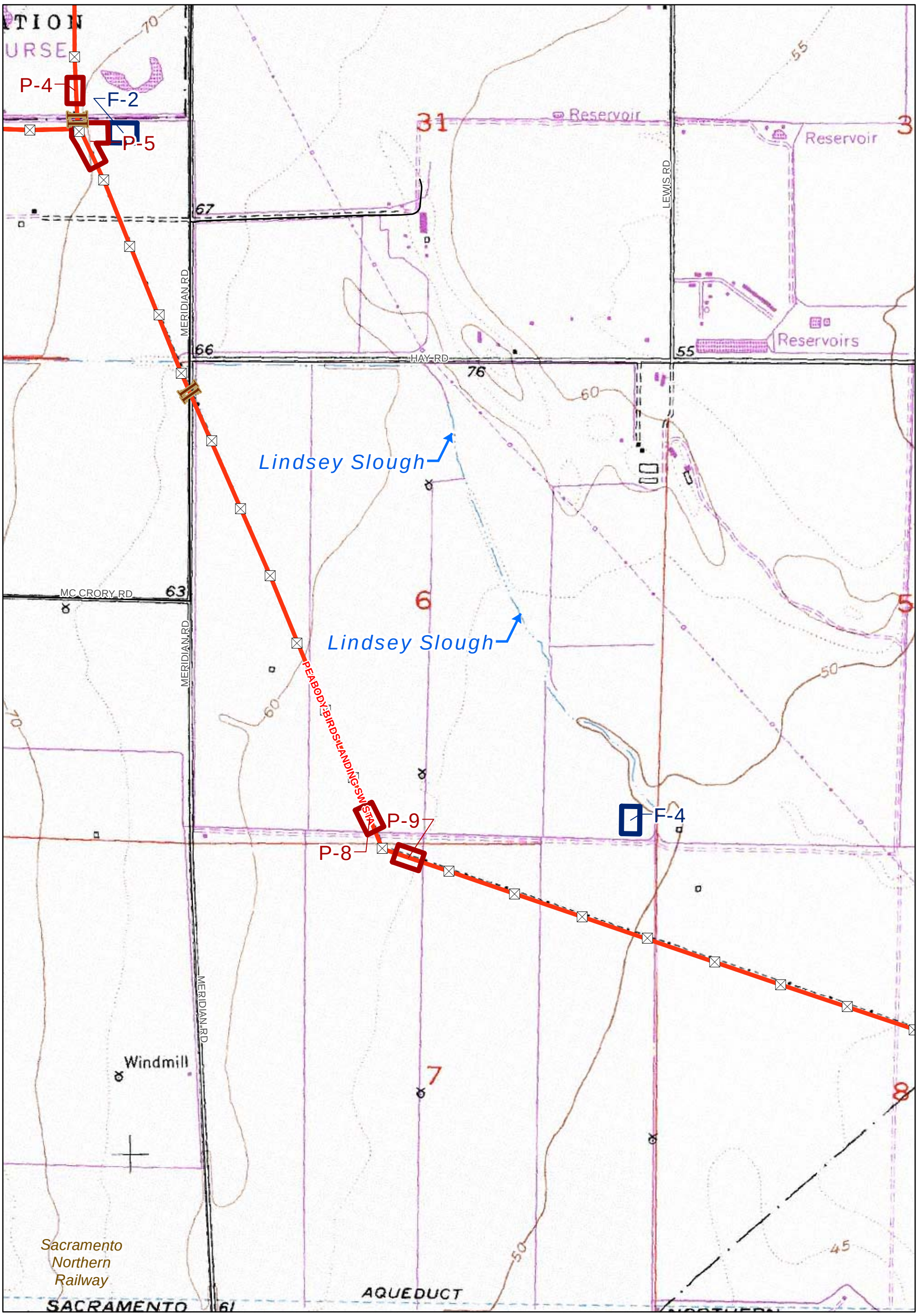
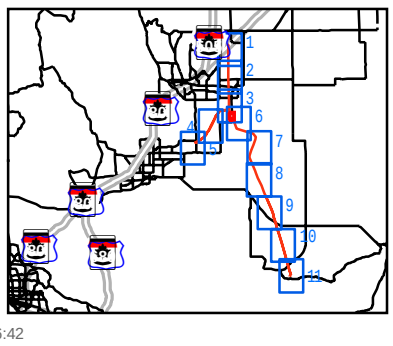


Structures
Transmission Lines
Pull Site
Fly Site
Guard Structures

Figure 2f - Project Overview
Vaca Dixon - Birds Landing 230kV
Reconductoring Project

Wetland Delineation Report
Solano County, CA
Map 6 of 11

0 1,000 2,000 Feet



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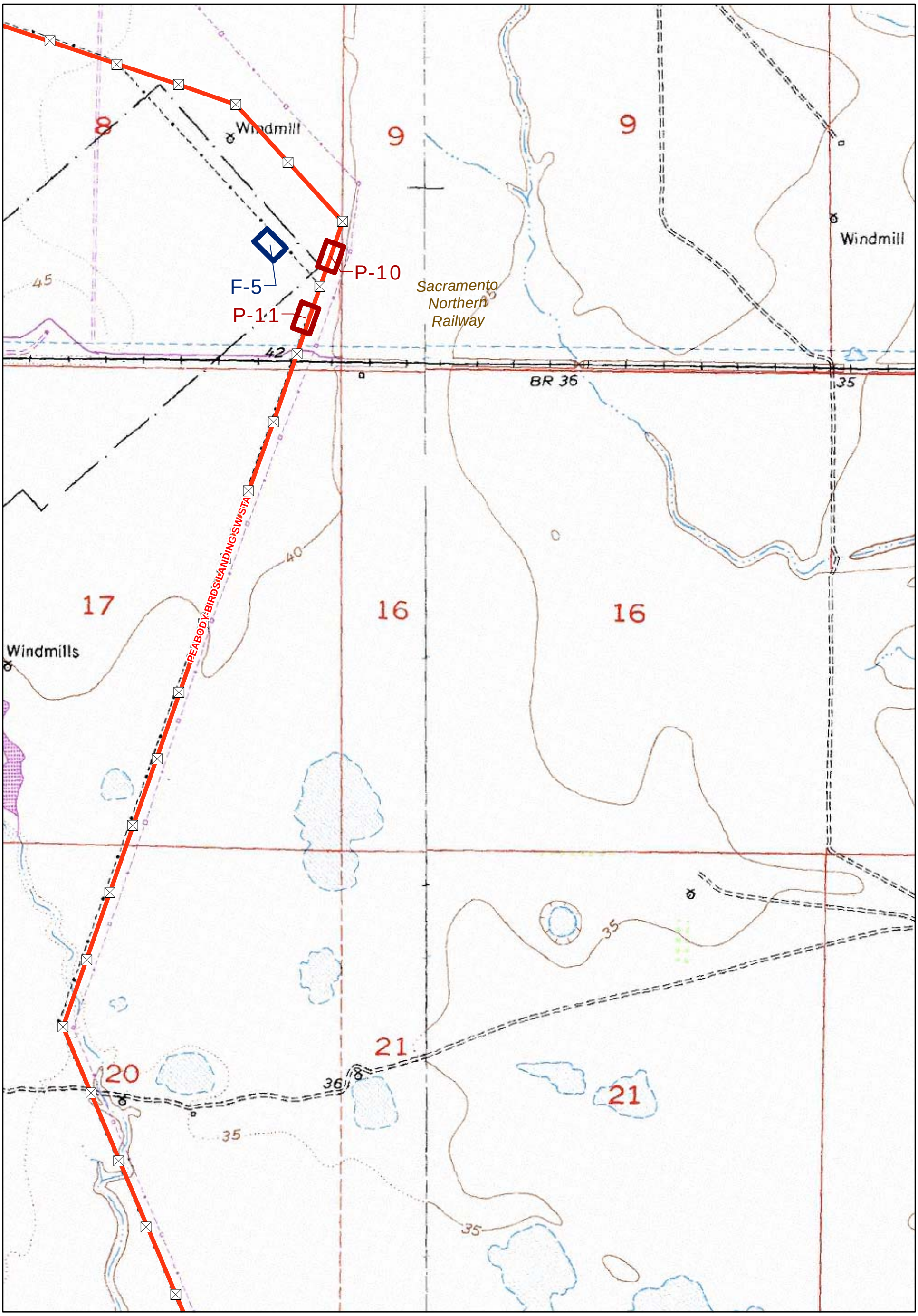
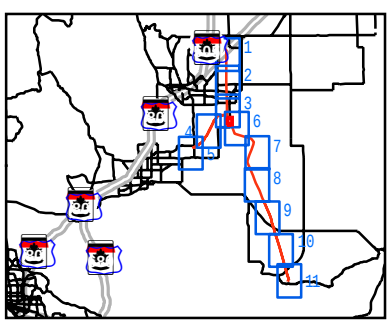


Structures
Transmission Lines
Pull Site
Fly Site
Guard Structures

Figure 2g - Project Overview
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation Report
Solano County, CA
Map 7 of 11

0 1,000 2,000 Feet



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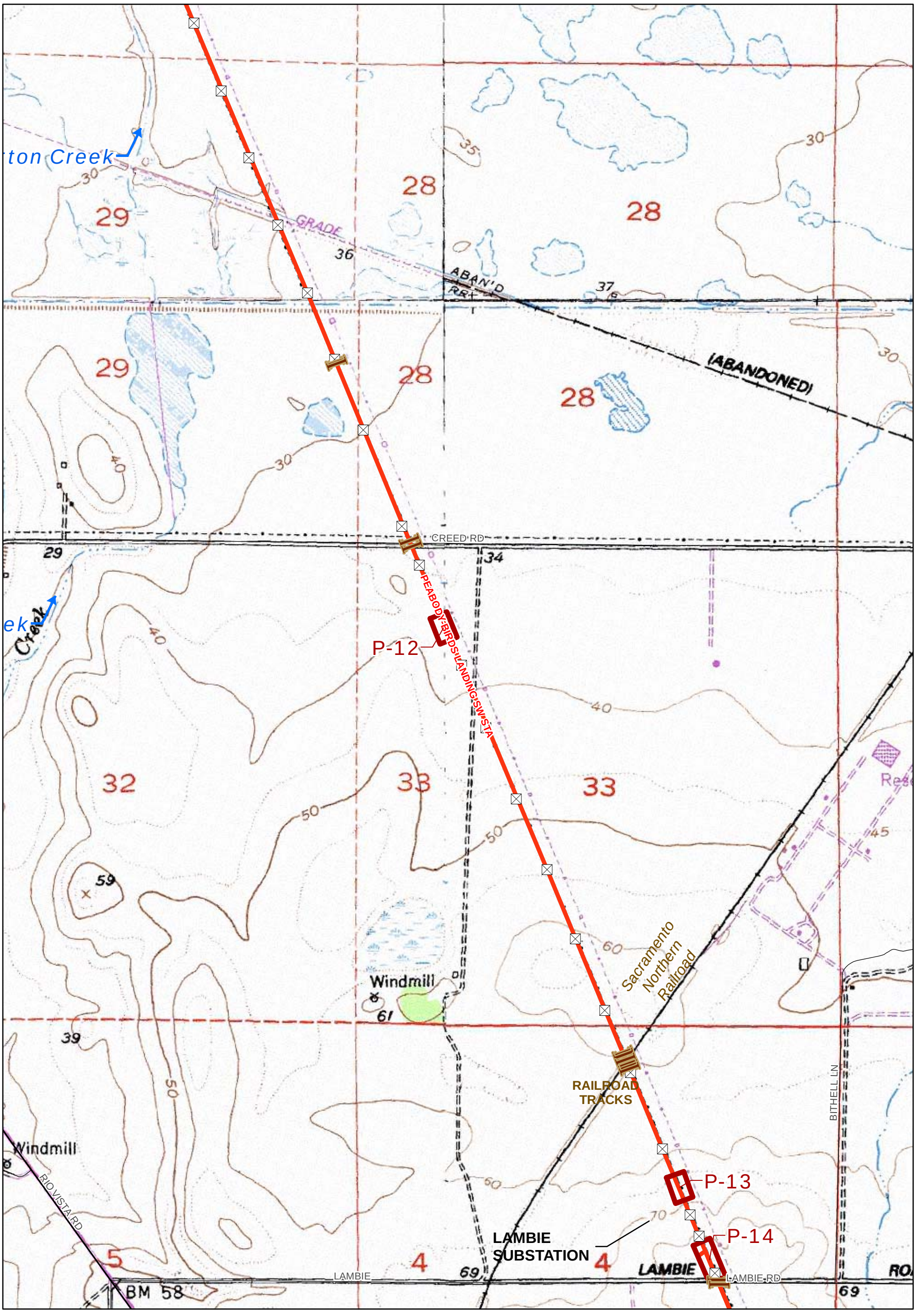
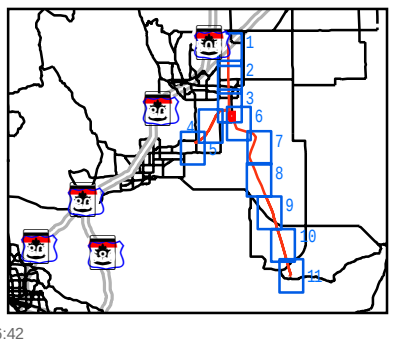


Structures
Transmission Lines
Pull Site
Fly Site
Guard Structures

Figure 2h - Project Overview
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Wetland Delineation Report
Solano County, CA
Map 8 of 11

0 1,000 2,000 Feet



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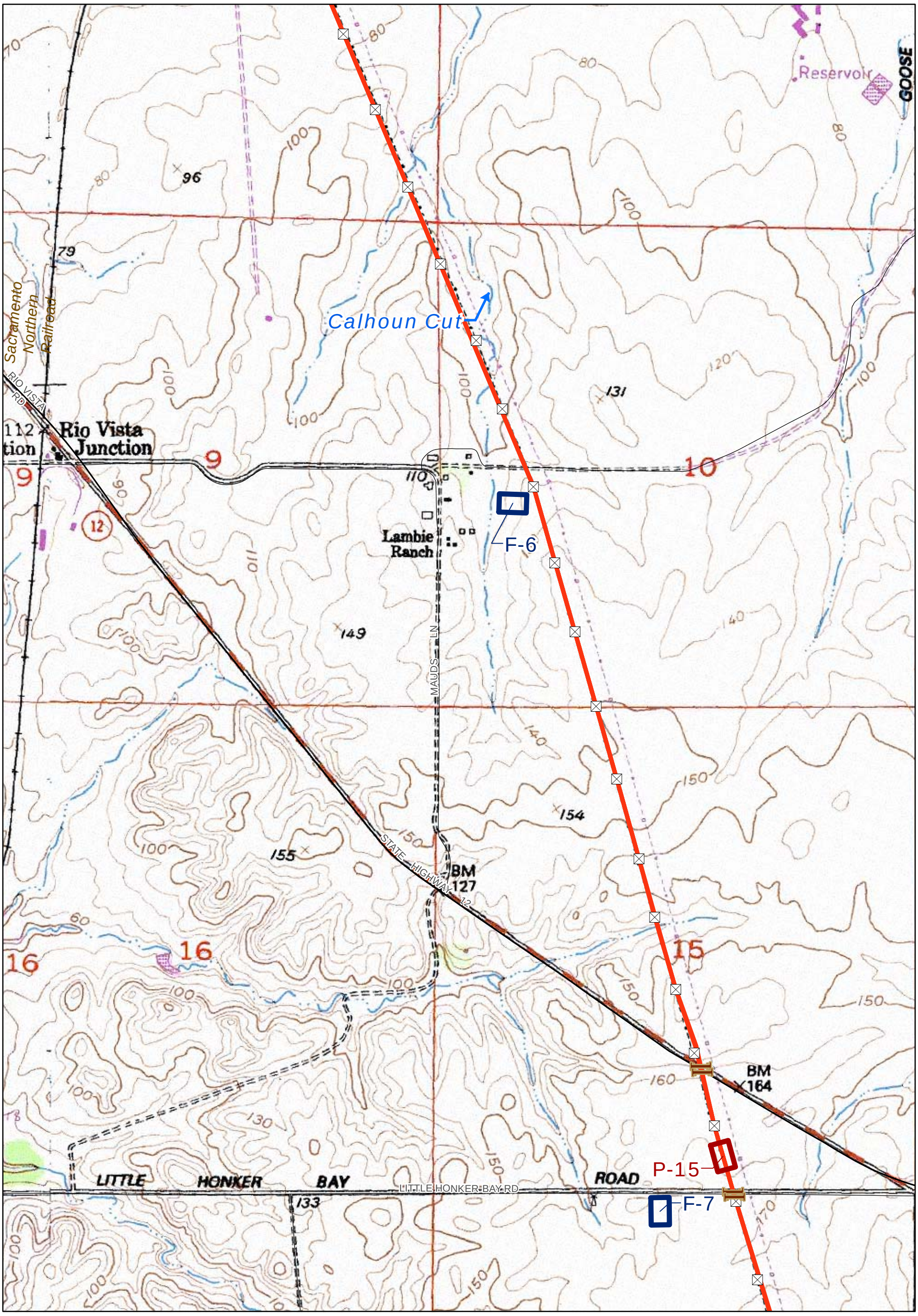
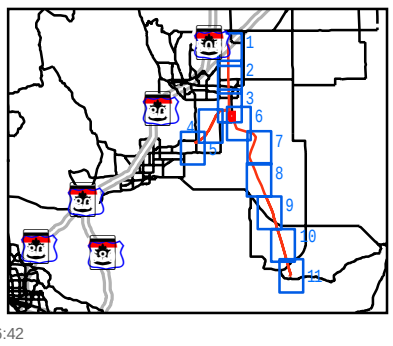


Structures
Transmission Lines
Pull Site
Fly Site
Guard Structures

Figure 2i - Project Overview
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Wetland Delineation Report
Solano County, CA
Map 9 of 11

0 1,000 2,000 Feet



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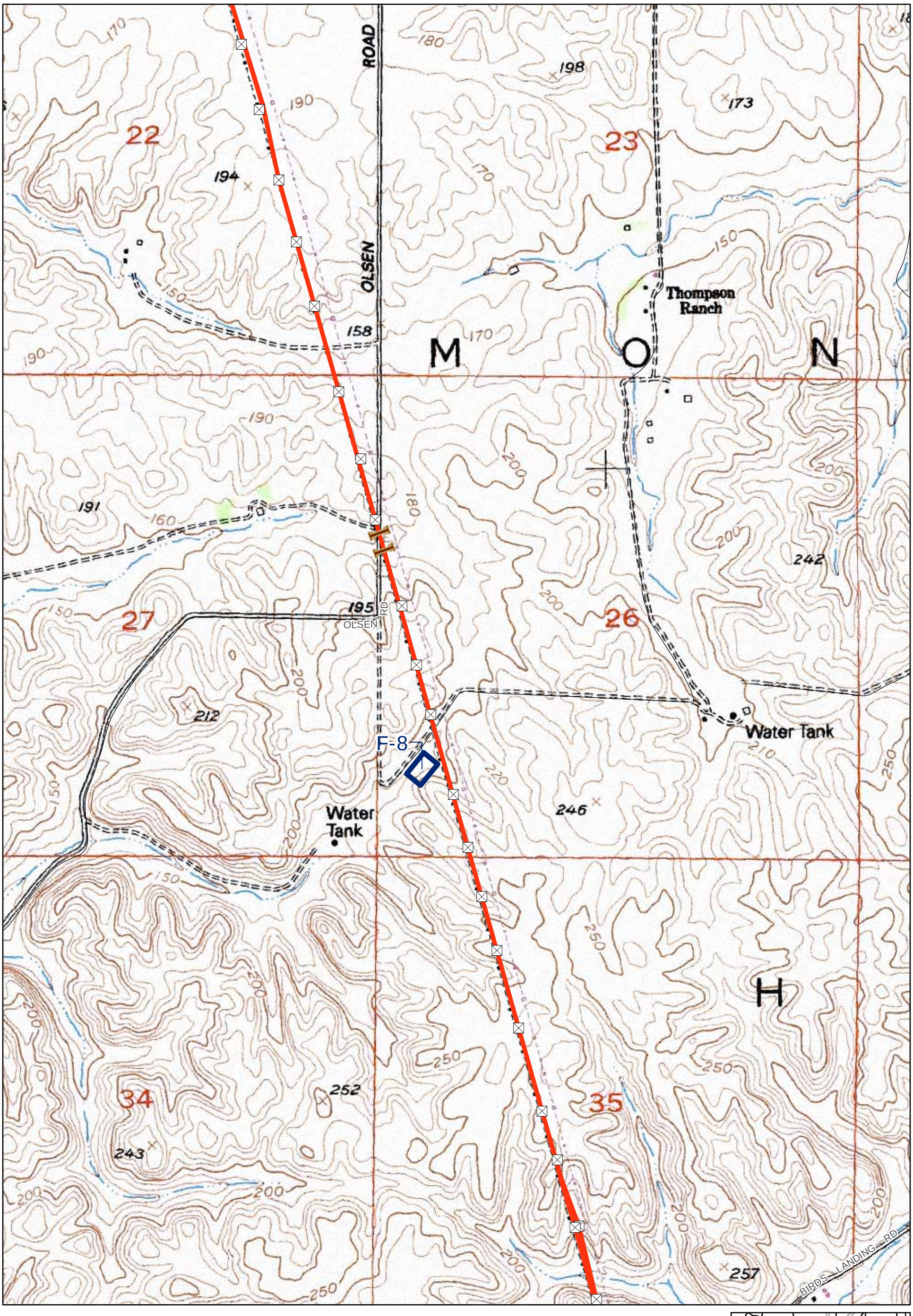
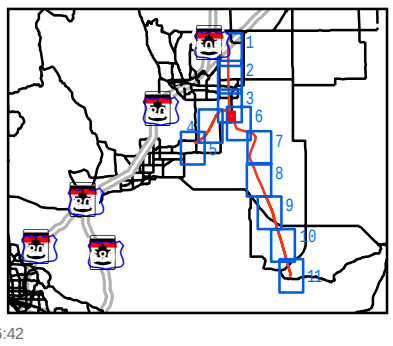


Structures
Transmission Lines
Pull Site
Fly Site
Guard Structures

Figure 2j - Project Overview
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Wetland Delineation Report
Solano County, CA
Map 10 of 11

0 1,000 2,000 Feet



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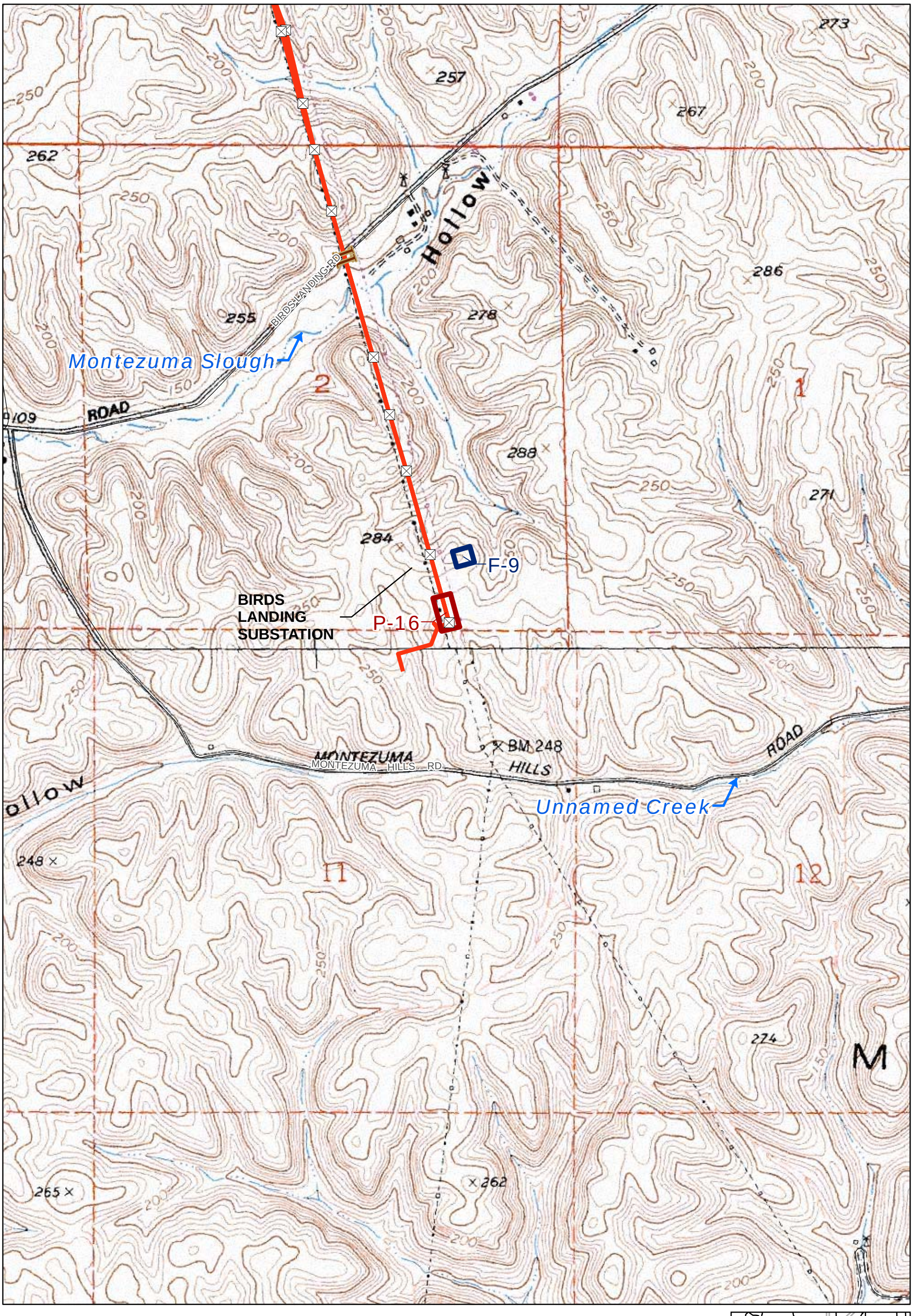
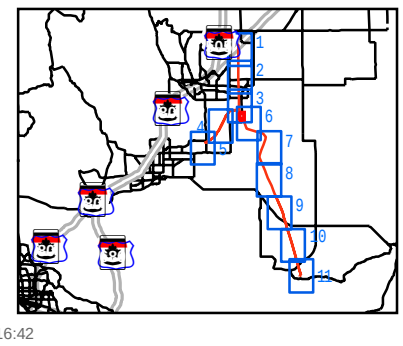


Structures
Transmission Lines
Pull Site
Fly Site
Guard Structures

Figure 2k - Project Overview
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation Report
Solano County, CA
Map 11 of 11

0 1,000 2,000 Feet



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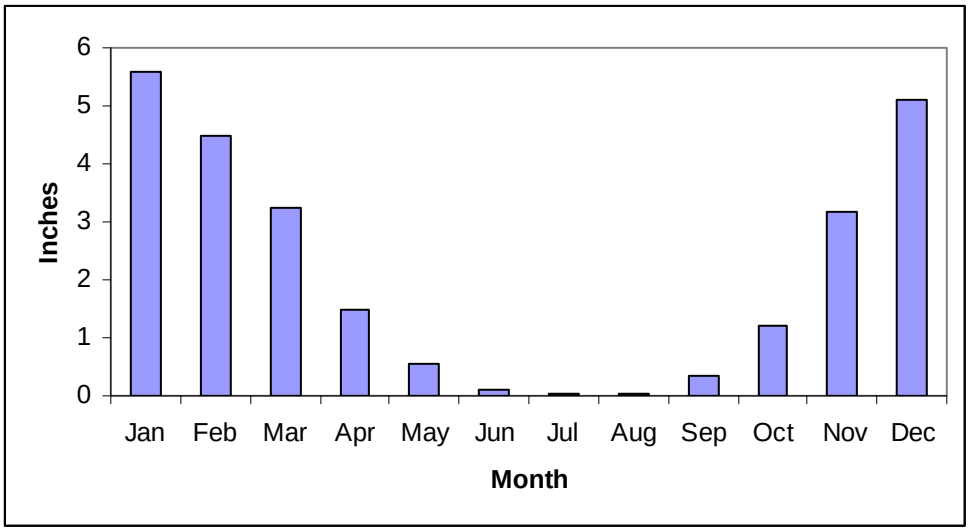


FIGURE 3. AVERAGE MONTHLY PRECIPITATION FOR VACAVILLE, CALIFORNIA (WRCC, 2008)

Sample Point
Potential USACE Jurisdictional Feature
Seasonal Wetland
Non-Jurisdictional Features
Agricultural Ditch
Drainage Ditch
Roadside Ditch
Swale

Study Area
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
100' Work Area
Access Road 12 ' Disturbance

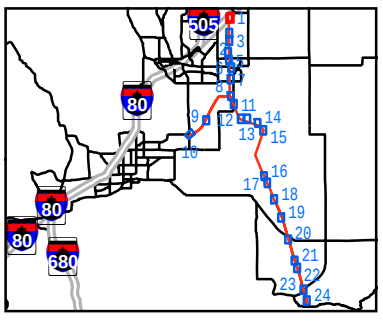
Guard Structures
Soils labeled by Soil Name

Figure 4a
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 1 of 24

N W E S

0 200 400 Feet



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Sample Point

Potential USACE Jurisdictional Feature
- Seasonal Wetland

Non-Jurisdictional Features
- Agricultural Ditch
- Drainage Ditch
- Roadside Ditch
- Swale

Study Area
- Structures
- 60kV Poles
- Transmission Lines
- Pull Site
- Fly Site
- 100' Work Area
- Access Road 12 ' Disturbance

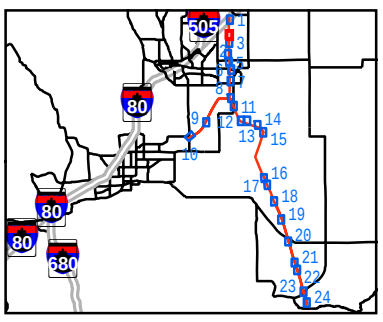
- Guard Structures
- Soils labeled by Soil Name

Figure 4b
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 2 of 24

N W E S

0 200 400 Feet



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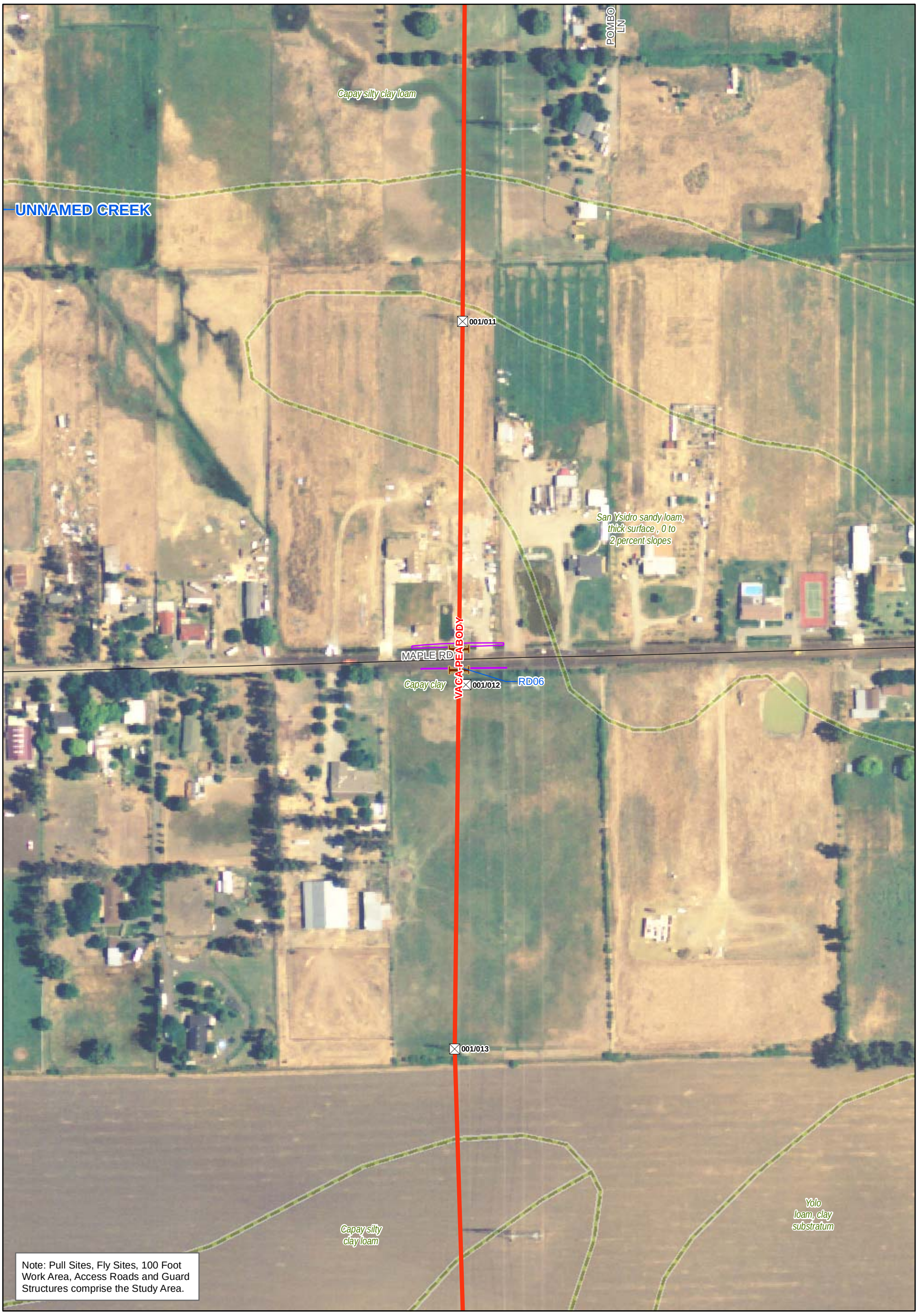


Note: Pull Sites, Fly Sites, 100 Foot Work Area, Access Roads and Guard Structures comprise the Study Area.

Sample Point

Potential USACE Jurisdictional Feature
- Seasonal Wetland

Non-Jurisdictional Features
- Agricultural Ditch
- Drainage Ditch
- Roadside Ditch
- Swale

Study Area
- Structures
- 60kV Poles
- Transmission Lines
- Pull Site
- Fly Site
- 100' Work Area
- Access Road 12 ' Disturbance

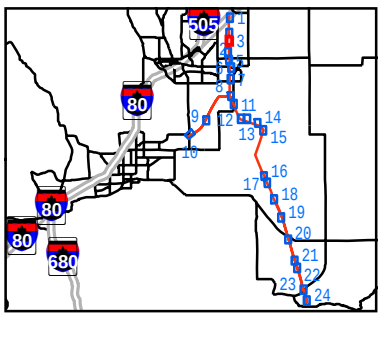
- Guard Structures
- Soils labeled by Soil Name

Figure 4c
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 3 of 24

N W E S

0 200 400 Feet



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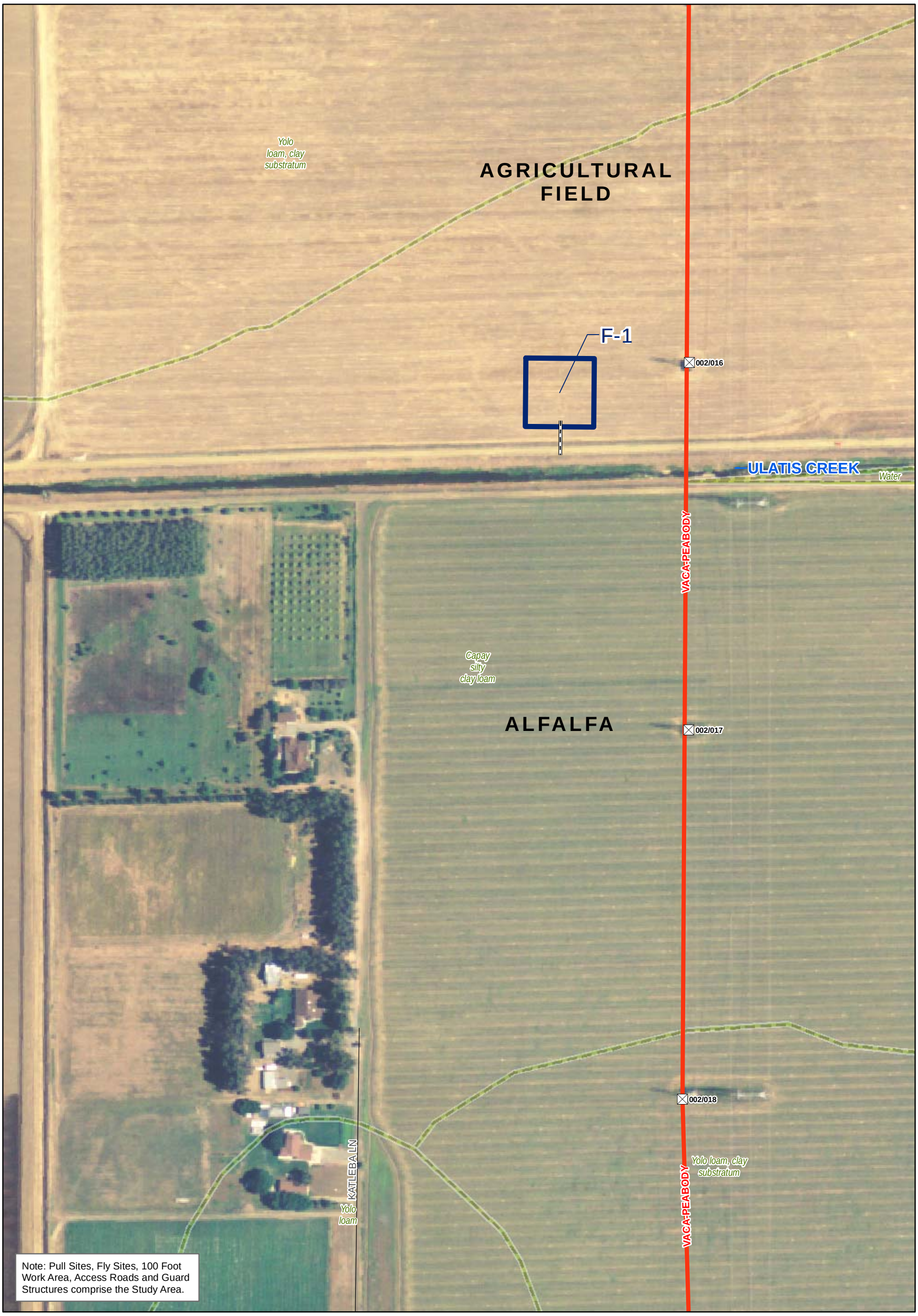


Sample Point

Potential USACE Jurisdictional Feature
- Seasonal Wetland

Non-Jurisdictional Features
- Agricultural Ditch
- Drainage Ditch
- Roadside Ditch
- Swale

Study Area
- Structures
- 60kV Poles
- Transmission Lines
- Pull Site
- Fly Site
- 100' Work Area
- Access Road 12 ' Disturbance

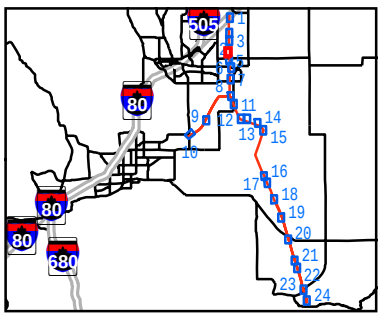
- Guard Structures
- Soils labeled by Soil Name

Figure 4d
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 4 of 24

N W E S

0 200 400 Feet



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Sample Point

Potential USACE Jurisdictional Feature
- Seasonal Wetland

Non-Jurisdictional Features
- Agricultural Ditch
- Drainage Ditch
- Roadside Ditch
- Swale

Study Area
- Structures
- 60kV Poles
- Transmission Lines
- Pull Site
- Fly Site
- 100' Work Area
- Access Road 12 ' Disturbance

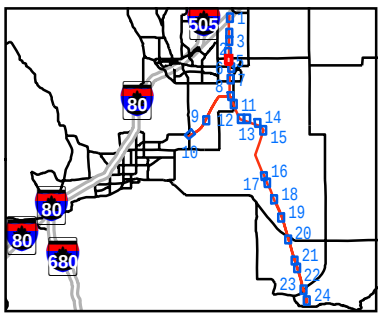
- Guard Structures
- Soils labeled by Soil Name

Figure 4e
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 5 of 24

N W E S

0 200 400 Feet



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003/022

Capay silty clay loam

ALFALFA

MERIDIAN RD

Yolo loam

003/023

ALAMO CREEK

ELMIRA RD

VACA-PEABODY

IRRIGATED HAY

003/024

Capay silty clay loam

Note: Pull Sites, Fly Sites, 100 Foot Work Area, Access Roads and Guard Structures comprise the Study Area.

003/025

San Ysidro sandy loam, 0 to 2 percent slopes

Sample Point

Potential USACE Jurisdictional Feature

Seasonal Wetland

Non-Jurisdictional Features

Agricultural Ditch

Drainage Ditch

Roadside Ditch

Swale

Study Area

Structures

60kV Poles

Transmission Lines

Pull Site

Fly Site

100' Work Area

Access Road 12 ' Disturbance

Guard Structures

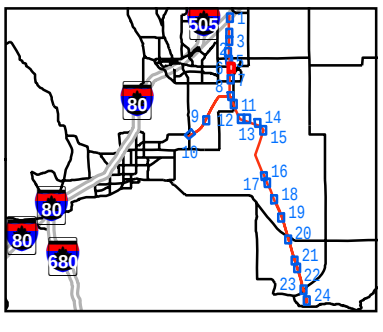
Soils labeled by Soil Name

Figure 4f
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 6 of 24

N W E S

0 200 400 Feet



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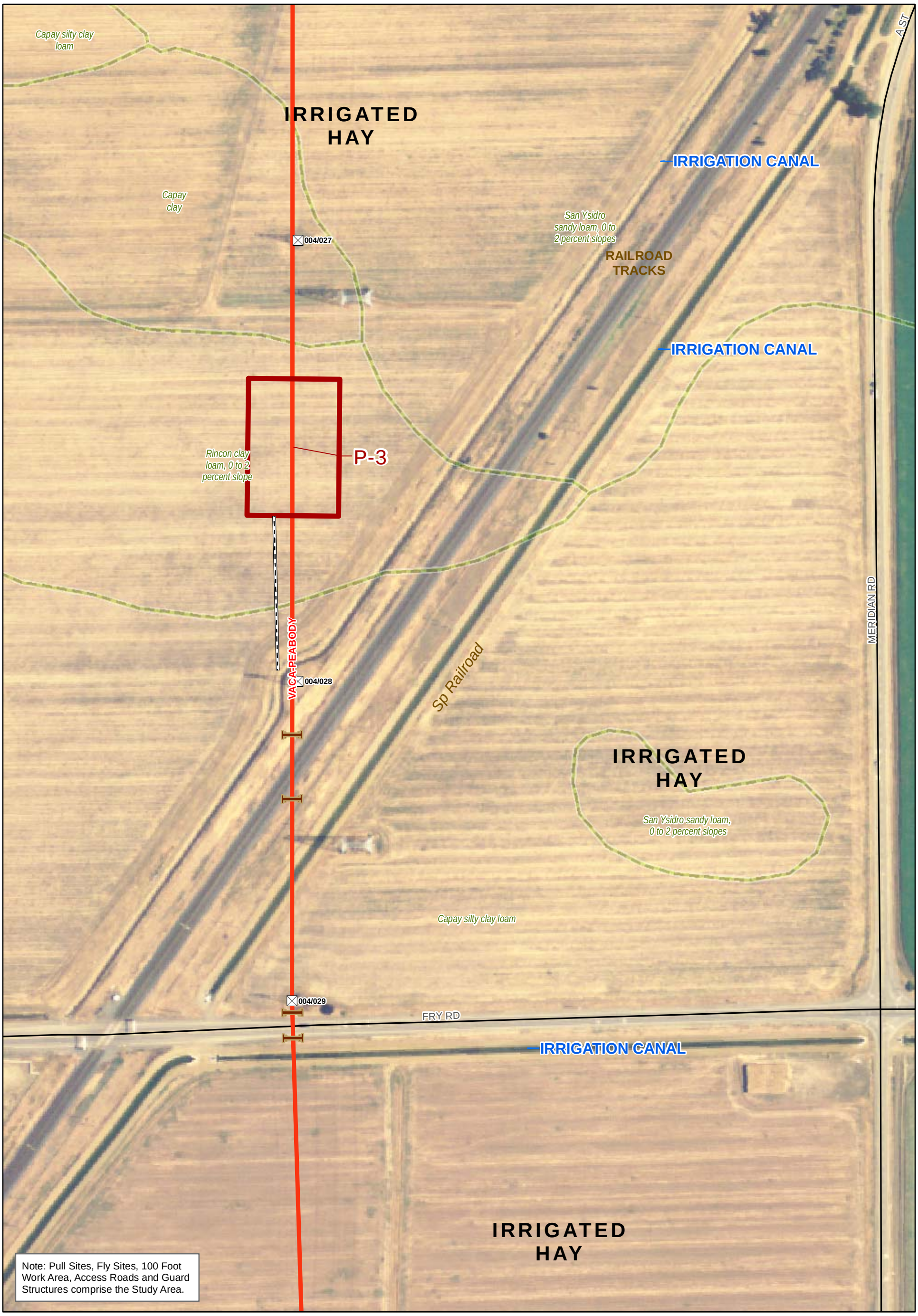


Sample Point

Potential USACE Jurisdictional Feature
- Seasonal Wetland

Non-Jurisdictional Features
- Agricultural Ditch
- Drainage Ditch
- Roadside Ditch
- Swale

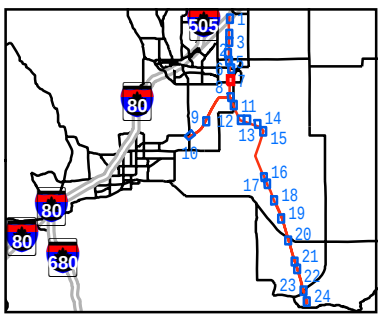
Study Area
- Structures
- 60kV Poles
- Transmission Lines
- Pull Site
- Fly Site
- 100' Work Area
- Access Road 12 ' Disturbance

- Guard Structures
- Soils labeled by Soil Name

Figure 4g
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 7 of 24

0 200 400 Feet



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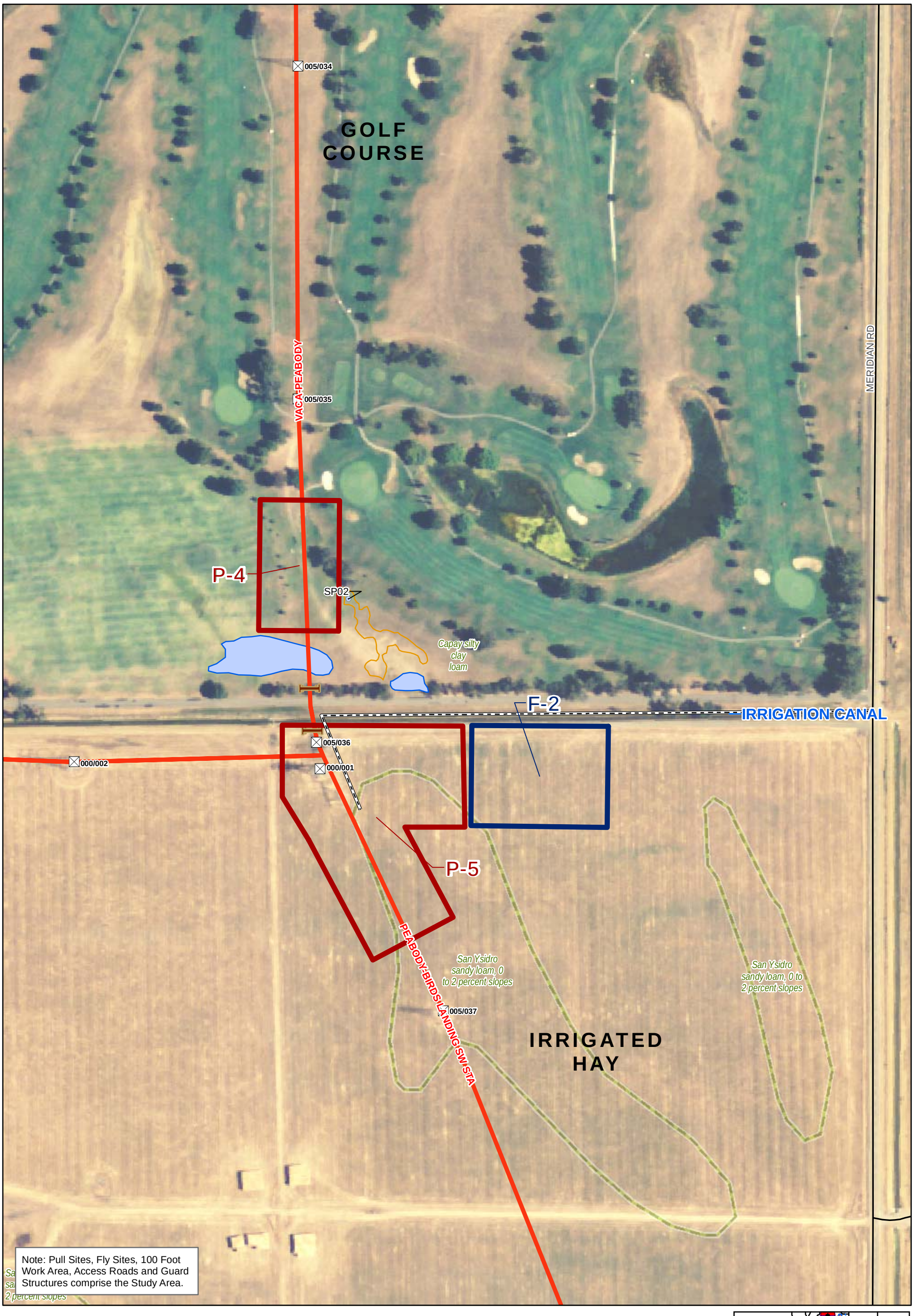


Sample Point
Potential USACE Jurisdictional Feature
Seasonal Wetland
Non-Jurisdictional Features
Agricultural Ditch
Drainage Ditch
Roadside Ditch
Swale

Study Area
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
100' Work Area
Access Road
12 ' Disturbance

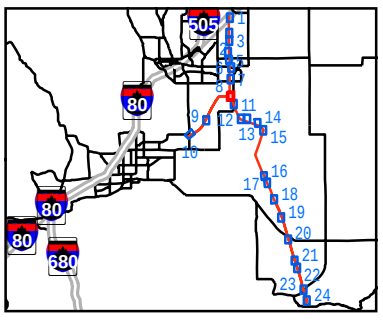
Guard Structures
Soils labeled by Soil Name

Figure 4h
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 8 of 24

N W E S

0 200 400 Feet



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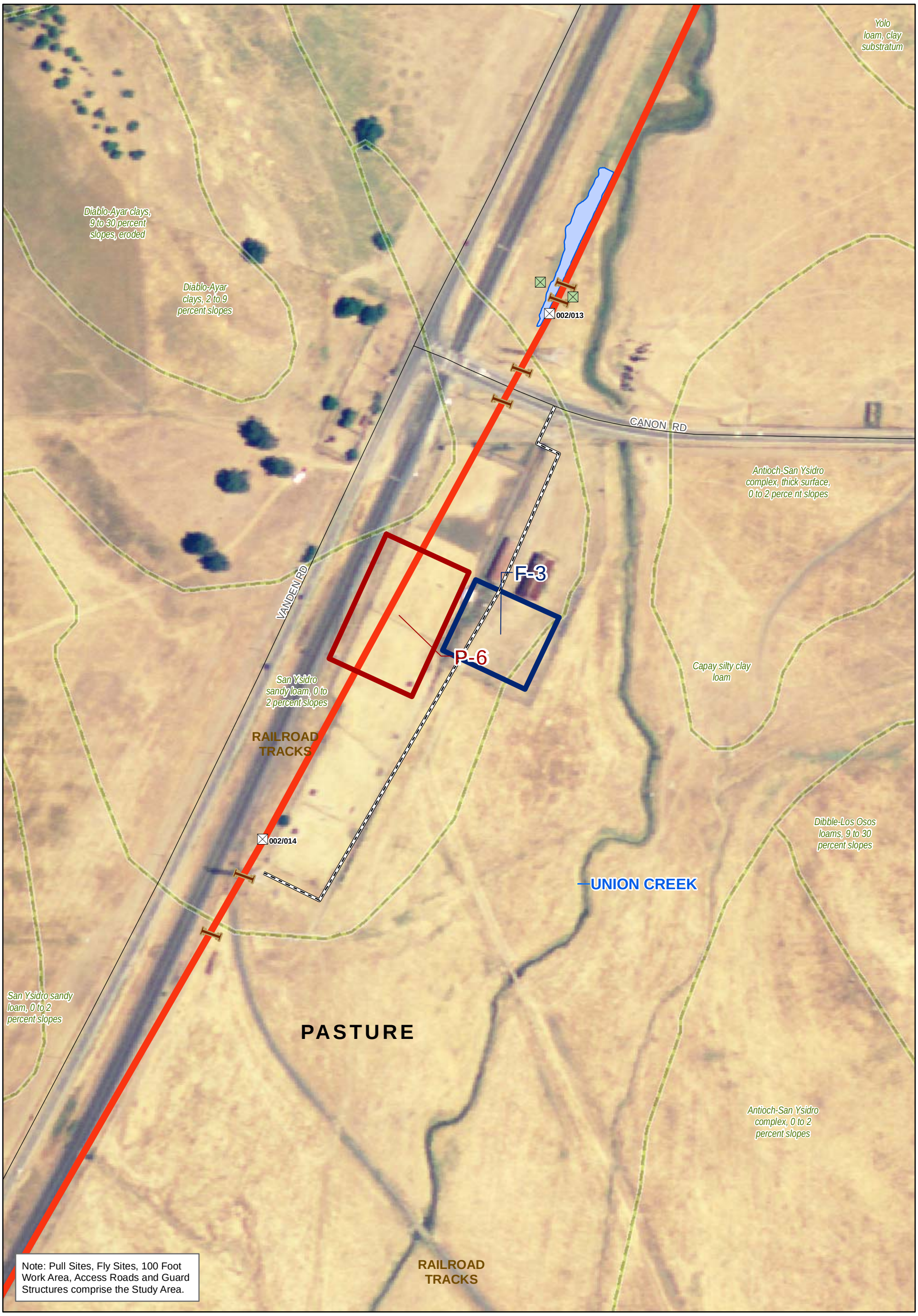


Note: Pull Sites, Fly Sites, 100 Foot Work Area, Access Roads and Guard Structures comprise the Study Area.

Sample Point

Potential USACE Jurisdictional Feature
- Seasonal Wetland

Non-Jurisdictional Features
- Agricultural Ditch
- Drainage Ditch
- Roadside Ditch
- Swale

Study Area
- Structures
- 60kV Poles
- Transmission Lines
- Pull Site
- Fly Site
- 100' Work Area
- Access Road 12 ' Disturbance

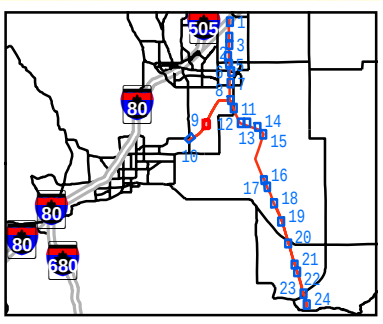
- Guard Structures
- Soils labeled by Soil Name

Figure 4i
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 9 of 24

N W E S

0 200 400 Feet



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Sample Point

Potential USACE Jurisdictional Feature
- Seasonal Wetland

Non-Jurisdictional Features
- Agricultural Ditch
- Drainage Ditch
- Roadside Ditch
- Swale

Study Area
- Structures
- 60kV Poles
- Transmission Lines
- Pull Site
- Fly Site
- 100' Work Area
- Access Road 12 ' Disturbance

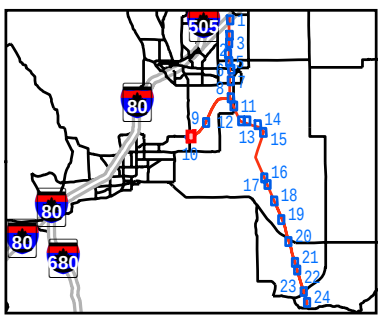
- Guard Structures
- Soils labeled by Soil Name

Figure 4j
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 10 of 24

N W E S

0 250 500 Feet



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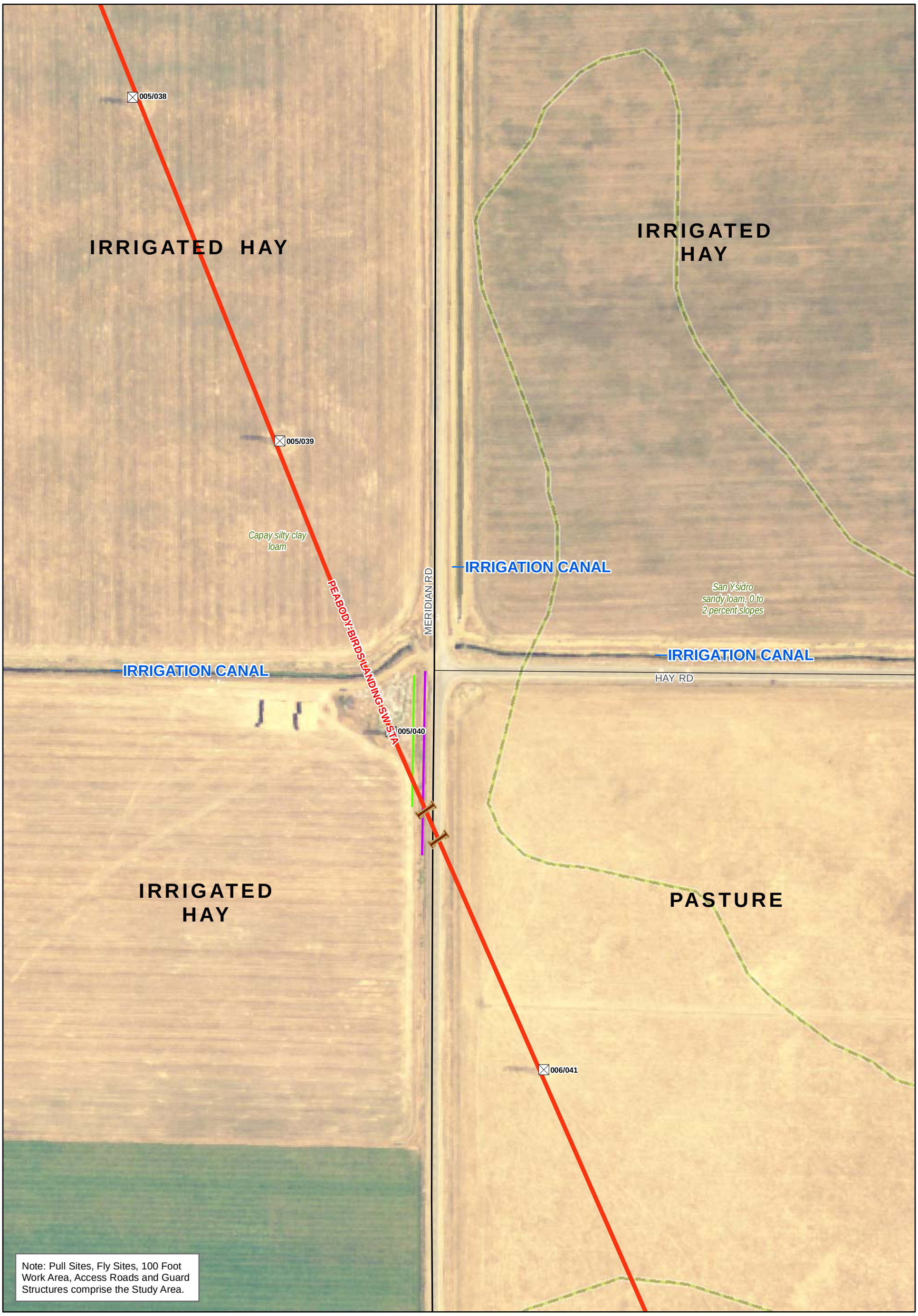


Sample Point

Potential USACE Jurisdictional Feature
- Seasonal Wetland

Non-Jurisdictional Features
- Agricultural Ditch
- Drainage Ditch
- Roadside Ditch
- Swale

Study Area
- Structures
- 60kV Poles
- Transmission Lines
- Pull Site
- Fly Site
- 100' Work Area
- Access Road 12 ' Disturbance

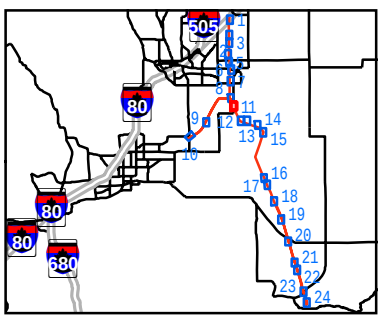
- Guard Structures
- Soils labeled by Soil Name

Figure 4k
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 11 of 24

N W E S

0 200 400 Feet



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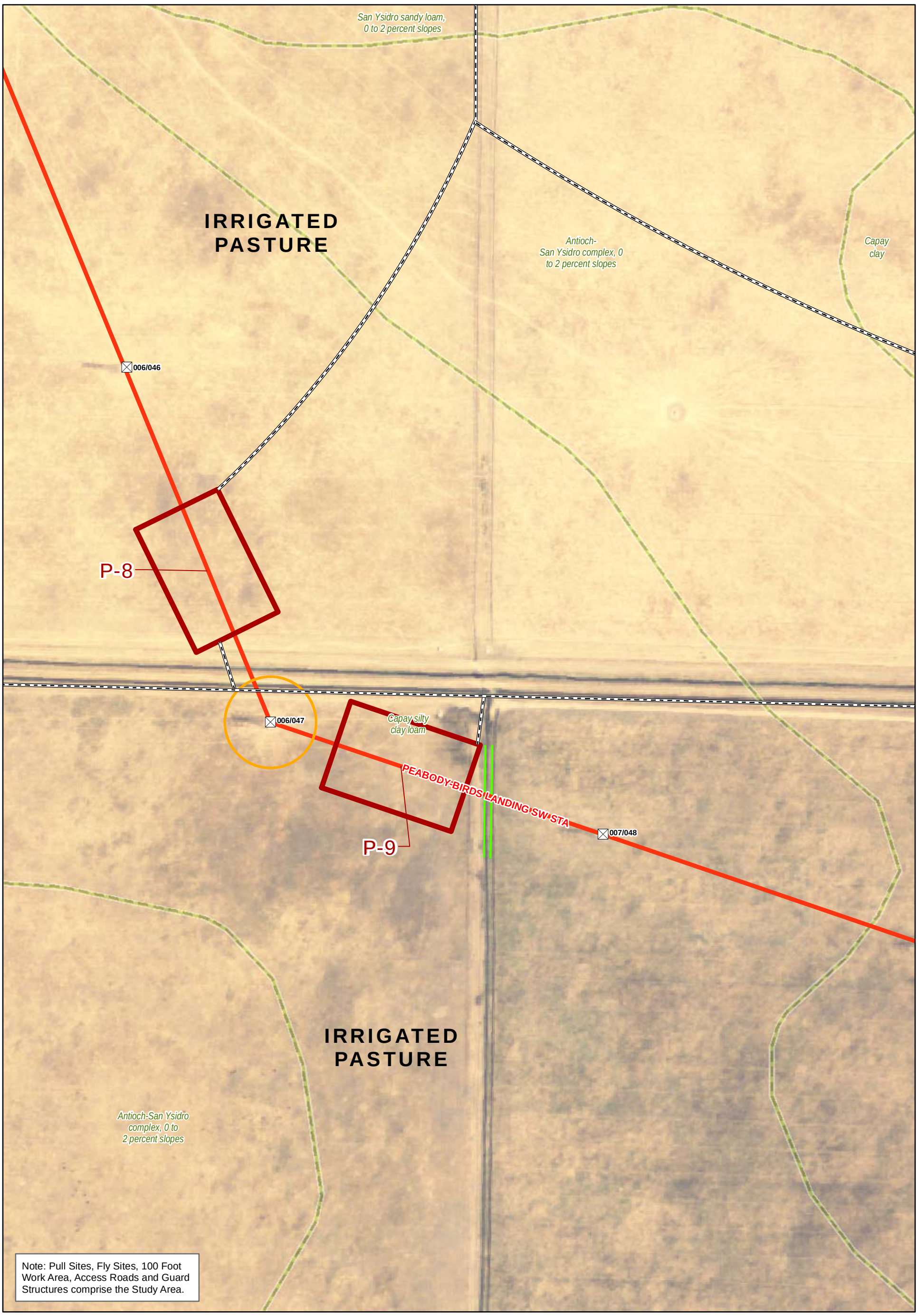


Sample Point
Potential USACE Jurisdictional Feature
Seasonal Wetland
Non-Jurisdictional Features
Agricultural Ditch
Drainage Ditch
Roadside Ditch
Swale

Study Area
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
100' Work Area
Access Road 12 ' Disturbance

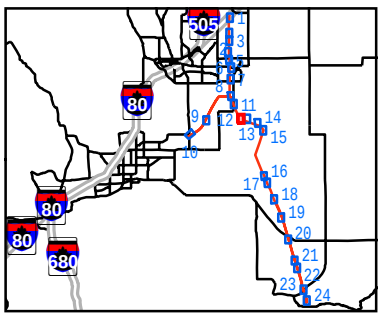
Guard Structures
Soils labeled by Soil Name

Figure 4l
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 12 of 24

N W E S

0 200 400 Feet



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Capay silty clay loam

Pescadero clay loam

Capay clay

LINDSEY SLOUGH

IRRIGATED PASTURE

F-4

IRRIGATION CANAL

Solano loam

IRRIGATION CANAL

IRRIGATED PASTURE

IRRIGATION CANAL

Antioch-San Ysidro complex, 0 to 2 percent slopes

007/050

PEABODY-BIRDS LANDING SW STA

Solano-Pescadero complex

007/051

Note: Pull Sites, Fly Sites, 100 Foot Work Area, Access Roads and Guard Structures comprise the Study Area.

Sample Point

Potential USACE Jurisdictional Feature

Seasonal Wetland

Non-Jurisdictional Features

Agricultural Ditch

Drainage Ditch

Roadside Ditch

Swale

Study Area

Structures

60kV Poles

Transmission Lines

Pull Site

Fly Site

100' Work Area

Access Road 12 ' Disturbance

Guard Structures

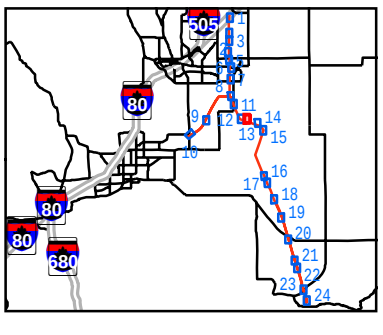
Soils labeled by Soil Name

Figure 4m
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 13 of 24

N W E S

0 200 400 Feet



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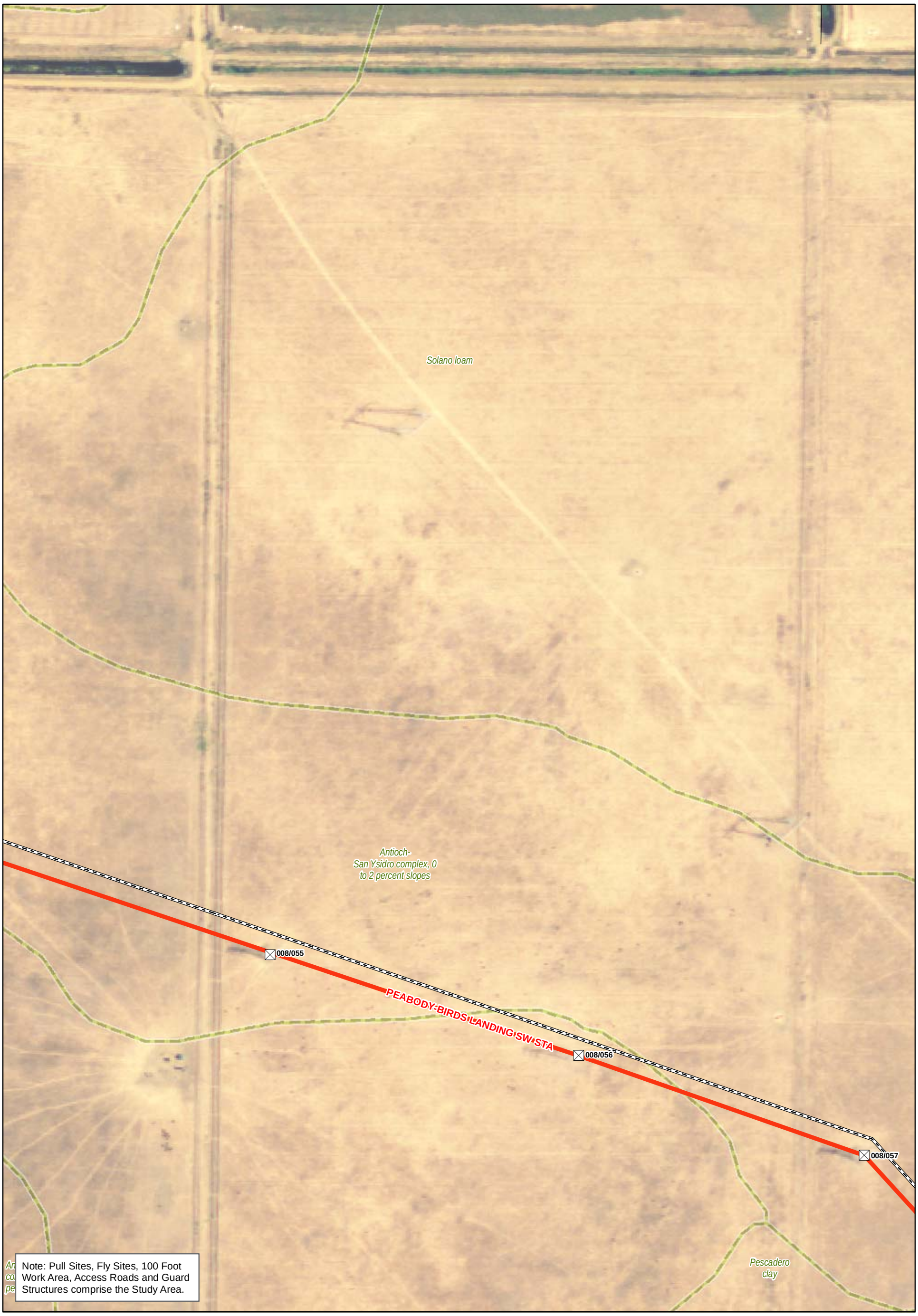


Sample Point
Potential USACE Jurisdictional Feature
Seasonal Wetland
Non-Jurisdictional Features
Agricultural Ditch
Drainage Ditch
Roadside Ditch
Swale

Study Area
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
100' Work Area
Access Road
12 ' Disturbance

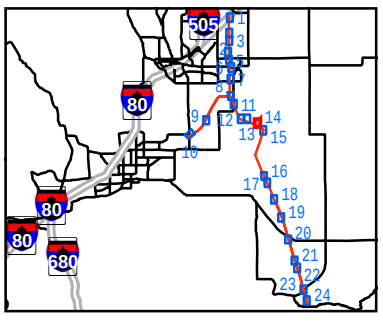
Guard Structures
Soils labeled by Soil Name

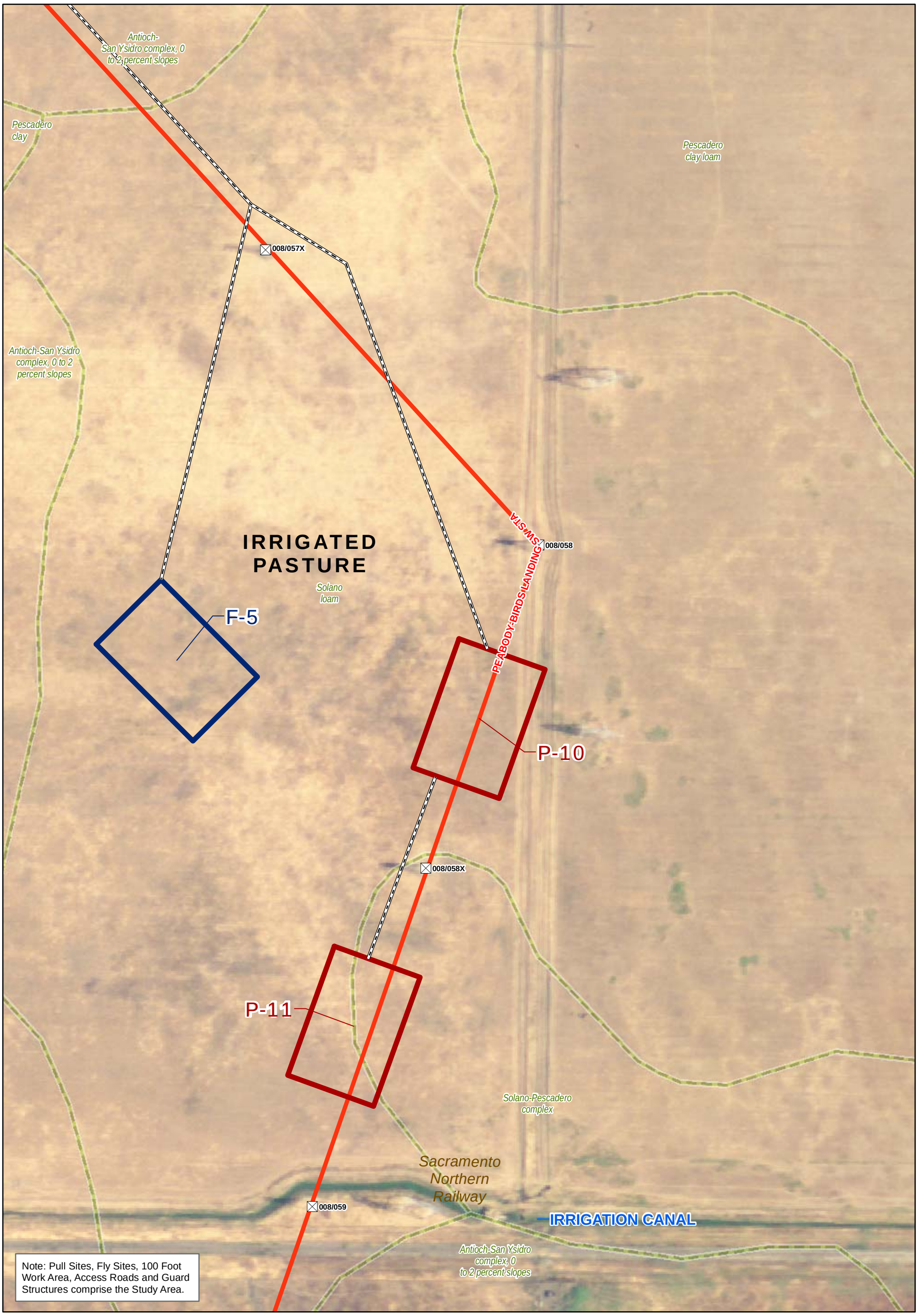
Figure 4n
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 14 of 24

N W E S

0 200 400 Feet





Sample Point

Potential USACE Jurisdictional Feature

Seasonal Wetland

Non-Jurisdictional Features

Agricultural Ditch

Drainage Ditch

Roadside Ditch

Swale

Study Area

Structures

60kV Poles

Transmission Lines

Pull Site

Fly Site

100' Work Area

Access Road
12 ' Disturbance

Guard Structures

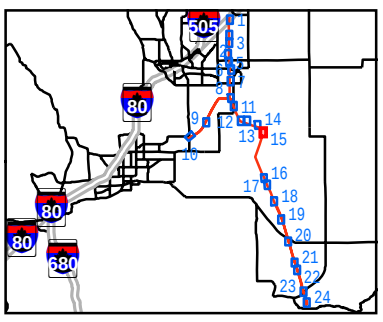
Soils labeled
by Soil Name

Figure 4o
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 15 of 24

N W E S

0 200 400 Feet



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010/072
Pescadero clay
Pescadero clay
010/073
C-134
Solano loam
PEABODY-BIRDS-LANDING-SW-STA
C-65
011/074
Clear Lake clay, 0 to 2 percent slopes
Antioch-San Ysidro complex, 0 to 2 percent slopes
PASTURE
011/075
Millsap sandy loam, 0 to 2 percent slopes
Omni
CREED RD
SW02
SP03
SP04

Note: Pull Sites, Fly Sites, 100 Foot Work Area, Access Roads and Guard Structures comprise the Study Area.

Sample Point
Potential USACE Jurisdictional Feature
Seasonal Wetland
Non-Jurisdictional Features
Agricultural Ditch
Drainage Ditch
Roadside Ditch
Swale

Study Area
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
100' Work Area
Access Road 12 ' Disturbance

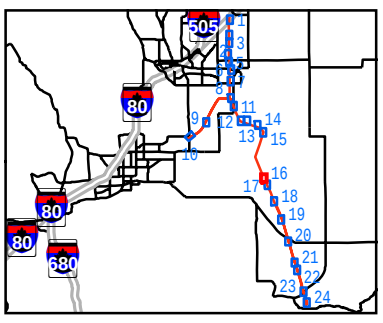
Guard Structures
Soils labeled by Soil Name

Figure 4p
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 16 of 24

N W E S

0 200 400 Feet



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Antioch-San Ysidro complex, 0 to 2 percent slopes

Solano loam

011/075

Millsap sandy loam, 0 to 2 percent slopes

CREED RD

Willows clay

SW02

SP03

SP04

011/076

PEABODY-BIRDS LANDING SW STA

SP06

SP05

PASTURE

VP07

SP08

SP07

VP08

SP10

SP09

SW05

Clear Lake clay, 0 to 2 percent slopes

P-12

Millsap-Los Osos complex, 2 to 9 percent slopes

011/077

011/078

Altamont-Diablo clays, 2 to 9 percent slopes

Note: Pull Sites, Fly Sites, 100 Foot Work Area, Access Roads and Guard Structures comprise the Study Area.

Sample Point

Potential USACE Jurisdictional Feature

Seasonal Wetland

Non-Jurisdictional Features

Agricultural Ditch

Drainage Ditch

Roadside Ditch

Swale

Study Area

Structures

60kV Poles

Transmission Lines

Pull Site

Fly Site

100' Work Area

Access Road 12 ' Disturbance

Guard Structures

Soils labeled by Soil Name

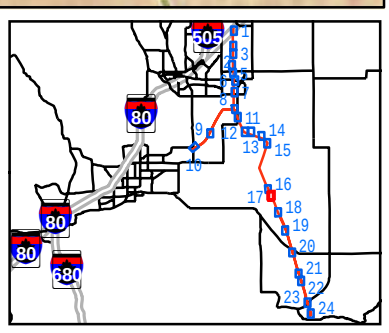
Figure 4q
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Wetland Delineation
Solano County, Ca

Map 17 of 24

N W E S

0 200 400 Feet



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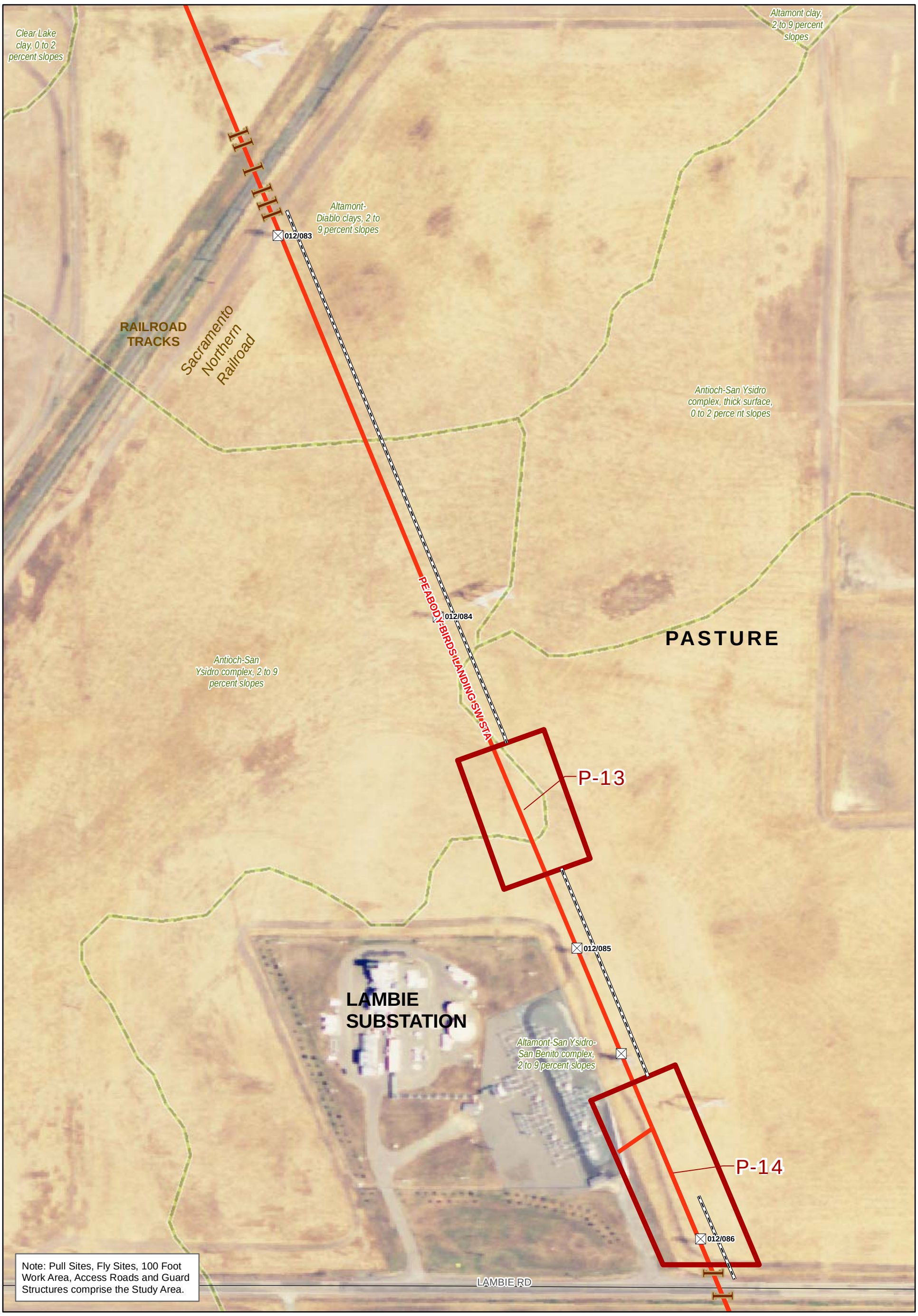


Note: Pull Sites, Fly Sites, 100 Foot Work Area, Access Roads and Guard Structures comprise the Study Area.

Sample Point
Potential USACE Jurisdictional Feature
Seasonal Wetland
Non-Jurisdictional Features
Agricultural Ditch
Drainage Ditch
Roadside Ditch
Swale

Study Area
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
100' Work Area
Access Road 12 ' Disturbance

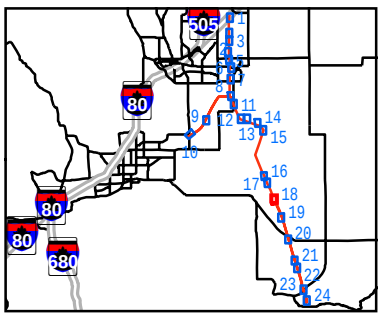
Guard Structures
Soils labeled by Soil Name

Figure 4r
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 18 of 24

N W E S

0 200 400 Feet



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013/091

Altamont-Diablo clays, 2 to 9 percent slopes

013/092

Altamont-San Ysidro-San Benito complex, 2 to 9 percent slopes

Antioch-San Ysidro complex, thick surface, 0 to 2 perce nt slopes

PASTURE

014/093

F-6

MAUDS LN

Altamont-Diablo clays, 2 to 9 percent slopes

Altamont-Diablo clays, 2 to 9 percent slopes

014/094

Note: Pull Sites, Fly Sites, 100 Foot Work Area, Access Roads and Guard Structures comprise the Study Area.

Sample Point

Potential USACE Jurisdictional Feature

Seasonal Wetland

Non-Jurisdictional Features

Agricultural Ditch

Drainage Ditch

Roadside Ditch

Swale

Study Area

Structures

60kV Poles

Transmission Lines

Pull Site

Fly Site

100' Work Area

Access Road 12 ' Disturbance

Guard Structures

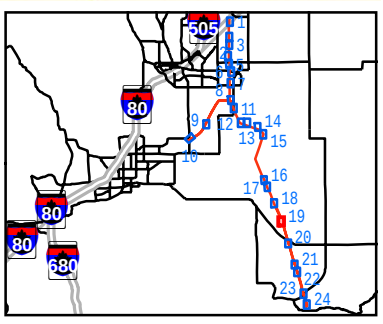
Soils labeled by Soil Name

Figure 4s
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 19 of 24

N W E S

0 200 400 Feet



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WHEAT

Altamont-Diablo clays, 2 to 9 percent slopes

015/101

STATE HIGHWAY 12

PASTURE

015/102

P-15

Antioch-San Ysidro complex, 2 to 9 percent slopes

HAY

Altamont-San Ysidro-San Benito complex, 2 to 9 percent slopes

LITTLE HONKER BAY RD

015/103

F-7

NON-NATIVE GRASSLAND

Note: Pull Sites, Fly Sites, 100 Foot Work Area, Access Roads and Guard Structures comprise the Study Area.

Sample Point

Potential USACE Jurisdictional Feature

Seasonal Wetland

Non-Jurisdictional Features

Agricultural Ditch

Drainage Ditch

Roadside Ditch

Swale

Study Area

Structures

60kV Poles

Transmission Lines

Pull Site

Fly Site

100' Work Area

Access Road 12 ' Disturbance

Guard Structures

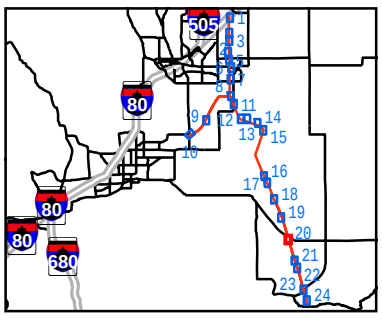
Soils labeled by Soil Name

Figure 4t
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 20 of 24

N W E S

0 200 400 Feet



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016/110

016/111

Altamont-San Ysidro-San Benito complex, 2 to 9 percent slopes

LAMBIE SW STA-CONTRA COSTA-PEABODY-BIRDS LANDING SW STA

Antioch-San Ysidro complex, 0 to 2 percent slopes

016/112

Solano loam

OLSEN RD

017/113

Note: Pull Sites, Fly Sites, 100 Foot Work Area, Access Roads and Guard Structures comprise the Study Area.

Sample Point

Potential USACE Jurisdictional Feature

Seasonal Wetland

Non-Jurisdictional Features

Agricultural Ditch

Drainage Ditch

Roadside Ditch

Swale

Study Area

Structures

60kV Poles

Transmission Lines

Pull Site

Fly Site

100' Work Area

Access Road 12 ' Disturbance

Guard Structures

Soils labeled by Soil Name

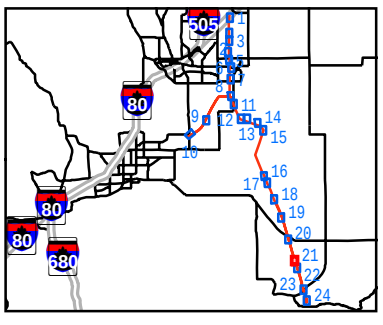
Figure 4u
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Wetland Delineation
Solano County, Ca

Map 21 of 24

N W E S

0 200 400 Feet



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017/114

Altamont-San Ysidro-San Benito complex, 2 to 9 percent slopes

PEABODY-BIRDSLANDING SWSTA-LAMBIE SWSTA-CONTRA COSTA

017/115

Altamont-San Ysidro-San Benito complex, 9 to 30 percent slopes

F-8

Antioch-San Ysidro complex, 0 to 2 percent slopes

017/116

Altamont-San Ysidro-San Benito complex, 9 to 30 percent slopes

017/117

Note: Pull Sites, Fly Sites, 100 Foot Work Area, Access Roads and Guard Structures comprise the Study Area.

Sample Point

Potential USACE Jurisdictional Feature

Seasonal Wetland

Non-Jurisdictional Features

Agricultural Ditch

Drainage Ditch

Roadside Ditch

Swale

Study Area

Structures

60kV Poles

Transmission Lines

Pull Site

Fly Site

100' Work Area

Access Road 12 ' Disturbance

Guard Structures

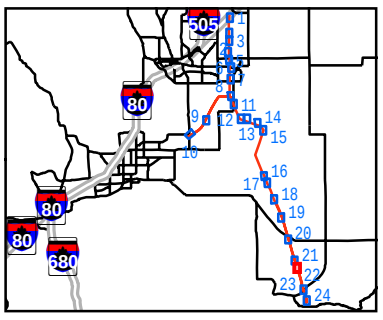
Soils labeled by Soil Name

Figure 4v
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 22 of 24

N W E S

0 200 400 Feet



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Altamont-San Ysidro-San Benito complex, 9 to 30 percent slopes

018/125

018/126

PASTURE

Altamont clay, 9 to 30 percent slopes

PASTURE

WHEAT

BIRDS LANDING RD

Omni clay loam

Diablo-Ayar clays, 9 to 30 percent slopes, eroded

MONTEZUMA SLOUGH

Altamont-Diablo clays, 9 to 30 percent slopes

019/127

Note: Pull Sites, Fly Sites, 100 Foot Work Area, Access Roads and Guard Structures comprise the Study Area.

Sample Point

Potential USACE Jurisdictional Feature

Seasonal Wetland

Non-Jurisdictional Features

Agricultural Ditch

Drainage Ditch

Roadside Ditch

Swale

Study Area

Structures

60kV Poles

Transmission Lines

Pull Site

Fly Site

100' Work Area

Access Road 12 ' Disturbance

Guard Structures

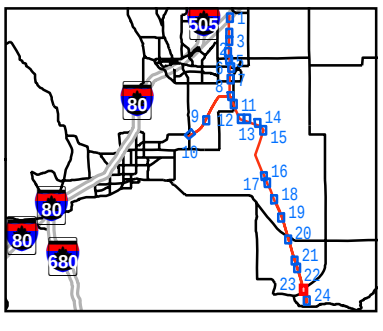
Soils labeled by Soil Name

Figure 4w
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Wetland Delineation
Solano County, Ca

Map 23 of 24

N W E S

0 200 400 Feet



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Altamont-
Diablo clays, 9 to 30
percent slopes

Omni clay
loam

019/129

F-9

019/130

BIRDS
LANDING
SUBSTATION

Diablo-Ayar clays,
9 to 30 percent
slopes, eroded

WHEAT

P-16

019/131

PEABODY-BIRDS LANDING SW STA

Note: Pull Sites, Fly Sites, 100 Foot Work Area, Access Roads and Guard Structures comprise the Study Area.

Sample Point

Potential USACE Jurisdictional Feature

Seasonal Wetland

Non-Jurisdictional Features

Agricultural Ditch

Drainage Ditch

Roadside Ditch

Swale

Study Area

Structures

60kV Poles

Transmission Lines

Pull Site

Fly Site

100' Work Area

Access Road
12 ' Disturbance

Guard Structures

Soils labeled
by Soil Name

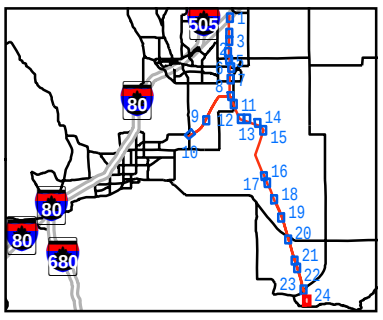
Figure 4x
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Wetland Delineation
Solano County, Ca

Map 24 of 24

N
W E
S

0 200 400 Feet



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Appendix A
WETS Tables

WETS Station : FAIRFIELD, CA2934 Creation Date: 08/29/2002
Latitude: 3817 Longitude: 12204 Elevation: 00040
State FIPS/County(FIPS): 06095 County Name: Solano
Start yr. - 1971 End yr. - 2000

Month	Temperature (Degrees F.) avg daily max	avg daily min	avg	Precipitation (Inches) avg	30% chance will have less than	more than	avg # of days w/.1 or more	avg total snow fall
January	54.9	37.6	46.2	5.04	2.24	6.15	8	0.0
February	61.4	41.0	51.2	4.57	1.75	5.53	6	0.0
March	65.7	44.0	54.8	3.59	1.65	4.38	7	0.0
April	71.5	46.4	58.9	1.12	0.46	1.36	2	0.0
May	78.2	50.5	64.3	0.64	0.06	0.70	1	0.0
June	85.0	54.1	69.6	0.16	0.00	0.11	0	0.0
July	89.1	56.1	72.6	0.03	0.00	0.00	0	0.0
August	88.7	56.1	72.4	0.05	0.00	0.00	0	0.0
September	86.3	54.5	70.4	0.29	0.00	0.33	1	0.0
October	78.2	49.9	64.1	1.24	0.46	1.54	2	0.0
November	64.8	42.7	53.8	3.08	1.10	3.70	5	0.0
December	55.7	36.9	46.3	3.64	1.73	4.51	5	0.0
Annual	-----	-----	-----	------	18.03	27.17	--	----
Average	73.3	47.5	60.4	------	------	------	--	----
Total	-----	-----	-----	23.43	------	------	37	0.0

GROWING SEASON DATES

Probability	Temperature: 24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates / Growing Season Length		
50 percent *	12/30 to 12/30 > 365 days	12/31 to 12/31 > 365 days	2/ 5 to 12/ 9 308 days
70 percent *	12/30 to 12/30 > 365 days	12/31 to 12/31 > 365 days	1/23 to 12/21 333 days

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

total 1951-2002 prcp

Station : CA2934, FAIRFIELD

------- Unit = inches

yr	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	annl
51	3.40	2.10	2.19	0.98	M0.83	0.00	0.00	0.00	M0.00	M1.28	4.84	8.25	23.87
52	9.00	M1.31	2.68	0.77	0.27	0.40	M0.00	0.00	M0.00	M0.00	M2.08	M7.79	24.30
53	4.31	0.00	M2.26	M2.58	M0.35	M0.38	0.00	0.04	M0.00	M0.00	M2.93	0.72	13.57
54	M3.02	2.94	M2.76	1.97	0.17	M0.00	M0.00	M0.00	0.00	M0.00	M0.00	M4.96	15.82
55	3.16	M1.61	0.53	2.21	0.32	M0.00	M0.00	0.00	0.28	M0.05	2.06	13.66	23.88
56	7.89	2.11	M0.32	1.10	M0.08	0.04	0.00	0.00	0.55	M0.41	0.12	M0.33	12.95
57	M2.48	4.46	M1.69	1.61	M0.73	0.00	M0.00	M0.00	M0.41	3.66	0.37	2.73	18.14
58	M4.22	9.55	6.02	4.33	0.64	0.33	0.15	0.07	0.04	0.13	0.08	1.10	26.66
59	5.19	5.59	1.05	0.19	0.00	0.00	0.00	0.00	2.49	0.00	0.00	2.34	16.85
60	3.11	4.79	2.21	1.05	0.74	0.00	0.00	0.00	0.00	0.13	M3.01	1.55	16.59
61	4.06	0.96	1.92	0.71	0.20	0.04	0.00	0.05	0.15	M0.18	4.01	2.34	14.62
62	0.80	6.25	3.05	0.22	0.00	0.00	0.00	0.00	0.00	7.85	0.16	2.58	20.91
63	5.32	2.67	3.59	5.49	0.45	0.09	0.00	0.00	0.40	1.77	2.80	0.48	23.06
64	3.22	0.00	1.91	0.12	0.22	0.93	0.04	0.05	0.00	2.23	2.85	5.01	16.58
65	4.34	0.00	1.35	2.94	0.12	0.00	0.00	0.43	0.00	0.00	M4.94	M2.63	16.75
66	4.46	2.49	0.26	0.34	0.45	0.00	0.08	0.18	0.37	0.00	5.68	4.39	18.70
67	9.90	0.31	4.17	4.78	0.12	1.45	0.00	0.00	0.05	0.36	1.36	1.75	24.25
68	4.93	3.11	2.31	0.29	0.40	0.00	0.00	1.18	0.00	0.75	3.55	4.44	20.96
69	9.80	7.04	1.95	1.25	0.00	0.10	0.00	0.00	0.00	2.12	0.46	6.16	28.88
70	11.75	1.36	1.86	0.16	0.00	0.39	0.00	0.00	0.00	0.76	5.94	6.00	28.22
71	1.86	0.26	2.72	0.22	0.69	0.00	0.00	0.00	0.15	0.06	2.20	4.16	12.32
72	1.30	1.54	0.19	1.00	0.02	0.20	0.00	0.00	0.98	4.60	6.73	1.67	18.23
73	11.54	5.62	2.71	0.19	0.14	0.00	0.00	0.00	0.35	1.66	7.20	4.73	34.14
74	3.64	1.06	4.61	1.80	0.11	0.00	0.60	0.00	0.00	1.29	0.88	3.79	17.78
75	1.16	7.03	5.58	1.13	0.07	0.10	0.06	0.14	0.03	3.50	0.44	0.30	19.54
76	0.52	1.31	1.89	0.86	0.00	0.01	0.00	0.66		0.33	1.02	1.26	7.86
77	1.89	1.06	2.13	0.14	0.81	0.00	0.00	0.00	1.08	0.42	5.44	5.51	18.48
78	9.73	5.25	5.12	2.02	0.05	0.05	0.00	0.00	0.23	0.00	1.67	0.84	24.96
79	9.13	4.31	1.93	1.19	0.59	0.00	0.00	0.00	0.00	2.38	2.47	6.58	28.58
80	6.94	10.33	3.58	1.24	0.34	0.01	0.13	0.00	0.00	0.20	0.08	2.67	25.52
81	M5.14	1.11	3.74	0.36	0.04	0.00	0.00	0.00	0.19	1.40	5.91	5.72	23.61
82	8.12	3.82	6.14	5.05	0.00	0.01	0.00	0.00	1.11	2.74	4.32	2.51	33.82
83	5.78	8.72	10.89	3.06	0.79	0.00	0.00	0.01	0.74	0.30	6.51	7.48	44.28
84	0.30	1.49	1.17	0.80	0.00	0.08	0.00	0.17	0.10	1.96	6.52	1.26	13.85
85	0.68	1.95	4.14	0.06	0.02	0.02	0.00	0.00	0.30	0.65	4.32	3.05	15.19
86	4.57	11.30	5.61	0.99	0.19	0.00	0.00	0.00	1.09	0.38	0.10	1.14	25.37
87	3.02	4.12	3.14	0.08	0.07	0.00	0.00	0.00	0.00	0.95	2.97	5.63	19.98
88	5.62	0.39	0.26	1.49	0.68	0.36	0.00	0.00	0.00	0.17	3.86	3.93	16.76
89	1.05	1.82	5.23	0.37	0.01	0.21	0.00	0.00	1.37	1.59	1.66	0.00	13.31
90	4.26	2.44	0.80	0.24	3.25	0.00	0.00	0.00	0.26	0.23	0.35	1.00	12.83
91	0.47	3.21	9.17	0.31	0.09	0.02	0.00	0.02	0.00	1.99	0.67	2.42	18.37
92	2.03	7.09	4.14	0.63	0.00	0.49	0.00	0.00	0.00	3.17	0.26	9.55	27.36
93	10.57	5.79	2.48	M0.55	0.86	0.96	0.00	0.00	0.00	0.59	2.65	2.39	26.84
94	2.71	4.31	0.14	1.19	1.26	0.00	0.00	0.00	0.02	0.28	5.30	4.49	19.70
95	12.47	0.14	9.21	0.88	1.21	1.83	0.00	0.00	0.00	0.00	0.08	10.02	35.84
96	8.65	8.34	2.32	2.18	3.03	0.00	0.00	0.00	0.00	1.61	3.58	11.67	41.38
97	11.07	0.28	0.52	0.20	0.47	0.27	0.00	0.41	0.00	0.81	6.73	2.30	23.06
98	8.95	14.71	2.35	2.30	3.29	0.00	0.00	0.00	0.34	0.71	4.29	1.57	38.51
99	2.11	6.97	2.85	1.73	0.03	0.00	0.00	0.00	0.04	0.56	2.91	0.52	17.72
0	5.98	11.25	2.87	1.29	0.98	0.17	0.00	0.00	0.08	2.54	1.15	1.13	27.44
1	3.36	6.35	1.37	0.62	0.00	0.08	0.00	0.00	0.20	0.50	4.47	10.23	27.18
2													

WETS Station : LAKE SOLANO, CA4712 Creation Date: 08/29/2002
Latitude: 3829 Longitude: 12200 Elevation: 00190

State FIPS/County(FIPS): 06095 County Name: Solano
Start yr. - 1975 End yr. - 2000

Month	Temperature (Degrees F.) avg daily max	avg daily min	avg	Precipitation (Inches) avg	30% chance will have less than	more than	avg # of days w/.1 or more	avg total snow fall
January	54.5	37.2	45.9	5.82	2.36	7.07	7	0.0
February	60.5	40.6	50.5	5.33	1.97	6.44	6	0.0
March	65.2	43.8	54.5	4.01	1.88	4.90	6	0.0
April	72.4	47.3	59.8	1.20	0.39	1.46	2	0.0
May	79.9	52.2	66.0	0.73	0.10	0.85	1	0.0
June	88.5	57.2	72.9	0.13	0.00	0.15	0	0.0
July	94.3	58.7	76.5	0.01	0.00	0.00	0	0.0
August	92.6	57.2	74.9	0.04	0.00	0.00	0	0.0
September	88.2	55.0	71.6	0.25	0.00	0.28	0	0.0
October	79.0	49.5	64.2	1.05	0.33	1.30	1	0.0
November	64.4	42.4	53.4	2.91	0.75	3.39	4	0.0
December	55.9	36.4	46.1	3.71	1.56	4.59	5	0.0
Annual	-----	-----	-----	------	16.70	29.25	--	----
Average	74.6	48.1	61.4	------	------	------	--	----
Total	-----	-----	-----	25.20	------	------	32	0.0

GROWING SEASON DATES

Probability	Temperature: 24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	> 365 days > 365 days	> 365 days > 365 days	2/10 to 11/30 294 days
70 percent *	> 365 days > 365 days	> 365 days > 365 days	2/ 1 to 12/ 9 312 days

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

total 1975-2002 prcp

Station : CA4712, LAKE SOLANO
------- Unit = inches

yr	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	annl
75								0.12	0.00	2.70	0.03	0.35	3.20
76	0.58	0.58	2.11	0.65	0.00	0.05	0.00	0.48	0.38	0.21	0.66	1.56	7.26
77	2.08	0.90	2.03	0.00	1.80	0.00	0.02	0.00	0.47	0.22	4.43	5.48	17.43
78	14.73	6.43	4.62	1.80		0.00	0.00	0.00	0.44	0.00	2.03	0.75	30.80
79	8.10	4.87	2.26	1.07	0.35	0.04	0.00	0.00	0.00	1.98	2.15	7.13	27.95
80	7.00	13.61	2.58	1.56	0.14	0.05	0.16	0.00	0.00	0.13	0.08	3.65	28.96
81	5.86	0.71	3.69	1.00	0.16	0.00	0.00	0.00	0.36	1.97	7.57	4.83	26.15
82	8.78	2.65	7.51	5.12	0.00	0.00	0.00	0.00	0.84	3.32	7.69	3.03	38.94
83	9.31	7.94	10.65	3.55	0.29	0.00	0.00	0.01	0.40	0.62	7.69	9.57	50.03
84	0.35	1.27	1.33	0.61	0.00	0.06	0.00	0.22	0.13	1.24	7.47	1.55	14.23
85	1.40	2.63	3.99	0.02	0.00	0.03	0.04	0.03	0.20	0.35	4.21	3.90	16.80
86	M4.59	14.02	6.46	0.75	0.27	0.00	0.00	0.00	0.53	0.05	0.09	1.24	28.00
87	2.25	5.48	3.92	0.10	0.13	0.00	0.00	0.00	0.00	0.94	1.86	6.61	21.29
88	6.46	0.49	0.57	1.22	0.51	0.31	0.00	0.00	0.00	0.07	2.63	3.60	15.86
89	0.74	0.71	4.50	0.49	0.02	0.26	0.00	0.00	2.41	2.12	1.37	0.00	12.62
90	3.50	2.73	0.56	0.07	2.11	0.00	0.00	0.00	0.09	0.21	0.26	0.88	10.41
91	0.32	3.42	12.33	0.30	0.12	0.16	0.00	0.01	0.00	0.61	0.46	3.20	20.93
92	2.21	8.17	3.49	0.66	0.08	0.25	0.00		0.00	2.71	0.17	8.20	25.94
93	13.48	6.99	1.37	0.56	0.89	1.28	0.00	0.00	0.00	1.04	2.64	2.41	30.66
94	2.55	4.91	0.45	1.25	1.55	0.00	0.00	0.00	0.02	0.73	5.00	3.23	19.69
95	18.64	0.37	13.91	0.78	1.73		0.00	0.00	0.00	0.00	0.05	9.47	44.95
96	5.88	9.86	2.32	2.81	2.30	0.00	0.00	0.00	0.00	1.66	2.75	10.93	38.51
97	12.42	0.47	0.67	0.05	0.55	0.24	0.00	0.20	0.00	0.51	7.10	2.39	24.60
98	6.79	17.26	2.14	2.00	3.34	0.00	0.00	0.00	0.35	0.63	4.26	1.74	38.51
99	1.51	7.28	3.44	1.73	0.02	0.15	0.00	0.00	0.00	0.30	2.17	0.24	16.84
0	5.86	9.52	3.30	1.92	1.18	0.34	0.00	0.00	0.00	3.06	0.86	0.50	26.54
1	4.34	7.54	2.31	0.62	0.00	0.07	0.00	0.00	0.39	0.55	5.32	10.42	31.56
2													

WETS Station : VACAVILLE, CA9200 Creation Date: 08/29/2002
Latitude: 3824 Longitude: 12157 Elevation: 00110
State FIPS/County(FIPS): 06095 County Name: Solano
Start yr. - 1971 End yr. - 2000

Month	Temperature (Degrees F.) avg daily max	avg daily min	avg	Precipitation (Inches) avg	30% chance will have less than	more than	avg # of days w/.1 or more	avg total snow fall
January	55.1	37.4	46.2	5.47	2.17	6.63	7	0.1
February	61.6	40.2	50.9	5.03	1.80	6.06	6	0.0
March	66.5	42.8	54.6	3.83	1.47	4.64	7	0.0
April	73.4	45.1	59.3	1.14	0.40	1.37	2	0.0
May	81.4	49.9	65.6	0.64	0.02	0.70	1	0.0
June	89.0	54.4	71.7	0.09	0.00	0.04	0	0.0
July	94.3	57.0	75.6	0.05	0.00	0.00	0	0.0
August	93.2	56.1	74.6	0.03	0.00	0.00	0	0.0
September	89.3	54.2	71.8	0.30	0.00	0.36	0	0.0
October	79.7	49.2	64.5	1.19	0.36	1.48	2	0.0
November	64.7	42.0	53.3	3.29	0.86	3.89	4	0.0
December	55.7	36.9	46.3	3.82	1.74	4.67	5	0.1

Annual	-----	-----	-----	------	17.32	28.18	--	----
Average	75.3	47.1	61.2	------	------	------	--	----
Total	-----	-----	-----	24.88	------	------	34	0.2

GROWING SEASON DATES

Probability	Temperature: 24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates / Growing Season Length		
50 percent *	> 365 days > 365 days	12/31 to 12/31 > 365 days	3/ 8 to 11/28 265 days
70 percent *	> 365 days > 365 days	12/31 to 12/31 > 365 days	2/26 to 12/ 9 287 days

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

total 1948-2002 prcp

Station : CA9200, VACAVILLE
------- Unit = inches

yr	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	annl
48							0.00	0.00	0.19	M0.90	M0.63	6.44	8.16
49	2.53	3.99	4.37	0.00	0.09	0.00	0.04	M0.08	0.00	0.00	1.73	M2.38	15.21
50	M6.96	4.35	1.82	1.24	0.24	0.00	0.00	0.00	0.43	2.77	7.30	8.29	33.40
51	3.98	1.97	2.63	0.93	M0.73	0.00	0.00	0.00	0.00	1.71	M3.76	8.88	24.59
52	10.58	2.78	3.89	1.09	0.12	0.22	0.00	0.00	0.00	0.00	M2.53	14.65	35.86
53	5.74	0.00	4.16	M2.94	1.43	M0.27	0.00	0.00	0.00	0.27	2.88	0.54	18.23
54	5.58	4.22	3.98	2.63	0.00	0.00	0.00	0.08	0.00	0.05	4.09	5.14	25.77
55	3.22	1.89	0.55	2.68	0.26	0.00	M0.00	0.00	0.92	0.10	2.31	M17.18	29.11
56	7.97	4.21	0.09	1.88	0.48	0.00	0.00	0.00	0.00	2.56	0.17	0.29	17.65
57	2.80	4.90	2.03	2.02	2.24	0.00	0.00	0.00	0.87	M4.21	0.57	4.06	23.70
58	M5.58	M11.22	M6.62	5.24	0.51	0.10	0.07	0.00	0.03	0.11	0.12	1.27	30.87
59	6.99	6.60	0.72	0.26	0.43	0.00	0.00	0.00	3.80	0.00	0.01	2.29	21.10
60	4.86	6.16	2.84	1.62	1.62	0.00	0.00	0.00	0.00	0.03	4.86	1.95	23.94
61	5.81	1.27	2.32	0.96	M0.15	0.03	0.00	0.02	0.17	M0.08	4.65	2.94	18.40
62	1.53	10.46	3.54	0.12	0.02	0.00	0.00	0.01	0.01	8.18	0.71	3.39	27.97
63	9.42	2.51	5.26	5.46	0.43	0.00	0.00	0.00	0.33	2.11	6.00	0.71	32.23
64	4.42	0.08	2.25	0.16	0.31	0.84	0.02	0.02	0.00	2.32	3.44	10.86	24.72
65	5.97	1.01	0.91	2.87	0.04	0.00	0.01	0.19	0.00	0.00	5.52	3.41	19.93
66	5.14	3.20	0.07	0.23	0.13	0.10	0.10	0.16	0.18	0.00	7.33	5.98	22.62
67	13.38	0.43	5.38	6.39	0.00	1.56	0.00	0.00	0.06	0.33	0.88	1.73	30.14
68	5.58	3.03	3.04	0.26	0.25	0.00	0.00	0.15	0.00	0.87	3.35	4.49	21.02
69	12.26	7.34	0.98	1.22	0.00	0.02	0.00	0.00	0.00	2.22	0.45	8.36	32.85
70	13.03	1.68	1.36	0.28	0.00	0.24	0.00	0.00	1.44	0.66	6.93	6.48	32.10
71	1.45	0.06	2.39	0.57	0.71	0.00	0.00	0.00	0.16	0.10	1.29	4.29	11.02

72	1.47	1.57	0.02	1.21	0.09	0.11	0.00	0.00	0.74	2.99	5.64	2.68	16.52
73	13.36	6.47	2.94	0.04	0.07	0.00	0.00	0.00	0.12	1.35	8.93	4.23	37.51
74	4.20	0.71	4.85	1.73	0.00	0.00	1.22	0.00	0.00	1.19	0.84	3.07	17.81
75	1.49	7.76	5.42	0.94	0.00	0.01	0.14	0.06	0.00	3.46	0.19	0.28	19.75
76	0.33	2.43	0.96	1.38	0.00	0.01	0.00	0.55	0.24	0.13	0.64	1.46	8.13
77	2.28	1.00	1.91	0.06	0.91	0.00	0.00	0.00	0.99	0.36	5.39	6.35	19.25
78	10.06	6.07	6.09		0.00	0.00	0.00	0.00	0.40	0.00		0.67	23.29
79	7.15	4.89	2.47	1.60	0.33	0.00	0.00	0.00	0.00	3.06	2.13	6.54	28.17
80	7.36	10.30	3.28	1.44	0.57	0.01		0.00		0.13	0.09	3.41	26.59
81	5.95	1.13	3.76	0.59	0.08	0.00	0.00	0.00	0.25	1.70	7.18	M6.15	26.79
82	9.20	3.92	8.19	5.83	0.00	0.00	0.00	0.00	0.92	3.13	7.81	2.98	41.98
83	7.06	10.44	10.54	3.18	0.59	0.00	0.00	0.00	0.51	0.42	7.96	8.20	48.90
84	0.54	1.75	1.49	0.76	0.01	0.00	0.00	0.12	0.87	1.57	8.13	1.44	16.68
85	0.97	2.81				0.00	0.00	0.00	M0.53	0.78	5.03		10.12
86	5.73	14.41	M5.44		0.00	0.00		0.00	0.79	M0.04	0.00	1.22	27.63
87	2.81	M4.31	3.65	0.31	0.18	0.00	0.00	0.00	0.00	M0.90	3.22	4.82	20.20
88	6.02	0.55	M0.21				0.00	0.00	0.00	0.00		3.15	9.93
89	0.90	1.32	5.55	M0.33	0.02	0.00	0.00	0.00	1.64	2.02	1.34		13.12
90	3.70	3.95		M0.08	M2.33	0.00	0.00	0.00	0.10	M0.13	0.25	0.92	11.46
91	0.09	3.62	10.67	0.30	0.31	0.12	0.00	0.00	0.00	1.05	0.24	2.31	18.71
92	2.26	7.82	4.03	0.76	0.00	0.28	0.00	0.00	0.00	2.59	0.09	8.67	26.50
93	14.07	5.90	1.63	0.05	0.85	0.92	0.00	0.00	0.00	0.73	2.56	2.60	29.31
94	2.22	3.86	0.12	0.85	1.05	0.00	0.00	0.00	0.02		5.27	4.09	17.48
95	16.69	0.16	9.67	0.89	1.41	0.70	0.00	0.00	0.00	0.00	0.06	10.76	40.34
96	8.50	9.98	3.21	1.60	2.86	0.00	0.00	0.00	0.00	1.94	2.90	12.32	43.31
97	12.18	0.27	0.50	0.20	1.09	0.14	0.00	0.20	0.00	0.56	7.47	2.51	25.12
98	7.95	15.14	2.72	1.80	3.38	0.04	0.00		0.39	0.70	4.86	1.06	38.04
99	1.85	7.83	3.36	1.72	0.04	0.04	0.00	0.00	0.05	0.42	1.74	0.35	17.40
0	6.12	10.51	2.27	1.44	0.99	0.20	0.00	0.00	0.03	3.15	0.77	0.53	26.01
1	M3.44	6.58	2.04	M0.78	0.00	0.07	0.00	0.00	M0.19	0.51	M5.33	10.28	29.22
2													

Appendix B
Data Sheets

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: VACCA - DIXON 230KV City/County: SOLANO Sampling Date: 1/25/08

Applicant/Owner: PG & E State: CA Sampling Point: SP01

Investigator(s): R. HUDDLESTON Section, Township, Range: S. 01 R06N T01W (MDM)

Landform (hillslope, terrace, etc.): TERRACE Local relief (concave, convex, none): NONE Slope (%): 0-1%

Subregion (LRR): C Lat: 38° 23' 43.16" Long: -121° 55' 11.75" Datum: WGS 84

Soil Map Unit Name: SAN YSIDRO SANDY LOAM 0-2% NWI classification: NONE

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation X, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X	No ____	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes X	No ____	

Remarks: ROADSIDE SWALE NORTH OF KILKENNY ROAD - SPARSE RUDERAL WETLAND VEGETATION; SUBJECT TO INUNDATION FOLLOWING STORM EVENTS BUT DOES NOT APPEAR TO SUPPORT HYDRIC SOILS

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. NONE			
2.			
3.			
4.			
Total Cover: N/A			
Sapling/Shrub Stratum			
1. NONE			
2.			
3.			
4.			
5.			
Total Cover: N/A			
Herb Stratum			
1. CYPERUS ERAGROSTIS	30%	X	FACW
2. RUMEX CRISPUS	30%	X	FACW-
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:			
Woody Vine Stratum			
1. NONE			
2.			
Total Cover: N/A			

% Bare Ground in Herb Stratum 40% % Cover of Biotic Crust ____

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

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

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

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

__ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes X No ____

Remarks: MUCH OF THE VEGETATION PREVIOUSLY MOWED AS PART OF ROAD MAINTENANCE; EARLY IN SEASON

SOIL

Sampling Point: SP01

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 4/2	100	–	–	–	–	CL	NO REDOX
9-16	10YR 4/3	100	–	–	–	–	CL	NO REDOX

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: N/E

Depth (inches): 7/6"

Hydric Soil Present? Yes ___ No X

Remarks: NO REACTION TO ALPHA - ALPHA DIPYRDYL DESPITE OVER SIX INCHES OF WATER PRESENT AT THE TIME OF THE SURVEY - NO EVIDENCE SOILS ARE ANEROBIC IN THIS AREA

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 6.5"

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

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

Remarks: AREA WAS INUNDATED FOLLOW HEAVY RAINS IN JANUARY.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: VACCA - DIXON 230KV City/County: SOLANO Sampling Date: 2/13/08

Applicant/Owner: PG & E State: CA Sampling Point: SP02

Investigator(s): R. HUDDLESTON Section, Township, Range: S. 36 T. 06N R. 01W (MDM)

Landform (hillslope, terrace, etc.): TERRACE Local relief (concave, convex, none): NONE Slope (%): 0-1%

Subregion (LRR): C Lat: 38° 19' 24.25" Long: -121° 55' 10.09" Datum: WGS 84

Soil Map Unit Name: SAN YSIDRO SANDY LOAM 0-2% NWI classification: NONE

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation X, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X	No ____	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks: WEAKLY EXPRESSED SWALE WITH RUDERAL HYDROPHYTIC PLANTS, SUPPORTS SHALLOW, EPHEMERAL INUNDATION ONLY.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. NONE			
2.			
3.			
4.			
Total Cover: N/A			
Sapling/Shrub Stratum			
1. NONE			
2.			
3.			
4.			
5.			
Total Cover: N/A			
Herb Stratum			
1. LYTHRUM HYSSOPIFOLIA	30%	X	FACW
2. CYNODON DACTYLON	30%	X	FAC
3. UNK ANNUAL GRASSES	15%		—
4. TRIFOLIUM SP	10%		—
5. RUMEX CRISPUS	5%		FACW-
6. PLANTAGO LANCEOLATA	5%		FAC-
7.			
8.			
Total Cover: 95%			
Woody Vine Stratum			
1. NONE			
2.			
Total Cover: N/A			

% Bare Ground in Herb Stratum 5% % Cover of Biotic Crust N/A

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

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

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

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

__ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes X No ____

Remarks: EARLY IN SEASON - NOT ALL SPECIES COULD BE IDENTIFIED AT THE TIME OF THE SURVEY

SOIL

Sampling Point: SP02

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6"	10YR 3/2	98%+	7.5YR 4/4	<2%	C	M, RC	CL	MANY FINE ROOTS
6-18"	10YR 4/3	98%	—	—	—	—	C	
	10YR 3/2	2%	—	—	—	—	C	ON PED SURFACES

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: N/E

Depth (inches): 7/8"

Hydric Soil Present? Yes ___ No X

Remarks:

- SOME CONCENTRATIONS PRESENT IN THE UPPER SIX INCHES, BUT LESS THAN 2% - AND LOW VALUE - THIS DOES NOT MEET ANY HYDRIC SOIL INDICATORS

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): 7/8

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): 7/8

Wetland Hydrology Present? Yes ___ No X

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

Remarks: SHALLOW INUNDATION OBSERVED IN THIS AREA IN LATE JANUARY AND EARLY FEBRUARY DUE TO HEAVY RAINFALL BUT NO EVIDENCE THAT THIS AREA IS SUBJECT TO PROLONGED INUNDATION OR SATURATION

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: VACCA - DIXON 230KV City/County: SOLANO Sampling Date: 2/13/08

Applicant/Owner: PG & E State: CA Sampling Point: SP03

Investigator(s): R. HUDDLESTON Section, Township, Range: S.33 T.05N R.01E (MDM)

Landform (hillslope, terrace, etc.): TERRACE Local relief (concave, convex, none): CONCAVE Slope (%): 0-1%

Subregion (LRR): C Lat: 38° 14' 32.64" Long: -121° 52' 37.82" Datum: WGS84

Soil Map Unit Name: CLEAR LAKE CLAY 0-2% NWI classification: NONE

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation X, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X	No ____	Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks: DEFINED DEPRESSION - INUNDATED AND EARLY SEASON PRECLUDED CHARACTERIZATION OF VEGETATION IN THIS LOCATION - APPEARS TO SUPPORT TYPICAL VERNAL POOL PLANT SPECIES

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. NONE			
2.			
3.			
4.			
Total Cover: N/A			
Sapling/Shrub Stratum			
1. NONE			
2.			
3.			
4.			
5.			
Total Cover: N/A			
Herb Stratum			
1. PLAGIOBOTHRYS STIPITATUS	–	x	OBL
2. DESCHAMPSIA DANTHONIOIDES	–	x	FACW
3. HORDEUM MARINUM	–	x	FAC
4.			
5.			
6.			
7.			
8.			
Total Cover: ~~N/A~~ ?			
Woody Vine Stratum			
1. NONE			
2.			
Total Cover: N/A			

% Bare Ground in Herb Stratum – % Cover of Biotic Crust N/A

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

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

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

Prevalence Index worksheet:

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

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

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

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes X No ____

Remarks: - VEGETATION BASED ON SCATTERED SEEDLINGS AND PLANTS AROUND EDGE OF STANDING WATER ONLY.

SOIL

Sampling Point: SP03

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-10"	10YR 4/1	90%	5YR 4/6	10%	C	M,RC	FSL	MANY FINE ROOTS
10-16"	10YR 4/3	90%	10YR 3/3	5%	C	M	FSL	
			10YR 4/1	5%	C	M	FSL	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: HARD PAN ?

Depth (inches): 16"

Hydric Soil Present? Yes X No ___

Remarks: SHOVEL REFUSAL AT 16"

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 6"

Water Table Present? Yes X No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 0

Wetland Hydrology Present? Yes X No ___

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

Remarks: INUNDATED AT TIME OF SURVEY - SOILS ADJACENT TO STANDING WATER WERE SATURATED TO THE SURFACE

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: VACCA - DIXON 230KV City/County: SOLANO Sampling Date: 2/13/08

Applicant/Owner: PG & E State: CA Sampling Point: SP04

Investigator(s): R. HUDDLESTON Section, Township, Range: S.33 T.05N R.01E (MDM)

Landform (hillslope, terrace, etc.): TERRACE Local relief (concave, convex, none): NONE Slope (%): 0-1%

Subregion (LRR): C Lat: 38° 14' 32.51" Long: -121° 52' 37.76" Datum: WGS 84

Soil Map Unit Name: CLEAR LAKE CLAY 0-2% NWI classification: NONE

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

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

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

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks: IN UPLAND PLANT COMMUNITY ADJACENT TO VERNAL POOL - HYDRIC SOILS AND WATER TABLE AT 12 INCHES AT THIS LOCATION

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. NONE			
2.			
3.			
4.			
Total Cover: N/A			
Sapling/Shrub Stratum			
1. NONE			
2.			
3.			
4.			
5.			
Total Cover: N/A			
Herb Stratum			
1. ERODIUM BOTRYS	80%	X	NL
2. TAENIATHRUM CAPUT-MEDUSAE	20%	X	NL
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:			
Woody Vine Stratum			
1. NONE			
2.			
Total Cover: N/A			

% Bare Ground in Herb Stratum 0% % Cover of Biotic Crust N/A

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

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

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: EARLY SEEDLINGS ONLY - SPECIES AND COVER TENTATIVE AT THIS LOCATION - BUT NO DOUBT HIGH COVER OF ERODIUM THROUGHOUT THIS AREA.

SOIL

Sampling Point: SP04

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR4/1	90%	5YR4/6	10%	C	M,RC	FSL	MANY FINE ROOTS
10-16"	10YR4/3	90%	10YR3/3	5%	-	-	FSL	
			10YR4/1	5%	-	-	FSL	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: N/E

Depth (inches): >16"

Hydric Soil Present? Yes X No ___

Remarks: SOILS SAME AS OBSERVED IN ADJACENT VERNAL POOL AREA

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes X No ___ Depth (inches): 12"

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 12"

Wetland Hydrology Present? Yes X No ___

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

Remarks: SHALLOW WATER TABLE PRESENT AT 12 INCHES

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: VACCA - DIXON 230KV City/County: SOLANO Sampling Date: 2/4/08

Applicant/Owner: PG & E State: CA Sampling Point: SP05

Investigator(s): R. HUDDLESTON Section, Township, Range: S. 33 T. 05N R01E (MDM)

Landform (hillslope, terrace, etc.): TERRACE Local relief (concave, convex, none): NONE Slope (%): 0-1%

Subregion (LRR): C Lat: 38° 14' ~~32.64"~~ 27.46" Long: -121° 52' ~~37.82"~~ 35' 44" Datum: WGS 84

Soil Map Unit Name: CLEAR LAKE CLAY 0-2% NWI classification: NONE

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

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

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

Hydrophytic Vegetation Present?	Yes X	No ____
Hydric Soil Present?	Yes ____	No X
Wetland Hydrology Present? SEE NOTES	Yes X*	No ____

Is the Sampled Area within a Wetland? Yes * PROBLEM AREA ____ No ____ POTENTIAL WETLAND

Remarks: SHALLOW, WEAKLY EXPRESSED TOPOGRAPHIC BASIN – MOSTLY GRASS DOMINATED WITH SCATTERED VERNAL POOL PLANT SPECIES NO STRONG EVIDENCE OF HYDRIC SOIL IN THIS AREA

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. NONE			
2.			
3.			
4.			
Total Cover: N/A			
Sapling/Shrub Stratum			
1. NONE			
2.			
3.			
4.			
5.			
Total Cover: N/A			
Herb Stratum			
1. HORDEUM MARINUM	75%	X	FAC
2. DESCHAMPSIA DANTHONIOIDES	5%		FACW
3. PLAGIOBOTHRYS STIPITATUS	5%		OBL
4. RUMEX CRISPUS	3%		FACW-
5. TRIFOLIUM HYACINTHINUM	3%		FACW
6. ERODIUM BOTRYS	T		NL
7.			
8.			
Total Cover: 790%			
Woody Vine Stratum			
1. NONE			
2.			
Total Cover: N/A			

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

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

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

Prevalence Index worksheet:

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

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

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

__ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes X No ____

Remarks: NOTABLE CHANGE FROM ADJACENT AREA CHARACTERIZED BY DENSE ERODIUM BOTRYS – TENTATIVE SPECIES AND COVER BASED ON EARLY SEEDLINGS ONLY

SOIL

Sampling Point: SP05

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/2	98%+	10YR 3/3	<2%	C	M	CL	MANY FINE ROOTS
6-12	10YR 3/1	100%	-	-	-	-	CL	
12-17	10YR 4/1	100%	-	-	-	-	CL	
17-21"	2.5Y 5/3	100%	-	-	-	-	C	HEAVY CLAY SOIL

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: CLAY PAN

Depth (inches): 17"

Hydric Soil Present? Yes ___ No X

Remarks: NO HYDRIC SOIL INDICATORS MET, NO REACTION TO ALPHA-ALPHA DIPYRDYL DESPITE SURFACE WATER PRESENT AT TIME OF THE SURVEY

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 3.25

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

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

Remarks: INUNDATED AT TIME OF SURVEY, BUT SITE WAS DRY ON FEB 13TH VISIT - APPEARS TO HAVE HIGHLY EPHEMERAL HYDROLOGY DUE TO SLOW PERMEABILITY.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: VACCA - DIXON 230KV City/County: SOLANO Sampling Date: 2/4/08

Applicant/Owner: PG & E State: CA Sampling Point: SP06

Investigator(s): R. HUDDLESTON Section, Township, Range: S. 33 T. 05N R. 01E (MDM)

Landform (hillslope, terrace, etc.): TERRACE Local relief (concave, convex, none): NONE Slope (%): 0-1%

Subregion (LRR): C Lat: 38° 14' 27.53" Long: -121° 52' 36.00" Datum: WGS 84

Soil Map Unit Name: CLEAR LAKE CLAY 0-2% NWI classification: NONE

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

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

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

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks: UPLAND SAMPLE POINT

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. NONE			
2.			
3.			
4.			
Total Cover: N/A			
Sapling/Shrub Stratum			
1. NONE			
2.			
3.			
4.			
5.			
Total Cover: N/A			
Herb Stratum			
1. TAENIATHRUM CAPUT-MEDUSAE	65%	X	NL
2. BROMUS SP.	10%		–
3. HORDEUM MARINUM	10%		FAC
4. TRIFOLIUM SP	10%		–
5. ERODIUM BOTRYS	5%		NL
6.			
7.			
8.			
Total Cover: 100%			
Woody Vine Stratum			
1. NONE			
2.			
Total Cover: N/A			

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

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 1 (B)

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

Prevalence Index worksheet:

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

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: EARLY SEASON - SEEDLINGS ONLY AT THIS TIME
TENTATIVE IDENTIFICATION AND COVER ESTIMATES

SOIL

Sampling Point: SP06

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/1	100%	–	–	–	–	CL	NO REDOX
12-23	10YR 4/1	100%	–	–	–	–	CL	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: N/E

Depth (inches): N/A

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

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

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: VACCA - DIXON 230 KV City/County: SOLANO Sampling Date: 2/4/08

Applicant/Owner: PG & E State: CA Sampling Point: SP07

Investigator(s): R. HUDDLESTON Section, Township, Range: S. 33 T. 05 N R 01E (MDM)

Landform (hillslope, terrace, etc.): TERRACE Local relief (concave, convex, none): NONE Slope (%): 0-1%

Subregion (LRR): C Lat: 38° 14' 25.54" Long: -121° 52' 34.45" Datum: WGS 84

Soil Map Unit Name: CLEAR LAKE CLAY 0-2% NWI classification: NONE

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

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

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

Hydrophytic Vegetation Present?	Yes X	No ____	Is the Sampled Area within a Wetland? Yes * No ____
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present? SEE NOTES	Yes *	No ____	PROBLEM AREA - POTENTIAL

Remarks: SHALLOW, WEAKLY EXPRESSED DEPRESSION, WETLAND EPHEMERAL HYDROLOGY - NOTABLE SHIFT IN PLANT COMMUNITY RELATIVE TO ADJACENT AREA

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. NONE			
2.			
3.			
4.			
Total Cover: N/A			
Sapling/Shrub Stratum			
1. NONE			
2.			
3.			
4.			
5.			
Total Cover: N/A			
Herb Stratum			
1. HORDEUM MARINUM	65%	X	FAC
2. PLAGIOBOTHRYS STIPITATUS	10%		OBL
3. TRITELEIA HYACINTHINA	3%		FACW
4. RUMEX CRISPUS	3%		FACW-
5. ERODIUM BOTRYS	3%		NL
6.			
7.			
8.			
Total Cover: 85%			
Woody Vine Stratum			
1. NONE			
2.			
Total Cover: N/A			

% Bare Ground in Herb Stratum 15% % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

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

Prevalence Index worksheet:

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

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

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

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes X No ____

Remarks: EARLY SEASON - TENTATIVE IDENTIFICATION AND COVER BASED ON SEEDLINGS ONLY

SOIL

Sampling Point: SP07

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/2	98%+	10YR 3/3	<2%	C	M	CL	MANY FINE ROOTS
12-20	10YR 4/1	100%	–	–	–	–	CL	
20-22"	2.5Y 6/3-5/3	100%	–	–	–	–	C	HEAVY CLAY SOIL

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: CLAY LAYER

Depth (inches): 20"

Hydric Soil Present? Yes ___ No X

Remarks: NO HYDRIC SOIL INDICATORS AT THIS LOCATION - LOW VALUE COLOR AND LESS THAN 2% REDOX CONCENTRATIONS

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 2.75"

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___ SEE NOTES

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

Remarks: SHALLOW INUNDATION PRESENT AT THE TIME OF THE SURVEY, BUT THIS AREA WAS DRY ON 2/13/08

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: VACCA - DIXON 230KV City/County: SOLANO Sampling Date: 2/4/08

Applicant/Owner: PG & E State: CA Sampling Point: SP08

Investigator(s): R. HUDDLESTON Section, Township, Range: S.33 T.05N R01E (MDM)

Landform (hillslope, terrace, etc.): TERRACE Local relief (concave, convex, none): NONE Slope (%): 0-1%

Subregion (LRR): C Lat: 38° 14' 25.53" Long: -121° 52' 34.19" Datum: WGS 84

Soil Map Unit Name: CLEAR LAKE CLAY 0-2% NWI classification: NONE

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

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

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

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

Remarks: UPLAND SAMPLE POINT

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. NONE			
2.			
3.			
4.			
Total Cover: N/A			
Sapling/Shrub Stratum			
1. NONE			
2.			
3.			
4.			
5.			
Total Cover: N/A			
Herb Stratum			
1. ERODIUM BOTRYS	60%	X	NL
2. TAENIATHRUM CAPUT-MEDUSAE	40%	X	NL
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:			
Woody Vine Stratum			
1. NONE			
2.			
Total Cover: N/A			

% Bare Ground in Herb Stratum 0% % Cover of Biotic Crust N/A

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

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

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: EARLY SEASON - SEEDLINGS ONLY

SOIL

Sampling Point: SP08

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/2	98%	10YR 3/3	1%	C	M	CL	MANY FINE ROOTS
			7.5YR 4/4	1%	C	RC	CL	
2-12	10YR 4/2	97%	10YR 3/4	3%	C	M	CL	DISTINCT CONCENTRATIONS
12-18	10YR 4/1 +	100%					CL	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: N/E

Depth (inches): N/A

Hydric Soil Present? Yes X No ___

Remarks:

- SOILS AT THIS LOCATION MEET THE DEPLETED MATRIX INDICATOR - BUT NO EVIDENCE OF WETLAND HYDROLOGY AT THIS LOCATION

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): 7/8"

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): 7/8"

Wetland Hydrology Present? Yes ___ No X

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

Remarks: NO EVIDENCE OF WETLAND HYDROLOGY

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: VACCA - DIXON 230KV City/County: SOLANO Sampling Date: 2/13/08

Applicant/Owner: PG & E State: CA Sampling Point: SP09

Investigator(s): R. HUDDLESTON Section, Township, Range: S. 33 T. 05N R01E (MDM)

Landform (hillslope, terrace, etc.): TERRACE Local relief (concave, convex, none): NONE Slope (%): 0-1%

Subregion (LRR): C Lat: 38° 14' 24.59" Long: -121° 52' 33.58" Datum: WGS84

Soil Map Unit Name: CLEAR LAKE CLAY 0-2% NWI classification: NONE

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology X naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X	No ____
Hydric Soil Present?	Yes X	No ____
Wetland Hydrology Present?	Yes X	No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks: SHALLOW, WEAKLY EXPRESSED, GRASSY DEPRESSION, EPHEMERAL WETLAND HYDROLOGY

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. NONE			
2.			
3.			
4.			
Total Cover: N/A			
Sapling/Shrub Stratum			
1. NONE			
2.			
3.			
4.			
5.			
Total Cover: N/A			
Herb Stratum			
1. HORDEUM MARINUM	80%	X	FAC
2. PLAGIOBOTHRYS STIPITATUS	3%		OBL
3. TRITELIEA HYACINTHINA	1%		FACW
4. RUMEX CRISPUS	1%		FACW-
5.			
6.			
7.			
8.			
Total Cover: 85%			
Woody Vine Stratum			
1. NONE			
2.			
Total Cover: N/A			

% Bare Ground in Herb Stratum 15% % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

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

Prevalence Index worksheet:

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

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

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

__ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes X No ____

Remarks: EARLY SEASON SEEDLINGS - SPECIES IDENTIFICATION AND COVER ESTIMATES TENTATIVE AT THIS LOCATION

SOIL

Sampling Point: SP09

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/2	98%+	7.5YR 4/4	<2%	C	RC	CL	MANY FINE ROOTS
3-10	10YR 3/2	95%	7.5YR 4/4	5%	C	RC, M	CL	
10-16	10YR 3/2	–	–	–	–	–	C	HEAVY CLAY SOIL

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: CLAY SOILS

Depth (inches): 10"

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): 3	4/4/08
Water Table Present?	Yes ___	No X	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___	

Wetland Hydrology Present? Yes X No ___

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

Remarks: SHALLOW INUNDATION WAS OBSERVED AT THIS LOCATION ON 3/4/08 - BUT AREA WAS DRY ON 3/13/08

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: VACCA - DIXON 230KV City/County: SOLANO Sampling Date: 2/13/08

Applicant/Owner: PG & E State: CA Sampling Point: SP10

Investigator(s): R. HUDDLESTON Section, Township, Range: S. 33 T05N R01E (MDM)

Landform (hillslope, terrace, etc.): TERRACE Local relief (concave, convex, none): NONE Slope (%): 0-1%

Subregion (LRR): C Lat: 38°14' 24.63" Long: -121° 52' 33.36" Datum: WGS84

Soil Map Unit Name: CLEAR LAKE CLAY 0-2% NWI classification: NONE

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

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

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

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

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

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. NONE			
2.			
3.			
4.			
Total Cover: N/A			
Sapling/Shrub Stratum			
1. NONE			
2.			
3.			
4.			
5.			
Total Cover: N/A			
Herb Stratum			
1. ERODIUM BOTRYS	~~80%~~ 75%	X	NL
2. TAENIATHRUM CAPUT-MEDUSAE	20%	X	NL
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover: 95%			
Woody Vine Stratum			
1. NONE			
2.			
Total Cover: N/A			

% Bare Ground in Herb Stratum 5% % Cover of Biotic Crust N/A

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

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

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: EARLY SEASON SEEDLINGS ONLY

SOIL

Sampling Point: SP10

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/2	98%	7.5YR 4/4	2%	C	RC	FSL-CL	MANY FINE ROOTS
12-16	2.5Y 5/2	50%					C	
	2.5Y 4/2	50%					C	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: CLAY LAYER

Depth (inches): 12"

Hydric Soil Present? Yes ___ No X

Remarks: - SOME REDOX ALONG ROOTS - BUT NOT IN CLOSED DEPRESSION NOR DEPLETED MATRIX

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

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

Remarks: NO EVIDENCE OF WETLAND HYDROLOGY

Appendix C
Representative Photographs

Seasonal wetland – South of Pull Site 4 (in golf course west of Meridian Road)

Seasonal Wetlands north of Creed Road near guard structure location

Seasonal Wetland south of Creed Road north of Pull Site 12

Seasonal Wetland within Pull Site 12 south of Creed Road

Seasonal Wetland Soils at Sample Point SP09

Swale 01 in Golf Course west of Meridian Road

Swale 02 – south of Creed Road

Swale 05 – within Pull Site 12, south of Creed Road

Roadside Swale along Kilkenny Road

Drainage Ditch DD01 from stormwater outflow at Peabody substation – Pull Site 7

Roadside Ditch along west side of Meridian Road and adjacent Agricultural Ditch

Agricultural drainage north of Elmira Road – typical of agricultural drainages in the project area

Appendix B
Habitat Assessment for Federally-listed Plant Species

Potentially Occurring Special-status Plants
PG&E Vaca-Dixon 230kV Reconductoring Project

Common name *Scientific name*[1]	Listing Status[2] Federal	State	CNPS	Flowering Period	Habitat Preferences[3]	Potential to Occur within the Project Sites[4]
Ferris' milk-vetch *Astragalus tener* var. *ferrisiae*	-	-	1B.1	Apr-May	Meadows and seeps, valley and foothill grassland. 5-75m.	Nearest known location is < 9 miles NW of the project area.
Alkali milk-vetch *Astragalus tener* var. *tener*	-	-	1B.2	Mar-June	Playas, valley and foothill grassland, vernal pools; adobe clay. 1-60m.	Nearest known location is within the project transmission line corridor.
Heartscale *Atriplex cordulata*	-	-	1B.2	Apr-Oct	Chenopod scrub, meadows and seeps, valley and foothill grassland; saline or alkaline. 1-375m.	Nearest known location is < 1mile NW of the project area.
Brittlescale *Atriplex depressa*	-	-	1B.2	May-Oct	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland, vernal pools; alkaline, clay. 1-320m.	Nearest known location is < 0.75 mile NW of the project area.
San Joaquin spearscale *Atriplex joaquiniana*	-	-	1B.2	Apr-Oct	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland; alkaline. 1-835m.	Nearest known location is within the project transmission line corridor.
Vernal pool smallscale *Atriplex persistens*	-	-	1B.2	Jun-Oct	Vernal pools. 10-15m.	Nearest known location is < 0.75 mile NW of the project area
Big tarplant *Blepharizonia plumosa*	-	-	1B.1	Jul-Oct	Valley and foothill grassland. 30-505m.	Nearest known location is < 8miles S of the project area
Round-leaved filaree *California macrophylla*	-	-	1B.1	Mar-May	Cismontane woodland, valley and foothill grassland; clay. 15-1200m.	Nearest known location is < 8.5 miles S of the project area
Congdon's tarplant *Centromadia parryi* ssp. *congdonii*	-	-	1B.2	May-Oct (Nov)	Valley and foothill grassland. 1-230m.	Nearest known location is > 10 miles SW of the project area
Pappose tarplant *Centromadia parryi* ssp. *parryi*	-	-	1B.2	May-Nov	Chaparral, coastal prairie, meadows and seeps, marshes and swamps. 2-240m.	Nearest known location is within the project transmission line corridor
Hispid bird's-beak *Cordylanthus mollis* ssp. *hispidus*	FE	SR	1B.2	Jun-Sep	Meadows and seeps, playas, valley and foothill grassland. 1-155m.	Nearest known location is 0.25 mile W of the project area.

Common name *Scientific name*[1]	Listing Status[2] Federal	State	CNPS	Flowering Period	Habitat Preferences[3]	Potential to Occur within the Project Sites[4]
Hoover's cryptantha *Cryptantha hooveri*	-	-	1A	Apr-May	Inland dunes, valley and foothill grassland. 9-150m.	Nearest known location is < 8.5 miles S of the project area.
Recurved larkspur *Delphinium recurvatum*	-	-	1B.2	Mar-Jun	Chenopod scrub, cismontane woodland, valley and foothill grassland. 3-750m.	Nearest known location is < 3 miles W of the project area.
Dwarf downingia *Downingia pusilla*	-	-	2.2	Mar-May	Valley and foothill grassland, vernal pools. 1-445m.	Nearest known location is within the project transmission line corridor.
Diamond-petaled California poppy *Eschscholzia rhombipetala*	-	-	1B.1	Mar-Apr	Valley and foothill grassland; alkaline clay flats and slopes. 0-975m.	Nearest known location is < 8 miles SE of the project area.
Fragrant fritillary *Fritillaria liliacea*	-	-	1B.2	Feb-Apr	Cismontane woodland, coastal prairie, coastal scrub, valley and foothill grassland; often serpentine. 3-410m.	Nearest known location is < 2 miles E of the project area.
Adobe-lily *Fritillaria pluriflora*	-	-	1B.2	Feb-Apr	Chaparral, cismontane woodland, valley and foothill grassland. 60-705m.	Nearest known location is < 3 miles W of the project area.
Boggs lake hedge-hyssop *Gratiola heterosepala*	-	-	1B.2	Apr-Aug	Marshes and swamps, vernal pools. 10-2375m.	Nearest known location is < I mile W of the project area.
Brewer's western flax *Hesperolinon breweri*	-	-	1B.2	May-Jul	Chaparral, cismontane woodland, valley and foothill grassland (usually serpentinite). 30-900m.	Nearest known location is < 8 miles NW of the project area.
Wooly rose mallow *Hibiscus lasiocarpus*	-	-	2.2	Jun-Sep	Marhses and swamps. 0-120m.	Nearest known location is <7 miles NE of the project area.
Carquinez goldenbush *Isocoma arguta*	-	-	1B.1	Aug-Dec	Valley and foothill grassland. 1-20m.	Nearest known location is within the project transmission line corridor.
Northern California black walnut *Juglans hindsii*	-	-	1B.1	Apr-May	Riparian forest, riparian woodland. 0-440m.	Nearest known location is < 8 miles W of the project area, on the banks of the Sacramento River.
Contra Costa goldfields *Lasthenia conjugens*	FE	-	1B.1	Mar-Jun	Cismontane woodland, playas, valley and foothill grassland, vernal pools. 0-470m.	Nearest known location is < 0.25 miles SE of the project area.

Common name *Scientific name*[1]	Listing Status[2] Federal	State	CNPS	Flowering Period	Habitat Preferences[3]	Potential to Occur within the Project Sites[4]
Delta tule pea *Lathyrus jepsonii var. jepsonii*	-	-	1B.2	May-Jul (Sep)	Marshes and swamps. 0-4m.	Nearest known location is < 3 miles SW of the project area.
Legenere *Legenere limosa*	-	-	1B.1	Apr-Jun	Vernal pools. 1-880m.	Nearest known location is < 0.5 miles SW of the project area.
Heckard's pepper-grass *Lepidium latipes var. heckardii*	-	-	1B.2	Mar-May	Valley and foothill grassland. 10-200m.	Nearest known location is < 6.5 miles NE from the project area.
Wooly-headed lessingia Lessingia hololeuca	-	-	3.?	Jun-Oct	Broadleafed upland forest, coastal scrub, lower montane coniferous forest, valley and foothill grassland. 15-305m.	Nearest known location is > 10 miles E of the project area.
Mason's lilaeopsis *Lilaeopsis masonii*	-	-	1B.1	Apr-Nov	Marshes and swamps, riparian scrub. 0-10m.	Nearest known location is < 2 miles W of the project area.
Delta mudwort *Limosella subulata*	-	-	2.1	May-Aug	Marshes and swamps. 0-3m.	Nearest known location is < 4.5 miles from the project area.
Showy madia *Madia radiata*	-	-	1B.1	Mar-May	Cismontane woodland, valley and foothill grassland. 25-900m.	Nearest known location is > 10 miles from the project area.
Baker's navarretia *Navarretia leucocephala ssp. bakeri*	-	-	1B.1	Apr-Jul	Cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, vernal pools. 5-1740m.	Nearest known location is < 0.25 miles from the project area.
Colusa grass *Neostapfia colusana*	FT	SE	1B.1	May-Aug	Vernal pools (adobe, large). 5-200m.	Nearest known location is < 1 mile W of the project area.
San Joaquin Valley orcutt grass *Orcuttia inaequalis*	FT	SE	1B.1	Apr-Sep	Vernal pools. 10-755m.	Nearest known location is within the project transmission line corridor.
Bearded popcorn-flower *Plagiobothrys hystriculus*	-	-	1B.1	Apr-May	Valley and foothill grassland, vernal pools, vernal swales. 0-52m.	Nearest known location is < 0.5 miles W of the project area.
Eel-grass pondweed *Potamogeton zosteriformis*	-	-	2.2	Jun-Jul	Marhses and swamps. 0-1860m.	Nearest known location is > 10 miles from the project area.

Common name *Scientific name*[1]	Listing Status[2]			Flowering Period	Habitat Preferences[3]	Potential to Occur within the Project Sites[4]
	Federal	State	CNPS			
Side flowering skullcap *Scutellaria lateriflora*	-	-	2.2	Jul-Sep	Meadows and seeps, marshes and swamps. 0-500m.	Nearest known location is > 10 miles from the project area.
Suisun Marsh aster *Symphotrichium lentum*	-	-	1B.2	May-Nov	Marshes and swamps. 0-3m.	Nearest known location is < 1.5 miles W of the project area.
Showy Indian clover *Trifolium amoenum*	FE	-	1B.1	Apr-Jun	Coastal bluff scrub, valley and foothill grassland. 5-415m.	Nearest known location is within the project transmission line corridor.
Saline clover *Trifolium depauperatum var. hydrophilum*	-	-	1B.2	Apr-Jun	Marshes and swamps, valley and foothill grassland, vernal pools. 0-300m.	Nearest known location is < 1 mile SW of the project area.
Caper-fruited tropidocarpum *Tropidocarpum capparideum*	-	-	1B.1	Mar-Apr	Valley and foothill grassland; alkaline hills. 1-455m	Nearest known location is > 10 miles from the project area.
Solano grass *Tuctoria mucronata*	FE	SE	1B.1	Apr-Aug	Valley and foothill grassland, vernal pools. 5-10m	Nearest known location is < I mile NW of the project area.

1. Scientific nomenclature based on Hickman (1993) and Jepson Online Interchange (2008); common names from Hickman (1993), CalFlora (2008) and other sources.

2. Conservation status definitions are as follows:

U.S. Fish and Wildlife Service designations:

- FE Endangered: Any species in danger of extinction throughout all or a significant portion of its range.
- FT Threatened: Any species likely to become endangered within the foreseeable future.
- SC Species of concern: Other species of concern to the Service.
- SLC Species of local concern: Species of local or regional concern or conservation significance.

California Department of Fish and Game designations:

- SE Endangered: Any species in danger of extinction throughout all or a significant portion of its range.
- ST Threatened: Any species likely to become endangered within the foreseeable future.
- SR Rare: Any species

California Native Plant Society designations:

- 1B Plants rare, threatened or endangered in California and elsewhere.
- 2 Plants rare, threatened or endangered in California, but more common elsewhere.
- 3 Plants for which more information is needed – a review list.
- 4 Plants of limited distribution – a watch list.

California Native Plant Society threat categories:

- .1 Seriously endangered in California.

.2 Fairly endangered in California.
.3 Not very endangered in California.
.? Threat level not determined.

3. Habitat information from the California Native Plant Society's on-line Inventory of Rare and Endangered Plants of California (2008).

4. A plant species was determined to have potential to occur at the project site if its known or expected geographic range includes the vicinity of the project site, and if its known or expected habitat is represented within or near the project site.
Sources: CNPS 2008, CNDDB 2008, Jepson Online Interchange 2008).

Habitat Suitability Table
PG&E Vaca-Dixon 230kV Reconductoring Project
Habitat Assessment for Federally-listed plant species *Lasthenia, conjugens* (LACO), *Trifolium amoenum*(TRAM), *Neostapfia colusana* (NECO), *Orcuttia inaequalis*(ORIN) and *Tuctoria mucronata* (TUMU)

Map #	Location: Project Feature	Suitable Habitat Present for Federally-listed Plants?	Rationale
Map 1	Vaca-Dixon Substation, Tower 0/001 vicinity: 2 new pull sites & access road	No suitable habitat.	Landscaping; ruderal vegetation; degraded freshwater marsh vegetation.
Map 1	I-80 guard structures	No suitable habitat.	Landscaping; ruderal vegetation.
Map 1	Kilkenny Rd area: P-1, P-2, access road and guard structures	Suitable habitat for LACO, TRAM north of Kilkenny Rd. Very low probability of occurrence.	California annual grassland; ruderal vegetation; agriculture. Limited view of site during reconnaissance. Known location for LACO within approx. 5 miles (EO #36), for TRAM within approx. 2.5 miles (EO #12) (CNDDB 2008).
Map 2	Walnut Ave: guard structures	Suitable habitat for LACO, TRAM north and south of Walnut Ave. Very low probability of occurrence.	Rural residential; ruderal vegetation; agriculture. Known location for LACO within approx. 5 miles (EO #36), for TRAM within approx 2 miles (EO #12) (CNDDB 2008).
Map 2	Poplar Rd: guard structures	No suitable habitat.	Rural residential; ruderal vegetation; heavily grazed pasture.
Map 3	Maple Rd: guard structures	Suitable habitat for LACO, TRAM south of Maple Rd. Very low probability of occurrence.	California annual grassland; ruderal vegetation, rural residential; industrial. Known location for LACO within approx. 4 miles (EO #36), for TRAM within 2 miles (EO #12) (CNDDB 2008).
Map 4	Tower 002/016: F-1, access road (area accessed from Katleba Ln)	No suitable habitat.	Agriculture; ruderal vegetation; Ulatis Creek (channelized).
Map 5	Hawkins Rd: guard structures	No suitable habitat.	Planted trees; agriculture; ruderal vegetation; roadside irrigation ditch.
Map 6	Elmira Rd: guard structures	No suitable habitat.	Agriculture; ruderal vegetation; roadside irrigation ditch.

Map #	Location: Project Feature	Suitable Habitat Present for Federally-listed Plants?	Rationale
Map 7	Fry Rd X So Pacific RR: P-3, guard structures, access road	No suitable habitat.	Agriculture; ruderal vegetation; seasonally ponded areas with weedy, non-native plants.
Map 8	Meridian Rd, Cypress Lake Golf Course area: P-4, P-5, F-2, access road	Suitable habitat for LACO in vernal pool, south edge of golf course.	Landscaped (golf course); ruderal; agriculture. Vernal pool dominated by native plants: *Pleuropogon, Plagiobothrys, Callitriche, Eleocharis, Eryngium, Isoetes,* etc. Known location for LACO within approx. 2 miles (EO #36) (CNDDB 2008).
Map11	Meridian Rd X Hay Rd area: guard structures	No suitable habitat.	Agriculture; ruderal vegetation; seasonally ponded areas contain weedy, non-native plants.
Map 9	Vanden Rd X Canon Rd area: P-6, F-3, access road, guard structures	Suitable habitat for LACO, TRAM. Very low probability of occurrence.	California annual grassland (moderate to low quality); shallow seasonal wetlands; intermittent drainage with native freshwater marsh plants; ruderal vegetation. Known location for LACO within approx. 1 mile (EO # 24), for TRAM within approx. 0.25 mile (EO #13) (CNDDB 2008).
Map 10	Vanden Rd near Tower 003/019: guard structures	No suitable habitat.	California annual grassland (very low quality, some with *Baccharis*); ruderal vegetation; industrial.
Map 10	Peabody Substation area: P-7, guard structures	Suitable habitat for LACO, TRAM. Moderate probability of occurrence for LACO. Very low probability of occurrence for TRAM.	California annual grassland (moderate quality); shallow vernal pools and seasonal wetlands may be present; ruderal vegetation; planted trees. Known location for LACO within approx. 0.25 mile (EO # 24), for TRAM within approx 0.25 mile (EO #13) (CNDDB 2008).
Map 12	End of Meridian Rd area, vicinity of Tower 006/047: P-8, P-9, access roads	No suitable habitat.	Irrigated pasture; irrigation ditches; ruderal vegetation.
Map 13	End of Meridian Rd area, North of Tower 007/050: F-4, access road	No suitable habitat.	Irrigated pasture; ruderal vegetation; irrigation ditches.

Map #	Location: Project Feature	Suitable Habitat Present for Federally-listed Plants?	Rationale
Map 14 & 15	Tower 008/058X vicinity: P-10, P-11, F-5, access roads	Suitable habitat for TRAM in one area. Probability of occurrence very low.	California annual grassland; irrigated and/or tilled pasture; ruderal vegetation; ponded areas contain weedy, non-native plants. Known location for TRAM within approx. 4 miles (EO #12) (CNDDB 2008).
Map 16	North of Creed Rd, Tower 010/073 vicinity: guard structures, access road	Suitable habitat for LACO, TRAM. Moderate probability of occurrence for LACO. Low probability of occurrence for TRAM. Large vernal pools nearby are suitable habitat for NECO, ORIN, TUMU.	Vernal pools, including alkaline pools; California annual grassland (seasonally wet, high quality). Tower 010/073 located on Wilcox Ranch, managed by Solano Land Trust. Known location for LACO within approx. 3 miles (EO # 34), for TRAM within approx. 4 miles (EO #13), for NECO within approx. 0.75 mile (EO# 48), for ORIN within approx. 1.5 mile (EO #63), for TUMU within 1 mile (EO #2) (CNDDB 2008).
Map 17	South of Creed Rd: P-12, guard structures, access road	Suitable habitat for LACO, TRAM. Moderate probability of occurrence for LACO. Low probability of occurrence for TRAM.	Vernal pools; California annual grassland (seasonally wet, high quality). Known location for LACO within approx. 3 miles (EO #34), for TRAM within approx. 5 miles (EO #13) (CNDDB 2008).
Map 18	Sacramento Northern RR, N of Tower 012/083: guard structures	Suitable habitat for TRAM may be present. If suitable habitat is present, probability of occurrence is likely very low.	No access during reconnaissance. Aerial photo signature indicates habitat suitable for TRAM may occur. Nearest known location for TRAM within approx. 6 miles (EO# XX).
Map 18	Lambie Substation vicinity: P-13, P-14, access roads	Suitable habitat for LACO, TRAM. Probability of occurrence very low.	California annual grassland; vernal pools nearby along Lambie Rd. Known location for LACO within approx. 3 miles (EO #34), for TRAM within approx. 6 miles (EO #13) (CNDDB 2008).
Map 19	Mauds Ln vicinity: F-6	Suitable habitat for TRAM may be present. If suitable habitat is present, probability of occurrence is likely very low.	No access during reconnaissance. Aerial photo signature indicates habitat suitable for TRAM may occur. Nearest know location for TRAM within approx. 8 miles (EO #13) (CNDDB 2008).

Map #	Location: Project Feature	Suitable Habitat Present for Federally-listed Plants?	Rationale
Map 20	State Hwy 12 crossing: guard structures	Suitable habitat for LACO, TRAM. Probability of occurrence very low.	Agriculture; ruderal vegetation; vernal pools. In 2006, plants found in vernal pools included: *Downingia concolor, Lilaea scilloides, Plagiobothrys, Eryngium* sp.*, Alopecurus saccatus, Lythrum hyssopifolium*. Uplands nearby contained native plants. Known location for LACO within approx. 5 miles (EO #34), for TRAM within 8 miles (EO #13) (CNDDB 2008).
Map 20	Little Honker Bay Rd vicinity: P-15, F-7, guard structures, access road	No suitable habitat.	Agriculture; ruderal vegetation; remnant swales in planted wheat.
Map 21	Olsen Rd: guard structures	No suitable habitat.	Agriculture; ruderal vegetation.
Map 22	Olsen Rd vicinity, South of Tower 017/115: F-8	Suitable habitat for TRAM may be present. If suitable habitat is present, probability of occurrence is likely very low.	No access during reconnaissance. Aerial photo signature indicates habitat suitable for TRAM may occur. Nearest known location for TRAM within approx. 12 miles (EO #13) (CNDDB 2008).
Map 23	Birds Landing Rd: guard structures	Suitable habitat for TRAM north of Birds Landing Rd. Very low probability of occurrence.	California annual grassland; heavily grazed small pastures; ruderal vegetation. Nearest known location for TRAM within approx. 12 miles (EO #13) (CNDDB 2008).
Map 24	Birds Landing Substation vicinity: P-16, F-9	No suitable habitat.	Agriculture; large shallow vernal pool with some native plant species (*Eryngium* sp., *Plagiobothrys* sp.); pool also planted with wheat. [Nearest known location for LACO approx. 9 miles from site (EO# 34) (CNDDB 2008).]

Notes: 250' buffer zones (pull sites, fly sites, guard structures) or 12' buffer zones (access roads) included in analysis for all project features.
Sources:
Observations made during reconnaissance-level visits to project sites on February 29 and March 3, 2008.
California Natural Diversity Database. 2008. Element occurrence information for *Lasthenia conjugens, Trifolium amoenum, Neostapfia colusana, Orcuttia inaequalis* and *Tuctoria mucronata*.

P-0
000/001
P-0
IRRIGATION CANAL
IRRIGATION CANAL
INTERSTATE 80
RAMP
CEMENT LINED DRAINAGE DITCH
ELLSWORTH RD
VACA-PEABODY
000/001X
p-1.a
P-1
000/002
p-1.b
P-1
P-2
p-2.a
000/003
KILKENNY RD
IRRIGATION CANAL
VACA-PEABODY

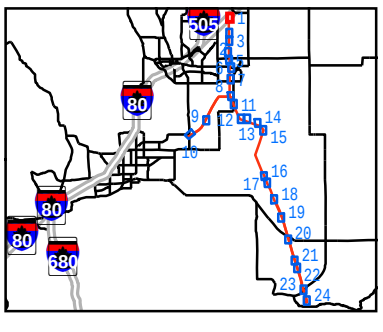
Pools
Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat
Potential Trifoleum amoenum habitat
Potential Lasthenia conjugens habitat
Direct Temporary Effects to Potential Lasthenia conjugens habitat
Indirect Temporary Effects to Known Lasthenia conjugens habitat
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
100' Work Area
Access Road 12 ' Disturbance
Guard Structures

Pacific Gas and Electric Company

Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
Map 1 of 24

N W E S
0 200 400 Feet



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000/007
WALNUT AVE
001/008
VACA-PEABODY
001/009
pop.g.a
POPLAR RD
POMBO LN
001/010

Pools
Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat
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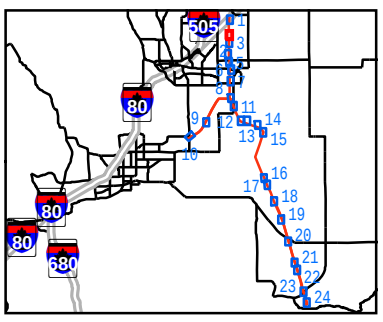
Pacific Gas and Electric Company

Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
Map 2 of 24

N W E S

0 200 400 Feet



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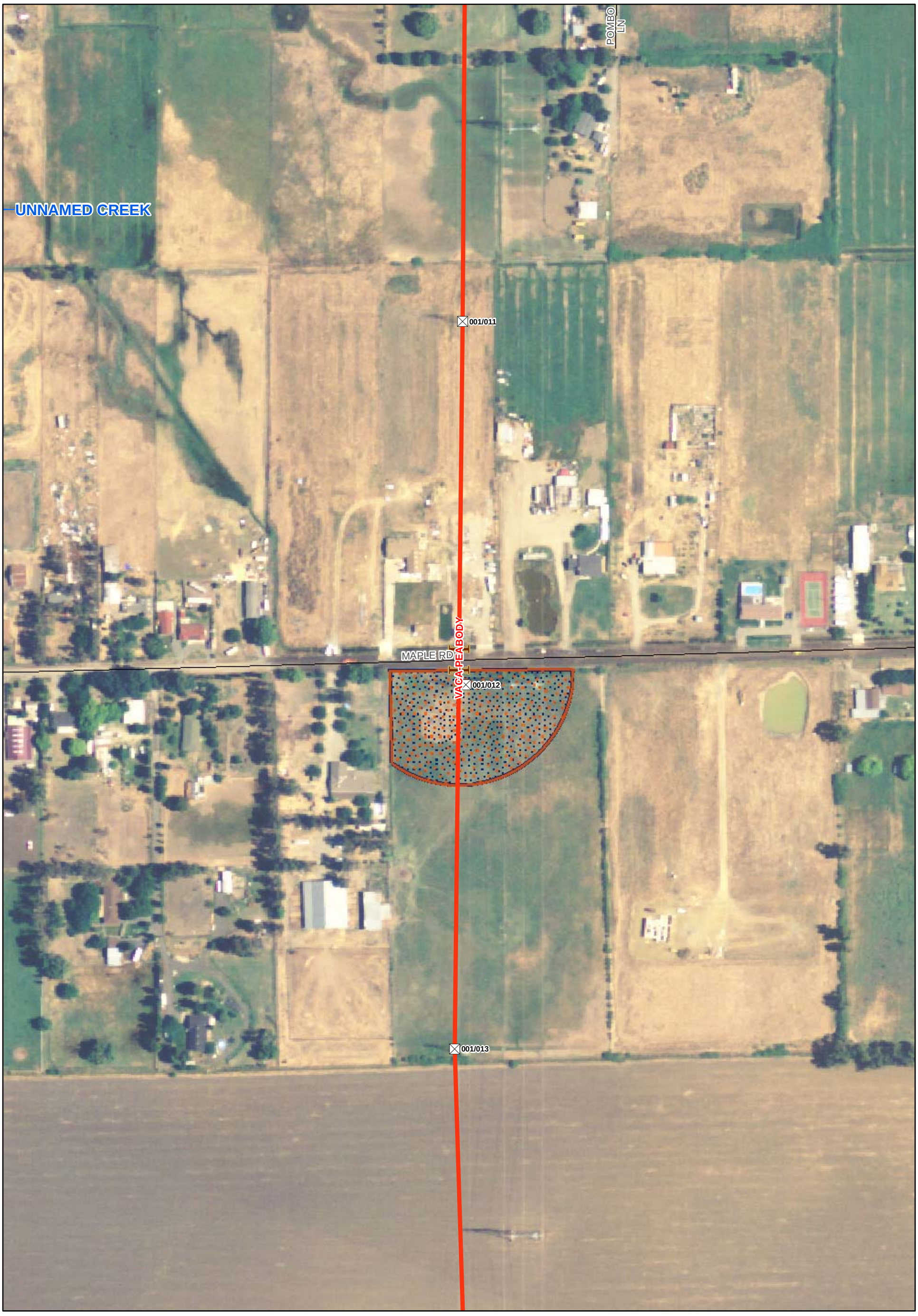

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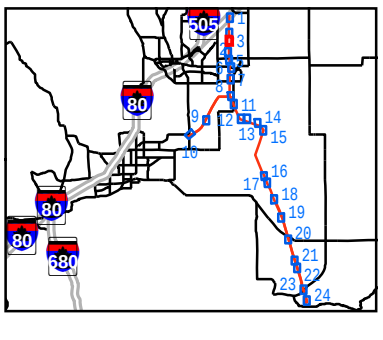
Pacific Gas and Electric Company

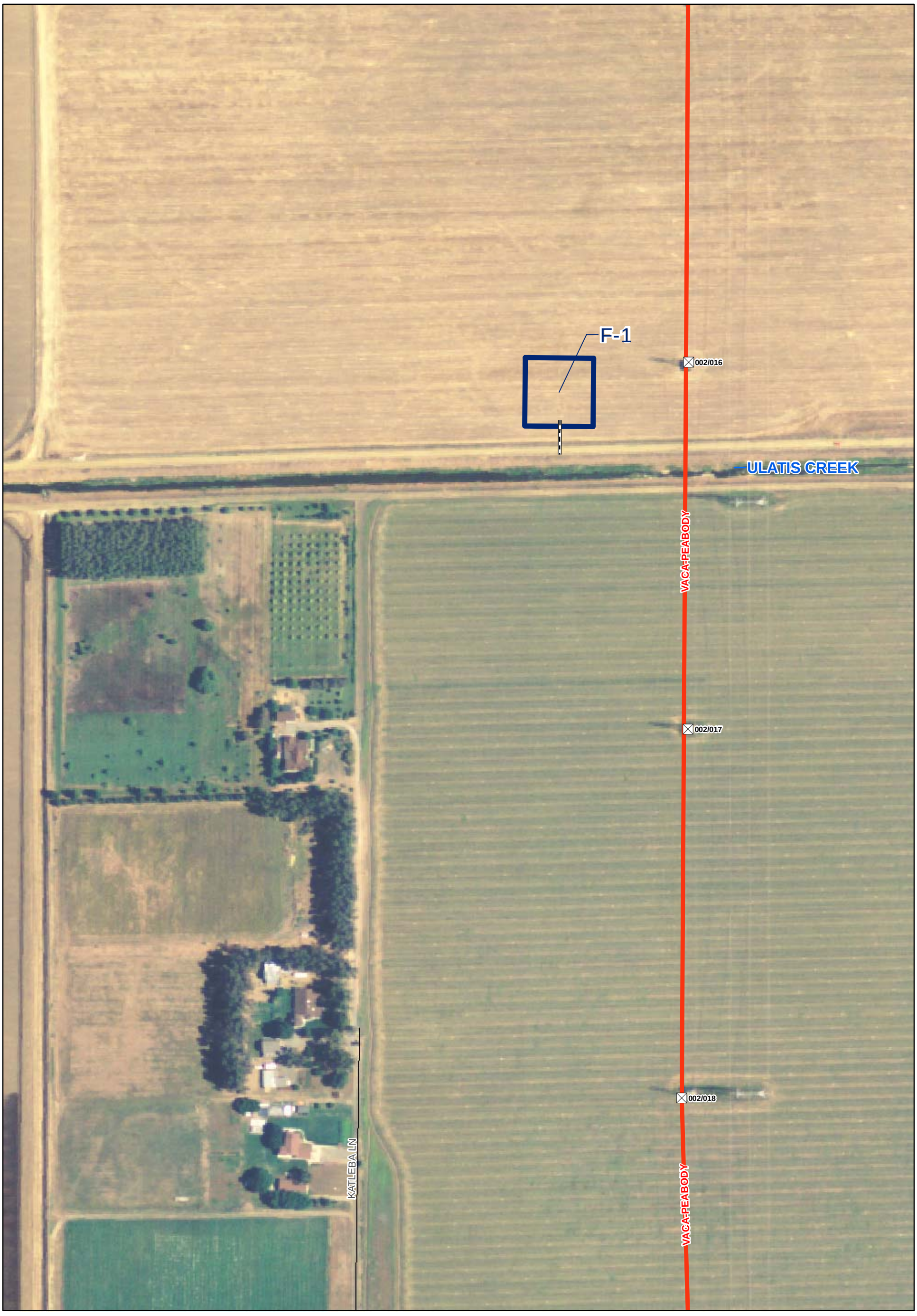
Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
Map 3 of 24

N W E S

0 200 400 Feet





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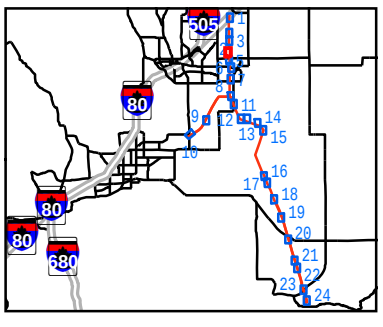
Pacific Gas and Electric Company

Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
Map 4 of 24

N W E S

0 200 400 Feet



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Guard Structures

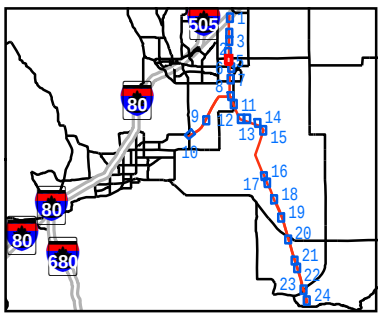
Pacific Gas and Electric Company

Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
Map 5 of 24

N W E S

0 200 400 Feet



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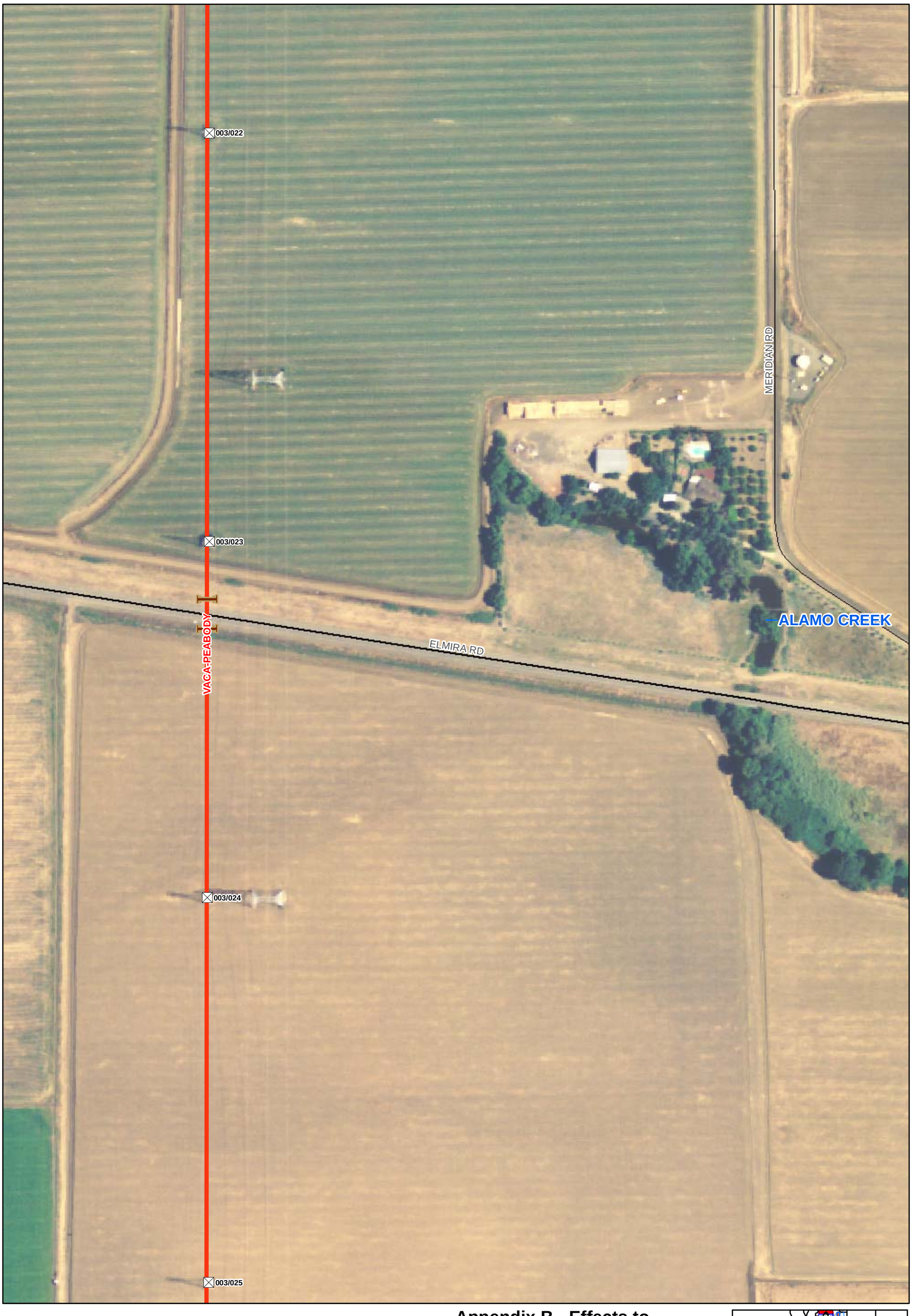

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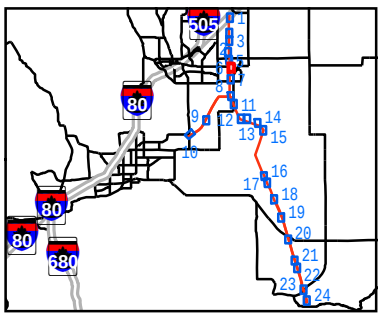
Pacific Gas and Electric Company

Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
Map 6 of 24

N W E S

0 200 400 Feet



IRRIGATION CANAL

RAILROAD TRACKS

IRRIGATION CANAL

004/027

P-3

VACA-PEABODY

004/028

Sp Railroad

fry.g.a-2

fry.g.a

004/029

FRY RD

IRRIGATION CANAL

MERIDIAN RD

AST

Pools

Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat

Potential Trifoleum amoenum habitat

Potential Lasthenia conjugens habitat

Direct Temporary Effects to Potential Lasthenia conjugens habitat

Indirect Temporary Effects to Known Lasthenia conjugens habitat

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Pull Site

Fly Site

100' Work Area

Access Road 12 ' Disturbance

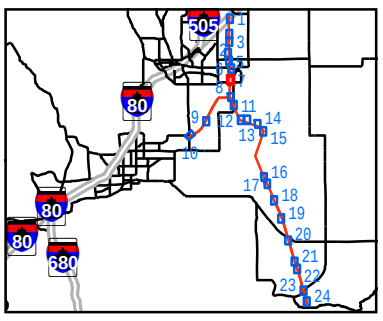
Guard Structures

Pacific Gas and Electric Company

Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
Map 7 of 24

0 200 400 Feet



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005/034
005/035
VACA-PEABODY
MERIDIAN RD
P-4
p-4.b
F-2
IRRIGATION CANAL
005/036
000/002
000/001
P-5
PEABODY-BIRDSLANDING SW STA
005/037

Pools
Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat
Potential Trifoleum amoenum habitat
Potential Lasthenia conjugens habitat
Direct Temporary Effects to Potential Lasthenia conjugens habitat
Indirect Temporary Effects to Known Lasthenia conjugens habitat
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
100' Work Area
Access Road
12 ' Disturbance
Guard Structures

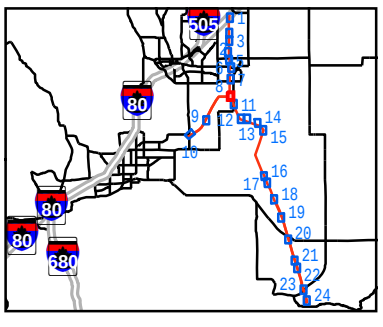
Pacific Gas and Electric Company

Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
Map 8 of 24

N W E S

0 200 400 Feet



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can.g.d
002/013
CANON RD
can.g.l
f-3.b
p-6.j
VANDEN RD
f-3.l
f-3.a
F-3
f-3.z
f-3.c
f-3.i
f-3.d-2
f-3.d
P-6
f-3.e
cor.road.b
RAILROAD TRACKS
p-6.g.a
cor.g.d-1
cor.g.d-2
f-3.j
f-3.z-2
cor.g.c
p-6.g.c
002/014
p-6.g.d
cor.road.a
UNION CREEK
p-6.g.f
p-6.g.h
p-6.g.g
cor.g.a
cor.g.b
RAILROAD TRACKS

Pools
Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat
Potential Trifoleum amoenum habitat
Potential Lasthenia conjugens habitat
Direct Temporary Effects to Potential Lasthenia conjugens habitat
Indirect Temporary Effects to Known Lasthenia conjugens habitat
Structures
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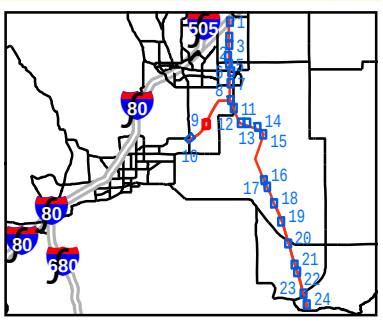
ESA Fence

Pacific Gas and Electric Company

Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
Map 9 of 24

N W E S
0 200 400 Feet



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Pools
Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat
Potential Trifoleum amoenum habitat
Potential Lasthenia conjugens habitat
Direct Temporary Effects to Potential Lasthenia conjugens habitat
Indirect Temporary Effects to Known Lasthenia conjugens habitat
Structures
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Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
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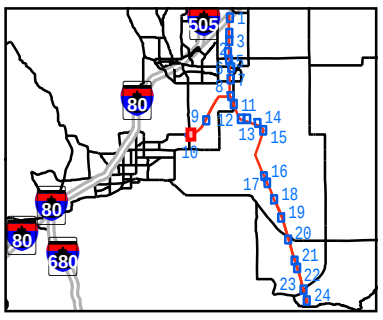
N W E S

0 250 500 Feet



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Pools
Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat
Potential Trifoleum amoenum habitat
Potential Lasthenia conjugens habitat
Direct Temporary Effects to Potential Lasthenia conjugens habitat
Indirect Temporary Effects to Known Lasthenia conjugens habitat
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Fly Site
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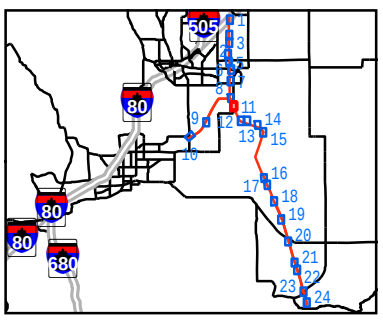
Pacific Gas and Electric Company

Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
Map 11 of 24

N W E S

0 200 400 Feet



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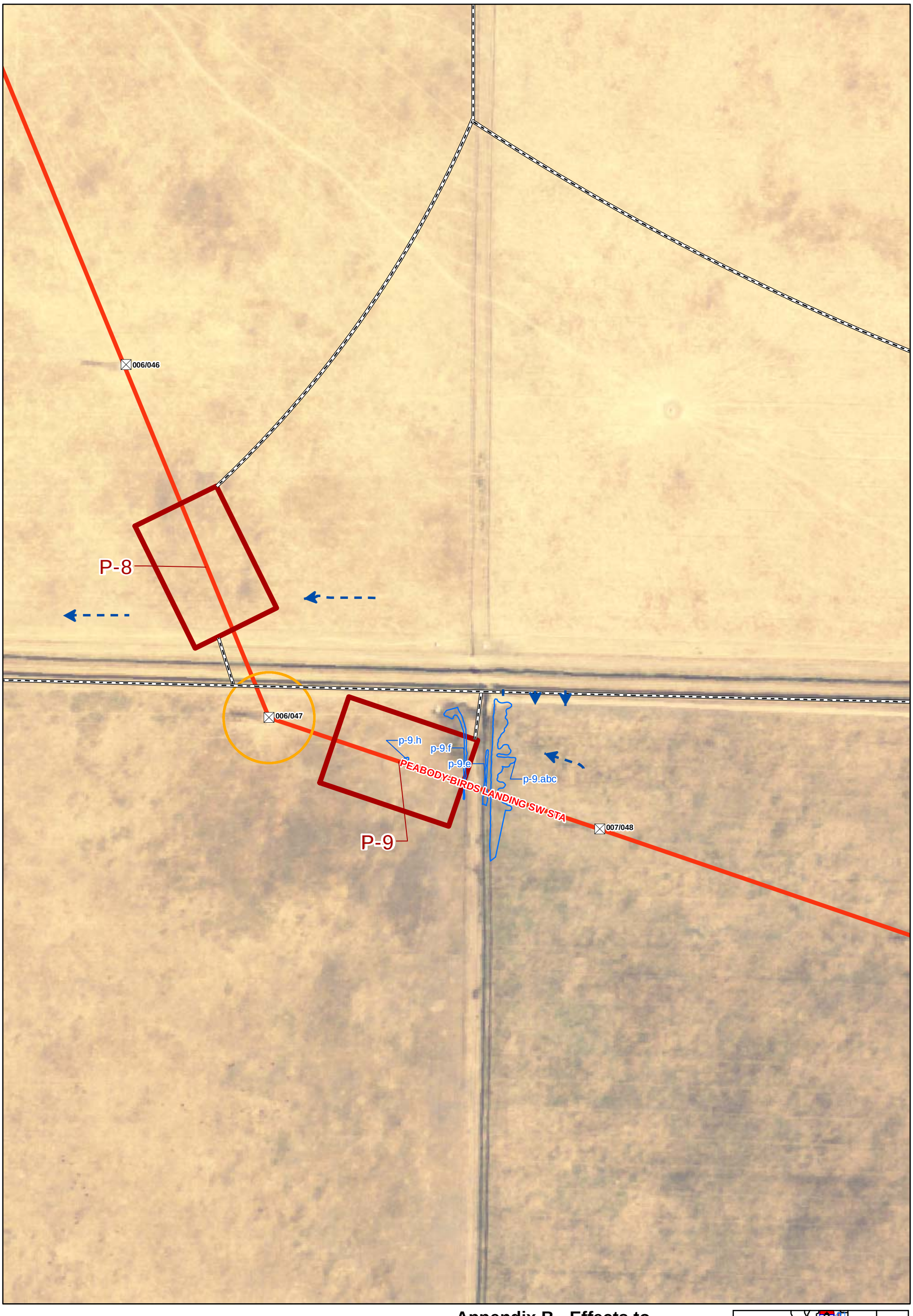

Pools
Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat
Potential Trifoleum amoenum habitat
Potential Lasthenia conjugens habitat
Direct Temporary Effects to Potential Lasthenia conjugens habitat
Indirect Temporary Effects to Known Lasthenia conjugens habitat
Structures
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Fly Site
100' Work Area
Access Road
12 ' Disturbance
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Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
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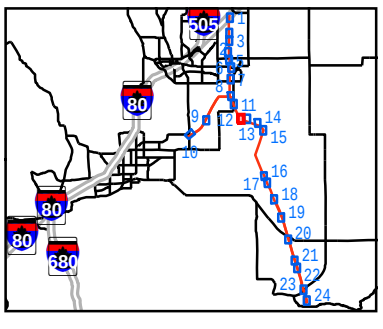
N W E S

0 200 400 Feet



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LINDSEY SLOUGH

F-4

IRRIGATION CANAL

007/050

007/051

PEABODY-BIRDS LANDING SW STA

007/052

Pools

Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat

Potential Trifoleum amoenum habitat

Potential Lasthenia conjugens habitat

Direct Temporary Effects to Potential Lasthenia conjugens habitat

Indirect Temporary Effects to Known Lasthenia conjugens habitat

Structures

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Fly Site

100' Work Area

Access Road

12 ' Disturbance

Guard Structures

Pacific Gas and Electric Company

Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report

Solano County, Ca

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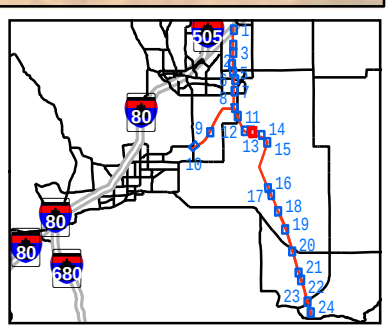
N W E S

0 200 400 Feet



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Pools
Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat
Potential Trifoleum amoenum habitat
Potential Lasthenia conjugens habitat
Direct Temporary Effects to Potential Lasthenia conjugens habitat
Indirect Temporary Effects to Known Lasthenia conjugens habitat
Structures
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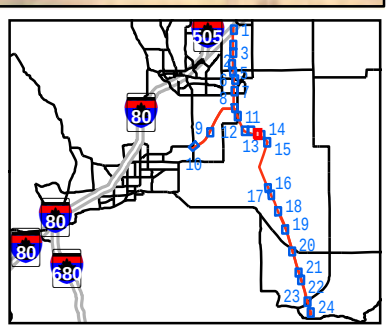
Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
Map 14 of 24

N W E S

0 200 400 Feet



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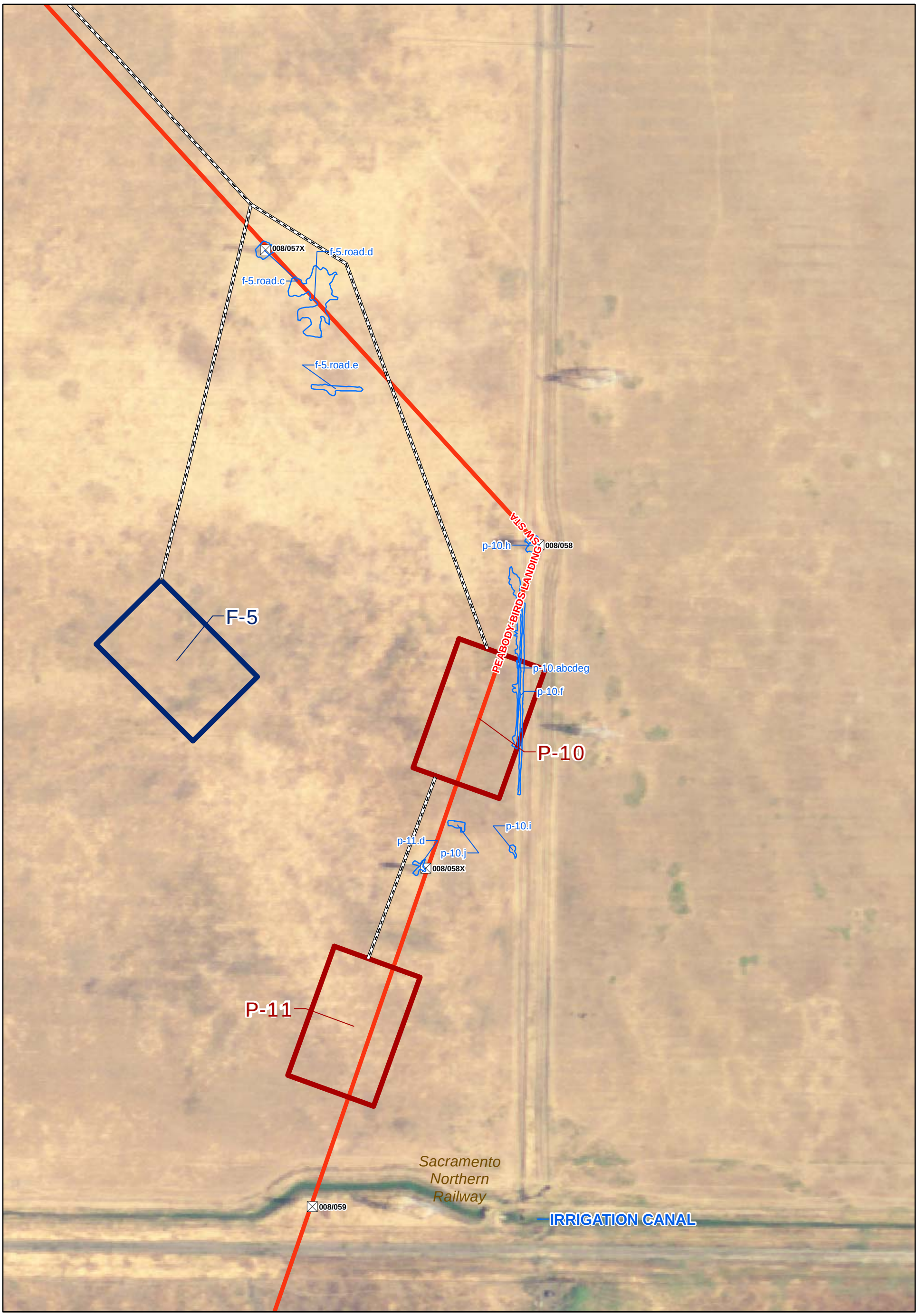

Pools
Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat
Potential Trifoleum amoenum habitat
Potential Lasthenia conjugens habitat
Direct Temporary Effects to Potential Lasthenia conjugens habitat
Indirect Temporary Effects to Known Lasthenia conjugens habitat
Structures
60kV Poles
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Pull Site
Fly Site
100' Work Area
Access Road
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Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
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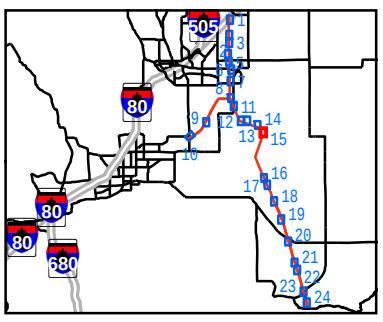
N W E S

0 200 400 Feet



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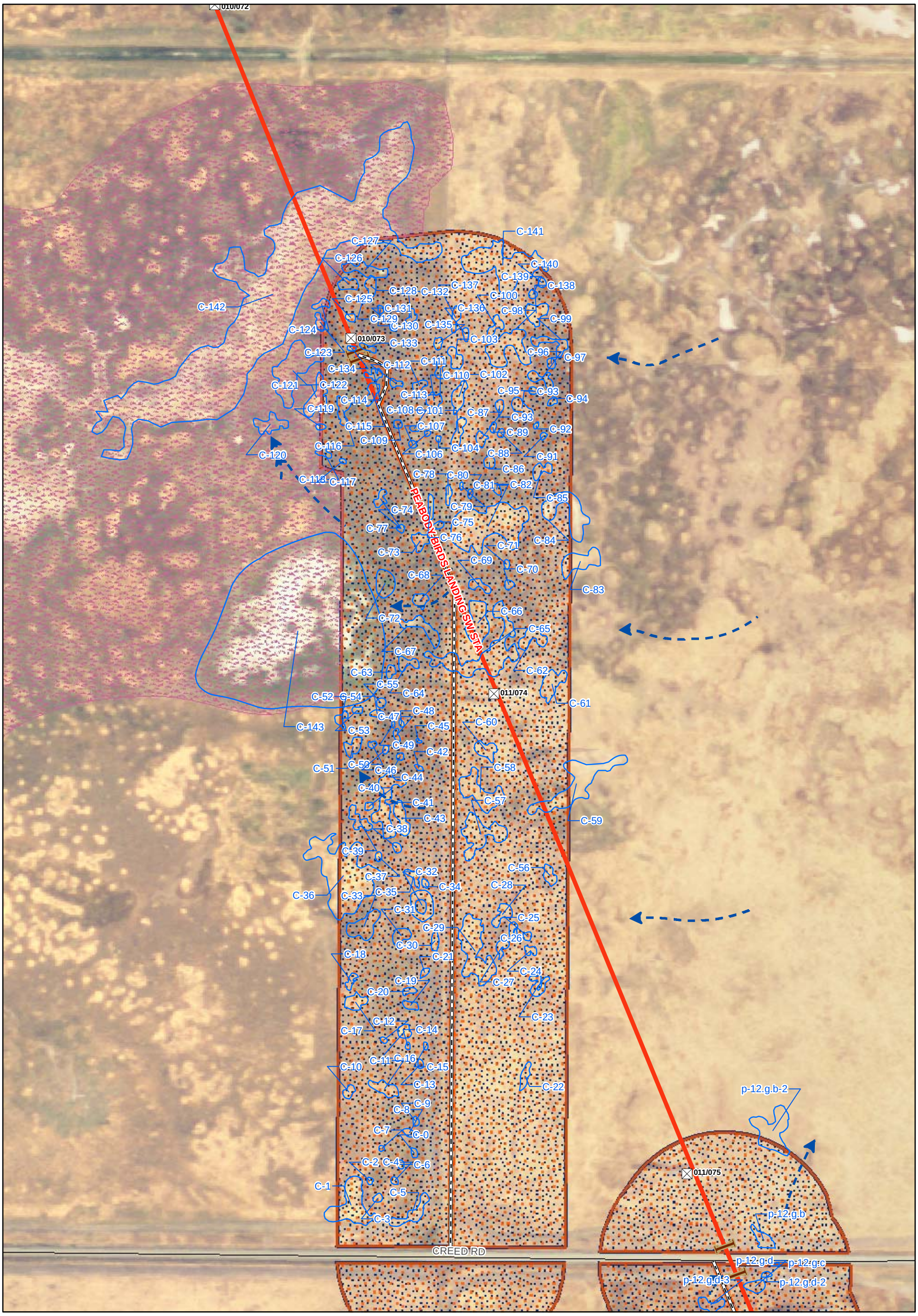

Pools

Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat

Potential Trifoleum amoenum habitat

Potential Lasthenia conjugens habitat

Direct Temporary Effects to Potential Lasthenia conjugens habitat

Indirect Temporary Effects to Known Lasthenia conjugens habitat

Structures

60kV Poles

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Fly Site

100' Work Area

Access Road 12 ' Disturbance

Guard Structures

Pacific Gas and Electric Company

Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
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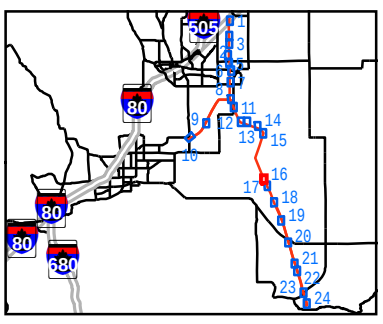
0 200 400 Feet



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c-22
p-12.g.b-2
011/075
p-12.g.b
CREED RD
p-12.g.d
p-12.g.c
p-12.g.d-3
p-12.g.d-2
011/076
p-12.b-2
p-12.b
p-12.b-3
p-12.b-5
p-12.c
PEABODY-BIRDSLANDING SW STA
P-12
011/077
011/078

Pools
Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat
Potential Trifoleum amoenum habitat
Potential Lasthenia conjugens habitat
Direct Temporary Effects to Potential Lasthenia conjugens habitat
Indirect Temporary Effects to Known Lasthenia conjugens habitat
Structures
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Pull Site
Fly Site
100' Work Area
Access Road
12 ' Disturbance
Guard Structures

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Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
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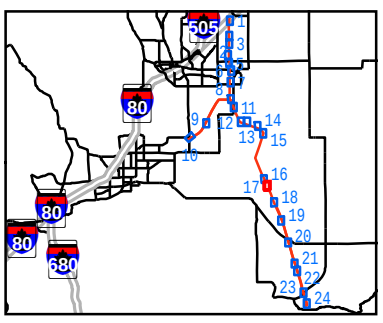
N W E S

0 200 400 Feet



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p-13.g.b
012/083
RAILROAD TRACKS
Sacramento Northern Railroad
p-13.road
PEABODY-BIRDS LANDING SW STA
012/084
p-13.b
p-13.a
P-13
012/085
LAMBIE SUBSTATION
P-14
012/086
LAMBIE
LAMBIE RD

Pools
Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat
Potential Trifoleum amoenum habitat
Potential Lasthenia conjugens habitat
Direct Temporary Effects to Potential Lasthenia conjugens habitat
Indirect Temporary Effects to Known Lasthenia conjugens habitat
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
100' Work Area
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12 ' Disturbance
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Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
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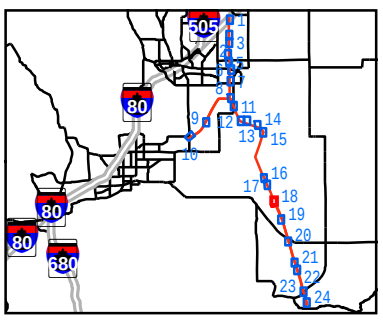
N W E S

0 200 400 Feet



013/091

013/092

014/093

F-6

MAUDS LN

014/094

Pools

Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat

Potential Trifoleum amoenum habitat

Potential Lasthenia conjugens habitat

Direct Temporary Effects to Potential Lasthenia conjugens habitat

Indirect Temporary Effects to Known Lasthenia conjugens habitat

Structures

60kV Poles

Transmission Lines

Pull Site

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100' Work Area

Access Road

12 ' Disturbance

Guard Structures

Pacific Gas and Electric Company

Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report

Solano County, Ca

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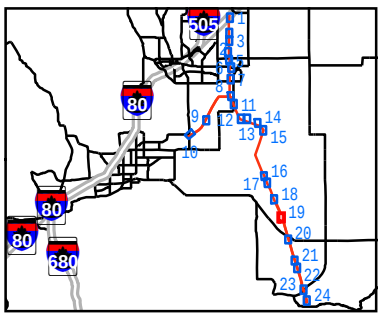
N W E S

0 200 400 Feet



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015/101
STATE HIGHWAY 12
sr12.g.a
sr12.g.b
015/102
P-15
p-15.g.a
LITTLE HONKER BAY RD
C-145
015/103
F-7

Pools
Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat
Potential Trifoleum amoenum habitat
Potential Lasthenia conjugens habitat
Direct Temporary Effects to Potential Lasthenia conjugens habitat
Indirect Temporary Effects to Known Lasthenia conjugens habitat
Structures
60kV Poles
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Pull Site
Fly Site
100' Work Area
Access Road
12 ' Disturbance
Guard Structures

Pacific Gas and Electric Company

Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
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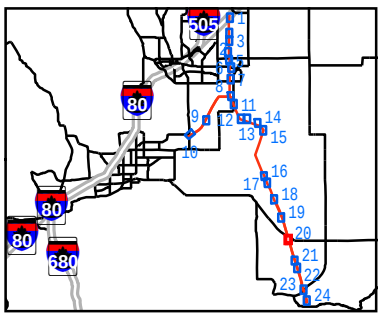
N W E S

0 200 400 Feet



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016/110

016/111

LAMBIE SW STA-CONTRA COSTA-PEABODY-BIRDS LANDING SW STA

016/112

01S.g.a

01S.g.b

OLSEN RD

017/113

Pools

Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat

Potential Trifoleum amoenum habitat

Potential Lasthenia conjugens habitat

Direct Temporary Effects to Potential Lasthenia conjugens habitat

Indirect Temporary Effects to Known Lasthenia conjugens habitat

Structures

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Access Road

12 ' Disturbance

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Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report

Solano County, Ca

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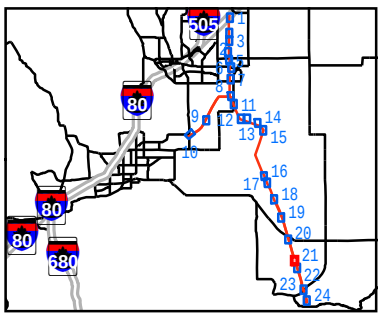
N W E S

0 200 400 Feet



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017/114

017/115

PEABODY-BIRDSLANDING SW STA-LAMBIE SW STA-CONTRA COSTA

F-8

f-8.a

017/116

017/117

Pools

Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat

Potential Trifoleum amoenum habitat

Potential Lasthenia conjugens habitat

Direct Temporary Effects to Potential Lasthenia conjugens habitat

Indirect Temporary Effects to Known Lasthenia conjugens habitat

Structures

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Fly Site

100' Work Area

Access Road 12 ' Disturbance

Guard Structures

Pacific Gas and Electric Company

Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
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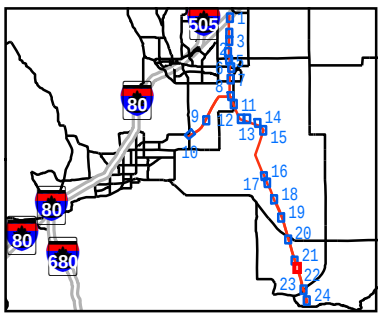
N W E S

0 200 400 Feet



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018/125

018/126

BIRDS LANDING RD

MONTEZUMA SLOUGH

019/127

Pools

Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat

Potential Trifoleum amoenum habitat

Potential Lasthenia conjugens habitat

Direct Temporary Effects to Potential Lasthenia conjugens habitat

Indirect Temporary Effects to Known Lasthenia conjugens habitat

Structures

60kV Poles

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Fly Site

100' Work Area

Access Road

12 ' Disturbance

Guard Structures

Pacific Gas and Electric Company

Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
Solano County, Ca
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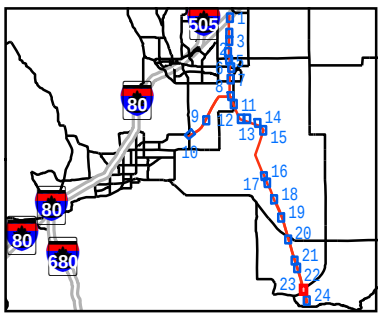
N W E S

0 200 400 Feet



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019/129

019/130

F-9

BIRDS
LANDING
SUBSTATION

f-9.a

P-16

019/131

PEABODY-BIRDS LANDING SW STA

Pools
Potential Neostapfia colusana, Orcuttia inaequalis, & Tuctoria mucronata habitat
Potential Trifoleum amoenum habitat
Potential Lasthenia conjugens habitat
Direct Temporary Effects to Potential Lasthenia conjugens habitat
Indirect Temporary Effects to Known Lasthenia conjugens habitat
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
100' Work Area
Access Road
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Guard Structures

Pacific Gas and Electric Company

Appendix B - Effects to Potential Rare Plant Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

Rare Plant Report
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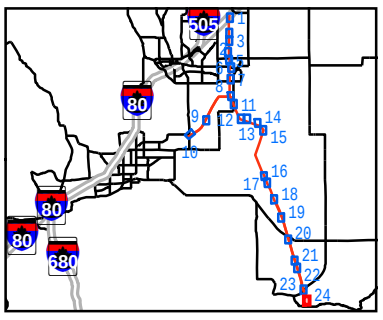
N W E S

0 200 400 Feet



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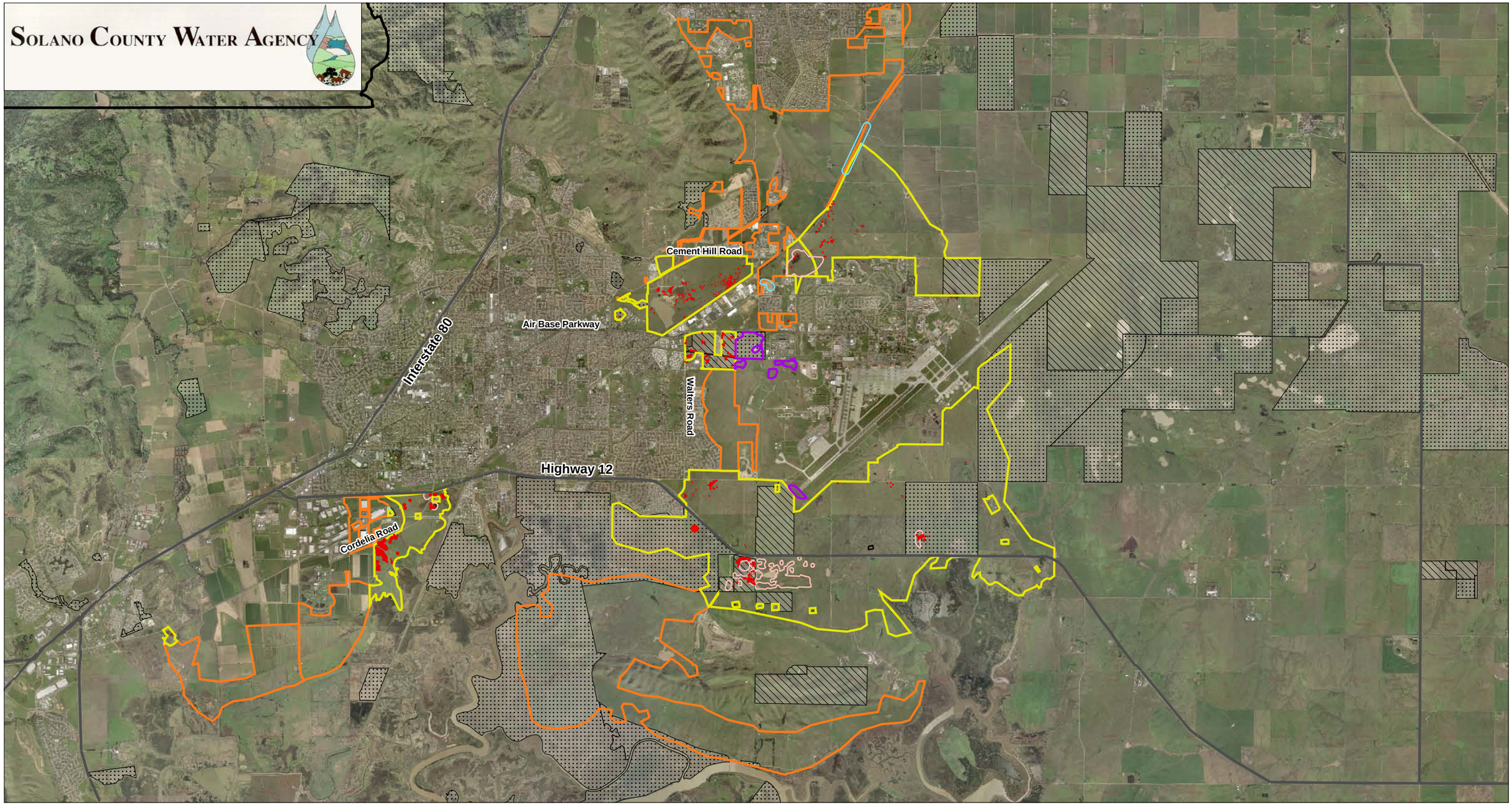


LSA

0 0.5 1
Miles

Reserve Areas
Potential Reserve Areas

Known Core Populations
Potential Habitat and Watershed/Corridor Areas
Contra Costa Goldfield Occurrence (Specific)
Contra Costa Goldfield Occurrence (General)

Other Presence/Absence Records (Primarily from CNDDB)
Presumed extirpated
Status Unknown
Presumed Present

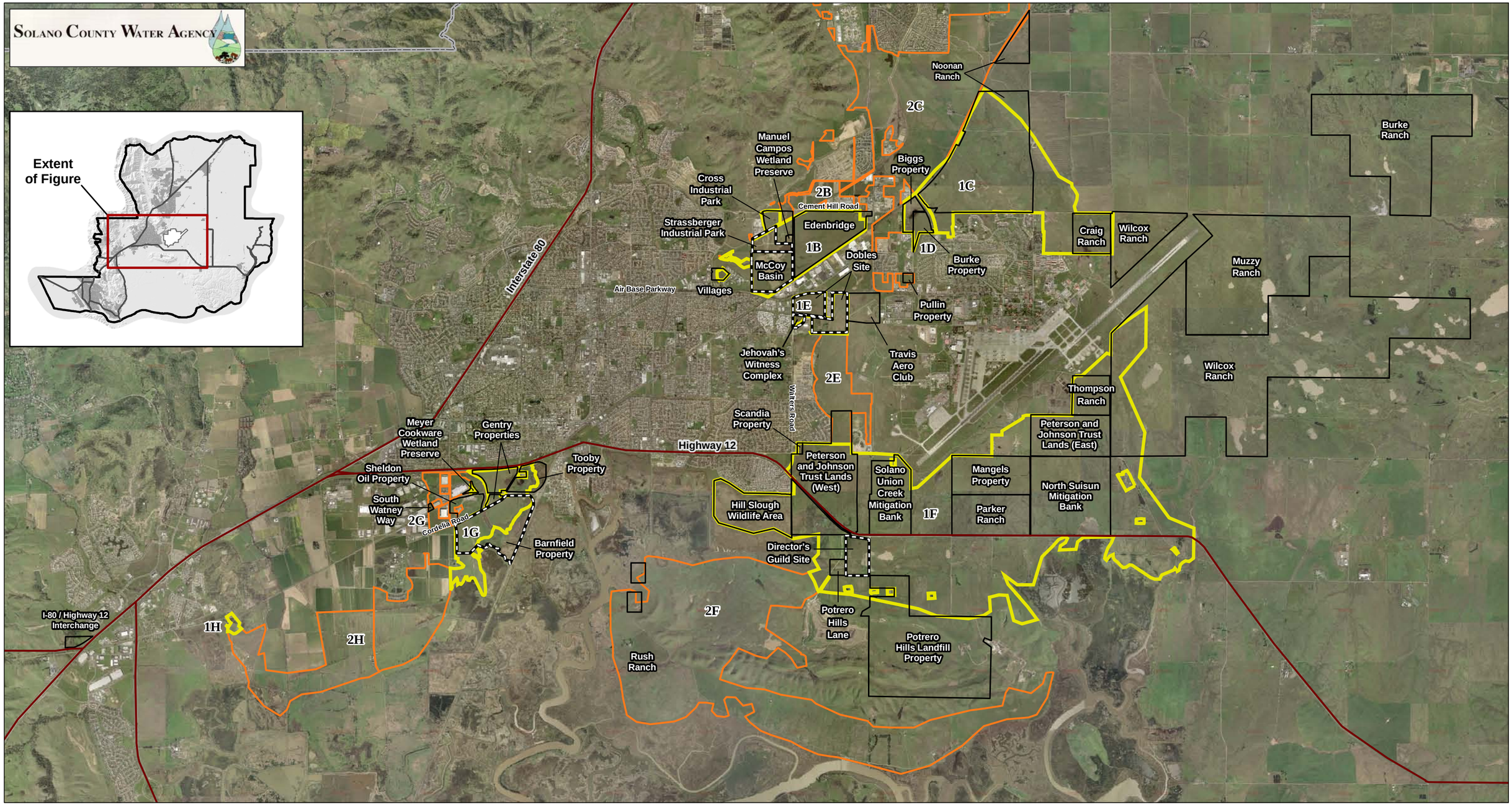
MAP 8

Contra Costa Goldfield Study
Solano County, California

Contra Costa Goldfields within Solano County

SOURCE: Aerial Imagery from the Solano County Water Agency (April, 2004)

I:\SCD0601\GIS\Maps\Section 6\Map8_GoldfieldOccurrences.mxd (11/06/2007)



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MAP 2

Contra Costa Goldfield Study
Solano County, California

Location of Study Sites

N

0 0.5 1
MILES

Major Roads

Area Surveyed for Contra Costa Goldfields

Population Estimate Study Sites

Known Core Populations

Potential Habitat and Watershed/Corridor Areas

1A Subarea Designation

SOURCE: Aerial Imagery from the Solano County Water Agency (2004)

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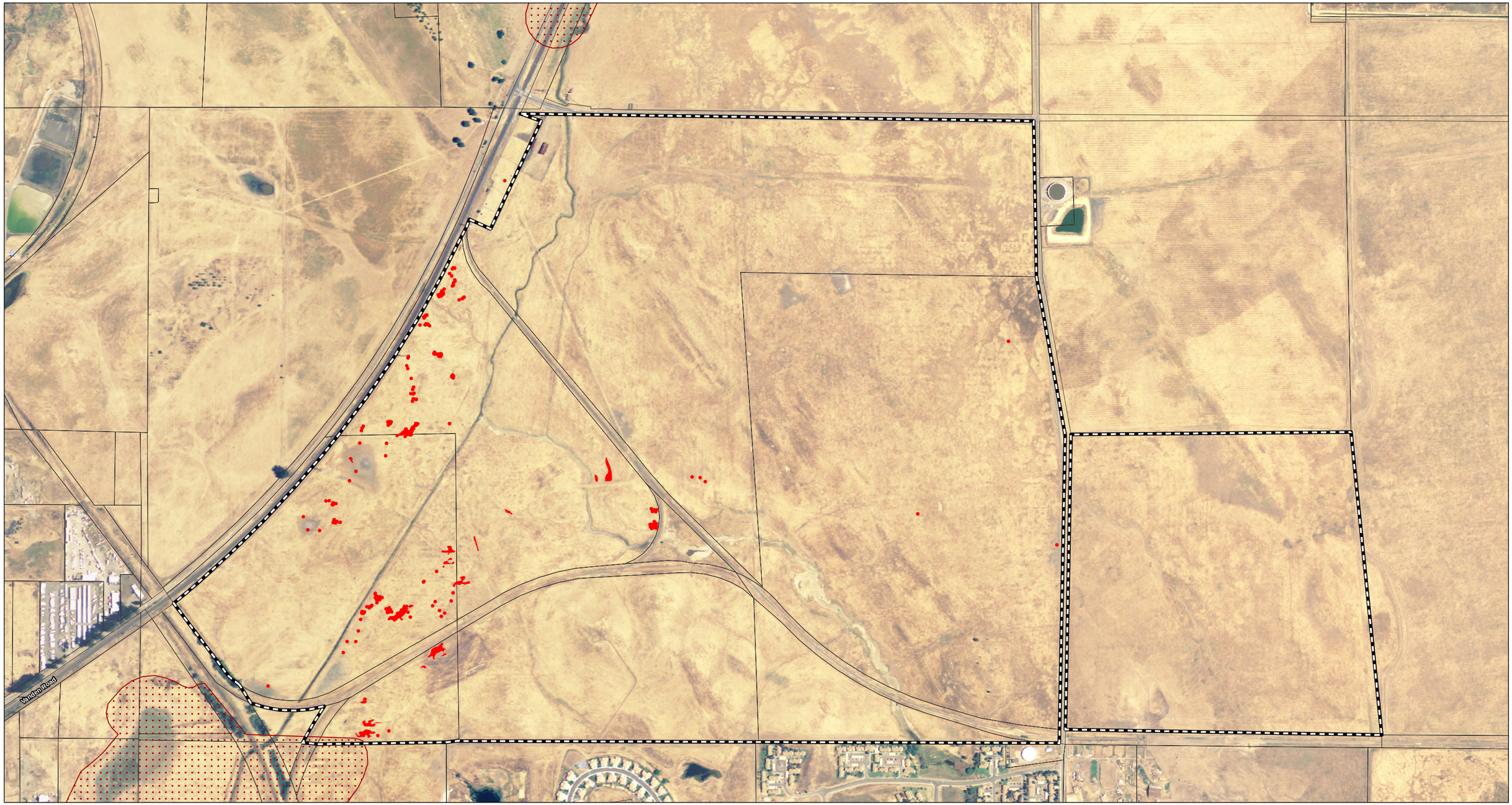

LSA

0 400 800
FEET

Noonan Property

Parcels

CNDDB Contra Costa Goldfield Occurrences

Other Contra Costa Goldfield Occurrences

Noonan Property

SOURCE: Aerial Imagery from the Solano County Water Agency (2004)

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Appendix C
Branchiopod Habitat Maps

CH2M HILL
155 Grand Ave, Suite 1000
Oakland, CA 94612
P. O. Box 12681
Oakland, CA 94604-2681
Tel 510.251.2426
Fax 510.622.9000

December 10, 2007

Ms. Michelle Tovar
U.S. Fish and Wildlife Service
2800 Cottage Way, Room W-2605
Sacramento, CA 95825

Subject: **Request for Permission to Perform One Wet Season Survey and One Dry Season Survey for Listed Vernal Pool Branchiopods for the Pacific Gas and Electric Vaca Dixon-Lambie-Birds Landing and Vaca Dixon-Peabody-Birds Landing 230 kV Lines**

Dear Ms. Tovar,

Pacific Gas and Electric Company (PG&E) is submitting, for your review, a request for permission to perform protocol- level surveys for listed vernal pool branchiopods in Solano County, California. PG&E proposes to reconductor approximately 50 circuit miles of power line from the Montezuma Hills area of Solano County to the Vaca-Dixon Substation near I-80 and the Peabody Substation near the town of Elmira. The objective of the Project is to accommodate the increased load generated by wind farms in the Montezuma Hills area of Solano County.

Proposed survey activity would include sampling for one full wet season and for one subsequent dry season pursuant to the guidelines provided in the April 19, 1996 *Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed vernal Pool Branchiopods*(guidelines). Surveys would be scheduled to begin as soon as conditions in the field provide the appropriate level of inundation (3 cm standing water 24 hours after a rain event) during the 2007/2008 season.

This linear project is located within the U.S. Geological Survey **Allendale, Elmira, Denverton, Birds Landing** and **Antioch North** 7.5-minute topographical quadrangles in Townships 7N, 6N, 5N, 4N and 3N respectively, and Range 1E and 1W (Map attached). Surveys would be performed in ponded basins, swales and drainage ditches located within the PG&E right-of-way, cross-country access roads and proposed staging areas. Surveys would also include a 250-foot radius adjacent to all areas proposed for ground disturbing activities. CH2M HILL biologists have performed a recent (dry) reconnaissance visit of the

CH2M HILL
155 Grand Ave, Suite 1000
Oakland, CA 94612
P. O. Box 12681
Oakland, CA 94604-2681
Tel 510.251.2426
Fax 510.622.9000

study area and have estimated that a maximum of 25 acres may be included in the survey effort, depending upon conditions at the time of inundation.

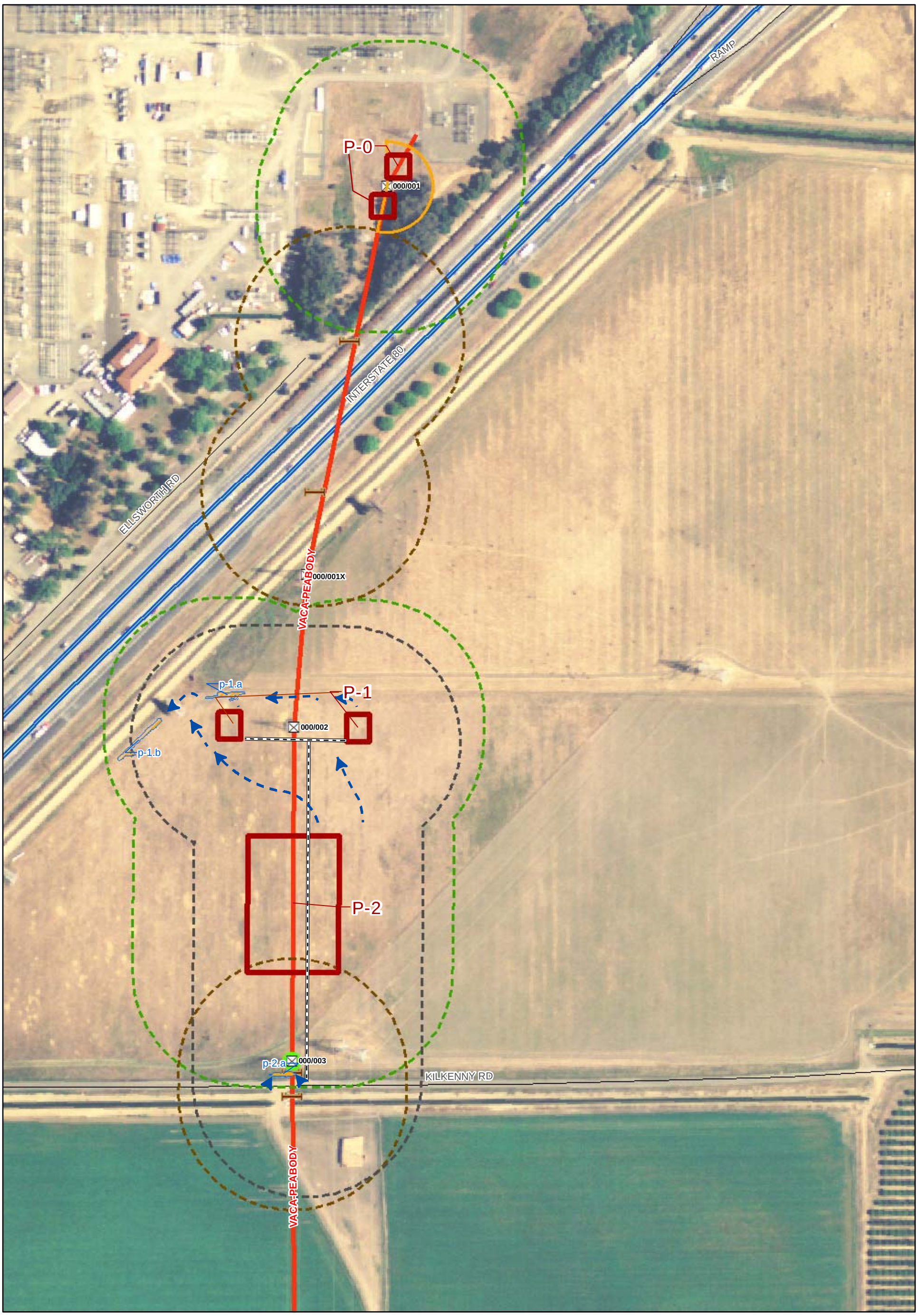
The personnel performing the proposed field surveys would be CH2M HILL biologists Daniel Weinberg (section 10(a)(1)(A) permit # TE081298-1), Ava Edens (section 10(a)(1)(A) permit # TE110382-0), Danielle Tannourji (section 10(a)(1)(A) permit # TE108093-0) and Russell Huddleston (section 10(a)(1)(A) permit # TE-054120-0). Helm Biological Consulting (principal Brent Helm {section 10(a)(1)(A) permit # TE795930-4}) would provide dry season sampling results.

The wet season survey results would be reported to the U.S. Fish and Wildlife Service, in the appropriate report format, within 90-days of completion. The subsequent dry season survey results would be reported to the U.S. Fish and Wildlife Service in an additional "90-day report" as provided by the guidelines. The biologists listed above would also coordinate with the California Department of Fish and Game to provide appropriate State Scientific Collection Permit information and to supply species presence data to the California Natural Diversity Data Base. Any voucher specimens would be deposited at the California Academy of Sciences in San Francisco, California.

If you have any questions or concerns about this survey request, please contact Sheila Byrne of PG&E at (925) 866-5987or Daniel Weinberg of CH2M HILL at (510) 587-7648. Thank you.

Sincerely,

Daniel Weinberg
Project Biologist



Potential Vernal Pool/Tadpole Shrimp Fairy Shrimp (VP/TS FS) Habitat
Temporary Indirect Effects to Potential VP/TS FS Habitat
Temporary Direct Effects to Potential VP/TS FS Habitat
Temporary Indirect Effects to Potential Conservation Fairy Shrimp (CFS) Habitat
Flow Lines
Berm

Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
250' Distance from Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance from Access Roads

100' Work Area
Guard Structures
250' Distance from Guard Structures
Vernal Pool Tadpole Shrimp Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
Conservation Fairy Shrimp Critical Habitat

Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 1 of 24

Pacific Gas and Electric Company

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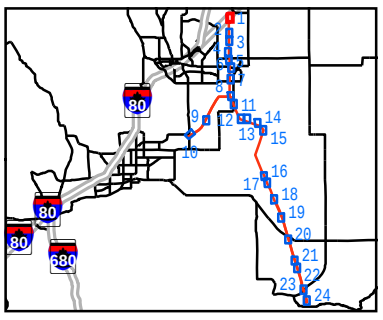

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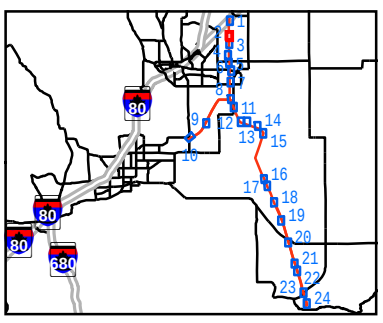
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 2 of 24

N W E S

0 100 200 400 Feet

Pacific Gas and Electric Company



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POMBO LN

001/011

MAPLE RD

001/012

VACA-PEABODY

001/013

Potential Vernal Pool/Tadpole Shrimp Fairy Shrimp (VP/TS FS) Habitat

Temporary Indirect Effects to Potential VP/TS FS Habitat

Temporary Direct Effects to Potential VP/TS FS Habitat

Temporary Indirect Effects to Potential Conservation Fairy Shrimp (CFS) Habitat

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Guard Structures

250' Distance from Guard Structures

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Conservation Fairy Shrimp Critical Habitat

Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment

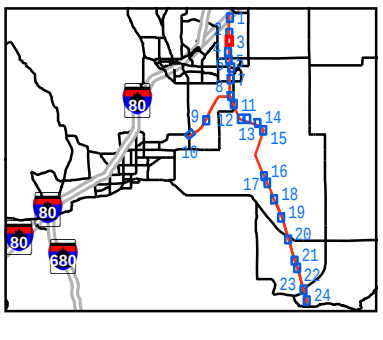
Solano County, CA

Map 3 of 24

N W E S

0 100 200 400 Feet

Pacific Gas and Electric Company.



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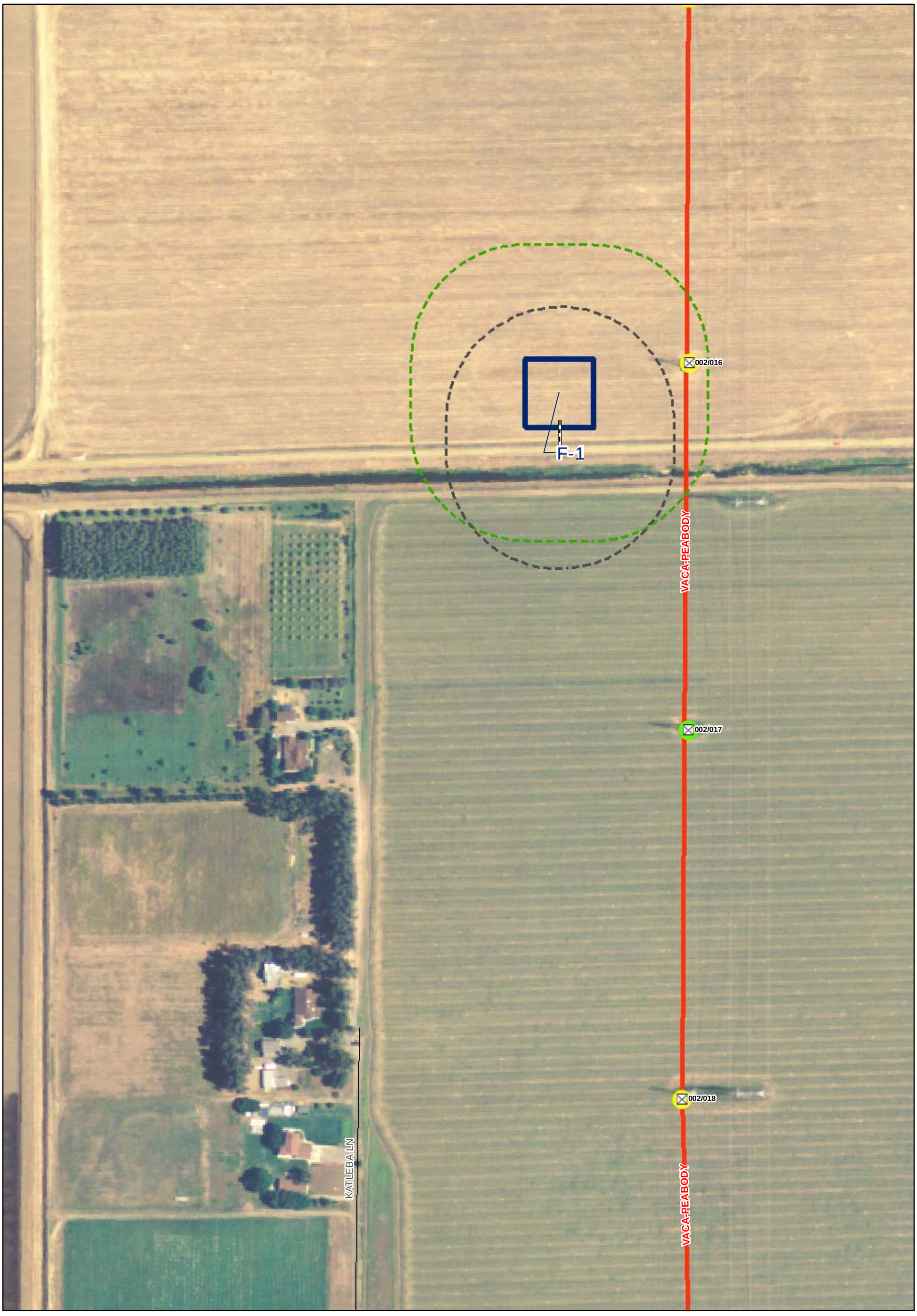

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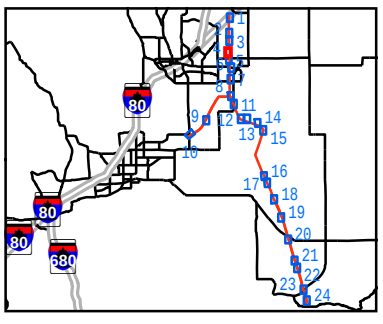
Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 4 of 24

Pacific Gas and Electric Company

0 100 200 400 Feet



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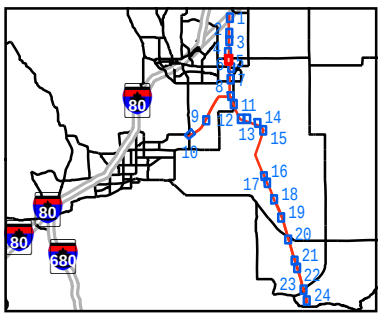
Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 5 of 24

N W E S

0 100 200 400 Feet

Pacific Gas and Electric Company



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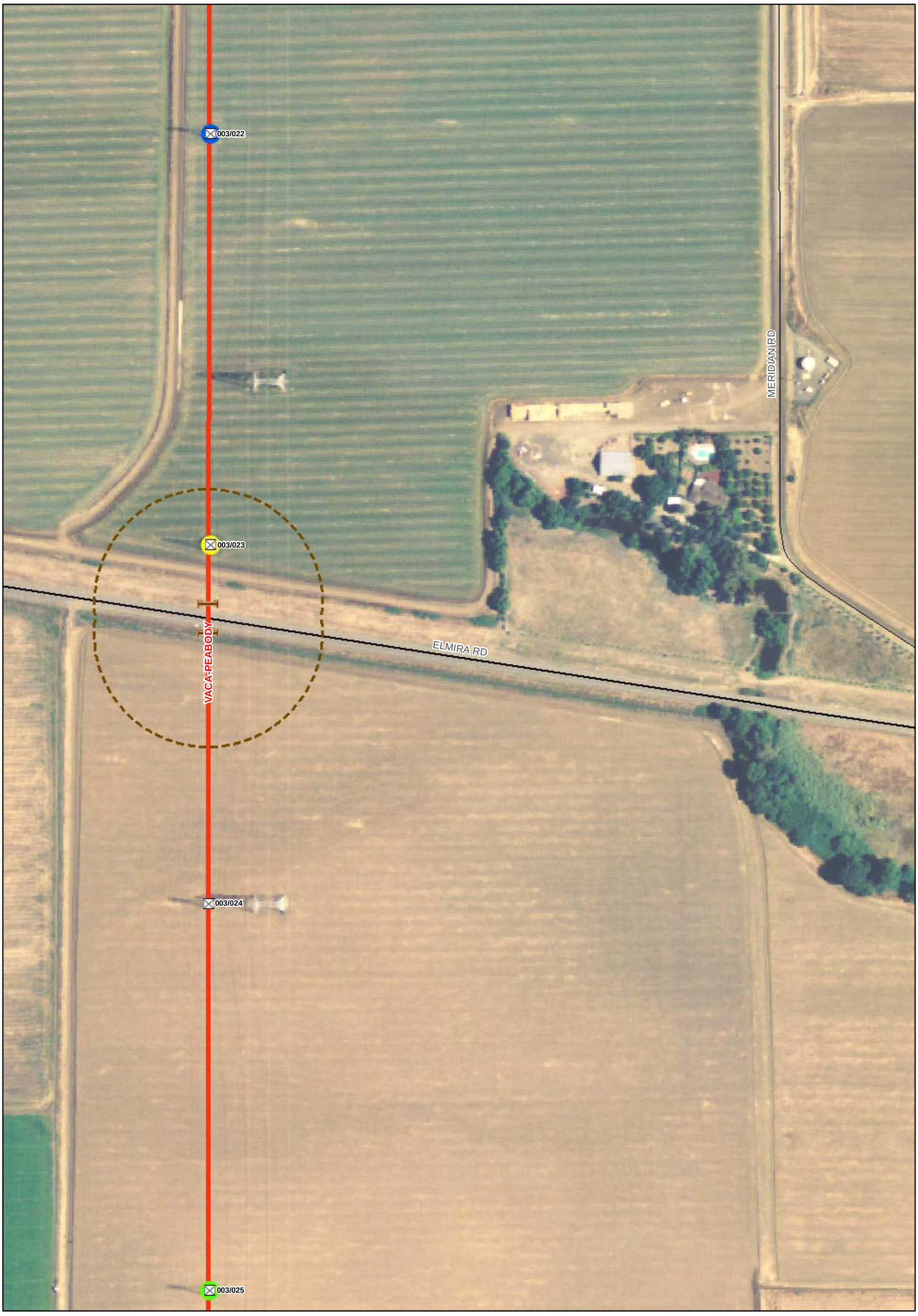

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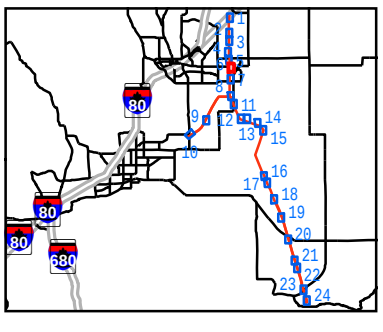
Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 6 of 24

N W E S

0 100 200 400 Feet

Pacific Gas and Electric Company



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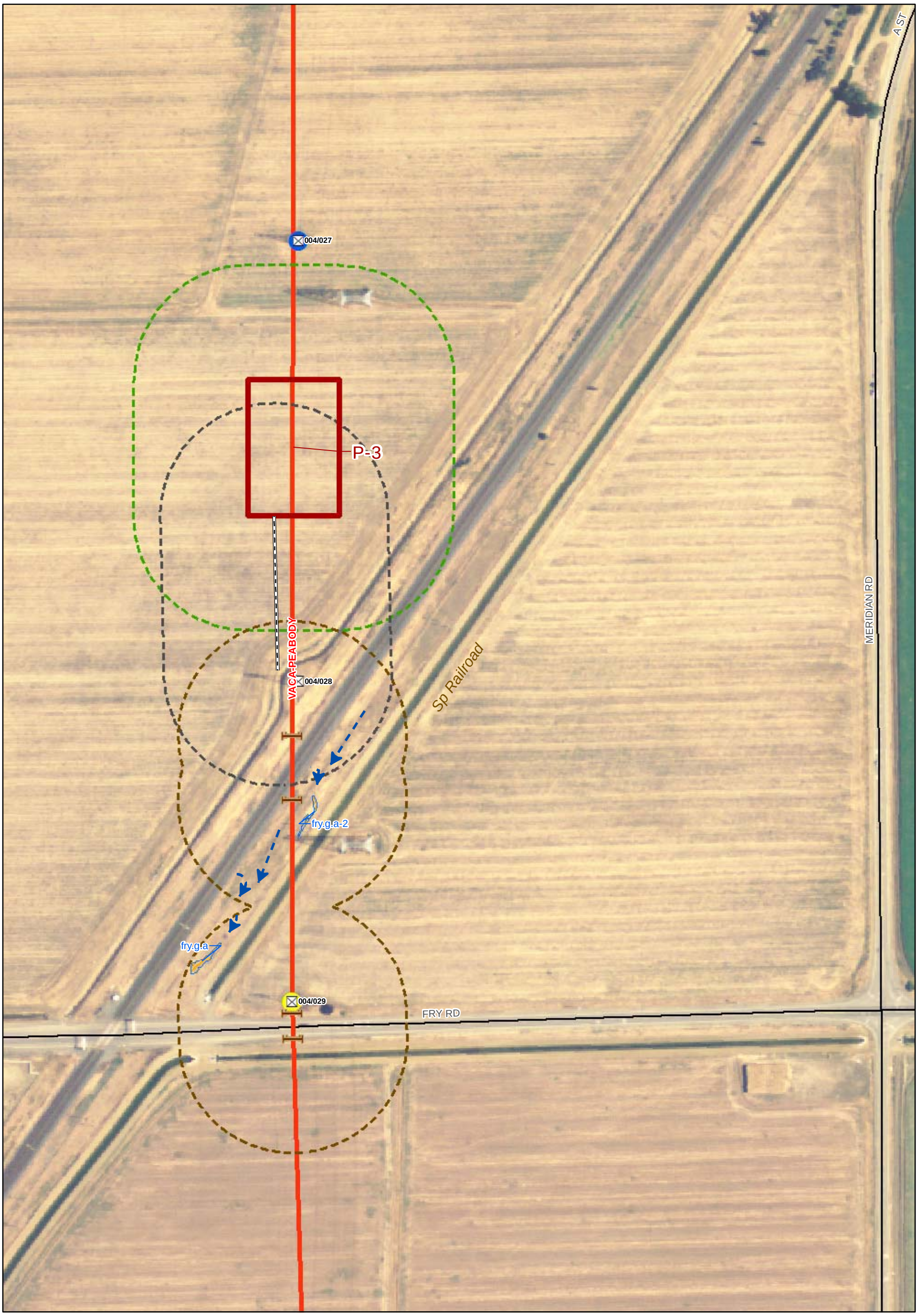

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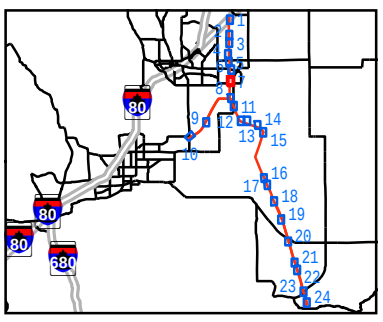
Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 7 of 24

N W E S

0 100 200 400 Feet

Pacific Gas and Electric Company.



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005/034
VACA-PEABODY
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p-4.b
F-2
005/036
000/002
000/001
P-5
PEABODY-BIRDS LANDING SW STA
005/037
MERIDIAN RD
UNKN

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Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 8 of 24

N W E S

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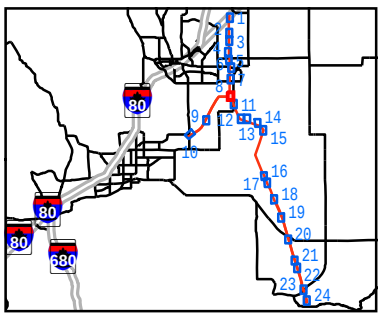
Pacific Gas and Electric Company



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002/013
CANON RD
can.g.l
Snr
VANDEN RD
p-6.j
f-3.b
f-3.l
f-3.a
f-3.z
f-3.c
f-3.d-2
f-3.d
f-3.i
F-3
P-6
f-3.e
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p-6.g.a
cor.road.b
f-3.j
f-3.z-2
cor.g.d-1
p-6.g.c
cor.g.c
002/014
Berm,
Hydrology
Obstruction
p-6.g.f
p-6.g.d
cor.road.a
p-6.g.h
p-6.g.g
cor.g.a
cor.g.b

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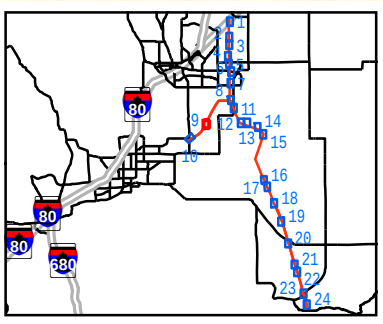
Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 9 of 24

Pacific Gas and Electric Company

0 100 200 400 Feet



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PEABODY RD
CEMENT HILL RD
VANDEN RD
003/019
003/020
003/021
Peabody Substation
Snrr
p-7.a
p-7.c
003/022A
003/022B
p-7.b
SARO LN
UNKN
MARKELEY LN
RAMP

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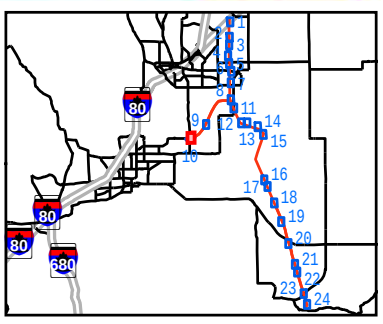
Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 10 of 24

Pacific Gas and Electric Company

0 125 250 500 Feet



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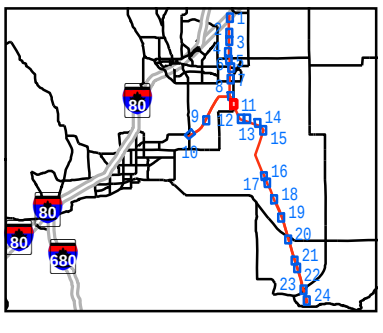
Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 11 of 24

Pacific Gas and Electric Company

0 100 200 400 Feet



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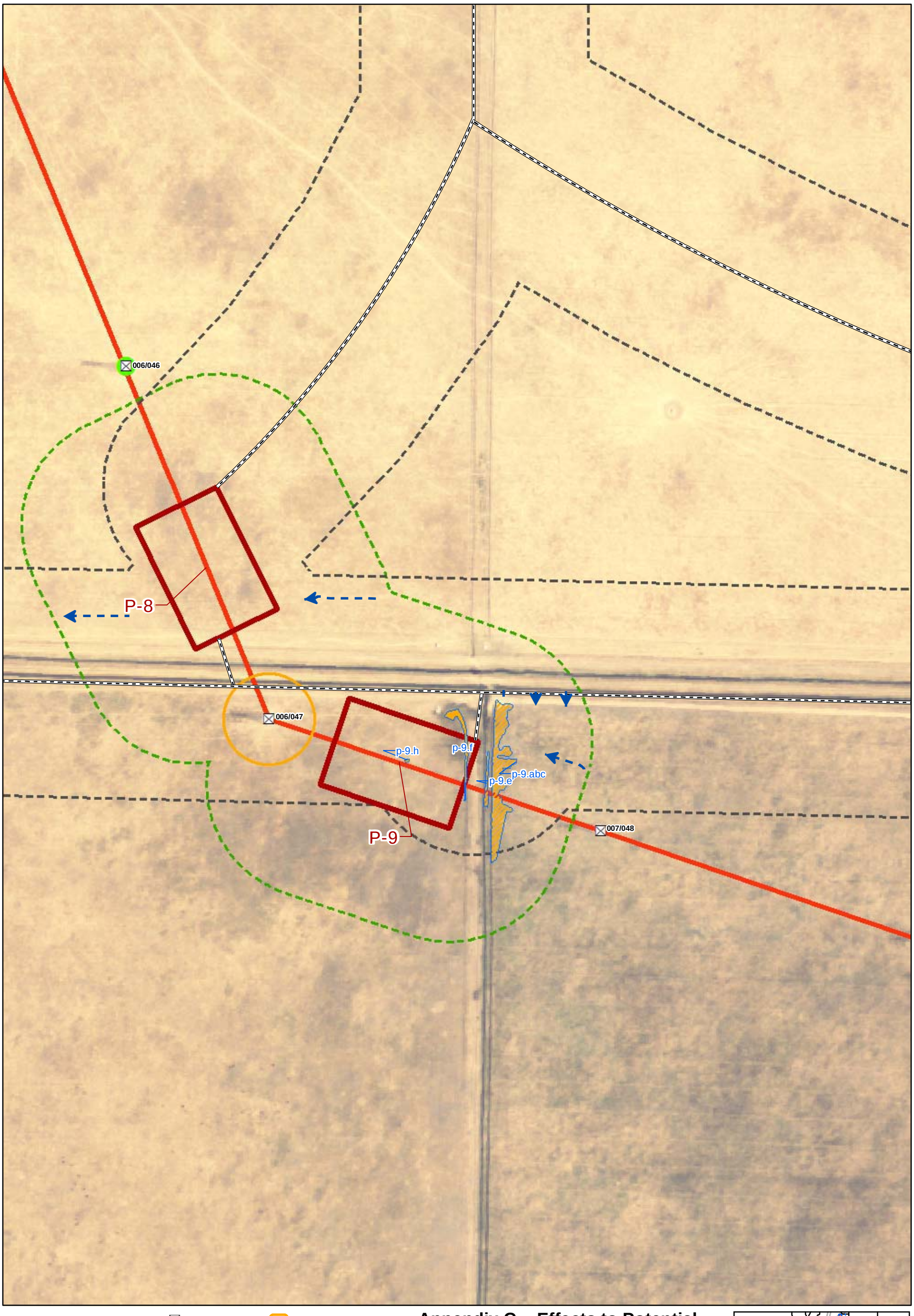


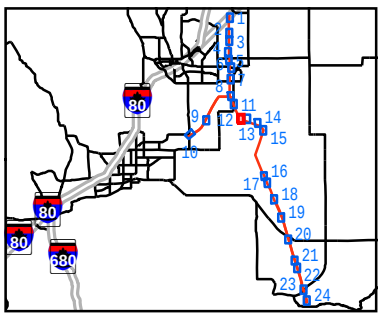
Potential Vernal Pool/Tadpole Shrimp Fairy Shrimp (VP/TS FS) Habitat
Temporary Indirect Effects to Potential VP/TS FS Habitat
Temporary Direct Effects to Potential VP/TS FS Habitat
Temporary Indirect Effects to Potential Conservation Fairy Shrimp (CFS) Habitat
Flow Lines
Berm
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
250' Distance from Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance from Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures
Vernal Pool Tadpole Shrimp Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
Conservation Fairy Shrimp Critical Habitat

Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 12 of 24

Pacific Gas and Electric Company

0 100 200 400 Feet



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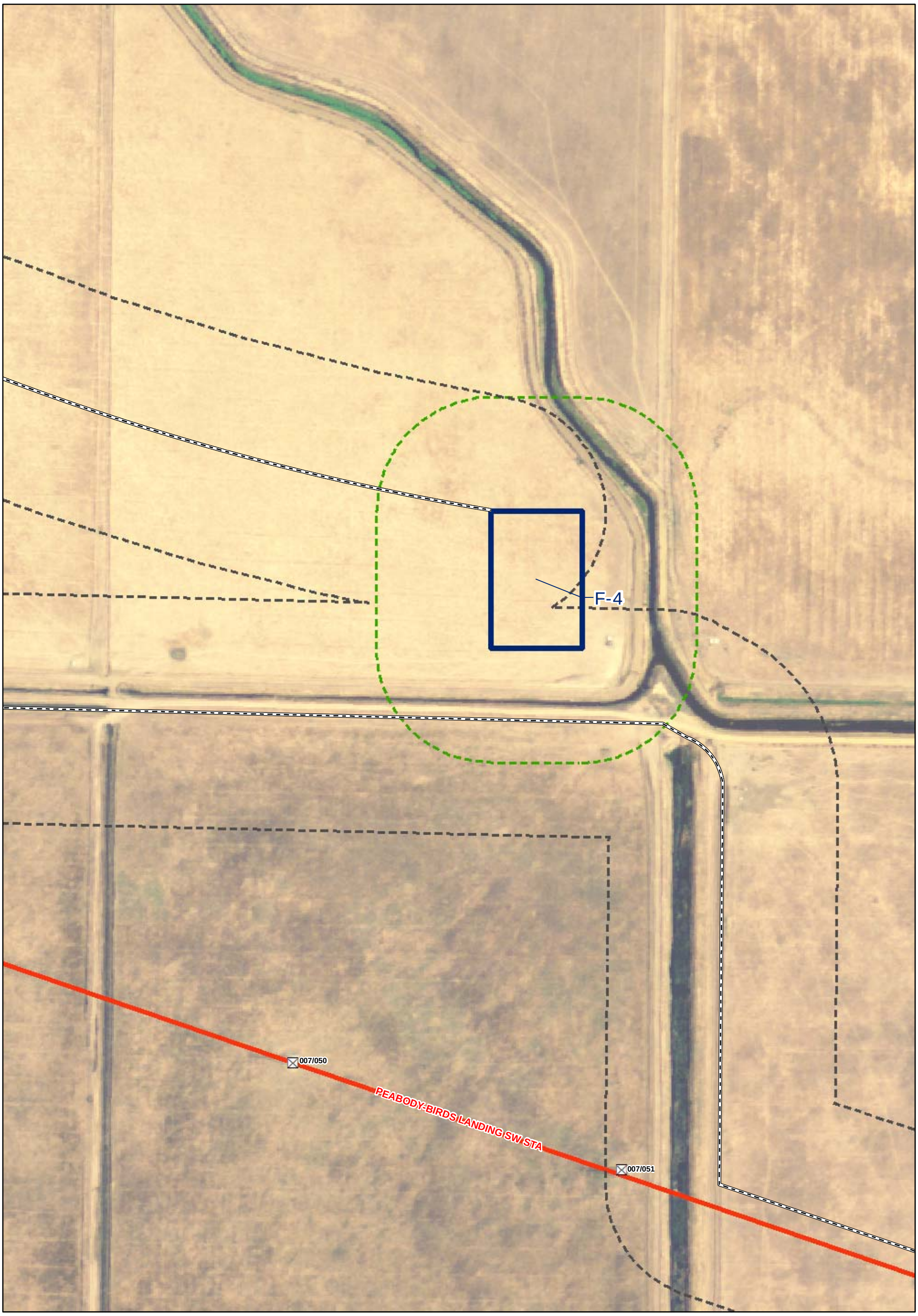

Potential Vernal Pool/Tadpole Shrimp Fairy Shrimp (VP/TS FS) Habitat
Temporary Indirect Effects to Potential VP/TS FS Habitat
Temporary Direct Effects to Potential VP/TS FS Habitat
Temporary Indirect Effects to Potential Conservation Fairy Shrimp (CFS) Habitat
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Berm
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
250' Distance from Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance from Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures
Vernal Pool Tadpole Shrimp Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
Conservation Fairy Shrimp Critical Habitat

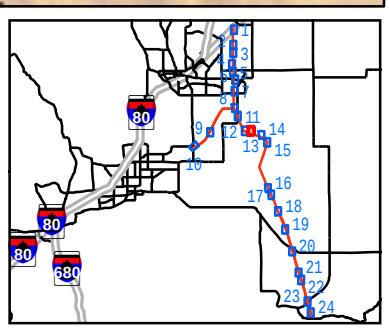
Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 13 of 24

N W E S

0 100 200 400 Feet

Pacific Gas and Electric Company.



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Potential Vernal Pool/Tadpole Shrimp Fairy Shrimp (VP/TS FS) Habitat
Temporary Indirect Effects to Potential VP/TS FS Habitat
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Structures
60kV Poles
Transmission Lines
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Access Road 12 ' Disturbance
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100' Work Area
Guard Structures
250' Distance from Guard Structures
Vernal Pool Tadpole Shrimp Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
Conservation Fairy Shrimp Critical Habitat

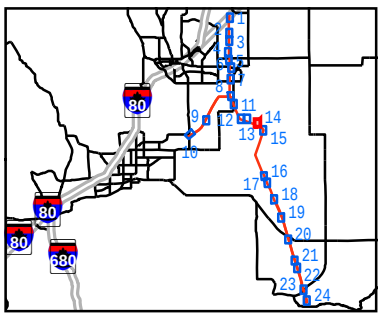
Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 14 of 24

N W E S

0 100 200 400 Feet

Pacific Gas and Electric Company



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008/057X
f-5.road.c
f-5.road.d
f-5.road.e
F-5
SW STA
PEABODY-BIRDS LANDING
p-10.h
008/058
p-10.abcdeg
p-10.f
P-10
p-10.j
p-10.i
p-11.d
008/058X
P-11
Sacramento Northern Railway
008/059

Potential Vernal Pool/Tadpole Shrimp Fairy Shrimp (VP/TS FS) Habitat
Temporary Indirect Effects to Potential VP/TS FS Habitat
Temporary Direct Effects to Potential VP/TS FS Habitat
Temporary Indirect Effects to Potential Conservation Fairy Shrimp (CFS) Habitat
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Guard Structures
250' Distance from Guard Structures
Vernal Pool Tadpole Shrimp Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
Conservation Fairy Shrimp Critical Habitat

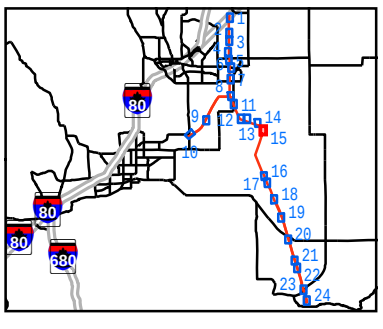
Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 15 of 24

N W E S

0 100 200 400 Feet

Pacific Gas and Electric Company



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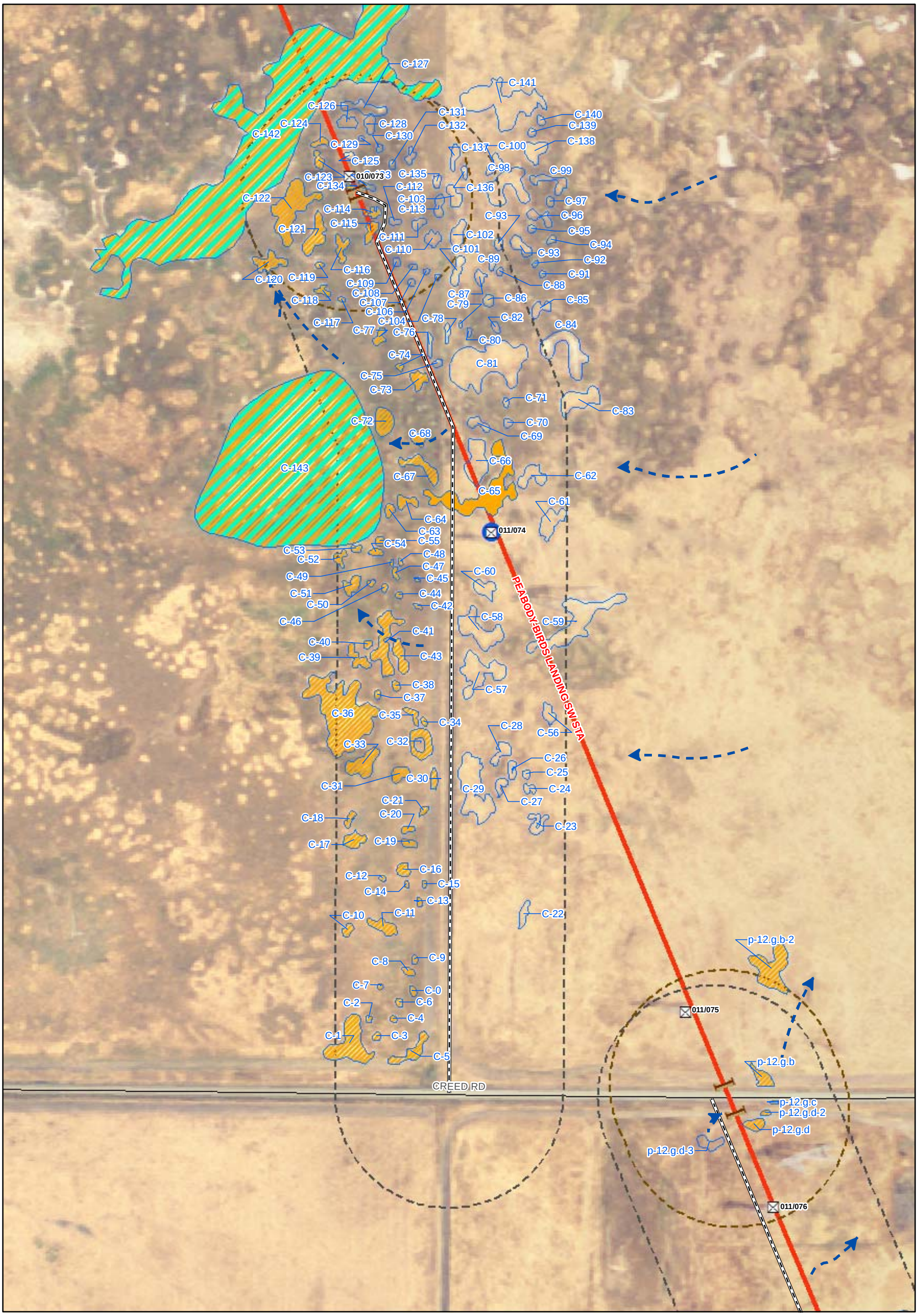

Potential Vernal Pool/Tadpole Shrimp Fairy Shrimp (VP/TS FS) Habitat
Temporary Indirect Effects to Potential VP/TS FS Habitat
Temporary Direct Effects to Potential VP/TS FS Habitat
Temporary Indirect Effects to Potential Conservation Fairy Shrimp (CFS) Habitat
Flow Lines
Berm

Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
250' Distance from Pull & Fly Sites
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250' Distance from Access Roads

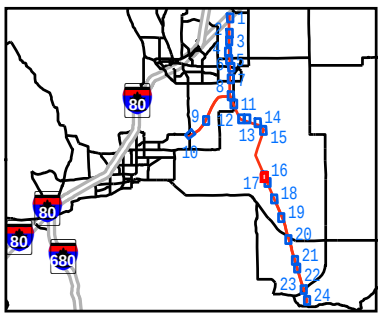
100' Work Area
Guard Structures
250' Distance from Guard Structures
Vernal Pool Tadpole Shrimp Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
Conservation Fairy Shrimp Critical Habitat

Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 16 of 24

Pacific Gas and Electric Company

0 100 200 400 Feet



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C-22
p-12.g.b-2
011/075
p-12.g.b
CREED RD
p-12.g.c
p-12.g.d
p-12.g.d-2
p-12.g.d-3
011/076
p-12.b-2
p-12.b
p-12.b-3
p-12.c
p-12.b-5
PEABODY-BIRDS LANDING SW STA
P-12
011/077
011/078

Potential Vernal Pool/Tadpole Shrimp Fairy Shrimp (VP/TS FS) Habitat
Temporary Indirect Effects to Potential VP/TS FS Habitat
Temporary Direct Effects to Potential VP/TS FS Habitat
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Guard Structures
250' Distance from Guard Structures
Vernal Pool Tadpole Shrimp Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
Conservation Fairy Shrimp Critical Habitat

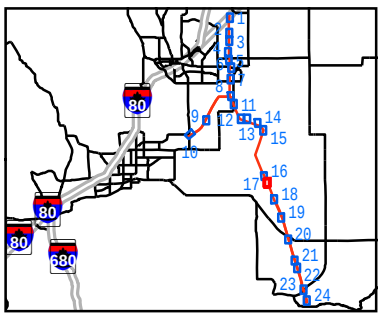
Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 17 of 24

Pacific Gas and Electric Company

N S E W

0 100 200 400 Feet



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p-13.g.b
012/083
Sacramento Northern Railroad
p-13.road
PEABODY-BIRDS LANDING SW STA
012/084
p-13.b
p-13.a
P-13
012/085
LAMBIE SUBSTATION
P-14
012/086
LAMBIE
LAMBIE RD

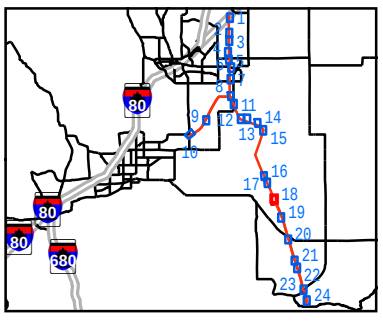
Potential Vernal Pool/Tadpole Shrimp Fairy Shrimp (VP/TS FS) Habitat
Temporary Indirect Effects to Potential VP/TS FS Habitat
Temporary Direct Effects to Potential VP/TS FS Habitat
Temporary Indirect Effects to Potential Conservation Fairy Shrimp (CFS) Habitat
Flow Lines
Berm
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
250' Distance from Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance from Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures
Vernal Pool Tadpole Shrimp Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
Conservation Fairy Shrimp Critical Habitat

Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 18 of 24

Pacific Gas and Electric Company

0 100 200 400 Feet



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013/091

013/092

014/093

F-6

MAUDS LN

014/094

Potential Vernal Pool/Tadpole Shrimp Fairy Shrimp (VP/TS FS) Habitat

Temporary Indirect Effects to Potential VP/TS FS Habitat

Temporary Direct Effects to Potential VP/TS FS Habitat

Temporary Indirect Effects to Potential Conservation Fairy Shrimp (CFS) Habitat

Flow Lines

Berm

Structures

60kV Poles

Transmission Lines

Pull Site

Fly Site

250' Distance from Pull & Fly Sites

Access Road 12 ' Disturbance

250' Distance from Access Roads

100' Work Area

Guard Structures

250' Distance from Guard Structures

Vernal Pool Tadpole Shrimp Critical Habitat

Vernal Pool Fairy Shrimp Critical Habitat

Conservation Fairy Shrimp Critical Habitat

Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment

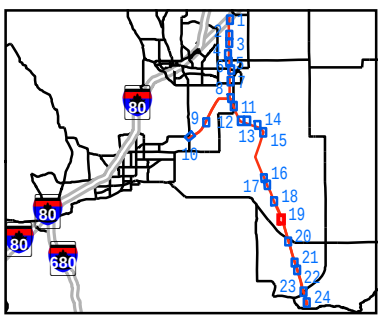
Solano County, CA

Map 19 of 24

N W E S

0 100 200 400 Feet

Pacific Gas and Electric Company.



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015/101
STATE HIGHWAY 12
sr12.g.a
sr12.g.b
015/102
P-15
LITTLE HONKER BAY RD
p-15.g.a
C-145
015/103
F-7

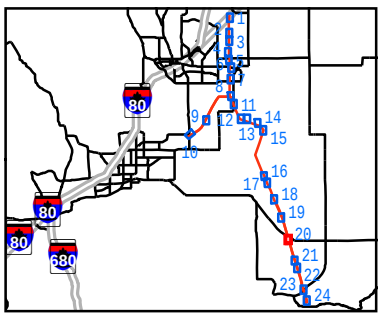
Potential Vernal Pool/Tadpole Shrimp Fairy Shrimp (VP/TS FS) Habitat
Temporary Indirect Effects to Potential VP/TS FS Habitat
Temporary Direct Effects to Potential VP/TS FS Habitat
Temporary Indirect Effects to Potential Conservation Fairy Shrimp (CFS) Habitat
Flow Lines
Berm
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
250' Distance from Pull & Fly Sites
Access Road 12 ' Disturbance
250' Distance from Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures
Vernal Pool Tadpole Shrimp Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
Conservation Fairy Shrimp Critical Habitat

Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 20 of 24

Pacific Gas and Electric Company

0 100 200 400 Feet



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016/110

016/111

PEABODY-BIRDS LANDING SW STA

016/112

01S.g.a

01S.g.b

OLSEN RD

017/113

Potential Vernal Pool/Tadpole Shrimp Fairy Shrimp (VP/TS FS) Habitat

Temporary Indirect Effects to Potential VP/TS FS Habitat

Temporary Direct Effects to Potential VP/TS FS Habitat

Temporary Indirect Effects to Potential Conservation Fairy Shrimp (CFS) Habitat

Flow Lines

Berm

Structures

60kV Poles

Transmission Lines

Pull Site

Fly Site

250' Distance from Pull & Fly Sites

Access Road 12 ' Disturbance

250' Distance from Access Roads

100' Work Area

Guard Structures

250' Distance from Guard Structures

Vernal Pool Tadpole Shrimp Critical Habitat

Vernal Pool Fairy Shrimp Critical Habitat

Conservation Fairy Shrimp Critical Habitat

Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

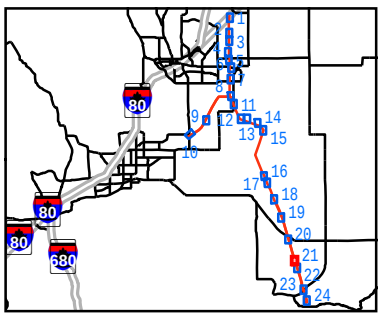
Biological Assessment

Solano County, CA

Map 21 of 24

Pacific Gas and Electric Company

0 100 200 400 Feet



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017/114

017/115

PEABODY-BIRDS LANDING SW STA

f-8.a

F-8

017/116

017/117

Potential Vernal Pool/Tadpole Shrimp Fairy Shrimp (VP/TS FS) Habitat

Temporary Indirect Effects to Potential VP/TS FS Habitat

Temporary Direct Effects to Potential VP/TS FS Habitat

Temporary Indirect Effects to Potential Conservation Fairy Shrimp (CFS) Habitat

Flow Lines

Berm

Structures

60kV Poles

Transmission Lines

Pull Site

Fly Site

250' Distance from Pull & Fly Sites

Access Road 12 ' Disturbance

250' Distance from Access Roads

100' Work Area

Guard Structures

250' Distance from Guard Structures

Vernal Pool Tadpole Shrimp Critical Habitat

Vernal Pool Fairy Shrimp Critical Habitat

Conservation Fairy Shrimp Critical Habitat

Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

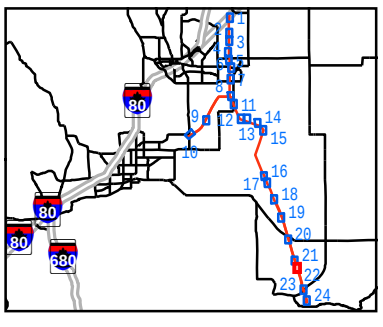
Biological Assessment

Solano County, CA

Map 22 of 24

Pacific Gas and Electric Company

0 100 200 400 Feet



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018/125

018/126

BIRDS LANDING RD

019/127

Potential Vernal Pool/Tadpole Shrimp Fairy Shrimp (VP/TS FS) Habitat
Temporary Indirect Effects to Potential VP/TS FS Habitat
Temporary Direct Effects to Potential VP/TS FS Habitat
Temporary Indirect Effects to Potential Conservation Fairy Shrimp (CFS) Habitat
Flow Lines
Berm
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
250' Distance from Pull & Fly Sites
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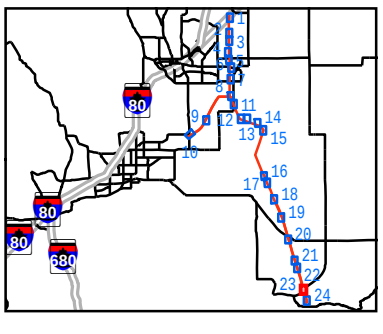
250' Distance from Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures
Vernal Pool Tadpole Shrimp Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
Conservation Fairy Shrimp Critical Habitat

Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 23 of 24

Pacific Gas and Electric Company

0 100 200 400 Feet



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019/129

019/130

F-9

BIRDS
LANDING
SUBSTATION

f-9.a

P-16

019/131

PEABODY-BIRDS LANDINGSWSTA

Potential Vernal Pool/Tadpole Shrimp Fairy Shrimp (VP/TS FS) Habitat
Temporary Indirect Effects to Potential VP/TS FS Habitat
Temporary Direct Effects to Potential VP/TS FS Habitat
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Flow Lines
Berm

Structures
60kV Poles
Transmission Lines
Pull Site
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250' Distance from Access Roads

100' Work Area
Guard Structures
250' Distance from Guard Structures
Vernal Pool Tadpole Shrimp Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
Conservation Fairy Shrimp Critical Habitat

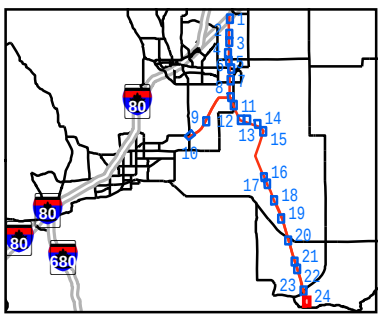
Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 24 of 24

N W E S

0 100 200 400 Feet

Pacific Gas and Electric Company



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Appendix D
Delta Green Ground Beetle Habitat Map

Creed Guard Site
Site Access Road
Length: 153 ft

010/073

C-143

Creed Guard Site Access
Road Length: 918 ft

011/074

Creed Guard Site Access
Road Length: 981 ft

011/075

CREED RD

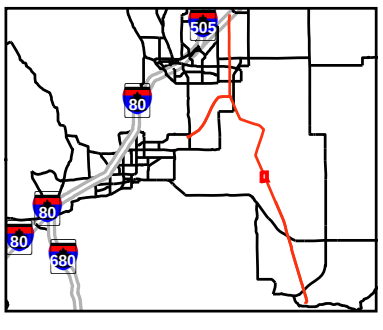
011/076

Pools
Potential Delta Green Ground Beetle (DGGB) Habitat
300' Buffer for Potential DGGB Upland Dispersal
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
Access Road 12 ' Disturbance
Guard Structures
Flow Lines

Pacific Gas and Electric Company

Appendix D - Effects to Potential DGGB Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project
Biological Assessment
Solano County, CA

0 100 200 400 Feet



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Appendix E
Habitat Assessment for California Tiger Salamander

Pacific Gas and Electric Vaca Dixon - Birds Landing 230 kV Reconductoring Project

Habitat Assessment for California Tiger Salamander (*Ambystoma californiense*)

PREPARED FOR: Sheila Byrne, Pacific Gas & Electric

PREPARED BY: CH2M HILL

DATE: March 25, 2008

Introduction

Pacific Gas and Electric Company (PG&E) proposes to upgrade approximately 30 miles of electrical transmission line, by replacing the conductors (wires) and modifying some towers to accommodate the new heavier wires. The proposed Vaca Dixon-Birds Landing 230kV Reconductoring Project (Project) is located entirely in Solano County, California (see Figure 1). A reconductoring project has two basic components: tower work and line work.

- Tower work consists of all necessary modifications and repairs to the towers needed to allow them to support the new, heavier conductor while maintaining required clearances from the ground.
- Line work consists of installing the new conductor and adjusting it to the correct tension. New insulators and hardware are also normally installed during reconductoring.

The location of each proposed Project impact area is shown in Figures 2a – 2l.

This habitat assessment for California tiger salamander (*Ambystoma californiense*) was prepared by CH2M HILL following the joint U.S. Fish and Wildlife Service (USFWS)/California Department of Fish and Game (CDFG) protocol: *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (October 2003). There are two procedures described therein to assess the likelihood of California tiger salamander presence in the vicinity of the Project site, including 1) an assessment of California tiger salamander locality records and potential California tiger salamander habitat in and around the Project area; and 2) focused surveys of breeding pools and their associated uplands to determine whether California tiger salamander are likely to be present.

Based on this site assessment, no California tiger salamander breeding sites occur within the boundaries of the Project. However, breeding sites exist within the Project vicinity, and therefore Project construction will likely result in temporary loss of California tiger salamander upland habitat.

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Description of Project Impacts

Ground disturbance associated with the proposed Project will occur during installation and use of the following temporary work areas: fly sites, pull sites, guard structures, and temporary access roads (Figure 2). Establishment of each work site may require varying levels of vegetation removal and grading. All new reconductoring infrastructure will be installed above ground and attached to existing towers, thus the proposed Project will not result in any permanent effects to the environment. All work sites will be removed following completion of the Project and disturbed soil areas (DSAs) will be restored to pre-existing conditions. A brief and representative description of each proposed work area is included below.

1. *Helicopter fly sites*. Fly sites (landing zones) are used as landing sites and to stage materials, equipment, and crews during Project construction. A fuel truck will also be present for helicopter fueling. Nine fly sites, with maximum dimensions of 200 feet by 300 feet, will be used during construction. No mowing or grading of the sites is planned, but fly sites used during the rainy season may require gravel to provide a stable base and reduce compaction.

2. *Pull sites*. Pull and tension sites are placed in reasonably flat areas in line with the conductor. Seventeen are needed for Project construction. Their dimensions vary from 50 feet by 60 feet to 200 feet by 200 feet. If necessary for equipment stability, gravel will be spread over the sites and removed at the end of the Project. Erosion-control measures such as silt fences or fiber rolls will be installed, if required, to minimize erosion. No mowing or grading of pull sites is planned. New temporary access roads and/or existing roads will be used to access each pull site. After the completion of the Project, pull sites will be returned to preconstruction conditions and reseeded as necessary.

3. *Guard structures*. Guard structures are used to protect roads, railroad tracks, powerlines, and the public should a line fall during reconductoring. Guard structures usually consist of one or two wooden poles and a cross beam. They are installed in pairs with a net strung between them. A line truck is used to auger and set the poles. Guard structure poles will be removed following reconductoring and the holes backfilled and compacted. In sensitive areas, guard structures will be installed and removed during the dry season to minimize ground disturbance and potential erosion. Approximately 28 pairs of guard structures will be required and almost all guard structures can be installed from existing paved or dirt roads.

4. *Access roads*. Access to temporary construction areas (*e.g.* pull sites, guard structures, helicopter landing sites) will be limited as much as possible to existing access roads and temporary routes through agricultural fields. Sensitive biological areas ((these areas include: the area north of Creed Road and at the coral site at the intersection of Vanden Road and Canon Road) will be accessed during the dry season.

   Wet season access to non-sensitive temporary construction areas may require improvements to existing dirt roads and temporary access routes to accommodate heavy equipment. Four to six inches of gravel will be placed where needed on these roads. No widening or grading will be needed. Temporary access routes through

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agricultural fields will be 12 feet wide or less. On off-road access routes, gravel will be underlain by geotextile fabric or matting to allow the gravel to be removed when the Project is complete.

Legal Status

The California tiger salamander occurs as three distinct population segments, including the Sonoma, Main (Central Valley) and Santa Barbara. On August 4, 2004, the USFWS designated all population segments as federally threatened (USFWS 2004). However, on August 20, 2005, a U.S. district judge vacated the August 4th ruling relisting both the Sonoma and Santa Barbara populations as endangered. The Central Valley population remains designated as federally threatened.

California tiger salamander is also a California "species of special concern." Although this designation by the state does not provide any legally mandated protection, projects under CEQA review must address potential effects on species of special concern. Similarly under CEQA, projects that require other public agency authorizations (e.g., Army Corp of Engineer's [ACOE] 404 permit) must consider special concern species. Finally, California tiger salamander is a protected amphibian under Title 14 of the California Code of Regulations, requiring special take authorizations by CDFG game codes and regulations.

On August 23, 2005, the USFWS designated critical habitat for the central population of California tiger salamander (USFWS 2005), totaling over 199,109 acres in 19 counties. Within the Project vicinity, Critical Habitat Unit 2-Jepson Prairie is located approximately 1 mi east of pull sites #10 and #11. Unit 2 is 5,699 acres, south of Dixon, west of State Route (SR) 113, north of Creed Road, and east of Travis Air Force Base. No other California tiger salamander critical habitat units are located in the Project area.

Life History

The California tiger salamander is an amphibian in the family Ambystomatidae. It is a large, stocky, terrestrial salamander with a broad, rounded snout. Adult males can reach lengths of approximately 8 inches (in), females slightly less. The tiger salamander's coloration consists of white or pale yellow spots or bars on a black background on the back and sides. The belly varies from almost uniform white or pale yellow to a variegated pattern of white or pale yellow and black. Males can be distinguished from females, especially during the breeding season, by their swollen cloacae, a common chamber into which the intestinal, urinary, and reproductive canals discharge. They also have more developed tail fins. The species is restricted to grasslands and low 1500 feet (ft) foothill regions where lowland aquatic sites are available for breeding.

California tiger salamander prefers to breed in natural seasonal (vernal) pools or ponds that mimic them such as stock ponds that are allowed to go dry (USFWS 2007). This species may also breed in artificial impoundments that do not contain fish as well as in slow-moving streams. Breeding ponds must remain wet for approximately 10 weeks (generally until mid-May) to allow sufficient time for breeding and metamorphosis (Zeiner et al. 1988). During summer months, California tiger salamander use subterranean refuge sites, usually small mammal burrows, but also crevices in the soil typically referred to as "aestivation" sites.

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Aestivation habitat is generally constructed by fossorial mammals such as California ground squirrel (*Spermophilus beecheyi*) and Botta's pocket gopher (*Thomomys bottae*) (Goals Project 2000).

After winter rains have moistened the ground, the salamanders emerge from their refugia and migrate to breeding pools. Females deposit eggs singly or in small groups in the water, and attach them to submerged vegetation or debris. Adults may live more than 10 years, but do not reproduce until they are four to five years old (Trenham et al. 2000). Aquatic juveniles usually complete metamorphosis three to six months after hatching. Following metamorphosis, juveniles spend a few days at the pond margin, and then migrate to refuge sites. Overland migration to refugia may extend up to 1.24 mi, but most California tiger salamanders remain within 0.4 mi of their breeding ponds (USFWS 2004). California tiger salamander will also move this distance as part of interpond dispersal.

Urban development poses a significant risk to the continued existence of California tiger salamander. Even relatively minor habitat modifications, such as construction of roads, storm drains, and road curbs within upland habitat of the species increases habitat fragmentation, impede or prevent migration, and result in direct and indirect mortality (USFWS 2002).

Site Assessment

For the purposes of this assessment, the Project area was divided into three geographic regions: northern, central, and southern. These regions are generally delineated by existing land use practices and apparent quality of California tiger salamander habitat. The northern extent starts just north of the northern extent of the Project and ends at Fry Road. This is a developing area with large tract housing interspersed with lower density rural homes and agricultural fields. Surface streets are busy serving the local communities from Interstate 80. Aquatic habitats include, but are not limited to, golf course ponds, irrigation canals, small stock ponds, and stream drainages. Vernal pools and other seasonal aquatic sites are uncommon.

The central extent starts at Fry Road and ends at SR 12, with Travis Air Force base located west of the Project. Some rural housing and agriculture exists in this portion of the Project; however, this region of the Project is generally less influenced by human disturbances. Thus there are larger expanses of open annual grasslands with a mixture of aquatic habitats including natural and restored vernal pools. The Jepson Prairie Preserve and California tiger salamander critical habitat are located in the immediate vicinity.

The south extent of the Project starts at SR 12 and ends at the southern terminus of the Project, traversing through what is known as Montezuma Hills. Historically, this region has seen extensive agricultural use and, presently, active wind farms dominate the region. The landscape is hilly and disking is widespread within the wind farm properties. Aquatic habitats include scattered stock ponds, roadside ditches, and stream drainages. Seasonal aquatic habitats are uncommon. Very little is known whether California tiger salamander currently exist within Montezuma Hills (per comm., Steve Foreman). The closest CNDDB occurrences are located greater than 8 mi west in the Potrero Hills and approximately 5 mi north at Wilcox Ranch ecological preserve.

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Methods

CH2M HILL biologists queried the CNDDB (CNDDB 2008) and USFWS species inventory (USFWS 2008) for all known occurrences of California tiger salamander within 5 km (3.1 mi) of the Project site for the Elmira, Allendale, Denverton, Bird's Landing, Dozier, and Antioch North USGS 7.5-minute topographic quadrangles. Figure 1 shows the location of all CNDDB record sightings within the search area. In addition, aerial imagery within 1.24 mi from the Project and field observations were used determine the location of other potential California tiger salamander breeding sites (Figure 1). These sites included seasonal wetlands and vernal pools, stock ponds, drainages and ditches, and permanent water bodies.

Temporary loss of California tiger salamander upland habitat was quantitatively determined based on CNDDB and potential breeding sites, and acreage of each Project impact area within 1.24 mi of these sites. For compensatory mitigation purposes, an additional calculation was performed for Project effects to habitat within 500 ft of breeding sites (Figure 2a – 2l). At this time, barriers to California tiger salamander dispersal (e.g., road curbing) were not factored into the calculation. The Project as proposed will not result in a direct affect to California tiger salamander breeding habitat.

Field Observations

Concurrently, CH2M HILL is conducting vernal pool branchiopod surveys for the proposed Project. The survey area includes each fly and pull site, guard sites, and proposed new access roads. As a result, CH2M HILL biologists have become generally familiar with the Project area regarding locations of potential suitable habitat for California tiger salamander. Although both review of aerial imagery and field observations have determined that no breeding sites occur within the Project site, potential breeding sites have been identified in the Project area that would have otherwise been missed using only aerial imagery.

Photographs taken during the branchiopod surveys show some potential California tiger salamander breeding sites within the Project area. Representative photographs are included in Appendix A.

Results

CNDDB Occurrences

A total of 17 CNDDB occurrences exist within approximately 3.1 mi from the Project with 6 less than 1.24 mi from the Project (Figure 1). No locality records occur within any Project impact area. A complete CNDDB record for California tiger salamander for the aforementioned quadrangles is attached as Appendix B. All CNDDB occurrences within the study area fall north of SR 12 and south of Fry Road in a region distinguished by large expanses of annual grasslands (mostly grazed) with vernal pools (natural and restored) scattered throughout. The Jepson Prairie Reserve and Critical Habitat Unit-2 are located within this region east of the study area.

A summary of the CNDDB occurrences is provided in Table 1. Occurrence no. 999 exists approximately 0.36 mi northwest of the guard structures and pull site #12 at Creed Road. This occurrence as well as 6 others in the immediate vicinity are located inside the Wilcox Ranch ecological preserve. Only one CNDDB record is associated with a pool that is likely a

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perennial pond near a housing development (#876). This pond is surrounded with emergent vegetation including willow (*Salix* spp.).

Table 1. CNDDB Sightings within the Project Area

Occurrence Number	Distance from Project Site (mi)	UTM Coordinate (zone 10N)	Habitat Description
81	3.0	N4236480 E602617	Olcott Lake (playa pool) at Jepson Prairie Preserve
336	2.4	N4236371 E601150	Restored vernal and playa pools
547	3.0	N4237209 E602491	Vernal pool at Calhoun Ecological Preserve
601	1.7	N4234229 E600850	Vernal pools
828	0.64	N4239196 E590750	Man-made pools and shallow natural pools
876	1.0	N4237871 E592137	Perennial pond with grazed annual grassland
883	1.9	N4237998 E594502	Large man-made pool surrounded by non-native grassland
889	0.44	N4237912 E591282	Man-made vernal pools/ponds adjacent to railroad tracks
940	2.0	N4238213 E594909	Vernal pool
995	1.8	N4235705 E598152	Vernal pool
996	1.0	N4235276 E598703	Vernal pool (Wilcox Ranch)
997	1.6	N4235255 E596440	Vernal pool (Wilcox Ranch)
998	1.8	N4234910 E595735	Vernal pool (Wilcox Ranch)
999	0.36	N4233844 E597940	Vernal pool (Wilcox Ranch)
1000	0.68	N4234220 E597606	Vernal pool (Wilcox Ranch)
1001	1.3	N4236665 E598026	Vernal pool (Wilcox Ranch)
1002	2.0	N4236064 E600017	Vernal pool (Wilcox Ranch)

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Study Area Findings

The study area includes many aquatic sites that may provide the requirements for California tiger salamander breeding habitat. Theses sites are characterized as:

- natural and restored vernal pools
- seasonal wetlands
- ephemeral and perennial drainages
- stock ponds
- other ponds including detention basins and golf course ponds

Due to the high volume of potential habitat and the extent that drainages exist in the Project area, creeks and canals were not mapped as shown in Figure 2. Waterways in the Project area may provide California tiger salamander breeding habitat if the drainages are slow-moving and remain inundated for a sufficient period of time. Drainages that may provide suitable breeding habitat include Ulatis, Union, Denverton, and Gibson Canyon creeks. Similarly, many of the agricultural ditches and canals in the area may provide breeding habitat. Field verification of all potential breeding sites has not occurred at this time.

Effects Analysis

CNDDB and other potential breeding sites occur within 1.24 mi of the Project area. After mapping each California tiger salamander site with the 1.24 mi dispersal distance buffer, CH2M HILL determined that nearly all Project impact areas fall within potential upland habitat for California tiger salamander. A short segment of proposed access road to Pull site #8 lies outside the dispersal buffer. The effects analysis also quantified loss of California tiger salamander habitat within 500 ft of breeding sites (Figure 2). Table 1 includes a tally of temporary impacts to dispersal habitat.

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Table 1. Project Effects to Potential California Tiger Salamander Dispersal Habitat

Dispersal Habitat	Acres*
Aquatic[1]	6.6
Upland[2]	36.5
Total Loss:	**43.1**

Notes:

[1] Habitat within 500 ft of breeding sites.

[2] Habitat between 500 ft and 1.24 mi of breeding sites.

*all impacts are considered temporary and will be restored as part of project construction.

Conclusion

The footprint of the proposed Project is located within the current and historic range of California tiger salamander. The Project area contains suitable California tiger salamander breeding habitat in the form of stock ponds, vernal pools and swales, ephemeral drainages, and stormwater detention basins. Additionally, given the close proximity of the CNDDB occurrences to the Project area, it is reasonable to conclude that the Project area may potentially be located in habitat that is suitable for California tiger salamander dispersal, including interpond movements and aestivation. Formal protocol surveys would be required to determine if the species is present within the Project site.

Through avoidance of known locality records and other aquatic areas that could support California tiger salamander breeding, the proposed Project will not result in any direct affect on California tiger salamander breeding habitat. Implementation of construction minimization measures (see Protection and Minimization Measures) will mitigate for any indirect effects on nearby breeding habitats and onsite upland areas. Temporary loss of upland habitat will be minimal, as Project implementation will occur over one construction season.

Minimization and Protection Measures

Through implementation of mitigation measures, temporary impacts to California tiger salamander upland habitat will be minimized during Project construction and mitigated following completion of the proposed Project. The following proposed measures should be incorporated into the Project design and schedule.

1. Implement a Worker Environmental Awareness Training Program to educate all construction personnel on the life history of California tiger salamander. The training program should also include all applicable agency permit conditions regarding protection of California tiger salamander and other sensitive resources.
2. Have a qualified biologist perform preconstruction surveys for California tiger salamander for all Project impact areas. Perform surveys a maximum of 1 week and minimum of 48 hours prior to ground disturbance activities. If California tiger salamanders are discovered during preconstruction surveys, relocate individuals to

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a USFWS-approved site. Only biologists specifically approved by USFWS may capture and relocate California tiger salamander.

3. During Project implementation, avoid concentrations of small mammal burrows and other refugia that may support aestivating California tiger salamander. If small mammal burrows can not be avoided, perform preconstruction surveys to determine if refugia are occupied by California tiger salamander.
4. Schedule ground disturbance activities to occur during the dry summer months between June 1 and October 31 when California tiger salamander are less active. The salamander is likely aestivating underground during this time period. If work must occur prior to June 1, install exclusionary fence as directed by the qualified biologist to prevent California tiger salamander from entering the active work site.
5. As appropriate, install environmentally sensitive area (ESA) fence at sites in close proximity to potential breeding sites. Prevent all construction personnel from entering ESAs.
6. Enforce a 20 mph speed limit within all construction sites.
7. Employ an onsite qualified biologist if the Project could result in take of California tiger salamander.
8. Implement Best Management Practices (BMPs) during Project construction to protect against adverse affects on water quality.
9. Restore all Project impact areas to pre-construction conditions, which may include recontouring to match adjoining grades, seeding disturbed soil areas, and installation of erosion/sedimentation control BMPs.

References

CNDDB (California Natural Diversity Data Base). 2008. Rarefind 3. Electronic data provided by the Natural Heritage Division, California Department of Fish and Game, Sacramento, CA.

Goals Project. 2000. Baylands Ecosystem Species and Community Profiles: Life histories and environmental requirements of key plants, fish and wildlife. Prepared by the San Francisco Bay Area Wetlands Ecosystem Goals Project. P.R. Olofson, editor. San Francisco Bay Regional Water Quality Control Board, Oakland California.

Trenham, P.C.; Shaffer, H.B.; Koenig, W.D.; Stromberg, M.R. 2000. Life history and demographic variation in the California tiger salamander (*Ambystoma californiense*). Copeia 2000(2):365-377.

United States Fish and Wildlife Service (USFWS). 2002. Endangered and Threatened Wildlife and Plants; Listing the Sonoma County Distinct Population Segment of the California Tiger Salamander as Endangered. Federal Register, 67(140):47731. 22 July.

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United States Fish and Wildlife Service (USFWS). 2004. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the California Tiger Salamander. Federal Register, 69(149):47211-47248. 4 August.

United States Fish and Wildlife Service (USFWS). 2005. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the California Tiger Salamander, Central Population; Final Rule Federal Register, 70(162):49379-49458. 23 August.

United States Fish and Wildlife Service (USFWS). 2008. Listed species online content. http://www.fws.gov/

Zeiner, D.; W. Laudenslayer, Jr.; & K. Mayer. 1988. California's wildlife, Volume I; amphibians and reptiles. California Department of Fish and Game, Sacramento.

Personal Communications

Personal Communication. 2008. Telephone conversation between CH2M HILL and Steve Foreman [Senior Biologist] of LSA, Associates. March 14th.

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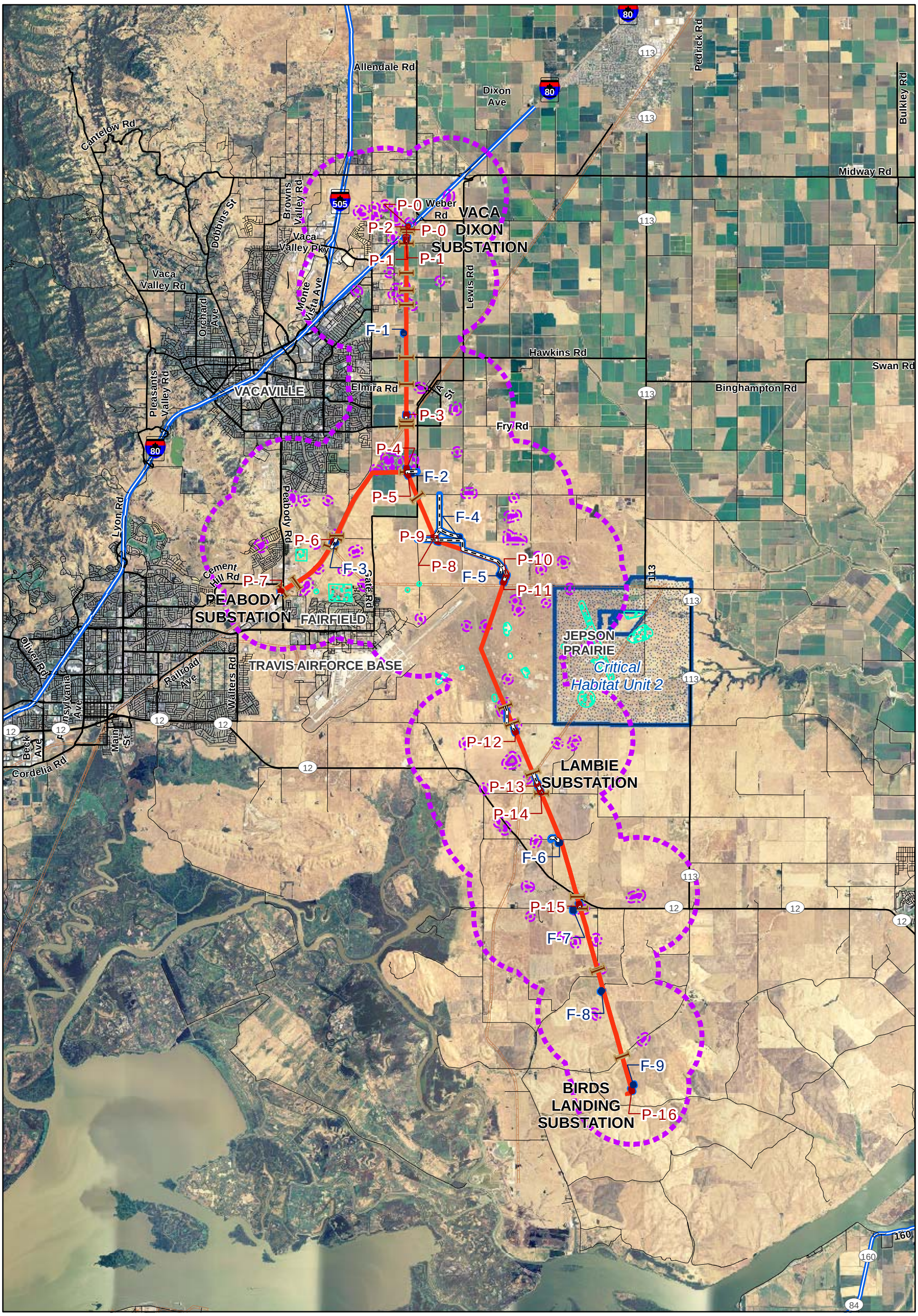


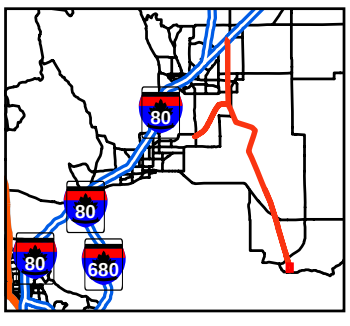
Project Footprint
Potential California Tiger Salamander (CTS) Breeding Habitat
Aquatic Dispersal Habitat: 500 Foot Buffer around Potential CTS Breeding Habitat
Upland Dispersal Habitat: 1.24 Mile Buffer around Potential CTS Breeding Habitat
CTS CNDDB occurrences (March, 2008)
CTS Critical Habitat
Transmission Lines
Guard Structures
Access Road 12 ' Disturbance
Pull Site
Fly Site

Figure 1 - Potential CTS Habitat and CTS CNDDB Occurrences Vaca Dixon- Birds Landing 230kV Reconductoring Project

CTS Assessment
Solano County, CA

N W E S

0 2 4 Miles



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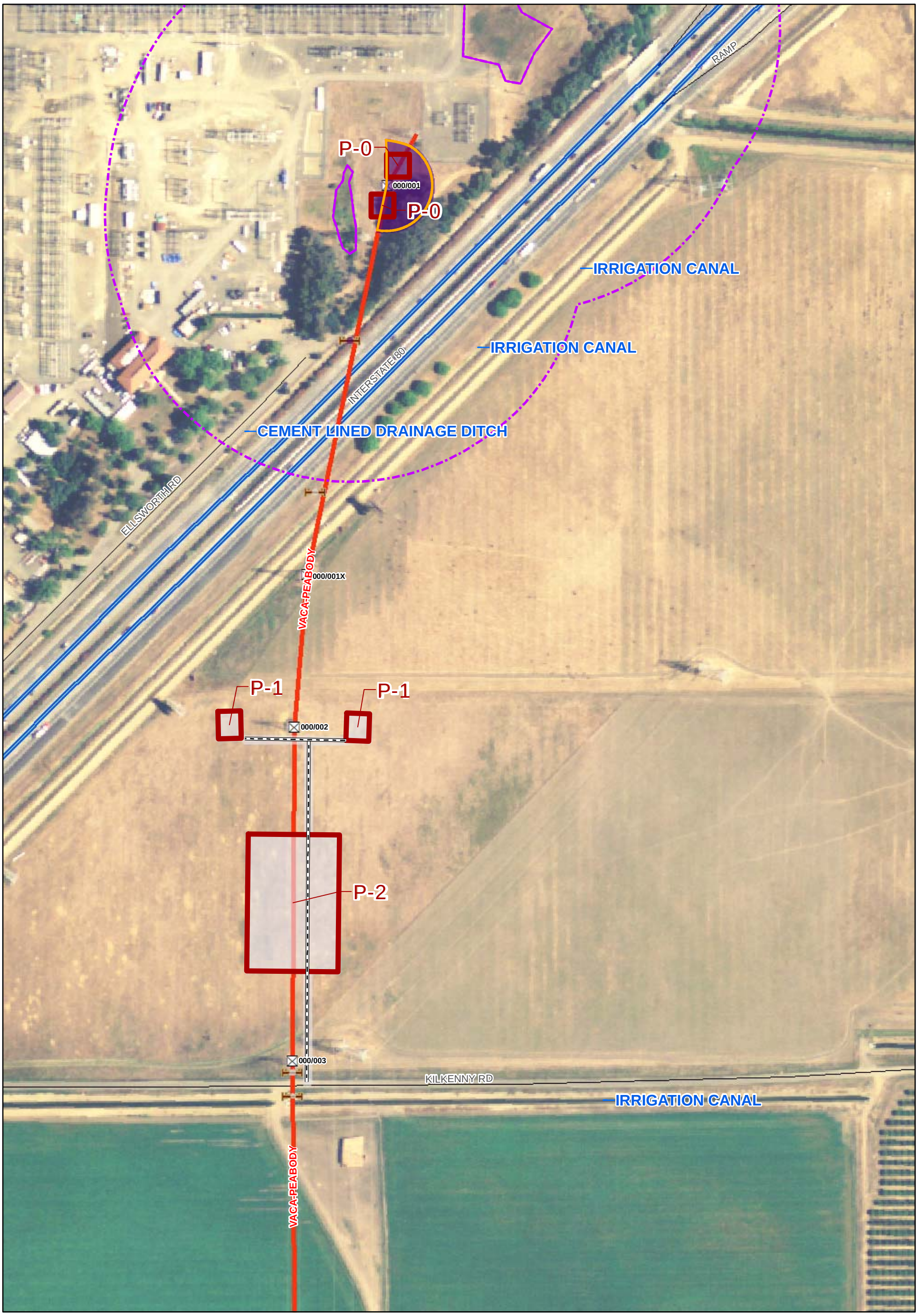


Potential California Tiger Salamander (CTS) Breeding Habitat
Aquatic Dispersal Habitat: 500 Foot Buffer around Potential CTS Breeding Habitat
Affects to CTS Habitat
Temporary Direct Affects to 500' Buffer of Potential CTS Habitat
Temporary Direct Affects to 1.24 Mile Buffer of Potential CTS Habitat
CTS CNDDB occurrences (March, 2008)
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
100' Work Area
Access Road 12 ' Disturbance
Guard Structures

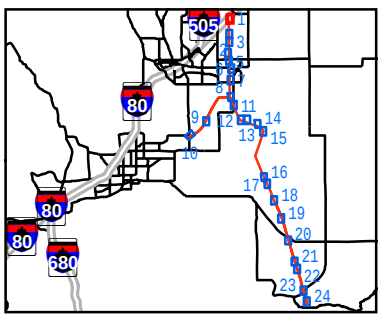
N W E S

0 200 400 Feet

Figure 2a - Potential Affects to CTS Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

CTS Assessment

Solano County, Ca



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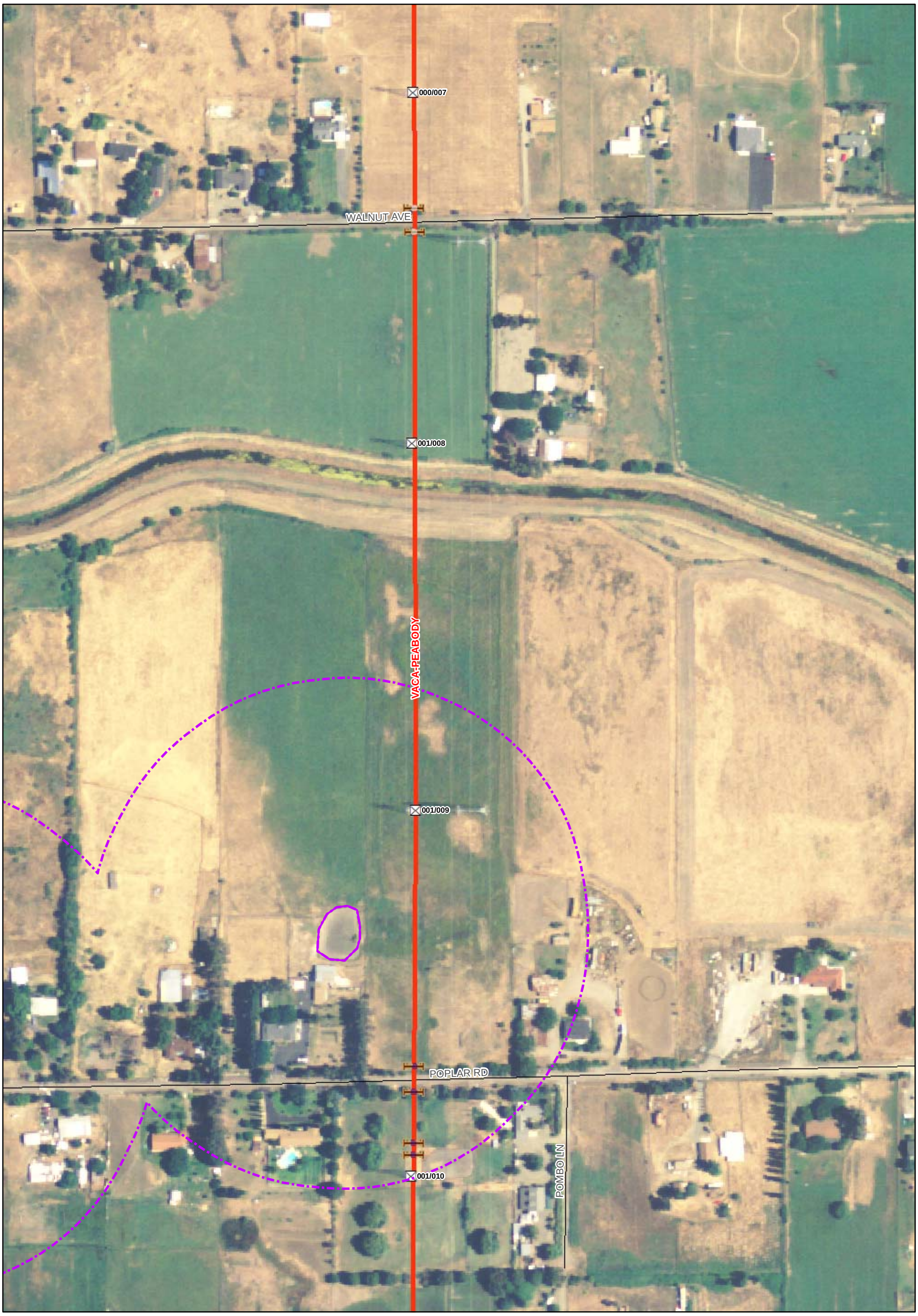


Potential California Tiger Salamander (CTS) Breeding Habitat

Aquatic Dispersal Habitat: 500 Foot Buffer around Potential CTS Breeding Habitat

Affects to CTS Habitat

Temporary Direct Affects to 500' Buffer of Potential CTS Habitat

Temporary Direct Affects to 1.24 Mile Buffer of Potential CTS Habitat

CTS CNDDB occurrences (March, 2008)

Structures

60kV Poles

Transmission Lines

Pull Site

Fly Site

100' Work Area

Access Road 12 ' Disturbance

Guard Structures

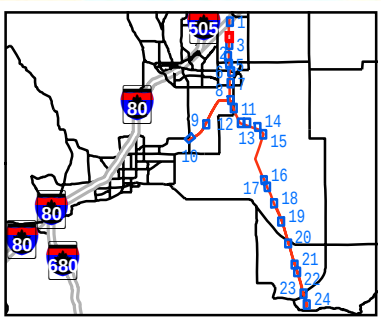
N W E S

0 200 400 Feet

Figure 2b - Potential Affects to CTS Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

CTS Assessment

Solano County, Ca



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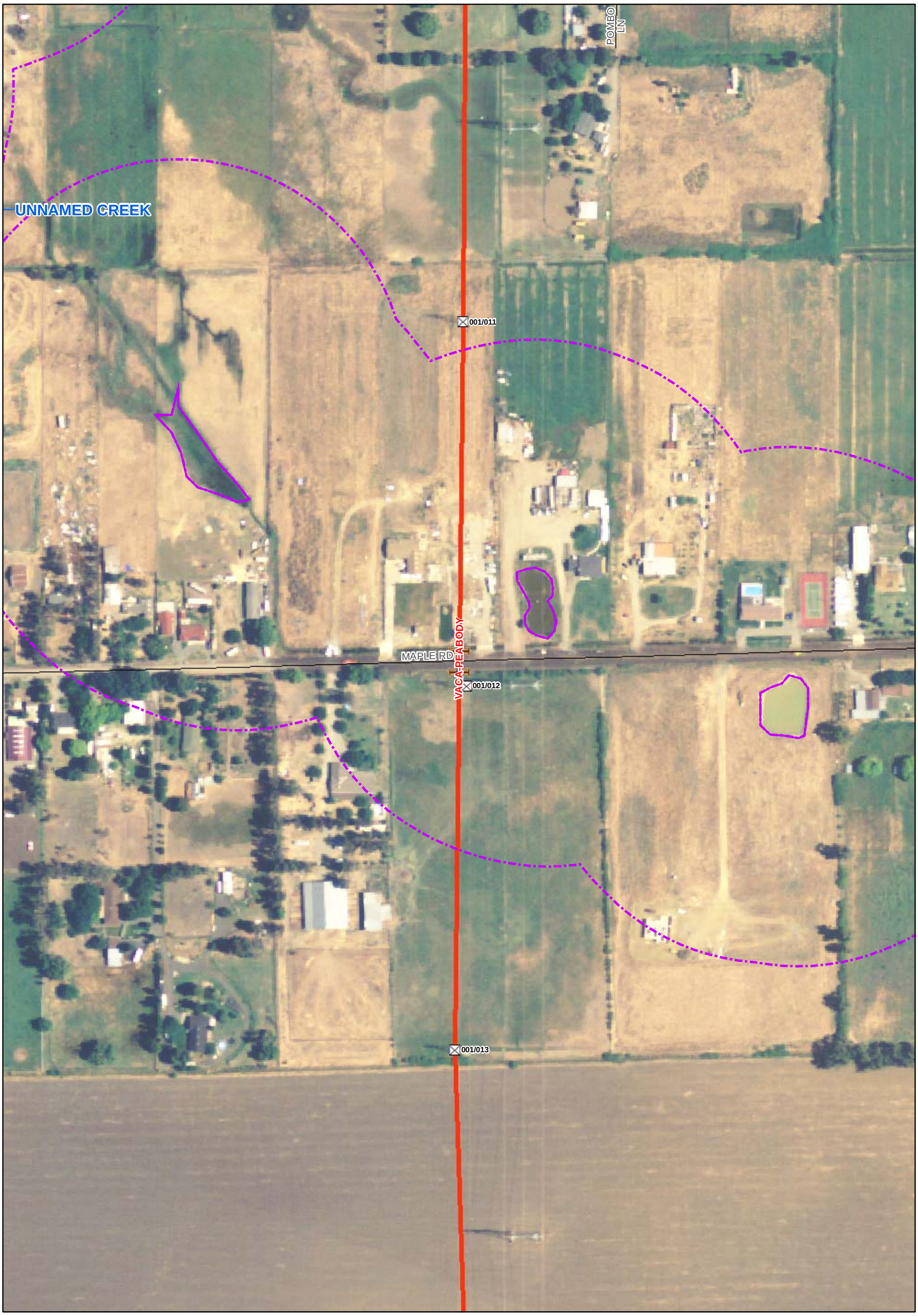

Potential California Tiger Salamander (CTS) Breeding Habitat
Aquatic Dispersal Habitat: 500 Foot Buffer around Potential CTS Breeding Habitat
Affects to CTS Habitat
Temporary Direct Affects to 500' Buffer of Potential CTS Habitat
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60kV Poles
Transmission Lines
Pull Site
Fly Site
100' Work Area
Access Road 12 ' Disturbance
Guard Structures

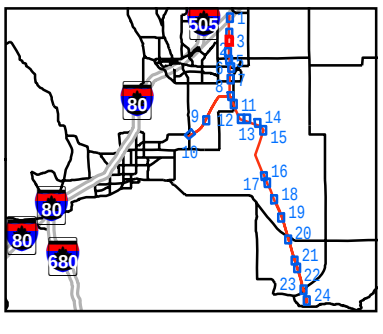
N W E S

0 200 400 Feet

Figure 2c - Potential Affects to CTS Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

CTS Assessment

Solano County, Ca



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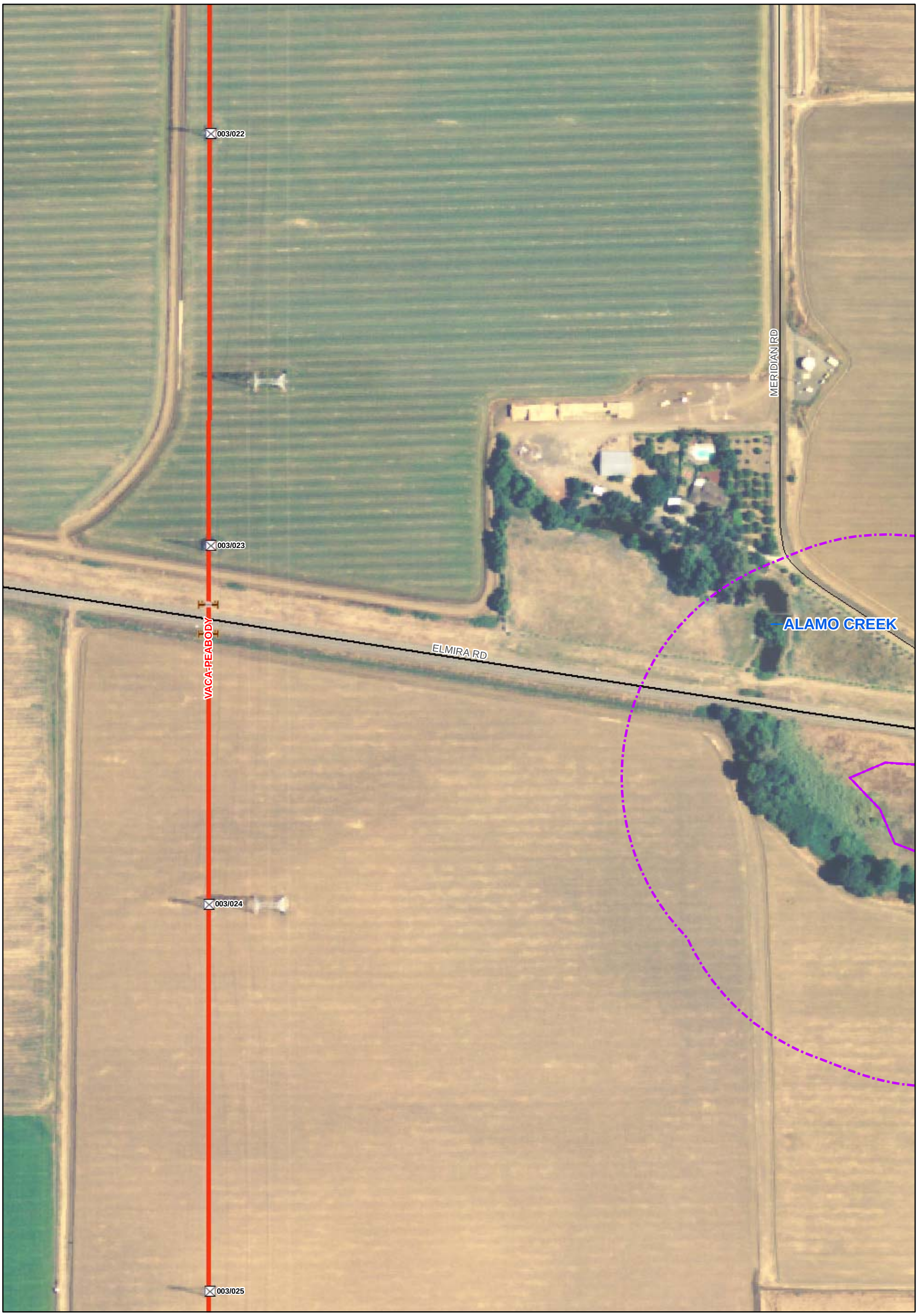

Potential California Tiger Salamander (CTS) Breeding Habitat
Aquatic Dispersal Habitat: 500 Foot Buffer around Potential CTS Breeding Habitat
Affects to CTS Habitat
Temporary Direct Affects to 500' Buffer of Potential CTS Habitat
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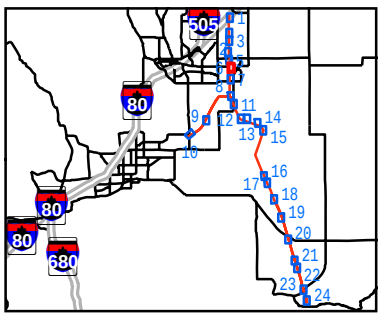
CTS CNDDB occurrences (March, 2008)
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
100' Work Area
Access Road 12 ' Disturbance
Guard Structures

0 200 400 Feet

Figure 2d - Potential Affects to CTS Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

CTS Assessment
Solano County, Ca



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IRRIGATION CANAL

004/027

RAILROAD TRACKS

IRRIGATION CANAL

P-3

VACA-PEABODY

004/028

Sp Railroad

MERIDIAN RD

004/029

FRY RD

IRRIGATION CANAL

Potential California Tiger Salamander (CTS) Breeding Habitat

Aquatic Dispersal Habitat: 500 Foot Buffer around Potential CTS Breeding Habitat

Affects to CTS Habitat

Temporary Direct Affects to 500' Buffer of Potential CTS Habitat

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CTS CNDDB occurrences (March, 2008)

Structures

60kV Poles

Transmission Lines

Pull Site

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100' Work Area

Access Road 12 ' Disturbance

Guard Structures

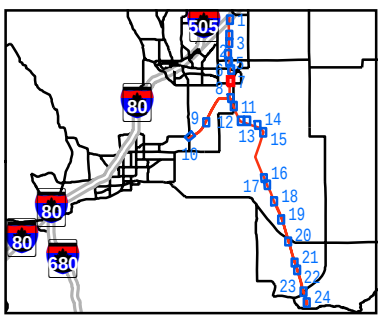
N W E S

0 200 400 Feet

Figure 2e - Potential Affects to CTS Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

CTS Assessment

Solano County, Ca



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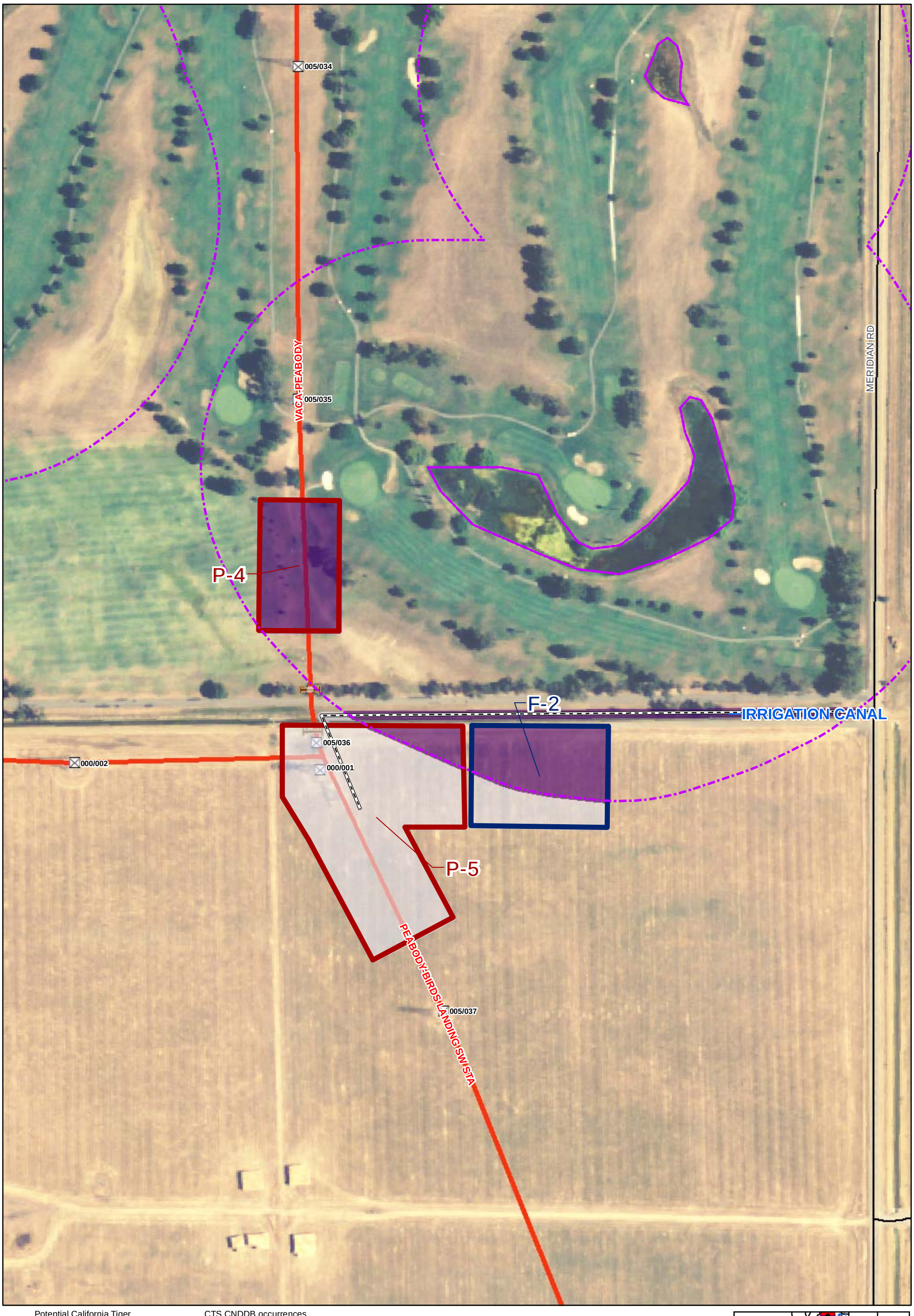


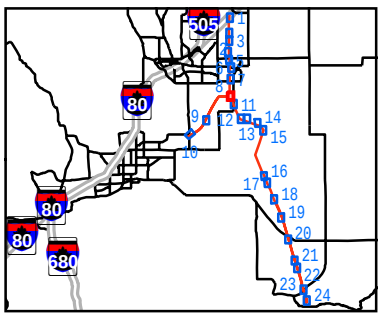
Potential California Tiger Salamander (CTS) Breeding Habitat
Aquatic Dispersal Habitat: 500 Foot Buffer around Potential CTS Breeding Habitat
Affects to CTS Habitat
Temporary Direct Affects to 500' Buffer of Potential CTS Habitat
Temporary Direct Affects to 1.24 Mile Buffer of Potential CTS Habitat
CTS CNDDB occurrences (March, 2008)
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
100' Work Area
Access Road 12 ' Disturbance
Guard Structures

N W E S

0 200 400 Feet

Figure 2 f - Potential Affects to CTS Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

CTS Assessment
Solano County, Ca



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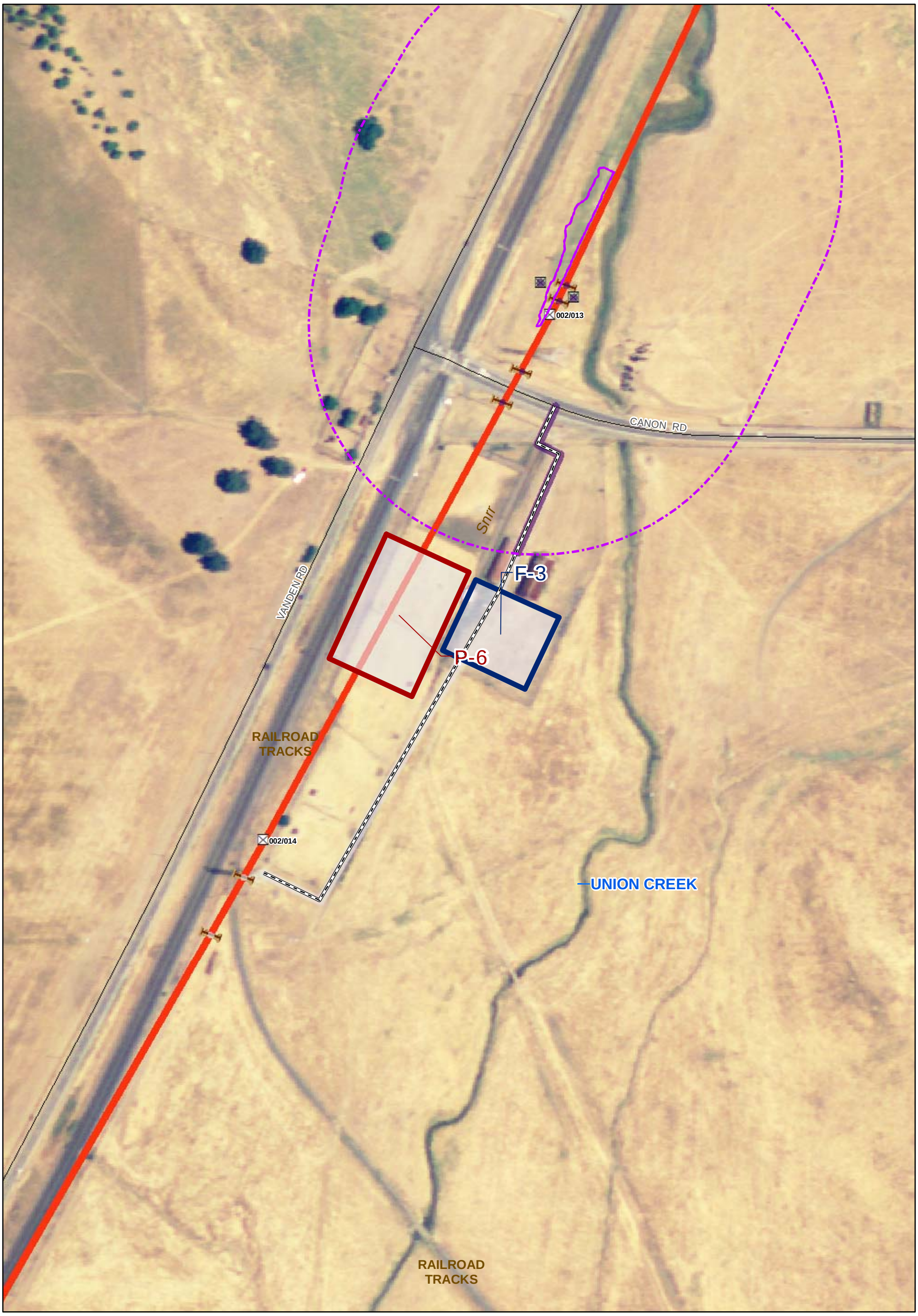


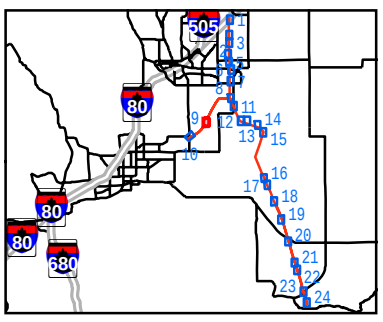
Potential California Tiger Salamander (CTS) Breeding Habitat
Aquatic Dispersal Habitat: 500 Foot Buffer around Potential CTS Breeding Habitat
Affects to CTS Habitat
Temporary Direct Affects to 500' Buffer of Potential CTS Habitat
Temporary Direct Affects to 1.24 Mile Buffer of Potential CTS Habitat
CTS CNDDB occurrences (March, 2008)
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
100' Work Area
Access Road 12 ' Disturbance
Guard Structures

N W E S

0 200 400 Feet

Figure 2g - Potential Affects to CTS Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

CTS Assessment
Solano County, Ca



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010/072
010/073
PEABODY-BIRDS LANDING SW STA
011/074
011/075
CREED RD

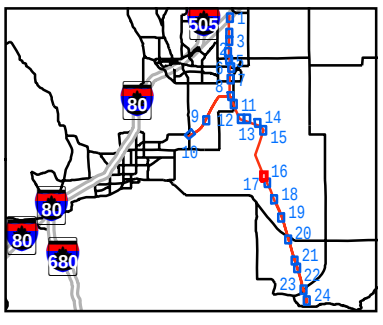
Potential California Tiger Salamander (CTS) Breeding Habitat
Aquatic Dispersal Habitat: 500 Foot Buffer around Potential CTS Breeding Habitat
Affects to CTS Habitat
Temporary Direct Affects to 500' Buffer of Potential CTS Habitat
Temporary Direct Affects to 1.24 Mile Buffer of Potential CTS Habitat
CTS CNDDB occurrences (March, 2008)
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
100' Work Area
Access Road 12 ' Disturbance
Guard Structures

N W E S

0 200 400 Feet

Figure 2h - Potential Affects to CTS Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

CTS Assessment
Solano County, Ca



011/075

CREED RD

011/076

P-12

PEABODY-BIRDS LANDING SW STA

011/077

011/078

Potential California Tiger Salamander (CTS) Breeding Habitat

Aquatic Dispersal Habitat: 500 Foot Buffer around Potential CTS Breeding Habitat

Affects to CTS Habitat

Temporary Direct Affects to 500' Buffer of Potential CTS Habitat

Temporary Direct Affects to 1.24 Mile Buffer of Potential CTS Habitat

CTS CNDDB occurrences (March, 2008)

Structures

60kV Poles

Transmission Lines

Pull Site

Fly Site

100' Work Area

Access Road 12 ' Disturbance

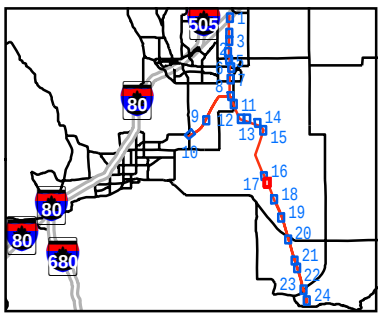
Guard Structures

N W E S

0 200 400 Feet

Figure 2 i - Potential Affects to CTS Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

CTS Assessment
Solano County, Ca



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012/083

RAILROAD TRACKS

Sacramento Northern Railroad

PEABODY-BIRDSLANDING SW STA

012/084

P-13

012/085

LAMBIE SUBSTATION

P-14

012/086

LAMBIE

LAMBIE RD

Potential California Tiger Salamander (CTS) Breeding Habitat

Aquatic Dispersal Habitat: 500 Foot Buffer around Potential CTS Breeding Habitat

Affects to CTS Habitat

Temporary Direct Affects to 500' Buffer of Potential CTS Habitat

Temporary Direct Affects to 1.24 Mile Buffer of Potential CTS Habitat

CTS CNDDB occurrences (March, 2008)

Structures

60kV Poles

Transmission Lines

Pull Site

Fly Site

100' Work Area

Access Road 12 ' Disturbance

Guard Structures

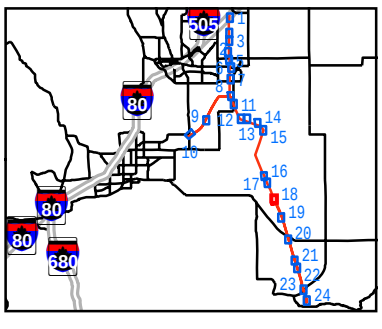
N W E S

0 200 400 Feet

Figure 2 j - Potential Affects to CTS Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

CTS Assessment

Solano County, Ca



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015/101

STATE HIGHWAY 12

015/102

P-15

LITTLE HONKER BAY RD

015/103

F-7

Potential California Tiger Salamander (CTS) Breeding Habitat

Aquatic Dispersal Habitat: 500 Foot Buffer around Potential CTS Breeding Habitat

Affects to CTS Habitat

Temporary Direct Affects to 500' Buffer of Potential CTS Habitat

Temporary Direct Affects to 1.24 Mile Buffer of Potential CTS Habitat

CTS CNDDB occurrences (March, 2008)

Structures

60kV Poles

Transmission Lines

Pull Site

Fly Site

100' Work Area

Access Road 12 ' Disturbance

Guard Structures

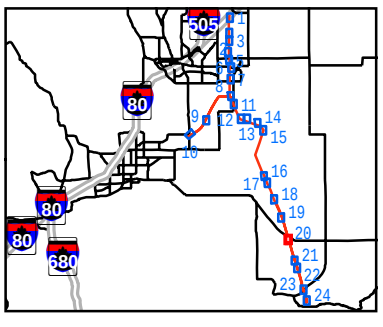
N W E S

0 200 400 Feet

Figure 2k - Potential Affects to CTS Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

CTS Assessment

Solano County, Ca



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016/110

016/111

PEABODY-BIRDS LANDING SW STA-LAMBIE SW STA-CONTRA COSTA

016/112

OLSEN RD

017/113

Potential California Tiger Salamander (CTS) Breeding Habitat

Aquatic Dispersal Habitat: 500 Foot Buffer around Potential CTS Breeding Habitat

Affects to CTS Habitat

Temporary Direct Affects to 500' Buffer of Potential CTS Habitat

Temporary Direct Affects to 1.24 Mile Buffer of Potential CTS Habitat

CTS CNDDB occurrences (March, 2008)

Structures

60kV Poles

Transmission Lines

Pull Site

Fly Site

100' Work Area

Access Road 12 ' Disturbance

Guard Structures

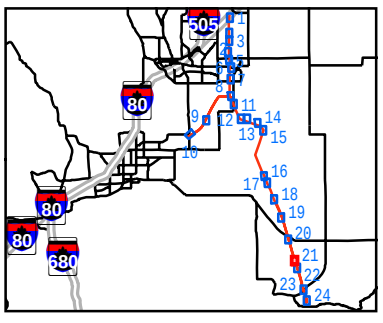
N W E S

0 200 400 Feet

Figure 2 l - Potential Affects to CTS Habitat Vaca Dixon - Birds Landing 230kV Reconductoring Project

CTS Assessment

Solano County, Ca



Appendix A

Representative Photographs

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Photo 1. Potential CTS breeding pool (vernal pool) less than 0.5 mi west of the guard structures near pull site P-13. This site is located north of Lambie Road and less than 1.3 mi south of CNDDB occurrence #999.

Photo 2. Potential CTS breeding pools located within an ephemeral drainage. This site is located south of Lambie Road within a grazed pasture and approximately 0.25 mi from fly site F-6. The nearest CNDDB record is approximately 3 mi to the north, but less than 1.3 mi from the site depicted in Photo 1.

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Photo 3. This seasonal wetland provides potential breeding habitat for CTS. The site is located within or near railroad right of way just north of Canon Road. The pool is located within the immediate proximity of the guard structures near the P-6 pull site. The nearest CNDDB record is less than 1 mi to the southwest (#828).

Photo 4. This seasonal wetland provides potential breeding habitat for CTS. The site is located within railroad right of way just north of Fry Road. The pool is located within the immediate proximity of the guard structures near the P-3 pull site. The nearest CNDDB record is 3.5 mi to the south.

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Appendix B

CNDDB Records

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Ambystoma californiense

California tiger salamander — Element Code: AAAAA01180

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2G3	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations

General: CENTRAL VALLEY DPS LISTED AS THREATENED. SANTA BARBARA & SONOMA COUNTIES DPS LISTED AS ENDANGERED.

Micro: NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS & VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING.

Occurrence No. 81 — Map Index: 68807 — EO Index: 28388

Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen — Element: 2006-XX-XX — Site: 2006-XX-XX
Record Last Updated: 2007-04-04

Quad Summary: Dozier (3812137/498D)
County Summary: Solano

Lat/Long: 38.27051° / -121.82689°
UTM: Zone-10 N4236480 E602617
Area: 78.0 acres
Elevation: 20 ft
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Township: 05N
Range: 01E
Section: 23
Qtr: NE
Meridian: M

Location: OLCOTT LAKE, JEPSON PRAIRIE PRESERVE, WEST OF COOK LANE & EAST OF SACRAMENTO NORTHERN RAILROAD, SW OF DOZIER.

Location Detail: FORMERLY TNC JEPSON PRAIRIE PRESERVE; TRANSFERRED TO SOLANO COUNTY FARMLANDS AND OPEN SPACE IN AUG 1997. SHAFFER SITE 95.

Ecological: HABITAT CONSISTS OF A LARGE VERNAL POOL. SHEEP GRAZING AND EXOTIC PLANTS PRESENT. BRANCHINECTA CONSERVATIO, LEPIDURUS PACKARDI, AND ELAPHRUS VIRIDIS ARE ALSO FOUND AT THIS SITE.

General: UCD RECORD FROM FEB 1972. SSC 714 (LARVA) ON 7 APR1973. 5 LARVAE NETTED, 9 APR 1998. 653 ADS/7749 JUVS OBSERVED, 2005-06 WET SEASON (88 VISITS). 4483 JUVS CAPTURED (PITFALL TRAPS & DRIFT FENCES), 13 MAY-28 JUN 2005.

Owner/Manager: SOLANO LAND TRUST

Occurrence No. 336 — Map Index: 34153 — EO Index: 1961

Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen — Element: 2002-05-13 — Site: 2002-05-13
Record Last Updated: 2005-06-21

Quad Summary: Dozier (3812137/498D)
County Summary: Solano

Lat/Long: 38.26970° / -121.84368°
UTM: Zone-10 N4236371 E601150
Area:
Elevation: 25 ft
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Township: 05N
Range: 01E
Section: 22
Qtr: XX
Meridian: M

Location: 1.8 MILES SW OF DOZIER, 2.2 MILES WNW OF HIGHWAY 113 AT CALHOUN CUT, WEST OF JEPSON PRAIRIE.

Location Detail: LOCATED ALONG PG&E/PGT UNDERGROUND GAS PIPELINE RIGHT-OF-WAY. PLAYA-2 LOCATION MAPPED TO WITHIN SAMPLE AREA, DETAILS NOT GIVEN AS TO ACTUAL LOCATION.

Ecological: HABITAT CONSISTS OF RESTORED VERNAL POOLS IN CENTRAL VALLEY GRASSLAND; PLAYA POOLS CONTAINING WATER INTO JUNE, WITH HIGH TURBIDITY DUE TO CONSTANT WIND CAUSING SUSPENSION OF FINE SEDIMENTS.

Threat: POSSIBLE THREATS INCLUDE OVERGRAZING, CONVERSION TO CROPLAND, DEVELOPMENT.

General: CAS #187388-89 COLL 20 APR 1978. CAS #178428 COLL 19 FEB 1982. SHAFFER SITE #57 COLL 21 APR 1990. SHAFFER SITE #89 COLLECTED 11 MAR 1990. SHAFFER SITE #274 COLLECTED 3 MAY 1991. PLAYA-2: LARVAE OBS, 1995. OBSERVED, 13 MAY 2002.

Owner/Manager: PVT

Ambystoma californiense

California tiger salamander — Element Code: AAAAA01180

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2G3	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations

General: CENTRAL VALLEY DPS LISTED AS THREATENED. SANTA BARBARA & SONOMA COUNTIES DPS LISTED AS ENDANGERED.

Micro: NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS & VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING

Occurrence No. 485 **Map Index:** 42796 **EO Index:** 42796

Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2006-05-12
Site: 2006-06-07
Record Last Updated: 2007-02-14

Quad Summary: Denverton (3812128/481B)
County Summary: Solano

Lat/Long: 38.21351° / -121.96751°
UTM: Zone-10 N4230008 E590387
Area: 0.7 acres
Elevation: 100 ft
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Township: 04N
Range: 01W
Section: 10 **Qtr:** NW
Meridian: M

Location: POTRERO HILLS, 1 MILE SOUTH OF HIGHWAY 12, SE OF FAIRFIELD

Location Detail: POND 1, WHICH IS 1 OF 7 STOCK PONDS LOCATED IN A VALLEY ENVELOPED WITHIN THE POTRERO HILLS. ADULT CTS HAVE BEEN OBSERVED THROUGHOUT SPRING BRANCH CREEK VALLEY. 1999 OBSERVATION IN UPLAND AREAS.

Ecological: POND 1 IS A FORMER QUARRY POND; HABITAT SURROUNDING POND CONSISTS OF GRAZED NON-NATIVE GRASSLAND; SURROUNDED BY OPEN SPACE AND A LANDFILL.

Threat: THREATENED BY A PROPOSED LANDFILL EXPANSION.

General: 1 ADULT/4 SUBADULTS OBSERVED 18 JAN 1999. ADULT OBS 4 JAN 2000, & 6 OTHERS IN BURROWS/UNDER DEBRIS IN THE VICINITY. 47 LARVAE OBS 8 APR 2003. 7 LARVAE OBS ON 14 MAY 2004. 77 & 38 LARVAE CAPTURED ON 28 MAR & 12 MAY 2006. NONE OBS 7 JUN 2006

Owner/Manager: PVT

Occurrence No. 535 **Map Index:** 10572 **EO Index:** 45811

Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown

Dates Last Seen
Element: 1983-02-XX
Site: 1983-02-XX
Record Last Updated: 2001-09-04

Quad Summary: Antioch South (3712187/464A), Antioch North (3812117/481D)
County Summary: Contra Costa

Lat/Long: 38.00282° / -121.80300°
UTM: Zone-10 N4206803 E605091
Radius: 1 mile
Elevation: 50 ft
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Township: 02N
Range: 02E
Section: 19 **Qtr:** XX
Meridian: M

Location: ANTIOCH.

Location Detail: NO OTHER LOCATION INFORMATION GIVEN.

General: FEB 1983: CAS# 178450, ADULT COLLECTED BY R. PITTS (DFG). JENNINGS CONSIDERS THIS SITE EXTIRPATED

Owner/Manager: UNKNOWN

Occurrence No. 547 **Map Index:** 45867 **EO Index:** 45867

Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2007-02-26
Site: 2007-02-26
Record Last Updated: 2007-06-06

Quad Summary: Dozier (3812137/498D)
County Summary: Solano

Lat/Long: 38.27709° / -121.82823°
UTM: Zone-10 N4237209 E602491
Area:
Elevation: 23 ft
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Township: 05N
Range: 01E
Section: 14 **Qtr:** XX
Meridian: M

Location: CALHOUN CUT (BARKER SLOUGH) ECOLOGICAL RESERVE. EAST OF FAIRFIELD, 0.6 AIR MILES SSW OF DOZIER.

Location Detail: SOUTHWEST OF THE INTERSECTION OF COOK ROAD AND RAILROAD CROSSING.

General: 207 ADULTS CAPTURED IN 16, 33 FOOT DRIFT FENCE ARRAYS WITH A PIT FALL TRAP AT EACH END, BETWEEN 14 NOV 2006 & 26 FEB 2007. ARRAYS RUN PER USFWS SURVEY PROTOCOLS. CAS# 178446, LARVA COLLECTED 2 APR 1983 BY D. MUTH & L. SPENCER (DFG).

Owner/Manager: DFG-CALHOUN CUT ER

Ambystoma californiense

California tiger salamander — Element Code: AAAAA01180

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2G3	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations

General: CENTRAL VALLEY DPS LISTED AS THREATENED. SANTA BARBARA & SONOMA COUNTIES DPS LISTED AS ENDANGERED.

Micro: NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS & VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING

Occurrence No. 601 **Map Index:** 46378 **EO Index:** 46378

Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 1990-04-29
Site: 1990-04-29
Record Last Updated: 2002-07-18

Quad Summary: Birds Landing (3812127/481A), Dozier (3812137/498D)
County Summary: Solano

Lat/Long: 38.25043° / -121.84741°
UTM: Zone-10 N4234229 E600850
Radius: 1/5 mile
Elevation: 25 ft
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Township: 05N
Range: 01E
Section: 27 **Qtr:** XX
Meridian: M

Location: ABOUT 0.6 MI NORTHEAST OF CREED. VERNAL POOLS ON BOTH SIDES OF THE RR TRACKS.

Ecological: VERNAL POOLS

General: SHAFFER SITES 73 AND 74 . CTS OBSERVED 29 APR 1990.

Owner/Manager: UNKNOWN

Occurrence No. 828 **Map Index:** 60705 **EO Index:** 60741

Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2005-03-08
Site: 2005-03-08
Record Last Updated: 2005-03-28

Quad Summary: Elmira (3812138/498C)
County Summary: Solano

Lat/Long: 38.29626° / -121.96218°
UTM: Zone-10 N4239196 E590750
Area:
Elevation: 100 ft
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Township: 05N
Range: 01W
Section: 10 **Qtr:** NW
Meridian: M

Location: 1.5 MILES NW OF TRAVIS FIELD, TRAVIS AIR FORCE BASE

Ecological: HABITAT CONSISTS OF NON-NATIVE GRASSLAND, WITH MAN-MADE POOLS AND SHALLOW, NATURAL POOLS.

General: 2 LARVAE OBSERVED IN A LARGE, MAN-MADE POOL ON 8 MAR 2005.

Owner/Manager: UNKNOWN

Occurrence No. 872 **Map Index:** 63832 **EO Index:** 63927

Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2001-07-06
Site: 2001-07-06
Record Last Updated: 2006-01-31

Quad Summary: Denverton (3812128/481B)
County Summary: Solano

Lat/Long: 38.21237° / -121.95933°
UTM: Zone-10 N4229891 E591105
Area: 2.0 acres
Elevation: 200 ft
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Township: 04N
Range: 01W
Section: 10 **Qtr:** XX
Meridian: M

Location: POTRERO HILLS, 1.05 MILE SOUTH OF HIGHWAY 12, SE OF FAIRFIELD

Location Detail: POND 2, WHICH IS 1 OF 7 STOCK PONDS LOCATED IN A VALLEY ENVELOPED WITHIN THE POTRERO HILLS.

Ecological: HABITAT SURROUNDING POND CONSISTS OF GRAZED NON-NATIVE GRASSLAND; SURROUNDED BY OPEN SPACE AND A LANDFILL.

Threat: THREATENED BY A PROPOSED LANDFILL EXPANSION.

General: A SINGLE LARVA OBSERVED IN POND 2 DURING MAR 2000. EGGS OBSERVED IN POND 2 EARLY IN 2001 SEASON, BUT ONLY A FEW LARVAE WERE FOUND WHEN POND WAS SAMPLED LATER IN THE SEASON.

Owner/Manager: PVT

Ambystoma californiense

California tiger salamander — Element Code: AAAAA01180

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2G3	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations

General: CENTRAL VALLEY DPS LISTED AS THREATENED. SANTA BARBARA & SONOMA COUNTIES DPS LISTED AS ENDANGERED.

Micro: NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS & VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING

Occurrence No. 873 **Map Index:** 63833 **EO Index:** 63928

Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2006-06-07
Site: 2006-06-07
Record Last Updated: 2007-02-14

Quad Summary: Denverton (3812128/481B)
County Summary: Solano

Lat/Long: 38.20973° / -121.96029°
UTM: Zone-10 N4229597 E591023
Area: 0.5 acres
Elevation: 120 ft
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Township: 04N
Range: 01W
Section: 10 **Qtr:** NE
Meridian: M

Location: POTRERO HILLS, 1.3 MILES SOUTH OF HIGHWAY 12, SE OF FAIRFIELD

Location Detail: POND 3, WHICH IS 1 OF 7 STOCK PONDS LOCATED IN A VALLEY ENVELOPED WITHIN THE POTRERO HILLS. POND 3 IS A LARGE STOCK POND THAT SUPPORTS LARGE NUMBERS OF LARVAE EVERY YEAR. ADULT CTS HAVE BEEN OBSERVED THROUGHOUT SPRING VALLEY CREEK WATERSHED

Ecological: HABITAT SURROUNDING POND CONSISTS OF GRAZED NON-NATIVE GRASSLAND; SURROUNDED BY OPEN SPACE AND A LANDFILL.

Threat: THREATENED BY A PROPOSED LANDFILL EXPANSION.

General: 10'S TO 100'S OF LARVAE OBSERVED IN POND 3 DURING MAR AND JUN 2000. NO LARVAE OBSERVED IN POND 3 DURING 2001. 261 LARVAE WERE CAPTURED ON 8 APR 2003. 5 LARVAE CAPTURED ON 28 MAR, 31 CAPTURED ON 12 MAY & 12 CAPTURED ON 7 JUN 2006.

Owner/Manager: PVT

Occurrence No. 874 **Map Index:** 63834 **EO Index:** 63929

Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2006-05-12
Site: 2006-06-07
Record Last Updated: 2007-02-14

Quad Summary: Denverton (3812128/481B)
County Summary: Solano

Lat/Long: 38.20582° / -121.95994°
UTM: Zone-10 N4229163 E591059
Radius: 80 meters
Elevation: 150 ft
Mapping Precision: SPECIFIC
Symbol Type: POINT
Township: 04N
Range: 01W
Section: 10 **Qtr:** SE
Meridian: M

Location: POTRERO HILLS, 1.6 MILES SOUTH OF HIGHWAY 12, SE OF FAIRFIELD

Location Detail: POND 5, WHICH IS 1 OF 7 STOCK PONDS LOCATED IN A VALLEY ENVELOPED WITHIN THE POTRERO HILLS. POND 5 IS A LARGE STOCK POND THAT SUPPORTS LARGE NUMBERS OF LARVAE EVERY YEAR. ADULT CTS HAVE BEEN OBSERVED THROUGHOUT SPRING VALLEY CREEK WATERSHED

Ecological: HABITAT SURROUNDING POND CONSISTS OF GRAZED NON-NATIVE GRASSLAND; SURROUNDED BY OPEN SPACE AND A LANDFILL.

Threat: THREATENED BY A PROPOSED LANDFILL EXPANSION.

General: 10'S TO 100'S OF LARVAE OBSERVED IN MAR AND JUN 2000. 1000'S OF CTS LARVAE OBS 30 MAR 2001. 160 LARVAE CAPTURED 8 APR 2003. 118 LARVAE CAPTURED ON 14 MAY 2004. 134 LARVAE CAPTURED ON 28 MAR, 117 CAPTURED ON 12 MAY 2006. NONE OBS 7 JUN 2006.

Owner/Manager: PVT

Ambystoma californiense

California tiger salamander — Element Code: AAAAA01180

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2G3	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations

General: CENTRAL VALLEY DPS LISTED AS THREATENED. SANTA BARBARA & SONOMA COUNTIES DPS LISTED AS ENDANGERED.

Micro: NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS & VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING

Occurrence No. 875 Map Index: 63835 EO Index: 63930

Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2006-05-12
Site: 2006-05-12
Record Last Updated: 2007-02-14

Quad Summary: Denverton (3812128/481B)
County Summary: Solano

Lat/Long: 38.20195° / -121.95145°
UTM: Zone-10 N4228742 E591807
Area: 2.1 acres
Elevation: 250 ft
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Township: 04N
Range: 01W
Section: 11
Qtr: SW
Meridian: M

Location: POTRERO HILLS, 1.8 MILES SOUTH OF HIGHWAY 12, SE OF FAIRFIELD

Location Detail: POND 7, IS 1 OF 7 STOCK PONDS LOCATED IN A VALLEY ENVELOPED WITHIN POTRERO HILLS. POND 7 IS A LARGE STOCK POND THAT SUPPORTS LARGE NUMBERS OF LARVAE EVERY YEAR. ADULT CTS HAVE BEEN OBSERVED THROUGHOUT SPRING BRANCH CREEK VALLEY TO THE NORTH

Ecological: HABITAT SURROUNDING POND CONSISTS OF HEAVILY-GRAZED NON-NATIVE GRASSLAND; SURROUNDED BY OPEN SPACE AND A LANDFILL TO THE WEST.

Threat: THREATENED BY A PROPOSED LANDFILL EXPANSION.

General: 600 LARVAE WERE CAPTURED ON 8 APR 2003. 130 LARVAE CAPTURED ON 14 MAY 2004. 64 LARVAE CAPTURED ON 12 MAY 2006.

Owner/Manager: PVT

Occurrence No. 876 Map Index: 64134 EO Index: 64229

Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 1999-02-10
Site: 1999-02-10
Record Last Updated: 2006-03-06

Quad Summary: Elmira (3812138/498C)
County Summary: Solano

Lat/Long: 38.28418° / -121.94649°
UTM: Zone-10 N4237871 E592137
Area:
Elevation: 140 ft
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Township: 05N
Range: 01W
Section: 14
Qtr: NW
Meridian: M

Location: ON THE NORTH EDGE OF TRAVIS AFB

Ecological: HABITAT CONSISTS OF GRAZED ANNUAL GRASSLAND. PORTIONS DEVELOPED INTO NEW BASE HOUSING, WITH SOME OPEN SPACE REMAINING.

Threat: THREATENED BY DEVELOPMENT (THIS SITE WAS SUBSEQUENTLY DEVELOPED INTO BASE HOUSING).

General: 1 DEAD ADULT OBSERVED ON 10 FEB 1999.

Owner/Manager: DOD-TRAVIS AFB

Ambystoma californiense

California tiger salamander — Element Code: AAAAA01180

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2G3	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations

General: CENTRAL VALLEY DPS LISTED AS THREATENED. SANTA BARBARA & SONOMA COUNTIES DPS LISTED AS ENDANGERED.

Micro: NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS & VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING

Occurrence No. 883 **Map Index:** 64470 **EO Index:** 64549

Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2006-03-13
Site: 2006-03-13
Record Last Updated: 2007-02-26

Quad Summary: Elmira (3812138/498C)
County Summary: Solano

Lat/Long: 38.28508° / -121.91944°
UTM: Zone-10 N4237998 E594502
Radius: 80 meters
Elevation: 70 ft
Mapping Precision: SPECIFIC
Symbol Type: POINT
Township: 05N
Range: 01W
Section: 13 **Qtr:** NE
Meridian: M

Location: NE OF TRAVIS FIELD, 7 MILES NE OF FAIRFIELD

Ecological: HABITAT CONSISTS OF A LARGE MAN-MADE POOL SURROUNDED BY NON-NATIVE GRASSLAND WITH A GENTLE MOUND AND SWALE TOPOGRAPHY. SHALLOW NATURAL POOLS AND AN INTERMITTENT STREAM ARE ALSO PRESENT NEARBY.

General: 1 LARVA OBSERVED ON 13 MAR 2006.

Owner/Manager: PVT

Occurrence No. 889 **Map Index:** 66597 **EO Index:** 66736

Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2006-03-22
Site: 2006-03-22
Record Last Updated: 2006-10-04

Quad Summary: Elmira (3812138/498C)
County Summary: Solano

Lat/Long: 38.28463° / -121.95627°
UTM: Zone-10 N4237912 E591282
Radius: 80 meters
Elevation: 82 ft
Mapping Precision: SPECIFIC
Symbol Type: POINT
Township: 05N
Range: 01W
Section: 15 **Qtr:** NE
Meridian: M

Location: 0.3 MILE NE OF VANDEN HIGH SCHOOL, FAIRFIELD.

Location Detail: POND IS THE SOUTHERNMOST OF THREE PONDS FOUND ALONG A RAISED RAILROAD TRACK BERM; NO CTS WERE FOUND IN THE OTHER PONDS.

Ecological: HABITAT CONSISTS OF A MAN-MADE POND LOCATED ALONG THE WEST SIDE OF A RAISED RAILROAD TRACK BERM; POND IS ~40' X 20', WITH A MAXIMUM PONDING DEPTH OF ~2', AND THE WATER WAS MURKY. CRAWDADS AND MOSQUITO FISH WERE ALSO CAPTURED DURING SEINING.

Threat: THREATENED BY FUTURE DEVELOPMENT OF THE AREA.

General: 3 LARVAE WERE CAPTURED USING A SEINE ON 22 MAR 2006.

Owner/Manager: UNKNOWN

Occurrence No. 940 **Map Index:** 64319 **EO Index:** 68397

Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2004-11-29
Site: 2004-11-29
Record Last Updated: 2007-02-26

Quad Summary: Elmira (3812138/498C)
County Summary: Solano

Lat/Long: 38.28697° / -121.91476°
UTM: Zone-10 N4238213 E594909
Radius: 80 meters
Elevation: 60 ft
Mapping Precision: SPECIFIC
Symbol Type: POINT
Township: 05N
Range: 01W
Section: 12 **Qtr:** XX
Meridian: M

Location: TRAVIS AFB, AT INTERSECTION OF MERIDIAN ROAD AND RAILROAD TRACKS.

Location Detail: MAPPED ACCORDING TO LAT/LONG COORDINATES AND MAP PROVIDED BY SOURCE.

Ecological: SHALLOW TURBID POOL AREA ALONG THE SOUTH SIDE OF THE RAILROAD TRACKS. NO VEGETATION OBSERVED. VERNAL POOLS/SEASONAL WETLANDS IN ADJACENT GRASSLANDS.

General: 1 ADULT OBSERVED BY D. CHRISTOPHER ROGERS DURING VERNAL POOL INVERTEBRATE SURVEY ON 29 NOV 2004. SPECIES NOT OBSERVED DURING SUBSEQUENT VISITS TO SITE; ANIMAL PRESUMED TO BE IN TRANSIT.

Owner/Manager: DOD-TRAVIS AFB

Ambystoma californiense

California tiger salamander — Element Code: AAAAA01180

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2G3	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations

General: CENTRAL VALLEY DPS LISTED AS THREATENED. SANTA BARBARA & SONOMA COUNTIES DPS LISTED AS ENDANGERED.

Micro: NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS & VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING

Occurrence No. 995 **Map Index:** 70198 **EO Index:** 71068

Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen — Element: 2002-05-13; Site: 2002-05-13; Record Last Updated: 2007-10-15

Quad Summary: Elmira (3812138/498C)
County Summary: Solano

Lat/Long: 38.26403° / -121.87804°
UTM: Zone-10 N4235705 E598152
Area: 5.0 acres — Mapping Precision: SPECIFIC
Elevation: 32 ft — Symbol Type: POLYGON

Township: 05N
Range: 01E
Section: 21 — Qtr: SW
Meridian: M

Location: 2.4 MILES NW OF THE INTERSECTION OF CREED ROAD AND GOOSE HAVEN ROAD, ~ 3MILES EAST OF TRAVIS FIELD.
Location Detail: LARRY SERPA'S POOL 3
Ecological: HABITAT CONSISTS OF A VERNAL POOL.
General: UNKNOWN NUMBER/LIFESTAGE OBSERVED ON 13 MAY 2002.
Owner/Manager: UNKNOWN

Occurrence No. 996 **Map Index:** 70210 **EO Index:** 71070

Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen — Element: 2002-03-25; Site: 2002-03-25; Record Last Updated: 2007-10-16

Quad Summary: Dozier (3812137/498D)
County Summary: Solano

Lat/Long: 38.26010° / -121.87180°
UTM: Zone-10 N4235276 E598703
Area: 15.0 acres — Mapping Precision: SPECIFIC
Elevation: 32 ft — Symbol Type: POLYGON

Township: 05N
Range: 01E
Section: 21 — Qtr: SW
Meridian: M

Location: 2 MILES NW OF THE INTERSECTION OF CREED RDAD AND GOOSE HAVEN ROAD, ~ 3MILES EAST OF TRAVIS FIELD.
Location Detail: LARRY SERPA'S POOL 4
Ecological: HABITAT CONSISTS OF A VERNAL POOL.
General: UNKNOWN NUMBER/LIFESTAGE OBSERVED ON 25 MAR 2002.
Owner/Manager: UNKNOWN

Occurrence No. 997 **Map Index:** 61647 **EO Index:** 71071

Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen — Element: 2002-05-13; Site: 2002-05-13; Record Last Updated: 2007-10-15

Quad Summary: Elmira (3812138/498C)
County Summary: Solano

Lat/Long: 38.26016° / -121.89766°
UTM: Zone-10 N4235255 E596440
Area: 4.8 acres — Mapping Precision: SPECIFIC
Elevation: 37 ft — Symbol Type: POLYGON

Township: 05N
Range: 01E
Section: 20 — Qtr: XX
Meridian: M

Location: 1 MILE EAST OF MERIDIAN ROAD, ~5 MILES SW OF DOZIER.
Location Detail: LARRY SERPA'S POOL 11
Ecological: HABITAT CONSISTS OF A VERNAL POOL.
General: UNKNOWN NUMBER/LIFESTAGE OBSERVED ON 13 MAY 2002.
Owner/Manager: UNKNOWN

Ambystoma californiense

California tiger salamander — Element Code: AAAAA01180

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2G3	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations

General: CENTRAL VALLEY DPS LISTED AS THREATENED. SANTA BARBARA & SONOMA COUNTIES DPS LISTED AS ENDANGERED.

Micro: NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS & VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING

Occurrence No. 998 **Map Index:** 61648 **EO Index:** 71074

Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2002-05-13
Site: 2002-05-13
Record Last Updated: 2007-10-31

Quad Summary: Elmira (3812138/498C)
County Summary: Solano

Lat/Long: 38.25712° / -121.90577°
UTM: Zone-10 N4234910 E595735
Area: 21.7 acres
Elevation: 47 ft
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Township: 05N
Range: 01E
Section: 30 **Qtr:** XX
Meridian: M

Location: 0.5 MILE EAST OF MERIDIAN ROAD, ~5 MILES SW OF DOZIER.
Location Detail: LARRY SERPA'S POOL 12
Ecological: HABITAT CONSISTS OF A VERNAL POOL.
General: UNKNOWN NUMBER/LIFE STAGE OBSERVED ON 13 MAY 2002.
Owner/Manager: UNKNOWN

Occurrence No. 999 **Map Index:** 70200 **EO Index:** 71075

Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2002-02-15
Site: 2002-02-15
Record Last Updated: 2007-10-15

Quad Summary: Denverton (3812128/481B)
County Summary: Solano

Lat/Long: 38.24728° / -121.88071°
UTM: Zone-10 N4233844 E597940
Area: 13.0 acres
Elevation: 36 ft
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Township: 05N
Range: 01E
Section: 29 **Qtr:** SE
Meridian: M

Location: ~4.3 MILES SW OF DOZIER.
Location Detail: LARRY SERPA'S POOL 15 AND 16
Ecological: HABITAT CONSISTS OF VERNAL POOLS.
General: UNKNOWN NUMBER/LIFESTAGE OBSERVED ON 15 FEB 2002.
Owner/Manager: UNKNOWN

Occurrence No. 1000 **Map Index:** 70201 **EO Index:** 71076

Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2002-02-15
Site: 2002-02-15
Record Last Updated: 2007-10-15

Quad Summary: Denverton (3812128/481B), Elmira (3812138/498C)
County Summary: Solano

Lat/Long: 38.25070° / -121.88447°
UTM: Zone-10 N4234220 E597606
Area: 9.0 acres
Elevation: 30 ft
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Township: 05N
Range: 01E
Section: 29 **Qtr:** XX
Meridian: M

Location: ~4.4 MILES SW OF DOZIER.
Location Detail: LARRY SERPA'S POOL 18
Ecological: HABITAT CONSISTS OF VERNAL POOL.
General: UNKNOWN NUMBER/LIFESTAGE OBSERVED ON 15 FEB 2002.
Owner/Manager: UNKNOWN

Ambystoma californiense

California tiger salamander — Element Code: AAAAA01180

Status
Federal: Threatened
State: None

NDDB Element Ranks
Global: G2G3
State: S2S3

Other Lists
CDFG Status: SC

Habitat Associations
General: CENTRAL VALLEY DPS LISTED AS THREATENED. SANTA BARBARA & SONOMA COUNTIES DPS LISTED AS ENDANGERED.
Micro: NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS & VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING

Occurrence No. 1001 **Map Index:** 61673 **EO Index:** 71077

Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2002-05-13
Site: 2002-05-13
Record Last Updated: 2007-10-15

Quad Summary: Elmira (3812138/498C)
County Summary: Solano

Lat/Long: 38.27269° / -121.87934°
UTM: Zone-10 N4236665 E598026
Area: 22.3 acres
Elevation: 34 ft
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Township: 05N
Range: 01E
Section: 17 **Qtr:** XX
Meridian: M

Location: ~3.4 MILES WSW OF DOZIER.
Location Detail: LARRY SERPA'S POOL 24
Ecological: HABITAT CONSISTS OF VERNAL POOL.
General: UNKNOWN NUMBER/LIFESTAGE OBSERVED ON 13 MAY 2002.
Owner/Manager: UNKNOWN

Occurrence No. 1002 **Map Index:** 61676 **EO Index:** 71079

Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2002-04-02
Site: 2002-04-02
Record Last Updated: 2007-10-31

Quad Summary: Dozier (3812137/498D)
County Summary: Solano

Lat/Long: 38.26705° / -121.85667°
UTM: Zone-10 N4236064 E600017
Radius: 80 meters
Elevation: 32 ft
Mapping Precision: SPECIFIC
Symbol Type: POINT
Township: 05N
Range: 01E
Section: 22 **Qtr:** XX
Meridian: M

Location: ~2.5 MILES SW OF DOZIER.
Location Detail: LARRY SERPA'S POOL 30. POOL DOES NOT SHOW ON TOPO MAP; LOCATION TAKEN FROM UTM COORDINATES IN SOURCE DOCUMENT TABLE.
Ecological: HABITAT CONSISTS OF A VERNAL POOL WITH AN IRREGULAR MARGIN.
General: UNKNOWN NUMBER/LIFESTAGE OBSERVED ON 2 APR 2002.
Owner/Manager: UNKNOWN

Appendix F
Vernal Pool Resource Tables

All Pools Acreage

MAP Location 1"=2400'	MAP Location 1"=12000'	Pool ID	Acreage	Square Feet
Map 1 of 24	Map 1 of 11	p-2.a	0.010	415
Map 1 of 24	Map 1 of 11	p-1.a	0.015	666
Map 1 of 24	Map 1 of 11	p-1.b	0.027	1160
Map 2 of 24	Map 2 of 11	pop.g.a	0.015	632
Map 7 of 24	Map 3 of 11	fry.g.a-2	0.010	443
Map 7 of 24	Map 3 of 11	fry.g.a	0.020	879
Map 8 of 24	Map 3 of 11	p-4.b	0.047	2068
Map 9 of 24	Map 4 of 11	cor.g.c	0.001	43
Map 9 of 24	Map 4 of 11	cor.g.a	0.070	3049
Map 9 of 24	Map 4 of 11	cor.g.b	0.000	13
Map 9 of 24	Map 4 of 11	p-6.g.g	0.009	407
Map 9 of 24	Map 4 of 11	p-6.g.h	0.001	62
Map 9 of 24	Map 4 of 11	cor.road.a	0.002	66
Map 9 of 24	Map 4 of 11	f-3.a	0.002	91
Map 9 of 24	Map 4 of 11	f-3.l	0.001	59
Map 9 of 24	Map 4 of 11	f-3.i	0.002	89
Map 9 of 24	Map 4 of 11	f-3.d-2	0.002	103
Map 9 of 24	Map 4 of 11	f-3.d	0.005	199
Map 9 of 24	Map 4 of 11	f-3.z	0.005	229
Map 9 of 24	Map 4 of 11	f-3.b	0.003	127
Map 9 of 24	Map 4 of 11	f-3.c	0.034	1465
Map 9 of 24	Map 4 of 11	f-3.e	0.022	940
Map 9 of 24	Map 4 of 11	f-3.z-2	0.005	212
Map 9 of 24	Map 4 of 11	f-3.j	0.001	35
Map 9 of 24	Map 4 of 11	cor.road.b	0.007	318
Map 9 of 24	Map 4 of 11	p-6.j	0.008	337
Map 9 of 24	Map 4 of 11	can.g.d	0.228	9921
Map 9 of 24	Map 4 of 11	can.g.l	0.001	30
Map 9 of 24	Map 4 of 11	p-6.g.f	0.004	173
Map 9 of 24	Map 4 of 11	p-6.g.d	0.003	127
Map 9 of 24	Map 4 of 11	p-6.g.c	0.001	49
Map 9 of 24	Map 4 of 11	p-6.g.a	0.004	153
Map 9 of 24	Map 4 of 11	cor.g.d-2	0.008	368
Map 9 of 24	Map 4 of 11	cor.g.d-1	0.015	639
Map 10 of 24	Map 5 of 11	p-7.c	0.009	407
Map 10 of 24	Map 5 of 11	p-7.b	0.027	1171
Map 10 of 24	Map 5 of 11	p-7.a	0.013	550
Map 11 of 24	Map 3 of 11	mer.g.b	0.010	438
Map 11 of 24	Map 3 of 11	mer.g.a	0.036	1552
Map 11 of 24	Map 3 of 11	mer.g.d	0.004	176
Map 11 of 24	Map 3 of 11	mer.g.e	0.014	606
Map 11 of 24	Map 3 of 11	mer.g.c	0.053	2318
Map 12 of 24	Map 6 of 11	p-9.abc	0.206	8981
Map 12 of 24	Map 6 of 11	p-9.e	0.015	657
Map 12 of 24	Map 6 of 11	p-9.f	0.032	1400
Map 12 of 24	Map 6 of 11	p-9.h	0.001	56
Map 14 of 24	Map 7 of 11	f-5.road.a	0.557	24255
Map 14 of 24	Map 7 of 11	f-5.road.b	0.121	5261
Map 14 of 24	Map 7 of 11	f-5.road.f	0.013	573

All Pools Acreage

MAP Location 1"=2400'	MAP Location 1"=12000'	Pool ID	Acreage	Square Feet
Map 14 of 24	Map 7 of 11	f-5.road.g	0.008	334
Map 15 of 24	Map 7 of 11	f-5.road.c	0.023	1021
Map 15 of 24	Map 7 of 11	f-5.road.d	0.180	7851
Map 15 of 24	Map 7 of 11	f-5.road.e	0.029	1255
Map 15 of 24	Map 7 of 11	p-10.h	0.015	673
Map 15 of 24	Map 7 of 11	p-10.f	0.051	2239
Map 15 of 24	Map 7 of 11	p-10.abcdeg	0.068	2947
Map 15 of 24	Map 7 of 11	p-10.i	0.005	238
Map 15 of 24	Map 7 of 11	p-10.j	0.013	548
Map 15 of 24	Map 7 of 11	p-11.d	0.010	451
Map 16 of 24	Map 8 of 11	C-4	0.005	210
Map 16 of 24	Map 8 of 11	C-81	0.282	12271
Map 16 of 24	Map 8 of 11	C-86	0.012	532
Map 16 of 24	Map 8 of 11	C-5	0.042	1848
Map 16 of 24	Map 8 of 11	C-93	0.009	402
Map 16 of 24	Map 8 of 11	C-49	0.002	83
Map 16 of 24	Map 8 of 11	C-112	0.009	375
Map 16 of 24	Map 8 of 11	C-113	0.018	797
Map 16 of 24	Map 8 of 11	C-46	0.004	194
Map 16 of 24	Map 8 of 11	C-47	0.006	275
Map 16 of 24	Map 8 of 11	C-48	0.003	134
Map 16 of 24	Map 8 of 11	C-43	0.034	1499
Map 16 of 24	Map 8 of 11	C-42	0.004	169
Map 16 of 24	Map 8 of 11	C-44	0.005	207
Map 16 of 24	Map 8 of 11	C-45	0.002	82
Map 16 of 24	Map 8 of 11	C-107	0.005	230
Map 16 of 24	Map 8 of 11	C-108	0.005	203
Map 16 of 24	Map 8 of 11	C-109	0.006	277
Map 16 of 24	Map 8 of 11	C-110	0.020	885
Map 16 of 24	Map 8 of 11	C-114	0.014	603
Map 16 of 24	Map 8 of 11	C-115	0.021	904
Map 16 of 24	Map 8 of 11	C-116	0.025	1098
Map 16 of 24	Map 8 of 11	C-1	0.128	5595
Map 16 of 24	Map 8 of 11	C-2	0.004	171
Map 16 of 24	Map 8 of 11	C-3	0.007	286
Map 16 of 24	Map 8 of 11	C-0	0.006	248
Map 16 of 24	Map 8 of 11	C-7	0.003	126
Map 16 of 24	Map 8 of 11	C-8	0.009	375
Map 16 of 24	Map 8 of 11	C-9	0.005	219
Map 16 of 24	Map 8 of 11	C-10	0.012	535
Map 16 of 24	Map 8 of 11	C-82	0.008	354
Map 16 of 24	Map 8 of 11	C-11	0.033	1452
Map 16 of 24	Map 8 of 11	C-12	0.004	159
Map 16 of 24	Map 8 of 11	C-13	0.005	205
Map 16 of 24	Map 8 of 11	C-14	0.003	138
Map 16 of 24	Map 8 of 11	C-15	0.003	133
Map 16 of 24	Map 8 of 11	C-16	0.016	706
Map 16 of 24	Map 8 of 11	C-83	0.069	2993
Map 16 of 24	Map 8 of 11	C-87	0.013	581

All Pools Acreage

MAP Location 1"=2400'	MAP Location 1"=12000'	Pool ID	Acreage	Square Feet
Map 16 of 24	Map 8 of 11	C-17	0.029	1278
Map 16 of 24	Map 8 of 11	C-18	0.011	482
Map 16 of 24	Map 8 of 11	C-19	0.012	520
Map 16 of 24	Map 8 of 11	C-20	0.008	370
Map 16 of 24	Map 8 of 11	C-21	0.006	281
Map 16 of 24	Map 8 of 11	C-23	0.026	1127
Map 16 of 24	Map 8 of 11	C-84	0.112	4899
Map 16 of 24	Map 8 of 11	C-24	0.010	425
Map 16 of 24	Map 8 of 11	C-25	0.006	277
Map 16 of 24	Map 8 of 11	C-26	0.015	634
Map 16 of 24	Map 8 of 11	C-27	0.015	648
Map 16 of 24	Map 8 of 11	C-28	0.026	1141
Map 16 of 24	Map 8 of 11	C-29	0.153	6675
Map 16 of 24	Map 8 of 11	C-85	0.021	930
Map 16 of 24	Map 8 of 11	C-88	0.005	220
Map 16 of 24	Map 8 of 11	C-30	0.013	585
Map 16 of 24	Map 8 of 11	C-31	0.024	1061
Map 16 of 24	Map 8 of 11	C-32	0.050	2191
Map 16 of 24	Map 8 of 11	C-33	0.063	2723
Map 16 of 24	Map 8 of 11	C-34	0.005	229
Map 16 of 24	Map 8 of 11	C-89	0.006	242
Map 16 of 24	Map 8 of 11	C-91	0.004	175
Map 16 of 24	Map 8 of 11	C-92	0.003	121
Map 16 of 24	Map 8 of 11	C-35	0.014	590
Map 16 of 24	Map 8 of 11	C-36	0.341	14841
Map 16 of 24	Map 8 of 11	C-37	0.005	238
Map 16 of 24	Map 8 of 11	C-38	0.008	335
Map 16 of 24	Map 8 of 11	C-39	0.030	1289
Map 16 of 24	Map 8 of 11	C-40	0.006	267
Map 16 of 24	Map 8 of 11	C-41	0.091	3959
Map 16 of 24	Map 8 of 11	C-93	0.027	1192
Map 16 of 24	Map 8 of 11	C-50	0.005	222
Map 16 of 24	Map 8 of 11	C-51	0.025	1086
Map 16 of 24	Map 8 of 11	C-52	0.014	590
Map 16 of 24	Map 8 of 11	C-55	0.008	349
Map 16 of 24	Map 8 of 11	C-94	0.007	286
Map 16 of 24	Map 8 of 11	C-95	0.005	239
Map 16 of 24	Map 8 of 11	C-96	0.024	1038
Map 16 of 24	Map 8 of 11	C-63	0.011	468
Map 16 of 24	Map 8 of 11	C-64	0.021	905
Map 16 of 24	Map 8 of 11	C-65	0.204	8884
Map 16 of 24	Map 8 of 11	C-97	0.008	346
Map 16 of 24	Map 8 of 11	C-98	0.102	4457
Map 16 of 24	Map 8 of 11	C-99	0.032	1381
Map 16 of 24	Map 8 of 11	C-66	0.083	3611
Map 16 of 24	Map 8 of 11	C-67	0.045	1965
Map 16 of 24	Map 8 of 11	C-68	0.019	807
Map 16 of 24	Map 8 of 11	C-69	0.019	837
Map 16 of 24	Map 8 of 11	C-70	0.008	334

All Pools Acreage

MAP Location 1"=2400'	MAP Location 1"=12000'	Pool ID	Acreage	Square Feet
Map 16 of 24	Map 8 of 11	C-71	0.005	201
Map 16 of 24	Map 8 of 11	C-72	0.047	2061
Map 16 of 24	Map 8 of 11	C-100	0.018	791
Map 16 of 24	Map 8 of 11	C-73	0.024	1041
Map 16 of 24	Map 8 of 11	C-74	0.005	235
Map 16 of 24	Map 8 of 11	C-75	0.007	299
Map 16 of 24	Map 8 of 11	C-76	0.013	546
Map 16 of 24	Map 8 of 11	C-80	0.004	192
Map 16 of 24	Map 8 of 11	C-101	0.026	1113
Map 16 of 24	Map 8 of 11	C-102	0.033	1424
Map 16 of 24	Map 8 of 11	C-106	0.003	140
Map 16 of 24	Map 8 of 11	C-111	0.013	579
Map 16 of 24	Map 8 of 11	C-117	0.003	129
Map 16 of 24	Map 8 of 11	C-118	0.011	470
Map 16 of 24	Map 8 of 11	C-119	0.005	231
Map 16 of 24	Map 8 of 11	C-120	0.043	1864
Map 16 of 24	Map 8 of 11	C-121	0.054	2349
Map 16 of 24	Map 8 of 11	C-122	0.151	6583
Map 16 of 24	Map 8 of 11	C-123	0.014	592
Map 16 of 24	Map 8 of 11	C-124	0.012	510
Map 16 of 24	Map 8 of 11	C-125	0.007	318
Map 16 of 24	Map 8 of 11	C-126	0.022	942
Map 16 of 24	Map 8 of 11	C-127	0.045	1943
Map 16 of 24	Map 8 of 11	C-128	0.018	779
Map 16 of 24	Map 8 of 11	C-129	0.003	141
Map 16 of 24	Map 8 of 11	C-130	0.004	192
Map 16 of 24	Map 8 of 11	C-131	0.006	263
Map 16 of 24	Map 8 of 11	C-132	0.013	546
Map 16 of 24	Map 8 of 11	C-133	0.010	418
Map 16 of 24	Map 8 of 11	C-134	0.004	176
Map 16 of 24	Map 8 of 11	C-135	0.010	421
Map 16 of 24	Map 8 of 11	C-136	0.007	312
Map 16 of 24	Map 8 of 11	C-137	0.017	751
Map 16 of 24	Map 8 of 11	C-138	0.038	1666
Map 16 of 24	Map 8 of 11	C-139	0.006	277
Map 16 of 24	Map 8 of 11	C-140	0.007	308
Map 16 of 24	Map 8 of 11	C-141	0.228	9928
Map 16 of 24	Map 8 of 11	C-142	2.591	112869
Map 16 of 24	Map 8 of 11	C-143	2.741	119413
Map 16 of 24	Map 8 of 11	C-6	0.006	257
Map 16 of 24	Map 8 of 11	C-53	0.007	295
Map 16 of 24	Map 8 of 11	C-54	0.009	395
Map 16 of 24	Map 8 of 11	C-56	0.021	898
Map 16 of 24	Map 8 of 11	C-57	0.107	4661
Map 16 of 24	Map 8 of 11	C-58	0.097	4246
Map 16 of 24	Map 8 of 11	C-59	0.171	7462
Map 16 of 24	Map 8 of 11	C-60	0.031	1358
Map 16 of 24	Map 8 of 11	C-61	0.051	2230
Map 16 of 24	Map 8 of 11	C-62	0.041	1798

All Pools Acreage

MAP Location 1"=2400'	MAP Location 1"=12000'	Pool ID	Acreage	Square Feet
Map 16 of 24	Map 8 of 11	C-77	0.015	638
Map 16 of 24	Map 8 of 11	C-78	0.010	428
Map 16 of 24	Map 8 of 11	C-79	0.002	102
Map 16 of 24	Map 8 of 11	C-103	0.024	1059
Map 16 of 24	Map 8 of 11	C-104	0.003	118
Map 17 of 24	Map 8 of 11	p-12.g.d	0.022	943
Map 17 of 24	Map 8 of 11	p-12.g.d-2	0.005	215
Map 17 of 24	Map 8 of 11	p-12.g.d-3	0.026	1152
Map 17 of 24	Map 8 of 11	C-22	0.019	812
Map 17 of 24	Map 8 of 11	p-12.b	0.009	406
Map 17 of 24	Map 8 of 11	p-12.b-2	0.038	1648
Map 17 of 24	Map 8 of 11	p-12.b-3	0.013	558
Map 17 of 24	Map 8 of 11	p-12.c	0.041	1778
Map 17 of 24	Map 8 of 11	p-12.b-5	0.003	133
Map 17 of 24	Map 8 of 11	p-12.g.c	0.002	108
Map 17 of 24	Map 8 of 11	p-12.g.b	0.028	1241
Map 17 of 24	Map 8 of 11	p-12.g.b-2	0.114	4975
Map 18 of 24	Map 8 of 11	p-13.road	0.154	6687
Map 18 of 24	Map 8 of 11	p-13.a	0.002	88
Map 18 of 24	Map 8 of 11	p-13.b	0.003	142
Map 18 of 24	Map 8 of 11	p-13.g.b	0.003	133
Map 20 of 24	Map 9 of 11	C-145	0.014	618
Map 20 of 24	Map 9 of 11	p-15.g.a	0.002	69
Map 20 of 24	Map 9 of 11	sr12.g.a	0.140	6112
Map 20 of 24	Map 9 of 11	sr12.g.b	0.024	1064
Map 21 of 24	Map 10 of 11	01S.g.a	0.027	1187
Map 21 of 24	Map 10 of 11	01S.g.b	0.070	3056
Map 22 of 24	Map 10 of 11	f-8.a	0.089	3879
Map 24 of 24	Map 11 of 11	f-9.a	0.471	20523

Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Notes
mer.g.c	0.053	Map 11 of 24	VPFS, VPTP		Pool outside 250 ft. buffer
C-85	0.021	Map 16 of 24	VPFS, VPTP		Upgradient; pool outside 250 ft. buffer
C-91	0.004	Map 16 of 24	VPFS, VPTP		Upgradient; pool outside 250 ft. buffer
C-92	0.003	Map 16 of 24	VPFS, VPTP		Upgradient; pool outside 250 ft. buffer
C-93	0.027	Map 16 of 24	VPFS, VPTP		Upgradient; pool outside 250 ft. buffer
C-94	0.007	Map 16 of 24	VPFS, VPTP		Upgradient; pool outside 250 ft. buffer
C-95	0.005	Map 16 of 24	VPFS, VPTP		Upgradient; pool outside 250 ft. buffer
C-96	0.024	Map 16 of 24	VPFS, VPTP		Upgradient; pool outside 250 ft. buffer
C-97	0.008	Map 16 of 24	VPFS, VPTP		Upgradient; pool outside 250 ft. buffer
C-99	0.032	Map 16 of 24	VPFS, VPTP		Upgradient; pool outside 250 ft. buffer
C-138	0.038	Map 16 of 24	VPFS, VPTP		Upgradient; pool outside 250 ft. buffer
C-139	0.006	Map 16 of 24	VPFS, VPTP		Upgradient; pool outside 250 ft. buffer
C-140	0.007	Map 16 of 24	VPFS, VPTP		Upgradient; pool outside 250 ft. buffer
C-141	0.228	Map 16 of 24	VPFS, VPTP		Upgradient; pool outside 250 ft. buffer
p-13.a	0.002	Map 18 of 24	VPFS, VPTP	Direct	
f-3.a	0.002	Map 9 of 24	VPFS, VPTP	Direct	
f-3.l	0.001	Map 9 of 24	VPFS, VPTP	Direct	
p-6.j	0.008	Map 9 of 24	VPFS, VPTP	Direct	
p-2.a	0.010	Map 1 of 24	VPFS, VPTP	Direct	
p-7.b	0.027	Map 10 of 24	VPFS, VPTP	Direct	
p-7.a	0.013	Map 10 of 24	VPFS, VPTP	Direct	
p-9.f	0.032	Map 12 of 24	VPFS, VPTP	Direct	
p-9.h	0.001	Map 12 of 24	VPFS, VPTP	Direct	
f-5.road.a	0.557	Map 14 of 24	VPFS, VPTP	Direct	
f-5.road.b	0.121	Map 14 of 24	VPFS, VPTP	Direct	
p-10.f	0.051	Map 15 of 24	VPFS, VPTP	Direct	
p-10.abcdeg	0.068	Map 15 of 24	VPFS, VPTP	Direct	
C-65	0.204	Map 16 of 24	VPFS, VPTP	Direct	
C-134	0.004	Map 16 of 24	VPFS, VPTP	Direct	
p-6.g.f	0.004	Map 9 of 24	VPFS, VPTP	Indirect	
p-15.g.a	0.002	Map 20 of 24	VPFS, VPTP	Indirect	
sr12.g.a	0.140	Map 20 of 24	VPFS, VPTP	Indirect	
sr12.g.b	0.024	Map 20 of 24	VPFS, VPTP	Indirect	
p-12.g.d	0.022	Map 17 of 24	VPFS, VPTP	Indirect	

Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Notes
p-12.g.d-2	0.005	Map 17 of 24	VPFS, VPTP	Indirect	
p-12.b	0.009	Map 17 of 24	VPFS, VPTP	Indirect	
p-12.b-2	0.038	Map 17 of 24	VPFS, VPTP	Indirect	
p-12.b-3	0.013	Map 17 of 24	VPFS, VPTP	Indirect	
p-12.c	0.041	Map 17 of 24	VPFS, VPTP	Indirect	
p-12.b-5	0.003	Map 17 of 24	VPFS, VPTP	Indirect	
p-12.g.c	0.002	Map 17 of 24	VPFS, VPTP	Indirect	
p-12.g.b	0.028	Map 17 of 24	VPFS, VPTP	Indirect	
p-12.g.b-2	0.114	Map 17 of 24	VPFS, VPTP	Indirect	
f-3.i	0.002	Map 9 of 24	VPFS, VPTP	Indirect	
f-3.d-2	0.002	Map 9 of 24	VPFS, VPTP	Indirect	
f-3.d	0.005	Map 9 of 24	VPFS, VPTP	Indirect	
f-3.z	0.005	Map 9 of 24	VPFS, VPTP	Indirect	
f-3.b	0.003	Map 9 of 24	VPFS, VPTP	Indirect	
f-3.c	0.034	Map 9 of 24	VPFS, VPTP	Indirect	
f-3.e	0.022	Map 9 of 24	VPFS, VPTP	Indirect	
f-3.z-2	0.005	Map 9 of 24	VPFS, VPTP	Indirect	
f-3.j	0.001	Map 9 of 24	VPFS, VPTP	Indirect	
can.g.d	0.228	Map 9 of 24	VPFS, VPTP	Indirect	
p-4.b	0.047	Map 8 of 24	VPFS, VPTP	Indirect	
fry.g.a	0.020	Map 7 of 24	VPFS, VPTP	Indirect	
fry.g.a-2	0.010	Map 7 of 24	VPFS, VPTP	Indirect	
pop.g.a	0.015	Map 2 of 24	VPFS, VPTP	Indirect	
p-1.a	0.015	Map 1 of 24	VPFS, VPTP	Indirect	
p-1.b	0.027	Map 1 of 24	VPFS, VPTP	Indirect	
p-7.c	0.009	Map 10 of 24	VPFS, VPTP	Indirect	
can.g.l	0.001	Map 9 of 24	VPFS, VPTP	Indirect	
p-6.g.d	0.003	Map 9 of 24	VPFS, VPTP	Indirect	
p-6.g.c	0.001	Map 9 of 24	VPFS, VPTP	Indirect	
p-6.g.a	0.004	Map 9 of 24	VPFS, VPTP	Indirect	
cor.g.a	0.070	Map 9 of 24	VPFS, VPTP	Indirect	
cor.g.b	0.000	Map 9 of 24	VPFS, VPTP	Indirect	
p-6.g.g	0.009	Map 9 of 24	VPFS, VPTP	Indirect	
p-6.g.h	0.001	Map 9 of 24	VPFS, VPTP	Indirect	

Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Notes
cor.road.a	0.002	Map 9 of 24	VPFS, VPTP	Indirect	
p-9.abc	0.206	Map 12 of 24	VPFS, VPTP	Indirect	
p-9.e	0.015	Map 12 of 24	VPFS, VPTP	Indirect	
mer.g.d	0.004	Map 11 of 24	VPFS, VPTP	Indirect	
mer.g.e	0.014	Map 11 of 24	VPFS, VPTP	Indirect	
f-5.road.c	0.023	Map 15 of 24	VPFS, VPTP	Indirect	
f-5.road.d	0.180	Map 15 of 24	VPFS, VPTP	Indirect	
f-5.road.e	0.029	Map 15 of 24	VPFS, VPTP	Indirect	
p-10.h	0.015	Map 15 of 24	VPFS, VPTP	Indirect	
p-10.i	0.005	Map 15 of 24	VPFS, VPTP	Indirect	
p-10.j	0.013	Map 15 of 24	VPFS, VPTP	Indirect	
p-11.d	0.010	Map 15 of 24	VPFS, VPTP	Indirect	
f-5.road.f	0.013	Map 14 of 24	VPFS, VPTP	Indirect	
f-5.road.g	0.008	Map 14 of 24	VPFS, VPTP	Indirect	
C-1	0.128	Map 16 of 24	VPFS, VPTP	Indirect	
C-2	0.004	Map 16 of 24	VPFS, VPTP	Indirect	
C-3	0.007	Map 16 of 24	VPFS, VPTP	Indirect	
C-4	0.005	Map 16 of 24	VPFS, VPTP	Indirect	
C-5	0.042	Map 16 of 24	VPFS, VPTP	Indirect	
C-6	0.006	Map 16 of 24	VPFS, VPTP	Indirect	
C-0	0.006	Map 16 of 24	VPFS, VPTP	Indirect	
C-7	0.003	Map 16 of 24	VPFS, VPTP	Indirect	
C-8	0.009	Map 16 of 24	VPFS, VPTP	Indirect	
C-9	0.005	Map 16 of 24	VPFS, VPTP	Indirect	
C-10	0.012	Map 16 of 24	VPFS, VPTP	Indirect	
C-11	0.033	Map 16 of 24	VPFS, VPTP	Indirect	
C-12	0.004	Map 16 of 24	VPFS, VPTP	Indirect	
C-13	0.005	Map 16 of 24	VPFS, VPTP	Indirect	
C-14	0.003	Map 16 of 24	VPFS, VPTP	Indirect	
C-15	0.003	Map 16 of 24	VPFS, VPTP	Indirect	
C-16	0.016	Map 16 of 24	VPFS, VPTP	Indirect	
C-17	0.029	Map 16 of 24	VPFS, VPTP	Indirect	
C-18	0.011	Map 16 of 24	VPFS, VPTP	Indirect	
C-19	0.012	Map 16 of 24	VPFS, VPTP	Indirect	

Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Notes
C-20	0.008	Map 16 of 24	VPFS, VPTP	Indirect	
C-21	0.006	Map 16 of 24	VPFS, VPTP	Indirect	
C-30	0.013	Map 16 of 24	VPFS, VPTP	Indirect	
C-31	0.024	Map 16 of 24	VPFS, VPTP	Indirect	
C-32	0.050	Map 16 of 24	VPFS, VPTP	Indirect	
C-33	0.063	Map 16 of 24	VPFS, VPTP	Indirect	
C-34	0.005	Map 16 of 24	VPFS, VPTP	Indirect	
C-35	0.014	Map 16 of 24	VPFS, VPTP	Indirect	
C-36	0.341	Map 16 of 24	VPFS, VPTP	Indirect	
C-37	0.005	Map 16 of 24	VPFS, VPTP	Indirect	
C-38	0.008	Map 16 of 24	VPFS, VPTP	Indirect	
C-39	0.030	Map 16 of 24	VPFS, VPTP	Indirect	
C-40	0.006	Map 16 of 24	VPFS, VPTP	Indirect	
C-41	0.091	Map 16 of 24	VPFS, VPTP	Indirect	
C-43	0.034	Map 16 of 24	VPFS, VPTP	Indirect	
C-42	0.004	Map 16 of 24	VPFS, VPTP	Indirect	
C-44	0.005	Map 16 of 24	VPFS, VPTP	Indirect	
C-45	0.002	Map 16 of 24	VPFS, VPTP	Indirect	
C-46	0.004	Map 16 of 24	VPFS, VPTP	Indirect	
C-47	0.006	Map 16 of 24	VPFS, VPTP	Indirect	
C-48	0.003	Map 16 of 24	VPFS, VPTP	Indirect	
C-49	0.002	Map 16 of 24	VPFS, VPTP	Indirect	
C-50	0.005	Map 16 of 24	VPFS, VPTP	Indirect	
C-51	0.025	Map 16 of 24	VPFS, VPTP	Indirect	
C-52	0.014	Map 16 of 24	VPFS, VPTP	Indirect	
C-53	0.007	Map 16 of 24	VPFS, VPTP	Indirect	
C-54	0.009	Map 16 of 24	VPFS, VPTP	Indirect	
C-55	0.008	Map 16 of 24	VPFS, VPTP	Indirect	
C-63	0.011	Map 16 of 24	VPFS, VPTP	Indirect	
C-64	0.021	Map 16 of 24	VPFS, VPTP	Indirect	
C-143	2.741	Map 16 of 24	VPFS, VPTP, CFS	Indirect	
C-67	0.045	Map 16 of 24	VPFS, VPTP	Indirect	
C-68	0.019	Map 16 of 24	VPFS, VPTP	Indirect	
C-72	0.047	Map 16 of 24	VPFS, VPTP	Indirect	

Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Notes
C-73	0.024	Map 16 of 24	VPFS, VPTP	Indirect	
C-74	0.005	Map 16 of 24	VPFS, VPTP	Indirect	
C-77	0.015	Map 16 of 24	VPFS, VPTP	Indirect	
C-114	0.014	Map 16 of 24	VPFS, VPTP	Indirect	
C-115	0.021	Map 16 of 24	VPFS, VPTP	Indirect	
C-116	0.025	Map 16 of 24	VPFS, VPTP	Indirect	
C-117	0.003	Map 16 of 24	VPFS, VPTP	Indirect	
C-118	0.011	Map 16 of 24	VPFS, VPTP	Indirect	
C-119	0.005	Map 16 of 24	VPFS, VPTP	Indirect	
C-120	0.043	Map 16 of 24	VPFS, VPTP	Indirect	
C-121	0.054	Map 16 of 24	VPFS, VPTP	Indirect	
C-122	0.151	Map 16 of 24	VPFS, VPTP	Indirect	
C-123	0.014	Map 16 of 24	VPFS, VPTP	Indirect	
C-145	0.014	Map 20 of 24	VPFS, VPTP	Indirect	
C-124	0.012	Map 16 of 24	VPFS, VPTP	Indirect	
01S.g.a	0.027	Map 21 of 24	VPFS, VPTP	Indirect	
C-142	2.591	Map 16 of 24	VPFS, VPTP, CFS	Indirect	
f-8.a	0.089	Map 22 of 24	VPFS, VPTP	Indirect	
f-9.a	0.471	Map 24 of 24	VPFS, VPTP	Indirect	
cor.road.b	0.007	Map 9 of 24	VPFS, VPTP	REMV'D: BEHIND BERM	Removed; pool buffered from work area by berm
cor.g.d-2	0.008	Map 9 of 24	VPFS, VPTP	REMV'D: BEHIND BERM	Removed; pool buffered from work area by berm
cor.g.d-1	0.015	Map 9 of 24	VPFS, VPTP	REMV'D: BEHIND BERM	Removed; pool buffered from work area by berm
cor.g.c	0.001	Map 9 of 24	VPFS, VPTP	REMV'D: BEHIND BERM	Removed; pool buffered from work area by berm
mer.g.b	0.010	Map 11 of 24	VPFS, VPTP	REMV'D: BEHIND BERM	Removed; pool buffered from work area by berm
mer.g.a	0.036	Map 11 of 24	VPFS, VPTP	REMV'D: BEHIND BERM	Removed; pool buffered from work area by berm
p-13.b	0.003	Map 18 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
p-13.g.b	0.003	Map 18 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
p-12.g.d-3	0.026	Map 17 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-81	0.282	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-86	0.012	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-82	0.008	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-83	0.069	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-87	0.013	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-22	0.019	Map 17 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area

Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Notes
C-23	0.026	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-84	0.112	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-24	0.010	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-25	0.006	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-26	0.015	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-27	0.015	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-28	0.026	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-29	0.153	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-88	0.005	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-89	0.006	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-93	0.009	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-56	0.021	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-57	0.107	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-58	0.097	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-59	0.171	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-60	0.031	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-61	0.051	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-62	0.041	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-98	0.102	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-66	0.083	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-69	0.019	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-70	0.008	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-71	0.005	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-100	0.018	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-75	0.007	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-76	0.013	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-78	0.010	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-79	0.002	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-80	0.004	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-101	0.026	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-102	0.033	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-103	0.024	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-104	0.003	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-106	0.003	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area

Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Notes
C-107	0.005	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-108	0.005	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-109	0.006	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-110	0.020	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-111	0.013	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-112	0.009	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-113	0.018	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
p-13.road	0.154	Map 18 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-125	0.007	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-126	0.022	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-127	0.045	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-128	0.018	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-129	0.003	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-130	0.004	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-131	0.006	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-132	0.013	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-133	0.010	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-135	0.010	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-136	0.007	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
C-137	0.017	Map 16 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area
01S.g.b	0.070	Map 21 of 24	VPFS, VPTP	REMV'D: UPGRADIENT	Removed; pool upgradient from project work area

Effects to Potential Contra Costa Goldfields Habitat

Map Location 1"=2400'	Construction Effect	Pool	Affected Acreage	Habitat	Effect	Presence	Notes
Map 9 of 24		f-3.a	0.002	LACO Vernal Pool	Direct	Assumed not present	Surveys ongoing
Map 9 of 24		f-3.l	0.001	LACO Vernal Pool	Direct	Assumed not present	Surveys ongoing
Map 9 of 24		p-6.j	0.008	LACO Vernal Pool	Direct	Assumed not present	Surveys ongoing
Map 10 of 24		p-7.b	0.027	LACO Vernal Pool	Direct	Assumed not present	Surveys ongoing
Map 10 of 24		p-7.a	0.013	LACO Vernal Pool	Direct	Assumed not present	Surveys ongoing
Map 12 of 24		p-9.f	0.032	LACO Vernal Pool	Direct	Assumed not present	Surveys ongoing
Map 12 of 24		p-9.h	0.001	LACO Vernal Pool	Direct	Assumed not present	Surveys ongoing
Map 14 of 24		f-5.road.a	0.557	LACO Vernal Pool	Direct	Assumed not present	Surveys ongoing
Map 14 of 24		f-5.road.b	0.121	LACO Vernal Pool	Direct	Assumed not present	Surveys ongoing
Map 15 of 24		p-10.f	0.051	LACO Vernal Pool	Direct	Assumed not present	Surveys ongoing
Map 15 of 24		p-10.abcdeg	0.068	LACO Vernal Pool	Direct	Assumed not present	Surveys ongoing
Map 16 of 24		C-65	0.204	LACO Vernal Pool	Direct	Assumed not present	Surveys ongoing
Map 16 of 24		C-134	0.004	LACO Vernal Pool	Direct	Assumed not present	Surveys ongoing
Map 18 of 24		p-13.a	0.002	LACO Vernal Pool	Direct	Assumed not present	Surveys ongoing
Map 1 of 24	P-1		0.115	LACO Upland	Direct	Assumed not present	Surveys ongoing
Map 1 of 24	P-2		1.377	LACO Upland	Direct	Assumed not present	Surveys ongoing
Map 2 of 24	Guard Structures		0.002	LACO Upland	Direct	Assumed not present	Surveys ongoing
Map 3 of 24	Guard Structures		0.001	LACO Upland	Direct	Assumed not present	Surveys ongoing
Map 9 of 24	P-6		1.370	LACO Upland	Direct	Assumed not present	Surveys ongoing
Map 9 of 24	F-3		0.791	LACO Upland	Direct	Assumed not present	Surveys ongoing
Map 9 of 24	Guard Structures		0.006	LACO Upland	Direct	Assumed not present	Surveys ongoing
Map 9 of 24	60 kV Shoofly Poles		0.005	LACO Upland	Direct	Assumed not present	Surveys ongoing
Map 9 of 24	Access Road		0.345	LACO Upland	Direct	Assumed not present	Surveys ongoing
Map 10 of 24	P-7		0.638	LACO Upland	Direct	Assumed not present	Surveys ongoing
Map 10 of 24	Tower Work Area		0.580	LACO Upland	Direct	Assumed not present	Surveys ongoing
Map 16 of 24	Guard Structures		0.002	LACO Upland	Direct	Assumed not present	Surveys ongoing
Map 16 of 24	Access Road		0.568	LACO Upland	Direct	Assumed not present	Surveys ongoing
Map 17 of 24	Guard Structures		0.002	LACO Upland	Direct	Assumed not present	Surveys ongoing
Map 17 of 24	Access Road		0.119	LACO Upland	Direct	Assumed not present	Surveys ongoing
Map 18 of 24	P-13		1.378	LACO Upland	Direct	Assumed not present	Surveys ongoing
Map 18 of 24	Access Road		0.247	LACO Upland	Direct	Assumed not present	Surveys ongoing
Map 18 of 24	P-14		1.140	LACO Upland	Direct	Assumed not present	Surveys ongoing
Map 18 of 24	Access Road		0.070	LACO Upland	Direct	Assumed not present	Surveys ongoing
Map 1 of 24		p-1.a	0.015	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 1 of 24		p-1.b	0.027	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 1 of 24		p-2.a	0.010	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 8 of 24		p-4.b	0.047	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 9 of 24		p-6.g.f	0.004	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 9 of 24		f-3.i	0.002	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 9 of 24		f-3.d-2	0.002	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 9 of 24		f-3.d	0.005	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 9 of 24		f-3.z	0.005	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 9 of 24		f-3.b	0.003	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 9 of 24		f-3.c	0.034	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 9 of 24		f-3.e	0.022	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 9 of 24		f-3.z-2	0.005	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 9 of 24		f-3.j	0.001	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 9 of 24		can.g.d	0.228	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 9 of 24		can.g.l	0.001	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 9 of 24		p-6.g.d	0.003	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 9 of 24		p-6.g.c	0.001	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 9 of 24		p-6.g.a	0.004	LACO Vernal Pool	Indirect	Present	Surveys ongoing
Map 9 of 24		cor.g.a	0.070	LACO Vernal Pool	Indirect	Present	Surveys ongoing
Map 9 of 24		cor.g.b	0.000	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 9 of 24		p-6.g.g	0.009	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 9 of 24		p-6.g.h	0.001	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 9 of 24		cor.road.a	0.002	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-1	0.128	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-2	0.004	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-3	0.007	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing

Effects to Potential Contra Costa Goldfields Habitat

Map Location 1"=2400'	Construction Effect	Pool	Affected Acreage	Habitat	Effect	Presence	Notes
Map 16 of 24		C-4	0.005	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-5	0.042	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-6	0.006	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-0	0.006	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-7	0.003	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-8	0.009	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-9	0.005	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-10	0.012	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-11	0.033	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-12	0.004	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-13	0.005	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-14	0.003	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-15	0.003	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-16	0.016	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-17	0.029	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-18	0.011	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-19	0.012	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-20	0.008	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-21	0.006	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-30	0.013	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-31	0.024	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-32	0.050	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-33	0.063	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-34	0.005	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-35	0.014	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-36	0.341	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-37	0.005	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-38	0.008	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-39	0.030	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-40	0.006	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-41	0.091	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-43	0.034	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-42	0.004	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-44	0.005	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-45	0.002	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-46	0.004	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-47	0.006	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-48	0.003	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-49	0.002	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-50	0.005	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-51	0.025	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-52	0.014	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-53	0.007	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-54	0.009	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-55	0.008	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-63	0.011	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-64	0.021	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-143	2.741	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-67	0.045	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-68	0.019	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-72	0.047	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-73	0.024	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-74	0.005	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-77	0.015	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-114	0.014	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-115	0.021	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-116	0.025	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-117	0.003	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-118	0.011	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-119	0.005	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing

Effects to Potential Contra Costa Goldfields Habitat

Map Location 1"=2400'	Construction Effect	Pool	Affected Acreage	Habitat	Effect	Presence	Notes
Map 16 of 24		C-121	0.054	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-122	0.151	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-123	0.014	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-124	0.012	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing
Map 16 of 24		C-142	2.591	LACO Vernal Pool	Indirect	Assumed not present	Surveys ongoing

Appendix G
California Natural Diversity Database Maps

Structures	CA Dept of Fish and Game
Transmission Lines	CA Dept of Water Resources
Highways	CA State Lands Commission
Roads	Department of Defense
CNDDB	US Fish and Wildlife Service
	VernalPools

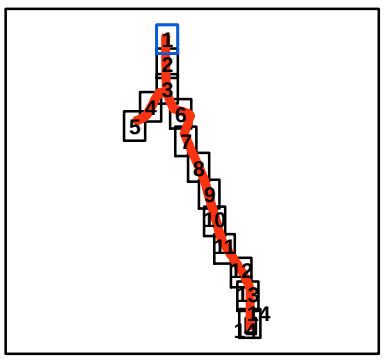
Vaca Dixon-Peabody-Lambie-Birds Landing 230kV Project

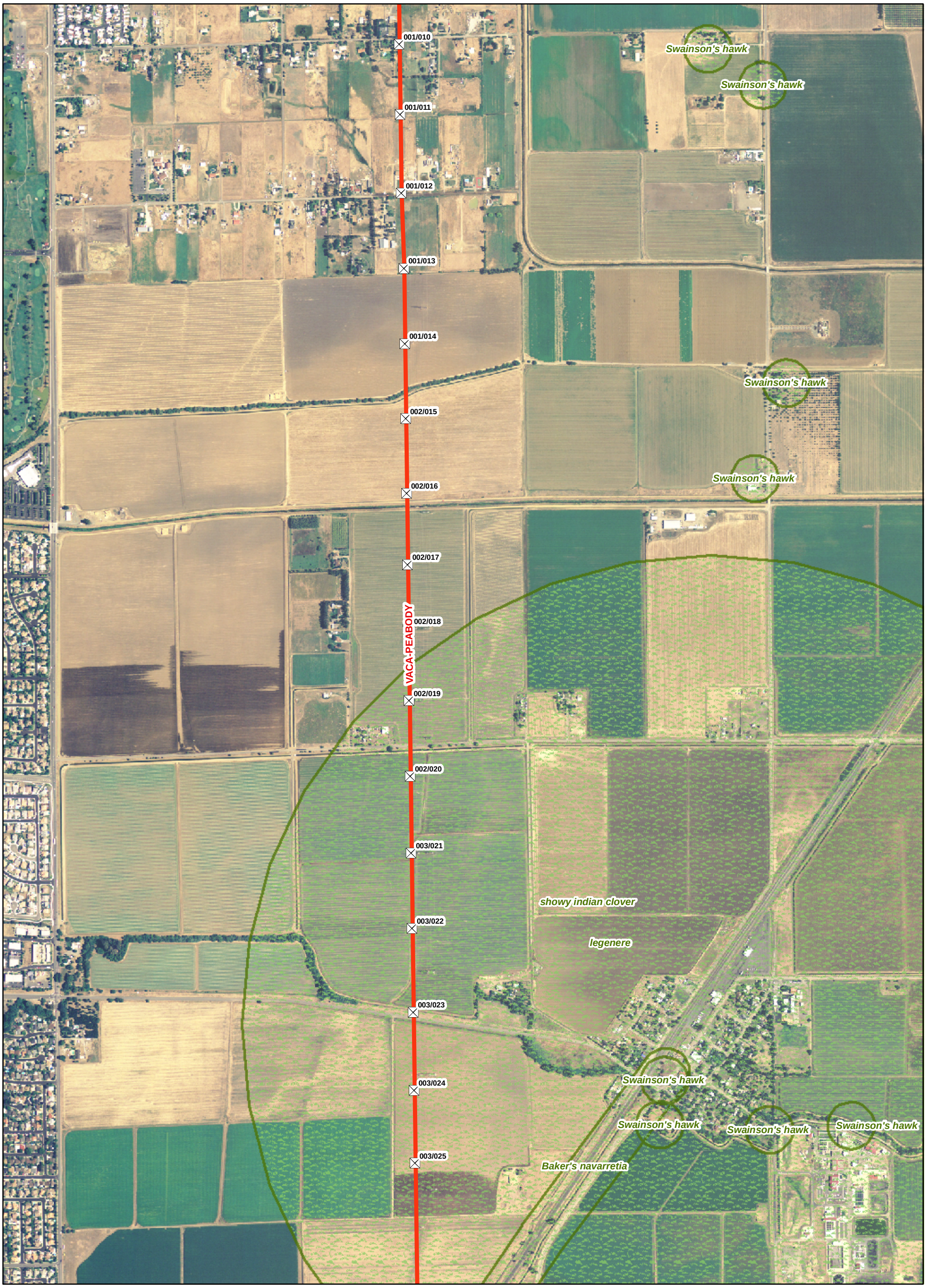
PG&E

N W E S

Map 1 of 14

0 490 980 1,470 1,960 Feet





- Structures
- Transmission Lines
- Highways
- Roads
- CNDDB
- CA Dept of Fish and Game
- CA Dept of Water Resources
- CA State Lands Commission
- Department of Defense
- US Fish and Wildlife Service
- VernalPools

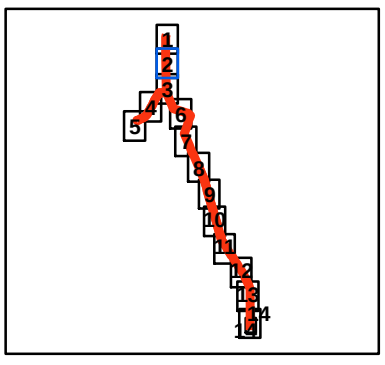
Vaca Dixon-Peabody-Lambie-Birds Landing 230kV Project

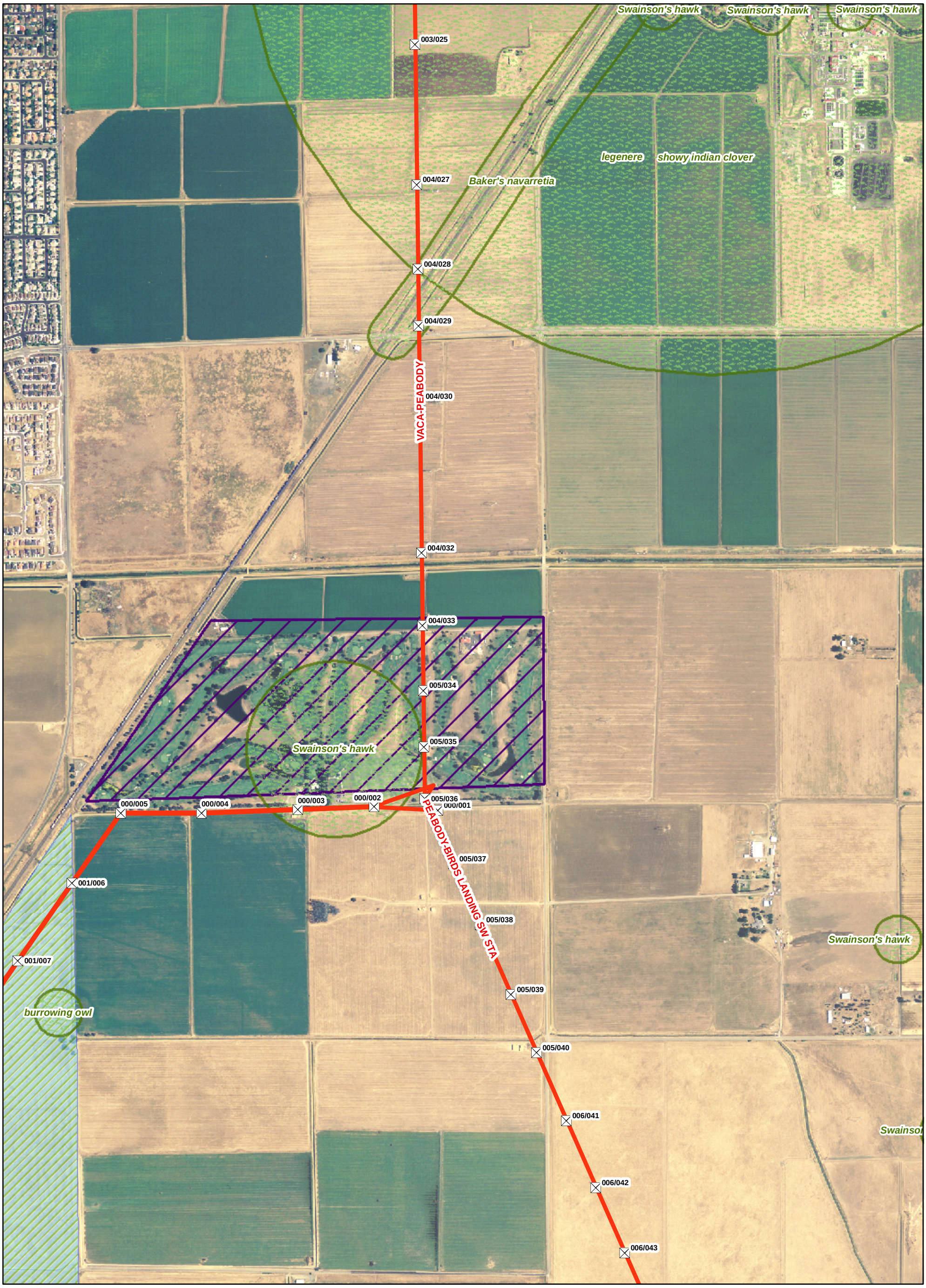
PG&E

N W E S

Map 2 of 14

0 500 1,000 1,500 2,000 Feet





Structures
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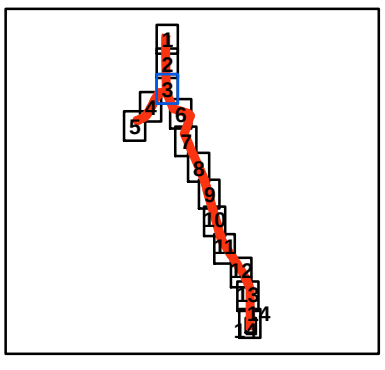
VernalPools

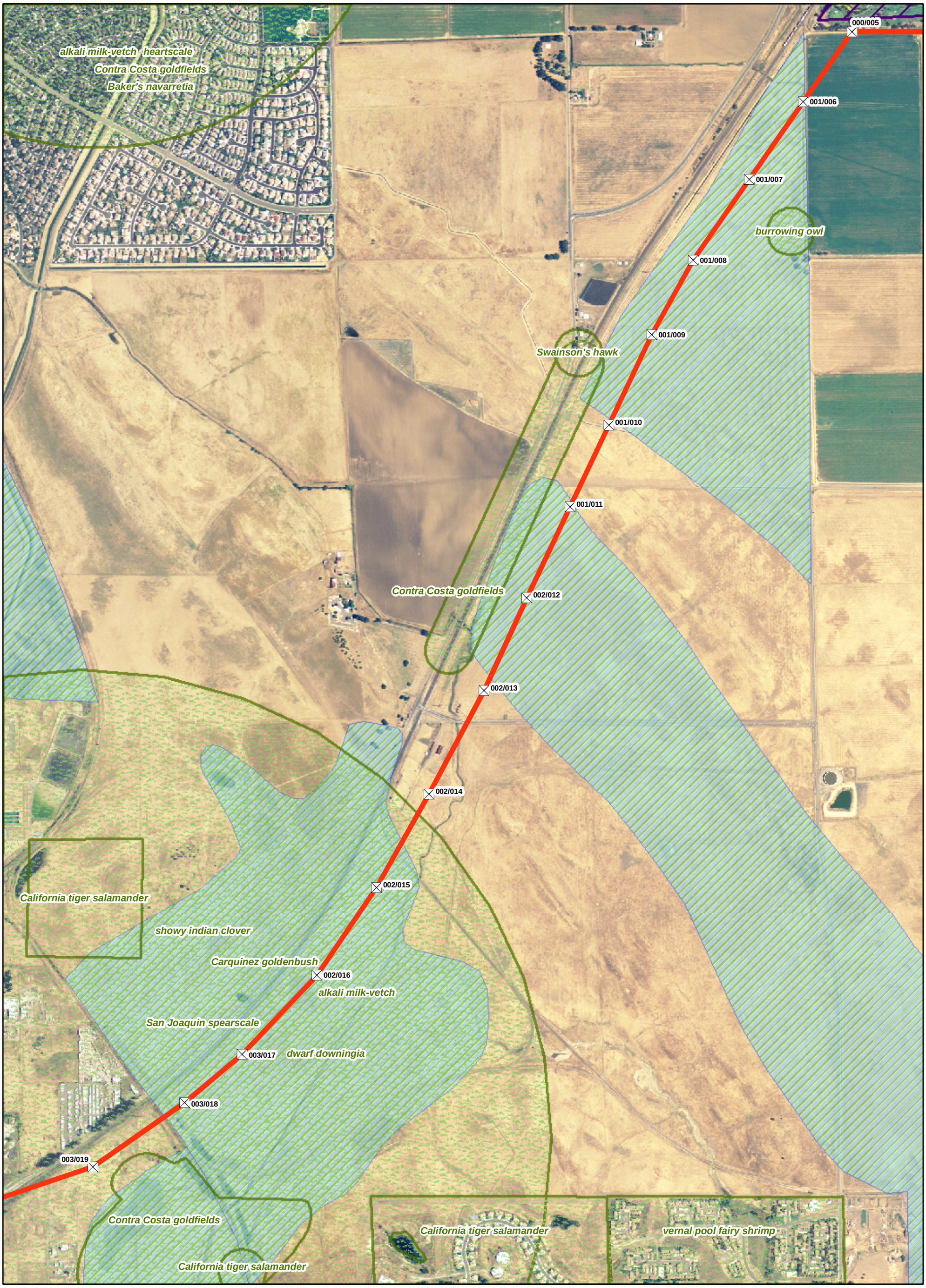
Vaca Dixon-Peabody-Lambie-Birds Landing 230kV Project

PG&E

Map 3 of 14

0 500 1,000 1,500 2,000 Feet





- Structures
- Transmission Lines
- Highways
- Roads
- CNDDB
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- CA Dept of Water Resources
- CA State Lands Commission
- Department of Defense
- US Fish and Wildlife Service
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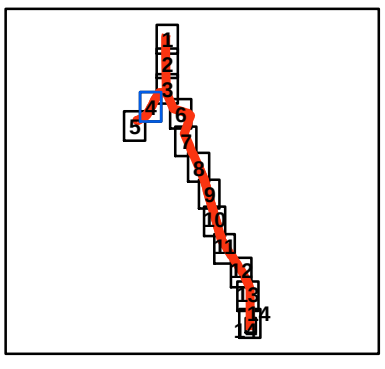
Vaca Dixon-Peabody-Lambie-Birds Landing 230kV Project

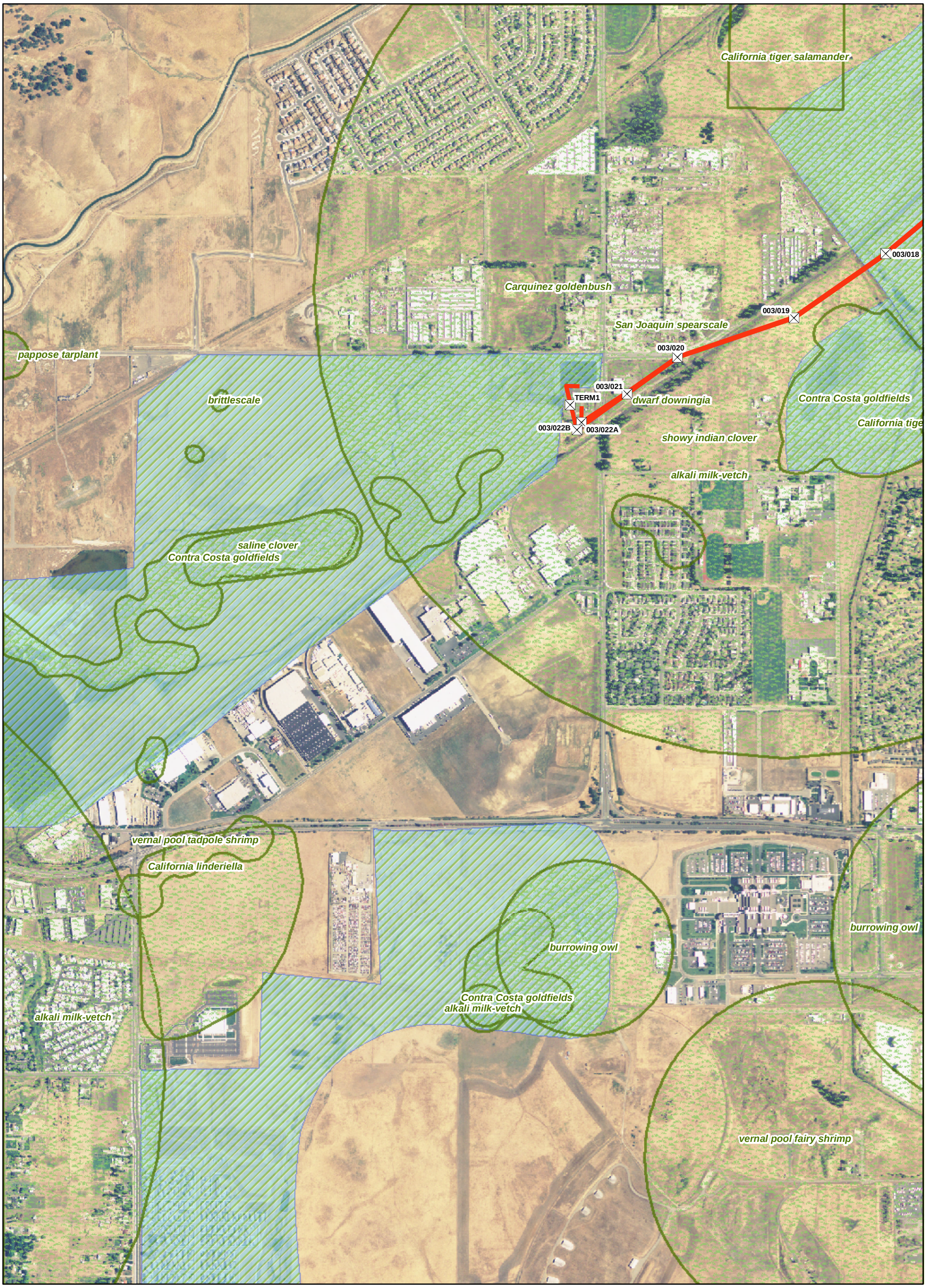
PG&E

N W E S

Map 4 of 14

0 500 1,000 1,500 2,000 Feet





- Structures
- Transmission Lines
- Highways
- Roads
- CNDDB
- CA Dept of Fish and Game
- CA Dept of Water Resources
- CA State Lands Commission
- Department of Defense
- US Fish and Wildlife Service
- VernalPools

Vaca Dixon-Peabody-Lambie-Birds Landing 230kV Project

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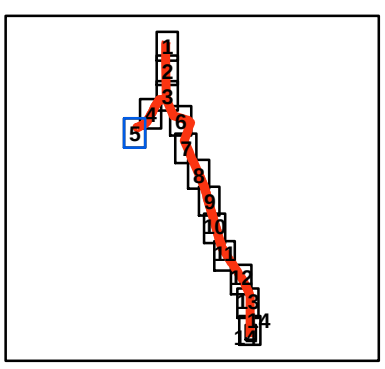
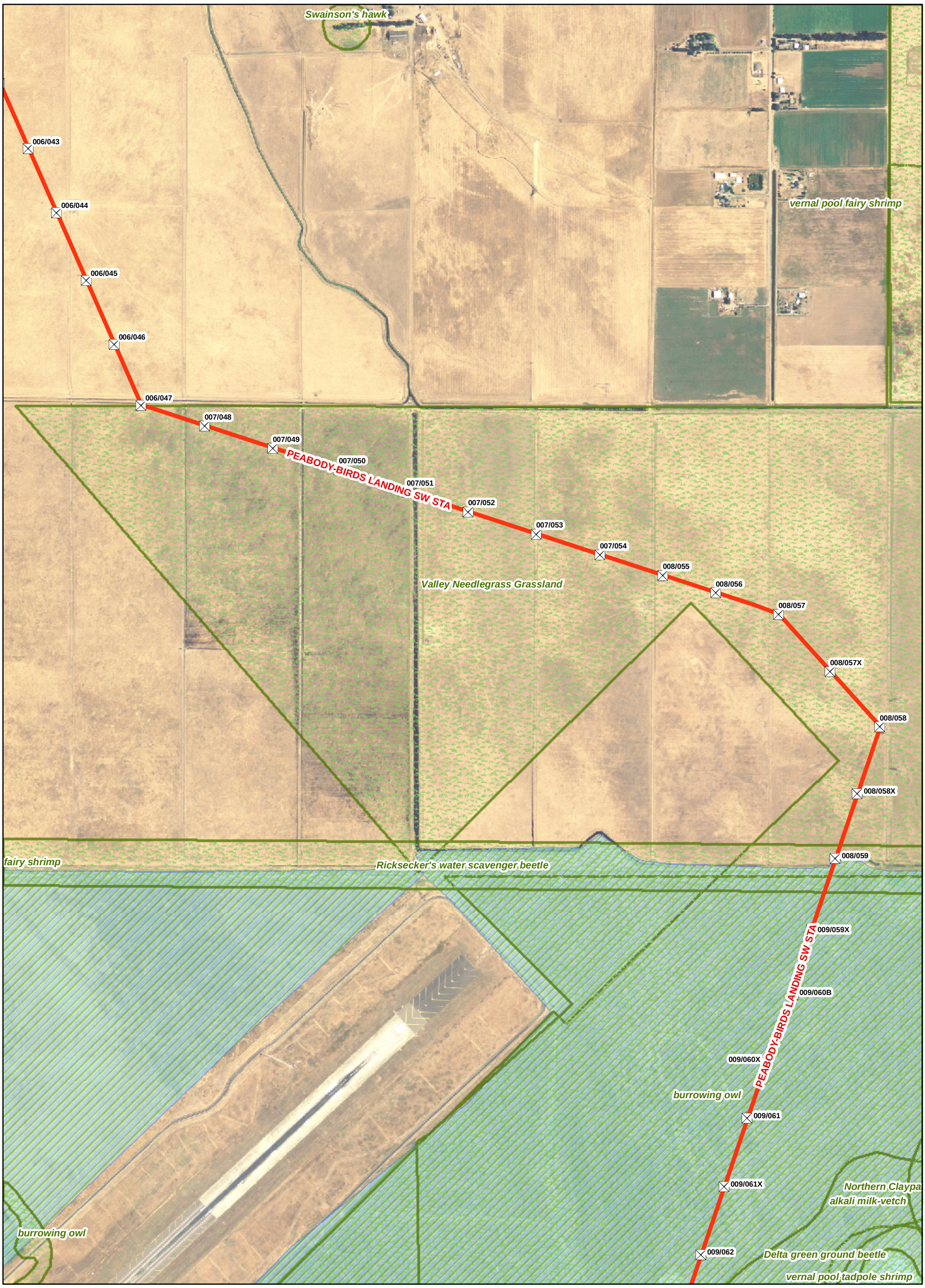
Map 5 of 14

0 500 1,000 1,500 2,000 Feet





- Structures
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- Roads
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- CA Dept of Fish and Game
- CA Dept of Water Resources
- CA State Lands Commission
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- VernalPools

Vaca Dixon-Peabody-Lambie-Birds Landing 230kV Project

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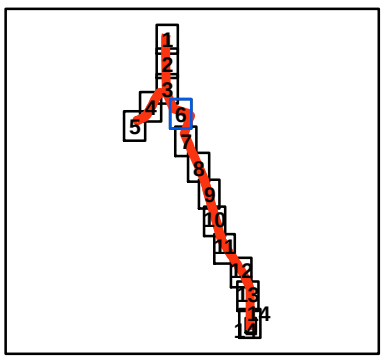
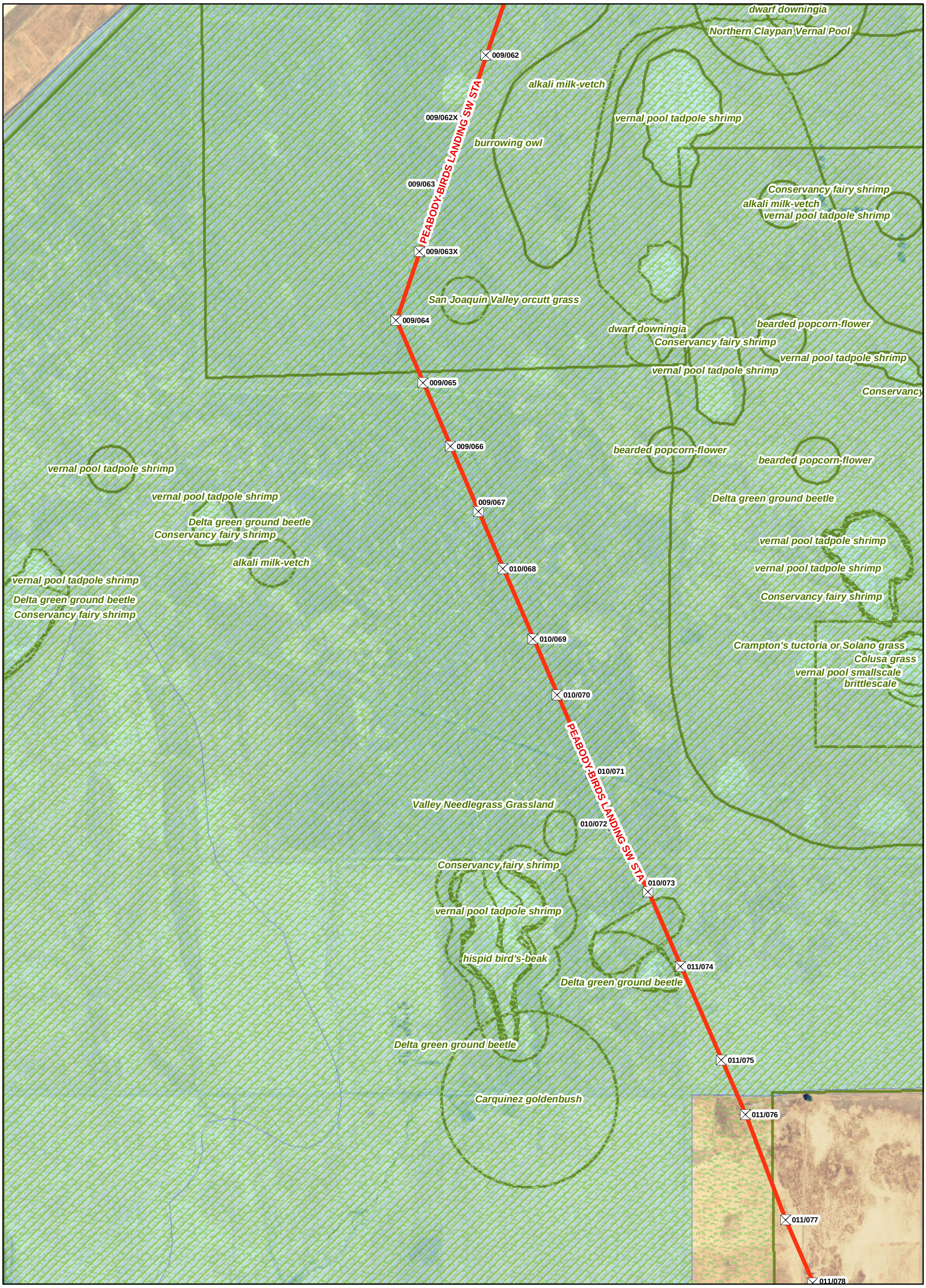
Map 6 of 14

0 500 1,000 1,500 2,000 Feet





- Structures
- Transmission Lines
- Highways
- Roads
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Vaca Dixon-Peabody-Lambie-Birds Landing 230kV Project

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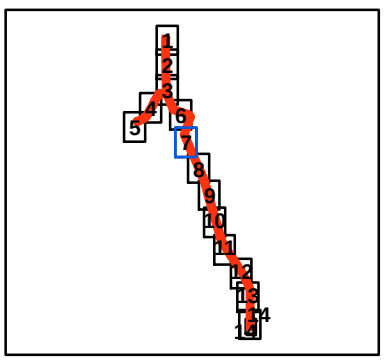
N W E S

Map 7 of 14

0 500 1,000 1,500 2,000 Feet



- Structures
- Transmission Lines
- Highways
- Roads
- CNDDB
- CA Dept of Fish and Game
- CA Dept of Water Resources
- CA State Lands Commission
- Department of Defense
- US Fish and Wildlife Service
- VernalPools

Vaca Dixon-Peabody-Lambie-Birds Landing 230kV Project

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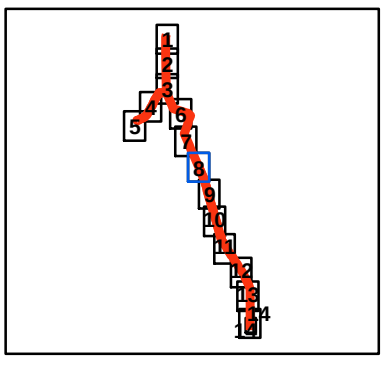
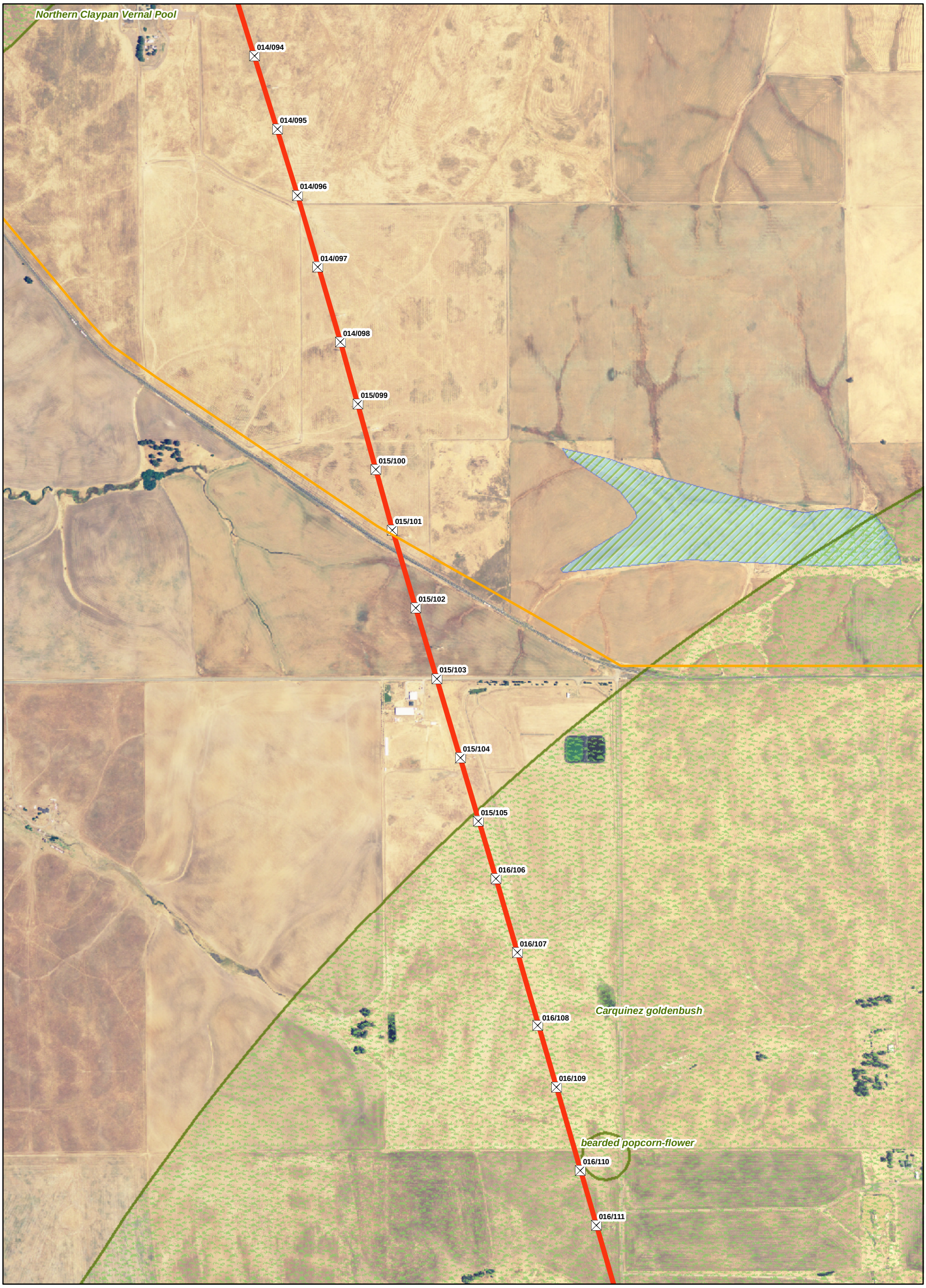
N W E S

Map 8 of 14

0 500 1,000 1,500 2,000 Feet





Structures
Transmission Lines
Highways
Roads
CNDDB
CA Dept of Fish and Game
CA Dept of Water Resources
CA State Lands Commission
Department of Defense
US Fish and Wildlife Service
VernalPools

Vaca Dixon-Peabody-Lambie-Birds Landing 230kV Project

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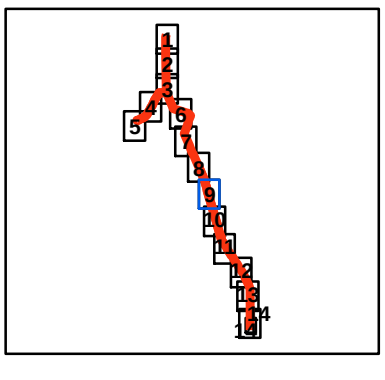
N W E S

Map 9 of 14

0 500 1,000 1,500 2,000 Feet



Structures
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CA Dept of Fish and Game
CA Dept of Water Resources
CA State Lands Commission
Department of Defense
US Fish and Wildlife Service
VernalPools

Vaca Dixon-Peabody-Lambie-Birds Landing 230kV Project

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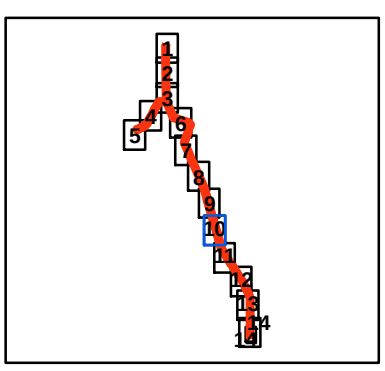
Map 10 of 14

0 490 980 1,470 1,960 Feet



019/129
019/130
019/131
019/132
020/133
020/134
020/135
020/136
020/137
020/138
L'AMBIE SW STA-CONTRA COSTA
021/139
Carquinez goldenbush
021/140
021/141
021/142
021/143
021/144
022/145
022/146

Structures	CA Dept of Fish and Game
Transmission Lines	CA Dept of Water Resources
Highways	CA State Lands Commission
Roads	Department of Defense
CNDDB	US Fish and Wildlife Service
	VernalPools

Vaca Dixon-Peabody-Lambie-Birds Landing 230kV Project

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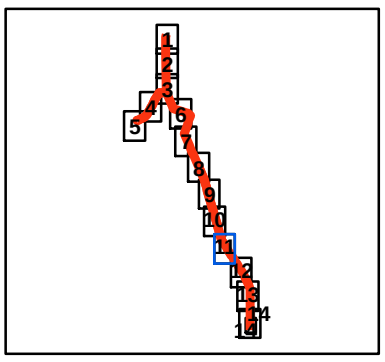
N W E S

Map 11 of 14

0 490 980 1,470 1,960 Feet



Structures
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CNDDB
CA Dept of Fish and Game
CA Dept of Water Resources
CA State Lands Commission
Department of Defense
US Fish and Wildlife Service
VernalPools

Vaca Dixon-Peabody-Lambie-Birds Landing 230kV Project

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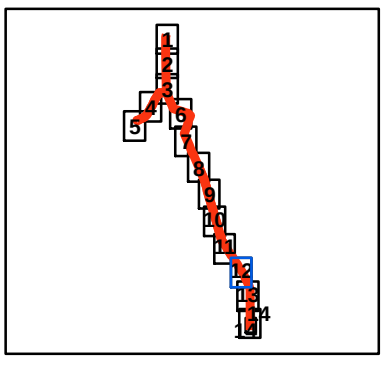
N W E S

Map 12 of 14

0 490 980 1,470 1,960 Feet



Delta smelt
Carquinez goldenbush
024/158
025/159
025/160
Suisun Marsh aster
025/161
LAMBIE SW STA-CONTRA COSTA
025/162
026/163
Mason's lilaeopsis
026/164
double-crested cormorant
026/165
026/166
Mason's lilaeopsis
Suisun Marsh aster
026/167
Mason's lilaeopsis
027/168
Suisun Marsh aster

Structures
Transmission Lines
Highways
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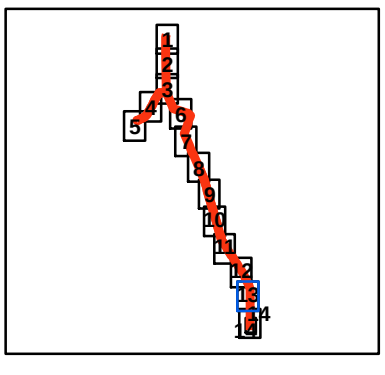
CNDDB
CA Dept of Fish and Game
CA Dept of Water Resources
CA State Lands Commission
Department of Defense
US Fish and Wildlife Service
VernalPools

Vaca Dixon-Peabody-Lambie-Birds Landing 230kV Project

PG&E

Map 13 of 14

0 490 980 1,470 1,960 Feet



Structures	CA Dept of Fish and Game
Transmission Lines	CA Dept of Water Resources
Highways	CA State Lands Commission
Roads	Department of Defense
CNDDB	US Fish and Wildlife Service
	VernalPools

Vaca Dixon-Peabody-Lambie-Birds Landing 230kV Project

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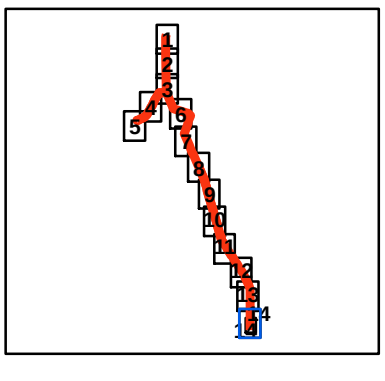
Map 14 of 14

0 500 1,000 1,500 2,000 Feet



Attachment C2
Biological Assessment Supplemental Information Memo

Supplemental Information to the Biological Assessment for PG&E Vaca Dixon - Birds Landing 230 kV Reconductoring Project

TO: Ms. Michelle Tovar/USFWS

COPIES: Michael Gunby/PG&E
Sheila Byrne/PG&E
Lynne Hosley/CH2M HILL

FROM: Craig Lawrence/CH2M HILL

DATE: September 5, 2008

Michelle,

CH2M HILL is providing the supplemental information you requested during our July 7, 2008 meeting with PG&E and yourself. The attached information is hereby provided as follow up to the Action Items from that meeting:

1. **Access Roads:** Create table and revise BA figures to distinguish heavy use versus light use access roads/routes. For purposes of this document, heavy use access roads/routes will provide access to fly sites (helicopter landing and staging areas). Light use access roads are those providing access into areas only requiring installation of guard structures. These roads will typically only be accessed twice during the project, once for installation and once for removal. Based on the Brighton Davis project, USFWS will not require compensation for effects related to light use access roads.

   Please refer to Attachment 1 for a table distinguishing between light use and heavy use access routes that will be used during various reconductoring activities. Attached maps 9 & 16 have been revised to illustrate locations of light use access roads to be used for installation of guard structures.

   Some access roads leading to pull sites may only be utilized twice (i.e. ingress and egress to pull sites) by cable pulling and personnel vehicles. These vehicles and accompanying equipment are only present at pull sites for as long as it takes to complete pulling and tensioning for that segment of line (typically 3-5 days). Therefore, access roads to pull sites will be used substantially less than access roads to fly sites, but more so than light use access roads described above. The attached table (Attachment 1) distinguishes between the 3 types of access road (Light Use – Guard Structures, Light Use – Pull Sites, and Regular Use – Fly Sites). The table also distinguishes between access roads that occur on "existing roads"(i.e. levee roads, ranch roads) and "new roads."

2. **Zoomed-in graphics:** Provide zoomed in graphics showing 50-ft radius around work areas at sensitive locations (*i.e.* Shoofly poles and guard structures at Noonan Ranch, guard structures north of Creed Road, Peabody substation, area south of Creed Road).

Please refer to attached maps 9, 10, 16, and 17. These show distances between the work areas and pools.

PG&E had previously indicated the need to build a shoofly structure to re-route the 60 kV distribution line located along Canon Road (across the street from Noonan Ranch). This activity would have required access within the field north of Canon Road and the installation of shoofly poles and associated guard structures between the creek and Pool can.g.d (see attached revised Map 9). A PG&E line construction supervisor has verified that reconductoring can occur without the need to re-route the distribution line; therefore, no ground disturbing activities will occur in the field north of Canon Road, with the exception of guard structure placement between the edge of pavement and the fence.

3. **Modify VPFS table**: Add column to table of vernal pools giving distance of pools/habitats from proposed work areas in those most sensitive areas.

   Please refer to Attachment 2 for a table showing approximate distances of vernal pools from proposed work areas.

   Distances from light use roads, e.g. those used only to install and remove guard structures (one or two time use during dry season only) are not shown since this use will have no indirect effect on resources not directly crossed.

   For guard structures, work consists of either installation of temporary poles (see photos in Attachment 3) or truck-mounted guard structure on light use road. Other disturbance includes temporary placement of tool bins at the base of guard structures. Indirect effects are assumed to be limited to a distance of 20 feet from guard structures used in the dry season only (see attached maps 9 and 16).

4. **P10:** Add exclusion fence separating pools found at edge of Pull Site P-10 from the work area.

   Please refer to attached map 15.

5. **Creed Road**: Install and remove guard structures north of Creed Road ONLY in dry season even if installation and removal need to span subsequent seasons. If needed, remove netting by accessing on foot during wet season. Provide representative photos or better description of guard structures and netting to be used for the guard structures.

   Installation and removal of guard structures in the area north of Creed Road (within the Wilcox Ranch Preserve) will only occur during the dry season. Please refer to Attachment 3 for representative photos of typical H-pole and Y-pole guard structures and their associated netting. The 4 X 4 ft plastic bins are used to transport and store tools and materials where line trucks cannot access the work location. The hole is backfilled with native material.

6. **Error in Table 5.5:** Revise Mitigation Table (Table 5.5).

   Please refer to Attachment 4 for a revised Table 5-5 from the Biological Assessment. This table corrects acreage calculations errors for CTS and revises indirect affect acreage for vernal pool fairy shrimp and vernal pool tadpole shrimp habitat. Acreage for indirect effects to vernal pool

fairy shrimp and vernal pool tadpole shrimp decreased from 3.9 acres to 1.8 acres and acreage of indirect effects to Delta green ground beetle decreased from 0.25 acre to 0 acre as a result of distinguishing between light use and heavy use access roads. Similarly, acreage of indirect effects to CTS habitat within 500 feet of a pond decreased from 6.64 acres to 5.71 acres and indirect effects to CTS habitat between 500 feet and 1.24 miles from pond decreased from 36.5 acres to 34.5 acres.

Attachment 1
Access Road Summary by Use Type

Access Road Type/ Location	Existing Road			New Road		
	Length (Feet)	Area (Ft^2)	Acres	Length (Feet)	Area (Ft^2)	Acres
Light Use - Guard Structures						
P-6				903	10,836	0.25
Creed Guard Site				2,052	24,628	0.57
Subtotal Light Use Guard				**2,955**	**35,464**	**0.81**
Light Use - Pull Sites						
P-1, P-2	971	11,652	0.27			
P-3	340	4,080	0.09			
P-8				1,106	13,272	0.30
P-9, P-10, P-11				1,702	20,424	0.47
P-12				900	10,800	0.25
P-13, P-14				1,758	21,096	0.25
P-15				260	3,120	0.48
Subtotal Light Use Pull Sites	**1,311**	**15,732**	**0.36**	**5,726**	**68,712**	**1.75**
Regular Use - Fly Sites						
F-1				75	904	0.02
F-2, P-5	1,200	14,400	0.33	230	2,760	0.06
F-3, P-6	643	7,716	0.18			
F-4				6,345	76,140	1.75
F-5, P-9, P-10, P-11	5,248	62,976	1.45	6,815	81,780	1.88
F-6				1,394	16,728	0.38
Subtotal Regular Use Fly Sites	**7,091**	**85,092**	**1.95**	**14,859**	**178,312**	**4.09**

Attachment 2
Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Distance to Work Area (Feet)	Notes
p-2.a	0.010	Map 1 of 24	VPFS, VPTP	Direct		
p-1.a	0.015	Map 1 of 24	VPFS, VPTP	Indirect	25	DIstance given is from pool to pull site P-1
p-1.b	0.027	Map 1 of 24	VPFS, VPTP	Indirect	65	DIstance given is from pool to pull site P-1
pop.g.a	0.015	Map 2 of 24	VPFS, VPTP	Indirect	10	Distance given is from pool to guard structure
fry.g.a	0.020	Map 7 of 24	VPFS, VPTP	Indirect	185	Distance given is from pool to guard structure
fry.g.a-2	0.010	Map 7 of 24	VPFS, VPTP	Indirect	20	Distance given is from pool to guard structure
p-4.b	0.047	Map 8 of 24	VPFS, VPTP	Indirect	80	DIstance given is from pool to pull site P-4
f-3.a	0.002	Map 9 of 24	VPFS, VPTP	Direct		
f-3.l	0.001	Map 9 of 24	VPFS, VPTP	Direct		
p-6.j	0.008	Map 9 of 24	VPFS, VPTP	None		Removed; pool buffered from work area by berm
p-6.g.f	0.004	Map 9 of 24	VPFS, VPTP	None		>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
f-3.i	0.002	Map 9 of 24	VPFS, VPTP	Indirect	70	DIstance given is from pool to pull site P-6
f-3.d-2	0.002	Map 9 of 24	VPFS, VPTP	Indirect	28	DIstance given is from pool to fly site F-3
f-3.d	0.005	Map 9 of 24	VPFS, VPTP	Indirect	35	DIstance given is from pool to fly site F-3
f-3.z	0.005	Map 9 of 24	VPFS, VPTP	Indirect	40	DIstance given is from pool to fly site F-3
f-3.b	0.003	Map 9 of 24	VPFS, VPTP	Indirect	175	DIstance given is from pool to heavy use access road
f-3.c	0.034	Map 9 of 24	VPFS, VPTP	Indirect	70	DIstance given is from pool to fly site F-3
f-3.e	0.022	Map 9 of 24	VPFS, VPTP	Indirect	125	DIstance given is from pool to fly site F-3
f-3.z-2	0.005	Map 9 of 24	VPFS, VPTP	Indirect	160	DIstance given is from pool to fly site F-3
f-3.j	0.001	Map 9 of 24	VPFS, VPTP	Indirect	90	DIstance given is from pool to pull site P-6
can.g.d	0.228	Map 9 of 24	VPFS, VPTP	None	>250	Only work within 250 feet is placemnt of temporary guard structure at edge of Canon Rd.

Attachment 2
Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Distance to Work Area (Feet)	Notes
can.g.l	0.001	Map 9 of 24	VPFS, VPTP	Indirect	25	DIstance given is from pool to heavy use access road
p-6.g.d	0.003	Map 9 of 24	VPFS, VPTP	None		>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
p-6.g.c	0.001	Map 9 of 24	VPFS, VPTP	Indirect	230	DIstance given is from pool to pull site P-6
p-6.g.a	0.004	Map 9 of 24	VPFS, VPTP	Indirect	60	DIstance given is from pool to pull site P-6
cor.g.a	0.070	Map 9 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
cor.g.b	0.000	Map 9 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
p-6.g.g	0.009	Map 9 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
p-6.g.h	0.001	Map 9 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
cor.road.a	0.002	Map 9 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
cor.road.b	0.007	Map 9 of 24	VPFS, VPTP	None		Removed; pool buffered from work area by berm
cor.g.d-2	0.008	Map 9 of 24	VPFS, VPTP	None		Removed; pool buffered from work area by berm
cor.g.d-1	0.015	Map 9 of 24	VPFS, VPTP	None		Removed; pool buffered from work area by berm
cor.g.c	0.001	Map 9 of 24	VPFS, VPTP	None		Removed; pool buffered from work area by berm
p-7.b	0.027	Map 10 of 24	VPFS, VPTP	Direct		

Attachment 2
Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Distance to Work Area (Feet)	Notes
p-7.a	0.013	Map 10 of 24	VPFS, VPTP	Direct		
p-7.c	0.009	Map 10 of 24	VPFS, VPTP	Indirect	25	Distance given is from pool to guard structure
mer.g.c	0.053	Map 11 of 24	VPFS, VPTP	None	>250	Pool outside 250 ft. buffer
mer.g.d	0.004	Map 11 of 24	VPFS, VPTP	None	>250	Pool outside 250 ft. buffer
mer.g.e	0.014	Map 11 of 24	VPFS, VPTP	Indirect	200	Distance given is from pool to guard structure
mer.g.b	0.010	Map 11 of 24	VPFS, VPTP	None		Removed; pool buffered from work area by berm
mer.g.a	0.036	Map 11 of 24	VPFS, VPTP	None		Removed; pool buffered from work area by berm
p-9.f	0.032	Map 12 of 24	VPFS, VPTP	Direct		
p-9.h	0.001	Map 12 of 24	VPFS, VPTP	Direct		
p-9.abc	0.206	Map 12 of 24	VPFS, VPTP	Indirect	25	Distance given is from pool to heavy use access road
p-9.e	0.015	Map 12 of 24	VPFS, VPTP	Indirect	125	Distance given is from pool to heavy use access road
f-5.road.a	0.557	Map 14 of 24	VPFS, VPTP	Direct		
f-5.road.b	0.121	Map 14 of 24	VPFS, VPTP	Direct		
f-5.road.f	0.013	Map 14 of 24	VPFS, VPTP	Indirect	25	Distance given is from pool to heavy use access road
f-5.road.g	0.008	Map 14 of 24	VPFS, VPTP	Indirect	25	Distance given is from pool to heavy use access road
p-10.f	0.051	Map 15 of 24	VPFS, VPTP	Direct		
p-10.abcdeg	0.068	Map 15 of 24	VPFS, VPTP	Direct		
f-5.road.c	0.023	Map 15 of 24	VPFS, VPTP	Indirect	30	Distance given is from pool to heavy use access road
f-5.road.d	0.180	Map 15 of 24	VPFS, VPTP	Indirect	30	Distance given is from pool to heavy use access road
f-5.road.e	0.029	Map 15 of 24	VPFS, VPTP	Indirect	60	Distance given is from pool to heavy use access road
p-10.h	0.015	Map 15 of 24	VPFS, VPTP	Indirect	150	Distance given is from pool to heavy use access road
p-10.i	0.005	Map 15 of 24	VPFS, VPTP	Indirect	120	Distance given is from pool to pull site P-10
p-10.j	0.013	Map 15 of 24	VPFS, VPTP	Indirect	75	Distance given is from pool to pull site P-10
p-11.d	0.010	Map 15 of 24	VPFS, VPTP	Indirect	20	Distance given is from pool to heavy use access road

Attachment 2
Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Distance to Work Area (Feet)	Notes
C-85	0.021	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer
C-91	0.004	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer
C-92	0.003	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer
C-93	0.027	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer
C-94	0.007	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer
C-95	0.005	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer
C-96	0.024	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer
C-97	0.008	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer
C-99	0.032	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer
C-138	0.038	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer
C-139	0.006	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer
C-140	0.007	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer
C-141	0.228	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer
C-65	0.204	Map 16 of 24	VPFS, VPTP	Direct		
C-134	0.004	Map 16 of 24	VPFS, VPTP	Direct		
C-1	0.128	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-2	0.004	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-3	0.007	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only

Attachment 2
Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Distance to Work Area (Feet)	Notes
C-4	0.005	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-5	0.042	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-6	0.006	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-0	0.006	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-7	0.003	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-8	0.009	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-9	0.005	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-10	0.012	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-11	0.033	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only

Attachment 2
Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Distance to Work Area (Feet)	Notes
C-12	0.004	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-13	0.005	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-14	0.003	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-15	0.003	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-16	0.016	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-17	0.029	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-18	0.011	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-19	0.012	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-20	0.008	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only

Attachment 2
Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Distance to Work Area (Feet)	Notes
C-21	0.006	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-30	0.013	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-31	0.024	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-32	0.050	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-33	0.063	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-34	0.005	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-35	0.014	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-36	0.341	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-37	0.005	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only

Attachment 2
Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Distance to Work Area (Feet)	Notes
C-38	0.008	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-39	0.030	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-40	0.006	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-41	0.091	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-43	0.034	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-42	0.004	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-44	0.005	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-45	0.002	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-46	0.004	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only

Attachment 2
Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Distance to Work Area (Feet)	Notes
C-47	0.006	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-48	0.003	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-49	0.002	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-50	0.005	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-51	0.025	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-52	0.014	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-53	0.007	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-54	0.009	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-55	0.008	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only

Attachment 2
Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Distance to Work Area (Feet)	Notes
C-63	0.011	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-64	0.021	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-143	2.741	Map 16 of 24	VPFS, VPTP, CFS	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-67	0.045	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-68	0.019	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-72	0.047	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-73	0.024	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-74	0.005	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only
C-77	0.015	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in dry season only

Attachment 2
Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Distance to Work Area (Feet)	Notes
C-114	0.014	Map 16 of 24	VPFS, VPTP	None	30	Distance given is from pool to guard structure
C-115	0.021	Map 16 of 24	VPFS, VPTP	None	60	Distance given is from pool to guard structure
C-116	0.025	Map 16 of 24	VPFS, VPTP	None	75	Distance given is from pool to guard structure
C-117	0.003	Map 16 of 24	VPFS, VPTP	None	205	Distance given is from pool to guard structure
C-118	0.011	Map 16 of 24	VPFS, VPTP	None	190	Distance given is from pool to guard structure
C-119	0.005	Map 16 of 24	VPFS, VPTP	None	150	Distance given is from pool to guard structure
C-120	0.043	Map 16 of 24	VPFS, VPTP	None	180	Distance given is from pool to guard structure
C-121	0.054	Map 16 of 24	VPFS, VPTP	None	70	Distance given is from pool to guard structure
C-122	0.151	Map 16 of 24	VPFS, VPTP	None	55	Distance given is from pool to guard structure
C-123	0.014	Map 16 of 24	VPFS, VPTP	None	70	Distance given is from pool to guard structure
C-124	0.012	Map 16 of 24	VPFS, VPTP	None	125	Distance given is from pool to guard structure
C-142	2.591	Map 16 of 24	VPFS, VPTP, CFS	None	135	Distance given is from pool to guard structure
C-81	0.282	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-86	0.012	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-82	0.008	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-83	0.069	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-87	0.013	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-23	0.026	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-84	0.112	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-24	0.010	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-25	0.006	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-26	0.015	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-27	0.015	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-28	0.026	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area

Attachment 2
Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Distance to Work Area (Feet)	Notes
C-29	0.153	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-88	0.005	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-89	0.006	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-93	0.009	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-56	0.021	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-57	0.107	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-58	0.097	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-59	0.171	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-60	0.031	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-61	0.051	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-62	0.041	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-98	0.102	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-66	0.083	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-69	0.019	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-70	0.008	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-71	0.005	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-100	0.018	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-75	0.007	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-76	0.013	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-78	0.010	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-79	0.002	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-80	0.004	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-101	0.026	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-102	0.033	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area

Attachment 2
Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Distance to Work Area (Feet)	Notes
C-103	0.024	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-104	0.003	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-106	0.003	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-107	0.005	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-108	0.005	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-109	0.006	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-110	0.020	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-111	0.013	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-112	0.009	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-113	0.018	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-125	0.007	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-126	0.022	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-127	0.045	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-128	0.018	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-129	0.003	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-130	0.004	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-131	0.006	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-132	0.013	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-133	0.010	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-135	0.010	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-136	0.007	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-137	0.017	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
p-12.g.d	0.022	Map 17 of 24	VPFS, VPTP	Indirect	50	Distance given is from pool to guard structure
p-12.g.d-2	0.005	Map 17 of 24	VPFS, VPTP	Indirect	67	Distance given is from pool to guard structure

Attachment 2
Effects on Inferred Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Habitat (Inferred Presence)	Effect	Distance to Work Area (Feet)	Notes
p-12.b	0.009	Map 17 of 24	VPFS, VPTP	Indirect	245	DIstance given is from pool to pull site P-12
p-12.b-2	0.038	Map 17 of 24	VPFS, VPTP	Indirect	240	DIstance given is from pool to pull site P-12
p-12.b-3	0.013	Map 17 of 24	VPFS, VPTP	Indirect	>250	Previously within 250 feet of access road
p-12.c	0.041	Map 17 of 24	VPFS, VPTP	Indirect	162	DIstance given is from pool to pull site P-12
p-12.b-5	0.003	Map 17 of 24	VPFS, VPTP	Indirect	38	DIstance given is from pool to pull site P-12
p-12.g.c	0.002	Map 17 of 24	VPFS, VPTP	Indirect	83	Distance given is from pool to guard structure
p-12.g.b	0.028	Map 17 of 24	VPFS, VPTP	Indirect	66	Distance given is from pool to guard structure
p-12.g.b-2	0.114	Map 17 of 24	VPFS, VPTP	Indirect	248	Distance given is from pool to guard structure
p-12.g.d-3	0.026	Map 17 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
C-22	0.019	Map 17 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
p-13.a	0.002	Map 18 of 24	VPFS, VPTP	Direct		
p-13.b	0.003	Map 18 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
p-13.g.b	0.003	Map 18 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
p-13.road	0.154	Map 18 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
p-15.g.a	0.002	Map 20 of 24	VPFS, VPTP	Indirect	70	Distance given is from pool to guard structure
sr12.g.a	0.140	Map 20 of 24	VPFS, VPTP	Indirect	15	Distance given is from pool to guard structure
sr12.g.b	0.024	Map 20 of 24	VPFS, VPTP	Indirect	20	Distance given is from pool to guard structure
C-145	0.014	Map 20 of 24	VPFS, VPTP	Indirect	30	Distance given is from pool to Fly Site F-7
01S.g.a	0.027	Map 21 of 24	VPFS, VPTP	Indirect	95	Distance given is from pool to guard structure
01S.g.b	0.070	Map 21 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area
f-8.a	0.089	Map 22 of 24	VPFS, VPTP	Indirect	35	Distance given is from pool to guard structure
f-9.a	0.471	Map 24 of 24	VPFS, VPTP	Indirect	25	Distance given is from pool to Pull Site P-16

Typical Y-Pole Guard Structure

Typical H-Pole Guard Structure

TABLE 5-5
Proposed Compensation for Effects to Special-status Species
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Species Habitat	Type of Effect (Temporary)	Acreage Affected	Proposed Mitigation Ratio	Mitigation Bank Credits
Vernal Pool Fairy Shrimp, Vernal Pool Tadpole Shrimp	Direct	1.1	3:1	3.3
	Indirect	1.8	0.1:1	0.18
Conservancy Fairy Shrimp, Vernal Pool Fairy Shrimp, Vernal Pool Tadpole Shrimp	Direct	0	3:1	0
	Indirect	0	0.1:1	0
California Tiger Salamander	Temporary within 500 ft of a pond	5.71	1.1:1[1]	0.57
	Temporary between 500 ft and 1.24 mi from pond	34.5	1.1:1[1]	3.45
Delta Green Ground Beetle	Indirect to pools + 300 feet	0	3:1	0
Contra Costa Goldfields	Direct to pools	0	9:1	0
	Indirect	0.074	3:1	0.22[2]

Notes:

[1] Represents 1:1 onsite restoration of affected areas and 0.1:1 offsite mitigation

[2] Combined fairy shrimp and Contra Costa goldfields credit

Actual impact area to be measured after construction is expected to be less.

This table does not reflect dry season sampling for vernal pool invertebrates.

can.g.d
002/013
CANON RD
can.g.l
Shrr
VANDEN RD
P-6
p-6.j
f-3.l
f-3.a
f-3.b
f-3.z
f-3.c
f-3.i
f-3.d-2
f-3.d
F-3
f-3.e
f-3.z-2
cor.road.b
cor.g.d-2
p-6.g.a
f-3.j
p-6.g.c
cor.g.d-1
cor.g.c
Berm, Hydrology Obstruction
p-6.g.f
002/014
p-6.g.d
cor.road.a
p-6.g.h
p-6.g.g
cor.g.b
cor.g.a

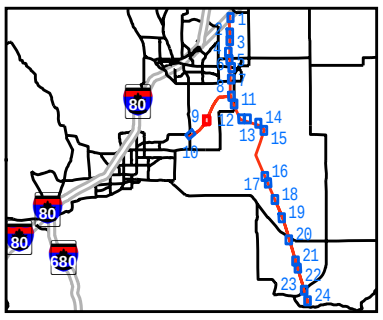
p-6.g.c
cor.g.cor.g.d-1
VANDEN RD
Berm, Hydrology Obstruction
p-6.g.f
002/014
p-6.g.d
Light access Road
p-6.g.g
p-6.g.h
cor.g.b
cor.g.a
0 75 150 300 Feet

Temporary Indirect Effects to Potential Conservation Fairy Shrimp (CFS) Habitat
Exclusion Fence
Flow Lines
Berm
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
250' Distance from Pull & Fly Sites
Access Road - 12 ' Disturbance
Light Use Access Road
250' Distance from Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures
Vernal Pool Tadpole Shrimp Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
Conservation Fairy Shrimp Critical Habitat

Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 9 of 24

N W E S
0 100 200 400 Feet



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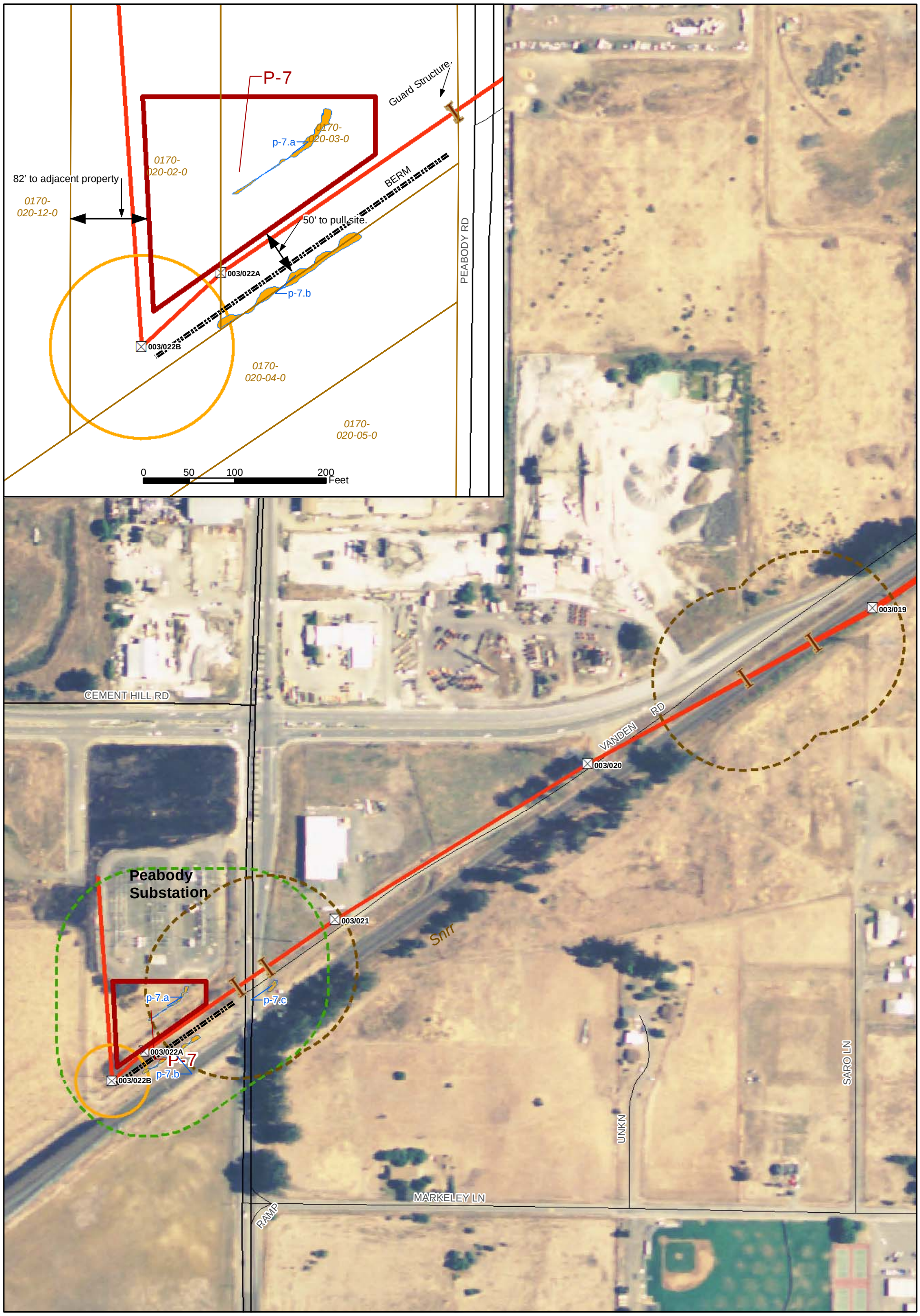


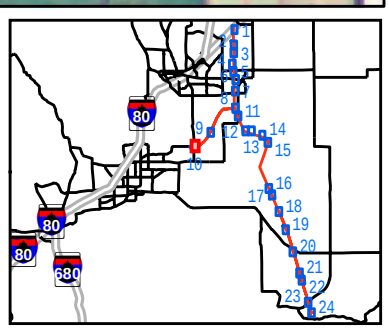
Potential Vernal Pool/Tadpole Shrimp Fairy Shrimp (VP/TS FS) Habitat
Temporary Indirect Effects to Potential VP/TS FS Habitat
Temporary Direct Effects to Potential VP/TS FS Habitat
Temporary Indirect Effects to Potential Conservation Fairy Shrimp (CFS) Habitat
Exclusion Fence
Flow Lines
Berm
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
250' Distance from Pull & Fly Sites
Access Road - 12 ' Disturbance
Light Use Access Road
250' Distance from Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures
Vernal Pool Tadpole Shrimp Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
Conservation Fairy Shrimp Critical Habitat

Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 10 of 24

N W E S

0 100 200 400 Feet



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008/057X
f-5.road.c
f-5.road.d
f-5.road.e
SW STA
p-10.h
008/058
PEABODY-BIRDS LANDING
p-10.abcdeg
p-10.f
F-5
P-10
p-10.j
p-10.i
p-11.d
008/058X
P-11
Sacramento Northern Railway
008/059

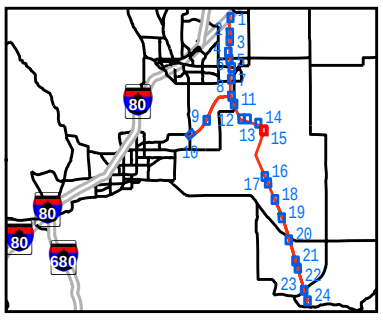
Potential Vernal Pool/Tadpole Shrimp Fairy Shrimp (VP/TS FS) Habitat
Temporary Indirect Effects to Potential VP/TS FS Habitat
Temporary Direct Effects to Potential VP/TS FS Habitat
Temporary Indirect Effects to Potential Conservation Fairy Shrimp (CFS) Habitat
Exclusion Fence
Flow Lines
Berm
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
250' Distance from Pull & Fly Sites
Access Road - 12 ' Disturbance
Light Use Access Road
250' Distance from Access Roads
100' Work Area
Guard Structures
250' Distance from Guard Structures
Vernal Pool Tadpole Shrimp Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
Conservation Fairy Shrimp Critical Habitat

Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 15 of 24

N W E S

0 100 200 400 Feet



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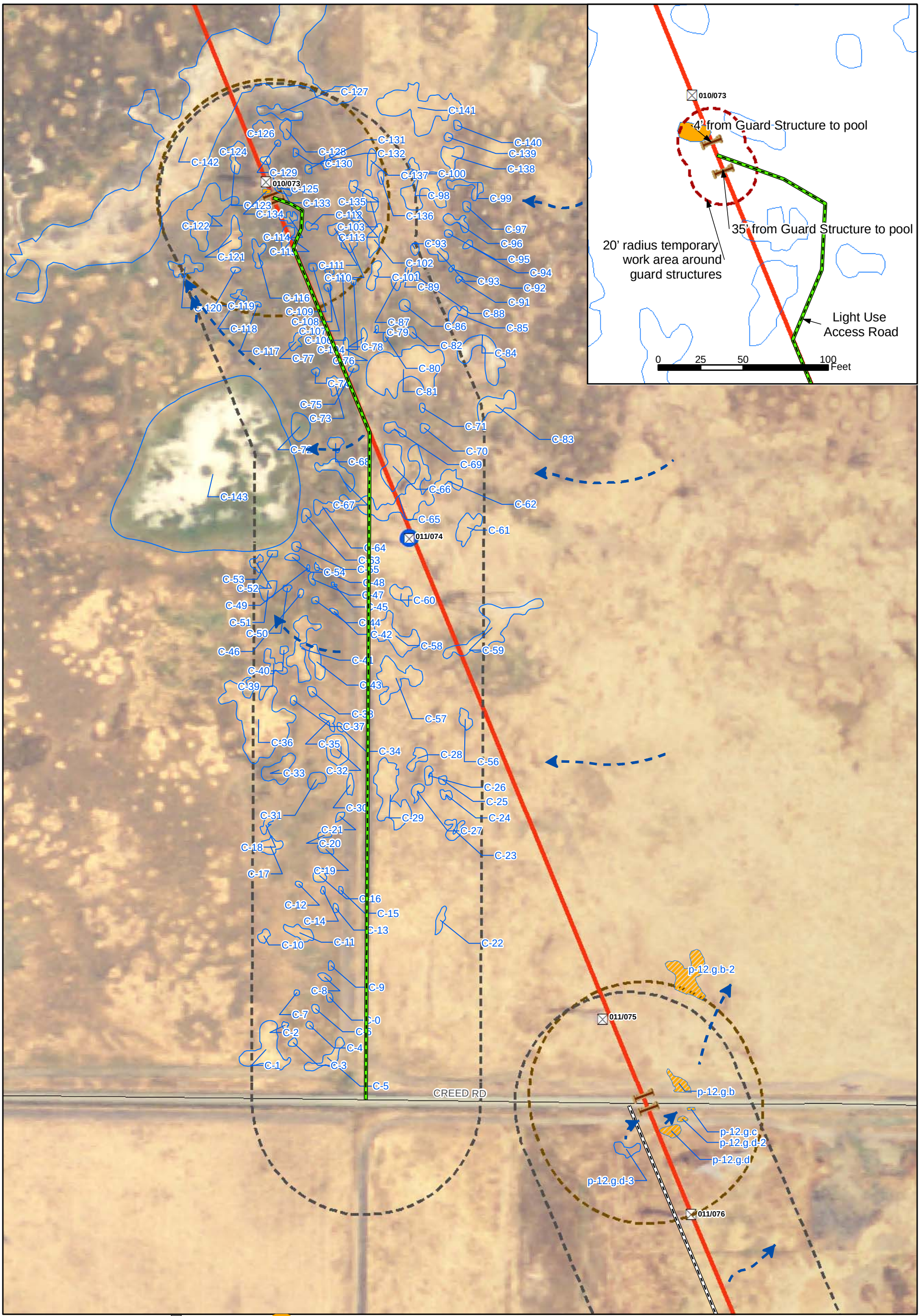
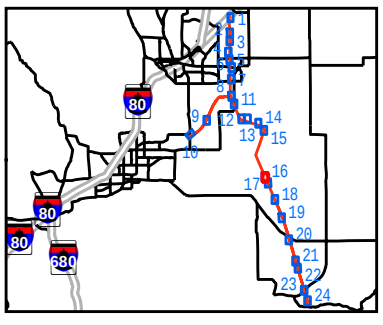


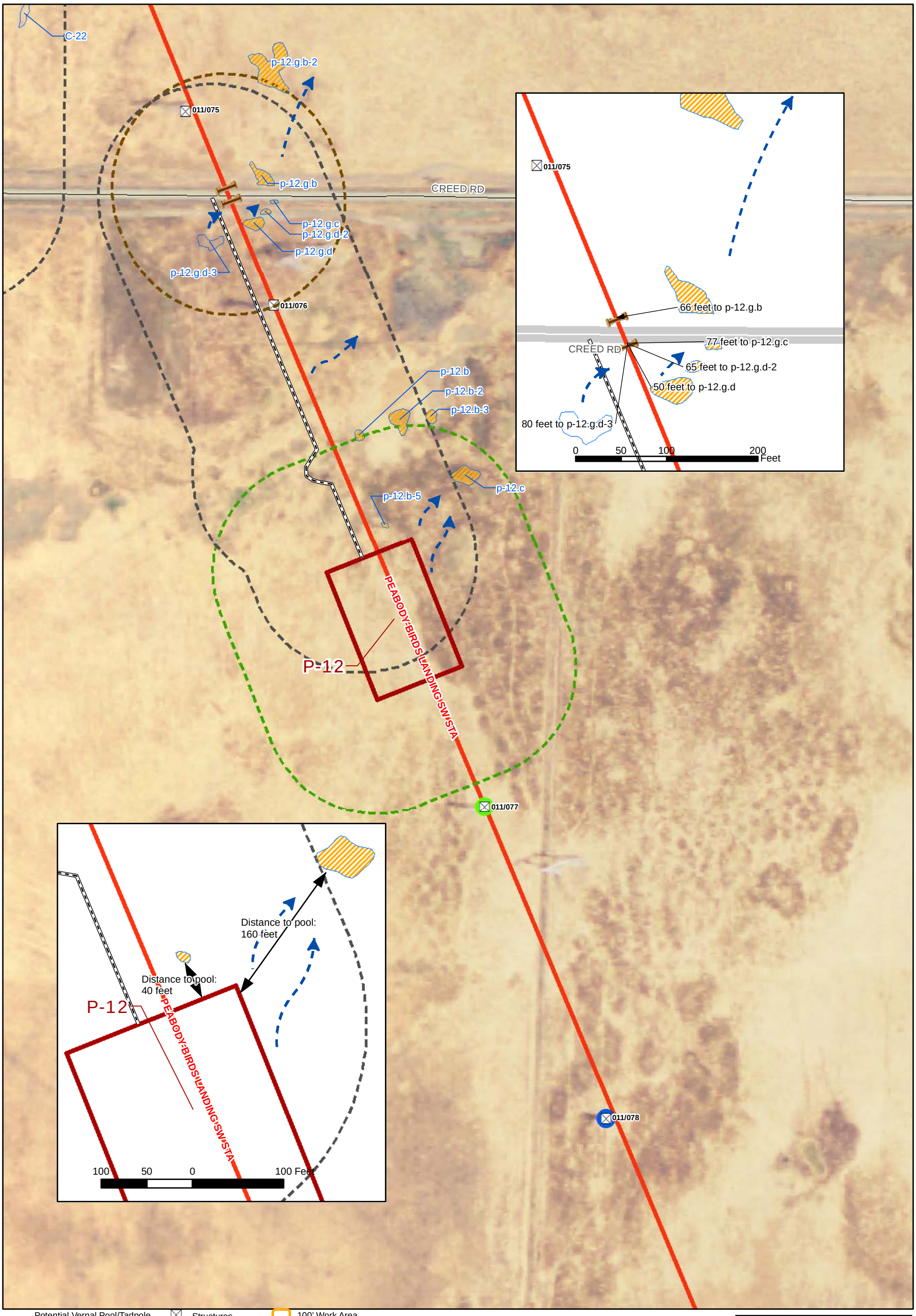
Potential Vernal Pool/Tadpole Shrimp Fairy Shrimp (VP/TS FS) Habitat
Temporary Indirect Effects to Potential VP/TS FS Habitat
Temporary Direct Effects to Potential VP/TS FS Habitat
Flow Lines
Berm
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
250' Distance from Pull & Fly Sites
250' Distance from Access Roads
Access Road - 12 ' Disturbance
Light Use Access Road
100' Work Area
Guard Structures
250' Distance from Guard Structures
Vernal Pool Tadpole Shrimp Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
Conservation Fairy Shrimp Critical Habitat

Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 16 of 24

0 100 200 400 Feet



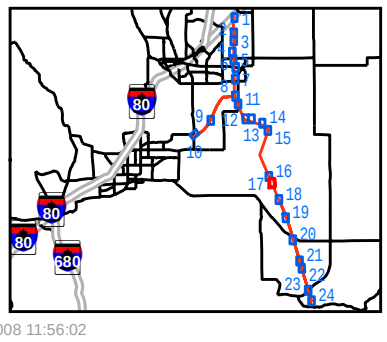


Potential Vernal Pool/Tadpole Shrimp Fairy Shrimp (VP/TS FS) Habitat
Temporary Indirect Effects to Potential VP/TS FS Habitat
Temporary Direct Effects to Potential VP/TS FS Habitat
Temporary Indirect Effects to Potential Conservation Fairy Shrimp (CFS) Habitat
Flow Lines
Berm
Structures
60kV Poles
Transmission Lines
Pull Site
Fly Site
250' Distance from Pull & Fly Sites
250' Distance from Access Roads
Access Road - 12 ' Disturbance
Light Use Access Road
100' Work Area
Guard Structures
250' Distance from Guard Structures
Vernal Pool Tadpole Shrimp Critical Habitat
Vernal Pool Fairy Shrimp Critical Habitat
Conservation Fairy Shrimp Critical Habitat

Appendix C - Effects to Potential Fairy Shrimp Habitat
Vaca Dixon - Birds Landing 230kV Reconductoring Project

Biological Assessment
Solano County, CA
Map 17 of 24

N W E S
0 100 200 400 Feet



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Attachment C3
Biological Assessment Supplemental Information Revised Tables

Attachment 1
Access Road Summary by Use Type

Access Road Type/ Location	Existing Road			New Road		
	Length (Feet)	Area (Ft^2)	Acres	Length (Feet)	Area (Ft^2)	Acres
Light Use - Guard Structures						
P-6				903	10,836	0.25
Creed Guard Site				2,052	24,628	0.57
Subtotal Light Use Guard				**2,955**	**35,464**	**0.81**
Light Use - Pull Sites						
P-1, P-2	971	11,652	0.27			
P-3	340	4,080	0.09			
P-8				1,106	13,272	0.30
P-9, P-10, P-11				1,702	20,424	0.47
P-12				900	10,800	0.25
P-13, P-14				1,758	21,096	0.25
P-15				260	3,120	0.48
Subtotal Light Use Pull Sites	**1,311**	**15,732**	**0.36**	**5,726**	**68,712**	**1.75**
Regular Use - Fly Sites						
F-1				75	904	0.02
F-2, P-5	1,200	14,400	0.33	230	2,760	0.06
P-6	643	7,716	0.18			
F-4				6,345	76,140	1.75
F-5, P-9, P-10, P-11	5,248	62,976	1.45	6,815	81,780	1.88
F-6				1,394	16,728	0.38
Subtotal Regular Use Fly Sites	**7,091**	**85,092**	**1.95**	**14,859**	**178,312**	**4.09**

Attachment 2
Effects on
Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Preliminary Habitat (inferred presence based on initial wet season survey results, April 2008)	Effect	Distance to Work Area (Feet)	Preliminary Notes	Final Determination of Effect (confirmed presence based on completion of one wet and one dry season survey, July 2008)	Final Notes
Pools that are directly or indirectly affected, with confirmed or inferred presence of vernal pool invertebrates								
C-134	0.004	Map 16 of 24	VPFS, VPTP	Direct		Assumed Presence	Habitat inferred north of Creed R	Guard structure north of Creed Road
p-6.g.a	0.004	Map 9 of 24	VPFS, VPTP	Indirect	60	DIstance given is from pool to pull site P-6	Found VPFS	Noonan Ranch, found VPFS (wet season)
p-12.g.c	0.002	Map 17 of 24	VPFS, VPTP	Indirect	83	Distance given is from pool to guard structure	Habitat inferred south of Creed Road	presence inferred south of Creed Road, downgradient of guard structure
p-12.g.b	0.028	Map 17 of 24	VPFS, VPTP	Indirect	66	Distance given is from pool to guard structure	Habitat inferred south of Creed Road	presence inferred north of Creed Road, downgradient of guard structure
Pools that are either 1) not affected directly or indirectly, or 2) surveyed with no vernal pool invertebrates found AND no inferred presence								
p-2.a	0.010	Map 1 of 24	VPFS, VPTP	Direct			None	None found in wet or dry season, none nearby
p-1.a	0.015	Map 1 of 24	VPFS, VPTP	Indirect	25	DIstance given is from pool to pull site P-1	None	None found in wet or dry season, none nearby
p-1.b	0.027	Map 1 of 24	VPFS, VPTP	Indirect	65	DIstance given is from pool to pull site P-1	None	None found in wet or dry season, none nearby
pop.g.a	0.015	Map 2 of 24	VPFS, VPTP	Indirect	10	Distance given is from pool to guard structure	None	None found in wet or dry season, none nearby
fry.g.a	0.020	Map 7 of 24	VPFS, VPTP	Indirect	185	Distance given is from pool to guard structure	None	None found in wet or dry season, none nearby
fry.g.a-2	0.010	Map 7 of 24	VPFS, VPTP	Indirect	20	Distance given is from pool to guard structure	None	None found in wet or dry season, none nearby
p-4.b	0.047	Map 8 of 24	VPFS, VPTP	Indirect	80	DIstance given is from pool to pull site P-4	None	None found in wet or dry season, none nearby
f-3.a	0.002	Map 9 of 24	VPFS, VPTP	Direct			None	None found in wet or dry season
f-3.l	0.001	Map 9 of 24	VPFS, VPTP	Direct			None	None found in wet or dry season
p-6.j	0.008	Map 9 of 24	VPFS, VPTP	None		Removed; pool buffered from work area by berm	None	None found in wet or dry season
p-6.g.f	0.004	Map 9 of 24	VPFS, VPTP	None		>250 ft from all work with exception of light use access	None	None found in wet or dry season

Attachment 2
Effects on
Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Preliminary Habitat (inferred presence based on initial wet season survey results, April 2008)	Effect	Distance to Work Area (Feet)	Preliminary Notes	Final Determination of Effect (confirmed presence based on completion of one wet and one dry season survey, July 2008)	Final Notes
f-3.i	0.002	Map 9 of 24	VPFS, VPTP	Indirect	70	DIstance given is from pool to pull site P-6	None	None found in wet or dry season
f-3.d-2	0.002	Map 9 of 24	VPFS, VPTP	Indirect	28	DIstance given is from pool to fly site F-3	None	None found in wet or dry season; distance from work area increased since F-3 removed
f-3.d	0.005	Map 9 of 24	VPFS, VPTP	Indirect	35	DIstance given is from pool to fly site F-3	None	None found in wet or dry season; distance from work area increased since F-3 removed
f-3.z	0.005	Map 9 of 24	VPFS, VPTP	Indirect	40	DIstance given is from pool to fly site F-3	None	None found in wet or dry season; distance from work area increased since F-3 removed
f-3.b	0.003	Map 9 of 24	VPFS, VPTP	Indirect	175	DIstance given is from pool to heavy use access road	None	None found in wet or dry season
f-3.c	0.034	Map 9 of 24	VPFS, VPTP	Indirect	70	DIstance given is from pool to fly site F-3	None	None found in wet or dry season; distance from work area increased since F-3 removed
f-3.e	0.022	Map 9 of 24	VPFS, VPTP	Indirect	125	DIstance given is from pool to fly site F-3	None	None found in wet or dry season; distance from work area increased since F-3 removed
f-3.z-2	0.005	Map 9 of 24	VPFS, VPTP	Indirect	160	DIstance given is from pool to fly site F-3	None	None found in wet or dry season; distance from work area increased since F-3 removed
f-3.j	0.001	Map 9 of 24	VPFS, VPTP	Indirect	90	DIstance given is from pool to pull site P-6	None	None found in wet or dry season
can.g.d	0.228	Map 9 of 24	VPFS, VPTP	None	>250	Only work within 250 feet is placemnt of temporary guard structure at edge of Canon Rd.	None	None found in wet or dry season
can.g.l	0.001	Map 9 of 24	VPFS, VPTP	Indirect	25	DIstance given is from pool to heavy use access road	None	None found in wet or dry season
p-6.g.d	0.003	Map 9 of 24	VPFS, VPTP	None		>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	None found in wet or dry season

Attachment 2
Effects on
Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Preliminary Habitat (inferred presence based on initial wet season survey results, April 2008)	Effect	Distance to Work Area (Feet)	Preliminary Notes	Final Determination of Effect (confirmed presence based on completion of one wet and one dry season survey, July 2008)	Final Notes
p-6.g.c	0.001	Map 9 of 24	VPFS, VPTP	Indirect	230	DIstance given is from pool to pull site P-6	None	None found in wet or dry season
cor.g.a	0.070	Map 9 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	None found in wet or dry season
cor.g.b	0.000	Map 9 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access	None	None found in wet or dry season
p-6.g.g	0.009	Map 9 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access	None	None found in wet or dry season
p-6.g.h	0.001	Map 9 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access	None	None found in wet or dry season
cor.road.a	0.002	Map 9 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access	None	None found in wet or dry season
cor.road.b	0.007	Map 9 of 24	VPFS, VPTP	None		Removed; pool buffered from work area by berm	None	None found in wet or dry season
cor.g.d-2	0.008	Map 9 of 24	VPFS, VPTP	None		Removed; pool buffered from work area by berm	None	None found in wet or dry season
cor.g.d-1	0.015	Map 9 of 24	VPFS, VPTP	None		Removed; pool buffered from work area by berm	None	None found in wet or dry season
cor.g.c	0.001	Map 9 of 24	VPFS, VPTP	None		Removed; pool buffered from work area by berm	None	None found in wet or dry season
p-7.b	0.027	Map 10 of 24	VPFS, VPTP	Direct			None	None found in wet or dry season, none nearby
p-7.a	0.013	Map 10 of 24	VPFS, VPTP	Direct			None	None found in wet or dry season, none nearby
p-7.c	0.009	Map 10 of 24	VPFS, VPTP	Indirect	25	Distance given is from pool to guard structure	None	None found in wet or dry season, none nearby
mer.g.c	0.053	Map 11 of 24	VPFS, VPTP	None	>250	Pool outside 250 ft. buffer	None	None found in wet or dry season, none nearby
mer.g.d	0.004	Map 11 of 24	VPFS, VPTP	None	>250	Pool outside 250 ft. buffer	None	None found in wet or dry season, none nearby
mer.g.e	0.014	Map 11 of 24	VPFS, VPTP	Indirect	200	DIstance given is from pool to guard structure	None	None found in wet or dry season, none nearby
mer.g.b	0.010	Map 11 of 24	VPFS, VPTP	None		Removed; pool buffered from work area by berm	None	None found in wet or dry season, none nearby

Attachment 2
Effects on
Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Preliminary Habitat (inferred presence based on initial wet season survey results, April 2008)	Effect	Distance to Work Area (Feet)	Preliminary Notes	Final Determination of Effect (confirmed presence based on completion of one wet and one dry season survey, July 2008)	Final Notes
mer.g.a	0.036	Map 11 of 24	VPFS, VPTP	None		Removed; pool buffered from work area by berm	None	None found in wet or dry season, none nearby
p-9.f	0.032	Map 12 of 24	VPFS, VPTP	Direct			None	None found in wet or dry season, none nearby
p-9.h	0.001	Map 12 of 24	VPFS, VPTP	Direct			None	None found in wet or dry season, none nearby
p-9.abc	0.206	Map 12 of 24	VPFS, VPTP	Indirect	25	DIstance given is from pool to heavy use access road	None	None found in wet or dry season, none nearby
p-9.e	0.015	Map 12 of 24	VPFS, VPTP	Indirect	125	DIstance given is from pool to heavy use access road	None	None found in wet or dry season, none nearby
f-5.road.a	0.557	Map 14 of 24	VPFS, VPTP	Direct			None	None found in wet or dry season, none nearby
f-5.road.b	0.121	Map 14 of 24	VPFS, VPTP	Direct			None	None found in wet or dry season, none nearby
f-5.road.f	0.013	Map 14 of 24	VPFS, VPTP	Indirect	25	DIstance given is from pool to heavy use access road	None	None found in wet or dry season, none nearby
f-5.road.g	0.008	Map 14 of 24	VPFS, VPTP	Indirect	25	DIstance given is from pool to heavy use access road	None	None found in wet or dry season, none nearby
p-10.f	0.051	Map 15 of 24	VPFS, VPTP	Direct			None	None found in wet or dry season, none nearby; ESA fence to exclude work in seasonal wetland regardless
p-10.abcdeg	0.068	Map 15 of 24	VPFS, VPTP	Direct			None	None found in wet or dry season, none nearby; ESA fence to exclude work in seasonal wetland regardless
f-5.road.c	0.023	Map 15 of 24	VPFS, VPTP	Indirect	30	DIstance given is from pool to heavy use access road	None	None found in wet or dry season, none nearby
f-5.road.d	0.180	Map 15 of 24	VPFS, VPTP	Indirect	30	DIstance given is from pool to heavy use access road	None	None found in wet or dry season, none nearby
f-5.road.e	0.029	Map 15 of 24	VPFS, VPTP	Indirect	60	DIstance given is from pool to heavy use access road	None	None found in wet or dry season, none nearby
p-10.h	0.015	Map 15 of 24	VPFS, VPTP	Indirect	150	DIstance given is from pool to heavy use access road	None	None found in wet or dry season, none nearby
p-10.i	0.005	Map 15 of 24	VPFS, VPTP	Indirect	120	DIstance given is from pool to pull site P-10	None	None found in wet or dry season, none nearby
p-10.j	0.013	Map 15 of 24	VPFS, VPTP	Indirect	75	DIstance given is from pool to pull site P-10	None	None found in wet or dry season, none nearby
p-11.d	0.010	Map 15 of 24	VPFS, VPTP	Indirect	20	DIstance given is from pool to heavy use access road	None	None found in wet or dry season, none nearby

Attachment 2
Effects on
Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Preliminary Habitat (inferred presence based on initial wet season survey results, April 2008)	Effect	Distance to Work Area (Feet)	Preliminary Notes	Final Determination of Effect (confirmed presence based on completion of one wet and one dry season survey, July 2008)	Final Notes
C-85	0.021	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer	None	Wilcox Ranch - not sampled
C-91	0.004	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer	None	Wilcox Ranch - not sampled
C-92	0.003	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer	None	Wilcox Ranch - not sampled
C-93	0.027	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer	None	Wilcox Ranch - not sampled
C-94	0.007	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer	None	Wilcox Ranch - not sampled
C-95	0.005	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer	None	Wilcox Ranch - not sampled
C-96	0.024	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer	None	Wilcox Ranch - not sampled
C-97	0.008	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer	None	Wilcox Ranch - not sampled
C-99	0.032	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer	None	Wilcox Ranch - not sampled
C-138	0.038	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer	None	Wilcox Ranch - not sampled
C-139	0.006	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer	None	Wilcox Ranch - not sampled
C-140	0.007	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer	None	Wilcox Ranch - not sampled
C-141	0.228	Map 16 of 24	VPFS, VPTP	None	>250	Upgradient; pool outside 250 ft. buffer	None	Wilcox Ranch - not sampled
C-65 (wil.b)	0.204	Map 16 of 24	VPFS, VPTP	None			None	Wilcox Ranch - not sampled

Attachment 2
Effects on
Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Preliminary Habitat (inferred presence based on initial wet season survey results, April 2008)	Effect	Distance to Work Area (Feet)	Preliminary Notes	Final Determination of Effect (confirmed presence based on completion of one wet and one dry season survey, July 2008)	Final Notes
C-1	0.128	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-2	0.004	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-3	0.007	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-4	0.005	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-5	0.042	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-6	0.006	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-0	0.006	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-7	0.003	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled

Attachment 2
Effects on
Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Preliminary Habitat (inferred presence based on initial wet season survey results, April 2008)	Effect	Distance to Work Area (Feet)	Preliminary Notes	Final Determination of Effect (confirmed presence based on completion of one wet and one dry season survey, July 2008)	Final Notes
C-8	0.009	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-9	0.005	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-10	0.012	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-11	0.033	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-12	0.004	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-13	0.005	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-14	0.003	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-15	0.003	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled

Attachment 2
Effects on
Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Preliminary Habitat (inferred presence based on initial wet season survey results, April 2008)	Effect	Distance to Work Area (Feet)	Preliminary Notes	Final Determination of Effect (confirmed presence based on completion of one wet and one dry season survey, July 2008)	Final Notes
C-16	0.016	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-17	0.029	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-18	0.011	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-19	0.012	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-20	0.008	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-21	0.006	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-30	0.013	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-31	0.024	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled

Attachment 2
Effects on
Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Preliminary Habitat (inferred presence based on initial wet season survey results, April 2008)	Effect	Distance to Work Area (Feet)	Preliminary Notes	Final Determination of Effect (confirmed presence based on completion of one wet and one dry season survey, July 2008)	Final Notes
C-32	0.050	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-33	0.063	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-34	0.005	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-35	0.014	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-36	0.341	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-37	0.005	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-38	0.008	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-39	0.030	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled

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Effects on
Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Preliminary Habitat (inferred presence based on initial wet season survey results, April 2008)	Effect	Distance to Work Area (Feet)	Preliminary Notes	Final Determination of Effect (confirmed presence based on completion of one wet and one dry season survey, July 2008)	Final Notes
C-40	0.006	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-41	0.091	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-43	0.034	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-42	0.004	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-44	0.005	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-45	0.002	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-46	0.004	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-47	0.006	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled

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Effects on
Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Preliminary Habitat (inferred presence based on initial wet season survey results, April 2008)	Effect	Distance to Work Area (Feet)	Preliminary Notes	Final Determination of Effect (confirmed presence based on completion of one wet and one dry season survey, July 2008)	Final Notes
C-48	0.003	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-49	0.002	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-50	0.005	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-51	0.025	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-52	0.014	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-53	0.007	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-54	0.009	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-55	0.008	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled

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Effects on
Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Preliminary Habitat (inferred presence based on initial wet season survey results, April 2008)	Effect	Distance to Work Area (Feet)	Preliminary Notes	Final Determination of Effect (confirmed presence based on completion of one wet and one dry season survey, July 2008)	Final Notes
C-63	0.011	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-64	0.021	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-143	2.741	Map 16 of 24	VPFS, VPTP, CFS	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-67	0.045	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-68	0.019	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-72	0.047	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access route that may be needed to provide access for a truck-mounted guard structure in	None	Wilcox Ranch - not sampled
C-73	0.024	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access	None	Wilcox Ranch - not sampled
C-74	0.005	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access	None	Wilcox Ranch - not sampled
C-77	0.015	Map 16 of 24	VPFS, VPTP	None	>250	>250 ft from all work with exception of light use access	None	Wilcox Ranch - not sampled
C-114	0.014	Map 16 of 24	VPFS, VPTP	None	30	Distance given is from pool to guard structure	None	Wilcox Ranch - not sampled
C-115	0.021	Map 16 of 24	VPFS, VPTP	None	60	Distance given is from pool to guard structure	None	Wilcox Ranch - not sampled

Attachment 2
Effects on
Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Preliminary Habitat (inferred presence based on initial wet season survey results, April 2008)	Effect	Distance to Work Area (Feet)	Preliminary Notes	Final Determination of Effect (confirmed presence based on completion of one wet and one dry season survey, July 2008)	Final Notes
C-116	0.025	Map 16 of 24	VPFS, VPTP	None	75	Distance given is from pool to guard structure	None	Wilcox Ranch - not sampled
C-117	0.003	Map 16 of 24	VPFS, VPTP	None	205	Distance given is from pool to guard structure	None	Wilcox Ranch - not sampled
C-118	0.011	Map 16 of 24	VPFS, VPTP	None	190	Distance given is from pool to guard structure	None	Wilcox Ranch - not sampled
C-119	0.005	Map 16 of 24	VPFS, VPTP	None	150	Distance given is from pool to guard structure	None	Wilcox Ranch - not sampled
C-120	0.043	Map 16 of 24	VPFS, VPTP	None	180	Distance given is from pool to guard structure	None	Wilcox Ranch - not sampled
C-121	0.054	Map 16 of 24	VPFS, VPTP	None	70	Distance given is from pool to guard structure	None	Wilcox Ranch - not sampled
C-122	0.151	Map 16 of 24	VPFS, VPTP	None	55	Distance given is from pool to guard structure	None	Wilcox Ranch - not sampled
C-123	0.014	Map 16 of 24	VPFS, VPTP	None	70	Distance given is from pool to guard structure	None	Wilcox Ranch - not sampled
C-124	0.012	Map 16 of 24	VPFS, VPTP	None	125	Distance given is from pool to guard structure	None	Wilcox Ranch - not sampled
C-142	2.591	Map 16 of 24	VPFS, VPTP, CFS	None	135	Distance given is from pool to guard structure	None	Wilcox Ranch - not sampled
C-81(wil.d)	0.282	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-86	0.012	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-82	0.008	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-83	0.069	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-87	0.013	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-23	0.026	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-84	0.112	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-24	0.010	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-25	0.006	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-26	0.015	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-27	0.015	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled

Attachment 2
Effects on
Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Preliminary Habitat (inferred presence based on initial wet season survey results, April 2008)	Effect	Distance to Work Area (Feet)	Preliminary Notes	Final Determination of Effect (confirmed presence based on completion of one wet and one dry season survey, July 2008)	Final Notes
C-28	0.026	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-29	0.153	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-88	0.005	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-89	0.006	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-93	0.009	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-56	0.021	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-57	0.107	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-58	0.097	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-59	0.171	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-60	0.031	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-61	0.051	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-62	0.041	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-98	0.102	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-66	0.083	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-69	0.019	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-70	0.008	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-71	0.005	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-100	0.018	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-75	0.007	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-76	0.013	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-78	0.010	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled

Attachment 2
Effects on
Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Preliminary Habitat (inferred presence based on initial wet season survey results, April 2008)	Effect	Distance to Work Area (Feet)	Preliminary Notes	Final Determination of Effect (confirmed presence based on completion of one wet and one dry season survey, July 2008)	Final Notes
C-79	0.002	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-80	0.004	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-101	0.026	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-102	0.033	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-103	0.024	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-104	0.003	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-106	0.003	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-107	0.005	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-108	0.005	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-109	0.006	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-110	0.020	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-111	0.013	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-112	0.009	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-113	0.018	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-125	0.007	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-126	0.022	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-127	0.045	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-128	0.018	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-129	0.003	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-130	0.004	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-131	0.006	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled

Attachment 2
Effects on
Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Preliminary Habitat (inferred presence based on initial wet season survey results, April 2008)	Effect	Distance to Work Area (Feet)	Preliminary Notes	Final Determination of Effect (confirmed presence based on completion of one wet and one dry season survey, July 2008)	Final Notes
C-132	0.013	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-133	0.010	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-135	0.010	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-136	0.007	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
C-137	0.017	Map 16 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
p-12.g.d	0.022	Map 17 of 24	VPFS, VPTP	Indirect	50	Distance given is from pool to guard structure	None; upgradient of guard structure	MVFS found during wet season survey; Unk. Branchinecta cyst observed during dry sample
p-12.g.d-2	0.005	Map 17 of 24	VPFS, VPTP	Indirect	67	Distance given is from pool to guard structure	None; upgradient of guard structure	Unk. Branchinecta cyst observed during dry sample
p-12.b	0.009	Map 17 of 24	VPFS, VPTP	Indirect	245	DIstance given is from pool to pull site P-12	None; assume no effect given distance from pull site	MVFS and VPTP found during wet season survey; Unk. Branchinecta cyst observed during dry sample
p-12.b-2	0.038	Map 17 of 24	VPFS, VPTP	Indirect	240	DIstance given is from pool to pull site P-12	None; assume no effect given distance from pull site	Unk. Branchinecta cyst observed during dry sample
p-12.b-3	0.013	Map 17 of 24	VPFS, VPTP	Indirect	>250	Previously within 250 feet of access road	None; assume no effect given distance from pull site	Unk. Branchinecta cyst observed during dry sample
p-12.c	0.041	Map 17 of 24	VPFS, VPTP	Indirect	162	DIstance given is from pool to pull site P-12	None; assume no effect given distance from pull site	MVFS found during wet season survey; no cysts observed during dry sample
p-12.b-5	0.003	Map 17 of 24	VPFS, VPTP	Indirect	38	DIstance given is from pool to pull site P-12	None; assume no effect given distance from pull site	Inferred presence since unknowm Branchinecta found in nearby 12 b-2 and b-3. MVFS found during wet season survey nearby.
p-12.g.b-2	0.114	Map 17 of 24	VPFS, VPTP	Indirect	248	Distance given is from pool to guard structure	None; assume no effect given distance from pull site	Unk. Branchinecta cyst, and CALI observed during dry sample

Attachment 2
Effects on
Branchiopod Habitat

Pool	Affected Acreage	Map Location 1"=2400'	Preliminary Habitat (inferred presence based on initial wet season survey results, April 2008)	Effect	Distance to Work Area (Feet)	Preliminary Notes	Final Determination of Effect (confirmed presence based on completion of one wet and one dry season survey, July 2008)	Final Notes
p-12.g.d-3	0.026	Map 17 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None; upgradient of guard structure	
C-22	0.019	Map 17 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	Wilcox Ranch - not sampled
p-13.a	0.002	Map 18 of 24	VPFS, VPTP	Direct			None	
p-13.b	0.003	Map 18 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	
p-13.g.b	0.003	Map 18 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	
p-13.road	0.154	Map 18 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	
p-15.g.a	0.002	Map 20 of 24	VPFS, VPTP	Indirect	70	Distance given is from pool to guard structure	None	
sr12.g.a	0.140	Map 20 of 24	VPFS, VPTP	Indirect	15	Distance given is from pool to guard structure	None	
sr12.g.b	0.024	Map 20 of 24	VPFS, VPTP	Indirect	20	Distance given is from pool to guard structure	None	
C-145	0.014	Map 20 of 24	VPFS, VPTP	Indirect	30	Distance given is from pool to Fly Site F-7	None	
01S.g.a	0.027	Map 21 of 24	VPFS, VPTP	Indirect	95	Distance given is from pool to guard structure	None	
01S.g.b	0.070	Map 21 of 24	VPFS, VPTP	None		Removed; pool upgradient from project work area	None	
f-8.a	0.089	Map 22 of 24	VPFS, VPTP	Indirect	35	Distance given is from pool to guard structure	None	
f-9.a	0.471	Map 24 of 24	VPFS, VPTP	Indirect	25	Distance given is from pool to Pull Site P-16	None	

Legend

MVFS = midvalley fairy shrimp (not currently listed)

VPFS = vernal pool fairy shrimp (federal threatened)

VPTS = vernal pool tadpole shrimp (federal endangered)

CALI = California linderiella (not currently listed)

Unk. = unknown species in Branchinecta genus. Potential identification requires additional laboratory work

TABLE 5-5
Proposed Compensation for Effects to Special-status Species
Biological Assessment for the Vaca Dixon-Birds Landing 230 kV Reconductoring Project

Species Habitat	Type of Effect (Temporary)	Acreage Affected	Proposed Mitigation Ratio	Mitigation Bank Credits
Vernal Pool Fairy Shrimp, Vernal Pool Tadpole Shrimp	Direct –	0.004	2:1 Creation/ Restoration	0.008 Creation/ Restoration
	Direct –	0.004	4:1 Preservation	0.016 Preservation
	Indirect	0.034	4:1 Preservation	0.136 Preservation
Conservancy Fairy Shrimp, Vernal Pool Fairy Shrimp, Vernal Pool Tadpole Shrimp	Direct	0	3:1	0
	Indirect	0	0.1:1	0
California Tiger Salamander	Temporary within 500 ft of a pond	5.71	1.1:1[1]	0.57
	Temporary between 500 ft and 1.24 mi from pond	34.5	1.1:1[1]	3.45
Delta Green Ground Beetle	Indirect to pools + 300 feet	0	3:1	0
Contra Costa Goldfields	Direct to pools	0	9:1	0
	Indirect	0	3:1	0

Notes:

[1] Represents 1:1 onsite restoration of affected areas and 0.1:1 offsite mitigation.

Actual impact area to be measured after construction is expected to be less.

Attachment C4
Biological Opinion

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In reply refer to:
81420-2008-F-1725-2

NOV 20 2008

Ms. Jane M. Hicks
Regulatory Division
U.S. Army Corps of Engineers
1455 Market Street
San Francisco, California 94103-1398

Subject: Biological Opinion for the Proposed Pacific Gas and Electric Company (PG&E) Vaca Dixon – Birds Landing 230 kV Reconductoring Project, Solano County, California (Corps # 200800243N)

Dear Ms. Hicks:

This letter is in response to your July 21, 2008, request for the initiation of formal consultation with the U.S. Fish and Wildlife Service (Service) on the proposed PG&E Vaca Dixon – Birds Landing 230 kV Reconductoring Project (proposed project) in Solano County, California. We received your request on July 23, 2008. On September 4, 2008, the Service requested additional information on the proposed project. On October 6, 2008, the Service received the information requested to complete formal consultation on the proposed project. At issue are the proposed project's effects on the federally- threatened vernal pool fairy shrimp (*Branchinecta lynchi*) and the endangered vernal pool tadpole shrimp (*Lepidurus packardi*) (these two species are collectively referred to as vernal pool crustaceans), and the threatened California tiger salamander (*Ambystoma californiense*) (salamander). The Service has determined that it is appropriate to append the proposed project to the *Programmatic Formal Endangered Species Act Consultation on Issuance of 404 Permits for Projects with Relatively Small Effects on Listed Vernal Pool Crustaceans within the Jurisdiction of the Sacramento Field Office, California* (Programmatic Consultation) (Service file number 1-1-97-F-0149). This document contains a programmatic biological opinion for vernal pool crustaceans, and a separate biological opinion for the salamander. This document is issued pursuant to section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act).

Based upon the information provided, the Service has determined that the proposed project is not likely to adversely affect the threatened Colusa grass (*Neostapfia colusana*), endangered Solano grass (*Tuctoria mucronata*), threatened San Joaquin Valley orcutt grass (*Orcuttia inaequalis*), endangered showy Indian clover (*Trifolium amoenum*), and endangered Contra Costa goldfields

TAKE PRIDE IN AMERICA

(*Lasthenia conjugens*). Although these plant species have the potential to occur in the proposed project area there will be no direct impacts (permanent or temporary) to potential habitat and all temporary activities that will occur within 250 feet of potential habitat will occur in the dry season. Based upon the information provided, the Service has determined that the proposed project is not likely to adversely affect the endangered Conservancy fairy shrimp (*Branchinecta conservatio*). The Service has made this determination based on lack of suitable habitat in the temporary construction areas. There will be no direct or indirect effect to playa type pools as a result of the proposed project activities. Based upon the information provided, the Service has determined that the proposed project is not likely to adversely affect the threatened Delta green ground beetle (*Elaphrus viridis*). The Service has made this determination based on lack of suitable playa pool habitat in the temporary construction areas. There will be no direct or indirect effect to playa type pools as a result of the proposed project activities. Additionally, no work activities will be allowed to occur north of Creed Road during the Delta green ground beetle flight season. Work in this area will, therefore, only take place from May 15 to October 31.

A portion of the proposed project lies within critical habitat unit 10D for the vernal pool crustaceans and Contra Costa goldfields. There are 7 towers currently located within this critical habitat unit. Although there are towers located within this critical habitat unit, no on-the-ground disturbance will occur within that unit. Therefore the Service has determined that the proposed project is not likely adversely to affect vernal pool critical habitat unit 10D.

This consultation is based on: (1) the April 2008, *Biological Assessment for Vaca Dixon-Birds Landing 230 kV Reconductoring Project, Solano County* (Biological Assessment), prepared by CH2MHILL, and received by the Service on May 9, 2008; (2) the July 21, 2008 letter from the U.S. Army Corps of Engineers (Corps) to the Service, requesting the initiation of section 7 consultation, on the proposed project; (3) the July 2008, *Listed Fairy Shrimp Survey Results (USFWS 90 Day Report) for the 2008 Wet Season Vaca Dixon-Birds landing PG&E 230 kV Reconductoring Project*, prepared by CH2MHILL, and received by the Service on August 1, 2008; (4) the September 5, 2008, *Supplemental Information to the Biological Assessment for PG&E Vaca Dixon-Birds Landing 230 kV Reconductoring Project*, prepared by CH2MHILL, and received by the Service on September 9, 2008; (5) the September 30, 2008, e-mail from CH2MHILL providing additional information on the proposed project; (6) a October 6, 2008, conference call between the Service, CH2MHILL, and PG&E; (7) the October 6, 2008, e-mail from CH2MHILL, providing additional information requested on the earlier conference call; and (8) other information available to the Service.

CONSULTATION HISTORY

December 18, 2007: Representatives from the Service, PG&E, and CH2MHILL met to informally discuss the proposed project.

July 7, 2008: Representatives form the Service, PG&E, and CH2MHILL met to informally discuss the proposed project.

May 9, 2008: The Service received the April 2008 *Biological Assessment for Vaca Dixon-Birds Landing 230 kV Reconductoring Project, Solano County* (Biological Assessment).

July 23, 2008: The Service received a letter from the Corps, dated July 21, 2008, requesting initiation of formal consultation on the Vaca Dixon – Birds Landing 230 kV Reconductoring Project.

August 1, 2008: The Service received the *Listed Fairy Shrimp Survey Results (USFWS 90 Day Report) for the 2008 Wet Season Vaca Dixon -Birds Landing PG&E 230 kV Reconductoring Project.*

September 4, 2008: The Service requested additional information from the Corps necessary to complete a biological opinion.

September 9, 2008: The Service received the *Supplemental Information to the Biological Assessment for PG&E Vaca Dixon-Birds Landing 230 kV Reconductoring Project,* from CH2MHILL.

September 30, 2008: The Service received an e-mail, from CH2MHILL, providing the additional information requested by the Service on September 4, 2008.

October 6, 2008: Representatives from the Service, PG&E, and CH2MHILL, had a telephone conference to discuss the proposed project. The Service requested a few items be clarified in the project description.

October 6, 2008: The Service received an e-mail form CH2MHILL providing the additional information which was requested during the earlier conference call.

Description of the Proposed Action

PG&E is proposing to reconductor approximately 30 miles of power line to increase transmission capacity to serve electric customers in Solano and Contra Costa counties. The Project is needed to increase transmission capacity to serve electric customers in those counties, and will allow the increased use of alternative energy sources such as wind power as required by the California Public Utilities Commission (CPUC). The proposed project is located entirely in Solano County, California. Upgrades and improvements to tbe 230 kV transmission line extend from PG&E's Vaca Dixon Substation, located on Quinn Road north of Interstate 80 (I-80) approximately 4.7 miles to the northeast of Vacaville (38.400645°N; -121.920885°W), south and west to Peabody Substation, located on Peabody Road at its intersection with Vanden Road between Fairfield and Vacaville (38.285410°N; -121.970530°W) and a second component extends from the Vaca Dixon Substation south to Birds Landing Substation north of Montezuma Road (38.123625°N; -121.829210°W).

The proposed project reconductoring has two basic components:

1. *Tower work*: consists of all necessary modifications and repairs to the towers to allow the towers to support the new, heavier conductor while maintaining required clearances from the ground. In order to accommodate heavier conductors, 105 of the 163 towers on the proposed project will require some sort of structural modification. Cage extensions will be added to 43 towers to increase tower height: 41 towers will be raised 15 feet, and two towers will be raised 20 feet. Arm extensions will be installed on 20 of the raised towers, as well as on 58 otherwise unmodified towers. Additionally, two towers will be converted from suspension to dead end, and two transposition towers will be reinforced. No foundation work or modifications to the base of the towers will be required at any tower location. Construction will be performed by helicopter except for a few towers near the Cypress Lakes Golf Course.

2. *Line work*: consists of installing the new conductor and adjusting it to the correct tension. New insulators and hardware are also normally installed during reconductoring. The proposed project will increase transmission line capacity by replacing the existing 1,113 kcmil (thousands of circular mills) aluminum and 954 kcmil aluminum conductor steel-reinforced conductors with 1,113 kcmil steel-supported aluminum conductor on approximately 30 miles of existing transmission line. Reconductoring is accomplished in sections of up to several miles between towers. Seventeen pull-and-tension sites have been identified as end points for these sections. Line work also includes replacing insulators and installing crossing structures to protect roadways and other power lines. Crossing structures consist of wood poles with netting strung between them. The structures are placed over overhead utilities and roadways at crossings to protect them when pulling the cable.

Construction Methods

Grounding

The first step in construction of towers is the installation of ground rods near the base of structures in active work areas. Ground rods are an important safety measure for linemen and other construction personnel working in and around towers. Ground rods are copper rods, 5/8-inch in diameter, and long enough to be driven into firm ground, with approximately 1 foot above ground. The ground rods are connected to the tower with clamps and a piece of conductor and are not removed until project activities are complete. Ground rods are also attached to any equipment used near an energized conductor, including reel pullers and bullwheel tensioners. The ground rods will be installed on each end of designated pull sites prior to pulling and tensioning work and will be removed once work is complete in that area. Grounding will also be necessary at towers not accessible by helicopter (Towers 4/33, 4/34, 4/35, 0/03, and 0/04). A crane truck will used for tower modifications at these locations.

Tower Construction

Towers will be prepared to accommodate the cage-top extensions by installing the necessary braces and additional plates. In the most sensitive areas (Tower 9/65 through Tower 12/82) workers, tools, and equipment will be brought in by helicopter. The cage-top extensions will be assembled within the designated fly site boundaries. Except for the five towers adjacent to the Cypress Lakes Golf Course (Towers 4/33, 4/34, 4/35, 0/03, and 0/04), cage-top extensions will be delivered to the tops of the towers by helicopter and will be bolted to the existing towers. Arm extensions will be installed after cage extensions are completed. The existing conductors will be temporarily clipped to the side of the tower while the arm extensions are brought into place and installed.

Crossing Structure Installation

Approximately 28 pairs of guard structures will be installed and are used to protect roads, railroad tracks, power lines, and the public should a line fall during reconductoring. Guard structures usually consist of one or two wooden poles and a cross beam and are installed in pairs with a net strung between the poles. A line truck will be used to auger and set the poles. Guard structure poles will be removed following reconductoring, and the holes will be backfilled and compacted. In sensitive areas, guard structures will be installed and removed during the dry season to minimize ground disturbance and potential erosion. Almost all guard structures can be installed from existing paved or dirt roads. The only structure requiring off-road access is located north of Creed Road, within Wilcox Ranch. This structure will protect an existing distribution line and will be accessed by a line truck following a disked firebreak through grazing land outside the Wilcox Ranch boundary. Access to this guard structure will require installing a new gate in the Wilcox Ranch fence to minimize the impacts to existing vernal pool habitat. However, this access route crosses a seasonal wetland that could potentially provide habitat for vernal pool invertebrates. This guard structure will be placed and removed when soils are dry.

Unclipping and Traveler Installation

Conductor replacement begins with the installation of travelers, which are pulleys that allow the conductor to be pulled through each structure. Travelers will be installed on the tower arms, and the existing conductors will be unclipped from the insulators and will be placed in the travelers. Travelers and insulators will be transported to each tower by helicopter or by vehicle in areas where off-road travel is permitted. Helicopters may also assist in moving conductors to the travelers.

Pulling and Tensioning

The new conductor will be attached to one end of the existing conductor, and a cable from the puller will be attached to the existing conductor at the other end. As the puller rolls up the old conductor, the new conductor is pulled into place. The conductor will be pulled through each structure under controlled tension to keep it elevated and away from obstacles, thereby preventing damage to the line and protecting the public. After the new conductor is in place, it

will be "sagged" (pulled to the appropriate height and tension). Once the new conductor is sagged, it will be removed from the rollers and clipped permanently to the end of each insulator. The rollers will then be removed and vibration dampers and other accessories installed.

Substation Modifications

Equipment at Lambie Switching Station and Vaca Dixon, Birds Landing, and Peabody Substations will be upgraded to accommodate the higher conductor ratings. All work at the switching station and substations will occur within the existing fences; therefore, expansion of existing facilities will not be required. Outdoor work at these facilities will include upgrades and replacement of switches and cable drops; installation of new insulators and hardware; reinforcement of existing piers at new dead end structures; and removal of switches, cable, and tubular bus conductors.

Access

Helicopter Access

Most construction activities will be carried out by helicopter to minimize ground-disturbing impacts and to maximize the speed of installation. In sensitive biological areas, workers and equipment will be flown to and from towers. Helicopters will typically hover at or above the tops of towers at heights of 80 to 120 feet, and workers will step onto towers directly from the helicopter. Helicopters will use designated fly sites.

Road Access

The main transportation corridors providing access to the project area are I-80, State Highway 12, and county roads. Existing paved roads will be used for general construction area access; some existing gravel roads (such as the access road for Birds Landing Substation) are all-weather roads that require no modification to provide access construction vehicles and equipment. Access to temporary construction areas (e.g., pull sites, guard structures, helicopter landing sites) will be limited as much as possible to existing access roads and temporary routes through agricultural fields. Sensitive biological areas (the area north of Creed Road and at the coral site at the intersection of Vanden Road and Canon Road) will be accessed during the dry season. Wet season access to non-sensitive temporary construction areas may require improvements to existing dirt roads and temporary access routes to accommodate heavy equipment. Four to six inches of gravel will be placed on these roads where needed and no widening or grading will be needed. Temporary access routes through agricultural fields will be 12 feet wide or less. On off-road access routes, gravel will be underlain by geotextile fabric or matting to allow the gravel to be removed when the project is complete.

Temporary Work Areas

Helicopter Landing Zones (Fly Sites)

Fly sites (landing zones) are used as landing sites and to stage materials, equipment, and crews during project construction. A fuel truck will also be present for helicopter fueling. Eight fly sites, with maximum dimensions of 200 feet by 300 feet, will be used during construction. The fly sites bave been located to avoid all U.S. Army Corps of Engineers jurisdictional areas. No mowing or grading of the sites is planned, but fly sites used during the rainy season may require gravel to provide a stable base. The helicopters will return to the Vacaville airport, or on an appropriate paved area at the conclusion of each work day.

Pull Sites

Pull-and-tension sites are placed in reasonably flat areas in line with the conductor. Seventeen of these sites are needed for project construction. Their dimensions vary from 50 feet by 60 feet to 200 feet by 200 feet. If necessary for equipment stability, gravel will be spread over the sites and will be removed at the end of the project. Erosion control measures such as silt fences or fiber rolls placed at the limits of work will be installed, for those sites where work is required during the wet season. No mowing or grading of pull sites is planned. After the completion of the project, pull sites will be returned to pre-construction conditions and will be reseeded as necessary.

Schedule

Work is scheduled to be completed by June 2009. Tower work will start first and is scheduled to finish by mid-May 2009. Line work will follow and will finish in June 2009. Scheduling is summarized below:

- *Fly sites and staging areas.* Crews will spend several days bringing equipment and materials to staging areas within the substations or fly site locations. A given fly site will be in use during work on that section of the line. Helicopters will be used for both tower modification work and replacement of conductors.

- *Tower work.* Cage and arm replacement will occur along the line in advance of reconductoring. Towers will be visited several times during the construction process: first to prepare for and then install any required cage or arm extensions; again to install the new conductor, travelers, and insulators on all towers in advance of reconductoring; and finally to remove the travelers and to place the conductors on the insulators ("clip" the conductors) once the pull-and-tension activity has resulted in achievement of the correct tension.

- *Guard structures.* These poles (with or without nets) will be placed prior to pulling and tensioning. In biologically-sensitive areas, they can be placed and removed during the dry season to avoid access during the wet season.

- *Reconductoring.* Approximately 200 days are planned for installing, pulling, and tensioning the new conductors on the entire length of the line; this work is accomplished in sections. If reconductoring work cannot be completed in this timeframe, work may be extended into the summer months. Since the lines being worked on are active transmission lines, timing of the pull and tensioning is dependent on load conditions and the ability to remove the line from service. This activity will be restricted to lower-load conditions outside the summer months.

- *Restoration.* Restoration of any temporarily disturbed areas will occur within 1 year of disturbance for all sites.

The proposed project site is primarily in a rural agricultural setting under private ownership. The area between Vacaville Substation, Peabody Substation, and Birds Landing Substation lies mostly within the Solano-Colusa Vernal Pool Region as defined in the *Recovery Plan for Vernal Pool Ecosystems of Southern Oregon and California* (Service 2005). About half the project lies within the Jepson Prairie Core area of that Region, extending from north of Travis Air Force Base (AFB) to an area just south of Little Honker Bay Road, on the edge of the Montezuma Hills. Vegetation communities within the project area and core area include annual non-native grasslands, seasonal wetlands, agricultural crops (such as alfalfa, irrigated hay, and dry land wheat), and vernal pool plant communities. Northern claypan vernal pools are typical of the vernal pools found in the Core Area. These can be smaller pools in mima mound topography, or larger playa pools such as the one found to the southeast of the guard structure north of Creed Road. The southern portion of the project is in the Montezuma Hills. Between Highway 12 (Rio Vista Road) and Birds Landing Substation, the project crosses over the hilly landscape of the Montezuma Hills which is used primarily for dry farming and dryland pasture.

The proposed project activities would be located within habitats potentially occupied by the vernal pool crustaceans and the California tiger salamander (salamander). There are 1.27 acres of seasonal wetlands, vernal pools, natural swales, roadside swales, roadside ditches, drainage ditches, and agricultural ditches within the proposed project area. The Service has determined that the proposed project is likely to directly and indirectly affect the vernal pool tadpole shrimp and vernal pool fairy shrimp inhabiting 0.038 acre of habitat. There are multiple recorded occurrences of the salamander within the proposed project area. The Service has determined that the proposed project is likely to temporarily affect 40.21 acres of upland habitat for the salamander.

Programmatic Consultation for Vernal Pool Crustaceans

Proposed Conservation Measures

The project applicant has proposed to offset the affects to 0.038 acre (0.004 acre direct and 0.034 acre indirect) of vernal pool crustacean habitat by purchasing 0.152 acres of vernal pool preservation credits and 0.008 acres of creation credits at a Service-approved vernal pool conservation bank; if no Service-approved vernal pool conservation banks are available which include the proposed project in their service area, the Service may extend the service boundaries of other banks that occur in the same vernal pool region for this project

Evaluation under Programmatic Consultation

The Service has determined that it is appropriate to append the proposed project to the Programmatic Consultation. This letter is an agreement by the Service to append the proposed project to the Programmatic Consultation and it represents the Service's biological opinion on the effects of the proposed action. Conservation measures for projects appended to the Programmatic Consultation involve the use of creation and preservation banks.

The Service is tracking losses of the two listed crustaceans and their habitat permitted under the Programmatic Consultation. We reevaluate the effectiveness of the Programmatic Consultation at least every six (6) months to ensure that continued implementation will not result in unacceptable effects to the listed species.

The conservation measures identified in the Programmatic Consultation includes the following:

1. **Preservation component**. For every acre of habitat directly or indirectly affected, *a minimum of* two vernal pool credits will be dedicated within a Service-approved ecosystem vernal pool preservation bank: or, based on Service evaluation of site-specific conservation values, three acres of vernal pool habitat may be preserved on the project site or another non-bank site as approved by the Service.

2. **Creation component**. For every acre of habitat directly affected, *a minimum of* one vernal pool creation credit will be dedicated within a Service-approved habitat creation bank: or, based on Service evaluation of site-specific conservation values; two acres of vernal pool habitat will be created and monitored on the project site or another non-bank site as approved by the Service.

Credits for preservation shall be purchased prior to the fill of any vernal pool areas. The agreed upon conservation responsibilities of the applicant are as follows:

1. Prior to the start of any earth moving activities at the project site, the project applicant shall purchase at least 0.152 acres (0.038 acre at a 4:1 ratio = 0.152 acre) of vernal pool preservation credits within a Service-approved vernal pool preservation bank.

If no Service-approved banks are available where the proposed project is located, the Service may extend the service boundaries of other banks that occur in the same vernal pool region for this project.

2. Prior to the start of any earth moving activities, the applicant shall purchase at least 0.008 acres (0.004 acre at a 2:1 ratio = 0.008) acre of vernal pool creation credits within a Service-approved vernal pool creation bank. If no Service-approved banks are available, and with Service approval, the Service may extend the Service boundaries of other banks that occur in the same vernal pool region for this project.

Conservation Measures:

Additional conservation measures for the proposed project are as follows:

1. The project proponent shall include a copy of the Service-issued Biological Opinion (BO) within its construction documents making the primary contractor responsible for implementing all requirements and obligations included within the BO, and to educate and inform all other contractors involved in the project as to the requirements of the BO.

2. A Service-approved biologist shall inspect construction-related activities at the proposed project area to ensure that no unauthorized take of federally-listed species or destruction of their habitat occurs. The biologist shall be available for monitoring throughout all phases of construction that may result in adverse effects to listed crustaceans or the salamander.

3. The contractor will prepare a site-specific Stormwater Pollution Prevention Plan (SWPPP) for the project to protect receiving waters from pollution. The SWPPP will include standard sediment and erosion control measures that include limiting soil disturbances during the winter rainfall season. Given the site-specific conditions of the project area, the SWPPP for this project will generally include limiting soil disturbances during the winter rainfall season of October 15 through April 15 and fully stabilizing disturbed areas prior to December 1. Standard sediment erosion control measures, such as silt fencing, straw bale barriers, sediment traps, or other measures could also directly reduce the off-site transport of sediment from disturbed slopes. Existing vegetation that can be preserved will be identified and flagged or fenced to avoid disturbance. Erosion in disturbed areas will be controlled through the use of grading operations that eliminate direct routes for conveying runoff to drainage channels and use of soil stabilization Best Management Practices (BMPs), such as mulching, erosion control fabrics, and/or reseeding with grass or other plants where necessary.

BIOLOGICAL OPINION FOR THE CALIFORNIA TIGER SALAMANDER

Project Description

A general summary of the proposed project is provided beginning on page 3 of this biological opinion. There are multiple recorded occurrences of the salamander within the proposed project area. The Service has determined that the proposed project is likely to temporarily affect 40.21 acres of upland habitat for the salamander.

Proposed Conservation Measures

The project applicant has proposed the following conservation measures to offset adverse effects to the California tiger salamander (salamander):

1. To minimize the adverse effects of the proposed project on the salamander PG&E proposes to restore and preserve a combined total of 44.23 acres of upland dispersal habitat. This consists of restoring the 40.21 acres of temporarily disturbed habitat and an additional 4.02 acres of preservation (40.21 acres at a 1.1:1 ratio). Temporarily disturbed areas that are not restored within one year of construction ground disturbance will be considered permanently impacted by the Service. This habitat preservation compensation can be achieved by: 1) purchase of compensation credits at an existing Service approved bank or banks, as appropriate for the species in Solano County, 2) or purchase and preservation of a Service approved parcel and establishment of a conservation easement, development of a management plan, and provision of a perpetual endowment sufficient to cover management and maintenance of protected lands for the benefit and recovery of the salamander, or 3) a combination of these two approaches.

2. An employee education program shall be conducted, consisting of a brief presentation by persons knowledgeable in vernal pool biology and legislative protection to explain endangered species concerns to contractors, their employees, and any other personnel involved in the project. The program should include the following: a description of the species and their habitat needs; a report of the occurrence of these species in the project area; an explanation of the status of these species and their protection under the 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 should be prepared for distribution to the above-mentioned people and anyone else who may enter the project site. Upon completion of training, employees will sign a form stating that they attended the training and understand all the conservation and protection measures. To the extent possible, nighttime construction will be minimized. Construction crews will he informed during the education program meeting that, to the extent possible, travel within the marked project site will be restricted to established roadheds. Established roadbeds include all pre-existing and project-constructed unimproved, as well as, improved roads.

3. A Service approved biological monitor will be onsite during all ground-disturbing work within sensitive biological areas. Offroad access routes will be clearly flagged and marked. All project-related vehicle access to the guard structures at Creed Road and south of the Noonan Ranch corrals will be monitored by a Service approved biological monitor. Work within sensitive biological areas north of Creed Road and at the corral site (at the intersection of Canon Road and Vanden Road) will be conducted during the dry season. Additionally, no work activities will be allowed to occur north of Creed Road during the Delta green ground beetle flight season. Work in this area can therefore only take place from May 15 to October 31 (Dr. Richard Arnold, Entomological Consulting Services, Inc., pers. comm.).

4. Geotextile fabric and a layer of gravel will protect the original contour of all wetland pools that cannot be avoided within identified temporary impact areas adjacent to or within the right of way with the possible exception of temporary access routes where overland travel in the dry season may have less impact than placement and removal of gravel, such as for the guard structure route at Creed Road. Using the geotextile fabric and gravel will minimize potential effects from compaction or other disturbance to areas that will have more frequent travel or heavier equipment, or be used during the wet season. After construction, the gravel and fabric will be removed. In areas of minimal effect such as temporary access at Creed Road, this measure could have greater impact on soil seed bank than overland driving in the dry season.

5. Dust control measures will be implemented during construction in the dry season. Work areas and dirt access roads will be watered regularly to minimize airborne dust and soil particles generated by construction. Fly sites will be rocked when necessary.

6. The potential for adverse effects to water quality in vernal pools or habitat within the action area will be avoided by implementing temporary Best Management Practices outlined in the California Stormwater Quality Association's Construction Handbook. PG&E's Storm Water Pollution Prevention Plan and erosion control BMPs will be used to minimize any wind- or water-related erosion. Protective measures will include:

    a. No discharge of pollutants from vehicle and equipment cleaning will be allowed into storm drains, wetlands, or water courses.

    b. Vehicle and equipment fueling and maintenance operations must be at least 100 feet from vernal pools and other aquatic habitat.

    c. Dust control will be implemented, including the use of water trucks to control dust in disturbed areas, rocking temporary access road entrances and exits, and placement of geotextile mats and rock on access road areas to be used in the wet season.

    d. Disturbed work areas will be restored to pre-project conditions and will be reseeded, as appropriate.

7. Project-related vehicles shall observe a 20-mile-per-hour speed limit in all project areas, except on county roads and state and federal highways.

8. The limits of the construction area throughout the project will be flagged if not already marked by right of way or other fencing, and all activity will be confined within the marked area. A qualified biologist shall be onsite during all activities that could result in the take of a listed species.

Action Area

The action area is defined in 50 CFR § 402.02 as, "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the Vaca Dixon – Birds Landing 230 kV Reconductoring Project, this includes the entire 30-mile line reconductoring.

Status of the Species/Environmental Baseline

California Tiger Salamander

The final rule listing the California tiger salamander as a threatened species was published on August 4, 2004 (Service 2004). The California tiger salamander is endemic to California and historically inhabited the low-elevation grassland and oak savanna plant communities of the Central Valley, adjacent foothills, and inner coast ranges (Jennings and Hayes 1994; Storer 1925; Shaffer *et al.* 1993). The species has been recorded from near sea level to approximately 3,900 feet in the coast ranges and to approximately 1,600 feet in the Sierra Nevada foothills (Shaffer *et al.* 2004). Along the coast ranges, the species occurred from the Santa Rosa area of Sonoma County, south to the vicinity of Buellton in Santa Barbara County. The historic distribution in the Central Valley and surrounding foothills included northern Yolo County southward to north western Kern County and northern Tulare County. Three distinct California tiger salamander populations are recognized and correspond to Santa Maria area within Santa Barbara County, the Santa Rosa Plain in Sonoma County, and vernal pool/grassland habitats in the southern Sacramento Valley, the San Joaquin Valley and associated areas in the foothills of the Sierra Nevada, and the San Francisco Bay area south into San Luis Obispo County.

Ambystoma californiense is a large, stocky, terrestrial salamander with a broad, rounded snout. Recorded adult measurements have been as much as 8.2 inches long (Petranka 1998; Stebbins 2003). Tiger salamanders exhibit sexual dimorphism (differences in body appearance based on gender) with males tending to be larger than females. The coloration of the adults generally consists of random white or yellowish markings against a black body. The markings tend to be more concentrated on the lateral sides of the body; whereas other tiger salamander species tend to have brighter yellow spotting that is heaviest on the dorsal surface.

The tiger salamander has an obligate biphasic life cycle (Shaffer *et al.* 2004). Although the larvae develop in the vernal pools and ponds in which they were born, the species is otherwise terrestrial and spend most of their post-metamorphic lives in widely dispersed underground retreats (Shaffer *et al.* 2004; Trenham *et al.* 2001). Because they spend most of their lives underground, the animals rarely are encountered even in areas where salamanders are abundant.

Subadult and adult tiger salamanders typically spend the dry summer and fall months in the burrows of small mammals, such as California ground squirrels (*Spermophilus beecheyi*) and Botta's pocket gopher (*Thomomys bottae*) (Storer 1925; Loredo and Van Vuren 1996; Petranka 1998; Trenham 1998a). Although ground squirrels have been known to eat these amphibians, the relationship with their burrowing hosts is primarily commensal (an association that benefits one member while the other is not affected) (Loredo *et al.* 1996; Semonsen 1998).
Tiger salamanders may also use landscape features such as leaf litter or desiccation cracks in the soil for upland refugia. Burrows often harbor camel crickets (*Stenelopomatus* species) and other invertebrates that provide likely prey for the amphibians. Underground refugia also provide protection from the sun and wind associated with the dry California climate that can cause excessive drying of amphibian skin. Although tiger salamanders are members of a family of "burrowing" salamanders, they are not known to create their own burrows. This may be due to the hardness of soils in the California ecosystems in which they are found. Tiger salamanders depend on persistent small mammal activity to create, maintain, and sustain sufficient underground refugia for the species. Burrows are short lived without continued small mammal activity and typically collapse within approximately 18 months (Loredo *et al.* 1996).

Upland burrows inhabited by tiger salamanders have often been referred to as aestivation sites. However, "aestivation" implies a state of inactivity, while most evidence suggests that the animals remain active in their underground dwellings. A recent study has found that tiger salamanders move, feed, and remain active in their burrows (Van Hattem 2004). Because the adults arrive at breeding ponds in good condition and are heavier when entering the pond than when leaving, researchers have long inferred that they are feeding while underground. Recent direct observations have confirmed this (Trenham 2001; Van Hattem 2004). Thus, "upland habitat" is a more accurate description of the terrestrial areas used by tiger salamanders.

Tiger salamanders typically emerge from their underground refugia at night during the fall or winter rainy season (November-May) to migrate to their breeding ponds (Stebbins 1985, 1989; Shaffer *et al.* 1993; Trenham *et al.* 2000). The breeding period is closely associated with the rainfall patterns in any given year with less adults migrating and breeding in drought years (Loredo and Van Vuren 1996; Trenham *et al.* 2000). Male salamander are typically first to arrive and generally remain in the ponds longer than females. Results from a 7-year study in Monterey County suggested that males remained in the breeding ponds for an average of 44.7 days while females remained for an average of only 11.8 days (Trenham *et al.* 2000). Historically, breeding ponds were likely limited to vernal pools, but now include livestock stockponds. Ideal breeding ponds are typically fishless, free of non-native predators, and seasonal or semi-permanent (Barry and Shaffer 1994; Petranka 1998).

While in the ponds, adult California tiger salamanders mate and then the females lay their eggs in the water (Twitty 1941; Shaffer *et al.* 1993; Petranka 1998). Egg laying typically reaches a peak in January (Loredo and Van Vuren 1996; Trenham *et al.* 2000). Females attach their eggs singly, or in rare circumstances, in groups of two to four, to twigs, grass stems, vegetation, or debris (Storer 1925; Twitty 1941). Eggs are often attached to objects, such as rocks and boards in ponds with no or limited vegetation (Jennings and Hayes 1994). Clutch sizes from a Monterey County study had an averaged of 814 eggs (Trenham *et al.* 2000). Seasonal pools may not

exhibit sufficient depth, persistence, or other necessary parameters for adult breeding during times of drought (Barry and Shaffer 1994). After breeding and egg laying is complete, adults leave the pool and return to their upland refugia (Loredo *et al.* 1996; Trenham 1998a). Adult salamanders often continue to emerge nightly for approximately the next two weeks to feed amongst their upland habitat (Shaffer *et al.* 1993).

California tiger salamander larvae typically hatch within 10 to 24 days after eggs are laid (Storer 1925). The peak emergence of these metamorphs is typically between mid-June and mid-July (Loredo and Van Vuren 1996; Trenham *et al.* 2000). The larvae are totally aquatic and range in length from approximately 0.45 to 0.56 inches (Petranka 1998). They have yellowish gray bodies, broad fat heads, large, feathery external gills, and broad dorsal fins that extend well up their back. The larvae feed on zooplankton, small crustaceans, and aquatic insects for about six weeks after hatching, after which they switch to larger prey (J. Anderson 1968). Larger larvae have been known to consume the tadpoles of Pacific treefrogs (*Pseudacris regilla*), western spadefoot toads (*Spea hammondii*), and California red-legged frogs (*Rana aurora draytonii*) (J. Anderson 1968; P. Anderson 1968). Tiger salamander larvae are among the top aquatic predators in seasonal pool ecosystems. When not feeding, they often rest on the bottom in shallow water but are also found throughout the water column in deeper water. Young salamanders are wary and typically escape into vegetation at the bottom of the pool when approached by potential predators (Storer 1925).

The tiger salamander larval stage is typically completed in 3 to 6 months with most metamorphs entering upland habitat during the summer (Petranka 1998). In order to be successful, the aquatic phase of this species' life history must correspond with the persistence of its seasonal aquatic habitat. Most seasonal ponds and pools dry up completely during the summer. Amphibian larvae must grow to a critical minimum body size before they can metamorphose (change into a different physical form) to the terrestrial stage (Wilbur and Collins 1973). Larval development and metamorphosis can vary and is often site-dependent. Larvae collected near Stockton in the Central Valley during April varied between 1.88 to 2.32 inches in length (Storer 1925). Feaver (1971) found that larvae metamorphosed and left breeding pools 60 to 94 days after eggs had been laid, with larvae developing faster in smaller, more rapidly drying pools. Longer ponding duration typically results in larger larvae and metamorphosed juveniles that are more likely to survive and reproduce (Pechmann *et al.* 1989; Semlitsch *et al.* 1988; Morey 1998; Trenham 1998b). Larvae will perish if a breeding pond dries before metamorphosis is complete (P. Anderson 1968; Feaver 1971). Pechmann *et al.* (1989) found a strong positive correlation between ponding duration and total number of metamorphosing juveniles in five salamander species. In Madera County, Feaver (1971) found that only 11 of 30 sampled pools supported larval California tiger salamanders, and 5 of these dried before metamorphosis could occur. Therefore, out of the original 30 pools, only 6 (20 percent) provided suitable conditions for successful reproduction that year. Size at metamorphosis is positively correlated with stored body fat and survival of juvenile amphibians, and negatively correlated with age at first reproduction (Semlitsch *et al.* 1988; Scott 1994; Morey 1998).

Following metamorphosis, juvenile California tiger salamanders leave their pools and move to upland habitat. This emigration can occur in both wet and dry conditions (Loredo and

Van Vuren 1996; Loredo *et al.* 1996). Wet conditions are more favorable for upland travel but rare summer rain events seldom occur as metamorphosis is completed and ponds begin to dry. As a result, juveniles may be forced to leave their ponds on rainless nights. Under dry conditions, juveniles may be limited to seeking upland refugia in close proximity to their aquatic larval pool. These individuals often wait until the next winter's rains to move further into more suitable upland refugia. Juveniles remain active in their upland habitat, emerging from underground refugia during rainfall events to disperse or forage (Trenham and Shaffer 2005). Depending on location and other development factors, metamorphs will not return as adults to aquatic breeding habitat for 2 to 5 years (Loredo and Van Vuren 1996; Trenham *et al.* 2000).

Lifetime reproductive success for the California tiger salamander is low. Results from one study suggest that the average female bred 1.4 times over their lifespan and produced 8.5 young per reproductive effort that survived to metamorphosis (Trenham *et al.* 2000). This resulted in the output of roughly 11 metamorphic offspring over a breeding female's lifetime. The primary reason for low reproductive success may be that this relatively short-lived species requires two or more years to become sexually mature (Shaffer *et al.* 1993). Some individuals may not breed until they are four to six years old. While California tiger salamanders may survive for more than ten years, many breed only once, and in one study, less than 5 percent of marked juveniles survived to become breeding adults (Trenham 1998b). With such low recruitment, isolated populations are susceptible to unusual, randomly occurring natural events as well human-caused factors that reduce breeding success and individual survival. Factors that repeatedly lower breeding success in isolated pools can quickly extirpate a population.

Dispersal and migration movements made by California tiger salamanders can be grouped into two main categories: (1) breeding migration; and (2) interpond dispersal. Breeding migration is the movement of salamanders to and from a pond from the surrounding upland habitat. After metamorphosis, juveniles move away from breeding ponds into the surrounding uplands, where they live continuously for several years. At a study in Monterey County, it was found that upon reaching sexual maturity, most individuals returned to their natal/ birth pond to breed, while 20 percent dispersed to other ponds (Trenham *et al.* 2001). After breeding, adult tiger salamanders return to upland habitats, where they may live for one or more years before attempting to breed again (Trenham *et al.* 2000).

California tiger salamanders are known to travel long distances between breeding ponds and their upland refugia. Generally it is difficult to establish the maximum distances traveled by any species, but tiger salamanders in Santa Barbara County have been recorded dispersing up to 1.3 miles from their breeding ponds (Sweet 1998). As a result of a 5-year capture and relocation study in Contra Costa County, Orlaf (2007) estimated that captured California tiger salamanders were traveling a minimum of 0.5 miles to the nearest breeding pond and that some individuals were likely traveling more than 1.3 miles to and from breeding ponds. Tiger salamanders are also known to travel between breeding ponds. One study found that 20 to 25 percent of the individuals captured at one pond were recaptured later at other ponds approximately 1,900 and 2,200 feet away (Trenham *et al.* 2001). In addition to traveling long distances during juvenile dispersal and adult migration, tiger salamanders may reside in burrows far from their associated breeding ponds.

Although previously cited information indicates that tiger salamanders can travel long distances, they typically remain close to their associated breeding ponds. A trapping study conducted in Solano County during the winter of 2002/2003 suggested that juveniles dispersed and used upland habitats further from breeding ponds than adults (Trenham and Shaffer 2005). More juvenile salamanders were captured at traps placed at 328, 656, and 1,312 feet from a breeding pond than at 164 feet. Approximately 20 percent of the captured juveniles were found at least 1,312 feet from the nearest breeding pond. The associated distribution curve suggested that 95 percent of juvenile salamanders were within 2,099 feet of the pond, with the remaining 5 percent being found at even greater distances. Preliminary results from the 2003-04 trapping efforts at the same study site detected juvenile tiger salamanders at even further distances, with a large proportion of the captures at 2,297 feet from the breeding pond (Trenham *et al.*, unpublished data). Surprisingly, most juveniles captured, even those at 2,100 feet, were still moving away from ponds (Ben Fitzpatrick, University of California at Davis, personal communication, 2004). In Santa Barbara County, juvenile California tiger salamanders have been trapped approximately 1,200 feet away while dispersing from their natal pond (Science Applications International Corporation, unpublished data). These data show that many tiger salamanders travel far while still in the juvenile stage. Post-breeding movements away from breeding ponds by adults appear to be much smaller. During post-breeding emigration from aquatic habitat, radio-equipped adult tiger salamanders were tracked to burrows between 62 to 813 feet from their breeding ponds (Trenham 2001). These reduced movements may be due to adult tiger salamanders exiting the ponds with depleted physical reserves, or drier weather conditions typically associated with the post-breeding upland migration period.

Tiger salamanders are also known to use several successive burrows at increasing distances from an associated breeding pond. Although previously cited studies provide information regarding linear movement from breeding ponds, upland habitat features appear to have some influence on movement. Trenham (2001) found that radio-tracked adults were more abundant in grasslands with scattered large oaks (*Quercus* species), than in more densely wooded areas. Based on radio-tracked adults, there is no indication that certain habitat types are favored as terrestrial movement corridors (Trenham 2001). In addition, captures of arriving adults and dispersing new metamorphs were evenly distributed around two ponds completely encircled by drift fences and pitfall traps. Thus, it appears that dispersal into the terrestrial habitat occurs randomly with respect to direction and habitat types.

Documented or potential tiger salamanders predators include coyotes (*Canis latrans*), raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), opossums (*Didelphis virginiana*), egrets (*Egretta* species), great blue herons (*Ardea herodias*), crows (*Corvus brachyrhynchos*), ravens (*Corvus corax*), garter snakes (*Thamnophis* species), bullfrogs (*Rana catesbeiana*), California red-legged frogs (*Rana aurora draytonii*), mosquito fish (*Gambusia affinis*), and crayfish (*Procrambus* species). Domestic dogs (*Canis familiaris*) have been observed eating California tiger salamanders at Lake Lagunitas at Stanford University (Sean Barry, ENTRIX, personal communication to C. Nagano, July 2004).

The California tiger salamander is imperiled throughout its range due to a variety of human activities (Service 2004). Current factors associated with declining tiger salamander populations include continued habitat loss and degradation due to agriculture and urbanization; hybridization with the non-native eastern tiger salamander (*Ambystoma tigrinum*) (Fitzpatrick and Shaffer 2004; Riley *et al.* 2003); and predation by introduced species. Tiger salamander populations are likely threatened by multiple factors but continued habitat fragmentation and colonization of non-native salamanders may represent the most significant current threats. Habitat isolation and fragmentation within many watersbeds have precluded dispersal between sub-populations and jeopardized the viability of metapopulations (broadly defined as multiple subpopulations that occasionally exchange individuals through dispersal, and are capable of colonizing or "rescuing" extinct habitat patches). Other threats include predation and competition from introduced exotic species; possible commercial over-utilization; diseases; various chemical contaminants; road kill; and certain unrestrictive mosquito and rodent control operations. Currently, these various primary and secondary threats are largely not being offset by existing Federal, State, or local regulatory mechanisms. The tiger salamander is also prone to chance environmental or demographic events, to which small populations are particularly vulnerable.

The **Environmental baseline** includes past and present impacts of all Federal, State, or private actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to access the effects of the action now under consultation.

Most of the proposed project area is located within the Solano-Colusa vernal pool region and the Greater Jepson Prairie Ecosystem, which is a geographical area, defined by landscape and hydrological features that support a complex of vernal pools and a variety of associated endemic and special-status plant and animal species. The California tiger salamander is one of the primary species in the ecology of this vernal pool region. This listed amphibian has been adversely affected by development and modification of the vernal pool, grassland, and open woodland habitat within the Solano-Colusa vernal pool region. Construction in Solano County has contributed to local California tiger salamander habitat loss and fragmentation. The California tiger salamander is known to be present in much of the undeveloped areas in the vernal pool landscape of Solano County. The proposed project area is located more than 0.75 mile from the nearest California tiger salamander critical habitat unit, Unit 2 of the Central Valley Region. Salamander occurrences are also reported within 0.5 mile of structures 002/015 through 003/019 of the west spur (CNDDB, 2007). The proposed action area between structures 002/015 through 003/019 is within the known California tiger salamander dispersal range from these known salamander occurrences.

The Service believes that the California tiger salamander is reasonably certain to occur within the action area because of the presence of appropriate upland habitat within the action area, the presence of a potential breeding ponds within the action area, known nearby occurrences within the dispersal range of the salamander, uninterrupted connectivity between occupied habitat and that action area, and the biology and ecology of the animal, especially the ability of the adults to move considerable distances between its breeding ponds and upland habitat.

Effects of the Proposed Action

The proposed project is likely to result in a number of adverse effects to the California tiger salamander such as direct mortality, injury, or harassment of individual juveniles and adults. Implementation of the proposed action would result in the temporary loss of 40.21 acres of suitable upland habitat for the salamander due to placement of pull-and-tension sites; helicopter landing/staging areas (fly sites); temporary access roads; and guard structures over roads, railroads, and distribution lines at various locations along the transmission line. In terms of wetlands, the areas of effects include the direct effects to 0.004 acres of wetlands and indirect effects to 0.034 acres of wetlands. No seasonal wetlands or ponds appropriate for salamander breeding, or associated suitable upland will be permanently lost from implementation of the proposed action.

Mortality, injury, or harassment of the California tiger salamander could occur from being crushed by project related equipment or vehicles, construction debris, and worker foot traffic within the action area. Individuals of this listed species also could fall into trenches, pits, or other excavations, and be directly killed, or unable to escape, be killed due to desiccation, entombment, or starvation. Work activities, including vibration, may cause tiger salamanders to leave the work site and surrounding areas. This disturbance and displacement may increase the potential for predation, desiccation, competition for food and shelter, or strike by vehicles on access roads.

The construction activities at the proposed project could result in the introduction of chemical contaminants to the site. Vehicles may leak hazardous substances such as motor oil and antifreeze. A variety of substances could be introduced during accidental spills of materials. Such spills can result from leaks in vehicles, small containers falling off vehicles, or from accidents resulting in whole loads being spilled. Large spills may be partially or completely mitigated by clean-up efforts, depending on the substance. California tiger salamanders using these areas could be exposed to any contaminants that are present at the site. Exposure pathways could include inhalation, dermal contact, direct ingestion, or ingestion of contaminated soil or plants. Exposure to contaminants could cause chronic or acute effects possibly reducing health and/or productivity or mortality. Carcinogenic substances could cause genetic damage resulting in sterility, reduced productivity, or reduced fitness among progeny. Little information is available on the effects of contaminants on the California tiger salamander. The effects may be difficult to detect. Morbidity or mortality likely would occur after the animals had left the contaminated site, and more subtle effects such as genetic damage could only be detected through intensive study and monitoring.

Because these animals are nocturnal, lighting installed for possible night time construction likely would increase all of the above effects. Wise and Buchanan (2006) reviewed the adverse effects that may result from night time illumination on salamander species. Artificial lighting used during night time construction may increase predation of the California tiger salamanders, if it occurs during periods of fall, winter, or spring rains, because the amphibians will lose the cover of darkness for movement. Nocturnal foraging by salamander species may be affected by artificial lighting. Wise and Buchanan (2006) reported that in one species of salamander,

individuals emerged from refugia to forage within one hour after light levels dropped following sunset. During such foraging bouts, visual information was used for locating prey. Greater light levels delay emergence, resulting in less foraging time, but could have increased the ability of the salamanders to capture prey; however, they also could make the amphibians more vulnerable to predation. Many salamanders, such as the California tiger salamander, are terrestrial as adults but migrate to ponds to breed and lay eggs. The orientation of some of these terrestrial species away from and toward these ponds is influenced by the spectral characteristics of light (Wise and Buchanan 2006). Artificial lights that emit unusual spectra may disrupt these migration patterns.

California tiger salamander mortality and injury occurs when the animals attempt to cross roads and are hit by cars, trucks, or motorcycles. The same threat will likely occur with the proposed access road activities. The majority of strikes would likely occur on rainy nights when the animals are moving to their breeding ponds. Thus, strikes would be a direct source of mortality for the California tiger salamander. If strikes are sufficiently frequent in a given locality, this could result in reduced abundance of this animal.

Especially problematic is the death of females prior to the laying of their eggs because this could result in the loss of an entire cohort, and therefore, reduced recruitment of new individuals into the population.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

A number of on-going and proposed projects could contribute to adverse affects to California tiger salamander habitat within Solano County. In most cases, however, these actions would be subject to Federal review and would, therefore, not be considered cumulative to the proposed project. These projects will contribute to the loss and degradation of habitats of listed species across their range. These activities may alter aquatic and upland habitats and can potentially harass, harm, injure, or kill tiger salamanders. Because these activities have a Federal nexus, the Service will analyze these projects to determine if they will result in the jeopardy of federally-listed species and/or adverse modification and destruction of critical habitat for these species. An undetermined number of future projects that alter the California tiger salamander aquatic habitat, however, could go forward without a Federal nexus. Activities that would potentially affect this listed amphibian iuclude development associated with urban, water, flood control, highway/roadway and utility projects, application of herbicides/pesticides, conversion to agricultural use, and indirect effects of adjacent development such as urban run-off altering the hydrologic regime.

Numerous non-Federal activities continue to negatively affect the California tiger salamander in Solano County. Habitats are lost or degraded as a result of road and utility construction and

maintenance, overgrazing, agricultural expansion, and water irrigation and storage projects that may not be funded, permitted, or constructed by a Federal agency. Other threats include contamination, poisoning, increased predation, and competition from non-native species associated with human development. Small private actions that may impact listed species, such as conversion of land, small mammal population control, mosquito control, and residential development, may occur without consultation with or authorization by the Service or the California Department of Fish and Game pursuant to their respectively Endangered Species Act.

Cattle-grazing is a common land use practice in rural Solano County. Overgrazing results in degradation and loss of riparian vegetation, increased water temperatures, streambank and upland erosion, and decreased water quality in streams. Livestock operations also degrade water quality with pesticides and nutrient contamination. However, light to moderate livestock grazing is generally thought to be compatible with continued successful use of rangelands by the tiger salamander, provided the grazed areas do not also have intensive burrowing rodent control efforts (T. Jones, in litt. 1993; Shaffer *et al.* 1993, Shaffer and Trenham, personal communication with the Service, 2003). The shorter vegetation associated with grazed areas may make the habitat more suitable for ground squirrels whose burrows are utilized by tiger salamanders.

Agricultural development, impoundments, and irrigation can alter vernal pool hydrology, resulting in the loss of aquatic breeding habitat for tiger salamanders. Discing is a common practice on agricultural lands which can result in substantial losses of upland habitat for tiger salamanders. Significant conversion of rural, undeveloped land to agricultural land, particularly vineyards, is currently occurring in Solano County, resulting in loss of upland habitat for listed species.

The proposed Jepson Parkway Project, is a four-lane parkway designed to provide intra-county mobility for Solano residents, generally located north and west of Travis AFB. The project upgrades and links a series of narrow local roads to provide a north-south travel route, and would connect the Interstate-80/Leisure Town Road interchange in Vacaville with State Route 12 in Suisun City (Solano County Transportation Agency, 2000). Within the County's jurisdiction, current development activities include proposed expansion of the Potrero Hills Landfill and additional wind energy/turbines in the Montezuma Hills Wind Resource Area. Expansion of the Potrero Hill Landfill would affect approximately 245 acre of primarily upland habitat which is inhabited by California tiger salamander.

As urban development continues, it will likely adversely impact upland areas that serve as dispersal and aestivation habitat for tiger salamanders. Continued development and maintenance of roadways to serve expanding urban areas may further fragment and isolate populations of tiger salamanders from other nearby populations and increased road kill due to the construction and use of new roads and increased traffic in the overall region. Increased predation associated with domesticated pets or feral animals generally accompanies urban expansion. As urban development encroaches on rural areas, the need increases for mosquito abatement programs that introduce exotic fish into breeding and non-breeding ponds impact the reproductive success tiger salamanders.

Increased levels of vehicles and increased vehicle speeds could lead to an increased mortality level for the California tiger salamanders. The cumulative local development will result in temporary and permanent habitat fragmentation. The results of fragmentation are inhibition of genetic exchange between populations and impediments to recolonization of habitats from which populations have been extirpated. Small, isolated populations are substantially more vulnerable to stochastic events (e.g., aberrant weather patterns, fluctuations in availability of food) and may exhibit reduced adaptability to environmental (natural or anthropogenic) changes.

The State Highway 12 corridor in the Fairfield-Suisun-Rio Vista area has experienced rapid growth over the last several decades. The Association of Bay Area Governments (ABAG) anticipates continued growth in Solano County and expects the County to lead the Bay Area in percentage growth of both population and jobs through 2020. The California Department of Finance projects that Solano County's population will increase from 399,000 in 2000, to 564,900 by 2020, with most growth occurring within the County's three largest cities, Vallejo, Fairfield, and Vacaville. Rio Vista, while still a relatively small community, has led Solano County growth (on terms of percentage growth rate) for the last few years (SCWA 2007). Increased demand for housing will likely result in loss of suitable habitat for the California tiger salamander as housing developments replace agricultural and ranch lands. Increased urbanization in the region will contribute to the degradation of water quality in streams, altered flow regimes, increased contaminated road runoff, loss of upland habitat, and increased human presence in natural areas.

Cumulative effects to the California tiger salamander include continuing and future conversion of suitable breeding, foraging, sheltering, and dispersal habitat resulting from urban development. Additional urbanization can result in road widening and increased traffic on roads that bisect habitat, thereby increasing road-kill while reducing in size and further fragmenting remaining habitats. California tiger salamanders likely are exposed to a variety of pesticides and other chemicals throughout their ranges. This amphibian species could also die from starvation due to the loss of their prey base. Hydrocarbon and other contamination from oil production and road runoff; the application of numerous chemicals for roadside maintenance; urban/suburban landscape maintenance; and rodent and vector control programs may all have negative effects on tiger salamander populations. In addition, tiger salamanders may be harmed through increased road kill due to the construction and use of new roads and increased traffic in the overall region and collection by amphibian enthusiast and others.

Further habitat fragmentation; additional non-native species introduction; and increased access to aquatic habitat could facilitate or increase the spread of amphibian diseases within the range of the California tiger salamander. The global mass extinction of amphibians primarily due to chytrid fungus continues to be of significant concern (Norris 2007; Skerratt *et al* 2007).

The global average temperature has risen by approximately 0.6 degrees Celsius during the 20th Century (IFPC 2001, 2007; Adger *et al* 2007). There is an international scientific cousensus that most of the warming observed has been caused by human activities (IFPC 2001, 2007; Adger *et al.* 2007), and that it is "very likely" that it is largely due to manmade emissions of carbon dioxide and other greenhouse gases (Adger *et al.* 2007). Ongoing climate change (Anonymous 2007; Inkley *et al.* 2004; Adger *et al.* 2007; Kanter 2007) likely imperils the

California tiger salamander, and the resources necessary for their survival. Since climate change threatens to disrupt annual weather patterns, it may result in a loss of their habitats and/or prey, and/or increased numbers of their predators, parasites, and diseases. Where populations are isolated, a changing climate may result in local extinction, with range shifts precluded by lack of habitat.

The Solano County Water Agency, in cooperation with the cities of Fairfield, Suisun, Rio Vista and several other applicants are currently preparing the Solano Multispecies HCP pursuant to section 10(a)(1)(B) of the Act that is expected to address the effects of land uses and associated conservation activities in this area on listed species (SCWA 2007). This HCP anticipates that actual development will be substantially reduced from the potential 1,000 acres of zoned development land in Fairfield and Suisun (SCWA 2007).

Conclusion

Analytical Framework for the Jeopardy/No Jeopardy Determination

The following analysis relies on four components to support the jeopardy/no jeopardy determination for the species that may be affected by the proposed project: 1) the *Status of the Species*, which evaluates the species' range-wide condition, the factors responsible for that condition, and its survival and recovery needs; 2) the *Environmental Baseline*, which evaluates the condition of the species in the action area, the factors responsible for that condition, and the role of the action area in the species' survival and recovery; 3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the species; and 4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the species.

In accordance with the implementing regulations for section 7 and Service policy, the jeopardy/no jeopardy determination is made in the following manner: the effects of the proposed Federal action are evaluated with the aggregate effects of everything that has led to the species' current status and, for non-Federal activities in the action area, those actions likely to affect the species in the future, to determine if, given the aggregate of all of these effects, implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild.

The following analysis places an emphasis on using the range-wide survival and recovery needs of the species and the role of the action area in meeting those needs as the context for evaluating the effects of the proposed Federal action combined with other relevant effects. In short, a non-jeopardy determination is warranted if the proposed action is consistent with maintaining the role of habitat and the species population in the action area for the survival and recovery of the species.

After reviewing the current status of the salamander, the environmental baselines for the action area covered by this biological opinion, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the proposed project, as proposed, is not likely

to jeopardize the continued existence of this species. The proposed project is not likely to destroy or adversely modify designated critical habitat for the salamander because no critical habitat for this species has been designated or proposed within the action area of the proposed project.

After reviewing the current status of the California tiger salamander, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the PG&E Vaca Dixon – Birds Landing 230 kV Reconductoring project, as proposed, is not likely to jeopardize the continued existence of this listed species. The proposed project is not located within designated critical habitat for the salamander; therefore, critical habitat for this species will not be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by the Corps so they become binding conditions of project authorization for the exemption under 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity that is covered by this incidental take statement. If the Corps (1) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of 7(o)(2) may lapse.

Amount or Extent of Take

The Service expects that incidental take of the salamander may occur as a result of this project. The extent of the take will be difficult to detect or quantify because of the ecology and biology of this species. Additionally, their size and cryptic nature makes the finding of a dead specimen unlikely. Seasonal population fluctuations also may mask the ability to determine the exact extent of take. Due to the difficulty in quantifying the number of tiger salamanders that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as the number of acres of upland tiger salamander habitat that will become temporarily unsuitable for tiger salamanders due to direct or indirect effects as a result of the action. Therefore, the

Service estimates that the proposed action will result in the take of all salamanders inhabiting or utilizing the temporarily affected 40.21 acres of appropriate upland habitat identified in the action area. Upon implementation of the following reasonable and prudent measures, incidental take associated with the proposed project on the salamander, in the form of harm, harassment, injury, or mortality from habitat loss or degradation will become exempt from the prohibitions described under section 9 of the Act.

Effect of the Take

The Service has determined that the level of take anticipated in this biological opinion is not likely to result in jeopardy to the California tiger salamander or result in destruction or adverse modification of critical habitat.

Reasonable and Prudent Measures

The following reasonable and prudent measures are necessary and appropriate to minimize the effects of the proposed project on the California tiger salamander (salamander):

1. The effects to the salamander resulting from habitat modification and habitat loss shall be minimized.

2. The effects to the salamander from project construction shall be minimized.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the project applicant must ensure that the proposed project complies with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The following terms and conditions implement Reasonable and Prudent Measure numbers one (1) and two (2):

    a. The project proponents shall minimize the potential for harm, harassment, or killing of federally listed species resulting from project related activities by implementation of the conservation measures as described in the Biological Assessment, and appearing in the Project Description of this biological opinion.

    b. The project proponent shall designate a Superintendent or other designee who will be responsible for implementing the conservation measures and Terms and Conditions of this biological opinion and shall be the point of contact for the project. The Superintendent shall maintain a copy of this biological opinion onsite whenever construction is taking place. Their name and telephone number shall be provided to the Service at least thirty (30) calendar days prior to groundbreaking at the project. Prior to ground disturbance, the Superintendent

must submit a letter to the Service verifying that they posses a copy of this biological opinion and have read and understand the Terms and Conditions.

c. Prior to the initiation of ground disturbance on each individual project site, pre-construction surveys shall be conducted by a Service-approved biologist(s) for the salamander. These surveys shall consist of walking surveys of the project site and adjacent areas accessible to the public to determine presence of the species. Salamanders will be removed by the biologist(s) and translocated under the direction and authorization of the Service

d. All salamanders captured on the project site during monitoring and inspections conducted during construction shall be removed by a Service-approved biologist(s) and translocated under the direction and authorization of the Service.

e. To prevent inadvertent entrapment of salamanders during construction, all excavated, steep-walled holes or trenches more than 2 feet deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they must be thoroughly inspected for trapped animals. If at any time a trapped listed animal is discovered, the Service-approved biologist(s) should immediately place escape ramps or other appropriate structures to allow the animal to escape, or the Service and/or California Department of Fish and Game shall be contacted by telephone for guidance. The Service shall be notified of the incident by telephone and electronic mail within one (1) working day.

f. If requested, before, during, or upon completion of ground breaking and/or construction activities, the project proponents shall allow access by Service and/or California Department of Fisb and Game personnel to the project site to inspect project effects to the salamander and associated habitats.

g. The project proponents shall immediately report to the Service by electronic mail and telephone any information about take or suspected take of listed wildlife species not authorized in this biological opinion. The applicant must notify the Service via electronic mail and telephone within twenty-four (24) hours of receiving such information. Notification must include the date, time, location of the incident or of the finding of a dead or injured animal, and photographs of the specific animal. The individual animal shall be preserved, as appropriate, and held in a secure location until instructions are received from the Service regarding the disposition of the specimen or the Service takes custody of the specimen. The Service contacts are the Deputy Assistant Field Supervisor, Endangered Species Program, Sacramento Fish and Wildlife Office at (916) 414-6600, and the Resident Agent-in-Charge of the Service's Law Enforcement Division at (916) 414-6660.

h. The project applicant shall provide proof of purchase (i.e., payment receipts) of habitat preservation credits for the salamander to the Service prior to the commencement of ground-disturbing activities.

i. The project applicant shall complete the reporting requirements below.

Reporting Requirements

The Corps must require the applicant to report to the Service immediately any information about take or suspected take of federally-listed species not authorized in this opinion. The Sacramento Fish and Wildlife Office is to be notified within one working day of the finding of any dead federally-listed species or any unanticipated harm to the species addressed in this biological opinion. The Service contact person for this is the Chief of Endangered Species Division (Central Valley) at (916) 414-6600 and the Resident Agent-in-Charge of the Service's Law Enforcement Division at (916) 414-6660. Any contractor or employee who during routine operations and maintenance activities inadvertently kills or injures a listed wildlife species must immediately report the incident to their representative superintendent or biologist. This representative superintendent or biologist must contact the California Department of Fish and Game immediately in the case of a dead or injured listed species. The California Department of Fish and Game contact for immediate assistance is State Dispatch at (916) 445-0045.

Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities that can be implemented to further the purposes of the Act, such as preservation of endangered species habitat, implementation of recovery actions, or development of information and data bases.

1. The Corps should work with the Service to address significant, unavoidable environmental impacts to federally-listed species approved by local agencies.

2. The Corps should assist the Service in the implementation of recovery efforts for listed species.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION–CLOSING STATEMENT

This concludes formal consultation on the proposed PG&E Vaca Dixon – Birds Landing 230 kV Reconductoring project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Please contact Michelle Tovar or the Sacramento Valley Branch Chief of my staff at (916) 414-6645 if you have questions regarding the proposed PG&E Vaca Dixon – Birds Landing 230 kV Reconductoring Project.

Sincerely,

Peter A. Cross

for Kenneth D. Sanchez
Acting Field Supervisor

cc:
Michael Gunby, PG&E, San Ramon, California
Lynne Hosley, CH2MHILL, Oakland, California
Amna Hawatky, RWQCB, Sacramento, California