APPENDIX BR-1A
BIOLOGICAL TECHNICAL REPORT FOR THE PROPOSED PROJECT

Biological Technical Report

Sloughhouse Solar Farm Project

JUNE 2022

Prepared for:

SLOUGHHOUSE SOLAR, LLC
1166 Avenue of the Americas, 9th Floor
New York, New York 10036

Prepared by:

DUDEK

1102 R. Street
Sacramento, California 95811
Contact: David Hochart and Morgan Kennedy

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
AOL	Adjacent Other Lands
AMM	avoidance and minimization measure
amsl	above mean sea level
ARD	Aquatic Resource Delineation
BAGEPA	Bald and Golden Eagle Protection Act
BCC	Bird of Conservation Concern
BTR	Biological Technical Report
BUOW	burrowing owl
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CEQA	California Environmental Quality Act
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRPR	California Rare Plant Rank
CTS	California tiger salamander
CWA	Clean Water Act
DBH	diameter at breast height
DCH	Designated Critical Habitat
DPS	distinct population segment
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
FESA	Federal Endangered Species Act
MBTA	Migratory Bird Treaty Act
MM	mitigation measure
NOP	Notice of Preparation
NWW	Non-Wetland Waters
OHWM	ordinary high water mark
OWCA	Oak Woodlands Conservation Act
Porter-Cologne Act	Porter-Cologne Water Quality Control Act
Project	Sloughhouse Solar Farm Project
PSA	Project Study Area
PRC	California Public Resources Code
Quad	Quadrangle
RWQCB	Regional Water Quality Control Board
SDA	Solar Development Area
SSC	species of special concern
SSHCP	South Sacramento Habitat Conservation Plan

Acronym/Abbreviation	Definition
SWHA	Swainson's hawk
SWRCB	State Water Resources Control Board
TRBL	tricolored blackbird
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VELB	valley elderberry longhorn beetle
WEAP	Worker Environmental Awareness Program
WST	western spadefoot toad

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Executive Summary

Sloughhouse Solar, LLC is proposing construction and operation of the Sloughhouse Solar Farm Project (Project), a solar photovoltaic energy-generating facility adjacent to an existing solar energy facility located in the Sloughhouse community of Sacramento County, California. A Project Study Area (PSA) of 732.26 acres was evaluated for this Biological Technical Report (BTR). The PSA comprises the Project solar development area (378.17 acres), plus the remaining areas outside of the solar development area, which will be referred to herein as "adjacent other lands" (354.09 acres). The purpose of evaluating resources within the PSA was to site an area for proposed solar development that would avoid biological and aquatic resources to the maximum extent feasible. This BTR uses the original site plan dated December 16, 2020 to assess location and potential impacts to biological and aquatic within the solar development area (BW 2020).

Sloughhouse Solar, LLC has contracted Dudek to prepare this BTR to provide an overview of biological and aquatic resources within the PSA and to identify any regulatory constraints and applicable avoidance and minimization measures and mitigation related to these resources. This BTR provides support for lead and responsible agency analyses, determinations, and findings pursuant to the California Environmental Quality Act, and preliminary impact evaluation and mitigation planning for state and federal permitting, as needed. This BTR includes a description of the Project; methods used to assess biological and aquatic resources, including analysis of a literature and database review; compiled field surveys; results of the assessment of biological and aquatic resources; resource impact assessments; and recommended avoidance and minimization measures and/or mitigation to reduce potential impacts. The resource evaluations presented herein refer to all resources occurring or with the potential to occur in the PSA and vicinity (i.e., up to 5 miles from the PSA), apart from Section 5, Summary of Solar Development Area Resources, and Section 6, Resources Impact Assessment of the Solar Development Area, which are explicit to only resources within the solar development area of the PSA (i.e., excludes adjacent other lands).

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1 Introduction

1.1 Purpose

Dudek has prepared this Biological Resources Report (BTR) for the Sloughhouse Solar Farm Project (Project). The purpose of this BTR is to provide a complete overview of biological and aquatic resources within the Project Study Area (PSA) and to identify any regulatory constraints in relation to these resources. In addition, this BTR provides support for lead and responsible agency analyses, determinations, and findings pursuant to the California Environmental Quality Act (CEQA) and supports impact determination and mitigation planning for state and federal permitting, as needed. This BTR includes a description of the Project; methods used to assess biological and aquatic resources, including analysis of a literature and database review; compiled field surveys; results of the assessment of biological and aquatic resources; resource impact assessments; and recommended avoidance and minimization measures (AMMs) and/or mitigation to reduce potential impacts.

1.2 Project Description

The Project is a solar photovoltaic energy-generating facility located on the southwest corner of Meiss Road and Dillard Road, adjacent to an existing solar energy facility (i.e., Dillard Road Solar Power Facility) located at 7794 Dillard Road, Sacramento County, California. The Project is proposed to be developed by Sloughhouse Solar, LLC to sell its electricity and all renewable and environmental attributes to the Sacramento Municipal Utility District under long-term contracts to help meet California's Renewables Portfolio Standard goals. The Project would construct, operate, and decommission a solar generation and energy storage facility within a solar development area of approximately 378.17 acres (the solar development area, or the limits of disturbance, is inclusive of solar fields, energy storage, substation[s], roads, retention basins, etc.). The Project may also include additional auxiliary facilities such as raw water/fire water storage, treated water storage, stormwater retention basins, water filtration buildings and equipment, equipment control buildings, septic system(s), and parking within the solar development area. The design and construction of the buildings, solar arrays (panels, etc.), energy storage facilities, and auxiliary facilities will be consistent with Sacramento County building standards.

1.3 Project Location

The approximately 732.26-acre PSA is located at the southwest corner of the intersection of Meiss Road and Dillard Road in Sloughhouse, an unincorporated area in eastern Sacramento County (Figure 1, Project Location). The southeast portion of the PSA is comprised of an existing solar facility (Dillard Road Solar Power Facility). The remainder of the PSA is comprised of a ponded area in the southwest corner and vacant lands used for cattle ranching. The PSA is surrounded by rural residences, specifically Simpson Ranch to the south, a caviar aquaculture farm to the north, orchards and a turkey farm to the east, and the Consumes River to the west. The PSA can be accessed from gates off both Dillard Road and Meiss Road (Figure 2, Project Setting).

- County – Sacramento
- Public Land Survey System – Cosumnes Land Grant
- U.S. Geological Survey (USGS) 7.5-Minute Quadrangle (Quad) – Sloughhouse
- Latitude, Longitude (decimal degrees) – 38.473731, −121.184568 (Centroid)
- Assessor Parcel Numbers – 12601100010000, 12601100030000
- Elevation Range/Average – 95 to 160 feet above mean sea level (amsl)/128 feet amsl
- PSA – 732.26 acres

2 Regulatory Setting

2.1 Federal

2.1.1 Clean Water Act: Section 404

Pursuant to Section 404 of the Clean Water Act (CWA), the U.S. Army Corps of Engineers (USACE) regulates the discharge of dredged and/or fill material into waters of the United States (U.S). Activities in wetlands or waters for which a USACE permit may be required include the placement of fill material due to development, land clearing involving relocation of soil, road construction, erosion control, mining, stockpiling excavation spoils, and utility line or pipeline construction. Activities that generally do not involve a regulated discharge (if performed specifically in a manner to avoid an impact) can include, to an extent, certain drainage channel maintenance activities involving the use of hand tools only or by positioning construction equipment outside of USACE jurisdiction and excavating without stockpiling in jurisdictional areas. Any person or public agency proposing to discharge dredged or fill material into waters of the U.S., including jurisdictional wetlands, must obtain a Section 404 permit from USACE.

The wetlands determination process is initiated by submitting either an Approved Jurisdictional Determination or a Preliminary Jurisdiction Determination request along with an Aquatic Resources Delineation (ARD) Report to determine if USACE-jurisdictional wetlands or other waters are present on the subject property. The wetland determination process is complete with the issuance of a written geographic jurisdictional determination verification from USACE. Compliance is required with Section 404 of the CWA if a project activity will affect verified waters of the U.S., including wetlands. The most common permits issued by the USACE Regulatory Program are Nationwide Permits, intended for those projects with minimal environmental impacts, and Individual Permits, intended for those projects that are more impactive to environmental resources.

The definition of waters of the U.S. establishes the geographic scope for jurisdiction under Section 404 of the CWA; however, the CWA does not specifically define waters of the U.S., leaving the definition open to statutory interpretation and agency rulemaking. On November 18, 2021, the U.S. Environmental Protection Agency (EPA) and USACE announced the signing of a proposed rule revising the current definition of waters of the U.S. This proposed rule obviates much of the 2020 Navigable Waters Protection Rule implemented during the Trump administration and restores the regulations in effect prior to the Obama Administration's 2015 Clean Water Rule. Moving forward, USACE and EPA propose to reinstate the pre-2015 definition of waters of the U.S. along with updates to reflect consideration of two notable Supreme Court decisions described in more detail below.

Rapanos v. United States and *Carabell v. United States*

In 2007 and again in 2008, USACE and EPA developed guidance for implementing the definition of waters of the U.S. under the CWA following the *Rapanos v. United States* and *Carabell v. United States* Supreme Court decision (EPA 2008). In accordance with both the original and revised guidance, jurisdiction over these waters are as follows:

- Traditional navigable waters
- Wetlands adjacent to traditional navigable waters

- Non-navigable tributaries of traditional navigable waters that are relatively permanent (i.e., the tributaries typically flow year-round or have continuous flow at least seasonally)
- Wetlands that directly abut such tributaries

USACE and EPA decide jurisdiction over the following waters based on a fact-specific analysis to determine whether they have a significant nexus with a traditional navigable water:

- Non-navigable tributaries that do not typically flow year-round or have continuous flow at least seasonally (i.e., ephemeral stream channels)
- Wetlands adjacent to such tributaries
- Wetlands adjacent to but that do not directly abut a relatively permanent non-navigable tributary

USACE and EPA apply a significant nexus evaluation to potential waters of the U.S. as follows:

- A significant nexus analysis assesses the flow characteristics and functions of the tributary itself and the functions performed by all wetlands adjacent to the tributary to determine if in combination they significantly affect the chemical, physical, and biological integrity of downstream traditional navigable waters
- Significant nexus includes consideration of hydrologic and ecologic factors including, but not limited to, volume, duration, and the frequency of surface water flow in the resource and its proximity to a traditional navigable water, and the functions performed by the resource on adjacent wetlands.

Solid Waste Agency of Northern Cook County v. USACE

In 2001 and again in 2003, the agencies developed guidance to address the above definition of waters of the U.S. under the CWA following the *Solid Waste Agency of Northern Cook County v. USACE* U.S. Supreme Court decision that "isolated, non-navigable, intrastate" waters could not be claimed as jurisdictional by USACE based on their use by migratory birds (EPA 2000). Although the Supreme Court did not specifically address the meaning of the word "isolated," it upheld the above definition of "adjacent" wetlands (and other waters), which are by definition wetlands that are "bordering, contiguous, or neighboring" other jurisdictional waters. Therefore, the term "isolated wetland" has implicitly been defined as wetlands that are not bordering, contiguous, or neighboring other waters. The 2001 decision did not, however, define the term "adjacent," nor did it state whether the basis for adjacency is geographic proximity or hydrology. As established by the Supreme Court in *United States v. Riverside Bayview Homes Inc.* in 1985, "wetlands separated from other waters by man-made dikes or barriers, natural river berms, beach dunes, and the like are 'adjacent wetlands.'"

Current (Proposed) Definition of Waters of the U.S., Including Wetlands

As currently proposed by USACE and EPA, the term waters of the U.S. include the following (86 Code of Federal Regulations [CFR] 69372-69450):

1. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

2. All interstate waters including interstate wetlands;

3. "Other Waters" that meet either the "Relatively Permanent Standard" or the "Significant Nexus Standard." All Other Waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce including any such waters:

    a. Which are or could be used by interstate or foreign travelers for recreational or other purposes; or

    b. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

    c. Which are used or could be used for industrial purposes by industries in interstate commerce;

4. All impoundments, and wetlands adjacent to impoundments, that meet either the Relatively Permanent Standard or the Significant Nexus Standard;

5. Tributaries of waters;

6. The territorial seas; and

7. Wetlands adjacent to waters (other than waters that are themselves wetlands), and waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not waters of the U.S.

The Relatively Permanent Standard refers to waters that are relatively permanent, standing, or continuously flowing, and waters with a continuous surface connection to such waters. The Significant Nexus Standard refers to waters that either alone, or in combination with similarly situated waters in the region, significantly affect the chemical, physical, or biological integrity of traditional navigable waters, interstate waters, or the territorial seas (86 CFR 69372-69450).

Wetlands are "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3). USACE predominantly relies on the *U.S. Army Corps of Engineers Wetlands Delineation Manual* (USACE 1987), and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region – Version 2.0* (USACE 2008a) methodology to determine the presence of jurisdictional wetlands in California. USACE relies on the presence of three criteria to determine if an area is a wetland: hydrophytic vegetation, hydric soils, and hydrology. Hydrophytic vegetation refers to a

predominance of plant life that is adapted to life in wet conditions. Hydric soils refer to soils that saturate, flood, or pond long enough during the growing season to develop anaerobic conditions in the upper part. Hydrology refers to the presence of water, either above the soil surface or within the upper 12 to 18 inches of the soil profile just below the soil surface (USACE 1987).

For linear, non-wetland waters of the U.S. (e.g., perennial, intermittent, or ephemeral drainages), the lateral limits of USACE jurisdiction extend to the reliable ordinary high water mark (OHWM). As defined in the CFR Title 33, Section 328.3(e), the OHWM is "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas." If wetlands are present adjacent to such resources and they meet the Relatively Permanent Standard or the Significant Nexus Standard, then jurisdiction would likely extend to the limit of these wetlands (86 CFR 69372-69450). Further guidance for determining jurisdictional limits in Washington is detailed in USACE's *A Field Guide to the Identification of the Ordinary High Water Mark (OWHM) in the Arid West Region of the Western United States* (USACE 2008b).

2.1.2 Clean Water Act: Section 401

Section 401 of the CWA provides states and authorized tribes with a valuable tool to help protect the water quality of federally regulated waters within their borders (i.e., waters of the state), in collaboration with federal agencies.

On June 1, 2020, the EPA finalized the 2020 CWA Section 401 Certification Rule (i.e., the 2020 Rule). The 2020 rule became effective on September 11, 2020. The 2020 Rule was vacated on October 21, 2021, and the vacatur was stayed on April 6, 2022, so the 2020 Rule is currently in effect (EPA 2022).

As such, the EPA's regulations at 40 CFR 121 address CWA Section 401 certification generally. Under Section 401 of the CWA, a federal agency may not issue a permit or license to conduct any activity that may result in any discharge into waters of the U.S. unless a CWA Section 401 water quality certification is issued, or certification is waived. States and authorized tribes where the discharge would originate are generally responsible for issuing water quality certifications. In cases where a state or tribe does not have authority, EPA is responsible for issuing certification. In making decisions to grant, grant with conditions, or deny certification requests, certifying authorities consider whether the federally licensed or permitted activity will comply with applicable water quality standards, effluent limitations, new source performance standards, toxic pollutants restrictions, and other appropriate water quality requirements of state or tribal law. A federal agency may not issue a license or permit for an activity that may result in a discharge into waters of the U.S. without a water quality certification or waiver (EPA 2022).

Implementation in California

The California State Water Resources Control Board (SWRCB) has authority over waters of the state, including wetlands, through Section 401 of the CWA, the Porter-Cologne Water Quality Control Act (Porter-Cologne Act), California Code of Regulations Section 3831(k), and the California Wetlands Conservation Policy. The CWA requires that an applicant for a Section 404 permit (to discharge dredge or fill material into waters of the U.S.) first obtain certification from the appropriate state agency stating that the fill is consistent with the state's water quality standards and criteria. In California, the authority to either grant certification or waive the requirement for permits is delegated by the SWRCB to the nine regional boards. The Central Valley Regional Water Quality Control Board

(RWQCB) has authority for Section 401 compliance in the Project region. A request for Water Quality Certification is submitted to the RWQCB while an application is filed with USACE (EPA 2022).

2.1.3 Federal Endangered Species Act

The Federal Endangered Species Act (FESA) of 1973, as amended (16 USC 1531 et seq.), serves as the enacting legislation to list, conserve, and protect threatened and endangered species, and the ecosystems on which they depend, from extinction. In addition, for those wildlife species listed as federally endangered, FESA provides for the ability to designate critical habitat, defined as that habitat considered "essential to the conservation of the species" and that "may require special management considerations or protection."

Under FESA Section 7, if a project that would potentially result in adverse impacts to threatened or endangered species includes any action that is authorized, funded, or carried out by a federal agency, that agency must consult with the U.S. Fish and Wildlife Service (USFWS) to ensure that any such action is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat for that species. FESA Section 9(a)(1)(B) prohibits the taking, possession, sale, or transport of any endangered fish or wildlife species. "Take" is defined to mean "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 USC 1532[19]). With respect to any endangered species of plant, Sections 9(a)(2)(A) and 9(a)(2)(B) prohibit the possession, sale, and import or export, of any such species, and prohibits any action that would "remove and reduce to possession any such species from areas under federal jurisdiction; maliciously damage or destroy any such species on any such area; or remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any law or regulation of any State or in the course of any violation of a State criminal trespass law." Pursuant to FESA Section 10(a)(1)(B), USFWS may issue a permit for the take of threatened or endangered species if such taking is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity" (USFWS 2020a).

2.1.4 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) regulates or prohibits taking, killing, possession of, or harm to migratory bird species listed in Title 50, Section 10.13 of the CFR. The MBTA is an international treaty for the conservation and management of bird species that migrate through more than one country and is enforced in the United States by USFWS. Hunting of specific migratory game birds is permitted under the regulations listed in Title 50, Section 20 of the CFR. The MBTA was amended in 1972 to include protection for migratory birds of prey (raptors) (USFWS 2021a).

2.1.5 Bald and Gold Eagle Protection Act

The Bald and Golden Eagle Protection Act (BAGEPA) (16 USC 668 et seq.) provides for the protection of both bald and golden eagles. Specifically, BAGEPA prohibits take of eagles, which is defined as any action that would "pursue, destroy, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb" bald and golden eagles, including parts, nests, or eggs. The term "disturb" is further defined by regulation as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, injury to an eagle, a decrease in productivity, or nest abandonment" (50 CFR 22.3). Under BAGEPA, it is also illegal to "sell, purchase, barter, trade, import, or export, or offer for sale, purchase, barter, or trade, at any time or in any manner, any bald eagle or any golden eagle, or the parts, nests, or eggs" of these birds. Pursuant to 50 CFR 22.26, and as of the latest amendment to BAGEPA in December 2016, a permit may be obtained that authorizes take of bald eagles and golden eagles where the take

is “compatible with the preservation of the bald eagle and the golden eagle; is necessary to protect an interest in a particular locality; is associated with, but not the purpose of, the activity; and cannot practicably be avoided” (USFWS 2021b).

2.2 State of California

2.2.1 California Department of Fish and Game Code

Divisions of the California Fish and Game Code (CFGC) establish the basis of fish, wildlife, and native plant protections and management in the state.

2.2.1.1 California Endangered Species Act

Under the California Endangered Species Act (CESA), the California Department of Fish and Wildlife (CDFW) has the responsibility of maintaining a list of threatened and endangered species. CESA prohibits the take of state-listed threatened or endangered animals and plants unless otherwise permitted pursuant to CESA. “Take” under CESA is defined as any of the following: “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill” (CFGC Section 86). Species determined by the state to be candidates for listing as threatened or endangered are treated as if listed as threatened or endangered and are, therefore, protected from take. Pursuant to CESA, a state agency reviewing a project within its jurisdiction must determine whether any state-listed endangered or threatened species, or candidate species, could be potentially impacted by that project (CDFW 2021a).

2.2.1.2 California Oak Woodlands Conservation Act and Oak Protection

The 2005 CFGC Sections 1360–1372 outline the terms and conditions comprising the California Oak Woodlands Conservation Act (OWCA) (CLI 2016). An oak woodland is defined as an oak stand with greater than 10% canopy cover, or that may have historically supported greater than 10% canopy cover. The overall purpose of the OWCA is to provide funding for the conservation and protection of California’s oak woodlands. In addition, the OWCA is designed to support and encourage voluntary, long-term private stewardship and conservation of California’s oak woodlands by offering landowners financial incentives to protect and promote biologically functional oak woodlands over time, as mandated by the Wildlife Conservation Board. The Wildlife Conservation Board has established programs, including the California Oak Woodlands Conservation Program, to protect and restore oak woodlands. The OWCA encourages and defers to local jurisdictions to develop and implement oak conservations plans developed under the OWCA (WCB 2021).

Furthermore, the California Public Resources Code (PRC) Section 21083.4 defines an oak as a native tree species in the genus *Quercus*, not designated as commercial species (i.e., Groups A and B) pursuant to regulations adopted by the State of California Board of Forestry and Fire Protection (i.e., Section 4526), that is 5 inches or more in diameter at breast height (DBH) (i.e., diameter of a tree measured 4.5 feet above natural grade). In addition, the PRC defines a 10% canopy cover stipulation that pertains to an individual stand of vegetation, and not all oaks within an entire project site. PRC 21083.4 does not apply to oak woodlands dominated by black oak (*Quercus kelloggii*). As part of the determination made pursuant to PRC Section 21080.1, it is the responsibility of a county to determine if a project under its jurisdiction would result in a significant effect on the environment resulting from a conversion of an oak woodland. When a county determines that a project could result in significant impacts to

oak woodlands, mitigation measures (MMs) are required and may be selected from several mitigation alternatives set forth in PRC Section 21083.4(b).

2.2.1.3 Lake and Streambed Alteration Program

Under Sections 1600–1616 of the CFGC, CDFW regulates activities that would alter the flow, bed, channel, or bank of streams and lakes. The limits of CDFW's jurisdiction are defined in the code as 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." In practice, CDFW usually marks its jurisdictional limit at the top of the stream or bank, or at the outer edge of the riparian vegetation, whichever is wider (CDFW 2021b).

2.2.1.4 Native Plant Protection Act

The Native Plant Protection Act was enacted in 1977 and is administered by CDFW, per CFGC Section 1900 et seq. The Native Plant Protection Act prohibits take of endangered, threatened, or rare plant species native to California, apart from special criteria identified in the CFGC. A "native plant" means a plant growing in a wild uncultivated state that is normally found native to the plant life of the state. A "rare" species can be defined as species that are broadly distributed but never abundant where found, narrowly distributed, or clumped yet abundant where found, and/or narrowly distributed or clumped and not abundant where found. If potential impacts are identified for a project activity, then consultation with CDFW, permitting, and/or other mitigation may be required (CLI 2021).

2.2.1.5 Nesting Migratory Birds and Raptors

Section 3503 of the CFGC states that it is unlawful to take, possess, or needlessly destroy the nests or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto. Section 3503.5 protects all birds of prey (raptors) and their eggs and nests. Section 3511 states that fully protected birds or parts thereof may not be taken or possessed at any time. Section 3513 states that it is unlawful to take or possess any migratory non-game bird as designated in the MBTA.

2.2.1.6 California Fish and Game Code Section 4150

CFGC Section 4150 states a mammal occurring naturally in California that is not a game mammal, fully protected mammal, or fur-bearing mammal is a non-game mammal. A non-game mammal may not be taken or possessed under this code. All bat species occurring naturally in California are considered non-game mammals and are therefore prohibited from take as stated in CFGC Section 4150.

2.2.1.7 California Fish and Game Code Section 1940

Section 1940 of the CFGC requires CDFW to develop and maintain a vegetation mapping standard for the state. More than half of the vegetation communities in the state have been mapped through the Vegetation Classification and Mapping Program.

Natural vegetation communities are evaluated by CDFW and are assigned global (G), and state (S) ranks based on rarity of and threats to these vegetation communities in California. Sensitive natural communities are defined by CDFW as vegetation alliances with state ranks of S1–S3 (S1: critically imperiled, S2: imperiled, S3: vulnerable), as

identified in the 2010 List of Vegetation Alliances and Associations and subsequent updates. Natural communities with ranks of S1–S3 are considered sensitive natural communities to be addressed in the environmental review processes of CEQA and its equivalents. Additionally, all vegetation associations within the alliances with ranks of S1–S3 are considered sensitive habitats. CEQA requires that impacts to sensitive natural communities be evaluated and mitigated to the extent feasible.

Sensitive natural communities are communities that have a limited distribution and are often vulnerable to the environmental effects of projects. These communities may or may not contain special-status species or their habitats. For purposes of this assessment, sensitive natural communities are considered to include vegetation communities listed in CDFW's California Natural Diversity Database (CNDDB) and communities listed in the Natural Communities List with a rarity rank of S1- S3 (CDFW 2021c).

2.2.1.8 Porter-Cologne Water Quality Control Act

As detailed above in Section 2.1.2, Clean Water Act: Section 401, The Porter-Cologne Act, CFGC Sections 1601–1607, delegates responsibility to the SWRCB for water rights and water quality protection and directs the nine statewide RWQCBs to develop and enforce water quality standards within their jurisdiction. The Porter-Cologne Act requires any entity discharging waste, or proposing to discharge waste, within any region that could affect the quality of the waters of the state to file a "report of waste discharge" with the appropriate RWQCB. The appropriate RWQCB then must issue a permit, referred to as a Waste Discharge Requirement. Waste Discharge Requirements implement water quality control plans and take into consideration the beneficial uses to be protected, the water quality objectives reasonably required for that purpose, other waste discharges, and the need to prevent nuisances (SWRCB 2019).

The SWRCB defines a water of the state as "any surface water or groundwater, including saline waters, within the boundaries of the state" (California Water Code Section 13050[e]). As of April 2019, the SWRCB has defined "wetland" to include the following (SWRCB 2019):

1. Natural wetlands,
2. Wetlands created by modification of a surface water of the state,
3. Artificial wetlands that meet any of the following criteria:
    a. Approved by an agency as compensatory mitigation for impacts to other Waters of the State, except where the approving agency explicitly identifies the mitigation as being of limited duration;

    b. Specifically identified in a Water Quality Control Plan as a wetland or other water of the state;

    c. Resulted from historic human activity, is not subject to ongoing operation and maintenance, and has become a relatively permanent part of the natural landscape; or

    d. Greater than or equal to one acre in size unless the artificial wetland was constructed and is currently used and maintained, primarily for one or more of the following purposes: industrial or municipal wastewater treatment or disposal; settling of sediment; detention, retention, infiltration, or treatment of stormwater runoff and other pollutants or runoff subject to regulation under a municipal, construction, or industrial permitting program; treatment of surface waters; agricultural crop irrigation or stock watering; fire suppression; industrial processing or cooling water; active surface mining – even

if the site is managed for interim wetlands functions and values; log storage; treatment, storage, or distribution of recycled water; maximizing groundwater recharge (this does not include wetlands that have incidental groundwater recharge benefits); or fields flooded for rice growing.

All waters of the U.S. are waters of the state. Wetlands, such as isolated seasonal wetlands, that are not generally considered waters of the U.S. are considered waters of the state if, "under normal circumstances, (1) the area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both; (2) the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and (3) the area's vegetation is dominated by hydrophytes or the area lacks vegetation" (SWRCB 2019).

2.2.2 California Environmental Quality Act

CEQA, PRC Section 21000 et seq., requires public agencies undertaking discretionary actions to approve a project to first determine whether a project may have a significant effect on the environment, and then to prepare an environmental impact report if there is substantial evidence that the project may have a significant effect on the environment. Where an environmental impact report has been prepared, CEQA further requires public agencies to adopt findings with respect to each significant effect that "changes or alterations have been required in, or incorporated, into the project which mitigate or avoid the significant effects on the environment; that those changes are within the responsibility and jurisdiction of another public agency and have been, or can and should be, adopted by that other agency; or that specific economic, legal, social, technological, or other considerations, including considerations for the provision of employment opportunities for highly trained workers, make infeasible the mitigation measures or alternatives identified in the environmental impact report" (PRC Section 21081[a]).

The California Natural Resources Agency has adopted regulations (i.e., guidelines) to implement CEQA. Pursuant to CEQA Guidelines Section 15380, protection is provided for federal and/or state-listed species, as well as species not listed federally or by the state that may be considered rare, threatened, or endangered. Species that meet these criteria can include candidate species, species proposed for listing, and species of special concern. Plants listed in the California Native Plant Society (CNPS) Rare Plant Program are considered to meet CEQA's Section 15380 criteria as well. Section 15380 also addresses a potential situation in which a public agency is to review a project that may have a significant effect on, for example a candidate species, which has not yet been listed by USFWS or CDFW. Therefore, CEQA enables an agency to protect a species from significant project impacts until the respective government agencies have had an opportunity to list the species as protected, if warranted. Impacts to these species would therefore be considered significant, requiring mitigation (CDFW 2021d).

2.2.3 California Department of Fish and Wildlife Special Plants

For the purposes of this analysis, special plant species are defined as plants that are legally protected or that are otherwise considered sensitive by federal, state, or local resource conservation agencies. These species fall into one or more of the following categories:

- Listed by the federal government under the FESA of 1973 or the State of California under the CESA of 1970 as endangered, threatened, or rare
- A candidate for federal or state listing as endangered or threatened

- Taxa that are biologically rare, very restricted in distribution, or declining throughout their range but not currently threatened with extirpation
- Population(s) in California that may be peripheral to the major portion of a taxon's range but are threatened with extirpation in California
- Taxa strongly associated with a habitat that is declining in California at a significant rate (e.g., wetlands, riparian, vernal pools, old growth forests, desert aquatic systems, native grasslands, valley shrubland habitats)

Taxa considered to be "rare, threatened, or endangered in California" as defined by CDFW are assigned a California Rare Plant Rank (CRPR). The CDFW system includes six rarity and endangerment ranks for categorizing plant species of concern, as follows:

- CRPR 1A – Plants presumed to be extinct in California
- CRPR 1B – Plants that are rare, threatened, or endangered in California and elsewhere
- CRPR 2A – Plants presumed to be extinct in California, but more common elsewhere
- CRPR 2B – Plants that are rare, threatened, or endangered in California, but more common elsewhere
- CRPR 3 – Plants about which more information is needed (a review list)
- CRPR 4 – Plants of limited distribution (a watch list)

Plants ranked as CRPR 1A, 1B, 2A, or 2B may qualify as endangered, rare, or threatened species within the definition of CEQA Guidelines Section 15380. CDFW recommends that potential impacts to CRPR 1 and 2 species be evaluated in CEQA review documents. In general, CRPR 3 and 4 species do not meet the definition of endangered, rare, or threatened pursuant to CEQA Guidelines Section 15380, but these species may be evaluated on a case-by-case basis (CNPS 2021a).

2.2.4 Other State Tree Protection Regulations

Additional state laws that regulate and/or protect oaks and oak woodlands include the Professional Foresters Law, CEQA, and the Board of Forestry and Fire Protection. The Professional Foresters Law addresses oak habitat evaluations. Both the Professional Foresters Law and CEQA apply to all local jurisdictions. Since it is a state agency, the Board of Forestry and Fire Protection has regulatory authority over all of California's forested landscapes, including the authority to regulate oak woodlands at the state or local level.

2.3 County

2.3.1 Sacramento County General Plan

The Sacramento County General Plan addresses policies to help preserve and restore vegetation, wildlife, biological habitat, and aquatic resources throughout Sacramento County, including ways to ensure that these important

natural resources are given adequate attention in development projects and master planning efforts. Additionally, the Open Space Element of the General Plan describes protection measures and provides a management/acquisition for continued preservation and protection of Sacramento County's natural resource habitats. The sections below provide an overview of General Plan Conservation Elements pertaining to biological and aquatic resources in Sacramento County (Sacramento County 2017).

2.3.1.1 Vegetation and Wildlife Conservation Element

Habitat Protection and Management

Goal: Preserve and manage natural habitats and their ecological functions throughout Sacramento County.

Habitat Mitigation

Objective: Mitigate and restore for natural habitat and special-status species loss.

Policies:

- CO-58. Ensure no net loss of wetlands, riparian woodlands, and oak woodlands.
- CO-59. Ensure mitigation occurs for any loss of or modification to the following types of acreage and habitat function: (1) vernal pools, (2) wetlands, (3) riparian, (4) native vegetative habitat, and (5) special-status species habitat.
- CO-60. Mitigation should be directed to lands identified on the Open Space Vision Diagram and associated component maps.
- CO-61. Mitigation should be consistent with Sacramento County-adopted habitat conservation plans.
- CO-62. Permanently protect land required as mitigation.

Habitat Preserve and Management

Objective: Establish and manage a preserve system with large core and landscape level preserves connected by wildlife corridors throughout Sacramento County to protect ecological functions and species populations.

Policies:

- CO-64. Consistent with overall land use policies, the County shall support and facilitate the creation and biological enhancement of large natural preserves or wildlife refuges by other government entities or by private individuals or organizations.
- CO-65. Create a network of preserves linked by wildlife corridors of sufficient size to facilitate the movement of species.
- CO-66. Mitigation sites shall have a monitoring and management program including an adaptive management component including an established funding mechanism. The programs shall be consistent with Habitat Conservation Plans that have been adopted or are in draft format.

- CO-67. Preserves and conservation areas should have an established funding mechanism, and where needed, an acquisition strategy for its operation and management in perpetuity. This includes existing preserves such as the American River Parkway, Dry Creek Parkway, Cosumnes River Preserve and other plans in progress for riparian areas like Laguna Creek.
- CO-68. Preserves shall be planned and managed to the extent feasible to avoid conflicts with adjacent agricultural activities.
- CO-69. Avoid, to the extent possible, the placement of new major infrastructure through preserves unless located along disturbed areas, such as existing roadways.

Habitat Protection and Project Review

Objective: Review development plans and projects to ensure a balance between essential growth needs and the protection and preservation of natural habitats and special-status species.

Policies:

- CO-70. Community Plans, Specific Plans, Master Plans and development projects shall: 1- include the location, extent, proximity and diversity of existing natural habitats and special-status species in order to determine potential impacts, necessary mitigation and opportunities for preservation and restoration; 2- be reviewed for the potential to identify nondevelopment areas and establish preserves, mitigation banks and restore natural habitats, including those for special-status species, considering effects on vernal pools, groundwater, flooding, and proposed fill or removal of wetland habitat; and 3- be reviewed for applicability of protection zones identified in this Element, including the Floodplain Protection Zone, Stream Corridor Ordinance, Cosumnes River Protection Combining Zone and the Laguna Creek Combining Zone.
- CO-71. Development design shall help protect natural resources by: (1) Minimizing total built development in the floodplain, while designing areas of less frequent use that can support inundation to be permitted in the floodplain; (2) Ensuring development adjacent to stream corridors and vernal pools provide, where physically reasonable, a public street paralleling at least one side of the corridor with vertical curbs, gutters, foot path, street lighting, and post and cable barriers to prevent vehicular entry; (3) Projects adjacent to rivers and streams shall integrate amenities, such as trail connectivity, that will serve as benefits to the community and ecological function; (4) Siting of wetlands near residential and commercial areas should consider appropriate measures to minimize potential for mosquito habitation; and (5) Development adjacent to stream corridors and vernal pools shall be designed in such a manner as to prevent unauthorized vehicular entry into protected areas.
- CO-72. If land within river and stream watersheds in existing agricultural areas is developed for non-agricultural purposes, the County should actively pursue easement dedication for recreation trails within such development as a condition of approval.
- CO-73. Secure easement or fee title to open space lands within stream corridors as a condition of development approval.

- CO-74. Evaluate feasible on-site alternatives early in the planning process and prior to the environmental review process that reduce impacts on wetland and riparian habitat and provide effective on-site preservation in terms of minimum management requirements, effective size, and evaluation criteria.

Special-Status Species and Their Respective Habitats

Goal: Preserve, enhance, and restore special-status species habitat in Sacramento County to aid in the recovery of these species.

Protection of Special-Status Species

Objective: Protect and maintain habitat for special-status species.

Policies:

- CO-75. Maintain viable populations of special-status species through the protection of habitat in preserves and linked with natural wildlife corridors.
- CO-77. Development of open space acquisition programs within natural areas shall consider whether the area is occupied by special-status species.

Manage Lands for Special-Status Species

Objective: Manage and maintain special-status species and their respective habitat in a manner that resolves conflicts with adjacent privately owned-land and agricultural operations.

Policies:

- CO-80. Control human access to sensitive habitat areas on public lands to minimize impact upon and disturbance of special-status species.
- CO-82. Ensure that mosquito control measures have the least effect on non-target species.

2.3.1.2 Aquatic Resources Conservation Element

Vernal Pools

Goal: Preserve and enhance self-sustaining vernal pool habitats.

Vernal Pools Preserves

Objective: Establish vernal pool preserves that enhance and protect the ecological integrity of vernal pool resources.

Policies:

- CO-83. Preserve a representative portion of vernal pool resources across their range by protecting vernal pools on various geologic landforms, vernal pools that vary in depth and size, and vernal pool complexes of varying densities; to maintain the ecological integrity of a vernal pool ecosystem.
- CO-84. Ensure that vernal pool preserves are large enough to protect vernal pool ecosystems that provide intact watersheds and an adequate buffer, have sufficient number and extent of pools to support adequate species populations and a range of vernal pool types.
- CO-85. Utilize proper vernal pool restoration techniques as approved by the USFWS, the CDFW, and the USACE.
- CO-86. Limit land uses within established preserves to activities deemed compatible with maintenance of the vernal pool resource, which may include ranching, grazing, scientific study, and education.

Rivers and Streams

Goal: Preserve, protect, and enhance natural open space functions of riparian, stream, and river corridors.

Riparian Habitat

Objective: Manage riparian corridors to protect natural, recreational, economic, agricultural, and cultural resources as well as water quality, supply, and conveyance.

Policies:

- CO-87. Encourage private landowners to protect, enhance and restore riparian habitat.
- CO-88. Where removal of riparian habitat is necessary for channel maintenance, it will be planned and mitigated to minimize unavoidable impacts upon biological resources.
- CO-89. Protect, enhance, and maintain riparian habitat in Sacramento County.
- CO-90. Increase riparian woodland, valley oak riparian woodland and riparian scrub habitat along select waterways within Sacramento County.
- CO-91. Discourage introductions of invasive non-native aquatic plants and animals.
- CO-92. Enhance and protect shaded riverine aquatic habitat along rivers and streams.

Limitation of Fill in Floodplains

Objective: Maintain the natural character of the 100-year floodplain by limiting fill and excavation.

Policies:

- CO-93. Discourage fill in the 100-year floodplain.

- CO-94. Development within the 100-year floodplain and designated floodway of Sacramento streams, sloughs, creeks, or rivers shall be: 1- Consistent with policies to protect wetlands and riparian areas; and 2- Limited to land uses that can support seasonal inundation.
- CO-95. Development within the 100-year floodplain should occur in concert with the development of the Floodplain Protection Zone.

Bank Stabilization

Objectives: Maintain levee protection, riparian vegetation, function and topographic diversity by stream channel and bank stabilization projects. Stabilize riverbanks to protect levees, water conveyance and riparian functions.

Policies:

- CO-96. Reduce dependence on traditional levee protection methods where those methods conflict with habitat preservation efforts and where alternate methods exist which are compatible with preservation efforts and offer an acceptable level of bank stabilization.
- CO-97. Work with appropriate regulatory agencies to reduce bank and levee erosion by minimizing erosive wake activity generated by recreational and commercial boating.
- CO-98. Coordinate with federal, state, and local agencies overseeing levee and bank stabilization to investigate and, whenever possible, utilize biotechnical or nonstructural alternatives to other conventional stabilization methods.
- CO-99. Encourage habitat restoration and recreational opportunities as an integral part of bank and levee stabilization efforts.
- CO-100. Encourage construction of structures for flood control and stormwater quality purposes using currently approved scientific methods to prevent erosion and stabilize the banks.
- CO-101. Stabilize the banks of rivers and streams in a manner that increases flood protection and increases riparian habitat functions.

Protection of Rivers

Objective: Conserve and protect the Sacramento, Cosumnes, Mokelumne and American Rivers to preserve natural habitat and recreational opportunities.

Policies:

- CO-102. Promote and encourage habitat restoration efforts on and adjacent to our river floodways.
- CO-103. Protect the Cosumnes River Corridor by promoting the preservation of agriculture, natural habitat, and limited recreational uses adjacent to the river channel, and when feasible by acquiring appropriate lands or easements adjacent to the river.

Channel Modifications

Objective: Protect and restore natural stream functions.

Policies:

- CO-105. Channel modification projects shall be considered for approval by the Board of Supervisors only after conducting a noticed public hearing examining the full range of alternatives, relative costs and benefits, and environmental, economic, and social benefits.
- CO-105a. Encourage flood management designs that respect the natural topography and vegetation of waterways while retaining flow and functional integrity.
- CO-106. Realigned or modified channels should retain topographic diversity including maintaining meandering characteristics, varied berm width, naturalized side slope, and varied channel bottom elevation.
- CO-107. Maintain and protect natural function of channels in developed newly developing, and rural areas.
- CO-108. Channel lowering should occur after consideration of alternatives and only when it is necessary to accommodate the gravity drainage of storm runoff and/or accommodate flood flows under existing bridge structures.
- CO-109. Channel modifications should not prevent minimum water flows necessary to protect and enhance fish habitats, native riparian vegetation, water quality, or ground water recharge.
- CO-110. Improvements in watercourses will be designed for low maintenance. Appropriate Manning's "n" 13 values will be used in design of the watercourses to reflect future vegetative growth (including mitigation plantings) associated with the low maintenance concept.
- CO-111. Channel modifications shall retain wetland and riparian vegetation whenever possible or otherwise recreate the natural channel consistent with the historical ecological integrity of the stream or river.
- CO-112. The use of concrete and impervious materials is discouraged where it is inconsistent with the existing adjacent watercourse and overall ecological function of the stream.
- CO-113. Encourage revegetation of native plant species appropriate to natural substrate conditions and avoid introduction of nonindigenous species.

Land Use Adjacent to Rivers and Streams

Objective: Land uses within and development adjacent to stream corridors are to be consistent with natural values.

Policies:

- CO-114. Protect stream corridors to enhance water quality, provide public amenities, maintain flood control objectives, preserve, and enhance habitat, and offer recreational and educational opportunities.
- CO-115. Provide setbacks along stream corridors and stream channels to protect riparian habitat functions. (1) A functional setback of at least 100 feet and measured from the outside edge of the stream bank should be retained on each side of a stream corridor that prohibits development or agricultural activity. This buffer is necessary to protect riparian

functions by allowing for the filtering of sediment, pesticides, phosphorus and nitrogen, organic matter and other contaminates that are known to degrade water quality. This buffer also provides for the protection of vegetation along the stream bank which provides bank stability, erosion control and flood attenuation; (2) A transitional setback of at least 50 feet in width beyond the functional buffer should be retained along all stream corridors. This buffer is necessary to protect hydrogeomorphic functions that regulate water temperature, regulate microclimate, maintain channel complexity, and retain hydrologic flow regimes. This buffer also provides corridors to facilitate the movement of wildlife; (3) An extended setback of at least 50 feet in width beyond the transitional setback should be retained along all stream corridors. This setback will allow for recreational uses such as bike, pedestrian and/or equestrian trails and will allow for the placement of infrastructure such as water and sewer lines; (4) Stormwater discharge ponds or other features used for improving stormwater quality may be located within the extended or transitional setback area. However, to protect stream habitat and floodplain value, the width of the setback shall not be based upon the width of the pollutant discharge pond. The ponds shall be landscaped and maintained with vegetation native to the surrounding area. Detention ponds or other features implementing pollutant discharge requirements, other than approved regional stormwater quality practices that are designed and operated to complement the corridor functionally and aesthetically, are prohibited; (5) Setback averaging within individual development projects or as otherwise specified in a Sacramento County-adopted master plan will be permitted except when riparian woodland will be lost. The minimum width of setbacks cannot fall below 50 feet; and (6) Master drainage plans may provide for other standards that meet the intent of this policy.

- CO-116. Encourage filter strips using appropriate native vegetation and substrate along riparian streambanks adjacent to irrigated croplands.
- CO-117. Public roads, parking, and associated fill slopes shall be located outside of the stream corridor, except at stream crossings and for purposes of extending or setting back levees. The construction of public roads and parking should utilize structural materials to facilitate permeability. Crossings shall be minimized and be aesthetically compatible with naturalistic values of the stream channel.
- CO-118. Development adjacent to waterways should protect the water conveyance of the system, while preserving and enhancing the riparian habitat and its function.

Maintenance of Rivers and Streams

Objective: Properly manage and fund the maintenance of rivers and streams to protect and enhance natural functions.

Policies:

- CO-120. Development projects adjacent to rivers and streams shall provide unencumbered maintenance access.
- CO-121. No grading, clearing, tree cutting, debris disposal or any other despoiling action shall be allowed in rivers and streams except for normal channel maintenance, restoration activities, and road crossings.

- CO-122. River and stream maintenance should allow natural vegetation in and along the channel to assist in removal of nutrients, pollutants, and sediment and to increase bank stabilization, while minimizing impacts on conveyance.
- CO-123. The use of native plant species shall be encouraged on revegetation plans.
- CO-124. Maintain and manage rivers and streams to encourage special-status species.

Restoration of Rivers and Streams

Objective: Restore concrete sections of rivers and streams to increase natural functions

Policies:

- CO-125. Restore concrete sections of rivers and streams to natural or naturalized channels, where feasible for increased flood or conveyance capacity and groundwater recharge.

Fisheries

Goal: Preserve and protect fisheries in the Sacramento County waterways and water bodies.

In-Stream Functions

Objective: Provide and protect high quality in-stream habitat, water quality and water flow to support fisheries propagation, development, and migration.

Policies:

- CO-126. Prohibit obstruction or underground diversion of natural waterways.
- CO-127. Protect, preserve, and restore migratory routes for anadromous species.
- CO-128. Require screens on diversion pumps or similar bypass apparatus to reduce fish mortality. CO-129. Require screening on all public water diversion facilities.
- CO-130. Protect, enhance, and restore riparian, in-channel, and shaded riverine aquatic habitat for: (1) spawning and rearing of fish species, including native and recreational non-native, non-invasive species, where they currently spawn; (2) potential areas where natural spawning could be sustainable; and (3) supporting other aquatic species.

2.3.1.3 Terrestrial Resources Conservation Element

Native Vegetation Protection, Restoration and Enhancement

Objective: Tree and native vegetation management practices to promote regeneration in designated resource conservation areas.

Policies:

- CO-132. Protect native vegetative habitats from improper grazing regimes on public lands and inform private land operators of how they may minimize impacts to these habitats.

- CO-133. Prohibit native vegetative habitat mitigation and/or other public plantings onto incompatible substrates i.e., tree planting in vernal pool hardpan.
- CO-134. Maintain and establish a diversity of native vegetative species in Sacramento County.
- CO-135. Protect the ecological integrity of California Prairie habitat.
- CO-136. Prohibit the loss of mitigated resource areas.
- CO-137. Mitigate for the loss of native trees for road expansion and development consistent with General Plan policies and/or the Sacramento County Tree Preservation Ordinance.

Landmark and Heritage Tree Protection

Objective: Heritage and landmark tree resources preserved and protected for their historic, economic, and environmental functions.

Policies:

- CO-138. Protect and preserve non-oak native trees along riparian areas if used by Swainson's Hawk (SWHA), as well as landmark and native oak trees measuring a minimum of 6 inches in diameter or 10 inches aggregate for multi-trunk trees at 4.5 feet above ground.
- CO-139. Native trees other than oaks, which cannot be protected through development, shall be replaced with in-kind species in accordance with established tree planting specifications, the combined diameter of which shall equal the combined diameter of the trees removed.
- CO-140. For projects involving native oak woodlands, oak savannah, or mixed riparian areas, ensure mitigation through either of the following methods: (1) An adopted habitat conservation plan; (2) Ensure no net loss of canopy area through a combination of the following: A- preserving the main, central portions of consolidated and isolated groves constituting the existing canopy and B- provide an area on site to mitigate any canopy lost. Native oak mitigation area must be a contiguous area on site which is equal to the size of canopy area lost and shall be adjacent to existing oak canopy to ensure opportunities for regeneration; (3) Removal of native oaks shall be compensated with native oak species with a minimum of a one to one DBH replacement; (4) A provision for a comparable on-site area for the propagation of oak trees may substitute for replacement tree planting requirements at the discretion of the Sacramento County Tree Coordinator when removal of a mature oak tree is necessary; (5) If the project site is not capable of supporting all the required replacement trees, a sum equivalent to the replacement cost of the number of trees that cannot be accommodated may be paid to Sacramento County's Tree Preservation Fund or another appropriate tree preservation fund; and (6) If on-site mitigation is not possible given site limitation, off-site mitigation may be considered. Such a mitigation area must meet all the following criteria to preserve, enhance, and maintain a natural woodland habitat in perpetuity, preferably by transfer of title to an appropriate public entity. Protected woodland habitat could be used as a suitable site for replacement tree plantings required by ordinances or other mitigations. (a) Equal or greater in area to the total area that is included within a radius of 30 feet of the dripline of all trees to be

removed; (b) Adjacent to protected stream corridor or other preserved natural areas; (c) Supports a significant number of native broadleaf trees; and (d) Offers good potential for continued regeneration of an integrated woodland community.

- CO-141. In 15 years, the native oak canopy within on-site mitigation areas shall be 50% canopy coverage for valley oak and 30% canopy coverage for blue oak and other native oaks.

2.3.2 Sacramento County Tree Preservation Ordinance

Sacramento County regulates tree impacts and preservation through the Tree Preservation Ordinance (Sacramento County Code 480 Section 1, 1981). The Sacramento County Tree Preservation Ordination specifically applies to the following: (1) the planting, maintenance, protection, and preservation of public trees and landscaping; (2) helping to eliminate dangerous conditions caused by trees and shrubs that may result in injuries to persons or property; (3) the protection of all trees within Sacramento County against the spread of disease or pests; and (4) the provision for the special protection of heritage and landmark trees within the unincorporated area of Sacramento County. Chapter 19.12 of the Sacramento County Code requires a Sacramento County Tree Permit before any party shall plant, transplant, move, separate, trim, prune, cut above or below the ground, disrupt, alter, or do surgery upon any public tree located on an easement, planting easement, street, or public premises, irrespective of whether the tree is alive or dead. In addition, without a tree permit or discretionary approval by the Board of Supervisors, Sacramento County Planning Commission, Zoning Board of Appeals, the Zoning Administrator, or the Subdivision Review Committee, no person shall trench, grade, or fill within the dripline of any tree or destroy, kill, or remove any tree as defined, in the designated urban area of the unincorporated area of Sacramento County, on any property, public or private (Sacramento County 2021). Protected trees under this ordinance include the following: valley oak (*Quercus lobata*), interior live oak (*Quercus wislizenii*), blue oak (*Quercus douglasii*), or oracle oak (*Quercus morehus).* Additionally, per Sacramento County, a "tree" shall mean any living native oak tree having at least one trunk of 6 inches or more in diameter measured at 4.5 feet above the ground, or a multi-trunked native oak tree having an aggregate diameter of 10 inches or more, measured 4.5 feet above the ground (Sacramento County 2021).

2.3.3 South Sacramento Habitat Conservation Plan

The *South Sacramento Habitat Conservation Plan* (SSHCP) streamlines federal and state permitting processes for SSHCP-covered development and infrastructure projects, while protecting habitat, open space, and agricultural lands (SSHCP 2021). The SSHCP is led by a multi-jurisdiction collaborative that includes Sacramento County, the Cities of Rancho Cordova and Galt, the Sacramento County Water Agency, the Sacramento Regional County Sanitation District, and the Capital Southeast Connector Joint Powers Authority (SSHCP 2021). The SSHCP does not expressly include utility-scale solar as a potential covered activity.

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3 Methods

3.1 Database and Literature Evaluation

Dudek completed a database and literature evaluation of special-status biological and aquatic resources present or potentially present within the PSA. The database and literature evaluation assessed the PSA vicinity, which specifically includes the general and nearby areas adjacent to the PSA, not to exceed 5 miles. Resources and search parameters used during the desktop-level review include the following:

- California Aquatic Resource Inventory dataset via ArcGIS for surface waters and their riparian areas in the PSA (CARI 2016).
- CDFW CNDDB nine USGS 7.5-minute quad search (Carmichael, Buffalo Creek, Folsom SE, Elk Grove, Sloughhouse, Carbondale, Galt, Clay, and Goose Creek) and within a 5-mile buffer search for special-status species (CDFW 2021a).
- CNPS Online Inventory of Rare and Endangered Plants nine USGS 7.5-minute quad search (Carmichael, Buffalo Creek, Folsom SE, Elk Grove, Sloughhouse, Carbondale, Galt, Clay, and Goose Creek) (CNPS 2020)
- California Tree and Landscape Consulting Updated Arborist Report and Tree Inventory for Sloughhouse Solar LLC (SSLLC 2020).
- Federal Emergency Management Agency National Flood Hazard Layer geospatial database (FEMA 2021).
- National Oceanic and Atmospheric Administration Essential Fish Habitat (EFH) West Coast Data Inventory via ArcGIS (NOAA 2020).
- Natural Resources Conservation Service Web Soil Survey (USDA 2020).
- SSHCP (Sacramento County 2018).
- USFWS Environmental Conservation Online System Threatened and Endangered Species Active Critical Habitat Report data via ArcGIS (USFWS 2020b).
- USFWS Information for Planning and Consultation Trust Resource Report for the PSA (USFWS 2020a).
- USFWS National Wetlands Inventory Mapper of historical wetland data (USFWS 2020c).
- USGS National Hydrography Dataset to assess potential surface water features occurring in the PSA vicinity (USGS 2021).

In Addition, Dudek reviewed secondary resources such as the Calflora database and the Jepson Herbarium online for vegetation and specialty soil resources occurring in Sacramento County, the CNPS Manual of California Vegetation Online for vegetation community descriptions and classification attributes (CNPS 2021b), current and historical Google Earth aerial photography to identify any potential jurisdictional aquatic resources based on aerial signatures, and climate information for the region using the Western Regional Climate Center (Calflora 2021; Google Earth 2021; Jepson eFlora 2021; WRCC 2020).

3.2 Field Study

Dudek completed various reconnaissance, focused, and protocol-level technical field studies for aquatic resources and special-status plant and wildlife species that have the potential to occur in the PSA; see Section 4.5, Special-Status Species, for a full discussion on occurrence potentials. The methodology for the field studies conducted are detailed in the sections below.

3.2.1 Aquatic Resources Delineation

Dudek conducted an ARD within the PSA on October 27, 29, and 30, 2020; November 4 and 9 through 13, 2020; and March 3, 2021. The purpose of an ARD is to identify aquatic resources that may be potentially subject to agency jurisdiction pursuant to regulations in Section 401 and 404 of the CWA, Porter-Cologne Act, CFGC, and CEQA Guidelines. Aquatic resources within the PSA were delineated based on methodology described in USACE's *Wetlands Delineation Manual* (USACE 1987) and the *Regional Supplement for the Arid West Region* (USACE 2008a). Non-wetland waters of the U.S. and/or state were delineated based on the presence of an OHWM, as determined using the methodology in the *OHWM Field Guide for the Arid West Region* (USACE 2008b). Aquatic resources were recorded and mapped in the field using a Trimble R1 GNSS Receiver with sub-meter accuracy and ArcGIS Collector app for iOS. On June 9, 2021, the final ARD Report with a formal request for an Approved Jurisdictional Delineation was submitted to USACE, Sacramento District, to definitively determine and approve the extent of waters of the U.S. The ARD results are summarized in Section 4.2.1 of this BTR and can be reviewed further in the ARD Report (SSLLC 2021a).

3.2.2 Special-Status Plant Species

3.2.2.1 Protocol-Level Botanical Surveys

Dudek conducted reference population checks for special-status plant species on April 22, 2021 and conducted protocol-level botanical field surveys within the PSA on May 4, 2021. The purpose of protocol-level botanical surveys is to identify special-status plant resources that may be potentially subject to agency jurisdiction pursuant to regulations under FESA, CESA, CFGC, CEQA Guidelines, and the Sacramento County General Plan. The botanical field surveys were performed in accordance with the *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed, and Candidate Plants* (USFWS 2000), the *Protocol for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Sensitive Natural Communities* (CDFW 2018), and the *Botanical Survey Guidelines* (CNPS 2001). The protocol-level botanical field surveys were conducted during the appropriate floristic bloom period for special-status plant species known to occur within the Project region (i.e., late spring to early summer months). Surveys were completed using a systematic transect approach within suitable habitats for special-status species that have the potential to occur. All plant species encountered were identified to the taxonomic level appropriate to determine species and regulatory status, if needed. Botanical resources were recorded and mapped in the field using a Trimble R1 GNSS Receiver with sub-meter accuracy and ArcGIS Collector app for iOS. Complete special-status plant species profiles and botanical survey results have been included in Section 4.5 of this BTR.

3.2.3 Special-Status Wildlife Species

3.2.3.1 Valley Elderberry Longhorn Beetle Focused Surveys

Dudek conducted focused surveys for valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*; VELB) within the PSA on February 19 and 25, 2021, and January 12, 2022. The purpose of focused VELB surveys is to identify habitat and species presence that may be potentially subject to agency jurisdiction pursuant to regulations under FESA, CESA, CFGC, and CEQA Guidelines. The focused VELB surveys were performed using the *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle* (*Desmocerus californicus dimorphus*) (USFWS 2017b), and the *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (USFWS 1999). The surveys focused on the assessment of black elderberry shrubs (*Sambucus nigra*), the host plant to VELB, to evaluate for ancillary evidence of VELB presence including eggs and/or larval galleries, bore holes, and frass. Only elderberry shrubs stem greater than 1 inch DBH were evaluated. Elderberry shrub health, total number of stems, and proximity to riparian habitat were also recorded during the focused surveys for VELB. Elderberry shrub locations were recorded and mapped in the field using ArcGIS Collector app for iOS. A complete VELB species profile and survey results have been included in Section 4.5.3.15 of this BTR.

3.2.3.2 California Tiger Salamander Preliminary Habitat Assessment and Aquatic Larval Surveys

Prior to conducting the California tiger salamander (*Ambystoma californiense*; CTS) aquatic larval surveys, a CTS preliminary habitat assessment was conducted to evaluate for the potential of CTS to occur within 2 kilometers of the solar development area within the PSA. This assessment was completed by compiling geographic information system aquatic resource data within 2 kilometers of the solar development area. Aquatic resources north of the Consumes River were not assessed, as CTS are not known to occur across the river boundary. Identified aquatic resource were further evaluated by assessing historic aerial imagery, hydrology sources, and other land use conditions to determine the likelihood for CTS to occur within the aquatic resources within 2 kilometers of the solar development area.

Dudek conducted CTS aquatic larval surveys within potential suitable habitat within the PSA in accordance with the *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or Negative Findings of California Tiger Salamander* (USFWS 2003). Aquatic larval surveys were conducted by a Dudek biologist holding a valid USFWS 10(a)(1)(A) Recovery Permit for the species. The CTS surveys included three separate site visits spaced a minimum of 10 days apart, on March 16, April 15, and April 28, 2021. The purpose of CTS aquatic larval surveys is to assess suitable upland and aquatic breeding habitat and determine species presence. Suitable sites were sampled using dipnets covering representative portions of the ponds with a maximum of 50 dipnet sweeps. Resources were recorded and mapped in the field using ArcGIS Collector app for iOS. A complete CTS species profile and survey results have been included in Section 4.5.3.1 of this BTR.

3.2.3.3 Western Spadefoot Toad Focused Surveys

Dudek conducted focused surveys for western spadefoot toad (*Spea hammondii*; WST) within potential suitable habitat for this species. The purpose of focused WST surveys is to assess suitable habitat and aquatic breeding habitat and determine species presence. The WST focused surveys were completed in conjunction with both the

CTS aquatic larval surveys (see Section 3.2.3.2) and the protocol-level large listed branchiopod wet season surveys (see Sections 3.2.3.4 and 3.2.3.5). Since there are no published protocols specific to WST surveys, WST surveys were performed in accordance with the most recent published literature and recommendations from CDFW and under the guidance of Dudek species experts. WST resources were recorded and mapped in the field using ArcGIS Collector app for iOS. A complete WST species profile and survey results have been included in Section 4.5.3.3 of this BTR.

3.2.3.4 Protocol-Level Large Listed Branchiopod Dry Season Surveys

Dudek conducted protocol-level dry season surveys for large-listed branchiopods (i.e., vernal pool fairy shrimp [*Branchinecta lynchi*] and vernal pool tadpole shrimp [*Lepidurus packardi*]) within the PSA. The purpose of protocol-level large listed branchiopod dry season surveys is to identify if listed branchiopods are present within aquatic habitat soils that may potentially be subject to agency jurisdiction pursuant to regulations under FESA, CESA, CFGC, and CEQA Guidelines. Surveys were conducted on October 13 through 16, October 19 through 22, and November 11, 2020, by Dudek biologists holding valid USFWS 10(a)(1)(A) Recovery Permits for the listed species. Surveys were conducted in accordance with the *Survey Guidelines for Large Listed Branchiopods* (USFWS 2015) and were approved by USFWS prior to surveying.

For the dry season surveys, soil samples were collected from the bottom of each known aquatic resource when the soil was very dry, and a small 6-inch hand trowel was used to excavate between 10 and 100 samples of soil (approximately 100 milliliters each), depending on the size of the aquatic resource. The locations of the aquatic resources and sampling transects were recorded and mapped in the field using ArcGIS Collector app for iOS. Samples were collected equidistantly along two generally perpendicular transects. Soil samples were submitted in November 2020 for processing by Helm Biological Consulting to assess for cysts in the soil samples. On February 11, 2021, the final 90-Day Dry Season Protocol Survey Letter Report for Federally Listed Branchiopods was submitted to the Sacramento Office of the USFWS. On March 4, 2021, the USFWS provided a formal receipt of all report submittals. Complete species profiles for large-listed branchiopods and survey results have been included in Section 4.5.3.17 of this BTR.

3.2.3.5 Protocol-Level Large Listed Branchiopod Wet Season Surveys

Dudek conducted protocol-level wet season surveys for large-listed branchiopods (i.e., vernal pool fairy shrimp and vernal pool tadpole shrimp) within the PSA. The purpose of protocol-level large listed branchiopod wet season surveys is to identify if live listed branchiopods are present within inundated aquatic resources that may be subject to jurisdiction pursuant to regulations under FESA, CESA, CFGC, and CEQA Guidelines. Surveys were conducted on February 3–5, February 17–18, March 3–4, March 17–18, March 31, April 14–15, and April 28, 2021, by a Dudek biologist holding a valid USFWS 10(a)(1)(A) Recovery Permit for the species. Surveys were conducted in accordance with the *Survey Guidelines for Large Listed Branchiopods* (USFWS 2015) and were approved by USFWS prior to surveying.

For the wet season surveys, site visits began after initial storm events when potential listed large branchiopod habitat had become inundated. All potential habitat was sampled at 14-day intervals after the initial inundation of habitat. Sampling continued within each potential habitat until it dried. At each wet season visit, representative portions of the bottom, edges, and vertical water column of the features were adequately sampled using a dip net or aquarium net. The contents of the nets were examined and emptied frequently. Information on pool conditions

and species was recorded and mapped in the field using ArcGIS Collector app for iOS. The final 90-Day Wet Season Protocol Survey Letter Report for Federally Listed Branchiopods was submitted to the USFWS in July 2021. Complete species profiles for large-listed branchiopods and survey results have been included in Section 4.5.3.17 of this BTR.

3.2.3.6 Protocol-Level Burrowing Owl Breeding Season Surveys

Dudek conducted protocol-level burrowing owl (*Athene cunicularia*; BUOW) breeding season surveys within the PSA. The purpose of protocol-level BUOW surveys is to assess for burrows, suitability of habitat, and foraging or other activity within the PSA and up to 500 feet from the solar development area that may be potentially subject to agency jurisdiction pursuant to regulations in MBTA, CFGC, and CEQA Guidelines. Surveys were focused on the BUOW breeding season and conducted on February 18 and 25, 2021 (Pass 1); March 4 and 16, 2021 (Pass 2); April 9 and 15, 2021 (Pass 3); and May 3, 2021 (Pass 4). Due to the early dry season in the 2021 rain year, Pass 4 was conducted earlier than is typical to account for early nesting and fledging. Surveys were completed in the PSA in accordance with the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012), and the *Burrowing Owl Survey Protocol and Mitigation Guidelines* (California Burrowing Owl Consortium 1993). Survey areas were focused on suitable habitat within the PSA, such as California annual grasslands, managed agricultural fields, roadside areas, and the margins of agricultural fields. Survey transect centerlines were marked at 30 feet and walked linearly. During the second, third, and fourth passes only those areas that were determined to support suitably sized burrows during the first survey pass were resurveyed. Surveys were conducted between civil twilight and 10:00 a.m. and 2 hours before sunset until civil twilight and were limited to periods when wind speed was less than 12 miles per hour and there was no precipitation or dense fog. Resources were recorded and mapped in the field using an ArcGIS Collector app for iOS. A complete BUOW species profile and survey results have been included in Section 4.5.3.9 of this BTR.

3.2.3.7 Protocol-Level Swainson's Hawk Surveys

Dudek conducted protocol-level Swainson's hawk (*Buteo swainsoni*; SWHA) surveys within the PSA including visual and aural detection and visual surveys within 0.5 miles of the solar development area. The purpose of protocol-level surveys is to assess for SWHA nesting, foraging, suitability of habitat, and other activity within the PSA and vicinity that may be subject to agency jurisdiction pursuant to regulations under MBTA, CESA, CFGC, and CEQA Guidelines. Surveys were focused on the SWHA breeding season and conducted on February 18 and 25, 2021 (Pass 1); March 4 and March 16, 2021 (Pass 2); April 9 and 15, 2021 (Pass 3), May 3, 2021 (Pass 4); and June 4, 2021 (Pass 5). Due to the early dry season in the 2021 rain year, Passes 4 and 5 were conducted earlier than is typical to account for early nesting and fledging. The protocol-level SWHA surveys were conducted in accordance with the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (SHTAC 2000). Initial surveys focused on inspection of individual and cluster trees and riparian areas for nests within the PSA. During subsequent surveys, nests and potential nest sites that were identified during the initial surveys were inspected for nesting activity, including territorial or courtship displays, brooding on the nest, presence of young on the nest, and frequent trips to the nest by adults. Survey transect centerlines were marked at 30 feet and walked linearly. Resources were recorded and mapped in the field using a Trimble R1 GNSS Receiver with sub-meter accuracy and ArcGIS Collector app for iOS. A complete SWHA species profile and protocol survey results have been included in Section 4.5.3.12 of this BTR.

3.2.3.8 Swainson's Hawk and Other Raptor Foraging and Land Use Study

In 2013, Estep Environmental Consulting conducted a 1-year study to assess raptor use of solar array fields at three newly developed photovoltaic solar facilities in Sacramento County (Estep Environmental Consulting 2013). The purpose of the study was to provide supplemental research that would inform impact assessment and mitigation requirements related to the loss of SWHA foraging habitat as provided under the *Staff Report Regarding Mitigation for Impacts to Swainson's Hawks (Buteo swainsoni) in the Central Valley* (CDFG 1994) by (1) determining the potential for solar facilities to maintain foraging habitat for SWHA and (2) evaluating and comparing the retained on-site foraging value to other known foraging habitats. The results of this study indicated that SWHAs and other raptors can use appropriately designed and managed solar array fields. Specifically, arrays should provide adequate spacing to allow foraging between arrays, and the grassland substrate should be managed to promote visibility and access to prey. The 2013 study found that foraging habitat within the solar arrays was being used by SWHAs at a greater frequency than would be expected based on habitat availability, suggesting that SWHAs were selecting the solar array habitat. Potential explanations for this included in the 2013 report included the ability of the hawks to perch on edges of solar arrays, and the management of grasslands in such a way to benefit prey detectability as compared to other local habitat types. However, CDFW determined that a 1-year study was insufficient to draw conclusions that would support the modification of standard mitigation requirement for solar projects.

The solar development area within the PSA is to be constructed on suitable SWHA foraging habitat. As such, Sloughhouse Solar, LLC engaged Estep Environmental Consulting to conduct an additional year (i.e., year two) of SWHA and other raptor foraging and land use studies. These studies were initiated on April 12, 2021 and concluded in September 2021. Both the 2013 and 2021 studies include the review of route and land cover to establish walking transects and survey points, and visual surveys of predetermined road routes in the vicinity of the Project. Surveys were conducted twice weekly during the breeding season for a total of 20 weeks, or 40 total surveys. Following surveys, all data was compiled and analyzed, including a Chi-square analysis to assess the relationship of available habitat, and observed use of habitat to determine the relative use of different land cover, including solar array fields. Results were compiled into *Swainson's Hawk and Other Raptor Foraging Use of Solar Array Fields within an Agricultural Landscape in Sacramento County, Year 2*, by Estep Environmental Consulting (Appendix A).

3.2.3.9 Tricolored Blackbird Focused Surveys

Dudek conducted tricolored blackbird (*Agelaius tricolor*; TRBL) focused surveys within the PSA. The purpose of focused TRBL surveys is to assess for colonial breeding sites/nesting, foraging, suitable habitat, and other activity within the PSA that may be potentially subject to agency jurisdiction pursuant to regulations in MBTA, CESA, CFGC, and CEQA Guidelines. Surveys for TRBL were conducted in accordance with *the Staff Guidance Regarding Avoidance of impacts to Tricolored Blackbird Breeding Colonies on Agricultural Fields* (CDFW 2015) and modified for the more natural and naturalized habitat present within the PSA. Surveys were focused on the TRBL breeding season and conducted in conjunction with the protocol-level BUOW and SWHA surveys in 2021. Survey transect centerlines were marked at 30 feet and walked linearly. Resources were recorded and mapped in the field using ArcGIS Collector app for iOS. A complete TRBL species profile and survey results have been included in Section 4.5.3.13 of this BTR.

3.2.4 Reconnaissance-Level Biological Resource Surveys

Reconnaissance-level biological field surveys in the PSA were conducted in conjunction with all the species-specific technical studies listed in the sections above. Reconnaissance-level biological observations focused on assessing and identifying common plant species to the lowest taxonomic group possible, all wildlife observations, the presence of or potential for other special-status plant and wildlife species, and vegetation communities and land cover types. Field notes, an aerial photograph with an overlay of the property boundary, Collector for ArcGIS on an iPad/mobile device, a Trimble R1 GNSS Receiver with sub-meter accuracy, and ArcGIS Collector app for iOS were used interchangeably to map biological resources while in the field. Species survey results and inventory have been included in Sections 4.4.5 and 4.5 of this BTR.

3.2.5 Arborist Tree Survey and Inventory

International Society of Arboriculture Certified Arborists with California Tree and Landscaping Consulting Inc. conducted a tree survey and inventory in February and December 2020, to evaluate the trees on the site for purposes of providing updated tree information for Project planning (Cal TLC 2020). The GPS location of each tree was collected using ArcGIS Collector app for iOS. The data detailed below were collected in the field. Survey and inventory results and inventory have been included in Section 4.5.2 of this BTR.

- Field Tag Number - The pre-stamped tree number on the tag which is installed at approximately 6 feet above ground level on the north side of the tree.
- Species - The species of a tree is listed by local and correct common name and botanical name by genus and species.
- DBH - DBH is normally measured at 4 feet 6 inches, but if that varies then the location where it is measured is noted.
- Measured At - Height above average ground level where the measurement of DBH was taken.
- Canopy Radius and Protection Area - The farthest extent of the crown composed of leaves and small twigs. This measurement represents the longest extension from the trunk to the outer canopy, known as the “dripline.” This measurement further defines the protection zone and can indicate if pruning may be required for development. Sacramento County specifies this measurement as the required “Protected Root Zone.”
- Critical Root Zone - The radius of the critical root zone is a circle equal to the trunk diameter inches converted to feet and factored by tree age, condition, and health pursuant to the industry standard.
- Arborist Rating - This rating is subjective to condition and is based on both the health and structure of the tree. All the trees were rated for condition, per the recognized national standard as set up by the Council of Tree and Landscape Appraisers and the International Society of Arboriculture on a numeric scale of 5 (being the highest) to 0 (the worst condition, dead) as depicted in Table 1. The rating was done in the field at the time of the measuring and inspection.

Table 1. Arborist and Sacramento County Tree Rating Scale

Rating Score	Arborist Tree Rating	Sacramento County Tree Rating
5 – Excellent	No problems	Excellent
4 – Good	No apparent problems	Good
3 – Fair	Minor problems	Fair
2 – Fair to Poor	Major problems	Declining
1 – Poor	Extreme problems	Severe decline
0 - Dead	Dead	Dead

Source: CalTLC 2020.

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4 Results

4.1 Environmental Setting

4.1.1 Regional Setting and Land Use

The PSA is located within eastern Sacramento County at the eastern edge of the Central Valley, less than 15 miles from the western foothills of the Sierra Nevada Mountains (Figure 1). The PSA is less than 1 mile south of State Route 16, and approximately 18 miles southeast of the City of Sacramento. The PSA is surrounded by rural residential, commercial development, and open space generally composed of annual grassland and agricultural fields. The PSA is primarily used for cattle grazing or other agricultural operations. There is an existing solar facility located in the southeast corner of the PSA (Figure 2).

4.1.2 Climate

The PSA is in a semi-arid climate where average annual temperatures range from approximately 53°F to 91°F, and the average annual precipitation is 20.06 inches. On average, the months with the highest rainfall are December and January, and July has the least precipitation (WRCC 2020). According to data from the Sacramento WB City weather station, the total precipitation recorded from October 1, 2019, through September 30, 2021, was 17.92 inches, approximately 61% of normal. Therefore, the PSA region had below normal hydrological conditions in the year preceding the biological resource surveys. The Sacramento WB City weather station is located approximately 18 miles west of the PSA at an elevation of approximately 25 feet amsl (CDEC 2020).

4.1.3 Soil and Terrain

The PSA is in an area of relatively flat topographic relief with scattered rolling hills. Elevations within the PSA range from approximately 95 feet amsl in the western portion of the PSA to 160 feet amsl in the southeastern portion of the PSA.

According to the Natural Resources Conservation Service, there are 16 soil units mapped within the PSA. Each soil unit, hydric and drainage class (i.e., frequency and duration of wet periods in conditions like those in which it was developed), and typical landform or geomorphic position within the landscape is detailed in Table 2. Figure 3, Soil and Terrain Setting, provides the geographic extent of each soil unit in the PSA region (USDA 2020).

Of the 16 soil units identified within the PSA, six are listed as hydric soils. Hydric soils are defined by the National Technical Committee for Hydric Soils as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (USDA 2021). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation. Refer to Section 4.2.1 for description of wetlands and other waters recorded in the PSA. Soils encountered during the field surveys were generally classified as clay to clay loam soils.

Table 2. Summary of Soil Units Within the Project Study Area

Soil Map Unit Name	Landform	Drainage Class	Hydric	Project Study Area Total Area (acres)
Bruella sandy loam, 0%–2% slopes	Terraces	Well-drained	No	2.44
Bruella sandy loam, 2%–5% slopes	Terraces	Well-drained	No	58.80
Columbia sandy loam, 0%–2% slopes	Flood plains	Somewhat poorly drained, occasionally flooded	Yes	17.93
Galt clay, 0%–1% slopes	Basin floors on fan remnants	Somewhat poorly drained	Yes	33.0
Galt clay, 2%–5% slopes	Basin floors on fan remnants	Moderately well drained	Yes	126.62
Hadselville-Pentz complex, 2%–30% slopes	Hills	Moderately well drained to well drained	No	226.32
Peters clay, 1%–8% slopes	Hills	Well drained	No	56.94
Redding gravelly loam, 0%–8% slopes	Fan remnants	Moderately well drained	No	14.93
Reiff fine sandy loam, 0%–2% slopes	Flood plains	Well drained, occasionally flooded	No	96.11
Sailboat silt loam, drained, 0%–2% slopes	Flood plains on natural levees	Somewhat poorly drained, occasionally flooded	Yes	3.50
San Joaquin silt loam, 0%–3% slopes	Terraces	Moderately well drained	No	14.02
San Joaquin silt loam, 0%–8% slopes	Terraces	Moderately well drained	No	52.45
San Joaquin-Durixeralfs complex, 0%–1% slopes	Terraces	Moderately well drained to well drained	No	0.25
San Joaquin-Galt complex, leveled, 0%–1% slopes	Terraces	Moderately well drained	Yes	0.52
San Joaquin-Galt complex, 0%–3% slopes	Terraces	Moderately well drained	Yes	18.59
San Joaquin-Xerarents complex, leveled, 0%–1% slopes	Terraces	Moderately well drained to well drained	No	3.52

Source: USDA 2020.

4.2 Hydrology

The PSA occurs within the Upper Cosumnes River watershed, which drains approximately 180 square miles of land in El Dorado, Amador, and Sacramento Counties (Hydrological Unit Code 1804001306) (USGS 2021). A complex of seasonally inundated aquatic features generally drains the PSA in a southwesterly direction, and the Cosumnes River

flows within the western boundary of the PSA (Figure 4, Hydrologic Setting). The western half of the PSA is located within the Federal Emergency Management Agency National Flood Hazard Layer 1% 100-year floodplain of the Cosumnes River (FEMA 2021), which flows immediately west of the PSA. However, the portion of the Cosumnes River within the PSA is bounded by levees intended to contain the river and protect against overtopping during varied annual precipitation events. The National Wetlands Inventory maps numerous aquatic resources in the PSA, including Freshwater Emergent Wetland, Freshwater Forested/Shrub Wetland, Freshwater Pond, and Riverine (USFWS 2020c). The National Wetlands Inventory dataset is based on coarse aerial mapping (Figure 4). Results are provided in Section 4.2.1.

4.2.1 Aquatic Resources Delineation

Dudek conducted an ARD within the PSA on October 27, 29, and 30, 2020; November 4 and 9 through 13, 2020; and March 3, 2021. Survey information and conditions is summarized below in Table 3.

Table 3. Aquatic Resources Delineation Survey Information Summary

Survey Date	Hours	Dudek Personnel	Conditions
10/27/2020	8:00 a.m.– 4:00 p.m.	Laura Burris, Allie Sennett, Anna Godinho	43°F–73°F; 0% cloud cover; 0–5 mph wind
10/28/2020	7:45 a.m.– 4:45 p.m.	Laura Burris, Allie Sennett, Anna Godinho	40°F–85°F; 0% cloud cover; 0–3 mph wind
10/30/2020	7:30 a.m.–2:30 p.m.	Laura Burris, Anna Godinho	41°F–77°F; 0% cloud cover; 0–3 mph wind
11/04/2020	8:30 a.m.–3:30 p.m.	Anna Godinho, Paul Keating	64°F–78°F; 0% cloud cover; 0–3 mph wind
11/09/2020	8:00 a.m.– 4:00 p.m.	Allie Sennett, Adam Crawford	33°F–50°F; 0% cloud cover; 0–3 mph wind
11/10/2020	8:00 a.m.–4:00 p.m.	Anna Godinho, Adam Crawford	48°F–55°F; 0% cloud cover; 0 mph wind
11/11/2020	7:30 a.m.–4:45 p.m.	Laura Burris, Allie Sennett	36°F–70°F; 0–20% cloud cover; 0–5 mph wind
11/12/2020	7:30 a.m.–4:00 p.m.	Allie Sennett, Anna Godinho	33°F–74°F; 0% cloud cover; 0–3 mph wind
11/13/2020	7:30 a.m.–1:30 p.m.	Laura Burris, Anna Godinho	41°F–57°F; 100% cloud cover; 0–3 mph wind
3/3/2021	2:00 p.m.–3:30 p.m.	Anna Godinho	60°F; 30% cloud cover; 0-3 mph wind

Source: SSLLC 2021a.

Ten aquatic resource types were documented in the solar development area and the adjacent other lands comprising the PSA, including freshwater emergent wetland, seasonal wetland, stock pond, vernal pool, ditch, ephemeral drainage, intermittent drainage, river, seasonal wetland swale, and upland swale (Figure 5, Aquatic Resources Delineation) (SSLLC 2021a). Aquatic resources delineated within the PSA are summarized in Table 4.

Table 4. Summary of Aquatic Resources within the Project Study Area

Aquatic Resource Feature	Aquatic Resource Type	Total Acreage
Solar Development Area		
Ephemeral Drainage	NWW	0.73
Intermittent Drainage	NWW	0.46
Seasonal Wetland Swale	NWW	0.70
Upland Swale	NWW	0.08
Pond	Wetlands	0.37
Seasonal Wetland	Wetlands	3.15
Vernal Pool	Wetlands	0.25
	Sub-Total	*5.74*
Adjacent Other Lands		
Ditch	NWW	1.93
Ephemeral Drainage	NWW	0.38
Intermittent Drainage	NWW	1.91
Perennial Drainage	NWW	24.10
Seasonal Wetland Swale	NWW	1.45
Upland Swale	NWW	0.54
Freshwater Emergent Wetland	Wetlands	0.02
Pond	Wetlands	16.64
Seasonal Wetland	Wetlands	11.01
Vernal Pool	Wetlands	6.04
	Sub-Total	*64.01*
	Total	**69.75**

Source: SSLLC 2021a.
Note: Applicable regulatory jurisdictions to aquatic resources as defined in this table are further provided in Table 16. Summary of the Preliminary Jurisdictions of Aquatic Resources within the Solar Development Area.

4.2.1.1 Ditch

There are three ditches comprising approximately 1.93 acres (5,1055.99 linear feet) throughout the PSA, of which all occur in the adjacent other lands. The earthen ditches are human-made features with intermittent hydrology intended for runoff from stormwater, agricultural uses, irrigation, or similar purposes. There is no continuous riparian corridor associated with the ditch features in the PSA (SSLLC 2021a).

4.2.1.2 Ephemeral Drainage

There are four ephemeral drainages comprising approximately 1.11 acres (3,431.84 linear feet) within the PSA, of which 0.73 acres (2,427.84 linear feet) occur in the solar development area and 0.38 acres (1,0047.00 linear feet) occur in the adjacent other lands. Ephemeral drainages on site consist of stream channels that are naturally occurring rather than human created and contain flowing water during and briefly after precipitation events. Hydrology of the ephemeral drainages depends on inputs during rain events and runoff from the surrounding uplands. There are no continuous riparian corridors associated with these features in the PSA (SSLLC 2021a).

4.2.1.3 Freshwater Emergent Wetland

One freshwater emergent wetland comprising approximately 0.02 acres occurs in the southwest corner of the PSA. This feature entirely occurs within the adjacent other lands within the PSA. This feature has developed because of artificial irrigation and would likely convert to upland vegetation if the leakage were repaired (SSLLC 2021a).

4.2.1.4 Intermittent Drainage

There is one intermittent drainage comprising approximately 2.36 acres (4,462.81 linear feet) within the PSA, of which 0.46 acres (1,303.60 linear feet) occur in the solar development area and 1.91 acres (3,159.21 linear feet) occur in the adjacent other lands. Intermittent drainages generally have flowing water during certain times of the year, when groundwater provides water for stream flow, and receive supplemental water from rainfall runoff. The intermittent drainage on site appears to receive water via a culvert from a basin complex located north of the PSA. The drainage receives water from two adjacent seasonal wetland swales, contains three seasonal wetlands within low points or widenings, and terminates into Pond 3 (SSLLC 2021a).

4.2.1.5 Perennial Drainage (Cosumnes River)

The northwestern portion of the PSA contains 24.10 acres (4,506.29 linear feet) of the Cosumnes River and its associated riparian corridor. This feature entirely occurs within the adjacent other lands within the PSA. The Cosumnes River is a known jurisdictional water with perennial flows that originates in the Sierra Nevada mountains and flows approximately 50 miles into the Central Valley, emptying into the Mokelumne River in the Sacramento San Joaquin Delta (SSLLC 2021a).

4.2.1.6 Seasonal Wetland

There are 51 seasonal wetlands comprising approximately 14.16 acres throughout the PSA, of which 3.15 acres occur in the solar development area and 11.01 acres occur in the adjacent other lands. These features only appear to be inundated seasonally, and some are connected via seasonal wetland swales, ephemeral drainages, and/or intermittent drainages. Seasonal wetlands were characterized by a distinct change in vegetation type and cover from the surrounding grassland. Small mammal burrows were observed within several of the features, indicating that these features remained dry for a long enough period for subterranean animals to inhabit them (SSLLC 2021a).

4.2.1.7 Seasonal Wetland Swale

There are 15 seasonal wetland swales comprising approximately 2.15 acres (8,807.17 linear feet) within the PSA, of which 0.70 acres (3,874.33 linear feet) occur in the solar development area, and 1.45 acres (4,932.85 linear feet) occur in the adjacent other lands. Seasonal wetland swales on site consist of topographic depressions that would be expected to convey water when inundated, but where a defined bed and bank and typical fluvial indicators are lacking (SSLLC 2021a).

4.2.1.8 Pond

There are three ponds comprising approximately 17.01 acres within the PSA, of which 0.37 acres occur in the solar development area and 16.64 acres occur in the adjacent other lands. These features are natural closed

depressions that have been artificially augmented by perennial water sources, for the purpose of supporting livestock (SSLLC 2021a).

4.2.1.9 Upland Swale

There are seven upland swales comprising approximately 0.62 acres (1,837.54 linear feet) within the PSA, of which 0.08 acres (923.59 linear feet) occur in the solar development area and 816 linear feet 0.54 acres (811.44 linear feet) occur in the adjacent other lands. Upland swales on site consisted of linear topographic depressions that lack a distinct OHWM (SSLLC 2021a).

4.2.1.10 Vernal Pool

There are 17 vernal pools comprising approximately 6.30 acres throughout the PSA, of which 0.25 acres occur in the solar development area and 6.04 acres occur in the adjacent other lands. These features were characterized as three-parameter wetlands with an impermeable layer such as a hard pan that may fill and empty several times during the rainy season. These features may be isolated or connected to larger vernal complexes via swales or subsurface flows. The vernal pools on site exhibited concentric rings of distinctly different vegetation cover and species composition (SSLLC 2021a).

4.3 Vegetation Communities and Land Cover Types

Vegetation communities and land cover types within the PSA consist of a combination of terrestrial non-vegetative land covers and natural vegetation communities. The vegetation communities and land covers within the PSA were mapped using the SSHCP land cover data (Sacramento County 2018). SSHCP vegetation communities and land cover types occurring within the PSA include agricultural, California annual grassland, low density development, mixed riparian forest, urban, valley foothill riparian, and valley grassland. The SSHCP has also mapped aquatic resource land covers with the PSA including hydrologic streams and creeks, swales, seasonal wetlands, and vernal pools (Figure 6, Vegetation and Land Cover). The SSCHP aquatic resources within the PSA have been replaced with the more detailed mapping of aquatic resources as defined in Section 4.2.1. A complete summary of vegetation communities and land cover types is summarized in Table 5. Special-status species and/or SSCHP Covered Species with the potential to occur and/or that are known to occur in the PSA and associated suitable habitat (i.e., vegetation community or land cover type) are discussed below.

Table 5. Summary of Vegetation Communities and Land Cover within the Project Study Area

Vegetation Community/Land Cover Type	Total Acreage
Solar Development Area	
California Annual Grassland	360.53
Low Density Development	11.28
Urban	0.80
Sub-Total	*372.60*
Adjacent Other Lands	
Agricultural	85.33

Table 5. Summary of Vegetation Communities and Land Cover within the Project Study Area

Vegetation Community/Land Cover Type	Total Acreage
California Annual Grassland	177.56
Low Density Development	10.49
Mixed Riparian Woodland	10.42
Urban	3.48
Valley Foothill Riparian	17.38
Valley Grassland	2.86
Sub-Total	*307.51*
Total	**680.12**

Source: Sacramento County 2018.
Note: The total acreage of vegetation communities land cover types omits overlapping aquatic resources occurring in the PSA.

4.3.1 Vegetation Communities

4.3.1.1 California Annual Grassland

California annual grassland is the dominant vegetation community present through all portions of the PSA. Dominant species in this community include soft brome (*Bromus hordeaceus*), medusa head (*Elymus caput-medusae*), and narrow tarweed (*Holocarpha virgata*). The shrub and tree layer are absent from this vegetation community. There are numerous aquatic features that occur throughout the California annual grassland (discussed in Section 4.2.1). California annual grassland supports wildlife species such as herbivores, deer, rabbits, gophers, and mice, and provides suitable nesting and foraging bird habitat. California annual grassland comprises a total of 360.53 acres in the solar development area and a total of 177.56 acres in the adjacent other lands of the PSA.

4.3.1.2 Mixed Riparian Woodland

Mixed riparian woodland is a vegetation community that is present along the Consumes River corridor, on the east side of the PSA, outside of the solar development area. Mixed riparian woodland intergrades with the valley grassland wooded borders along streams and agricultural fields (Sacramento County 2018). Vegetation associated with this vegetation community includes various oak species (*Quercus* ssp.) and elderberry shrubs, as well as other herbaceous species that occur in the sparse to densely vegetated ground cover. There is no mixed riparian woodland within the solar development area. Mixed riparian woodland comprises a total of 10.42 acres with the adjacent other lands of the PSA.

4.3.1.3 Valley Foothill Riparian

Valley foothill riparian is a vegetation community that is also present along the Cosumnes River corridor. Valley foothill riparian is like the mixed riparian woodland vegetation community described in Section 4.3.1.2. There is no valley foothill riparian within the solar development area. Valley foothill riparian comprises a total of 17.38 acres with the adjacent other lands of the PSA.

4.3.1.4 Valley Grassland

Valley grassland is present within a ditch adjacent to the agricultural areas in the eastern vicinity of the PSA. Valley grassland is a vegetation community that is like the California annual grassland vegetation community described in Section 4.3.1.1. Additionally, valley grassland is one of the most dominant vegetation types in the PSA and in the PSA region (Sacramento County 2018). This vegetation community is characterized mostly by naturalized annual grasses and herbaceous annual forbs and includes patches with relatively high proportions of native grasses and forbs. There is no valley grassland within the solar development area. Valley grassland comprises a total of 2.86 acres with the adjacent other lands of the PSA.

4.3.2 Land Cover Types

4.3.2.1 Agricultural

Agricultural land cover comprises a large field to the east of the Cosumnes River riparian corridor and levee. Land cover classified as agricultural typically includes lands where farming and other agricultural practices take place, including pastures (hay and alfalfa), row crops and other unidentified croplands. Production practices observed in the PSA include flood-irrigation and cultivation followed by harvesting and discing. After discing, some fields remain fallow for short periods of time, allowing for the establishment of annual and biennial native and non-native annual grasses and broad-leaved plants, including many non-native species. In 2018, approximately 500 acres were burned in a fire and no irrigation was initiated. No agricultural land cover was identified in the solar development area of the PSA. Agricultural land cover comprises a total of 85.33 acres in the adjacent other lands of the PSA.

4.3.2.2 Low Density Development

The low-density development land cover type consists of relatively sparse constructed environments such as residences and other structures, including farm buildings, and small rural neighborhoods with large individual property sizes per house (Sacramento County 2018). These areas are primarily concentrated in the northeastern vicinity of the PSA, adjacent to agricultural lands. Low density development land cover comprises a total of 11.28 acres in the solar development area and a total of 10.49 acres in the adjacent other lands of the PSA.

4.3.2.3 Urban

The urban land cover type consists of developed areas, including roadways and other general infrastructure systems. Most urban areas, if planted, are planted with non-native grasses, shrubs, and trees. Species composition in urban habitats varies with planting design and climate. Monoculture is commonly observed in tree groves and street tree strips. Some urban land covers are regularly maintained by irrigation, mowing, pruning, or other management techniques (Sacramento County 2018). Urban land cover in the PSA consists of county roads. Urban land cover comprises a total of 0.80 acres in the solar development area and a total of 3.48 acres in the adjacent other lands of the PSA.

4.4 Other Biological and Aquatic Resources

4.4.1 Sensitive Natural Communities

Sensitive natural communities are communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects. These communities may or may not contain special-status species. Specifically, sensitive natural communities are those that are listed in the CDFW CNDDB due to the rarity of the community in the state or throughout its entire range (i.e., globally). For rarity, the ranking involves the knowledge of range and distribution of a given type of vegetation, and the proportion of occurrences that are of good ecological integrity. The conservation of sensitive natural communities is integral to maintaining biological diversity (CDFW 2021b).

4.4.1.1 Northern Hardpan Vernal Pool

Northern hardpan vernal pool has been identified within 5 miles of the PSA, with the closest known occurrence located approximately 0.90 miles east of the PSA, specifically in the Meiss Road vicinity, 1 mile south of the Cosumnes River and east of Dillard Road (Figure 7, Known Special-Status Species Occurrences, Critical Habitat, and Sensitive Communities) (CDFW 2020). Northern hardpan vernal pools are not decidedly present within the PSA, however there is vernal pool habitat, a sensitive community, present within the PSA, as discussed in Section 4.2.1 above.

Northern hardpan vernal pools are seasonally flooded or saturated with fresh water. Many species of plants and wildlife depend on these unique communities and are often classified special-status, including CTS and WST, which have a potential to occur in the PSA and are further discussed in Section 4.5.3. Vegetative species composition varies from pool to pool and from year to year. Herbs and grasses typically grow less than 1 foot high with intermediate to open cover. These pools form over areas with hardpan soils and generally have more topographic relief associated with them. CDFW tracks this rare habitat (Tulare Basin Wildlife Partners 2021). The vernal pools in the PSA are considered a sensitive natural community.

4.4.2 Riparian Habitat

A stream or other watercourse is a body of water that flows year-round or intermittently, and as such has surface and subsurface flow that supports or has supported riparian vegetation/habitat. Riparian habitat acts as a buffer between aquatic resources and uplands. Healthy riparian habitat is essential in supporting both plant and wildlife species, as well as supporting watercourse integrity. As such, riparian habitat is considered a sensitive habitat within California pursuant to CFGC 1600-1616 and regulated through the CDFW Lake and Streambed Alteration Program. The goal of conserving riparian habitat as a sensitive natural community is to preserve these systems to maintain species and watercourse health and function. Within the PSA, riparian habitat was identified along the Consumes River in the adjacent other lands of the PSA and classified as mixed riparian woodland and valley foothill riparian vegetation communities; riparian habitat is discussed in Section 4.3.1. above.

4.4.3 Swainson's Hawk Foraging Habitat

SWHA nesting and foraging habitat is present within the PSA. Specifically, SWHA foraging habitat is identified as the California annual grassland vegetation community in the PSA, as described in Section 4.3.1.

4.4.4 Designated Critical Habitat/Essential Fish Habitat

Critical habitat is designated by USFWS and is specifically defined as a geographic area that contains features essential to the conservation of species listed as threatened or endangered under FESA. The purpose of Designated Critical Habitat (DCH) is to identify areas that are essential to the species' conservation and recovery and what management requirements may be necessary to conserve the species. EFH is designated by the National Oceanic and Atmospheric Administration and is specific to aquatic habitat where federally managed fish species and invertebrates live and reproduce. Discussed below are the five types of DCH and EFH occurring within the PSA and/or within 5 miles of the PSA (Figure 7).

4.4.4.1 Central Valley Steelhead Essential Fish Habitat

National Oceanic and Atmospheric Administration Fisheries has delineated eight recovery domains, or geographic recovery planning areas, for the FESA-listed salmon and steelhead populations on the western coast of California, and this includes Central Valley steelhead (*Oncorhynchus mykiss*). The 2014 Recovery Plan for Sacramento River Winter-run Chinook, Central Valley Spring-run Chinook, and Central Valley Steelhead domain extends from the upper Sacramento River Valley to the northern portion of the San Joaquin River Valley (NOAA 2014). This domain includes the Cosumnes River.

The Cosumnes River flows along the western boundary of the PSA, within the adjacent other lands of the PSA, where EFH for Central Valley steelhead has been identified (NOAA 2020). Central Valley steelhead and their potential for occurrence within the PSA are discussed in detail in Section 4.5.3.4.

4.4.4.2 Sacramento Orcutt Grass and Slender Orcutt Grass Designated Critical Habitat

USFWS has designated habitat for special-status annual grass species Sacramento Orcutt grass (*Orcuttia viscidia*) and slender Orcutt grass (*Orcuttia tenuis*). Protection and recovery requisites for these species are detailed in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005). The known range and habitat for these species includes swales, wetlands, and vernal pools within the Sacramento Valley. These species are distributed in a narrow zone of remnant depositional stream terraces at the base of the Sierra foothills in northern hardpan vernal pool and northern volcanic mudflow vernal pools. Most, if not all occurrences for these species are in eastern Sacramento County in the general vicinity of the PSA. Although several occurrences are now protected under land conversion easements, impacts from surrounding land use, adjacent road widening, and other human activities continue to threaten the species (USFWS 2009).

DCH for Sacramento Orcutt grass has been identified within 5 miles of the PSA, with the closest located approximately 3.70 miles southeast of the PSA (USFWS 2020d). DCH for slender Orcutt grass has also been identified within 5 miles of the PSA, with the closest located approximately 4.20 miles northwest of the PSA (USFWS 2020e). Sacramento Orcutt grass and slender Orcutt grass are discussed in detail in Section 4.5.1, Special-Status Plants.

4.4.4.3 Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Designated Critical Habitat

USFWS has designated habitat for special-status invertebrate species vernal pool fairy shrimp and vernal pool tadpole shrimp. Protection and recovery requisites for these species are detailed in the 2005 Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (USFWS 2005). These species have an ephemeral life cycle and exist only in vernal pools or vernal pool-like habitats, such as those occurring within the PSA. The overarching recovery strategy for these species is habitat protection and management (USFWS 2005).

DCH for vernal pool fairy shrimp and vernal pool tadpole shrimp have both been identified within 5 miles of the PSA, with the closest located approximately 1.30 miles southeast of the PSA (USFWS 2020d). Vernal pool fairy shrimp and vernal pool tadpole shrimp are discussed in detail in Section 4.5.3.

4.4.5 Wildlife Corridors and Habitat Linkages

Wildlife movement corridors have been recognized by federal and state agencies as important habitats worthy of conservation. Wildlife corridors provide migration channels seasonally (i.e., between winter and summer habitats) and provide non-migrant wildlife the opportunity to move within their home range for food, cover, reproduction, and refuge.

The existing network of fencing throughout the PSA is wildlife-friendly and does not preclude overland movement. Therefore, agricultural areas and undeveloped grassland in the PSA provide open space with some habitat value. However, proposed fencing around the solar development area of the Project may limit wildlife permeability for certain species. Species such as birds, small to medium sized mammals (i.e., coyote, racoon, etc.) and reptiles (i.e., snakes, lizards, etc.) will be able to pass through or over the proposed fencing and will not impede their movement through the solar development area.

According to the California Essential Habitat Connectivity Project, the Cosumnes River corridor in the western vicinity of the PSA is considered a potential riparian connection, providing native habitat for resident wildlife and linkages to additional native habitat in the surrounding area (Spencer et al. 2010). The California Essential Habitat Connectivity Project also identifies much of the grasslands within the PSA as “Natural Areas Small,” which are areas important to maintaining ecological integrity, but not specifically identified in the Essential Connectivity Network as Essential Connectivity Areas or Natural Landscape Blocks. As discussed in Section 4.3, the agricultural areas and grasslands on site provide nursery and migratory habitat for common wildlife species. Furthermore, the SSCHP recognized the Cosumnes River Corridor in the vicinity as part of SSHCP Preserve Planning Unit 5 (i.e., a linkage to targeted preserve areas within the region). A complete discussion of habitat and wildlife linkages is provided in Section 6.2 of the BTR.

4.4.6 Plant and Wildlife Species Observed

During field studies conducted in the PSA, a total of 75 species of native or naturalized plants, 34 native (45%) and 41 non-native (55%), were recorded on the PSA. A total of 40 wildlife species were observed in the PSA, 38 native (95%) and two introduced species (5%). Wildlife species observed primarily consisted of common bird species, some of which are considered special status. A compendium of observed plant and wildlife species identified during the field surveys is included as Appendix B.

4.5 Special-Status Species

For this BTR, special-status plant and wildlife species are defined as those that are (1) listed, proposed for listing, or candidates for listing as threatened or endangered under the FESA; (2) listed or candidates for listing as threatened or endangered under the CESA; (3) a CDFW species of special concern (SSC); (4) a plant species with a CRPR or 1 or 2; and/or (5) a Covered Species under the SSHCP. Appendices C and D summarize the potential for the occurrence of special-status species identified during the literature and desktop review. Figure 7 provides known occurrence locations of special-status species based on database search results. This section further summarizes the results of special-status species with the potential to occur within the PSA based on the database and literature evaluation and species-specific technical survey results.

4.5.1 Special-Status Plants

Results of the database searches of the USFWS Information for Planning and Consultation, CDFW CNDDB, the CNPS Inventory of Rare and Endangered Plants, and the SSHCP revealed a total of 16 special-status plant species that have known occurrences within the nine USGS 7.5-Minute Quads and/or within 5 miles of the PSA (CDFW 2020; CNPS 2020). Of these special-status plant species, 11 species have a low to moderate potential to occur in the PSA, and of these, nine are Covered Species under the SSHCP. Species with the potential to occur in the PSA are discussed in further detail below. The remaining five special-status plant species were removed from further consideration due to lack of suitable habitat within or adjacent to the PSA, no known occurrences within 5 miles of the PSA, and/or because the PSA is outside of the species' known geographic or elevation range. The plant species with no potential to occur in the PSA can be referenced in Appendix C. Results of the protocol-level botanical survey are summarized in Section 4.5.1.10.

4.5.1.1 Ahart's Dwarf Rush (*Juncus leiospermus* var. *ahartii)*

Ahart's dwarf rush (*Juncus leiospermus* var. *ahartii*) is a CRPR 1B.2 species (i.e., moderately threatened in California) and SSHCP Covered Species with a low potential to occur in the PSA. Ahart's dwarf rush is an annual herb that is native to California. The common blooming period for this species is March through May. This species can be found in mesic valley and foothill grassland habitat from approximately 98 to 750 feet amsl. This species has not been documented in the vicinity of the PSA, but the PSA is within the known range of the species. Habitat for the species is minimal and of low quality in the PSA, though the PSA does include SSHCP modeled habitat (Sacramento County 2018). Suitable habitat for this species in the PSA includes vernal pools, wetland swales and seasonal wetlands throughout both the solar development area and adjacent other lands. The nearest known occurrence for this species is within 5 miles of the PSA, located at the southeast corner of Keifer Boulevard and Sunrise Boulevard (CDFW 2020; Sacramento County 2018).

This species was not observed during protocol-level botanical surveys, as discussed below in Section 4.5.1.10.

4.5.1.2 Boggs Lake Hedge-Hyssop (*Gratiola heterosepala*)

Boggs Lake hedge-hyssop (*Gratiola heterosepala*) is a state endangered, CRPR 1B.2 species (i.e., moderately threatened in California) and SSHCP Covered Species with a moderate potential to occur in the PSA. Boggs Lake hedge-hyssop is an annual herb that is native to California. The common blooming period for this species is April

through August. This species can be found in clay soils in marshes, swamps, lake margins, and vernal pools from approximately 33 to 7,790 feet amsl. The PSA is within the known range of the species, and low-quality suitable habitat for the species is present throughout the PSA within the vernal pools, wetland swales, and seasonal wetlands of both the solar development area and adjacent other lands. The nearest known occurrence for this species is within 5 miles of the PSA, located approximately 0.85 miles southwest of the junction at Sloughhouse Road and Jackson Road (Highway 16) (CDFW 2020; Sacramento County 2018).

This species was not observed during protocol-level botanical surveys, as discussed below in Section 4.5.1.10.

4.5.1.3 Dwarf Downingia (*Downingia pusilla*)

Dwarf downingia *(Downingia pusilla*) is a CRPR 2B.2 species (i.e., moderately threatened in California) and SSHCP Covered Species with a moderate potential to occur in the PSA. Dwarf downingia is an annual herb that is native to California. The common blooming period for this species is March through May. This species can be found in mesic valley and foothill grassland and vernal pool habitat from approximately 3 to 1,455 feet amsl. The PSA is within the known range of the species, and suitable habitat for this species is located throughout the PSA within the vernal pools, wetland swales, and seasonal wetlands of the solar development area and adjacent other lands. The nearest known occurrences for this species are located west of the PSA in the Elk Grove USGS 7.5-Minute Quad and south to southwest in the Clay and Galt USGS 7.5-Minute Quads (CNPS 2020; Sacramento County 2018).

This species was not observed during protocol-level botanical surveys, as discussed below in Section 4.5.1.10.

4.5.1.4 Legenere (*Legenere limosa*)

Legenere (*Legenere limosa*) is a CRPR 1B.1 species (i.e., seriously threatened in California) and SSHCP Covered Species with a moderate potential to occur in the PSA. Legenere is an annual herb that is native to California. The common blooming period for this species is April through June. This species can be found in vernal pools from approximately 2 to 2,885 feet amsl. The PSA is within the known range of the species, and habitat for the species is present. There is also SSHCP modeled habitat in the PSA (Sacramento County 2018). Suitable habitat for this species is located throughout the PSA within the vernal pools, wetlands swales, and seasonal wetlands of the solar development area and adjacent other lands. The nearest known occurrences for this species are within 5 miles of the PSA, located approximately 2 miles northeast of the Nimbus Fish Hatchery and 1.8 miles east of the junction of Apple Road and Dillard Road (CDFW 2020; Sacramento County 2018).

This species was not observed during protocol-level botanical surveys, as discussed below in Section 4.5.1.10.

4.5.1.5 Pincushion Navarretia (*Navarretia myersii* ssp. *myersii*)

Pincushion navarretia (*Navarretia myersii* ssp. *myersii*) is a CRPR 1B.1 species (i.e., seriously threatened in California) and SSHCP Covered Species with a moderate potential to occur in the PSA. Pincushion navarretia is an annual herb that is native to California. The common blooming period for this species is April through May. This species can be found in often acidic vernal pools from approximately 66 to 1,080 feet amsl. The PSA is within the known range of the species, and habitat for the species is present. The PSA is also mapped as SSHCP modeled habitat for the species (Sacramento County 2018). Specifically, the Hadselville-Pentz and Redding Gravelly Loam soil complexes within the PSA are slightly acidic, and vernal pools located in these soils provide potential suitable

habitat. The nearest known occurrence for this species is within 5 miles of the PSA, located approximately 6 miles east of Highway 16, south of the Schneider Ranch property near Meiss Road (CDFW 2020; Sacramento County 2018; USDA 2020).

This species was not observed during protocol-level botanical surveys, as discussed below in Section 4.5.1.10.

4.5.1.6 Sacramento Orcutt Grass (*Orcuttia viscida*)

Sacramento Orcutt (*Orcuttia viscida*) grass is a federally and state endangered, CRPR 1B.1 species (i.e., seriously threatened in California) and SSHCP Covered Species with a moderate potential to occur in the PSA. Sacramento Orcutt grass is an annual herb that is native to California. The common blooming period for this species is April through July. This species can be found in vernal pools from approximately 98 to 330 feet amsl. The PSA is within the known range of the species, and habitat for the species is present. Suitable habitat for this species is located throughout the PSA within the vernal pools, wetland swales, and seasonal wetlands of both the solar development area and adjacent other lands. DCH is located approximately 4 miles northwest of the PSA and discussed further in Section 4.4.3. There are also several known occurrences for this species within 5 miles of the PSA, including numerous locations off Kiefer Boulevard near the intersection with Grant Line Road (CDFW 2020; USFWS 2020e).

This species was not observed during protocol-level botanical surveys, as discussed below in Section 4.5.1.10.

4.5.1.7 Sanford's Arrowhead (*Sagittaria sanfordii*)

Sanford's arrowhead (*Sagittaria sanfordii*) is a CRPR 1B.2 species (i.e., moderately threatened in California) and SSHCP Covered Species with a low potential to occur in the PSA. Sanford's arrowhead is a perennial rhizomatous emergent herb that is native to California. The common blooming period for this species is April through October (or sometimes November). This species can be found in assorted, shallow freshwater marshes and swamps from approximately sea level to 2,130 feet amsl. The PSA is within the known range of the species and perennially inundated habitat for the species is present but is minimal and of low quality. The PSA also includes SSHCP modeled habitat for the species (Sacramento County 2018). The nearest known occurrence for this species is within 5 miles of the PSA, located approximately 0.60 miles south of Meiss Road and southeast of Sloughhouse (CDFW 2020; Sacramento County 2018).

This species was not observed during protocol-level botanical surveys, as discussed below in Section 4.5.1.10.

4.5.1.8 Slender Orcutt Grass (*Orcuttia tenuis*)

Slender Orcutt grass (*Orcuttia tenuis*) is a federally threatened, state endangered, CRPR 1B.1 species (i.e., seriously threatened in California) and SSHCP Covered Species with a moderate potential to occur in the PSA. Slender Orcutt grass is an annual herb that is native to California. The common blooming period for this species is May through September. This species can be found in often gravelly vernal pools from approximately 115 to 5,770 feet amsl. The PSA is within the known range of the species, and suitable habitat for this species is located throughout the PSA within the vernal pools, wetland swales, and seasonal wetlands of both the solar development area and adjacent other lands. DCH is located approximately 4 miles northwest of the PSA. A known occurrence is also recorded for this species to the west of the PSA in the Elk Grove USGS 7.5-Minute Quad (CNPS 2020; USFWS 2020d).

This species was not observed during protocol-level botanical surveys, as discussed below in Section 4.5.1.10.

4.5.1.9 Tuolumne Button-Celery (*Eryngium pinnatisectum*)

Tuolumne button-celery (*Eryngium pinnatisectum*) is a CRPR 1B.2 species (i.e., moderately threatened in California) with a low potential to occur in the PSA. Tuolumne button-celery is an annual or perennial herb that is native to California. The common blooming period for this species is May through August. This species can be found in mesic cismontane woodland, lower montane coniferous forest, and vernal pools from approximately 230 to 3,000 feet amsl. This species has not been documented in the vicinity of the PSA, but the PSA is within the known range of the species. Habitat for the species in the PSA is minimal and of low quality and is in the vernal pools, wetland swales, and seasonal wetlands of the solar development area and adjacent other lands. The nearest known occurrences for this species are located to the east and northeast of the PSA in the Carbondale and Folsom SE USGS 7.5-Minute Quads (CNPS 2020).

This species was not observed during protocol-level botanical surveys, as discussed below in Section 4.5.1.10.

4.5.1.10 Protocol-Level Botanical Survey Results

Dudek conducted protocol-level botanical surveys in April and May 2021 in accordance with *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed, and Candidate Plants* (USFWS 2000), the *Protocol for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Sensitive Natural Communities* (CDFW 2018), and the *Botanical Survey Guidelines* (CNPS 2001).

As part of the protocol-level botanical surveys, Dudek first conducted reference population checks at known locations for species that were found to have a potential to occur within the PSA during the database and literature evaluation (Figure 7). On April 22, 2021, Dudek conducted reference population checks for mid to early late bloom species. Reference population checks yielded positive identification of Tuolumne button-celery, which typically blooms May through August, and was in early phenological stage at the time of observation. All other reference population checks for known special-status plant species yielded no observations, as well as abnormally dry conditions in suitable habitat features (Table 6).

Table 6. Botanical Reference Population Assessment Summary

Species	Location of Reference Population	Occurrence ID	Typical Bloom Period	Assessment Summary
Ahart's dwarf rush (*Juncus leiospermus* var. *ahartii*)	Illa Collin Preserve at Mather Field; off Zinfandel Drive, west side of road	8[1]	March–May	No special-status plant observed. Vernal pools very dry.
Boggs Lake hedge-hyssop (*Gratiola heterosepala*)	Illa Collin Preserve at Mather Field; off Zinfandel Drive,	84[1]	April–August	No special-status plant observed. Common hedge hyssop (*Gratiola ebracteata*) observed in drainage across from Zinfandel Drive. Vernal

Table 6. Botanical Reference Population Assessment Summary

Species	Location of Reference Population	Occurrence ID	Typical Bloom Period	Assessment Summary
	west side of road			pools very dry and in poor condition.
Boggs Lake hedge-hyssop (*Gratiola heterosepala*)	Illa Collin Preserve at Mather field; on Cobble Brook Road off Jaeger Road	57[1]	April–August	No special-status plant observed. Active construction surrounding preserve, no access. Visual observations indicate dry conditions.
Dwarf downingia (*Downingia pusilla*)	Phoenix Park, Fair Oaks	129[1]	March–May	No special-status plant observed. Vernal pools very dry and in poor condition.
Legenere (*Legenere limosa*)	Arno Road and Frontage Road	21[1]	April–June	No special-status plant observed. Vernal pools very dry and in poor condition.
Legenere (*Legenere limosa*)	Riley Road, Galt.	21[1]	April–June	No special-status plant observed. Vernal pools very dry and in poor condition.
Pincushion navarretia (*Navarretia myersii* ssp. myersii)	Twin Cities Road (38.388417°, −121.039917°)	77f0dd52-d335-427b-ac8e-8a292559491d[2]	April–May	No special-status plant observed. Private land with no access. Visual observations indicate dry conditions.
Sacramento Orcutt grass (*Orcuttia viscida*)	Southeast of Grantline Road, Rancho Cordova (38.58008, −121.196666)	b413c094-cc5f-4ddf-8239-9027599ed5c1[2]	April–	No special-status plant observed. Private land with no access. Visual observations indicate dry conditions.
Sanford's arrowhead (*Sagittaria sanfordii*)	Deer Creek Preserve (38.535833, −121.098889)	1f49032a-eb6d-4298-a5af-b74d3a2bbc5c[2]	May–October	No special-status plant observed. Plants observed were still in vegetative cycle.
Slender Orcutt grass (*Orcuttia tenuis*)	—	—	May–September	No special-status plant observed. No suitable reference population locations due to old occurrences that may be extirpated.
Tuolumne button-celery (*Eryngium pinnatisectum*)	1 mile north of Carbondale Road on Lambert Road	20[1]	May–August	Approximately 20 individuals observed, in bud and vegetative; however, identifiable due to bracts. Located on the west side of road.

Sources: CDFW 2020; CNPS 2020.
Notes:
1 California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB) occurrence ID.
2 University of California Davis Herbarium occurrence ID.

Due to the abnormally dry conditions from the lack of annual precipitation events in the 2020 through 2021 water year, species phenology for the region was observed to be atypical, with some species blooming earlier than typical and/or not at all. As such, only one mid to late early bloom protocol-level botanical survey was conducted on May 4, 2021, within the PSA, with focus on suitable habitat features for special-status species known to occur in the Project vicinity. No special-status species were observed during the protocol-level surveys conducted within the PSA.

4.5.2 Arborist Tree Survey and Inventory Results

International Society of Arboriculture Certified Arborists with California Tree and Landscaping Consulting Inc. conducted tree surveys and inventory on February 6, 2020, and December 2, 2020, and a total of 22 trees were inventoried within the PSA. Table 7 and Table 8 summarize all California Tree and Landscaping Consulting Inc. survey results within the PSA, as well as the trees' provided protection assignments according to the Sacramento County Tree Preservation Ordinance.

Table 7. Summary of Trees Inventoried within the Project Study Area

Tree Species	Total Trees Inventoried	Protected by Sacramento County Tree Preservation Ordinance	Total Trees Proposed for Removal
Protected Species			
Valley Oak (*Quercus lobata*)	1	1	0
Non-Protected Species			
Incense cedar (*Calocedrus decurrens*)	1	0	1
Oak species (*Quercus* ssp.)	1	0	0
Tree of heaven (*Ailanthus altissima*)	17	0	0
Unknown species	1	0	1
Valley oak (*Quercus lobata*)	1	0	0
Total	**22**	**1**	**2**

Source: CalTLC 2020.

Table 8. Summary of Tree Inventory Data

Field Tag	Protected	Common Name	Scientific Name	Multi-Stems	DBH	Measured At	Canopy Radius	Arborist Rating [a]	Tree Location in PSA
4001[b]	No	Incense cedar	*Calocedrus decurrens*	—	12	54	8	1	SDA
4002[b]	No	Unknown	*Unknown*	—	26	54	0	0	SDA
4403	No	Tree of heaven	*Ailanthus altissima*	—	7	36	12	3	SDA
4404	No	Tree of heaven	*Ailanthus altissima*	—	9	54	15	3	SDA

Table 8. Summary of Tree Inventory Data

Field Tag	Protected	Common Name	Scientific Name	Multi-Stems	DBH	Measured At	Canopy Radius	Arborist Rating [a]	Tree Location in PSA
4405	No	Tree of heaven	*Ailanthus altissima*	—	4	54	5	3	SDA
4406	No	Tree of heaven	*Ailanthus altissima*	—	5	54	5	3	SDA
4407	No	Tree of heaven	*Ailanthus altissima*	—	10	36	10	3	SDA
4408	No	Tree of heaven	*Ailanthus altissima*	—	12	36	15	3	SDA
4409	No	Tree of heaven	*Ailanthus altissima*	—	12	24	15	3	SDA
4410	No	Tree of heaven	*Ailanthus altissima*	—	8	24	10	3	SDA
4411	No	Tree of heaven	*Ailanthus altissima*	—	5	54	8	3	SDA
4412	No	Oak	*Quercus sp.*	—	0	54	0	0	SDA
4413	No	Tree of heaven	*Ailanthus altissima*	2,3,4,5	7	54	6	3	SDA
4414	No	Tree of heaven	*Ailanthus altissima*	8,8	11	54	15	3	SDA
4415	No	Tree of heaven	*Ailanthus altissima*	—	18	36	20	3	SDA
4416	No	Tree of heaven	*Ailanthus altissima*	—	20	54	18	3	AOL
4417	No	Tree of heaven	*Ailanthus altissima*	—	19	24	8	3	AOL
4418	No	Tree of heaven	*Ailanthus altissima*	—	13	54	15	3	AOL
4419	No	Tree of heaven	*Ailanthus altissima*	—	36	54	20	3	AOL
4420	No	Tree of heaven	*Ailanthus altissima*	—	9	54	8	3	AOL
4421	Yes	Valley oak	*Quercus lobata*	—	32	54	28	3	AOL
4422[b]	No	Valley oak	*Quercus lobata*	—	0	54	—	0	AOL

Source: CalTLC 2020.
Notes: DBH = diameter at breast height; PSA = Project Study Area; SDA = Solar Development Area; AOL = Adjacent Other Lands
[a] 0=Dead; 3= Fair.
[b] Recommendations – Remove due to defects.

Based on the tree inventory results captured in Table 7 and Table 8, one tree (i.e., tree number 4421, valley oak) is protected by Sacramento County Tree Preservation Ordinance; however, this tree will not be impacted by Project

activities as it resides within the adjacent other lands of the PSA. Tree numbers 4001, 4002, and 4422 are recommended to be removed (per Arborist Report), as they are either dead or have extreme problems and are in severe decline. Therefore, these three trees will be directly impacted, as they are situated within the solar development area. Tree numbers 4003, 4004, 4405, 4406, 4407, 4408, 4409, 4410, 4411, 4412, 4413, 4414, and 4415 are also situated within the solar development area. Tree numbers 4412 and 4422 are native oak trees; however, they are not protected as they are dead. In total, 16 trees (tree numbers 4001, 4002, 4003, 4004, 4405, 4406, 4407, 4408, 4409, 4410, 4411, 4412, 4413, 4414, 4415, and 4422) will be directly impacted and may need to be removed, depending on Project activities. Tree numbers 4001 and 4002 are located approximately in the center of the solar development area. Tree numbers 4003, 4004, 4405, 4406, 4407, 4408, 4409, 4410, 4411, 4412, 4413, 4414, 4415, and 4422 are located approximately in the northwest area of the solar development area, except for 4422 which is located in the adjacent other lands.

4.5.3 Special-Status Wildlife

Results of the database searches of the USFWS Information for Planning and Consultation, the CDFW CNDDB, and the SSHCP revealed 23 special-status wildlife species that have known occurrences either within the nine USGS 7.5-Minute Quads or within 5 miles of the PSA. Of these 23 special-status wildlife species, 20 have a low to high potential to occur in the PSA or are known to occur in the PSA, and of these, 14 are Covered Species under the SSHCP. In addition, the PSA provides habitat for nesting birds protected by the federal MBTA and CFGC and native bats protected by the CFGC. The remaining three special-status wildlife species were removed from further consideration due to lack of suitable habitat within or adjacent to the PSA, no known occurrences within 5 miles of the PSA, and/or the PSA being outside of the species' known geographic range. The special-status wildlife species with no potential to occur in the PSA can be referenced in Appendix D. Results of the various wildlife technical studies are summarized in Sections 4.5.3.1 through 4.5.3.21.

4.5.3.1 California Tiger Salamander (*Ambystoma californiense*)

CTS is a federally and state threatened species with a moderate potential to occur in the PSA. CTS is most associated with annual grassland habitats but may also occur within open woodland areas of low hills and valleys. Necessary habitat components for CTS include suitable underground retreats and breeding ponds. CTS spend most of their adult life within suitable underground refugia, such as the burrows of California ground squirrel (*Spermophilus beecheyi*) and pocket gopher (*Thomomys* sp.) or other small mammal burrows; occasionally CTS will occupy human-made structures. Suitable underground refugia for CTS provides cover from predators, protection from desiccation during the dry season, and foraging habitat (Stebbins and McGinnis 2012; USFWS 2005). Suitable breeding sites include vernal pools, seasonal wetlands, stock ponds, or slow-moving streams that do not support fish, although streams are rarely used for reproduction. This species may use permanent human-made ponds if predatory species (e.g., fish, crayfish) are absent (Fisher and Shaffer 1996).

CTS have been reported to migrate up to 1.3 miles between breeding ponds and upland habitat (Orloff 2007); however, only a small number of individuals likely travel this distance (Orloff 2011). The estimated average migration distance is estimated to be 1,844 feet (Searcy and Shaffer 2011). Several studies have indicated that, depending on habitat and life stage, the majority of CTS (between 50% and 95% of adults) travel between 0.09 and 0.5 miles and adult captures declined with increased distance from the breeding pond (Trenham and Shaffer 2005; Orloff 2011),

Although CTS has not been documented in the PSA, this species is known to occur in the vicinity of the PSA. CTS is an SSHCP Covered Species and suitable habitat, as well as SSHCP-modeled aquatic and upland habitat, is present within the PSA (Sacramento County 2018). Specifically, there are known occurrences for CTS 5 miles southeast of the PSA, southeast of Laguna Creek, approximately 0.25 miles southeast of Katena Lane at Clay Station Road (CDFW 2020; USFWS 2020a). The site is at the extreme northern extent of the presumed species range (Sacramento County 2018), as the Cosumnes River provides a barrier to movement. A summary of the CTS aquatic larval survey results is provided below.

California Tiger Salamander Preliminary Habitat Assessment and Aquatic Larval Survey Results

Prior to conducting the CTS aquatic larval surveys, a CTS preliminary habitat assessment of aquatic features was conducted to evaluate for the potential for CTS to occur within 2 kilometers of the solar development area, south of the Cosumnes River. Dudek identified a total of 34 aquatic resources within 2 kilometers of the solar development area. Of these 34 identified resources, a total of 13 could not be excluded as having potential for CTS to occur and 21 were determined to have little to no likelihood for CTS to occur based on ponding duration (either too brief or perennial) and known or suspected presence of predatory fish or bullfrogs (Figure 8, California Tiger Salamander Habitat Assessment). Generally, the features that could not be eliminated as potential CTS aquatic habitat were toward the edge or the 2 kilometer buffer or had significant barriers to movement toward the solar development area such as orchards or concentrations of residential development. The potential upland habitat within the PSA is also not unique or especially high quality, based on the generally low density of small mammal burrows that would be used by CTS.

Dudek conducted CTS aquatic larval surveys on March 16, April 15, and April 28, 2021, within the PSA in accordance with the *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or Negative Findings of California Tiger Salamander* (USFWS 2003). Surveys were conducted by Allie Sennett, a Dudek biologist holding a valid USFWS 10(a)(1)(A) Recovery Permit for the species (Permit No. TE55068D-0). Surveys were specifically conducted within all suitable breeding habitat (i.e., seasonal bodies of standing water) for CTS located in the PSA, which included pond 1 (0.28 acres), pond 2 (0.37 acres), and pond 3 (16.36 acres). Pond 1 and pond 3 are located within adjacent other lands, and pond 2 is located within the solar development area of the PSA (Figure 5). Pond 1 and pond 3 were highly disturbed due to cattle activity and dredging by the landowner. Soils in these ponds were unconsolidated and no emergent vegetation or other structure was present for deposition of eggs. The recent dredging of pond 3 had increased pond depth such that surveyors could only access the pond edges; however, CTS larvae do not typically use such deeper waters. Pond 2 adjoins and overflows into an adjacent vernal pool (VP-08), which was also surveyed for presence of larval CTS; therefore, only the edges of pond could be sampled due to depth and unconsolidated earth.

There were no observations of CTS during the aquatic larval surveys conducted within the PSA (Table 9). There were no incidental observations of CTS within the aquatic features in the PSA during wet season large-listed branchiopod surveys or during focused CTS surveys. Lastly, no incidental observations of CTS or suitable burrows were made in the uplands within the PSA during the additional field studies.

Table 9. California Tiger Salamander Aquatic Larval Survey Results Summary

Survey Pass[1]	Survey Time	Weather Conditions (°C)	Average Pond Depth (inches)	Pond Inundation (%)	Water Temperature	Turbidity[2]	Aquatic Vegetation Present	Dip Net Area (SqFt)	Invertebrates Observed	Vertebrate Observed	Larval Length (mm)
Pond 1											
1	1125	9, clear, windy	9	70	14	H	No	5,000	Yes	No	—
2	0940	9, clear, windy	2	60	23	H	Yes	7,300	Yes	Yes	—
3	1125	9, clear, windy	≥10	90	13	L	No	Access only at edge of pond	Yes	No	—
Pond 2											
1	1340	22, clear	0.80	10	29.8	H	No	1,400	Yes	No	—
2	1150	22, clear	1	40	18.4	H	Yes	4,300	Yes	Yes	—
3	1230	22, clear	≥5	60	23.5	H	No	Access only at edge of pond	Yes	No	—
Pond 3											
1	1228	28, clear	5.9	60	28.6	H	No	1,000	Yes	No	—
2	1540	28, clear	15.7	20	31.4	H	No	1,300	Yes	No	—
3	1728	28, clear	15	70	29.8	H	No	Access only at edge of pond	Yes	No	—

Notes:

1 Survey Pass 1 – March 16, 2021; Survey Pass 2 – April 15, 2021, Survey Pass 3 – April 28, 2021.

2 Turbidity – H = High; M= Moderate; L= Low

Pond 1 – Poor quality breeding habitat, highly denuded due to dredging and cattle activity.

Pond 2 – Adjoins/overflows into adjacent vernal pool (i.e., VP-08), which was also surveyed.

Pond 3 – Poor quality breeding habitat, highly denuded due to dredging and cattle activity; highly disturbed with unconsolidated soil; emergent vegetation present; poor quality and highly turbid water; recently dredged by landowner; therefore, only the edges of pond could be sampled due to depth and unconsolidated earth.

4.5.3.2 California Red-Legged Frog (*Rana draytonii*)

California red-legged frog (*Rana draytonii*) is a federally threatened species and state SSC with a low potential to occur in the PSA. California red-legged frog occur in different habitats depending on their life stage, the season, and weather conditions. Breeding habitat includes coastal lagoons, marshes, springs, permanent and semi-permanent natural ponds, and ponded and backwater portions of streams. These frogs also breed in artificial impoundments including stock ponds, irrigation ponds, and siltation ponds. Creeks and ponds with dense growths of woody riparian vegetation, especially willows (*Salix* spp.) are preferred, although the absence of vegetation at an aquatic site does not rule out the possibility of occupancy. Adult California red-legged frog prefer dense, shrubby, or emergent riparian vegetation near deep (2 to 3 feet) still or slow-moving water, especially where dense stands of overhanging willow and an intermixed fringe of cattail occur adjacent to open water.

California red-legged frog has not been documented in the vicinity of the PSA and the habitat on site is of low quality. This species has been eliminated from the valley floor and populations along the western slope of the Sierra Nevada

have been fragmented or eliminated (USFWS 2002a, 2020b). In addition, there are no known occurrences for California red-legged frog within 5 miles of the PSA (CDFW 2020). No California red-legged frog were observed during reconnaissance-level field surveys.

4.5.3.3 Western Spadefoot Toad (*Spea hammondii*)

WST is a state SSC with a moderate potential to occur in the PSA. WST is almost completely terrestrial, entering temporal pools and drainages only to breed. The species aestivates within rodent burrows in upland habitats near aquatic breeding sites (Stebbins 1972). The species prefers open areas with sandy or gravelly soils in a variety of habitats, including mixed woodlands, grasslands, coastal sage scrub, chaparral, sandy washes, river floodplains, alluvial fans, playas, and alkali flats (Stebbins 2003; Holland and Goodman 1998). However, the species is most common in grasslands with vernal pools or mixed grassland/coastal sage scrub areas and is most active during periods of rain (Holland and Goodman 1998).

Although WST has not been documented in the PSA, this species is known to occur in the PSA vicinity. WST is an SSHCP Covered Species and suitable habitat, as well as SSHCP modeled aquatic and upland habitat, is present within the PSA (Sacramento County 2018). In addition, there are known occurrences for WST within 4.8 miles of the PSA, located on the west side of Sloughhouse Road, approximately 0.90 miles south of Highway 16 (CDFW 2020; USFWS 2020a).

Focused Western Spadefoot Toad Survey Results

Dudek conducted focused surveys for WST within the PSA in conjunction with both the CTS aquatic larval surveys and the protocol-level large listed branchiopod wet season surveys (see Section 4.5.3.17) in accordance with the most recent published literature and recommendations from CDFW and under the guidance of Dudek species experts. Both the solar development area and the adjacent other lands within the PSA provide suitable aquatic and upland aestivation sites for WST. No WST or their larval masses were observed during focused surveys.

4.5.3.4 Central Valley Steelhead Distinct Population Segment (*Oncorhynchus mykiss irideus*)

The Central Valley steelhead distinct population segment (DPS) is a federally threatened species that is known to occur within 5 miles of the PSA and has designated EFH within the western boundary of the PSA along the Cosumnes River. Adult steelhead spawn in relatively high-gradient reaches of tributary rivers and require streams with cool, clean, well-oxygenated water and suitably sized spawning gravel that is generally free of fine sediments (i.e., sand, silt, and clay) (Moyle 2002). Spawning water depth ranges from 15 to 60 centimeters (preferred depth of 35 centimeters) typically in gravel-sized substrate, but also in a mixture of sand-gravel and gravel-cobble (McEwan and Jackson 1996). Juvenile steelhead require year-round flows, suitable water temperatures, adequate cover, and abundant food to support growth and survival to the smolt stage. Summer rearing habitat consisting of pools, cool, well-oxygenated water, and sufficient cover are often cited as major limiting factors for juvenile steelhead in California streams when one or more of these habitat conditions are absent (Moyle 2002).

The Central Valley steelhead DPS species has been documented in the Cosumnes River in the PSA (CDFW 2020). There is EFH for this species located approximately 10 miles northwest of the PSA along the American River in Rancho Cordova (USFWS 2020a). Based on field observations, the Cosumnes River within the PSA is deep, lacks riffle habitat, and contains a bedrock bottom that is absent of sand, gravel, or cobble that is suitable substrate for

spawning steelhead. In addition, the river contains limited shaded areas or overhanging banks and in-stream structures, such as downed trees, that normally provide cover and foraging opportunities for rearing juvenile steelhead. For these reasons, EFH for steelhead in the Cosumnes River within the PSA only provides habitat for migrating steelhead and generally lacks spawning and rearing habitat for this DPS. No Central Valley steelhead were observed during reconnaissance-level field surveys.

4.5.3.5 Northwestern Pond Turtle (*Actinemys marmorata*)

Northwestern pond turtle (*Actinemys marmorata*) is a state SSC with a moderate potential to occur in the adjacent other lands of the PSA. This species is found in rivers, lakes, streams, ponds, wetlands, ephemeral creeks, reservoirs, agricultural ditches, estuaries, and brackish waters. Northwestern pond turtles prefer areas that provide cover from predators, such as vegetation and algae, as well as basking sites for thermoregulation. Adults tend to favor deeper, slow moving water, whereas hatchlings search for slow and shallow water that is slightly warmer. Terrestrial habitats are used for wintering and usually consist of burrows in leaves and soil. Northwestern pond turtles also lay their eggs in terrestrial habitats normally near water. Although nesting sites should contain deep soils (at least 4 inches deep), the type of soil can vary from sandy to very hard.

Although northwestern pond turtle has not been documented in the PSA, this species is known to occur in the PSA vicinity and marginal suitable habitat is present in the PSA, specifically in the other lands adjacent to the Cosumnes River. Northwestern pond turtle is an SSHCP Covered Species and modeled aquatic and upland habitat is also present within the PSA (Sacramento County 2018). There are known occurrences for northwestern pond turtle within 5 miles of the PSA, located at Laguna Creek approximately 2.70 miles northeast of Clay Station Road (CDFW 2020). No northwestern pond turtles were observed during reconnaissance-level field surveys.

4.5.3.6 Giant Garter Snake (*Thamnophis gigas*)

Giant garter snake (*Thamnophis gigas*) is a federally and state threatened species with a low potential to occur in the PSA. Giant garter snake is primarily aquatic and prefers marshes, sloughs, wetlands, agricultural ditches, rice fields, and other slow moving or still waters with emergent vegetation that is necessary for cover and foraging, and upland habitat consisting of grassy banks and openings for basking and aestivation in the summer and torpor in the winter (Hansen 1988). Suitable habitat components consist of (1) adequate water during the snake's active period (i.e., early spring through mid-fall) to provide a prey base and cover; (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat; (3) upland habitat for basking, cover, and retreat sites; and (4) high-elevation uplands for cover and refuge from flood waters. Giant garter snake is typically absent from larger rivers and other water bodies that support introduced populations of large, predatory fish, and from wetlands with sand, gravel, or rock substrates. Riparian woodlands do not provide habitat because of excessive shade, lack of basking sites, and absence of prey populations (USFWS 2017a).

Giant garter snake has not been documented in the vicinity of the PSA and the habitat in the PSA is of low quality. There are no known occurrences within 5 miles of the PSA (CDFW 2020; USFWS 2020a). No giant garter snakes were observed during reconnaissance-level field surveys. Giant garter snake is an SSHCP Covered Species; however, modeled aquatic and upland habitat is not present within the PSA (Sacramento County 2018).

4.5.3.7 Bald Eagle (*Haliaeetus leucocephalus*)

Bald eagle (*Haliaeetus leucocephalus*) is a federally delisted species and state endangered and fully protected species that is known to occur within the PSA. In California, most nesting bald eagles are found in the northern part of the state, but pairs nest locally south through the Sierra Nevada, coastal counties in Central and Southern California, and on the Channel Islands. Bald eagles typically nest in large conifers or on rock outcrops near aquatic features, but also occasionally in large hardwoods, such as sycamores and oaks (Anthony et al. 1982; USFWS 1986). They usually nest in one of the largest trees available in proximity of water and generally situated with a prominent overview of the surrounding area (Buehler 2000). Bald eagles preferentially forage on fish and waterfowl, but their diet varies regionally and seasonally in response to locally available resources, and often includes a variety of mammals, as well as carrion, especially in winter (Todd et al. 1982; Stalmaster 1987; Ewins and Andress 1995; Buehler 2000).

Although nesting habitat throughout the PSA is generally absent to limited, bald eagles were observed in both the PSA and the surrounding vicinity during field studies conducted by Dudek in 2020–2021. Specifically, one eagle was observed perched on a wooden fence post in the vicinity of an anchovy production facility (i.e., north of Meiss Road), and another was observed up to three separate times perched on a tree snag on an island in the middle of pond 3 in the southeast corner of the PSA in the adjacent other lands. These eagles were likely winter migrants to the area and/or foraging along the Cosumnes River corridor.

4.5.3.8 Bank Swallow (*Riparia riparia*)

Bank swallow (*Riparia riparia*) is a state threatened species with a moderate potential to occur in the PSA. In California, this species is found primarily west of deserts in riparian and other lowland habitats during the spring–fall period. In summer, bank swallows are restricted to riparian, lacustrine, and coastal areas with vertical banks, bluffs, and cliffs with fine textured sandy soils, into which they dig nesting holes. Approximately 75% of the breeding population in California occurs along banks of the Sacramento and Feather Rivers in the northern Central Valley. Breeding colonies can have between 10 and 1,500 nesting pairs, but typically have between 100 and 200 nesting pairs (CDFW 2020).

The PSA provides suitable migratory habitat for bank swallow but is located outside the breeding range for this species. There are known occurrences of bank swallow within 5 miles of the PSA, located on the Cosumnes River approximately 0.25 miles downstream of Bridge House (CDFW 2020; Cornell Lab 2021; USFWS 2020a). No bank swallows were observed during reconnaissance-level field surveys.

4.5.3.9 Burrowing Owl (*Athene cunicularia*)

BUOW is a state SSC known to occur in the PSA. In California, BUOWs are yearlong residents of open, dry grassland and desert habitats and grass, forb, and open shrub stages of pinyon-juniper and ponderosa pine habitats (CDFW 2020). Preferred habitat is typified by short, sparse vegetation with few shrubs, level to gentle topography, and well-drained soils. The presence of burrows is the most essential component of BUOW habitat, as they are required for nesting, roosting, cover, and caching prey (Poulin et al. 2011). In California, BUOWs most commonly live in burrows created by California ground squirrels. BUOWs may also occur in human-altered landscapes such as agricultural areas, ruderal grassy fields, vacant lots, and pastures if the vegetation structure is suitable (i.e., open, and sparse),

usable burrows are available, and foraging habitat occurs in proximity (Gervais et al. 2008). Debris piles, riprap, culverts, and pipes can also be used for nesting, shelter, and roosting.

There is suitable habitat for BUOW in the PSA, as well as recorded presence. BUOW is an SSHCP Covered Species and modeled wintering habitat is present within the PSA (Sacramento County 2018). A summary of the protocol-level BUOW surveys results is provided below.

Protocol-Level Burrowing Owl Breeding Season Survey Results

Dudek conducted protocol-level BUOW surveys within the PSA and visual surveys within the surrounding vicinity (i.e., up to 500 feet) on February 18 and 25, 2021 (Pass 1); March 4 and 16, 2021 (Pass 2); April 9 and 15, 2021 (Pass 3), and May 3, 2021 (Pass 4). Surveys were conducted in accordance with the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012), and the *Burrowing Owl Survey Protocol and Mitigation Guidelines* (California Burrowing Owl Consortium 1993). A total of 22 BUOW observations, mostly of suitable burrows but including two visual observations of BUOW, were made during the four survey passes conducted in 2021. Specifically, the two visual observations were of individual BUOWs and not ancillary observations such as burrows, whitewash, etc. Observations were made within areas that provided suitable burrowing and foraging habitat, including both the solar development area and the adjacent other lands within the PSA (Figure 11, Burrowing Owl, Swainson's Hawk, and Tricolored Blackbird Survey Results; Table 10).

Table 10. Protocol-Level Burrowing Owl Breeding Season Survey Results Summary

Date	Observation Summary	Observation Location (decimal degrees)	
		Latitude	Longitude
Survey Pass 1			
2/18/2021	Burrow - potential, single	38.46777976°	−121.1795649°
2/18/2021	Burrow - potential, single	38.47138943°	−121.1811695°
2/18/2021	Burrow - potential, single	38.48260533°	−121.1887913°
2/25/2021	Burrow - potential, single	38.48344044°	−121.1933353°
2/25/2021	Visual - flushed	38.47075249°	−121.1851769°
2/25/2021	Burrow - potential, single	38.46530577°	−121.1830474°
2/25/2021	Burrow - potential, single	38.46525486°	−121.1830911°
2/25/2021	Burrow - potential, single	38.46460451°	−121.1851927°
2/25/2021	Burrow - potential, single	38.46465651°	−121.1849397°
2/25/2021	Burrow - potential, single	38.46552494°	−121.1860965°
2/25/2021	Burrow - potential, single	38.46707128°	−121.1830843°
Survey Pass 2			
3/4/2021	Burrow - potential, single	38.46957097°	−121.1886550°
3/4/2021	Burrow - potential, single	38.47086409°	−121.1883382°
3/4/2021	Burrows - potential, multiple	38.46942884°	−121.1895094°
3/16/2021	Burrow - potential, single	38.46668135°	−121.1792350°
Survey Pass 3			
4/9/2021	Burrow - potential, single	38.48130423°	−121.1872571°
4/9/2021	Burrows - potential, multiple	38.48023688°	−121.1880083°

Table 10. Protocol-Level Burrowing Owl Breeding Season Survey Results Summary

Date	Observation Summary	Observation Location (decimal degrees)	
		Latitude	Longitude
4/15/2021	Burrows - potential, multiple	38.46501097°	−121.1844780°
4/15/2021	Burrow - potential, single	38.46952106°	−121.1840387°
4/15/2021	Burrow - potential, single	38.46487298°	−121.1859698°
4/15/2021	Burrow - potential, single	38.46586949°	−121.1846340°
Survey Pass 4			
5/4/2021	Visual - flushed	38.47255171°	−121.1794499°

4.5.3.10 Common Yellowthroat (*Geothlypis trichas sinuosa*)

Common yellowthroat (*Geothlypis trichas sinuosa*) is a state SSC with a low potential to nest in the PSA. This species nests and forages in emergent wetlands including woody swamp, brackish marsh, and freshwater marsh. Common yellowthroat also breeds in valley foothill riparian, and occasionally in desert riparian, annual grassland, and perennial grassland habitats. During migration, they are found in other moist habitats with low dense vegetation (CDFW 2020).

Although the PSA provides suitable foraging habitat for common yellowthroat, this species is not common in inland habitats during the breeding season, especially in the Central Valley. In addition, there are no known occurrences of this species within 5 miles of the PSA (CDFW 2020; USFWS 2020a). No common yellowthroats were observed during reconnaissance-level field surveys.

4.5.3.11 Golden Eagle (*Aquila chrysaetos*)

Golden eagle (*Aquila chrysaetos*) is a federally fully protected species and a state watchlist species with a low potential to nest in the PSA. Golden eagle is a year-round, diurnally active species that is a permanent resident and migrant throughout California where it tends to occupy mountain, foothill, and desert areas. Foraging habitat for this species includes open habitats with scrub, grasslands, desert communities, and agricultural areas. This species typically nests on cliffs within canyons and escarpments and in large trees (generally in open habitats) primarily within rugged, hilly, or mountainous terrain (Garrett and Dunn 1981; Johnsgard 1990). Most nests are located on cliffs or trees near forest edges or in small stands near open fields, but golden eagle is also known to utilize electrical transmission towers and similarly sized structures as nest sites (Garrett and Dunn 1981; Johnsgard 1990; Kochert et al. 2002; Scott 1985). Golden eagles commonly build, maintain, and variably use multiple alternative nest sites in their breeding territories, routinely refurbishing and reusing individual nests over many years.

The PSA lacks cliff and canyon nesting habitat and only provides foraging habitat for golden eagle. There are no known occurrences of golden eagle within 5 miles of the PSA (CDFW 2020; USFWS 2020a). No golden eagles were observed during reconnaissance-level field surveys.

4.5.3.12 Swainson's Hawk (*Buteo swainsoni*)

SWHA is a state threatened species known to occur in the PSA. In California, this species nests in the Central Valley and smaller adjacent valleys, the Klamath Basin, the Northeastern Plateau, Lassen County, and the Mojave Desert. It breeds in riparian areas, stands of trees in agricultural environments, oak savannah, Joshua trees (*Yucca brevifolia*) in the Mojave Desert, and juniper-sage flats. In the San Joaquin Valley, it nests in riparian areas and in isolated tree clusters, often near rural residences or other areas with some human disturbance. Alfalfa fields are the favored foraging areas of SWHA in the Central Valley, but the species also forages in undisturbed grasslands, fallow agricultural fields, and some row crops.

There are known occurrences of SWHA within the PSA. SWHA is an SSHCP Covered Species and modeled foraging and nesting habitat is located within and immediately adjacent to the PSA (Sacramento County 2018). A summary of the protocol-level SWHA survey results is provided below.

Protocol-Level Swainson's Hawk Survey Results

Dudek conducted protocol-level SWHA surveys within the PSA and visual surveys up to 0.5 miles from the solar development area on February 18 and 25, 2021 (Pass 1); March 4 and March 16, 2021 (Pass 2); April 9 and 15, 2021 (Pass 3); May 3, 2021 (Pass 4); and June 4, 2021 (Pass 5). Surveys were conducted in accordance with the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (SHTAC 2000). A total of nine SWHA observations, including foraging and courting, were made during the five survey passes conducted in 2021. No nesting observations were made. Observations were made within areas that primarily provided suitable foraging habitat, as well as some nesting habitat, including both the solar development area and the adjacent other lands within the PSA (Figure 11; Table 11).

Table 11. Protocol-Level Swainson's Hawk Survey Results Summary

Date	Observation Summary	Observation Location (decimal degrees)	
		Latitude	Longitude
Survey Pass 1			
2/25/2021	Raptor nest - unoccupied	38.47971791°	−121.1895586°
Survey Pass 2			
3/16/2021	Foraging - juvenile	38.48067111°	−121.1836011°
Survey Pass 3			
4/9/2021	Visual flight	38.47189084°	−121.1801946°
4/9/2021	Visual flight	38.47821603°	−121.1885398°
4/9/2021	Perched	38.48351407°	−121.1889381°
4/14/2021	Visual flight- pair	38.48424802°	−121.1885927°
4/15/2021	Foraging	38.46309840°	−121.1824983°
4/15/2021	Courting pair	38.46538260°	−121.1829533°
Survey Pass 4			
5/4/2021	No observations	—	—

Table 11. Protocol-Level Swainson's Hawk Survey Results Summary

Date	Observation Summary	Observation Location (decimal degrees)	
		Latitude	Longitude
Survey Pass 5			
6/8/2021	No observations	—	—

Swainson's Hawk and Other Raptor Foraging and Land Use Study Results

As noted in Section 3.2.3.8, Estep Environmental Consulting conducted two 1-year studies in 2013 and 2021 to assess raptor use of solar array fields in Sacramento County, including the Dillard Road solar array that is immediately adjacent to the Project (Estep Environmental Consulting 2013, 2021). Refer to Section 3.2.3.8 for details on the findings of the 2013 study and Appendix A for the report synthesizing findings of the 2013 and 2021 studies. The studies indicate that raptors including SWHA continued to use moderately sized solar array fields following conversion from cultivated uses. Results of the strip transect road survey indicate raptor use in general, and specifically SWHA and American kestrel use, of solar array fields exceeds expected use based on their availability within the agricultural landscape. This suggests that solar array fields are not avoided by these species and may be selected at a greater frequency than many cultivated land cover types. The stationary observation point surveys confirmed use within solar array fields, including foraging or potential foraging use by all species. The study suggested that management of a grassland substrate to promote rodent populations and maintaining this substrate at a height that promotes visibility and access to prey is favorable to continued raptor usage. Unlike most crop types, these grassland conditions are available in solar fields throughout the spring and summer breeding season, and thus can provide a consistent and available source of prey.

4.5.3.13 Tricolored Blackbird (*Agelaius tricolor*)

TRBL is a state threatened species with known occurrences within the PSA. This species typically nests in freshwater marshes with dense growths of emergent vegetation dominated by cattails or bulrushes, but has also established colonies in willows, blackberries (*Rubus* spp.), and a variety of other types of dense, herbaceous vegetation, such as thistles (*Cirsium* and *Centaurea* spp.) and nettles (*Urtica* spp.). TRBLs forage in a variety of habitats, such as grasslands and croplands, where high densities of suitable insect prey are found.

SSHCP has modeled nesting and foraging TRBL habitat located within the solar development area (Sacramento County 2018). In addition, there are several known occurrences of TRBL within 5 miles of the PSA, with the nearest approximately 0.40 miles south of Dillard Road (which runs adjacent to the PSA) at its intersection with Highway 16 (CDFW 2020; USFWS 2020a).

There are known occurrences of TRBL within the PSA. A summary of the TRBL focused survey results is provided below. TRBL is an SSHCP Covered Species and modeled nesting, and foraging habitat is located within the PSA (Sacramento County 2018).

Tricolored Blackbird Focused Survey Results

Dudek conducted focused TRBL surveys within the PSA on February 18 and 25, 2021 (pass 1); March 16 and 17, 2021 (Pass 2); April 9 and 15, 20201 (Pass 3); and May 3, 2021 (Pass 4). Surveys were conducted in accordance

with the *Staff Guidance Regarding Avoidance of impacts to Tricolored Blackbird Breeding Colonies on Agricultural Fields* (CDFW 2015). A total of six TRBL species observations, including foraging, were observed during the four total survey passes conducted in 2021. No nesting colonies were observed. The PSA, both within the solar development area and the adjacent other lands, provides suitable foraging habitat for TRBL. Nesting habitat is generally absent from the PSA; however, sites exist just outside the western PSA near the Cosumnes River (Table 12; Figure 11).

Table 12. Focused Tricolored Blackbird Survey Results Summary

Date	Observation Summary	Observation Location (decimal degrees)	
		Latitude	Longitude
Survey Pass 1			
2/18/2021	No observations	—	—
2/25/2021	No observations	—	—
Survey Pass 2			
3/17/2021	Perched - mixed flock	38.48186885°	−121.1855454°
3/17/2021	Perched - mixed flock	38.48186885°	−121.1855454°
Survey Pass 3			
4/9/2021	Vocalizing	38.47405814°	−121.1875744°
4/9/2021	Foraging, perched, vocalizing - mixed flock	38.48160789°	−121.1859765°
4/9/2021	Perched, vocalizing - various	38.48044310°	−121.1824292°
4/15/2021	Perched, vocalizing - various	38.47428959°	−121.1891113°
Survey Pass 4			
5/3/2021	No observations	—	—

4.5.3.14 White-Tailed Kite (*Elanus leucurus*)

White-tailed kite (*Elanus leucurus*) is a state fully protected species known to occur in the PSA. White-tailed kites occur in grasslands, marshes, and lowland scrub habitats, and nest in dense foliage in taller- to medium-size trees near foraging habitat. This species may also forage in meadows, agricultural fields, other types of emergent wetlands, and disturbed lands. White-tailed kites feed principally on rodents, especially voles (CDFW 2020).

There are several known occurrences for white-tailed kite in or adjacent to the PSA (CDFW 2020). The SSHCP shows one white-tailed kite occurrence and modeled nesting habitat along the riparian habitat adjacent to the Cosumnes River at the northern edge of Assessor's Parcel No. 126-0110-001. There is also SSHCP modeled foraging habitat within the PSA (Sacramento County 2018). During the reconnaissance-level biological surveys conducted by Dudek in 2021, various observations of white-tailed kite were made in both the solar development area and adjacent other lands of the PSA. Observations specifically included foraging, hovering, perching, and flight.

4.5.3.15 Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)

VELB is a federally threatened species known to occur in the PSA. VELB is completely dependent on its host plant, elderberry (*Sambucus* ssp.), which occurs in riparian and other woodland communities in California's Central Valley and the associated foothills. Female beetles lay their eggs in crevices on the stems or on the leaves of living elderberry plants. When the eggs hatch, larvae bore into the stems. The larval stages last for 1 to 2 years. The fifth instar larvae create emergence holes in the stems and then plug the holes and remain in the stems through pupation. Adults emerge through the emergence holes from late March through June. The short-lived adult beetles forage on leaves and flowers of elderberry shrubs.

There are several known occurrences of this species documented in the western part of the PSA (CDFW 2020; USFWS 2007a; USFWS 2020a). VELB is an SSHCP Covered Species and modeled habitat is present within the PSA (Sacramento County 2018). A summary of the VELB focused survey results is provided below.

Valley Elderberry Longhorn Beetle Focused Survey Results

Dudek conducted focused surveys for VELB within the PSA on February 19 and 25, 2021, and January 12, 2022; see Table 13 and Figure 9, Valley Elderberry Longhorn Beetle Results. Surveys were conducted in accordance with the *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (USFWS 1999) and specifically focused on the assessment of known locations of elderberry shrubs to evaluate for evidence of VELB. Surveys were conducted prior to the onset of the typical known emergence period for adult VELB (i.e., March through June).

A total of 13 elderberry shrubs, all identified as *Sambucus nigra*, were assessed. Of these 13 shrubs, 8 occur within the solar development area and/or within 165 feet (i.e., typical avoidance buffer area) of the solar development area of the PSA. No VELB, egg/larval galleries, or frass were observed on any of the shrubs. Bore and/or exit holes were observed on four of the 13 shrubs, specifically on shrub ID 2, ID 6, ID 8, and ID 12. Shrub ID 2 is in fair condition and located approximately 385 feet from the Cosumnes River riparian habitat. Shrub ID 6 is in poor condition and located in an upland area approximately 1,650 feet from the riparian habitat. Shrub ID 6 is located within the adjacent other lands within 80 feet of the solar development area. Shrub IDs 8 and 12 are both in good condition and are located within 130 and 335 feet of riparian habitat, respectively. The condition of the bore holes observed reflect potential past use of boring insects and are not conclusive to VELB occupancy. No other elderberry shrub observations relevant to VELB were made during focused surveys.

Table 13. Focused Valley Elderberry Longhorn Beetle Survey Results Summary

Shrub ID (Shrub-Stem)	Dead/ Alive[1]	General Condition[2]	Approx. no. of Stems	Approx. no. of Stems ≥1 in. DBH	Beetle Observed[3]	Eggs/ Larval Gallery [3]	Bore Holes[3]	Frass[3]	Other	Location (decimal degrees)	Habitat	Land Use	PSA Location[4]	Approx. Distance from Riparian Habitat (Ft)	Approx. Distance from Work Limits (Ft)	Notes
1-A	A	G	30	10	N	N	N	N	—	38.458791°, −121.191745°	Riparian	Adjacent agriculture	AOL	0, Within	970	Two shrubs present at this location on Cosumnes River levee slope.
1-B	A	G	25	7	N	N	N	N	—	38.458791°, −121.191745°	Riparian	Adjacent agriculture	AOL	0, Within	970	Two shrubs present at this location on Cosumnes River levee slope.
2-A	A	F	75	25	N	N	N	N	—	38.484704°, −121.189644°	Converted grassland	Agricultural	AOL	275	385	Three shrubs present at this location.
2-B	A	F	150	45	N	N	N	N	—	38.484704°, −121.189645°	Converted grassland	Agricultural	AOL	275	385	Three shrubs present at this location.
2-C	A	F	300	95	N	N	Y	N	—	38.484704°, −121.189646°	Converted grassland	Agricultural	AOL	275	385	Three shrubs present at this location. Bore holes only present on old bark (not new growth), in areas where outer bark has begun to sluff of exposing the cambium.
3-A	A	G	20	3	N	N	N	N	—	38.485637°, −121.192488°	Riparian	Adjacent agriculture	AOL	0, Within	1,075	Six shrubs present at this location on Cosumnes River levee slope.
3-B	A	G	25	5	N	N	N	N	—	38.485637°, −121.192488°	Riparian	Adjacent agriculture	AOL	0, Within	1,075	Six shrubs present at this location on Cosumnes River levee slope.
3-C	A	G	25	5	N	N	N	N	—	38.485637°, −121.192488°	Riparian	Adjacent agriculture	AOL	0, Within	1,075	Six shrubs present at this location on Cosumnes River levee slope.
3-D	A	G	30	5	N	N	N	N	—	38.485637°, −121.192488°	Riparian	Adjacent agriculture	AOL	0	1,075	Six shrubs present at this location on Cosumnes River levee slope.
3-E	A	G	45	7	N	N	N	N	—	38.485637°, −121.192488°	Riparian	Adjacent agriculture	AOL	0	1,075	Six shrubs present at this location on Cosumnes River levee slope.
3-F	A	G	55	10	N	N	N	N	—	38.485637°, −121.192488°	Riparian	Adjacent agriculture	AOL	0	1,075	Six shrubs present at this location on Cosumnes River levee slope.
4-A	A	P	15	4	N	N	N	N	—	38.470930°, −121.185041°	Converted grassland	Agricultural	SDA	4,200	0	Two shrubs present at this location. Isolated pasture near fence line.
4-B	A	F	35	6	N	N	N	N	—	38.470930°, −121.185041°	Converted grassland	Agricultural	SDA	4,200	0	Two shrubs present at this location. Isolated pasture near fence line.
5	A	F	8	3	N	N	N	N	—	38.479077°, −121.190647°	Converted grassland	Agricultural, Irrigation Drainage	AOL	1,550	660	On irrigation drainage at fence line.
6	A	P	400	85	N	N	Y	N	—	38.480429°, −121.188664°	Converted grassland	Agricultural	AOL	1,650	80	Highly degraded due to cattle use. Dead valley oak tree

Table 13. Focused Valley Elderberry Longhorn Beetle Survey Results Summary

Shrub ID (Shrub-Stem)	Dead/ Alive[1]	General Condition[2]	Approx. no. of Stems	Approx. no. of Stems ≥1 in. DBH	Beetle Observed[3]	Eggs/ Larval Gallery [3]	Bore Holes[3]	Frass[3]	Other	Location (decimal degrees)	Habitat	Land Use	PSA Location[4]	Approx. Distance from Riparian Habitat (Ft)	Approx. Distance from Work Limits (Ft)	Notes
																growing within and through shrub. Bore holes not observed on new growth. Majority of new growth is less than 1 inch DBH. Only stems at base where dead valley oak tree is present are greater than 1 inch DBH. Cambium and heartwood exposure.
7	A	G	70	15	N	N	N	N	—	38.480377°, −121.195489°	Converted grassland	Adjacent agriculture	AOL	145	1,800	On adjacent Cosumnes River Levee.
8	A	G	45	30	N	N	Y	N	—	38.484131°, −121.188719°	Converted agriculture	Adjacent agriculture	AOL	130	0	Elderberry shrub was obstructed by blackberry shrubs; located adjacent to barn.
9	A	G	45	12	N	N	N	N	—	38.483398°, −121.189090°	Converted agriculture	Adjacent agriculture	AOL	200	0	Located adjacent to barn.
10	A	G	80	20	N	N	N	N	—	38.484051°, −121.88989°	Converted agriculture	Adjacent agriculture	AOL	185	0	Located adjacent to barn.
11	A	G	70	30	N	N	N	N	—	38.483701°, −121.18893°	Converted agriculture	Adjacent agriculture	AOL	150	0	Elderberry shrub was obstructed by blackberry shrubs; located adjacent to barn.
12	A	G	90	50	N	N	Y	N	—	38.483701°, −121189249°	Converted agriculture	Adjacent agriculture	SDA	335	0	Located adjacent to barn.
13	A	G	30	5	N	N	N	N	—	38.470444°, −121.184741°	Converted grassland	Adjacent agriculture	SDA	4,300	0	Base of elderberry shrub was wrapped in barbed wire; located adjacent to barn.

Notes:
1 A = Alive; D = Dead
2 G = Good; F = Fair; P = Poor
3 N = No, Y = Yes
4 Project Study Area (PSA) Locations: AOL = Adjacent Other Lands; SDA = Solar Development Area.

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4.5.3.16 Vernal Pool Fairy Shrimp (*Branchinecta lynchi*)

Vernal pool fairy shrimp is a federally threated species with a low potential to occur in the PSA. This species is known to occupy vernal pools or other areas of similar hydrology that pool continuously for enough time to support its average reproductive period of 43 days (Helm 1998). Vernal pool fairy shrimp does not occupy perennial waters or creeks. They are most frequently found in small vernal pools (less than 0.05 acres), especially pool and swale complexes where they can move between individual pools (USFWS 2005).

Vernal pool fairy shrimp is known to occur in the vicinity of the PSA, but this species was not observed during protocol-level dry and wet season surveys. Suitable habitat and SSHCP modeled habitat are present in the PSA, which include vernal pools (Sacramento County 2018). There are various DCH units for vernal pool fairy shrimp within 5 miles of the PSA, with the nearest 1.3 miles southeast of the PSA (USFWS 2020a). In addition, there are several known occurrences for this species within 5 miles of the PSA, with the nearest being located within 0.25 miles of the PSA on the south side of Meiss Road, approximately 0.75 miles southeast of the intersection at Dillard Road (CDFW 2020).

A summary of the protocol-level large listed branchiopod dry and wet season survey results is provided below in Section 4.5.3.17.

4.5.3.17 Vernal Pool Tadpole Shrimp (*Lepidurus packardi*)

Vernal pool tadpole shrimp is a federally endangered and SSHCP Covered Species known to occur in the PSA. This species occupies vernal pools and seasonally ponded areas within vernal swales. Aquatic habitat for vernal pool tadpole shrimp is typically mud or grass-bottomed with clear to tea-colored or highly turbid water. These species are typically found in depressional pools within grassland habitat (Sacramento County 2018).

Vernal pool tadpole shrimp has been documented in the PSA (Sacramento County 2018) but was not observed during protocol-level dry and wet season surveys of the PSA during 2020–2021. Suitable habitat and SSHCP modeled habitat are present within the solar development area, including vernal pools (CDFW 2020; Sacramento County 2018). In addition, there are various DCH units for vernal pool tadpole shrimp within 5 miles of the PSA, with the nearest 1.3 miles southeast of the PSA (USFWS 2020a).

A summary of the protocol-level large listed branchiopod dry and wet season survey results is provided below.

Protocol-Level Large Listed Branchiopod Dry Season Survey Results

Dry season branchiopod surveys were conducted in October and November 2020; see Table 14. Soil samples were submitted to Dr. Brent Helm at Helm Biological Consulting to process the dry soil samples for the presence of cysts from fairy shrimp and tadpole shrimp. Dry season surveys were negative for federally listed large branchiopods (Figure 10, Dry and Wet Season Large Listed Branchiopod Results). However, six features contained cysts belonging to the non-listed California fairy shrimp (*Linderiella occidentalis*) (SSLLC 2021b).

Table 14. Summary of Dry Season Survey Dates, Site Conditions, and Biologists Present

Date of Survey	Site Conditions	Permitted Biologist	Assisting Biologists
October 13, 2020	66°F–90°F; 0%–10% cloud cover; 0–6 mph wind	Heather Moine[1]	Allie Sennett
October 14, 2020	62°F–91°F; 0% cloud cover; 1–7 mph wind	Heather Moine	Allie Sennett
October 15, 2020	57°F–90°F; 0% cloud cover; 0–5 mph wind	Heather Moine	Emily Scricca
October 19, 2020	55°F–89°F; 0% cloud cover; 0–4 mph wind	Heather Moine	Laura Burris
October 20, 2020	54°F–88°F; 0% cloud cover; 0–4 mph wind	Heather Moine, Paul Lemons[2]	Laura Burris, Anna Godinho, Emily Scricca, and Allie Sennett
October 21, 2020	54°F–88°F; 0% cloud cover; 0–4 mph wind	Heather Moine, Paul Lemons	Laura Burris, Anna Godinho, Emily Scricca, and Allie Sennett
October 22, 2020	56°F–78°F; 0% cloud cover; 0–6 mph wind	Heather Moine	Anna Godinho, Allie Sennett
October 23, 2020	45°F–59°F; 0% cloud cover; 0–3 mph wind	Heather Moine	Anna Godinho
November 11, 2020	42°F–58°F; 80%–90% cloud cover; 0–4 mph wind	Heather Moine	Anna Godinho, Allie Sennett

Notes:
1 Heather Moine (TE-60147A-1).
2 Paul Lemons (TE-051248-6).

Protocol-Level Large Listed Branchiopod Wet Season Survey Results

Wet season branchiopod surveys were conducted February through April 2021, with surveys occurring every 14 days; see Table 15. Wet season surveys were negative for federally listed large branchiopods (Figure 10) (SSLLC 2021c).

Table 15. Summary of Wet Season Survey Dates, Site Conditions, and Biologists Present

Date of Survey	Site Conditions	Permitted Biologist	Assisting Biologists
February 3, 2021	48°F–50°F; 10%–100% cloud cover; 0–3 mph wind	Heather Moine[1]	Laura Burris, Morgan Kennedy
February 4, 2021	40°F–55°F; 10%–50% cloud cover; 0–3 mph wind	Heather Moine	Laura Burris, Morgan Kennedy
February 5, 2021	54°F–63°F; 0%–10% cloud cover; 0 mph wind	Heather Moine	Laura Burris, Morgan Kennedy
February 17, 2021	41°F–60°F; 0%–10% cloud cover; 1–15 mph wind	Heather Moine	Paul Keating, Adam Crawford
February 18, 2021	39°F–61°F; 30%–90% cloud cover; 0–5 mph wind	Heather Moine	Morgan Kennedy, Adam Crawford

Table 15. Summary of Wet Season Survey Dates, Site Conditions, and Biologists Present

Date of Survey	Site Conditions	Permitted Biologist	Assisting Biologists
February 18, 2021	50°F–54°F; 100% cloud cover; 0–3 mph wind	Heather Moine	Morgan Kennedy, Paul Keating
March 3, 2021	46°F–60°1F; 100% cloud cover; 0–4 mph wind	Heather Moine	Anna Godinho, Paul Keating
March 4, 2021	49°F–67°F; 0% cloud cover; 0–4 mph wind	Heather Moine	Anna Godinho, Paul Keating
March 17, 2021	41°F–58°F; 90% cloud cover; 0–4 mph wind	Heather Moine	Adam Crawford, Naomi Serratos
March 18, 2021	47°F–59°F; 100% cloud cover; 0–3 mph wind	Heather Moine	Adam Crawford, Naomi Serratos
March 31, 2021	61°F–81°F; 0% cloud cover; 0–2 mph wind	Heather Moine	Adam Crawford
April 1, 2021	48°F–80°F; 0%–10% cloud cover; 0–3 mph wind	Heather Moine	None
April 14, 2021	58°F–71°F; 0%–10% cloud cover; 0–4 mph wind	Heather Moine	Adam Crawford
April 15, 2021	63°F–73°F; 0% cloud cover; 0–5 mph wind	Heather Moine	Adam Crawford, Allie Sennett
April 28, 2021	52°F–83°F; 0% cloud cover; 0–4 mph wind	Heather Moine	Allie Sennett, Sarah Foster

Note:
[1] Heather Moine (TE-60147A-1).

4.5.3.18 Midvalley Fairy Shrimp (*Branchinecta mesovallensis*)

Midvalley fairy shrimp (*Branchinecta mesovallensis*) is an SSHCP Covered Species with a high potential to occur in the PSA. This species is known to occupy vernal pools and seasonally ponded areas within vernal swales. Aquatic habitat for midvalley fairy shrimp is typically mud or grass-bottomed with clear or tea-colored water (Sacramento County 2018).

Although midvalley fairy shrimp has not been documented in the PSA, this species is known to occur in the vicinity and suitable habitat, as well as modeled habitat, is present within the PSA (Sacramento County 2018). There are various known occurrences for this species within 5 miles of the PSA, with the nearest located northwest of the junction at Florin Road and Sunrise Boulevard on the north and south sides of Highway 16 (CDFW 2020).

4.5.3.19 Ricksecker's Water Scavenger Beetle (*Hydrochara rickseckeri*)

Ricksecker's water scavenger beetle (*Hydrochara rickseckeri*) is an SSHCP Covered Species with a moderate potential to occur in the PSA. This species is exclusively associated with vernal pools that contain water in winter and early spring and are dry in summer. This species does not discriminate between small or large vernal pools, vernal swales, or constructed vernal pools, but appears to favor aquatic habitat that is neutral to slightly alkaline, clear, and low in dissolved salts. In addition, they prefer habitat dominated by vernal pool plants. In the Central

Valley, Ricksecker's water scavenger beetle generally occurs in these aquatic environments from approximately 0 to 985 feet AMSL (Sacramento County 2018).

4.5.3.20 American Badger (*Taxidea taxus*)

American badger (*Taxidea taxus*) is a state SSC and SSHCP Covered Species with a high potential to occur on the solar development area. This species is most abundant in drier open stages of most shrub and forest habitat, as well as open herbaceous habitats, including grasslands, meadows, and savannahs. Suitable habitat for American badger typically contains loose soils for denning and hunting, ample prey, and uncultivated land. American badgers are elusive, nocturnal mammals with expansive home ranges (CDFW 2020).

Although American badger has not been documented in the PSA, a collapsed burrow with badger sign (i.e., claw marks along both sides of entrance) was documented in the northern portion of the PSA. In addition, this species is known to occur in the vicinity and suitable habitat, as well as SSHCP modeled habitat, is present (Sacramento County 2018). There are known occurrences for American badger within 5 miles of the PSA, with one located 0.40 miles east of Sunrise Boulevard in southeast Rancho Cordova (CDFW 2020; USFWS 2020a).

4.5.3.21 Other Special-Status Wildlife

Native Bats

Trees and structures in or adjacent to the PSA provide roosting habitat for native bats protected by the CFGC. Specifically, trees with exfoliating bark, crevices, and/or sufficient foliage and barns (or similar structures) in the PSA provide potential bat roosting habitat. Roosting habitat in the PSA is limited to trees along the Cosumnes River and isolated trees near seasonal ponds or other aquatic habitat that provide nearby foraging opportunities. No active bat roosts or signs of occupation, such as guano or staining, were detected during the reconnaissance-level field surveys.

Nesting Raptors and Migratory Birds

In addition to the special-status birds discussed above, the PSA provides nesting habitat for several other local and migratory bird species. Native birds of prey are protected by CFGC Section 3503.5 and migratory bird species are protected by the federal MBTA. Although no active nests were detected during the field surveys, many common migratory birds and raptors were recorded (Appendix B).

5 Summary of Solar Development Area Resources

In the summary of findings section below, the results provided in Section 4 have been further summarized to be explicit to the solar development area of the PSA (i.e., excluding the other adjacent lands within the PSA).

Representative photographs of resource findings can be referenced in Appendix E, Photo Record.

5.1 Soil and Terrain

A total of 10 soil units were mapped in the solar development area, of which three are listed as hydric soils. Hydric soils are defined by the National Technical Committee for Hydric Soils as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (USDA 2021). Soils encountered during the field surveys were generally classified as clay to clay loam soils (Table 2; Figure 3).

5.2 Hydrology and Aquatic Resources

The solar development area occurs within the Upper Cosumnes River watershed. The western half of the solar development area is located within the Federal Emergency Management Agency National Flood Hazard Layer 1% 100-year floodplain of the Cosumnes River (FEMA 2021).

During the ARD conducted for the Project, eight aquatic resource types were documented within the solar development area including ditch, ephemeral drainage, intermittent drainage, perennial drainage, seasonal wetland, seasonal wetland swale, pond, and upland swale (Figure 4 and Figure 5) (SSLLC 2021a).

Aquatic resources delineated within the solar development area have the potential to be waters of the U.S. and/or waters of the state based on an analysis of the three parameters (i.e., soils, hydrology, and vegetation) and connectivity/proximity to known waters of the U.S. and waters of the state. A preliminary jurisdictional assessment of aquatic resources known to occur in the solar development area was completed to evaluate total acreages and linear feet of resources for each known regulatory authority that may require compliance (i.e., permitting). The findings in the solar development area as they correspond with each regulatory authority are detailed in Table 16 (SSLLC 2021b).

Table 16. Summary of the Preliminary Jurisdictions of Aquatic Resources within the Solar Development Area[1]

Feature Type[2]	Feature Classification	Total Acreage
U.S. Army Corps of Engineers		
Seasonal wetland	Wetlands	2.59
Ephemeral drainage	Non-wetland waters (NWW)	0.67
Intermittent drainage	NWW	0.46

Table 16. Summary of the Preliminary Jurisdictions of Aquatic Resources within the Solar Development Area[1]

Feature Type[2]	Feature Classification	Total Acreage
Seasonal wetland swale		0.65
Upland swale		0.05
USACE Total		**4.42**
California Department of Fish and Wildlife		
Pond	Wetlands	0.37
Seasonal wetland	Wetlands	3.16
Vernal pool	Wetlands	0.25
Upland swale	NWW	0.08
Ephemeral drainage	NWW	0.74
Intermittent drainage	NWW	0.46
Seasonal wetland swale	NWW	0.70
CDFW Total		**5.76**
Regional Water Quality Control Board		
Pond	Wetlands	0.37
Seasonal wetland	Wetlands	3.16
Vernal pool	Wetlands	0.25
Ditch	NWW	0.15
Ephemeral drainage	NWW	0.74
Intermittent drainage	NWW	0.46
Seasonal wetland swale	NWW	0.70
RWQCB Total		**5.83**

Notes:
1 This table accounts for only the permanent impact area (i.e., excludes temporary impact areas) of the solar development area.
2 Each resource feature is calculated separately for each regulatory entity.

5.3 Vegetation Communities and Land Cover Types

Vegetation communities and land cover types were documented within the solar development area and mapped using the vegetation community and land cover data in the SSHCP (Table 5; Figure 6) (Sacramento County 2018). Vegetation and land cover within the solar development area includes California annual grassland (361.29 acres), low density development (11.82 acres), and urban (1.96 acres).

5.4 Sensitive Natural Communities

No CDFW sensitive natural communities were identified within the solar development area (Figure 7).

Vernal pool habitat is present within the solar development area (Figure 5).

5.5 Designated Critical Habitat/Essential Fish Habitat

No USFWS DCH or National Oceanic and Atmospheric Administration EFH was identified within the solar development area (Figure 7) (USFWS 2020d).

5.6 Special-Status Plant Species

A total of 16 special-status plant species that have known occurrences either within the nine USGS 7.5-Minute Quads and/or within 5 miles of the PSA were identified (CDFW 2020; CNPS 2020). Of these 16, 11 species have a low to moderate potential to occur in the PSA, and of these, nine are Covered Species under the SSHCP. The remaining five special-status plant species were removed from further consideration due to lack of suitable habitat within the solar development area, no known occurrences within 5 miles of the PSA, and/or because the PSA is outside of the species' known geographic or elevation range. No special-status plant species were observed during protocol-level botanical field surveys. Species with the potential to occur within the solar development area of the PSA are summarized below.

Moderate potential for occurrence within the PSA

- Boggs Lake hedge-hyssop—No federal status, moderately threatened in California, SSHCP Covered Species
- Dwarf downingia—No federal status, moderately threatened in California, more common elsewhere, SSHCP Covered Species
- Legenere—No federal status, seriously threatened in California, more common elsewhere, SSHCP Covered Species
- Pincushion navarretia—No federal status, seriously threatened in California, more common elsewhere
- Sacramento Orcutt grass—Federally endangered, state endangered, seriously threatened in California, SSHCP Covered Species
- Slender Orcutt grass—Federally endangered, state endangered, seriously threatened in California, SSHCP Covered Species
- Valley brodiaea—No federal status, moderately threatened in California, not covered under SSHCP
- Hoary navarretia—No federal status, not very threatened in California, SSHCP Covered Species

Low Potential for Occurrence within the PSA

- Ahart's dwarf rush—No federal status, moderately threatened in California, SSHCP Covered Species
- Tuolumne button-celery—No federal status, moderately threatened in California, not covered under SSHCP
- Sanford's arrowhead—No federal status, moderately threatened in California, SSHCP Covered Species

5.6.1 Protocol-Level Botanical Survey Summary

Dudek conducted protocol-level botanical surveys in May 2021 within the solar development area. No special-status plant species were observed in the solar development area during the protocol-level surveys conducted.

5.6.2 Arborist Survey and Tree Inventory

International Society of Arboriculture Certified arborists with California Tree and Landscaping Consulting Inc. conducted an arborist survey and tree inventory of trees that could potentially be protected by the Sacramento County Tree Preservation Ordinance. Twenty-two trees were inventoried and 15 could be directly impacted by Project activities, as they reside within the solar development area. Since none of the 15 trees are protected, no trees need a permit for removal within the solar development area. The remaining seven trees are outside of the solar development area and are not expected to be impacted by Project activities.

5.7 Special-Status Wildlife Species

A total of 23 special-status wildlife species have known occurrences either within the nine USGS 7.5-Minute Quads or within 5 miles of the PSA. Of these 23 special-status wildlife species, 20 have a low to high potential to occur in the solar development area and/or are known to occur in the solar development area, and of these, 13 are Covered Species under the SSHCP (Sacramento County 2018). In addition, the solar development area provides suitable habitat for nesting birds protected by the federal MBTA and CFGC and native bats protected by the CFGC. The remaining three special-status wildlife species were removed from further consideration due to lack of suitable habitat within or adjacent to the PSA, no known occurrences within 5 miles of the PSA, and/or because the PSA is outside of the species' known geographic range. Special-status wildlife species including bald eagle, BUOW, SWHA, TRBL, and white-tailed kite were observed during field studies. Species with the potential to occur within the solar development area of the PSA are summarized below.

Known to Occur within the PSA

- Bald eagle—Federal Bird of Conservation Concern (BCC), state endangered, not covered under the SSHCP
- BUOW—Federal BCC, no state status, not covered under the SSHCP
- Central Valley Steelhead—Federally threatened, no state status, not covered under the SSHCP
- SWHA—Federal BCC, state threatened, SSHCP Covered Species
- TRBL—Federal BCC, state threatened and SSC, SSHCP Covered Species
- VELB—Federally threatened, no state status, SSHCP Covered Species
- Vernal pool tadpole shrimp—Federally endangered, no state status, SSHCP Covered Species
- White-tailed kite—No federal status, state fully protected, SSHCP Covered Species

High Potential for Occurrence within the PSA

- American badger—No federal status, state SSC, not covered under the SSHCP
- Midvalley fairy shrimp—No federal status, no state status, SSHCP Covered Species

Moderate Potential for Occurrence within the PSA

- Bank swallow—No federal status, state threatened, not covered under the SSHCP
- Northwestern pond turtle—No federal status, State SSC, SSHCP Covered Species
- Ricksecker's water scavenger beetle—No federal status, no state status, SSHCP Cover Species
- WST—No federal status, state SSC, SSHCP Covered Species

Low Potential for Occurrence within the PSA

- California red-legged frog—Federally threatened, state threatened and on state watchlist, not covered under the SSHCP
- CTS—Federally threatened, state threatened and on state watchlist, SSHCP Covered Species
- Common yellowthroat—Federal BCC, state SSC, not covered under the SSHCP
- Golden eagle—Federally protected and BCC, state watchlist, not covered under the SSHCP
- Giant garter snake—Federally threatened, state threatened, SSHCP Covered Species
- Vernal pool fairy shrimp—Federally threatened, no state status, SSHCP Covered Species

5.7.1 Protocol-Level and Focused Wildlife Survey Summary

5.7.1.1 California Tiger Salamander

During the database and literature evaluation, the nearest CTS occurrences was determined to be approximately 5 miles from the solar development area, beyond the dispersal distance known for the species. Evaluation of potential aquatic habitat within the vicinity of the solar development area identified some features that could potentially provide aquatic habitat for the species, but they were generally toward the edges of the dispersal distance or blocked by partial or complete barriers to movement. During the aquatic larval surveys, no CTS or their larvae were observed within the solar development area, and a low number of burrows suitable for CTS were identified within the upland areas of the solar development area.

5.7.1.2 Western Spadefoot Toad

There is suitable habitat for WST within the solar development area. During database and literature evaluation, WST were identified within 5 miles of the PSA. During CTS aquatic larval surveys and wet season large listed branchiopod surveys, WST were not identified within the solar development area.

5.7.1.3 Burrowing Owl

There is suitable habitat for BUOW in the solar development area, as well as recorded known occurrences. Protocol-level BUOW surveys were conducted from February through May 2021 within the solar development area. These surveys identified two visual detections of BUOW individuals, and several potential burrow locations based on presence of sign such as pellets, whitewash, etc.

5.7.1.4 Swainson's Hawk

There is suitable habitat for foraging for SWHA within the solar development area. There are known occurrences of SWHA within the PSA, but nesting has not been observed. Dudek conducted protocol-level SWHA surveys within the PSA, and visual surveys up to 0.5 miles outside of the solar development area, from February through June 2021. These surveys identified multiple SWHA individuals foraging, perching, and displaying courtship behavior within and/or adjacent to the solar development area.

5.7.1.5 Tricolored Blackbird

There is suitable habitat for foraging for TRBL within the solar development area. Nesting habitat is generally absent from the solar development area; however, potential nesting habitat is present just outside the solar development area within the western PSA near the Cosumnes River. There are several known occurrences of TRBL within 5 miles of the PSA and record known occurrences within the PSA in the adjacent other lands. Dudek conducted focused TRBL surveys within the PSA from February through May 2021. A total of six TRBL species observations, including foraging, were observed during the four survey passes conducted in 2021. No nesting colonies were observed.

5.7.1.6 Valley Elderberry Longhorn Beetle

Habitat suitable for VELB has been identified within 165 feet of the solar development area, specifically within upland areas. The black elderberries within the 165 feet of the solar development area were surveyed in February 2021 for signs of VELB. One surveyed location of elderberry shrubs identified relict bore holes present on older branches, but none present on new growth.

5.7.1.7 Large-Listed Branchiopods

During the database and literature evaluation, vernal pool fairy shrimp were identified within 5 miles of the solar development area and vernal pool tadpole shrimp were identified as having known recorded occurrences within the solar development area (Sacramento County 2018). Vernal pool fairy shrimp and vernal pool tadpole shrimp were not observed in the Project during protocol-level dry season and wet season surveys, and there are no recorded occurrences of these species on the site in agency databases. Suitable habitat is present in the solar development area for both branchiopod species.

6 Resources Impact Assessment of the Solar Development Area

This section addresses impacts to biological and aquatic resources that have the potential to be affected by the implementation of the Project and provides preliminary analysis of impacts, as well as recommendations to avoid and minimize potential impacts. For this BTR, this assessment explicitly addresses only the impacts to resources occurring within the solar development area (378.17 acres) of the PSA (i.e., not the adjacent other lands).

6.1 Definition of Impact Types

6.1.1 Direct Permanent Impacts

Direct permanent impacts refer to the permanent physical loss of a biological and aquatic resource typically due to clearing and grading associated with implementation of a project. Direct permanent impacts are analyzed in four ways: (1) permanent loss of vegetation communities and natural land cover types (excluding anthropogenic/disturbed land covers), as well as general wildlife and their habitat; (2) permanent loss of or harm to individuals of special-status plant and wildlife species; (3) permanent loss of suitable and/or occupied habitat for special-status species; and/or (4) permanent loss of wildlife movement and habitat connectivity in the Project vicinity.

6.1.2 Temporary Impacts

Temporary impacts refer to a temporary loss of biological and aquatic resources typically due to clearing and grading associated with implementation of the Project. Temporary impacts generally occur for a brief period (e.g., up to approximately 1 year) and would normally be reversible (e.g., temporary removal of vegetation after which no permanent impacts would occur).

6.1.3 Indirect impacts

Indirect impacts are reasonably foreseeable effects of Project implementation on remaining or adjacent biological and aquatic resources outside the direct disturbance zone that may occur during typical grading or maintenance activities (i.e., short-term construction-related indirect impacts) or later in time as a result of the Project (i.e., long-term, or operational, indirect impacts). Short-term indirect impacts can include dust, human activity, pollutants (e.g., potential erosion), and noise that extend beyond the identified construction area. Long-term indirect impacts can include changes to hydrology, introduction of invasive species, dust, and noise that are operations related or persist after construction is complete.

6.1.4 Design to Avoid Resource Impacts

The Project has the potential to influence both biological and aquatic resources. The Project assessed a PSA of 732.26 acres to allow for flexibility in the solar development design to avoid biological and aquatic resources to the

maximum extent possible. As such, the Project is designed in such a manner that impacts to resources will be avoided and reduced to the extent feasible.

6.1.5 Avoidance, Minimization, and Mitigation

The significance criteria used to evaluate impacts to biological and aquatic resources is based on CEQA Guidelines, as well as federal, state, and local regulatory guidance pertaining to potential jurisdictional resources and features occurring only within the solar development area of the PSA. Suggested AMMs and MMs include those measures that would avoid, minimize, or otherwise mitigate potential impacts to biological and aquatic resources. Based on the results in this BTR, preliminary AMMs and MMs have been provided where applicable in the resource impact assessment sections below.

6.2 Preliminary Analysis of Impacts

A preliminary analysis of impacts to biological (and aquatic) resources, consistent with the Sacramento County thresholds of significance and those included in CEQA Appendix G (14 CCR 15000 et seq.), has been provided below (Table 17).

Table 17. Preliminary Resource Impact Analysis Checklist for the Solar Development Area within the Solar Development Area

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
BIOLOGICAL RESOURCES – 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 state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☒	☐	☐

Table 17. Preliminary Resource Impact Analysis Checklist for the Solar Development Area within the Solar Development Area

	Potentially Significant Impact	Less Than Significant Impact with Mitigation Incorporated	Less Than Significant Impact	No Impact
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?	☐	☐	☒	☐
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?	☐	☐	☐	☒

Source: 14 CCR 15000 et seq.

a) ***The Project would 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 CDFW and or USFWS.***

A total of eight special-status plant species and 13 special-status wildlife species are known to occur in the PSA or have a moderate to high potential to occur in the PSA and could therefore be impacted by eventual Project implementation. Species-specific impacts and recommended avoidance measures are included below.

a.1 Special-Status Plant Species

Eight special-status plant species have a moderate potential to occur within the PSA, including Boggs Lake hedge-hyssop, dwarf downingia, hoary navarretia, legenere, pincushion navarretia, Sacramento Orcutt grass, slender Orcutt grass, and valley brodiaea. Suitable habitat for these species includes valley grasslands and several types of aquatic resources (e.g., vernal pools, pond and lake margins, mesic areas), like those identified within the solar development area.

Of these eight special-status species, only Sacramento Orcutt grass and slender Orcutt are federally, and state listed. Of the remaining six special-status plant species, only four are state listed and/or have a CNPS CRPR rank of 1 or 2, including Boggs Lake hedge hyssop, Dwarf downingia, legenere, and pincushion navarretia. Special-status plant resources may be subject to agency jurisdiction pursuant to regulations under FESA, CESA, CFGC, CEQA Guidelines, and the Sacramento County General Plan.

To assist the Project design in understanding areas to avoid, specifically in regard to botanical resources, Dudek conducted reference population checks for special-status plant species on April 22, 2021, and conducted protocol-level botanical field surveys within the PSA, including the solar development area, during the appropriate floristic period, on May 4, 2021, in accordance with the *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed, and Candidate Plants* (USFWS 2000), the *Protocol for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Sensitive Natural Communities* (CDFW 2018), and the *Botanical Survey Guidelines* (CNPS 2001). Due to the early dry season in the 2021 rain year, many species did not bloom due to inadequate inundation in suitable habitat resources (e.g., wetlands, vernal pools, etc.). No special-status plant species were observed. Note that negative survey results during one field season does not constitute evidence that a plant occurrence is absent from a location (CDFW 2018).

If eventual Project implementation were to cause reduction and/or damage to special-status plant species and/or existing habitat that supports special-status plant species, then it would be considered a significant impact under CEQA.

To reduce impacts to special-status plant species and habitat to ***less than significant with mitigation incorporated***, the measures below are recommended.

Recommended Avoidance and Minimization Measures. The following measures are recommended to avoid, minimize, and mitigate direct or indirect impacts to special-status plant species:

- A Worker Environmental Awareness Program (WEAP) should be prepared that will educate staff on the presence of all special-status plant species, sensitive natural communities, and protected wetlands with potential to occur, or that are known to occur, within the solar development area. The program should describe their identification, habitat requirements, and penalties for species impacts, as well as immediate steps to take should special-status plant species be observed by staff on site. This WEAP should include biological resource AMMs from the Project's CEQA Mitigation Monitoring and Reporting Program, resource permits or agreements, and any species-specific plans. The WEAP can be provided in the form of a handout and/or video presentation. Staff that attend the training should fill out a sign-in sheet indicating that they completed the training.

- Protocol-level botanical surveys shall be conducted by a qualified botanist a maximum of 2 weeks prior to Project activity initiation, in accordance with CDFW and CNPS guidelines.

- If no special-status species are observed, then no further AMMs or mitigation is required.

- If special-status plant species are observed, then the following measures are additionally recommended to avoid the species:

    - Special-status plant species should be mapped and flagged within the solar development area.

    - Project activities should be modified to avoid impact.

- Environmentally sensitive area fencing, and appropriate signage should be installed at a minimum of 20 feet from the edge of special-status plant populations. The Project should avoid performing any construction related activities within the environmentally sensitive area.

- If full avoidance is not feasible, the applicant should prepare and implement a Botanical Mitigation Plan. The plan will include specifications for transplantation, including requirements for transplant destinations, methods to minimize damage of plants during transplantation, and irrigation or other treatments required to improve chance of transplantation success. The plan would also include monitoring requirements to demonstrate transplantation success and no net loss of special-status plant species. If monitoring demonstrates transplantation is not fully successful in achieving no net loss, compensatory mitigation would be required. The mitigation ratios would vary depending on the level of transplantation success but would ensure no net loss of special-status plant species from direct permanent, indirect, and/or temporary Project impacts.

a.2 California Tiger Salamander

CTS is a federally and state threatened species and an SSHCP Covered Species. CTS has not been documented in the solar development area. The nearest known occurrence of the species is approximately 5 miles south of the solar development area (CDFW 2020; USFWS 2021a). CTS are subject to agency jurisdiction pursuant to regulations under FESA, CESA, CFGC, and CEQA Guidelines.

Dudek conducted CTS aquatic larval surveys within potential suitable aquatic habitat within the solar development area and other areas of the PSA in accordance with the *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or Negative Findings of California Tiger Salamander* (USFWS 2003). Aquatic larval surveys were conducted on March 16, April 15, and April 28, 2021, and no CTS larvae were observed. Aquatic resources within the solar development area were found to lack required habitat characteristics for CTS. Note that negative survey findings (i.e., no presence), especially from a single season of larval surveys, does not demonstrate species absence. However, assessment of aquatic resources within 2 kilometers of the solar development area (i.e., the maximum reasonable dispersal distance for CTS) indicated that most aquatic features in the vicinity lack the appropriate hydro-period or show evidence of occupancy by game fish (e.g., fishing docks). The ponds within the 2 kilometer buffer that could not be eliminated as potential CTS aquatic habitat were generally blocked from dispersal to and from the solar development area by partial or complete barriers to movement. The potential upland habitat within the PSA, specifically the solar development area, does contain small mammal burrows in some areas, but substantial portions of the solar development area lack burrows entirely or have low burrow densities. This potential upland CTS habitat is not unique or high quality as compared to similar resources in the vicinity.

To reduce impacts to CTS and habitat to ***less than significant with mitigation incorporated***, the measures below are recommended.

Recommended Avoidance, and Minimization Measures. The following measures are recommended to avoid and minimize direct or indirect impacts to this species:

- Project ground-disturbing activities within CTS suitable habitat will occur outside of the breeding and dispersal season (after July 31 and before October 15), to the extent feasible. If Project

activities must be implemented during the breeding and dispersal season, they will not start until 30 minutes after sunrise and must be completed 30 minutes prior to sunset.

- A biologist with CTS knowledge and experience will conduct a pre-construction survey and monitor Project activities within CTS suitable habitat.

- If a CTS is encountered during Project activities, the approved biologist will notify CDFW and USFWS immediately. Project activities will cease within a 100-foot radius of the animal until the animal is relocated by an approved biologist with appropriate handling permits. Prior to relocation, the approved biologist will notify CDFW and USFWS to determine the appropriate procedures related to relocation. If the animal is handled, a report will be submitted within 1 business day to CDFW and USFWS.

- The Project will prepare a CTS Relocation Plan for Project activities occurring in CTS suitable habitat. The CTS Relocation Plan will achieve no net reduction in CTS or CTS suitable habitat within the PSA. The CTS Relocation Plan will include the name(s) of the approved biologists(s) who will relocate CTS; pre-construction habitat assessment methodology; measures to minimize temporary impacts to CTS suitable habitat; capture, handling, and relocation methods; a map and description of the relocation area(s) for captured CTS, including relative location, quality of habitat, non-native species or the potential for CTS-barred tiger salamander hybrids to be present, identified upland burrows determined to be suitable for CTS placement, distance to aquatic habitat, and potential barriers for movement; written permission from the landowner to use their land as a relocation site; and identification of a wildlife rehabilitation center or veterinary facility that routinely evaluates or treats amphibians. The Project permittee will submit the CTS Relocation Plan to CDFW for written approval at least 15 days prior to the beginning of any Project activities, including pre-construction surveys.

a.3 Western Spadefoot Toad

WST is a state SSC and SSHCP Covered Species with a moderate potential to occur in the solar development area. Vernal pools, seasonal wetlands swales, and other aquatic resources in the solar development area provide habitat for WST. Development could impact WST if this species is present within the solar development area prior to ground-disturbing activities. To assist the Project design in understanding areas to avoid, Dudek conducted focused WST surveys within potential suitable habitat for this species. The surveys were completed in conjunction with the CTS and large listed branchiopod surveys between February and April 2021. No WST or their larval masses were observed during focused surveys. Although WST has not been documented in the solar development area, there are known occurrences of the species within 5 miles. Direct or indirect impacts to this species would likely be considered a potentially significant impact under CEQA. To reduce impacts to WST and habitat to ***less than significant with mitigation incorporated***, the measures below are recommended.

Recommended Avoidance, and Minimization Measures. The following measures are recommended to avoid and minimize direct or indirect impacts to this species:

- Project ground-disturbing activities within western spadefoot suitable habitat will occur outside the breeding and dispersal season (after May 15 and before October 15), to the extent feasible. The

Project should also enlist biologists with valid collecting permits to perform a pre-construction survey for WST within suitable habitat, including breeding habitat. If WST are encountered during the survey, individuals will be safely relocated to suitable habitat outside of the solar development area. The survey should include searches for small mammal burrows, crevices, and other potential refugia, as well as dip-netting or seining suitable breeding habitat. Additionally, if WST is observed within the solar development area, adult and larval WST and egg masses should be collected and relocated to suitable habitat (i.e., to be preserved in perpetuity).

- WST should be hand-captured and relocated outside the construction area to suitable habitat by a biologist with a valid collecting permit or with proper agency authorization as determined during coordination with CDFW. All relocation areas should be identified and approved by CDFW prior to the pre-construction survey. Relocated WST should be monitored until they have escaped into upland refugia or aquatic habitat with sufficient water. Project construction activities will be suspended in a 100-foot radius of the WST until the WST leaves the solar development area on its own or is relocated by a CDFW approved biologist.

- If Project ground-disturbing activities must commence in suitable WST habitat during the breeding and dispersal season, exclusion fencing will be installed around the Project footprint and must be monitored by an approved biologist following rain events. Temporary high-visibility construction fencing will be installed along the edge of work areas, and silt fencing will be installed immediately behind the temporary high-visibility construction fencing to exclude WST from entering the construction area. Fencing will remain in place until all construction activities within the construction area are completed.

- At the end of each working day, open trenches and holes must be covered or installed with wildlife ramps to avoid wildlife entrapment overnight.

- If WST are determined to be present within the solar development area, then ongoing monitoring by a qualified biologist is required to ensure there are no impacts to this species and its habitat during construction and operation and maintenance activities for the Project.

- This species should be included in the WEAP described above for special-status plant species and should also educate staff on the presence of special-status wildlife species and ways to avoid and minimize impacts.

a.4 Central Valley Steelhead Distinct Population Segment

Central Valley steelhead DPS is a federally threatened species. The Cosumnes River in the western portion of the PSA is known to support the Central Valley steelhead DPS and is designated as EFH for this species. No EFH is present in the solar development area of the PSA. As a federally listed species, impacts to this steelhead DPS would be considered take under FESA and a significant impact under CEQA.

Direct and indirect impacts to the Cosumnes River would be avoided and there would be ***no impact*** to Central Valley Steelhead DPS.

a.5 Northwestern Pond Turtle

Northwestern pond turtle is a state SSC and SSHCP Covered Species with a moderate potential to occur in upland habitat within the solar development area. The Cosumnes River in the northern portion of the PSA provides aquatic habitat for northwestern pond turtle. Development in the solar development area of the PSA could impact this species if upland nesting or aestivation sites or individual turtles are present within the construction footprint during ground disturbance. Although no northwestern pond turtles have been documented in the solar development area, this species is known to occur within 5 miles. Direct or indirect impacts to this species would likely be considered a potentially significant impact under CEQA.

To reduce impacts to northwestern pond turtle and habitat to ***less than significant with mitigation incorporated,*** the measures below are recommended.

Recommended Avoidance and Minimization Measures. The following measures are recommended to avoid and minimize direct or indirect impacts to this species:

- Project ground-disturbing activities will be conducted outside of northwestern pond turtle's active season (after May 1 and before September 15), to the extent feasible. If Project activities must be implemented during the breeding and dispersal season, they will not start until 30 minutes after sunrise and must be completed 30 minutes prior to sunset.

- A qualified biologist should conduct a pre-construction survey for northwestern pond turtle within 48 hours prior to the start of construction activities within 300 feet of suitable habitat (e.g., any adjacent riparian woodland). Concurrently with the pre-construction survey, searches for nesting sites should be conducted and any identified sites should be delineated with high-visibility flagging or fencing and avoided during construction activities. If avoidance is not possible, the nest and/or turtle should be removed by a qualified biologist and relocated to an appropriate location.

- If turtles and/or nests are encountered during the pre-construction survey, a qualified biologist should be present during grubbing and clearing activities in suitable habitat (aquatic) to monitor for northwestern pond turtle. If a turtle is observed in the active construction zone, construction should cease within a 100-foot buffer, and a qualified biologist will be notified. Construction may resume when the biologist has either hand-captured and relocated the turtle to nearby suitable habitat outside the construction zone, or, after thorough inspection, determined that the turtle has moved away from the construction zone.

- On-site personnel will observe a 20-mile-per-hour speed limit within northwestern pond turtle suitable habitat.

- This species should be included in the WEAP described above for special-status plant species that will also educate staff on the presence of special-status wildlife species and ways to avoid and minimize impacts.

a.6 Burrowing Owl

BUOW is an SSC and an SSHCP Covered Species. There is suitable habitat for BUOW in the PSA, as well as recorded presence. Protocol-level and visual BUOW surveys were conducted from February through May 2021 within the PSA. The surveys covered the entirety of the PSA, including the solar development area, as well as suitable nesting habitat within 500 feet. Within the solar development area, these surveys identified two visual detections of BUOW individuals, and 16 potential burrow locations (i.e., of single and/or multiple burrows) based on presence of signs such as pellets, whitewash, etc. BUOW is a federal BCC and a state SSC. Open areas in the solar development area (i.e., grassland and cultivated land) provide foraging and nesting habitat for BUOW. Impacts to this species would likely be considered a potentially significant impact under CEQA and may be considered take under the MBTA.

To reduce impacts to BUOW and habitat to ***less than significant with mitigation incorporated***, the measures below are recommended.

Recommended Avoidance, and Minimization Measures. The following measures are recommended to avoid, minimize, and mitigate direct or indirect impacts to this species:

- A qualified biologist should conduct surveys for BUOW within 30 days prior to ground-disturbing activities within suitable habitat for the species. The survey should cover the limits of ground disturbance and potentially suitable nesting habitat within 500 feet. If ground-disturbing activities are delayed, then additional surveys should be conducted such that no more than 7 days elapse between the survey and ground-disturbing activities.

- If BUOW is encountered during the pre-construction survey, the approved biologist should prepare a Special-Status Species Avoidance, Minimization, and Relocation Plan for special-status species occurring in the solar development area, including BUOW. The Avoidance, Minimization, and Relocation Plan shall include a performance standard of no net loss of BUOW within the PSA.

- If non-nesting BUOWs are observed in or adjacent to the construction footprint during the survey, construction should be postponed until the qualified biologist can fully implement a Burrowing Owl Passive Relocation and Exclusion Plan (to be prepared by the qualified biologist). The plan should be prepared in accordance with the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012). Once owls have been successfully excluded and unoccupied burrows evacuated, construction in the area may proceed.

- If nesting BUOWs are observed during the survey, construction activities within 300 feet of occupied burrows should be delayed until young owls have fledged and are independent of the burrow, as determined by a qualified biologist. The qualified biologist may reduce the 300-foot buffer based on the type, timing, extent, and intensity of the construction activity and other factors such as site topography and vegetation cover between the construction activity and the burrow. Once all young have fledged and are no longer dependent upon the nest burrow, the same burrow exclusion (i.e., environmentally sensitive area) procedure described above should be implemented prior to resuming construction activities in the area.

- If BUOW is determined present within the solar development area, then on-going monitoring by a qualified biologist may be required to ensure there are no impacts to this species and its habitat during construction and operation and maintenance activities for the Project.

- This species should be included in the WEAP described above for special-status plant species that will also educate staff on the presence of special-status wildlife species and ways to avoid and minimize impacts.

- Compensatory mitigation shall be provided for impacts to BUOW nesting, wintering, and/or foraging habitat by Project infrastructure to achieve a performance standard of no let loss of habitat value to the BUOW. The methods and implementation measures to achieve this performance standard shall be described in a mitigation plan to be submitted to the County of Sacramento for review prior to the start of construction.

a.7 Swainson's Hawk

SWHA is a federal BCC, a state threatened species, and an SSHCP Covered Species. No SWHA nests were observed in the solar development area, within the PSA, or within 0.5 miles of the solar development area. However, large trees in the riparian corridor of the PSA north of the solar development area and outside the PSA within 0.5 miles provide potential nesting habitat for SWHA, and open areas in the solar development area provide foraging habitat for this species.

Construction activities, including grading and grubbing, near suitable nesting habitat (e.g., individual trees or riparian woodland habitats) within the solar development area or within 0.5 miles of the PSA could disturb an active SWHA nest. SWHA were not observed nesting within the solar development area or within 0.5 miles of the PSA during protocol-level surveys conducted on February 18 and 25, 2021; March 4 and March 16, 2021; April 9 and 15, 2021; May 3, 2021; and June 4, 2021; however, a pair was observed over the solar development area exhibiting courting behavior. It is expected that a few trees would be removed during Project construction, but these trees have not been found to support nesting SWHA. If trees within 0.5 miles of the solar development area become occupied by nesting SWHA prior to construction, then activities could result in the incidental loss of adults, juveniles, nestlings, or fertile eggs. In addition to the potential to remove a tree with an active nest, construction-generated disturbances also have the potential to indirectly affect SWHAs if the species is nesting within 0.5 miles of Project activities. Increased levels of noise and human activity within 0.5 miles of an active nest could result in nest abandonment or forced fledging and subsequent loss of fertile eggs, nestlings, or juveniles. These construction-generated disturbances could also cause SWHA to temporarily avoid foraging on some or all the solar development area.

Conversion of annual grassland to solar fields (i.e., disturbed habitat) could result in impacts on SWHA through permanent loss of foraging habitat. However, the annual grassland that composes most of the solar development area (361.91 acres of the 381.29-acre area) is abundant in the region. For example, within 5 miles of the solar development area, approximately 41,098 acres (61%) of the 66,539-acre area is annual grassland. Although there is a large amount of available foraging habitat for SWHAs in the Project vicinity (i.e., within 5 miles of the PSA), grassland conversion of the solar development area would decrease available foraging habitat for locally nesting SWHAs. Depending on the intensity of SWHA use of the affected foraging habitat, this decrease could result in displacement of nesting pairs, reduction in reproductive

potential, or decreased survival rates, particularly for hawks nesting within 0.5 miles of the solar development area. However, SWHA foraging within the solar development area was not intensive during surveys conducted in 2021. During five survey passes conducted from February to June 2021, SWHA foraging behavior was observed within the PSA three times, and SWHA was observed five other times in the PSA in non-foraging behavior such as perching, courtship flight, and transiting flight. Due to the dry conditions present in 2021, foraging intensity on the solar development area may have been suppressed due to lower prey availability or reduced SWHA breeding.

The results of studies conducted by Estep Environmental Consulting (i.e., 2013 and preliminary 2021 findings) indicate that properly designed and managed solar arrays can provide suitable SWHA foraging habitat. As noted in Section 4.5.3.12, solar arrays will be spaced to allow for foraging by SWHA between array rows. The Project sub arrays (i.e., contiguous part of array string in one area) would cover approximately 190.47 acres of annual grassland within the 381.29 acres of the solar development area. Therefore, approximately 190.82 acres (50%) of the annual grasslands within the solar development area is expected to remain available for SWHA foraging upon Project completion.

The solar arrays are proposed to be approximately 6 feet above ground level when at a level position (e.g., mid-day), though distances will vary depending on the panel tilt of 60 degrees to each side. Although the area under the solar arrays may be unavailable for aerial foraging, it would still provide habitat for rodents and large insects that form the SWHA prey base. SWHA may also pursue prey under the panels by hopping short distances, especially when the tracking panels are tilted in early morning and late afternoon to better expose the area on each side of the post. SWHA would also likely perch on the solar arrays, potentially enhancing their foraging efficiency within the remaining foraging habitat.

As a state-listed species, impacts to SWHA would be considered take under CESA, and therefore would be a significant impact under CEQA. If take of SWHA is anticipated, the Project would require consultation and subsequent authorization (i.e., in the form of an Incidental Take Permit or Consistency Determination) from CDFW pursuant to Section 2081 of CESA.

To reduce impacts to SWHA and habitat to ***less than significant with mitigation incorporated***, the measures below are recommended.

Recommended Avoidance, and Minimization Measures. The following measures are recommended to avoid, minimize, and mitigate direct or indirect impacts to this species:

- If nesting SWHA are determined present within the solar development area or within 0.5 miles of the solar development area during construction of the Project, ongoing monitoring by a qualified biologist may be required to ensure there are no impacts to this species and its habitat. The requirement for monitoring will be determined in consultation with CDFW biologists after they are notified of the nesting SWHA.

- SWHA shall be included in the WEAP described above for special-status plant species that will also educate staff on the presence of special-status wildlife species and ways to avoid and minimize impacts.

- A SWHA Management Plan should be developed and implemented by the Project to ensure that the solar development area and adjacent suitable SWHA foraging habitat achieve a performance standard of no net loss of SWHA habitat function and value following Project completion. The SWHA Management Plan should include, at a minimum, (1) requirements for timing of vegetation management and vegetation height to maximize SWHA access to prey species; (2) procedures to be followed in the event SWHA are present in an area, especially during nesting season; (3) elimination of interior fencing within the site and maximizing of visibility of perimeter fencing through flagging or other techniques to allow freedom of movement by SWHA and avoid collision; and (4) measures to potentially increase prey populations (e.g., burrowing rodents) such as avoiding rodenticide use or vegetation management. The SWHA Management Plan will be reviewed and approved by USFWS and CDFW and implemented for the Project duration, until decommissioning.

- Compensatory mitigation shall be provided for impacts to SWHA foraging habitat by Project infrastructure to achieve a performance standard of no let loss of habitat value to SWHA. The methods and implementation measures to achieve this performance standard shall be described in a mitigation plan to be submitted to the County of Sacramento for review prior to the start of construction. The Project may achieve the performance standard through the County of Sacramento Swainson's Hawk Mitigation Program or other compensatory programs (e.g., mitigation banks; conservation easements). Under the County of Sacramento program, mitigation would be provided for the change in habitat value from existing (75% of foraging habitat value remaining based on the AG-20 zoning) and the post-Project habitat value. Because the impacted area would be larger than 40 acres, the County Swainson's Hawk Mitigation Program would require the Project to provide mitigation lands.

a.8 Tricolored Blackbird

TRBL is a federal BCC and state threatened species, an SSC, and an SSHCP Covered Species. Dense stands of emergent vegetation, willows, thistle, Himalayan blackberry, or similar in the solar development area, although minimal, provide nesting habitat for TRBL, and open grassland and cultivated land provide foraging habitat for this species. Dudek conducted focused TRBL surveys within the solar development area from February through May 2021. Three TRBL species observations, including perching and foraging but no nesting, were made within the solar development area during the four survey passes conducted in 2021. No nesting colonies were observed. As a state-listed species, impacts to TRBL would be considered take under CESA and a significant impact under CEQA. If take of TRBL is anticipated, this Project action would require consultation and subsequent authorization in the form of a CDFW Incidental Take Permit pursuant to Section 2081 of CESA.

To reduce impacts to TRBL and habitat to ***less than significant with mitigation incorporated***, the measures below are recommended.

Recommended Avoidance and Minimization Measures. The following measures are recommended to avoid and minimize direct or indirect impacts to this species:

- A qualified biologist should conduct a pre-construction survey for nesting TRBL approximately 2 days prior to vegetation or tree removal or ground-disturbing activities during the nesting season

(April through August). The survey should cover the limits of construction and suitable nesting habitat within 500 feet.

- If any active nests are observed during surveys, a qualified biologist should establish a suitable avoidance buffer from the active nest. The buffer distance for TRBL will be 500 feet and should be determined based on factors such as topographic features, intensity and extent of the disturbance, timing relative to the nesting cycle, and anticipated ground disturbance schedule. Limits of construction to avoid active nests should be established in the field with flagging, fencing, or other appropriate barriers and should be maintained until the chicks have fledged and the nests are no longer active, as determined by the qualified biologist.

- If vegetation removal activities are delayed, additional nest surveys should be conducted such that no more than 7 days elapse between the survey and vegetation removal activities. It is recommended that disturbing potential nesting habitat (i.e., trimming and/or vegetation removal) be performed outside of the nesting season (September through March) to avoid impacts to nesting birds.

- If an active nest is identified within 500 feet of the construction zone after construction has started, work within 500 feet of the nest should be halted until the qualified biologist can provide appropriate avoidance and minimization measures to ensure that the nest is not disturbed by construction. Appropriate measures may include a no-disturbance buffer until the birds have fledged, limitations on construction activities that generate substantial vibration and/or noise, and/or full-time monitoring by a qualified biologist during construction activities conducted near the nest.

- This species should be included in the WEAP described above for special-status plant species that will also educate staff on the presence of special-status wildlife species and ways to avoid and minimize impacts.

a.9 Valley Elderberry Longhorn Beetle

VELB is a federally threatened species and an SSHCP Covered Species. As a federally listed species, direct impacts to VELB would be considered take under the FESA. If the Project affects VELB and/or VELB habitat, then the Project would require consultation and subsequent incidental take authorization (in the form of a Biological Opinion or Letter of Concurrence) from USFWS pursuant to Section 7 of the FESA.

Suitable habitat for VELB has been identified within the PSA (i.e., elderberry plants within riparian and adjacent non-riparian areas). Specifically, a total of 21 elderberry plants were identified within the PSA, with eight plants within 165 feet of the Project solar development area within non-riparian uplands. Dudek conducted focused surveys of elderberry plants within the solar development area and adjacent other lands (i.e., PSA) on February 19 and 25, 2021, and January 12, 2022, in accordance with the *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus)* (USFWS 2017b) and the *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (USFWS 1999).

The focused surveys found that four plants, 2A-C, 7, 8, and 12, exhibited relict bore/exit holes from a burrowing insect, and no observations of VELB were recorded. Elderberry plant 2A-C is approximately 275

feet outside of the riparian habitat in the western vicinity of the PSA, and greater than 165 feet (i.e., avoidance buffer distance) from the Project solar development area. Elderberry plant 7 is approximately 145 feet outside of the riparian habitat and is greater than 165 feet from the Project solar development area. Elderberry plant 8 through 11 are approximately 130 feet outside of the riparian habitat and its 165-foot buffer is located within the Project solar development area. Elderberry plant 12 is approximately 335 feet outside of the riparian habitat and is located within the Project solar development area. For the eight elderberry plants occurring within the Project solar development area or within 165 of the Project solar development area, no observations of VELB were observed during focused surveys. All eight plants were located within non-riparian uplands. Additionally, all eight plants include clusters of stems that were both greater and less than 1 inch in diameter. No bore/exit holes or observations of VELB were recorded for these elderberry plants. Plants 6 and 8 through 11 could be indirectly impacted by Project activities. Plants 4, 12, and 13 are located within the solar development area and could be directly impacted by Project activities (see Table 18 for a complete summary of VELB focused survey results, impacts types based on survey result findings and proximity to the solar development area, and proposed mitigation).

Table 18. Summary of VELB Focused Survey Results, Impacts, and Mitigation

ID	Location	Focused Survey Results	Impact Type [a]	Mitigation
1[b]	Riparian	No presence observed	No impact	None
2[b]	Upland	Relict bore/exit holes, no presence observed	No impact	None
3[b]	Riparian	No presence observed	No impact	None
4[b]	Non-riparian, upland	No presence observed	Direct	Compensatory mitigation at 1:1 ratio
5	Non-riparian, upland	No presence observed	No impact	None
6	Non-riparian, upland	No presence observed	Indirect	AMMs
7	Riparian	Relict bore/exit holes, no presence observed	No impact	None
8	Non-riparian, converted agriculture	Relict bore/exit holes, no presence observed	Indirect	AMMs
9	Non-riparian, converted agriculture	No presence observed	Indirect	AMMs
10	Non-riparian, converted agriculture	No presence observed	Indirect	AMMs
11	Non-riparian, converted agriculture	No presence observed	Indirect	AMMs
12	Non-riparian, converted agriculture	Relict bore/exit holes, no presence observed	Direct	Compensatory mitigation at 1:1 ratio
13	Non-riparian, upland	No presence observed	Direct	Compensatory mitigation at 1:1 ratio

Notes:

[a] Impact Type: Direct- permanent physical loss ("take") typically due to clearing and grading associated with implementation of a project; Indirect- reasonably foreseeable effects of a project implementation on remaining or adjacent resources outside the direct disturbance zone that may occur during typical grading or maintenance activities or later in time because of a project; None- no associated impacts.

[b] Cluster of more than one elderberry plant in one location.

To reduce impacts to VELB and habitat to ***less than significant with mitigation incorporated***, the measures below are recommended.

Recommended Avoidance and Minimization Measures: The following measures are recommended to avoid and minimize impacts:

Transplantation for direct impacts is not recommended for elderberry plants within the Project solar development area due to the unlikelihood of survival. As such, direct impacts (i.e., within 20 feet or less of solar development construction) will be mitigated at a 1:1 ratio and secured in accordance with the *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus)* (USFWS 2017b) and the *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (USFWS 1999).

Indirect impacts (i.e., plants between 20 to 100 feet of solar development construction) will be avoided and are subject to the implementation of the following AMMs:

- Avoidance and Fencing. Project activities that may damage or kill an elderberry plant (e.g., trenching, paving, etc.) should be avoided to the extent feasible. If avoidance of all plants is not fesible, impacts to plants will be compensated through planting of elderberry plants in areas not subject to project disturbance at a ratio of 1:1. All areas to be avoided during construction activities will be fenced and/or flagged as close to the Project solar development area as feasible. Temporary construction fencing and flagging shall be installed at least 165 feet outside the edge of the driplines of the elderberry plants. Environmentally sensitive area signs shall be erected along the edge of the avoidance area. In areas where encroachment on the 165-foot buffer has been approved by USFWS, a minimum setback of at least 20 feet from the dripline of each elderberry plant shall be provided, as well as documentation of USFWS setback approval.

- Timing. All activities that could occur within 165 feet of an elderberry plant will be conducted outside of the flight season of the VELB (i.e., March through July) to the maximum extent feasible.

- Trimming. If necessary, trimming may remove or destroy VELB eggs and/or larvae and may reduce the health and vigor of the elderberry plant. Therefore, to avoid and minimize direct impacts to VELB, trimming will occur between November and February and will avoid the removal of any branches or stems that are greater than 1 inch in diameter. Measures to address regular and/or large-scale maintenance (trimming) should be established and approved by USFWS.

- Mowing. Mechanical weed removal within the dripline of any elderberry plant will be limited to the season when adult VELB are not active (i.e., August through February) and will avoid damage to the elderberry plant.

- Construction Monitoring. A qualified biologist will monitor the Project solar development area if work is approved to occur within the 165-foot avoidance buffer to assure that all avoidance and minimization measures are implemented. The amount and duration of monitoring will depend on the project specifics and should be discussed with USFWS.

- WEAP. A qualified biologist will provide training for all contractors, work crews, and any on-site personnel on the status of the VELB, its host plant and habitat, the need to avoid damaging the elderberry shrubs, and the possible penalties for not complying with these requirements.

a.10 Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

Vernal pool fairy shrimp are a federally threatened and SSHCP Covered Species with a low potential to occur within the solar development area. There are known occurrences of this species within 5 miles of the PSA. Vernal pool tadpole shrimp are a federally endangered species with recorded known historic occurrences within the solar development area. Approximately 5.92 acres of low quality suitable aquatic habitat is present within the solar development area. Dudek conducted protocol-level surveys for both dry and wet season large-listed branchiopods within the solar development area. No observation of vernal pool fairy shrimp or vernal pool tadpole shrimp were made during the protocol-level surveys. Note that negative survey findings (i.e., no presence) does not demonstrate species absence, but does support the conclusion that this habitat is of low quality.

Vernal pool fairy shrimp and vernal pool tadpole shrimp species and their habitat are subject to agency jurisdiction pursuant to regulations under FESA, CESA, CFGC, and CEQA Guidelines. Measures to avoid, minimize, and mitigate impacts to jurisdictional wetlands and waters that provide potential large listed branchiopod habitat are provided in Section 6.2(c).

To reduce impacts to vernal pool fairy shrimp and vernal pool tadpole shrimp to ***less than significant with mitigation incorporated***, the measures below are recommended.

Recommended Avoidance and Minimization Measures. The following measures are recommended to avoid and minimize impacts:

Unless a smaller buffer is approved through formal consultation with USFWS, construction fencing shall be installed a minimum of 250 feet from the delineated wetland edge. All construction activities are prohibited within this buffer area. If total avoidance is achieved, no further action is required.

a.11 American Badger

American badger is a state SSC and SSHCP Covered Species with a high potential to occur in grassland habitat such as that within the solar development area. American badger has not been documented within the solar development area, but there are known occurrences of American badger within 5 miles. Additionally, although American badger has not been documented in the solar development area, one collapsed burrow with badger sign (i.e., claw marks along both sides of entrance) was documented in the northern portion of the solar development area. In addition, this species is known to occur in the vicinity, and suitable habitat, as well as SSHCP modeled habitat, is present (Sacramento County 2018). Eventual

solar development in the PSA could impact this species if the species is denning in or near the construction footprint during ground disturbance.

Impacts to this species would be ***less than significant with implementation of recommended avoidance and minimization measures***.

Recommended Avoidance and Minimization Measures. The following measures are recommended to avoid and minimize impacts:

- A qualified biologist should conduct focused surveys for American badger dens within 2 weeks prior to ground-disturbing activities in undeveloped grassland. The survey should cover the limits of ground disturbance and a 100-foot buffer. Any winter or natal American badger dens located during the survey should be evaluated (typically with remote cameras) to determine activity status.

- If American badger is identified, then prior to construction, the qualified biologist should establish a 100-foot no-disturbance buffer (e.g., mesh exclusion fencing, flagging, or similar) around any active American badger natal dens identified during the survey. The buffer should be maintained until the qualified biologist determines that the den is no longer active, and the young are no longer dependent upon the den for survival.

- If construction occurs during the non-breeding period (i.e., typically from June through February) and an active non-natal den is found in or adjacent to the construction footprint, a qualified biologist should attempt to trap or flush the individual and relocate it to suitable habitat away from construction. If no dens are observed, and/or after a trapping or flushing effort is completed, and/or after it is confirmed that a natal den is no longer active, the vacated or unoccupied den can be excavated, and construction can proceed.

- If American badger is determined present within the solar development area of the PSA, then ongoing monitoring by a qualified biologist may be required to ensure there are no impacts to this species and its habitat during construction and operation and maintenance activities for the Project.

- This species should be included in the WEAP described above for special-status plant species that will also educate staff on the presence of special-status wildlife species and ways to avoid and minimize impacts.

a.12 Native Bats

Native bat roosting habitat in the solar development area is limited to isolated trees near seasonal ponds or other aquatic habitat that provide nearby foraging opportunities. No active bat roosts or signs of occupation, such as guano or staining, were detected during the reconnaissance-level field surveys. If bats are roosting in or adjacent to the solar development area, impacts could result from the permanent removal of roosting sites, such as trees and snags, or from Project-related noise disturbance to an occupied roosting site in the vicinity of construction. Native bat species are protected by the state under CFGC Section 4150 for non-game mammals (including bats). Should bats be roosting during construction activities, removal of

active roost sites that would result in the harm or mortality of native bats and would be considered a violation of the take provisions of Section 4150 of the CFGC.

Impacts to native bats would be ***less than significant with implementation of recommended avoidance and minimization measures.***

Recommended Avoidance and Minimization Measures. The following measures are recommended to avoid and minimize impacts:

- A qualified biologist should conduct a habitat assessment for roosting bats within the solar development area. The habitat assessment should include a visual inspection of potential roosting features (bats need not be present) and presence of guano within the solar development area, access routes, and 300 feet around these areas. The qualified biologist should survey these areas no less than 30 days prior to the start of work. Potential roosting features found during the survey should be flagged or marked.

- Removal of potential roost habitat identified during the assessment (described above) should be avoided during the bat maternity season (i.e., May 1 through August 15). If removal of potential roost habitat occurs outside of the maternity season, no further mitigation should be required.

- If a bat roosting or maternity colony cannot be completely avoided, the individuals should be safely evicted under the direction of the qualified bat biologist. If individuals cannot be safely evicted due to factors such as lack of alternative roosting sites or the young still being reliant on adults, as determined by the qualified bat biologist, ground-disturbing activities within a specified distance of the roost (specified distance to be determined by the bat biologist, based on surroundings and vulnerability of roost site, etc.) should be postponed or halted until conditions are suitable for safe eviction or the roost has vacated naturally.

- If native bats are determined present within the solar development area, then ongoing monitoring by a qualified biologist may be required to ensure there are no impacts to this species and its habitat during construction and operation and maintenance activities for the Project.

- Prior to Project initiation, a Bat and Avian Protection Plan will be prepared in coordination with CDFW and USFWS to reduce/eliminate impacts to bat and avian species.

- Native bats should be included in the WEAP described above for special-status plant species that will also educate staff on the presence of special-status wildlife species and ways to avoid and minimize impacts.

a.13 Nesting Raptors and Migratory Birds

Potential nesting habitat for migratory bird species within the solar development area is generally limited to that for ground-nesting species. Bald eagles and white-tailed kites were observed within the solar development area and adjacent area (i.e., the PSA), but nesting habitat for the species is not present in the solar development area. Bank swallows have low to no potential to occur within the solar development area and there are known occurrences within 5 miles of the solar development area. Eventual development

within the solar development area could involve removal of vegetation and isolated trees, which has the potential to impact nesting birds protected by the federal MBTA and CFGC. In addition to violating the protections under the MBTA and CFGC, direct or indirect impacts to nesting birds would likely be considered a potentially significant impact under CEQA. To avoid impacting active nests, it is recommended that tree or vegetation removal be conducted outside of the nesting season (i.e., February through August).

Impacts to nesting birds would be ***less than significant with implementation of recommended avoidance and minimization measures***.

Recommended Avoidance and Minimization Measures. The following measures are recommended to avoid and minimize impacts:

- A qualified biologist should conduct a survey for nesting birds within 1 week prior to vegetation removal or ground-disturbing activities during the nesting season within suitable habitat (i.e., February through August). The survey should cover the limits of construction and accessible suitable nesting habitat within 150 feet.

- If any active nests are observed during surveys, a qualified biologist should establish a suitable avoidance buffer from the active nest. The buffer distance will typically range from 50 to 300 feet and should be determined based on factors such as the species of bird, topographic features, intensity and extent of the disturbance, timing relative to the nesting cycle, and anticipated ground disturbance schedule. Limits of construction to avoid active nests should be established in the field with flagging, fencing, or other appropriate barriers and should be maintained until the chicks have fledged and the nests are no longer active, as determined by the qualified biologist.

- Throughout the duration of the Project, a qualified biologist will conduct up to twice-weekly bird mortality surveys, with particular attention on areas of recent or current Project activities.

- Vegetation or trees planned for removal shall be removed during the period of September through January, to avoid the nesting season. Any trees that are to be removed during the nesting season, which is February through August, will be surveyed by a qualified biologist and will only be removed if no nesting migratory birds are found. If vegetation removal activities are delayed, additional nest surveys should be conducted such that no more than 7 days elapse between the survey and vegetation removal activities.

- If an active nest is identified in or adjacent to the construction zone after construction has started, work in the vicinity of the nest should be halted as-needed until the Project biologist can provide appropriate avoidance and minimization measures to ensure that the nest is not disturbed by construction. Appropriate measures may include a no-disturbance buffer until the nest has fledged and/or full-time monitoring by a qualified biologist during construction activities conducted near the nest.

- Nesting birds should be included in the WEAP described above for special-status plant species that will also educate staff on the presence of special-status wildlife species and ways to avoid and minimize impacts.

b) ***The Project would not 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 CDFW or USFWS.***

Sensitive natural communities and DCH, including riparian habitat, fall under the jurisdiction of CDFW pursuant to CESA and Section 1600 of the CFGC, and USFWS pursuant to FESA. These communities are habitats that have a limited distribution and are often vulnerable to the environmental effects of projects. In addition, riparian habitat may also be subject to Sacramento County tree permits and fees for the removal of protected tree species within the riparian habitat zone (i.e., *Quercus* spp.). These communities may or may not contain special-status species or their habitats.

No sensitive natural communities were identified within the solar development area, including riparian habitat. Three CDFW sensitive natural communities, northern hardpan vernal pool, valley oak woodland, and riparian vegetation community, were identified within 5 miles of the PSA.

Impacts to sensitive natural communities that are present within the solar development area may be reduced to ***less than significant with mitigation incorporated*** with the implementation of measures recommended to address potential impacts to wetlands and other jurisdictional waters (see Section 6.2[c] below) and measures recommended to address potential impacts to oak species (see Section 6.2[e] below).

c) ***The Project would not have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.***

There are approximately 5.74 acres of aquatic resources in the solar development area. Of the total aquatic resources present within the solar development area, approximately 4.42 acres meet the criteria for jurisdictional waters of the U.S. under CWA Section 404 regulated by USACE; and 5.83 acres meet the criteria of waters of the state under CWA Section 401 regulated by RWQCB and the definition of aquatic resources under CFGC Section 1602 regulated by the CDFW. Specifically, unlike USACE, RWQCB asserts jurisdiction over ephemeral drainages and isolated wetlands, and CDFW jurisdiction extends to the top of bank or edge of wetland or riparian vegetation (if present) rather than the OHWM of applicable aquatic resources. Furthermore, each resource present may be impacted by Project activities either indirectly, permanently, or temporarily. For permanent impact areas within the solar development area, approximately 2.355 acres meet the criteria for jurisdiction of waters of the U.S. and state waters, and 2.739 acres meet only criteria of waters of the state. Table 19 below outlines the indirect, direct permanent, and temporary by jurisdictional authority within the solar development area of the PSA.

Table 19. Summary of Aquatic Resources Impacts by Jurisdiction within the Solar Development Area

Impact Type	Total Impacts in the Solar Development area By Jurisdictional Authority (acres)[1]		
	CDFW	RWQCB	USACE
Indirect	2.803	2.803	2.055
Permanent	2.739	2.739	2.355
Temporary	0.202	0.202	0.006

Notes: CDFW= California Department of Fish and Wildlife, RWQCB= Regional Water Quality Control Board, USACE= U.S. Army Corps of Engineers.

To reduce impacts to state and federally protected wetlands and waters to ***less than significant with mitigation incorporated***, the measures below are recommended.

Recommended Avoidance, and Minimization Measures: The following measures are recommended to avoid and minimize impacts:

- Impacts to jurisdictional aquatic resources will require prior authorization from the resource agencies listed above in the form of waters and wetland permits (e.g., 404 Nationwide or Individual Permit, 401 Water Quality Certification, 1600 Lake or Streambed Alteration Agreement, and Floodplain Encroachment Permit), as well as compensatory mitigation to ensure no net loss of jurisdictional resources. Potential mitigation options include purchasing mitigation credits from an agency-approved wetlands mitigation bank, paying an agency-approved in-lieu fee, and/or developing conservations lands to compensate for permanent loss of resources. An Aquatic Resources Mitigation Plan and/or a Restoration and Revegetation Plan that includes aquatic resources may need to be prepared if impacts cannot be avoided.

- An Approved Jurisdictional Delineation from USACE for the ARD Report must be completed prior to and/or in conjunction with permit submittals for USACE, CDFW, and RWQCB.

- Jurisdictional wetlands that provide habitat to special-status species (e.g., CTS, large-listed branchiopods, WST, northwestern pond turtle). Additional mitigation for potential direct and indirect impacts to special-status species habitat will achieve a no net loss of habitat value at a mitigation ratio determined by the USFWS and CDFW for species within their respective jurisdiction.

- Aquatic resources should be included in the WEAP described above for special-status plant species that will also educate staff on the presence of special-status wildlife species and ways to avoid and minimize impacts.

d) ***The Project would not 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.***

As stated above, agricultural areas and undeveloped grassland in the solar development area provide nursery and migratory habitat for common wildlife species, and the Cosumnes River corridor in the western vicinity of the PSA within less than 1,500 feet from the solar development area is a potential riparian

connection, providing native habitat for resident wildlife, as well as linkages to additional native habitat in the surrounding area.

According to the California Essential Habitat Connectivity, grasslands within the solar development area are not specifically identified as Essential Connectivity Areas or Natural Landscape Blocks. In addition, there is ample similar open land available in the Project vicinity and many thousands of acres of habitat for migrating birds. Potential Project impacts to wildlife corridors and habitat linkages would be considered a significant impact under CEQA because of the sensitivity of the riparian corridor within the adjacent other lands of the PSA. However, recommended avoidance and minimization measures would ensure this impact remains ***less than significant with mitigation incorporated***.

e) ***The Project would conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.***

Protected tree species are primarily located within the valley oak woodland/riparian corridor adjacent to the Cosumnes River in the PSA, outside of the solar development area. To the extent feasible, it is recommended that the Project avoid all impacts to tree resources, specifically the removal of trees and/or work within the dripline of each tree. Tree numbers 4001, 4002, 4003, 4004, 4405, 4406, 4407, 4408, 4409, 4410, 4411, 4412, 4413, 4414, and 4415 are located within the solar development area and may be directly impacted by Project activities. Tree numbers 4412 is a native oak tree; however, is not considered protected by Sacramento County if dead. No trees will require a Sacramento County Tree Removal Permit, as none of the trees fall within the Sacramento County Tree Preservation Ordinance requirements.

To reduce impacts to biological resources, such as trees, to ***less than significant with mitigation incorporated***, the measures below are recommended.

Recommended Avoidance, and Minimization Measures: The following measures are recommended to avoid and minimize impacts:

- If tree removal and/or work within the dripline cannot be avoided, then the Sacramento County Tree Preservation Ordinance requires a tree removal permit for the removal of any native oak with a single trunk measuring 6 inches or greater in DBH, or a multiple-trunked tree with an aggregate DBH measuring 10 inches or greater. This ordinance also prohibits grading, trenching, or filling any area within the dripline of a native oak without being issued a permit. Potential impacts to trees must be mitigated in accordance with the Sacramento County Tree Preservation Ordinance.

- For trees that need removal and do not fall within Sacramento County Tree Preservation Ordinance requirements, a Landscaping Plan will be prepared and submitted prior to the start of Project activities.

f) ***The Project would not 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 County adopted the SSHCP in 2019, which established a regional habitat conservation program for the South Sacramento area. The SSHCP provides simplified permitting for the impacts of identified covered

activities to certain special-status covered species and wetlands. Most SSHCP covered activities are located within Sacramento County's Urban Services Boundary and the Urban Development Area defined in the SSHCP. The Project land is outside of those areas. Solar development outside the Urban Development Area is not a covered activity, is not subject to the SSHCP permitting process, and is not otherwise subject to regulation under the SSHCP.

The SSHCP contemplates those activities that are not covered activities, and therefore are not regulated by the SSHCP, may nevertheless occur within the Plan Area of the SSHCP with the approval of the applicable state and federal environmental agencies. For example, the SSHCP acknowledges that the Sacramento County General Plan provides for land uses that are not covered activities, but that are within the Plan Area of the SSHCP. The SSHCP recognizes that land uses outside of the Plan Area that are not covered activities may be permitted through separate federal and state authorization. While mitigation banks in the Plan Area are not a covered activity, the SSHCP provides for the acquisition of mitigation bank credits by the South Sacramento Conservation Agency to meet certain of the SSHCP goals and objectives (Sacramento County 2018).

The Project will obtain applicable permits and other approvals from the USFWS, USACE, CDFW, and RWQCB, and will further minimize and mitigate impacts on natural resources to achieve comply with the regulatory standards of these agencies. These are the same regulatory standards applied by the USFWS and the other environmental agencies in their review and approval of the SSHCP. Therefore, the Project mitigation strategy is designed to achieve the mitigation standards applicable to covered activities under the SSHCP.

During the 30-year life of the Project, the lands within the solar development area would not be available for acquisition by the South Sacramento Conservation Agency and inclusion within the SSHCP Preserve System. The solar development area will continue to provide some habitat value for SSHCP Covered Species, the lands in the solar development area but could not be acquired and considered for inclusion in the SSHCP preserve System prior to the decommissioning of the Project.

The Project will provide compensatory mitigation for impacts to aquatic resources and specific SSHCP covered species through the acquisition of credits from existing mitigation banks and other compensatory mitigation.

The SSHCP included an inventory of undeveloped potential habitat for SSHCP Covered Species in the SSHCP Plan Area and in each Preserve Planning Unit; the Project is in Preserve Planning Unit 5. That inventory is excerpted below and compared with the acres of land cover proposed within only the solar development area for the Project (Table 20).

Table 20. South Sacramento Habitat Conservation Plan Modeled Special-Status Wildlife Species Habitat and Land Cover within Undeveloped Lands in Plan Area and the Solar Development Area

Habitat Model Land Cover Types	Total Modeled Habitat Potentially Available in SSHCP Plan Area (acres)	Total Modeled Habitat Potentially Available in SSHCP Preserve Planning Unit 5 (acres)	Total Modeled Habitat with the Solar Development Area of the Project (acres)
Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp			
Valley Grassland	97,349	13,028	296.52
Vernal Pool	4,536	339	3.51
Swale	1,252	89	1.86
Streams/Creeks (VPIH)	73	0.4	0
Valley Elderberry Longhorn Beetle			
Mine Tailing Riparian Woodland	641	59	0
Mixed Riparian Woodland	5,785	1,169	0
Mixed Riparian Scrub	1,451	173	0
California Tiger Salamander – Upland Habitat			
Blue Oak Savanna	3,322	242	0
Blue Oak Woodland	3,774	992	0
Valley Grassland[1]	78,274	13,897	355.88
California Tiger Salamander – Aquatic Habitat			
Vernal Pool	3,033	277	3.51
Seasonal Wetland	1,391	355	0
Western Spadefoot – Upland Habitat			
Blue Oak Savanna	5,637	692	0
Blue Oak Woodland	9,132	5,864	0
Valley Grassland[1]	135,094	27,463	355.88
Western Spadefoot – Aquatic Habitat			
Vernal Pool	4,536	339	3.51
Swale	1,252	89	1.86
Seasonal Wetland	2,600	446	0
Open Water	2,344	365	0
Streams/Creeks	2,674	481	0

Table 20. South Sacramento Habitat Conservation Plan Modeled Special-Status Wildlife Species Habitat and Land Cover within Undeveloped Lands in Plan Area and the Solar Development Area

Habitat Model Land Cover Types	Total Modeled Habitat Potentially Available in SSHCP Plan Area (acres)	Total Modeled Habitat Potentially Available in SSHCP Preserve Planning Unit 5 (acres)	Total Modeled Habitat with the Solar Development Area of the Project (acres)
Streams/Creeks (VPIH)	73	0.4	0
Northwestern Pond Turtle –Upland Habitat			
Blue Oak Woodland	7,610	4,983	0
Blue Oak Savanna	4,825	519	0
Valley Grassland[1]	91,580	22,373	46.14
Mine Tailing Riparian Woodland	306	59	0
Mixed Riparian Woodland	5,347	1,152	0
Mixed Riparian Scrub	1,178	170	0
Northwestern Pond Turtle – Aquatic Habitat			
Freshwater Marsh	2,240	122	0
Open Water	1,441	205	0
Stream/Creeks	2,674	480	0
Swainson's Hawk – Nesting Habitat			
Mixed Riparian Woodland	5,785	1,169	0
Mixed Riparian Scrub	1,449	173	0
Swainson's Hawk – Foraging Habitat			
Valley Grassland[1]	133,705	26,503	355.88
Cropland	47,905	2,549	5.64
Irrigated Pasture-Grassland	15,991	2,203	0
Vernal Pool	4,536	339	3.51
Seasonal Wetland	2,600	446	0
Swale	1,252	89	1.86
Western Burrowing Owl – Nesting/Foraging Habitat			
Valley Grassland[1]	135,112	27,463	355.88
Blue Oak Savanna	5,637	692	0
Cropland	47,905	2,549	5.64

Table 20. South Sacramento Habitat Conservation Plan Modeled Special-Status Wildlife Species Habitat and Land Cover within Undeveloped Lands in Plan Area and the Solar Development Area

Habitat Model Land Cover Types	Total Modeled Habitat Potentially Available in SSHCP Plan Area (acres)	Total Modeled Habitat Potentially Available in SSHCP Preserve Planning Unit 5 (acres)	Total Modeled Habitat with the Solar Development Area of the Project (acres)
Irrigated Pasture-Grassland	15,991	2,203	0
Western Burrowing Owl – Foraging Habitat			
Vernal Pool	4,536	339	3.51
Swale	1,252	89	1.86
Seasonal Wetland	2,600	446	0
Stream/Creek (VPIH)	73	0.4	0
Tricolored Blackbird – Nesting/Foraging Habitat			
Valley Grassland[1]	135,112	27,463	355.88
Cropland	47,905	2,549	5.64
Seasonal Wetland	2,600	446	0
Freshwater Marsh	2,922	159	0
Tricolored Blackbird – Foraging Habitat			
Irrigated Pasture-Grassland	15,991	2,203	0
Vernal Pool	4,536	339	3.51
Swale	1,222	89	1.86
Open Water	2,344	365	0

Source: Sacramento County 2018

Notes:

[1] Valley Grassland is synonymous with California Annual Grassland

- SSHCP= South Sacramento Habitat Conservation Plan; VPIH= Vernal Pool Invertebrate Habitat.
- No SSHCP Valley Grassland landcover was modeled within the solar development area of the Project Study Area (PSA), however, approximately 361.91 acres of SSHCP California Annual Grassland landcover, a similar vegetation community, was mapped within the solar development area of the PSA.
- For this table, the aquatic resource acreages are based on the total of SSHCP modeled landcover and differs from the final acreages defined by the aquatic resource delineation conducted for the Project, as analyzed further within this document.

As Table 20 indicates, The Project impacts an extremely small percentage of the SSCHP modeled habitat in SSHCP Preserve Planning Unit 5. During the 30-year life of the Project, approximately 0.001% of the inventory of seasonal wetlands, and less than 0.001% of swales and vernal pools in Planning Unit 5 would not be available for acquisition by the South Sacramento Conservation Agency.

The solar development area is a potential connectivity site between the Cosumnes River and the existing preserves to the southeast of Dillard Road. The SSHCP design focus in Preserve Planning Unit 5 is primarily to provide habitat linkages among existing and future preserves both outside and inside the Urban Development Area, primarily along the Cosumnes River/Deer Creek Corridor.

The existing fencing around the solar development area currently may limit movement of certain larger mammals (i.e., American badger) Small to medium-sized mammals such as coyotes, raccoons, and possums will have the ability to move through the site, either digging under the existing fencing or passing through gaps. Coyote were observed several times during visits to the site. Dillard Road does not carry a high traffic volume[1] and the orchard to the southeast of the site is unfenced, making transit possible from the Cosumnes River through the subject property to the large preserves southeast of the orchard. In addition to terrestrial mammals, the open grassland of the subject property can provide a movement corridor for bird species that are less likely to move through a developed area, including the red-tailed hawk and northern harrier that were observed perching on and moving through the site.

The solar development area will allow for continued wildlife movement through the Cosumnes River corridor and across the project lands for common species and SSHCP covered species. Therefore, the Project fencing may impair wildlife movement through the solar development area by larger mammals (i.e., American badger). However, based on the extended analysis conducted for the Project for SWHA space use (Section 5.7.1.4), areas with solar panels can continue to provide foraging habitat for raptor species if appropriate vegetation is maintained under and between solar arrays (Estep Environmental Consulting 2021).

The impacts to SSHCP land cover types from Project development are a very small percentage of the inventory of those lands in Preserve Planning Unit 5 and an even smaller percentage of the modeled habitat in the SSHCP Plan Area. Mitigation for the Project would include incorporating the AMMs from the SSHCP, despite the Project not receiving permit coverage under the SSHCP. This mitigation would ensure that Project effects on SSHCP Covered Species, if present, would be avoided and minimized in the same way as if the SSHCP permits applied to the Project.

[1] Measured 24-hour traffic volumes on Dillard Road at Meiss Road ranged from 4032 to 5410 daily vehicles during measurements taken from 2015 through 2019. No measurements are available that specify the time of day for traffic levels. However, if it assumed that 75% of this traffic happens during the hours of 6:00 a.m.–6:00 p.m., that daily traffic amounts to 5.6 cars per minute during the day (including both directions) and 1.9 cars per minute during the evening (again, including both directions).

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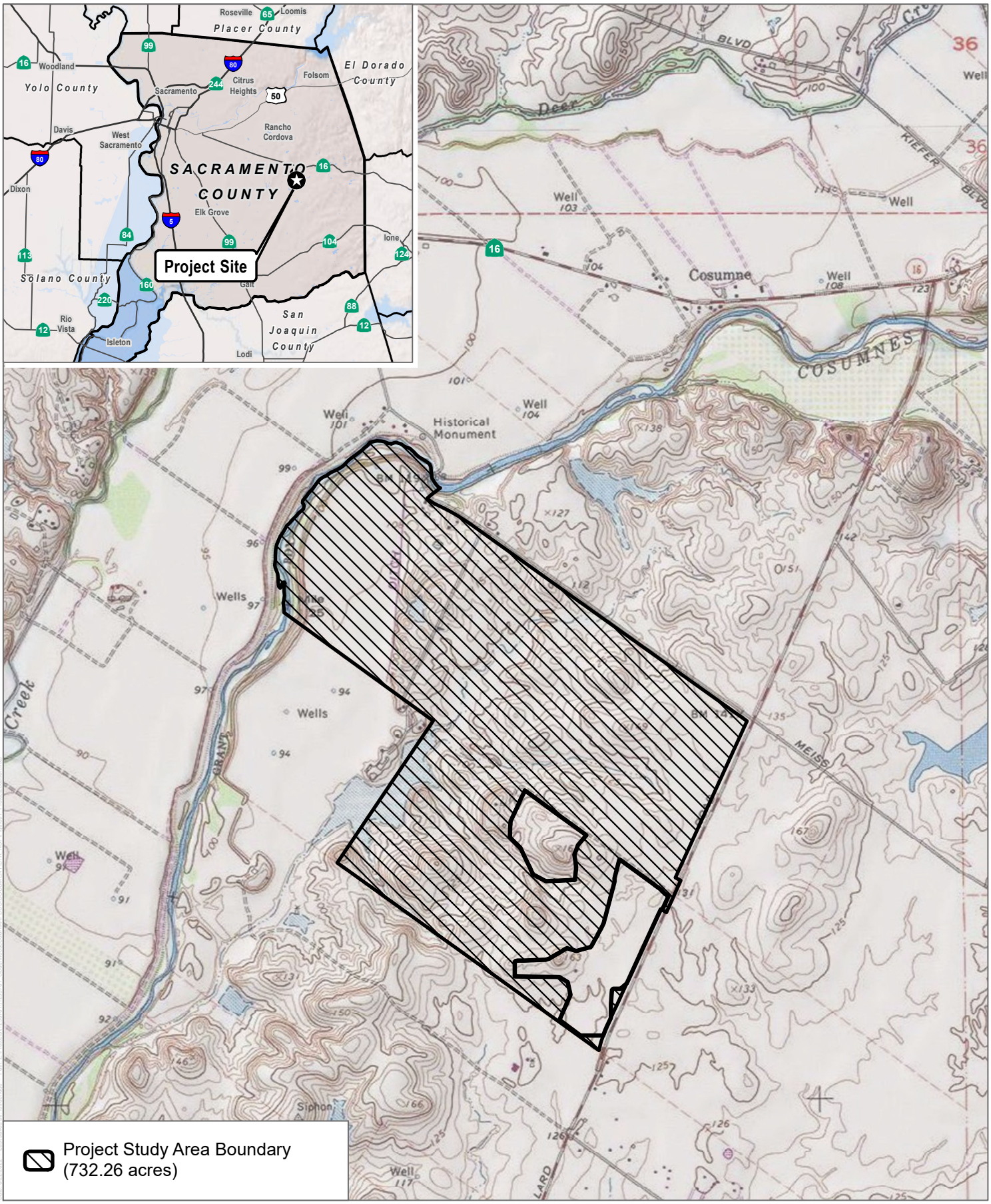

SOURCE: USGS 7.5-Minute Series Sloughhouse Quadrangle, Original Site Plan - Baker Williams (12/16/2020)

DUDEK

0 1,000 2,000 Feet

FIGURE 1

Project Location

Biological Technical Report for the Sloughhouse Solar Farm Project

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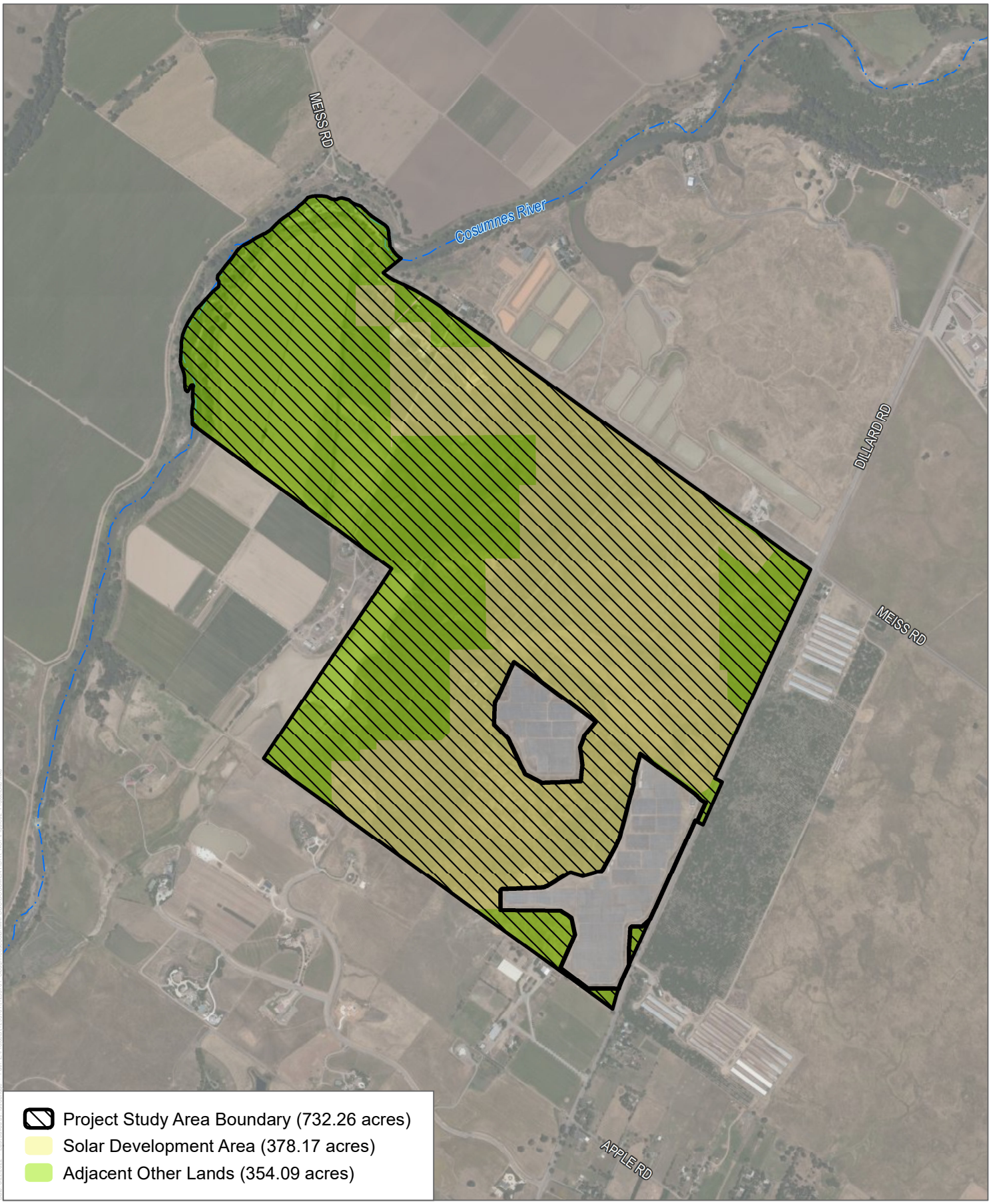

SOURCE: Bing Maps (2020), Sacramento County (2019), Original Site Plan - Baker Williams (12/16/2020)

DUDEK

0 750 1,500 Feet

FIGURE 2

Project Setting

Biological Technical Report for the Sloughhouse Solar Farm Project

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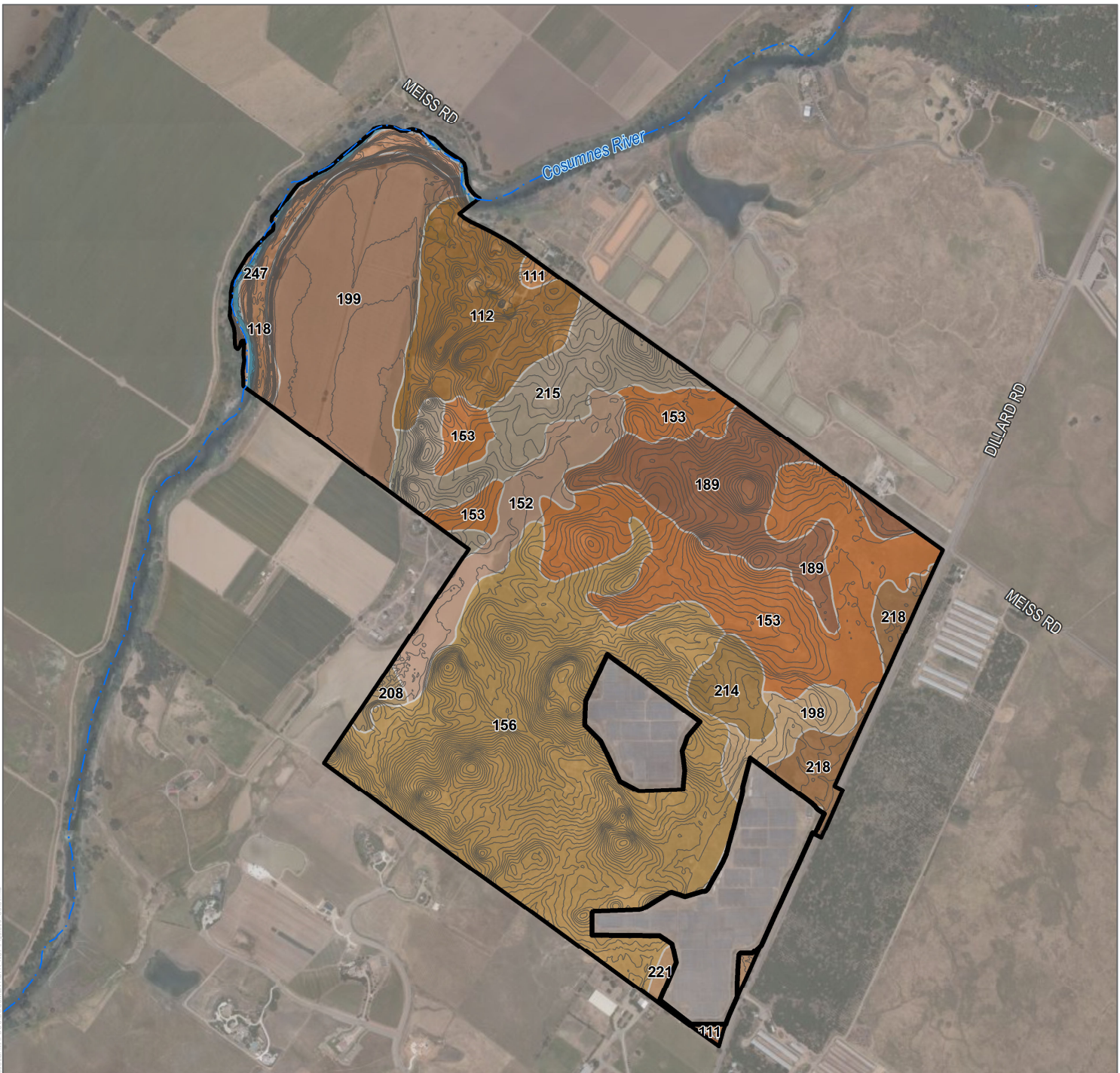

Project Study Area Boundary (732.26 acres)
NHD Flowline
2-foot Contours

Soil Classification

111 : Bruella sandy loam, 0 to 2 percent slopes
112 : Bruella sandy loam, 2 to 5 percent slopes
118 : Columbia sandy loam, drained, 0 to 2 percent slopes, occasionall y flooded
152 : Galt clay, 0 to 2 percent slopes
153 : Galt clay, 2 to 5 percent slopes
156 : Hadselville-Pentz complex, 2 to 30 percent slopes
189 : Peters clay, 1 to 8 percent slopes
198 : Redding gravelly loam, 0 to 8 percent slopes
199 : Reiff fine sandy loam, 0 to 2 percent slopes, occasionally flood ed
208 : Sailboat silt loam, drained, 0 to 2 percent slopes, occasionally flooded
214 : San Joaquin silt loam, 0 to 3 percent slopes
215 : San Joaquin silt loam, 3 to 8 percent slopes
216 : San Joaquin-Durixeralfs complex, 0 to 1 percent slopes
217 : San Joaquin-Galt complex, leveled, 0 to 1 percent slopes
218 : San Joaquin-Galt complex, 0 to 3 percent slopes
221 : San Joaquin-Xerarents complex, leveled, 0 to 1 percent slopes
247 : Water

SOURCE: Bing Maps (2020), Sacramento County (2019), USDA (2019), Original Site Plan - Baker Williams (12/16/2020)

DUDEK

0 750 1,500 Feet

FIGURE 3

Soil and Terrain Setting

Biological Technical Report for the Sloughhouse Solar Farm Project

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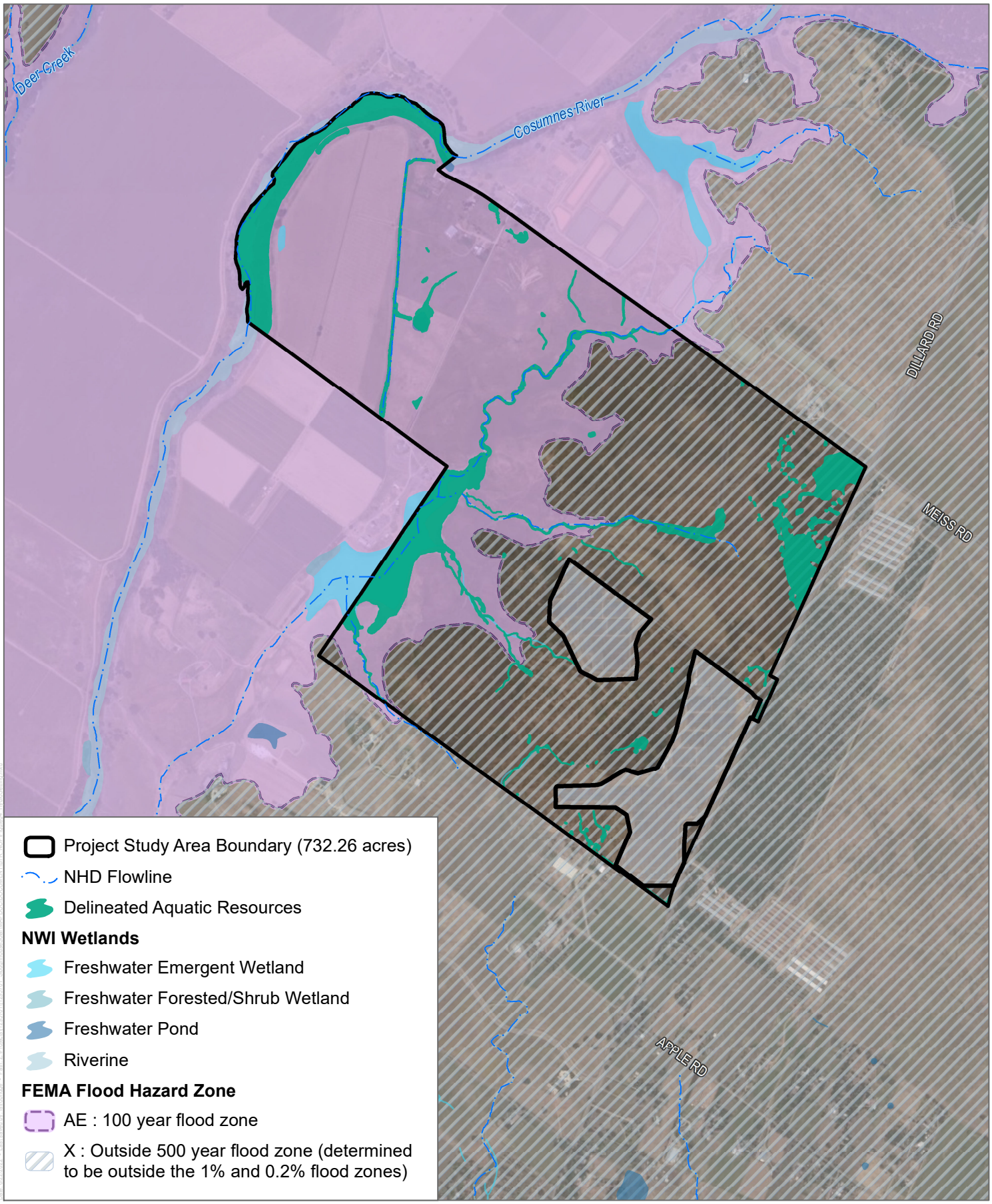

SOURCE: Bing Maps (2020), NHD (2019), Sacramento County (2019), USFWS (2020), FEMA (2019), Original Site Plan - Baker Williams (12/16/2020)

DUDEK

0 750 1,500 Feet

FIGURE 4

Hydrologic Setting

Biological Technical Report for the Sloughhouse Solar Farm Project

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- Project Study Area Boundary *(732.26 acres)*
- Solar Development Area (378.17 acres)
- Adjacent Other Lands (354.09 acres)

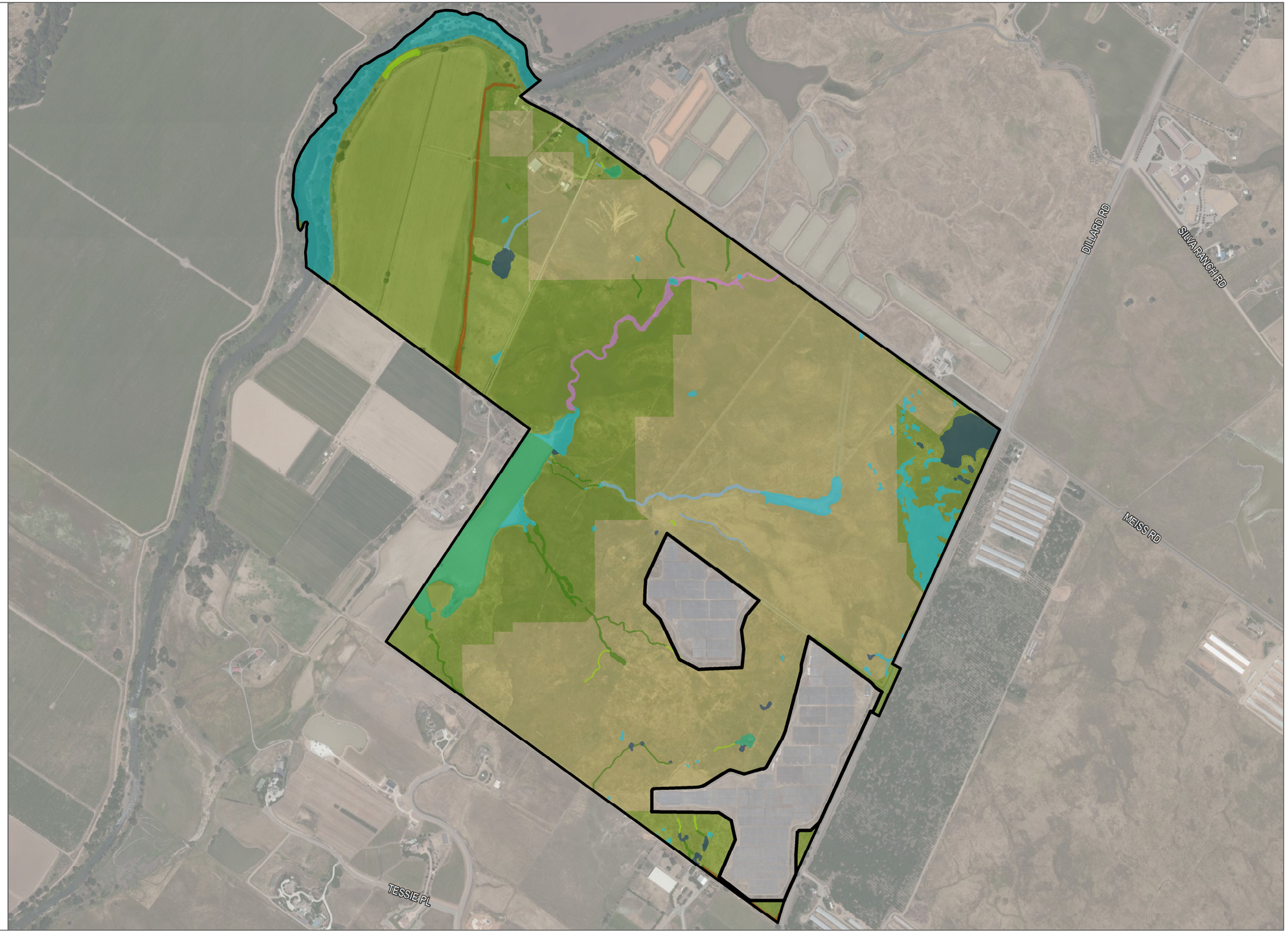
Aquatic Resources

Wetlands *(37.49 acres)*

- Freshwater Emergent Wetland *(0.02 acre)*
- Seasonal Wetland *(14.16 acres)*
- Vernal Pool *(6.30 acres)*
- Pond *(17.01 acres)*

Waters *(32.28 acres) (28,152 linear feet)*

- Ephemeral Drainage *(1.11 acres) (3,432 linear feet)*
- Intermittent Drainage *(2.36 acres) (4,463 linear feet)*
- Perennial Drainage *(24.10 acres) (4,506 linear feet)*
- Seasonal Wetland Swale *(2.15 acre) (8,807 linear feet)*
- Upland Swale *(0.63 acre) (1,838 linear feet)*
- Ditch *(1.93 acres) (5,106 linear feet)*



SOURCE: Bing Maps (2020), Original Site Plan - Baker Williams (12/16/2020)

DUDEK

0 500 1,000 Feet

FIGURE 5

Aquatic Resources Delineation

Biological Technical Report for the Sloughhouse Solar Farm Project

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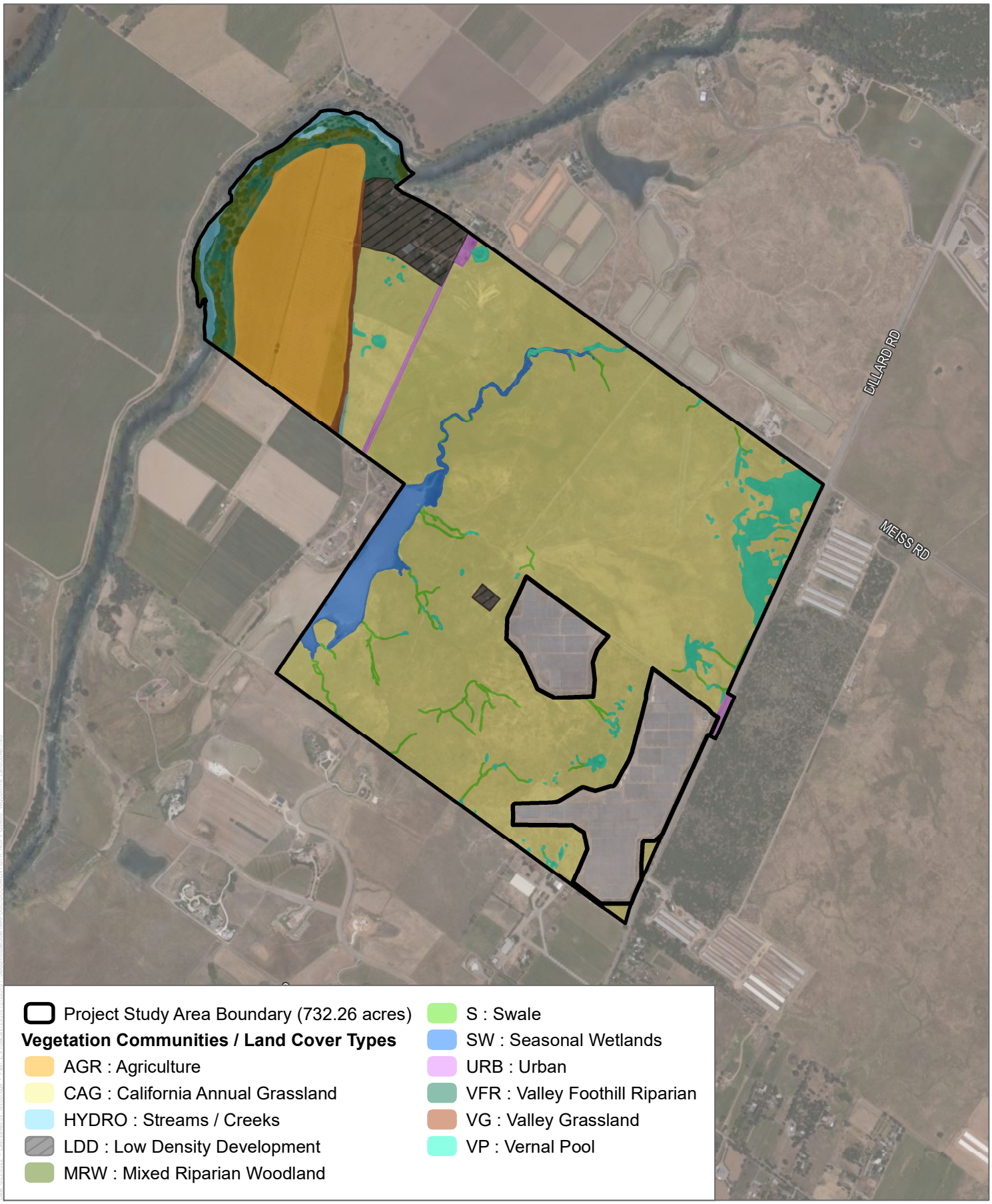

SOURCE: Bing Maps (2020), Sacramento County (2019), Original Site Plan - Baker Williams (12/16/2020)

DUDEK

0 750 1,500 Feet

FIGURE 6

Vegetation and Land Cover

Biological Technical Report for the Sloughhouse Solar Farm Project

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Project Study Area Boundary (732.26 acres)
Project Study Area Boundary 5-mile Buffer

Designated Critical Habitat
- Slender Orcutt grass
- Sacramento Orcutt grass
- Vernal pool tadpole shrimp
- Vernal pool fairy shrimp

Essential Fish Habitat
- Steelhead

CNDDB Occurrence

Plants
- 1 : Ahart's dwarf rush
- 2 : Boggs Lake hedge-hyssop
- 3 : Legenere
- 4 : Pincushion navarretia
- 5 : Sacramento Orcutt grass
- 6 : Sanford's arrowhead

Wildlife
- 7 : American badger
- 8 : Bank swallow
- 9 : Blennosperma vernal pool andrenid bee
- 10 : Burrowing owl
- 11 : California linderiella
- 12 : California tiger salamander
- 13 : Great blue heron
- 14 : Great egret
- 15 : Hairy water flea
- 16 : Midvalley fairy shrimp
- 17 : Ricksecker's water scavenger beetle
- 18 : Steelhead - Central Valley DPS
- 19 : Swainson's hawk
- 20 : Tricolored blackbird
- 21 : Valley elderberry longhorn beetle
- 22 : Vernal pool fairy shrimp
- 23 : Vernal pool tadpole shrimp
- 24 : Western pond turtle
- 25 : Western spadefoot
- 26 : White-tailed kite

Sensitive Natural Community
- 27 : Northern Hardpan Vernal Pool

Cosumnes River

bing

SOURCE: Bing Maps (2020), CDFW (2020), USFWS (2020), Original Site Plan - Baker Williams (12/16/2020)

DUDEK

0 0.75 1.5 Miles

FIGURE 7

Known Special-Status Species Occurrences, Critical Habitat, and Sensitive Communities

Biological Technical Report for the Sloughhouse Solar Farm Project

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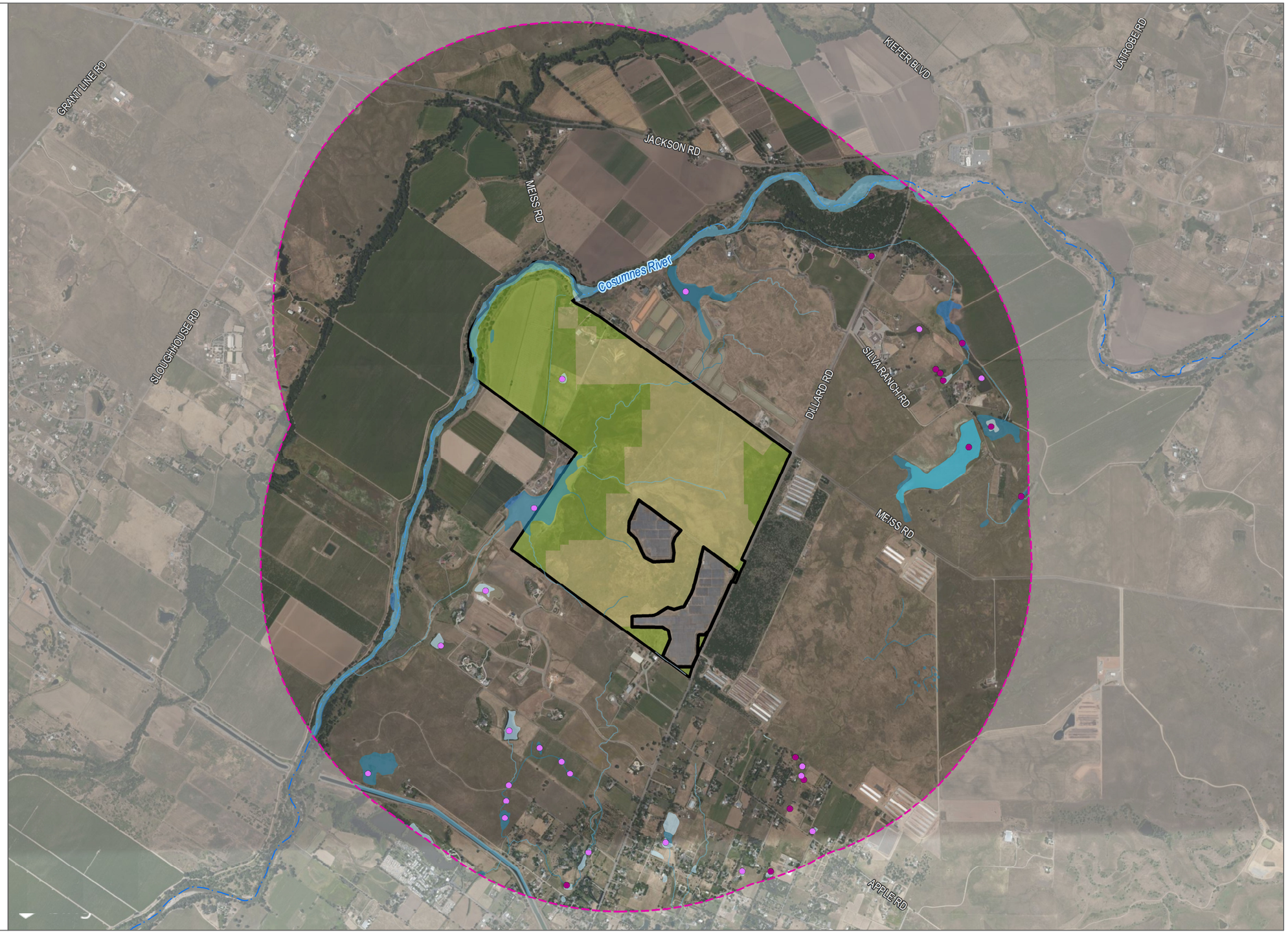
- Project Study Area Boundary (7362.26 acres)
- Solar Development Area (378.17 acres)
- Adjacent Other Lands (354.09 acres)
- CTS Survey Area (2 km)

CTS Habitat Assessment - Occurrence Potential

- Not likely to occur
- Potentially could occur

Aquatic Resources

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine



SOURCE: Bing Maps (2020), Sacramento County (2019), Original Site Plan - Baker Williams (12/16/2020)

DUDEK

0 1,125 2,250 Feet

FIGURE 8

California Tiger Salamander Habitat Assessment

Biological Technical Report for the Sloughhouse Solar Farm Project

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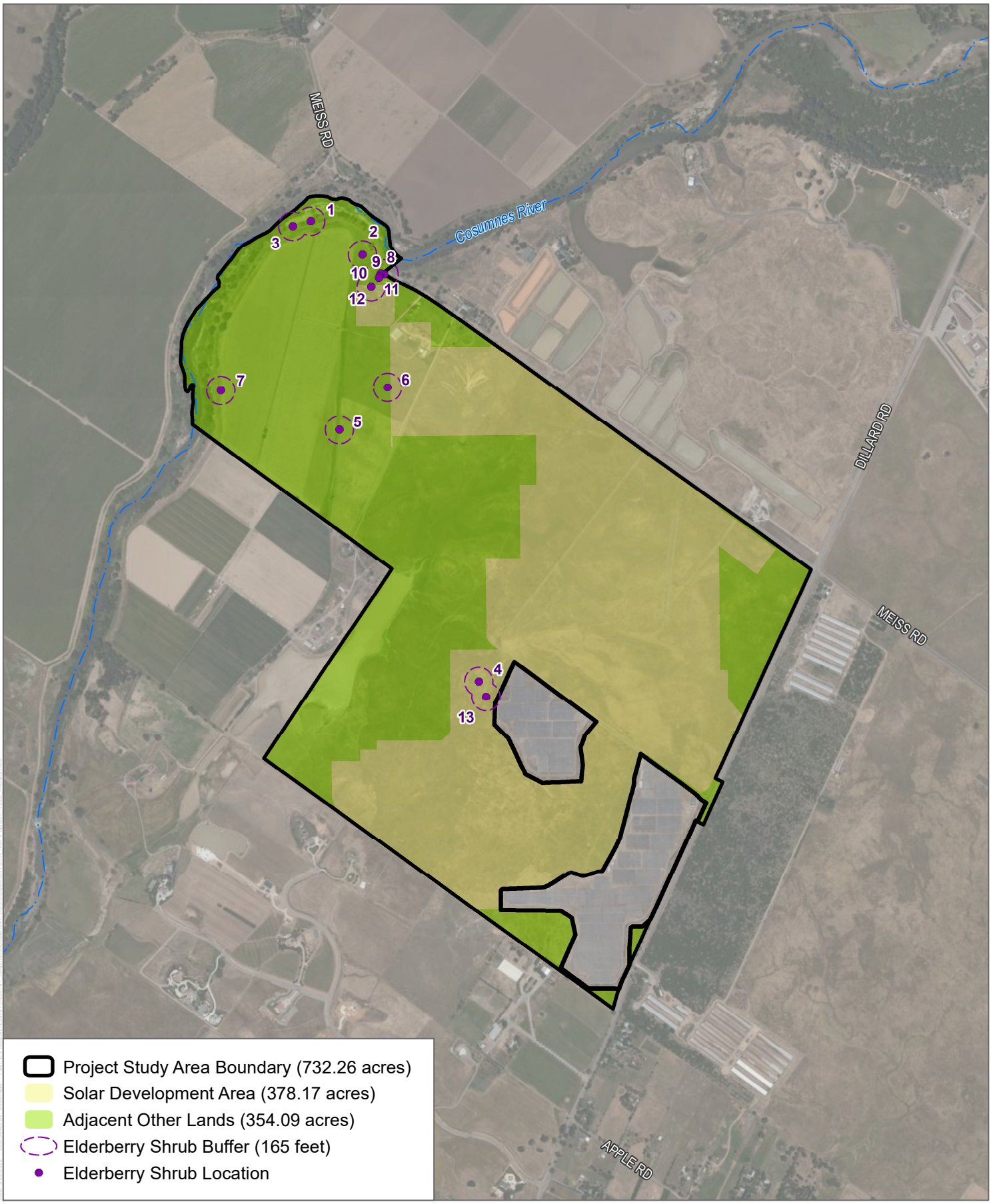

SOURCE: Bing Maps (2020), Sacramento County (2019), Original Site Plan - Baker Williams (12/16/2020)

DUDEK

0 750 1,500 Feet

FIGURE 9

Valley Elderberry Longhorn Beetle Results

Biological Technical Report for the Sloughhouse Solar Farm Project

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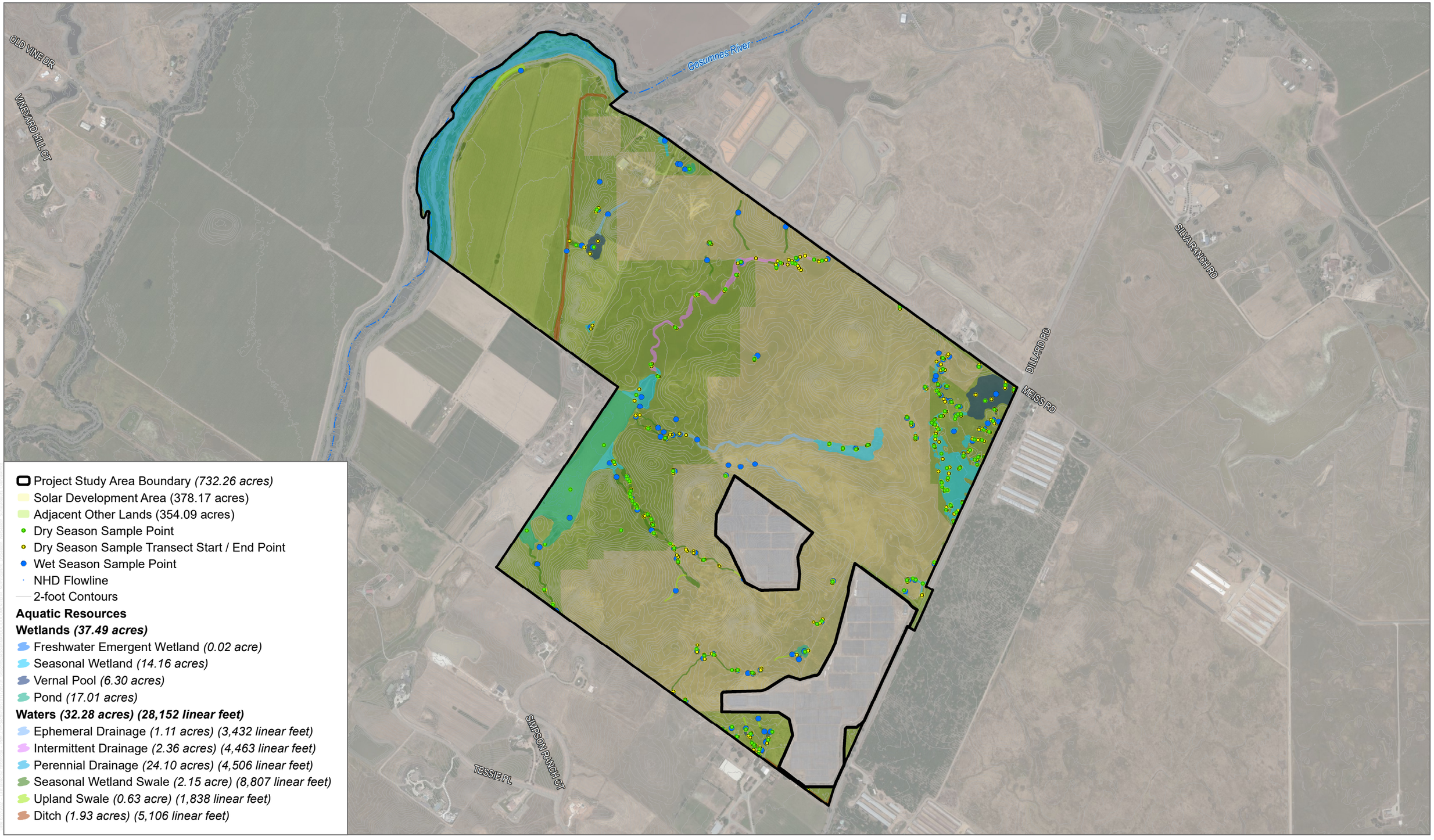

SOURCE: Bing Maps (2020), Sacramento County (2019), Original Site Plan - Baker Williams (12/16/2020)

DUDEK

0 550 1,100 Feet

FIGURE 10

Dry and Wet Season Large Listed Branchiopod Results

Biological Technical Report for the Sloughhouse Solar Farm Project

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- Project Study Area Boundary (732.26 acres)
- Solar Development Area (378.17 acres)
- Adjacent Other Lands (354.09 acres)
- Burrowing Owl Survey Area
- Burrowing Owl Survey Area - Visual Only
- Swainson's Hawk Survey Area
- Swainson's Hawk Survey Area - Visual Only

Swainson's Hawk Survey Results 2021

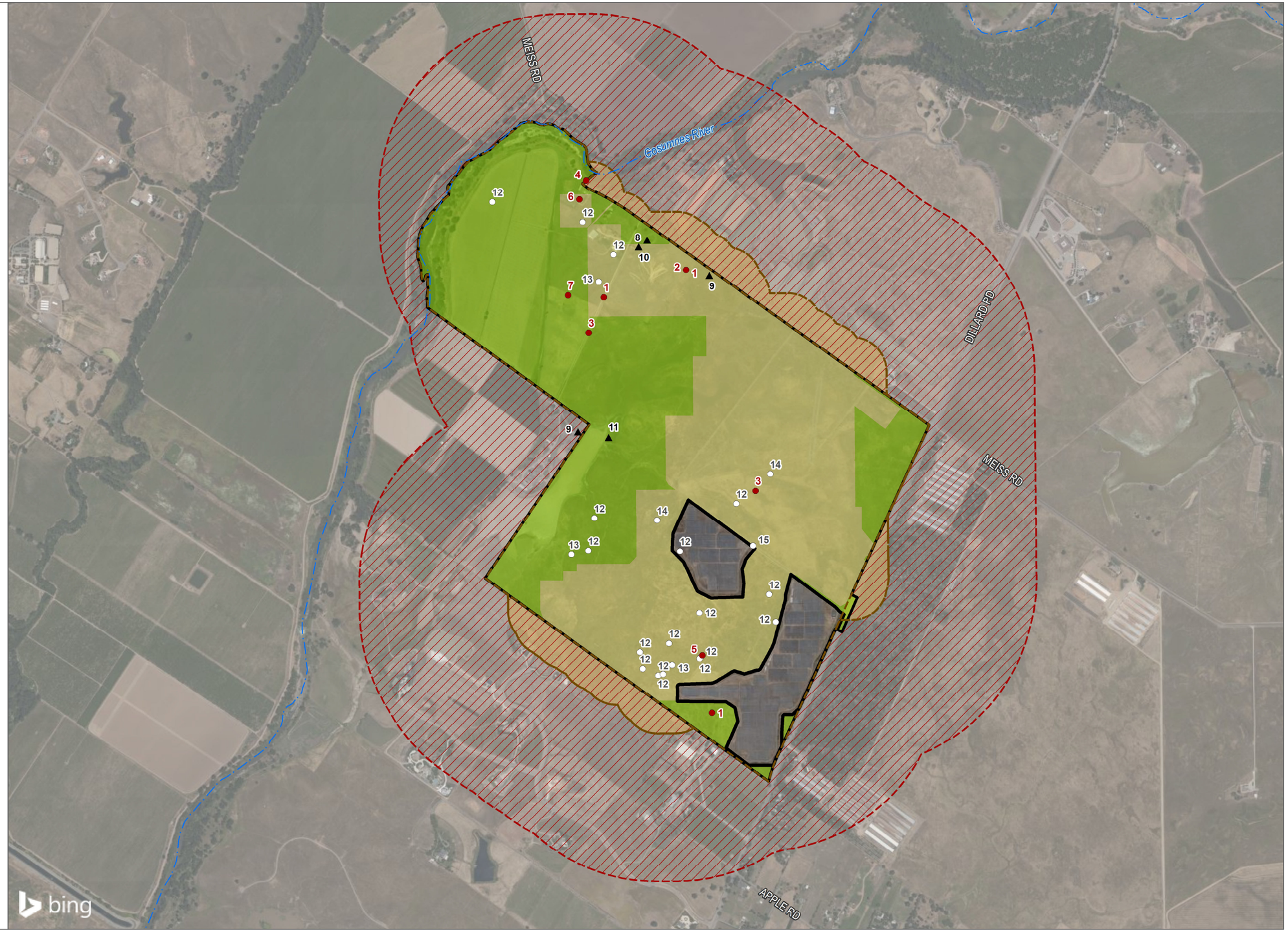
- 1 : Foraging
- 2 : Foraging - Juvenile
- 3 : Visual Flight
- 4 : Visual Flight- Pair
- 5 : Courting Pair
- 6 : Perched
- 7 : Raptor Nest - Unoccupied

Tricolored Blackbird Survey Results 2021

- ▲ 8 : Perched - Mixed Flock
- ▲ 9 : Perched, Vocalizing - Various
- ▲ 10 : Foraging, Perched, Vocalizing - Mixed Flock
- ▲ 11 : Vocalizing

Burrowing Owl Survey Results 2021

- ○ 12 : Burrow - Potential, single
- ○ 13 : Burrows - Potential, multiple
- ○ 14 : Visual - Flushed
- ○ 15 : Visual - Flushed, Burrow in Use



SOURCE: Bing Maps (2020), Sacramento County (2019), Original Site Plan - Baker Williams (12/16/2020)

DUDEK

0 750 1,500 Feet

FIGURE 11

Burrowing Owl , Swainson's Hawk, and Tricolored Blackbird Survey Results

Biological Technical Report for the Sloughhouse Solar Farm Project

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Appendix A

Swainson's Hawk and Other Raptor Foraging Use of Solar Array Fields within an Agricultural Landscape in Sacramento County, Year 2

Swainson's Hawk and Other Raptor Foraging Use of Solar Array Fields within an Agricultural Landscape in Sacramento County

Year 2

November 2021

Prepared for:

DUDEK

Prepared by:

ESTEP Environmental Consulting

Swainson's Hawk and Other Raptor Foraging Use of Solar Array Fields within an Agricultural Landscape in Sacramento County

Year 2

Prepared for:

Dudek
853 Lincoln Way, Suite 105
Auburn, CA 95603
Contact: Michael Henry
530.863.4654

Prepared by:

Estep Environmental Consulting
3202 Spinning Rod Way
Sacramento, CA 95833
Contact: Jim Estep
916.921.2515

November 2021

Introduction

This report presents data from the second year of a study to evaluate the use of photovoltaic solar energy projects by Swainson's hawks (*Buteo Swainsoni*) and other raptors within an agricultural landscape in the Sacramento Valley.

Background

Four photovoltaic solar energy projects were constructed in south Sacramento County in 2012. All occur within an agricultural landscape used by foraging raptors, including the state-listed Swainson's hawk. Because of its dependence on agricultural foraging habitats in the Central Valley, loss of suitable agricultural lands to urban development has been considered a potentially significant environmental impact on the Swainson's hawk pursuant to the California Environmental Quality Act (CEQA) (CDFG 1994). Since the early 1990s, impacts considered significant were usually mitigated through a compensatory process of acquisition, management, and preservation of replacement agricultural lands. This process was based initially on guidance provided by the California Department of Fish and Wildlife (CDFG 1994) and later in Sacramento County through an ordinance enacted in 2006 (Sacramento County 2006). Because neither the CDFG guidance nor the county ordinance addressed the relationship between land conversion and the status of the Swainson's hawk breeding population or differentiated between different types of land use conversion, but instead assumed significance pursuant to CEQA based on broadly defined habitat availability/species abundance relationships, the proponents of the four solar projects questioned the reliability of the existing process to require compensatory mitigation relative to the specific conditions of a photovoltaic solar project compared with other types of land conversion, mainly urban development. As a result, through consultation with the county and CDFW, a one-year study was undertaken to assess the use of the photovoltaic solar projects by Swainson's hawks and other raptors.

The initial study was completed in 2013 (Estep 2013) and results were presented to the county and CDFW staff. Despite the evidence of ongoing Swainson's hawk and other raptor use of the solar projects, CDFW determined that the evidence gathered during a single year was insufficient and that the project should remain subject to the earlier guidelines (CDFG 1994) and county ordinance, and with concurrence from Sacramento County, the request to reevaluate the need for and extent of compensatory mitigation was rejected.

In 2018, the South Sacramento County Habitat Conservation Plan was approved and subsequently became the framework for ongoing mitigation and conservation efforts in Sacramento County, superseding earlier CDFW guidance and the county ordinance to address land conversion impacts to Swainson's hawk related to most development projects. However, solar energy projects were not included in the HCP as covered projects, and thus remain under the purview of independent CEQA review by Sacramento County to determine the significance of the land use conversion and the need for compensatory mitigation.

In 2021, Bona Terra Energy, LLC proposed construction of additional photovoltaic projects in South Sacramento County. Aware of the efforts in 2013 to investigate ongoing use of solar

projects and the resulting unsuccessful negotiations with the county and CDFW, they decided to undertake a second year of study in order to provide additional data to supplement the results from the initial 2013 study. If results were similar to the 2013 study, this additional information would again be presented to the county and CDFW in an effort to reassess the need for and extent of compensatory mitigation. This report summarizes the results of this additional research.

Summary of 2013 Results

The 2013 study, which is largely repeated in 2021, poses a simple question: Do Swainson's hawks and other raptors use photovoltaic solar arrays for foraging, and if so, within a diverse agricultural landscape, to what extent are they, and other land cover types, used in proportion to their availability? The results documented use by Swainson's hawk, red-tailed hawk (*Buteo jamaiscensis*), American kestrel (*Falco sparverious*), and northern harrier (*Circus hudsonius*), and indicated that Swainson's hawks used solar array fields at a significantly greater frequency than would be expected relative to their availability, suggesting that solar array fields were being selected by foraging Swainson's hawks. This result was also found for American kestrels. The report concluded that integrated within a diverse agricultural landscape, the presence solar array fields of moderate size and that maintain a suitable grassland substrate are unlikely to have a negative affect on Swainson's hawk distribution or abundance.

Location

The four solar projects installed in 2012 (referred to as Bruceville, Kammerer, McKenzie, and Dillard projects) were all used in this study. A fifth solar project (Belectric project), installed earlier, was also included. The study area is located at and in the vicinity of these five projects in South Sacramento County. All are south of the City of Sacramento and east of Interstate 5 (Figure 1). The Kammerer, Bruceville, and Belectric project sites are immediately south of the City of Elk Grove between Interstate 5 and State Route 99. The McKenzie project site is just north of the City of Galt and just east of State Route 99, and the Dillard project is further northeast, just south of State Route 16 (Figure 1).

Description of the Solar Projects

The four solar projects installed in 2012 range in size from approximately 45 acres to 200 acres and consist of an array of photovoltaic solar panels installed in east-west-facing rows. The earlier-installed 140-acre Belectric project is similarly designed with northeast-southwest-facing rows. The panels are connected uniformly in rows along a solar tracker frame that maintains conformity and allows the panels to pivot along a single axis as they track the sun. The trackers are set into the ground using 4-inch galvanized steel poles set in 1-foot concrete pads spaced approximately 10 feet apart along the row. The 8-foot-long solar panels are installed onto the frame with a 2-foot minimum clearance from the ground to panel edge at a 45-degree angle, the maximum tilt angle. The total height of the structure reaches a maximum of approximately 10 feet at full 45-degree tilt. Panel rows are spaced 20 feet apart from pole to pole. With 8-foot-long panels, this leaves 12 feet of open space between each row at horizontal, and slightly larger open space as the trackers angle. The collection systems are underground with the exception of grid tie

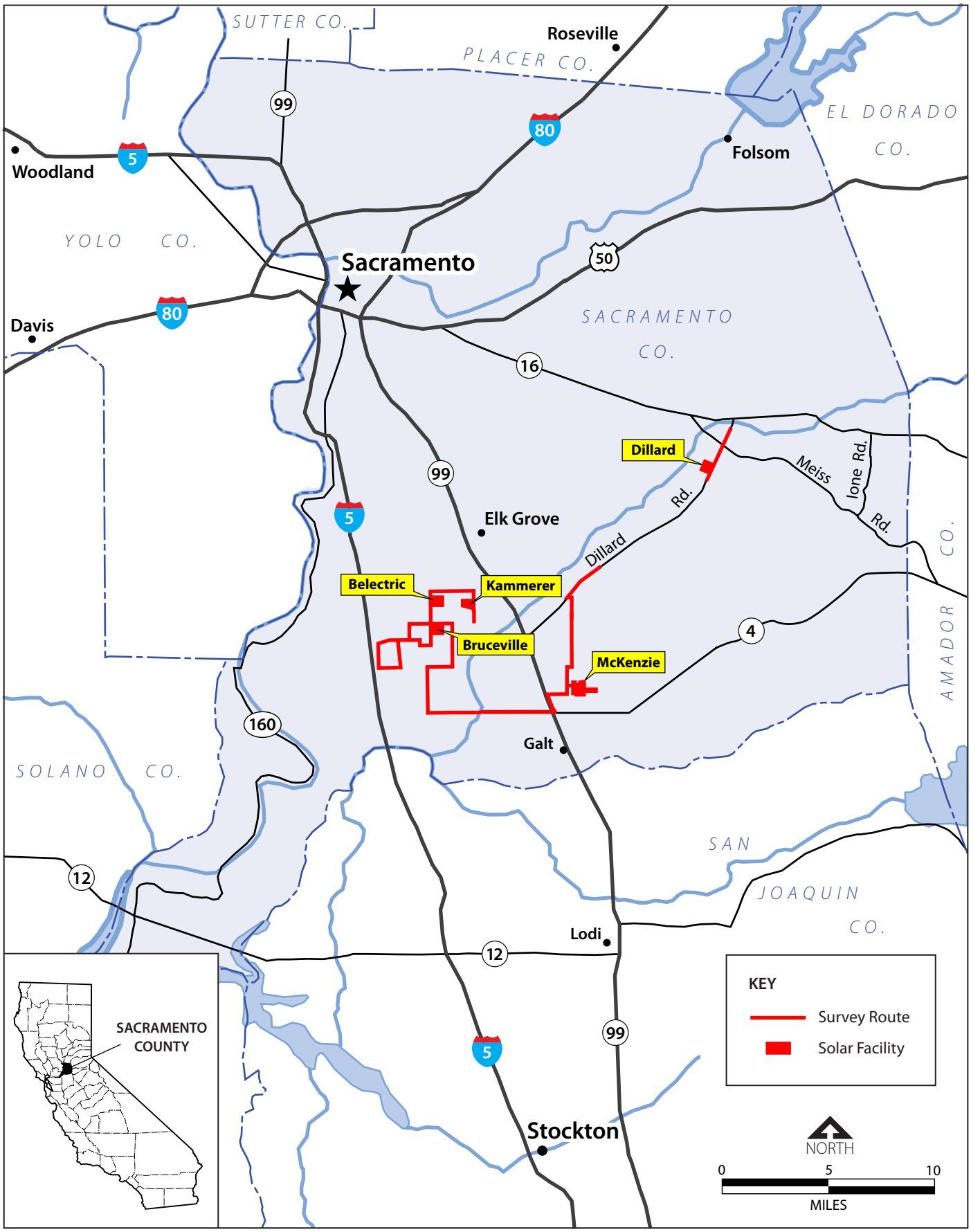


Figure 1
Regional Location of Survey Route and Photovoltaic Solar Facilities

inverters, which are spaced uniformly throughout each project site. Power is delivered to an onsite solar substation. Each project also includes internal gravel access roads and an 8-foot-high chain link security fence around the perimeter.

A management plan was prepared for each of the sites constructed in 2012, which includes the establishment of grasses throughout the project sites, including beneath and between the trackers and solar panels. The grasses are maintained at a low (4 to 12 inches) height through a sheep grazing program that periodically rotates between the sites as needed. The grass ground cover is designed to encourage the establishment of rodent populations to promote raptor use of the site as well as to provide for rodent refugia to aid in the reestablishment of rodent prey populations on adjacent farmlands following cultivation. The earlier-installed Belectric project also includes a similar grass substrate.

Differentiating the Structure and Management of Solar Arrays from Cultivated Habitats

The extent to which raptors are likely to use solar arrays compared with cultivated fields is largely a function of their design and management as well as the foraging behavior of each species. For example, Swainson's hawks are highly active aerial hunters. Typical foraging behavior is a relatively low (less than 100 meters) circling flight above suitable foraging habitat. They avoid fields with tall or dense vegetation because this condition reduces visibility and access to prey (Bechard 1982, Estep 2009). As a result, at first glance it would seem that a solar array, like a vineyard or orchard, would not provide suitable foraging conditions. Swolgaard et al. (2007) found some use of vineyards by foraging Swainson's hawks, but not to the extent of other crops and land cover types in the surrounding landscape. Still, the Swolgaard et al. (2007) study revealed that Swainson's hawks are not entirely averse to hunting in these conditions.

A typical solar array, however, has greater separation between rows than do most vineyards. For most photovoltaic solar projects, including the five included in this study, at least 60 percent of the area within the solar array remains potentially available at any given time. Most projects also retain open areas between array cells, along access roads, and between the arrays and the perimeter fence. Management of the substrate is also essential to ensure that the project supports available rodent prey for foraging raptors. In order to encourage a sustainable source of small rodent prey, a grass substrate is maintained year-round throughout the project area (Plate 1). Sheep grazing is used to control vegetation height and density, which also encourages accessibility of raptors to rodent prey (Plate 2). Because the grass substrate is maintained, it also functions as a stable source of recolonization of rodent populations into adjacent fields, which may be subject to seasonal fluctuations of rodent populations resulting from the planting/harvesting regime. In some cases, it is also possible to apply the principals of agrivoltaics (Goetzberger and Zastrow, 1982; Dolezal et al. 2021), the practice of agriculture in and around solar PV facilities, by including a mixture of grasses, forbs, and a variety of pollinator plant species. In addition to further encouraging rodent prey populations, this deep-rooted system helps save water, holds and improves the topsoil on-site, and encourages pollinators, which can benefit neighboring crops.

Plate 1. Solar array with grassland substrate.

Plate 2. Sheep grazing the grasslands at the Bruceville solar project site, 2021.

Physiography and Land use

The surrounding land use is entirely agricultural, consisting of a combination of irrigated pasture, dry pasture, and irrigated cropland. Dominant crop types in the area include oat hay, alfalfa, corn, wheat, and vineyards. Agricultural land use has changed since the 2013 study. Orchards, a land cover providing unsuitable foraging habitat for most raptors, have increased substantially, replacing row and grain crops, and potentially reducing overall use of the landscape by foraging raptors. Urbanization from the City of Elk Grove has also expanded southward toward the survey route. Although these dense urban developments were not included within the survey area, their increasingly close proximity likely affects raptor use of the surrounding area and thus may influence occurrences within the survey area.

Rural urban areas also occur throughout the area including farm and ranch residences and related facilities and dairies. The landscape is flat with virtually no topographic relief other than seasonal and perennial drainages, with the exception of the low grassland hills surrounding the Dillard project and to a lesser extent on the open grassland/rangelands of the Cosumnes River Preserve, north of the McKenzie project. Trees occur along riparian corridors, roadsides, and field borders, and around farm and ranch residences. These trees provide nesting habitat for several of the raptor species in the study area including Swainson's hawk, red-tailed hawk, red-shouldered hawk (*Buteo lineatus*), white-tailed kite (*Elanus leucurus*), American kestrel, and great-horned owl (*Bubo virginianus*).

Distribution and Foraging Behavior of Nesting Swainson's Hawks and other Raptor Species in South Sacramento County

Because of its status as a state-threatened species and its association with mitigation and conservation actions in the Central Valley, our target species for this study was the Swainson's hawk. However, all raptor species were recorded during the survey. A brief description of those species known to occur in the vicinity of the study area follows.

The Swainson's hawk is a medium-sized buteo most often characterized by its long, narrow, and tapered wings held in flight in a slight dihedral shape. The body size is somewhat smaller, thinner, and less robust than other buteos, although the wings are at least as long as other buteos. This body and wing shape allow for efficient soaring flight and aerial maneuverability, important for foraging, which Swainson's hawks do primarily from the wing, and during courtship and inter-specific territorial interactions (Plate 3). The species nests in trees along riparian corridors, field edges, roadsides, isolated trees, and around rural homesites; and forages in compatible cultivated landscapes and grasslands.

Plate 3. Adult Swainson's hawk showing the long, tapered wings that allow for efficient soaring and flight maneuverability.

The Swainson's hawk occurs throughout the undeveloped portions of Sacramento County. Surveys have been conducted throughout Sacramento County for several decades resulting in a substantial number of breeding records (California Natural Diversity Data Base 2021, Estep 2007, 2009a, 2012). Surveys conducted in 2006 reported a total of 188 active breeding sites in Sacramento County south of Jackson Highway (State Route 16) (Estep 2007). More recent surveys (Estep 2009a, 2012) reported additional active breeding sites within and south of the City of Elk Grove. Additional nesting sites are reported in eBird, a publicly-accessed online repository of bird occurrence data. Several additional nest sites were also reported during road transect surveys conducted for this study, one of which is located within the substation of the Kammerer solar project site (Plates 4 and 5).

Plate 4. Swainson's hawk nest in the Kammerer substation, 2021.

Plate 5. Swainson's hawk nest at Kammerer solar site, 2021.

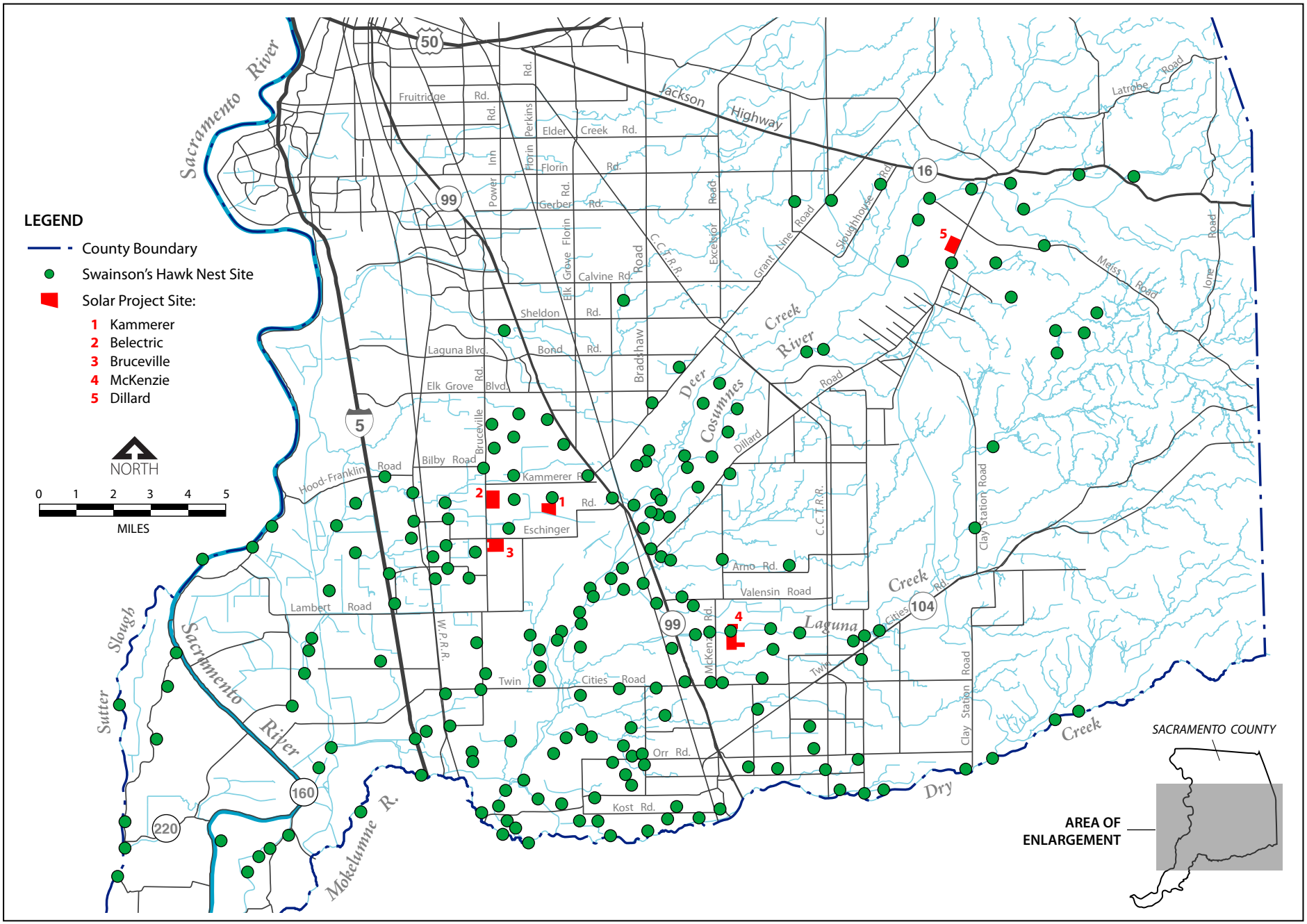
Figure 2 illustrates the locations of reported Swainson's hawk nests in South Sacramento County in the vicinity of the solar project sites. The highest nesting density was found in the interior of the county where the land use is predominantly irrigated cropland and irrigated pastureland.

In the Central Valley, the distribution of the red-tailed hawk is similar to the Swainson's hawk. There is substantial overlap in the habitat associations of the two species. Similar in size, but more robust in body than the Swainson's hawk, red-tailed hawks are somewhat less-active hunters, often hunting from perches. Distribution in the vicinity of the study area is similar to the Swainson's hawk, and although red-tailed hawks are more common range-wide, they are less abundant than Swainson's hawks in the irrigated agricultural landscape of the Central Valley (Estep 2007, 2008, 2012, 2020, Estep and Dinsdale 2012).

Red-shouldered hawks are distributed throughout the Central Valley, and are found primarily in riparian and other woodland habitats. As a result, their distribution is less uniform across the landscape compared with Swainson's hawk and red-tailed hawk, and although underreported, they are also less common. Red-shouldered hawks forage primarily in woodlands and along woodland edges, but will opportunistically hunt in open agricultural and grassland habitats.

White-tailed kites also occur throughout the Central Valley, using similar nesting and foraging habitats as Swainson's hawk and red-tailed hawk. However, they are substantially less common and more specialized in their use of foraging habitats and their hunting behavior, particularly their use of kiting or hovering technique while searching for rodent prey.

American kestrel is also distributed throughout the Central Valley, and although populations fluctuate, the species is relatively common and ubiquitous in agricultural landscapes. Kestrels also nest in similar riparian and other woodland habitats, in tree rows, or in small woodlots or in



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SOURCE: Estep 2021.

Figure 2
Swainson's Hawk Distribution in the Vicinity of the Solar Project Sites

trees surrounding rural farm houses. They typically hunt from a perch – often seen along utility line corridors – or using a hovering technique similar to white-tailed kite.

Northern harrier is a ground-nesting raptor also commonly observed in agricultural and grassland landscapes in the Central Valley that uses a low-elevation coursing flight technique while hunting for small rodents. Great-horned owl, with a similar Central Valley distribution, nests in riparian and other woodland habitats and hunts, usually from a perch, in cultivated fields and grasslands. Burrowing owl, also a ground-nesting species, occurs primarily in open grassland habitats but is also occasionally found in cultivated landscapes. Cooper's hawk (*Accipiter cooperii*) is uncommonly found in riparian and other woodland habitats in the Central Valley where it uses a meandering flight pattern under the canopy to surprise prey. However, like all raptors in the altered landscape of the Central Valley, they will opportunistically hunt in open cultivated or grassland habitats.

Purpose

This study was designed to meet the following objectives (1) examine how and the extent to which Swainson's hawks and other raptors forage on or otherwise use the solar facilities; and (2) evaluate raptor use of solar facilities and other available land cover types relative to their availability on the landscape. Through this investigation, the purpose was to provide a general estimation of the use of the solar project facilities compared to other available land cover types and to provide data that can be used to assess the potential for changes in the distribution and abundance of Swainson's hawks resulting from the presence of moderately-sized solar facilities within an otherwise diverse, expansive, and dynamic agricultural landscape.

Methods

Strip Transect Road Surveys

The strip transect road survey method (Fuller and Mosher 1987) was used to evaluate relative foraging use of different land cover types, including the solar arrays. The transect route included the same 26-mile route used during the 2013 study, but included an additional 14 miles for a total route distance of approximately 40 miles. The survey route was selected based on the following:

- Incorporating the five solar facilities into the design
- Road/vehicle accessibility
- Visibility
- Road safety
- Diversity of land cover types

The survey area extended 600 feet from each side of the road for a total width of 1,200 feet. Initially, all land cover types were mapped and classified along the survey route. To conduct the survey, the surveyor slowly drove at a consistent pace between 10 and 15 mph, stopping as needed to identify and record raptors and raptor behavior. Recorded behaviors included:

- Circling below 100 meters
- Soaring below 200 meters
- Flying through the survey area below 200 meters
- Kiting/Hovering
- Perching (adjacent poles/trees/fences)
- Standing on ground
- Prey capture attempt
- Prey capture successful
- Prey capture unsuccessful
- Aerial foraging

The surveyor recorded data as raptors were observed within the 1,200-foot-wide transect survey area. Land cover type and status, including vegetation height, and farming activity were recorded for each occurrence. Start times were variable in order to account for differences in foraging use patterns. Using this method, a reliable statistical analysis can be performed that measures habitat use as a proportion of availability. In other words, it determines whether a habitat type is used more or less than expected relative to its availability. In this way we can evaluate the relative use of all cover types in the survey area, including the solar array fields.

A survey form along with an accompanying data code sheet and field maps with the route and land cover types illustrated were used to record observational and related data while in the field. Surveys were conducted during daylight hours and were not conducted during severe weather events such as heavy rainfall, winds greater than 20 mph or foggy conditions. Surveys were conducted twice weekly by the same surveyor between April 19 and August 31, 2021 for a total of 39 surveys.

Habitat Mapping. Land cover types were mapped and characterized in the field along the survey route on 7.5-minute USGS quadrangle maps. Current 2021 land use was documented in the field according to the land cover type categories listed below.

- Oats
- Alfalfa
- Dry Pasture
- Irrigated pasture
- Ruderal/Developed
- Vineyard
- Orchard
- Grassland
- Corn
- Tilled
- Solar Array field
- Idle/Fallow
- Riparian/Wetland
- Wheat

Field boundaries were recorded, confirmed, or adjusted as needed on USGS base maps. Tilled was included separately because some fields were tilled and unplanted for approximately one-half of the survey period before being planted. Rural residences and their surrounding footprint (e.g., barns, out buildings, yards, and equipment storage areas), adjacent ruderal areas, and other agricultural facilities, mainly dairies, were combined into a single category – Ruderal/Developed. Following the initial field mapping of habitat/land use categories, the data were then re-mapped using aerial photos to confirm field boundaries.

These maps were then converted to graphic maps using Adobe Illustrator. Habitat/land use cover type acreages were calculated from the graphic maps using a plug-in filter from Telegraphics Inc. While this process provided a reasonably accurate representation of land cover types along the survey route, it did not exclude interior farm roads and other edge features. As a result, the acreage totals may exceed the actual acreage for some types. However, this was considered to have a negligible effect on the total calculations or the relative abundance of the various types.

Several crop type rotations occurred during the survey including wheat, oats, and tilled fields rotating to corn. These rotations or conversions occurred at approximately the mid-point of the survey. To account for these changes and to satisfy the assumption that habitat availability is constant throughout the study (Manly et al. 2002), we used the same approach as Swolgaard et al. (2008) by tallying the areas of all fields that changed crops midseason, dividing the values in half, and assigning those values to each habitat.

Analysis. Documented raptor occurrences and acreages of land cover types were compiled and proportions of land cover types and occurrences within each land cover type calculated. As in the 2013 study, of the nine species documented during the survey, only Swainson's hawk, red-tailed hawk, and American kestrel had sufficient occurrences to be included in the statistical analysis. The null hypothesis stated that Swainson's hawks and other raptor species used each habitat for foraging in proportion to its availability in the survey area. Therefore, only behaviors that represented foraging were included in the analysis. To ensure consistency with the 2013 results, foraging behaviors for Swainson's hawk included circling below 100 meters, the typical foraging behavior of Swainson's hawks, kiting/hovering, and prey capture attempts. Perching behavior was initially excluded because the species does not typically hunt from a perch. However, in 2021, additional calculations were run that included perching as a foraging behavior to account for observed behavioral changes in Swainson's hawk use of solar array fields since 2013. Perching was included as a foraging behavior for red-tailed hawk and American kestrel, species that often hunt from perches.

Hypothesis testing for selection of foraging habitat consisted of a chi-square test for goodness of fit, followed by chi-square testing of individual types to determine if use was disproportionate to availability and whether it was positively or negatively correlated. While this approach may be regarded as very conservative compared with other more robust statistical tests used in habitat use/availability studies, it was considered appropriate to address the rather narrow objectives (use of solar array fields) of this study.

Stationary Observation Point Surveys

In addition to the strip transect road surveys, surveys were also conducted from stationary observation points around the perimeter of four of the five solar arrays (not including the Belectric project). The purpose of these surveys was to document additional use of the solar fields by all raptor species and to increase the opportunity to record prey captures or prey capture attempts, which are generally less frequently observed during road transect surveys. Stationary observation point surveys were conducted at the four solar projects once per week in a rotational sequence between April 22 and August 25 for a total of 19 separate four-hour observation periods totaling 76 hours of observation.

Results and Discussion

Land Cover Types within the Survey Area

Table 1 presents the types and corresponding acreages of land cover within the survey area. Figures 3a through 3h illustrate the distribution of these types along the survey route. The land use along the approximately 40-mile route and throughout much of the south Sacramento County area consists of a mixture of grazing lands in the form of both irrigated and non-irrigated pasturelands and cultivated lands. Of the 5,501 acres within the survey area, 79 percent are active agricultural types including irrigated and non-irrigated pasturelands (21.7 percent), seasonally or annually cultivated crops (28.8 percent), semi-perennial hays (12.2 percent), and perennial crops (16.1 percent). The remaining 21 percent of the land cover consists of ruderal/developed (9.7 percent), uncultivated grassland (6.2 percent), riparian (1.4 percent), and solar array fields (3.7 percent). Two primary changes occurred since the 2013 survey: the expansion of orchards – largely at the expense of irrigated pasture acreage, and the increase in grassland, which is due mainly to expanding the survey route through a portion of the Cosumnes River preserve (Table 1).

Table 1. Land use types and acreages in the survey area, 2021 and 2013.

Land Cover Type	Acres	Percent of Total 2021	Percent of Total 2013
Oats	844	15.3	19.2
Alfalfa	672	12.2	10.6
Dry Pasture	613	11.1	7.2
Irrigated Pasture	585	10.6	23.6
Ruderal/Developed	531	9.7	10.8
Vineyard	495	9.0	6.5
Orchard	393	7.1	0
Grassland	340	6.2	1.3
Corn	283	5.1	4.6
Tilled	235	4.3	4.7
Solar Array Field	206	3.7	6.9
Idle/Fallow	159	2.9	0.2
Riparian/Wetland	77	1.4	1.1
Wheat	68	1.2	3.3
Total	5,501	100	100

Seasonally or Annually Cultivated Crops. Within the survey area, these include oat hay, corn, and wheat crops, much of which is grown as silage to support local dairy operations. Tilled lands are cultivated lands that are between plantings and were included as a separate type because most of these areas were in a tilled condition for approximately one-half of the survey period before being planted to corn, which is often planted later in the season. These crops have variable suitability as foraging habitat depending on vegetation height and density, which influences prey accessibility (Bechard 1982, Estep 2009). Of the types found in the survey area, oat hay likely provides the highest value due to large rodent prey populations and relatively early harvest, which increases prey accessibility. After cutting, oat fields may continue to provide foraging value if the field is not disked and prepared for the following planting.

Semi-Perennial Hays. These are alfalfa hay fields that remain uncultivated for at least 3 consecutive years. During the spring and summer months, alfalfa fields are mowed approximately once per month and may be irrigated as frequently as once per week. This is considered a high value foraging crop type for Swainson's hawk and other raptors because of the lack of seasonal or annual cultivation and because the regular mowing and irrigation operations increase prey accessibility (Estep 2009).

Irrigated and Non-irrigated Pasturelands. Irrigated pastures are planted with grasses (e.g., bromes, ryegrass, clovers), irrigated, and grazed by livestock. They may be periodically cultivated and replanted. Non-irrigated, or dry pastures are uncultivated natural grasslands that are grazed by livestock. Both types are used by Swainson's hawks and other foraging raptors but are considered to have only moderate value due to low rodent prey populations compared to some cultivated lands (Estep 1989, 2009).

Perennial Crops. Perennial crops include vineyards and orchards. Although some use by Swainson's hawks has been documented (Swolgaard et al 2008), vineyards are generally considered to have low foraging value because as they mature, the vegetation becomes tall and dense and largely precludes foraging access (Estep 1989). Orchards, primarily nut orchards, have expanded throughout the region and in 2021 represent 7.1 percent of the land cover in the survey area, up from 0 percent in 2013. This land cover is considered unsuitable for Swainson's hawk foraging due to the dense canopy and inaccessibility to the ground.

Urban/Ruderal. Rural farm and ranch residences and associated out-buildings, dairy facilities, and other farming and ranching facilities occur along the survey route. Ruderal weedy or grassy patches also occur within or adjacent to some of the developed areas. Although these areas provide relatively little foraging value, they often provide perching habitat or nest sites where suitable trees or utility poles occur around their perimeter.

Uncultivated Grassland and Riparian. The survey route crosses the flood plain of the Cosumnes River where a small amount of riparian and associated uncultivated grassland were documented. The riparian forest in this area supports high value nesting habitat but would not typically be used for foraging by raptor species documented during the survey with the exception of red-shouldered hawk and Cooper's hawk. The small patches of grassland may be used by foraging raptors, but usually do not support the prey abundance and accessibility compared with open, cultivated lands. The expanded route for 2021 included additional open grassland through

the Cosumnes River Preserve and in the vicinity of the Dillard project at the eastern terminus of the route.

Solar Array Fields. A description of the five solar fields is provided in the Introduction section.

Strip Transect Road Surveys

Data on species occurrence, land cover, and behavior are compiled into the following tables, which provide insight into the use of solar fields compared with other land cover types by each raptor species, and inform the statistical outcome presented in the chi-square value tables from which the relative importance of each land cover can be inferred.

A total of 1,029 raptor occurrences were documented within the survey area. Three of the seven documented species, Swainson's hawk, red-tailed hawk, and American kestrel comprised 92.4 percent of the total occurrences. Swainson's hawk comprised 30.4 percent of the total occurrences (Table 2), down from 38.5 percent in 2013, speculatively due to orchard expansion in the region. In 2021, red-tailed hawks were the most commonly documented species in the survey area at 39.8 percent, up from 31.2 percent in 2013.

Table 2. Species occurrences documented within the survey area, 2021.

Species	Number of Occurrences	Percent of Total
Red-tailed hawk	410	39.8
Swainson's hawk	313	30.4
American kestrel	228	22.2
Red-shouldered hawk	42	4.1
White-tailed kite	20	1.9
Osprey	5	0.5
Cooper's Hawk	5	0.5
Northern harrier	4	0.4
Great-horned Owl	2	0.2
Total	1,029	100

Table 3 shows the number of occurrences by species within each land cover type. Alfalfa was associated with the largest proportion of all raptor occurrences at 23.6 percent, and the largest proportion of occurrences for red-tailed hawk (21.2 percent), Swainson's hawk (27.2 percent), American kestrel (26.3 percent), and red-shouldered hawk (23.8 percent). Dry pasture, irrigated pasture, solar fields, and oats also supported relatively high overall raptor occurrences, particularly red-tailed hawks, Swainson's hawks, and American kestrels.

Although solar fields made up only 3.7 percent of the survey area (Table 1), 8.7 percent of all raptor occurrences and 11.2 percent of all Swainson's hawk occurrences were documented in solar fields. Nearly 13 percent of all American kestrel occurrences and 4.6 percent of all red-tailed hawk occurrences were in solar fields.

Table 3. Species occurrences documented within each land cover type, 2021.

Land Cover Type	Species									Total	% of Total
	RTHA	SWHA	AMKE	RSHA	WTKI	OSPR	NOHA	COHA	GHOW		
Alfalfa	87	85	60	10	1					243	23.6
Dry pasture	56	34	11	3	1					105	10.2
Irrigated. pasture	53	20	15	5						93	9.0
Solar field	19	35	29	4				2	1	90	8.7
Oats	14	33	32		3				1	83	8.1
Vineyard	48	16	7	3			2	2		78	7.6
Corn	24	16	25	2				1		68	6.6
Field edge*	13	15	16	8	6	5				63	6.1
Tilled	11	25	20	3	1		1			61	5.9
Idle/Fallow	27	2	6		8					43	4.2
Orchard	38	4	1							43	4.2
Wheat	4	16	5							25	2.4
Grassland	15	5	1				1			22	2.1
Riparian/wetland	1	2		4						7	0.7
Ruderal/Develop	0	5								5	0.5
Total	410	313	228	42	20	5	4	5	2	1,029	100

SWHA = Swainson's hawk; RTHA = red-tailed hawk; AMKE = American kestrel; NOHA = northern harrier; WTKE = white-tailed kite; RSHA = red-shouldered hawk; OSPR = osprey; COHA = Cooper's hawk, GHOW = great-horned owl.
*Field or road edge was not a mapped habitat type, so these data are not included in the statistical analysis.

Species occurrences by behavior type are presented in Table 4. Perched occurrences were most common followed by circling below 100 meters, and together comprised nearly 82 percent of all occurrences. A total of 831 occurrences (81 percent) were considered potential foraging occurrences (Table 4).

Table 4. Behaviors documented by species. Potential foraging behaviors are highlighted.

Behavior Code	Species									Total	% of Total
	RTHA	SWHA	AMKE	RSHA	WTKI	COHA	OSPR	NOHA	GHOW		
P	304	122	145	31	14	2	3		1	622	60.4
C	81	122	10	4	2		1			220	21.4
F	13	14	24	4	3	3	1	3	1	66	6.4
G	1	28	1	1						31	3.0
CS	1	9	12	1						23	2.2
K		5	14		1					20	1.9
CU	2	3	11							16	1.6
S	5	9						1		15	1.5
CA	3	1	9	1						14	1.4
AF			2							2	0.2
Total	410	313	228	42	20	5	5	4	2	1029	100

SWHA = Swainson's hawk; RTHA = red-tailed hawk; AMKE = American kestrel; NOHA = northern harrier; WTKE = white-tailed kite; RSHA = red-shouldered hawk; OSPR = osprey. P-perching; C-circling below 100m; F-flying through below 200m; G-on the ground; CS-successful prey capture; K-kiting/hovering; CU-unsuccessful prey capture; S-soaring below 200m; CA-prey capture attempt; AF-aerial foraging.

Table 5 summarizes all raptor behaviors by land cover type. Tables 6, 7, and 8 show the behaviors associated with each occurrence in each land cover type for the Swainson's hawk, red-tailed hawk, and American kestrel, respectively. Swainson's hawks (Table 6) generally spend less time perching, particularly while foraging, than do red-tailed hawks and American kestrels, species that often hunt from perches. Typical hunting behavior of Swainson's hawk is a circling

flight at an altitude less than 100 meters. Nearly 40 percent of all Swainson's hawk occurrences were of circling flights below 100 meters. The proportion of perching occurrences (39%) was similar (up from 29% in 2013); however, in contrast, the largest proportion of Red-tailed hawk and American kestrel occurrences (74 percent and 64 percent, respectively) were of perching individuals (Tables 7 and 8).

Table 5. All raptor behaviors by land cover type

Land Cover Type	Behaviors										Total
	P	S	C	F	CA	CS	CU	G	K	AF	
Oats	48	2	23	1			3	1	5		83
Alfalfa	141	2	39	9	5	12	8	18	9		243
Dry pasture	66	1	22	8	1	2	1	4			105
Irrigated pasture	59	4	17	5	1	3	1	2		1	93
Ruderal/Developed	4		1								5
Vineyard	44	2	26	6							78
Orchard	35		8								43
Grassland	12		7	2	1						22
Corn	44	1	13	6		1	2			1	68
Field edge*	38		13	11					1		63
Tilled	35		16	5		1		4			61
Solar field	51		22	10	4	2	1				90
Idle/fallow	32		7	2	2						43
Riparian/Wetland	4		1	1					1		7
Wheat	6	3	8			2		2	4		25
Total	619	15	223	66	14	23	16	31	20	2	1029

P = perching; S = soaring below 200 m; C = circling below 100 meters; F = Flying below 200 meters; CA = prey capture attempt; CS = prey capture successful; CU = prey capture unsuccessful; G = standing on the ground; K = kiting/hovering, AF = aerial foraging. *Field or road edge was not a mapped habitat type, so these data are not included in the statistical analysis.

Table 6. Swainson's hawk behaviors by land cover type

Land Cover Type	Behaviors										Total
	P	S	C	F	CA	CS	CU	G	K	AF	
Oats	9	2	21					1			33
Alfalfa	26	1	24	5	1	7	2	17	2		85
Dry pasture	13	1	14	2		1		3			34
Irrigated pasture	9	1	8				1	1			20
Ruderal/Developed	4		1								5
Vineyard	5		11								16
Orchard			4								4
Grassland	2		2	1							5
Corn	10	1	5								16
Field edge	7		4	3					1		15
Tilled	8		11	2				4			25
Solar field	24		10			1					35
Idle/fallow	2										2
Riparian/wetland				1					1		2
Wheat	3	3	7					2	1		16
Total	122	9	122	14	1	9	3	28	5		313

P = perching; S = soaring below 200 m; C = circling below 100 meters; F = Flying below 200 meters; CA = prey capture attempt; CS = prey capture successful; CU = prey capture unsuccessful; G = standing on the ground; K = kiting/hovering. *Field or road edge was not a mapped habitat type, so these data are not included in the statistical analysis.

Table 7. Red-tailed hawk behaviors by land cover type

Land Cover Type	Behaviors										Total
	P	S	C	F	CA	CS	CU	G	K	AF	
Oats	12		2								14
Alfalfa	71	1	11	1	1		2				87
Dry pasture	45		8	2				1			56
Irrigated pasture	37	3	8	3	1	1					53
Ruderal/Developed											0
Vineyard	32	1	14	1							48
Orchard	34		4								38
Grassland	9		5		1						15
Corn	15		8	1							24
Field edge	8		4	1							13
Tilled	9		1	1							11
Solar field	7		10	2							19
Idle/Fallow	22		4	1							27
Riparian/wetland			1								1
Wheat	3		1								4
Total	304	5	81	13	3	1	2	1			410

P = perching; S = soaring below 200 m; C = circling below 100 meters; F = Flying below 200 meters; CA = prey capture attempt; CS = prey capture successful; CU = prey capture unsuccessful; G = standing on the ground; K = kiting/hovering. *Field or road edge was not a mapped habitat type, so these data are not included in the statistical analysis.

Table 8. American kestrel behaviors by land cover type

Land Cover Type	Behaviors										Total
	P	S	C	F	CA	CS	CU	G	K	AF	
Oats	23			1			3		5		32
Alfalfa	35		3	3	3	5	4	1	6		60
Dry pasture	5			4		1	1				11
Irrigated pasture	11		1	1		1				1	15
Ruderal/Developed											0
Vineyard	4		1	2							7
Orchard	1										1
Grassland	1										1
Corn	17			4		1	2			1	25
Field edge	9		2	5							16
Tilled	18		1			1					20
Solar field	17		2	4	4	1	1				29
Idle/fallow	4				2						6
Riparian/Wetland											0
Wheat						2			3		5
Total	145		10	24	9	12	11	1	14	2	228

P = perching; S = soaring below 200 m; C = circling below 100 meters; F = Flying below 200 meters; CA = prey capture attempt; CS = prey capture successful; CU = prey capture unsuccessful; G = standing on the ground; K = kiting/hovering, AF = aerial foraging. *Field or road edge was not a mapped habitat type, so these data are not included in the statistical analysis.

To examine the extent of foraging within solar fields and to evaluate the foraging use of solar fields and other land cover types relative to their availability within the survey area, those behaviors that were considered foraging behaviors were isolated from the total occurrences and used in the statistical analysis. For Swainson's hawk this included the following behaviors:

- Circling below 100 meters

- Kiting/Hovering
- Standing on ground
- Prey capture (attempt, successful, unsuccessful)

However, review of the data revealed an increase in Swainson's hawk perching occurrences compared with 2013, particularly at solar array fields (Plate 6). Although many of these were attributed to the proximity of the active nest at the Kammerer solar site, it also appeared that Swainson's hawk perching within the solar arrays had increased and may be attributed to using the structures as hunting perches within the array. The proportion of perching occurrences within in the solar array in 2021 (7.7 percent) increased nearly four times of that reported in 2013 (2.1 percent). As a result, although the analysis was initially conducted using the behaviors noted above, it was repeated using perching as a potential foraging behavior. Only those perching events within the solar arrays that were not attributed to the nesting activity at the Kammerer solar site were used.

Plate 6. Adult Swainson's hawk perched on solar panel at the McKenzie site. This use of the solar array suggests potential onsite foraging activity.

For the red-tailed hawk and American kestrel, perching was also included as a foraging behavior since these species commonly hunt from a perch. Note that with the exception of prey capture types and kiting/hovering, the remaining behaviors could be attributed to activities other than foraging. However, these are the primary foraging techniques of these species, and including them provides a reasonable estimation of foraging use for purposes of a comparative analysis.

Swainson's Hawk

Table 9 shows the relationship between foraging occurrences and habitat/land use type acreages for Swainson's hawk. As expected, 33.3 percent of the foraging occurrences were in alfalfa.

Oats, dry pasture, and tilled fields account for an additional 34.5 percent. Although comprising only 3.7 percent of the land cover, 6.9 percent of the foraging occurrences were in solar fields. Table 10 shows the same relationship but includes additional perching occurrences within solar fields considered potential foraging occurrences, increasing the proportion of foraging occurrences in solar fields to 10.6 percent.

Table 9. Swainson's hawk foraging occurrences within each land cover type.

Land Cover Type	Acres	Percent of Total	SWHA Foraging Observations	Percent of Total
Oats	844	15.3	22	13.8
Alfalfa	672	12.2	53	33.3
Dry Pasture	613	11.1	18	11.3
Irrigated Pasture	585	10.6	10	6.3
Ruderal/Developed	531	9.7	1	0.6
Vineyard	495	9.0	11	6.9
Orchard	393	7.1	4	2.5
Grassland	340	6.2	2	1.3
Corn	283	5.1	5	3.1
Tilled	235	4.3	15	9.4
Solar Array Field	206	3.7	11	6.9
Idle/Fallow	159	2.9	0	0
Riparian/Wetland	77	1.4	1	0.6
Wheat	68	1.2	10	6.3
Total	5,501	100	163	100

Table 10. Swainson's hawk foraging occurrences within each land cover type (including perching occurrences within solar array fields).

Land Cover Type	Acres	Percent of Total	SWHA Foraging Observations	Percent of Total
Oats	844	15.3	22	12.9
Alfalfa	672	12.2	53	31.2
Dry Pasture	613	11.1	18	10.6
Irrigated Pasture	585	10.6	10	5.9
Ruderal/Developed	531	9.7	1	0.6
Vineyard	495	9.0	11	6.5
Orchard	393	7.1	4	2.4
Grassland	340	6.2	2	1.2
Corn	283	5.1	5	2.9
Tilled	235	4.3	15	8.2
Solar Array Field	206	3.7	18	10.6
Idle/Fallow	159	2.9	0	0
Riparian/Wetland	77	1.4	1	0.6
Wheat	68	1.2	10	5.9
Total	5,501	100	170	100

The first chi-square test determines whether or not foraging use was in proportion to the availability of the land cover types in the survey area. As expected, the pattern of use indicates a high degree of habitat selectively and thus the null hypothesis was rejected ($\chi^2_{13.d.f.= 34.528}$ $P<0.001$) (Table 11). In other words, Swainson's hawks are selecting or avoiding specific crop or land cover types for foraging. Next, the contribution of the individual types was evaluated with regard to their significant contribution (positive or negative) to the chi-square

determination. Those with an observed use that exceeds the expected use, have a significant positive contribution (brown highlighting) and those with an expected use that exceeds the observed use have a significant negative contribution (blue highlighting) ($\chi^2_{1.d.f.=3.84}$ $P<0.05$). In other words, Table 11 indicates that Swainson's hawks appear to be using alfalfa, tilled, wheat, and solar array fields at a significantly greater frequency than would be expected relative to their availability in the survey area.

Table 12 shows the same relationship but includes the additional perching occurrences within solar fields considered potential foraging occurrences (Table 10), resulting in a similar outcome, but with a substantially greater positive contribution from solar array fields. In other words, Swainson's hawks are not avoiding solar array fields within the agricultural landscape and appear to be using them at a greater frequency than would be expected given their availability.

Some caution is needed when interpreting these results. While the results indicate that land cover types overall are not used in proportion to their availability and that certain types have a significant contribution to this result, it does not necessarily indicate that those that do not have a significant contribution or that have a significant negative association lack value. For example, dry pasture accounted for the third highest number of Swainson's hawk foraging occurrences, but because dry pasture was relatively common within the survey area, the expected use was similar to the observed use. So, while it does not appear to have been selected over other land cover types or used in proportion to its availability, 10.6 percent of all documented Swainson's hawk foraging occurred in dry pastures, and therefore this type, regardless of its availability or use, clearly has foraging value to this species.

Table 11. Chi-square values for Swainson's hawk.

Land Cover Type	Available Land Cover (%)	Observed Use of Land Cover (Frequency)	Expected Use of Land Cover (Frequency)	Chi-square Contribution
Oats	15.3	22	24.94	0.35
Alfalfa	12.2	53	19.89	55.12
Dry Pasture	11.1	18	18.09	0.00
Irrigated Pasture	10.6	10	17.28	3.07
Ruderal/Developed	9.7	1	15.81	13.87
Vineyard	9.0	11	14.67	0.92
Orchard	7.1	4	11.57	4.95
Grassland	6.2	2	10.11	6.51
Corn	5.1	5	8.31	1.32
Tilled	4.3	15	7.01	9.11
Solar Array Field	3.7	11	6.03	4.10
Idle/Fallow	2.9	0	4.72	4.72
Riparian/Wetland	1.4	1	2.28	0.72
Wheat	1.2	10	1.96	32.98
Total	100	163	163	137.74*

*137.74 represents the sample statistic in the chi-square analysis. To be considered significant, this value must exceed the Critical Value ($\chi^2_{13.d.f.=34.528}$ $P<0.001$), indicating that the observed frequencies are significantly different from the expected frequencies. The brown-highlighted rows indicate the land cover types that have a significant positive contribution and the blue-highlighted rows indicate a significant negative contribution ($\chi^2_{1.d.f.=3.84}$ $P<0.05$).

Table 12. Chi-square values for Swainson's hawk (including perching in solar arrays).

Land Cover Type	Available Land Cover (%)	Observed Use of Land Cover (Frequency)	Expected Use of Land Cover (Frequency)	Chi-square Contribution
Oats	15.3	22	26.01	0.62
Alfalfa	12.2	53	20.74	50.18
Dry Pasture	11.1	18	18.87	0.04
Irrigated Pasture	10.6	10	18.02	3.57
Ruderal/Developed	9.7	1	16.49	14.55
Vineyard	9.0	11	15.30	1.21
Orchard	7.1	4	12.07	5.40
Grassland	6.2	2	10.54	6.92
Corn	5.1	5	8.67	1.55
Tilled	4.3	15	7.31	8.09
Solar Array Field	3.7	18	6.29	21.80
Idle/Fallow	2.9	0	4.93	4.93
Riparian/Wetland	1.4	1	2.38	0.80
Wheat	1.2	10	2.04	31.06
Total	100	170	170	150.72*

*150.72 represents the sample statistic in the chi-square analysis, which exceeds the Critical Value ($\chi^2_{13.d.f.= 34.528}$ $P<0.001$), indicating that the observed frequencies are significantly different from the expected frequencies. The brown-highlighted rows indicate the land cover types that have a significant positive contribution and the blue-highlighted rows indicate a significant negative contribution ($\chi^2_{1.d.f.= 3.84}$ $P<0.05$).

Red-tailed Hawk

Table 13 shows the relationship between foraging occurrences and land use type acreages for red-tailed hawk. Three types comprised nearly 50 percent of the foraging occurrences, alfalfa, irrigated pasture, and dry pasture. Red-tailed hawk was also found more frequently in vineyards and orchards, which together comprised 22 percent of the total foraging occurrences. Most of these were perching individuals and were thus considered potential foraging occurrences, although it is likely that many were roosting rather than foraging. Solar fields accounted for 4.5 percent of the red-tailed hawk occurrences and just 3.7 percent of the total land cover.

Table 13. Red-tailed hawk foraging occurrences within each land cover type.

Land Cover Type	Acres	Percent of Total	RTHA Foraging Observations	Percent of Total
Oats	844	15.3	14	3.7
Alfalfa	672	12.2	85	22.4
Dry Pasture	613	11.1	54	14.2
Irrigated Pasture	585	10.6	47	12.4
Ruderal/Developed	531	9.7	0	0
Vineyard	495	9.0	46	12.1
Orchard	393	7.1	38	10.0
Grassland	340	6.2	15	3.9
Corn	283	5.1	23	6.1
Tilled	235	4.3	10	2.6
Solar Array Field	206	3.7	17	4.5
Idle/Fallow	159	2.9	26	6.8
Riparian/Wetland	77	1.4	1	0.3
Wheat	68	1.2	4	1.1
Total	5,501	100	380	100

As expected, the pattern of use for red-tailed hawk also indicates a high degree of habitat selectively and thus the null hypothesis was rejected ($\chi^2_{13.d.f.=34.528}$ $P<0.001$) (Table 14). The contribution of the individual types indicated that alfalfa, idle/fallow fields, and to a marginal extent vineyards and orchards, were used significantly more than their relative availability and oats and ruderal/developed, were used significantly less than their relative availability ($\chi^2_{1.d.f.=3.84}$ $P<0.05$). Although not contributing significantly to the sample statistic, the results also indicate that solar fields were not avoided by foraging red-tailed hawks. Instead, they accounted for 4.5 percent of all red-tailed hawk foraging occurrences with observed use higher than expected use.

As noted above, lack of a significant contribution or a significant negative contribution does not necessarily indicate lack of value. For example, dry and irrigated pastures accounted for 14.2 and 12.4 percent of foraging occurrences, respectively (Table 13). But because these types occurred more frequently in the survey area, even though observed use exceeded expected use, neither had a significant positive contribution. However, the proportion of occurrences clearly suggests the importance of these land cover types to foraging red-tailed hawks.

Table 14. Chi-square values for red-tailed hawk.

Land Cover Type	Available Land Cover (%)	Observed Use of Land Cover (Frequency)	Expected Use of Land Cover (Frequency)	Chi-square Contribution
Oats	15.3	14	58.14	33.51
Alfalfa	12.2	85	46.36	32.21
Dry Pasture	11.1	54	42.18	3.31
Irrigated Pasture	10.6	47	40.28	1.12
Ruderal/Developed	9.7	0	36.86	36.86
Vineyard	9.0	46	34.20	4.07
Orchard	7.1	38	26.98	4.50
Grassland	6.2	15	23.56	3.11
Corn	5.1	23	19.38	0.68
Tilled	4.3	10	16.34	2.46
Solar Array Field	3.7	17	14.06	0.61
Idle/Fallow	2.9	26	11.02	20.36
Riparian/Wetland	1.4	1	5.32	3.51
Wheat	1.2	4	4.56	0.07
Total	100	380	380	146.38*

*146.38 represents the sample statistic in the chi-square analysis. To be considered significant, this value must exceed the Critical Value ($\chi^2_{13.d.f.=34.528}$ $P<0.001$), indicating that the observed frequencies are significantly different from the expected frequencies. The brown-highlighted rows indicate the land cover types that have a significant positive contribution and the blue-highlighted rows indicate a significant negative contribution ($\chi^2_{1.d.f.=3.84}$ $P<0.05$).

American Kestrel

Table 15 shows the relationship between foraging occurrences and habitat/land use type acreages for American kestrel. Three types made up 58.6 percent of the foraging occurrences, alfalfa, oats, and solar array fields. Thirteen percent of all foraging occurrences were in solar fields.

Table 15. American kestrel foraging occurrences within each land cover type.

Land Cover Type	Acres	Percent of Total	AMKE Foraging Observations	Percent of Total
Oats	844	15.3	31	16.1
Alfalfa	672	12.2	57	29.5
Dry Pasture	613	11.1	7	3.6
Irrigated Pasture	585	10.6	14	7.3
Ruderal/Developed	531	9.7	0	0
Vineyard	495	9.0	5	2.6
Orchard	393	7.1	1	0.5
Grassland	340	6.2	1	0.5
Corn	283	5.1	21	10.9
Tilled	235	4.3	20	10.4
Solar Array Field	206	3.7	25	13.0
Idle/Fallow	159	2.9	6	3.1
Riparian/Wetland	77	1.4	0	0
Wheat	68	1.2	5	2.6
Total	5,501	100	193	100

The pattern of use for American kestrel also indicates a high degree of habitat selectively and thus the null hypothesis was rejected ($\chi^2_{13.d.f.=34.528}$ $P<0.001$) (Table 16). The contribution of the individual types indicate that alfalfa, solar fields, tilled, and corn fields were used significantly more than their relative availability, and dry pasture, ruderal/developed, vineyard, orchard, and grassland were used significantly less than their relative availability ($\chi^2_{1.d.f.=3.84}$ $P<0.05$).

Foraging use of solar fields by American kestrels was particularly high due mainly to the high proportion of perching occurrences (63.6 percent) (Table 8). The solar panels and the perimeter fence provided excellent perching habitat for kestrels (Plate 7).

Table 16. Chi-square values for American kestrel.

Land Cover Type	Available Land Cover (%)	Observed Use of Land Cover (Frequency)	Expected Use of Land Cover (Frequency)	Chi-square Contribution
Oats	15.3	31	29.53	0.07
Alfalfa	12.2	57	23.55	47.51
Dry Pasture	11.1	7	21.42	9.71
Irrigated Pasture	10.6	14	20.46	2.04
Ruderal/Developed	9.7	0	18.72	18.72
Vineyard	9.0	5	17.37	8.81
Orchard	7.1	1	13.70	11.77
Grassland	6.2	1	11.97	10.05
Corn	5.1	21	9.84	12.66
Tilled	4.3	20	8.30	11.70
Solar Array Field	3.7	25	7.14	44.68
Idle/Fallow	2.9	6	5.60	0.03
Riparian/Wetland	1.4	0	2.70	2.70
Wheat	1.2	5	2.32	3.09
Total	100	193	193	183.54

*183.54 represents the sample statistic in the chi-square analysis. To be considered significant, this value must exceed the the Critical Value ($\chi^2_{13.d.f.=34.528}$ $P<0.001$), indicating that the observed frequencies are significantly different from the expected frequencies. Brown-highlight indicates a significant contribution and blue indicates negative contribution ($\chi^2_{1.d.f.=3.84}$ $P<0.05$).

Plate 7. American kestrel perch-hunting on a solar panel at the Kammerer Site.

All Raptors

Table 17 shows the relationship between foraging occurrences and land cover type acreages for all raptors combined. Not unexpectedly, the largest proportion of foraging occurrences for all raptors combined occurred in alfalfa fields (26.2 percent), although this land cover type made up just 12.2 percent of the survey area. Dry pasture, irrigated pasture, and oats were also relatively frequently used and combined for a total of 29.3 percent of the occurrences, although they made up 37 percent of the survey area. Solar array fields, 3.7 percent of the survey area, contributed 7.2 percent of the foraging occurrences for all raptors combined.

The overall pattern of use for all raptor species combined also indicates a high degree of habitat selectively and thus the null hypothesis was rejected ($\chi^2_{13.d.f.= 34.528}$ $P<0.001$) (Table 18). The contribution of the individual types indicates that alfalfa, solar fields, idle/fallow, and tilled fields were used significantly more than their relative availability, and ruderal/developed, grassland, and oats were used significantly less than their relative availability ($\chi^2_{1.d.f.= 3.84}$ $P<0.05$). With the same cautionary notes expressed above relating to existing knowledge of observed habitat value and the availability/frequency formulation used here, it is clear that raptors are not avoiding solar array fields and at least to some extent appear to be selecting them.

Table 17. All raptor foraging occurrences within each land cover type.

Land Cover Type	Acres	Percent of Total	All Raptor Foraging Observations	Percent of Total
Oats	844	15.3	71	9.1
Alfalfa	672	12.2	205	26.2
Dry Pasture	613	11.1	83	10.6
Irrigated Pasture	585	10.6	75	9.6
Ruderal/Developed	531	9.7	1	0.1
Vineyard	495	9.0	67	8.6
Orchard	393	7.1	43	5.5
Grassland	340	6.2	19	2.4
Corn	283	5.1	51	6.5
Tilled	235	4.3	46	5.9
Solar Array Field	206	3.7	56	7.2
Idle/Fallow	159	2.9	39	5.0
Riparian/Wetland	77	1.4	6	0.8
Wheat	68	1.2	19	2.4
Total	5,501	100	781	100

Table 18. Chi-square values for all raptors.

Land Cover Type	Available Land Cover (%)	Observed Use of Land Cover (Frequency)	Expected Use of Land Cover (Frequency)	Chi-square Contribution
Oats	15.3	71	119.49	19.68
Alfalfa	12.2	205	95.28	126.35
Dry Pasture	11.1	83	86.69	0.16
Irrigated Pasture	10.6	75	82.79	0.73
Ruderal/Developed	9.7	1	75.76	73.77
Vineyard	9.0	67	70.29	0.15
Orchard	7.1	43	55.45	2.80
Grassland	6.2	19	48.42	17.88
Corn	5.1	51	39.83	3.13
Tilled	4.3	46	33.58	4.59
Solar Array Field	3.7	56	28.90	25.41
Idle/Fallow	2.9	39	22.65	11.80
Riparian/Wetland	1.4	6	10.93	2.22
Wheat	1.2	19	9.37	9.90
Total	100	781	781	298.57

*298.57 represents the sample statistic in the chi-square analysis. To be considered significant, this value must exceed the Critical Value ($\chi^2_{13.d.f.=34.528}$ $P<0.001$), indicating that the observed frequencies are significantly different from the expected frequencies. The brown-highlighted rows indicate the land cover types that have a significant positive contribution and the blue-highlighted rows indicate a significant negative contribution ($\chi^2_{1.d.f.=3.84}$ $P<0.05$).

Stationary Observation Points

A total of 160 raptor occurrences were reported within the solar array fields during the stationary observation point surveys (Table 19). Of these, 126 (78.8 percent) were considered foraging occurrences. Consistent with the driving transect survey results, American kestrel (38.8 percent) and Swainson's hawk (36.9 percent) were the most commonly observed raptors. Nearly 60 percent of the Swainson's hawk occurrences were considered foraging occurrences. Some of the perching occurrences may also have been associated with foraging behavior, but were excluded for consistency with the 2013 data.

Although fewer Swainson's hawks were observed in 2021 (59) than in 2013 (108), the proportion of foraging occurrences (59.3 percent in 2021 and 63.9 percent in 2013) was similar. Results were also consistent for all other species between 2013 and 2021.

Table 20 shows the different behaviors of each species within the solar fields. Similar to the road transect results, the most common behaviors were circling below 100 meters and perching, comprising 78.6 percent of foraging occurrences. Nearly 17 percent of the foraging occurrences were prey captures or prey capture attempts.

Table 19. Total number of occurrences and the proportion of foraging occurrences in solar fields for all species observed.

Species	Total occurrences	Foraging occurrences	Percent Foraging occurrences
Swainson's hawk	59	35	59.3
Red-tailed hawk	27	26	96.3
American kestrel	62	55	88.7
Red-shouldered hawk	2	1	50.0
Cooper's hawk	8	7	87.5
Northern harrier	1	1	100
Peregrine falcon	1	1	100
Total	160	126	78.8

Table 20. Behaviors in solar fields (all species). Foraging behaviors are highlighted.

	Behaviors								
	P	**S**	**C**	**K**	**F**	**G**	**CA**	**CS**	**CU**
SWHA	14	2	32	1	8		1	1	
RTHA	3	1	21			1	1		
AMKE	31		5	2	8		9	5	2
RSHA			1		1				
COHA	2		3		1		2		
NOHA					1				
PEFA			1						
Total	50	3	63	3	19	1	13	6	2

P = perching; S = soaring below 200 m; C = circling below 100 meters; F = Flying below 200 meters; CA = prey capture attempt; CS = prey capture successful; CU = prey capture unsuccessful; G = standing on the ground; K = kiting/hovering. SWHA = Swainson's hawk; RTHA = red-tailed hawk; AMKE = American kestrel; RSHA = red-shouldered hawk; COHA = Cooper's hawk; NOHA = northern harrier; PEFA = peregrine falcon.

Summary and Conclusions

The results of this study indicate ongoing raptor use of moderately-sized solar array fields following conversion from cultivated uses. Results of the strip transect road survey indicate raptor use in general, and specifically Swainson's hawk and American kestrel use of solar array fields exceeds expected use based on their availability within the agricultural landscape. This suggests that solar array fields are not avoided by these species and may be selected at a greater frequency than many cultivated land cover types. The stationary observation point surveys confirm use within solar array fields, including foraging or potential foraging use by all species observed.

Comparison with 2013 Results

Data from 2021 are consistent with the 2013 results. Although there were some differences in the use of specific cultivated land cover types for some species, similar use patterns were found, particularly the overall use of solar array fields.

The total number and the relative proportion of Swainson's hawks in 2021 (30.4 percent) was less than in 2013 (38.5 percent), while the numbers of other species, including red-tailed hawk, American kestrel, and red-shouldered hawk, increased in 2021 (Table 21). This may have been due in part to the expansion of the strip transect road survey route, which increased the proportion of grasslands, and to the conversion to orchards along the route, which decreased the proportion of irrigated pasture (Table 22). The extent of orchard expansion throughout the region has resulted in declines of available habitat for Swainson's hawk (Estep 2020).

The proportion of Swainson's hawk foraging observations in solar array fields was greater in 2013 (12.8 percent) than in 2021 (6.9 percent). However, the observed use of solar array fields by Swainson's hawk has changed since 2013, with a greater proportion of perching occurrences in 2021. Perching was not included as a potential foraging behavior in 2013, but 2021 observations suggest that perching within the solar array may have become a more common technique for foraging within the array. Thus, the data were recalculated by including several perching occurrences considered to be foraging behaviors, resulting in the proportion of foraging observations approaching 11 percent and greater consistency with 2013 results. However, either result (including and not including the additional perching occurrences) resulted in an observed use of solar array fields by Swainson's hawks that exceeded expected use. In other words, in either case, Swainson's hawks appear to be using solar array fields at a significantly greater frequency than would be expected relative to their availability.

Conclusions

The following conclusions are the same as were made in the 2013 study (Estep 2013).

1. Swainson's hawks use and forage within managed solar array fields. The results of the driving transect surveys and the stationary observation point surveys indicate foraging use of the solar array fields by Swainson's hawks and other raptors. While it is difficult to observe the precise locations of prey capture attempts in solar array fields due to their height, the rows of

solar trackers may not preclude foraging in the open grasslands between them. However, foraging hawks may also be focused primarily on the wider spaces between the sub-areas within the projects and around the perimeter of the projects. Of key importance is the management of a grassland substrate to promote rodent populations and maintaining this substrate at a height that promotes visibility and access to prey. Unlike most crop types, this condition is available in solar fields throughout the spring and summer breeding season, and thus provides a consistent and available source of prey. Many crop types, while important in the overall agricultural matrix, may be available for a relatively short period of time during the breeding season due to the planting, growth, and harvesting regime.

2. Swainson's hawk foraging use of solar array fields exceeds what would be expected based on their availability. This suggests that not only were the solar array fields being used by foraging Swainson's hawks, but that they were being selectively used at greater frequency than some of the other land cover types in the survey area. The data indicates a similar conclusion for American kestrel, and although not selected at a greater frequency, data on red-tailed hawk use of solar array fields indicate they were not avoided.

3. Within the diverse agricultural landscape of the study area, the presence of the managed solar array fields (i.e., managed grassland substrate) did not appear to negatively affect the Swainson's hawk and other raptors. The solar array fields were used for foraging similarly to other moderate to high value agricultural cover types and their presence did not appear to affect the overall use of the landscape by Swainson's hawks or other raptors. As one element of an otherwise diverse agricultural matrix, the solar array fields provided a consistent and an apparently reasonably accessible source of prey, particularly for Swainson's hawks and American kestrels. However, this outcome should be viewed with some caution in that while this study indicated a positive relationship, only a small percent of the survey area was solar array field. But these results suggest that solar array fields designed and managed similarly as those included within this study and integrated into a diverse agricultural landscape may not negatively affect Swainson's hawk and other raptors.

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LEGEND

- Survey Route
- Survey Area (1,200' total width)

KEY TO LAND COVER

Solar Facility	116 Ac.
Irrigated Pasture	232 Ac.
Oats	315 Ac.
Dry Pasture	61 Ac.
Alfalfa	187 Ac.
Ruderal/Developed	133 Ac.
Wheat	
Tilled	2.5 Ac.
Vineyard	160 Ac.
Grassland	
Orchard	132 Ac.
Idle/Fallow	62 Ac.

ROTATED LAND COVER

Wheat to Corn	
Oats to Corn	53 Ac.
Tilled to Corn	78 Ac.
Oats to Tilled	64 Ac.

MATCH LINE (see Figure 3b)

MATCH LINE (see Figure 3c)

Figure 3a
Survey Route and Land Cover Types

NORTH

0 1,000 2,000

FEET

BASE MAP: USGS 7.5' Bruceville and Galt, California Quadrangles

09/21/2021

LEGEND

- Survey Route
- Survey Area (1,200' total width)

KEY TO LAND COVER

Solar Facility	
Irrigated Pasture	118 Ac.
Oats	20 Ac.
Dry Pasture	92 Ac.
Alfalfa	142 Ac.
Ruderal/Developed	74 Ac.
Wheat	
Tilled	
Vineyard	30 Ac.
Grassland	
Orchard	25 Ac.
Idle/Fallow	2 Ac.

ROTATED LAND COVER

Wheat to Corn	15 Ac.
Oats to Corn	32 Ac.
Tilled to Corn	
Oats to Tilled	83 Ac.

MATCH LINE (see Figure 3a)

Point Pleasant

Bruceville

Figure 3b
Survey Route and Land Cover Types

NORTH

0 1,000 2,000

FEET

BASE MAP: USGS 7.5' Bruceville and Galt, California Quadrangles

09/27/2021

MATCH LINE (see Figure 3a)

MATCH LINE (see Figure 3d)

LEGEND

- Survey Route
- Survey Area (1,200' total width)

KEY TO LAND COVER

Solar Facility	
Irrigated Pasture	
Oats	47 Ac.
Dry Pasture	25 Ac.
Alfalfa	115 Ac.
Ruderal/Developed	80 Ac.
Wheat	
Tilled	
Vineyard	
Grassland	
Orchard	53 Ac.
Idle/Fallow	35 Ac.

ROTATED LAND COVER

Wheat to Corn	18 Ac.
Oats to Corn	15 Ac.
Tilled to Corn	176 Ac.
Oats to Tilled	

09/21/2021

Figure 3c
Survey Route and Land Cover Types

NORTH

0 1,000 2,000

FEET

BASE MAP: USGS 7.5' Bruceville and Galt, California Quadrangles

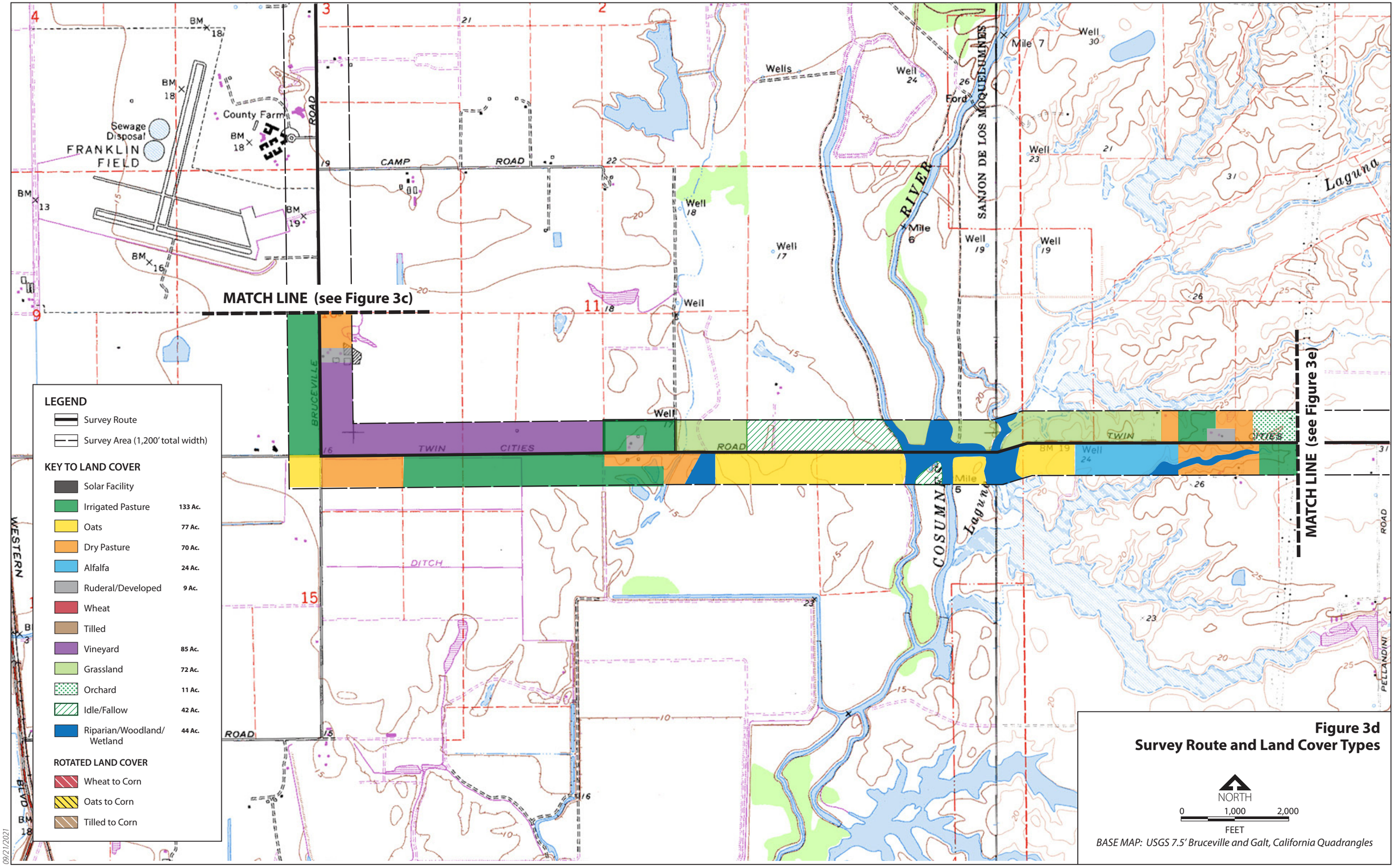

Figure 3d
Survey Route and Land Cover Types

BASE MAP: USGS 7.5' Bruceville and Galt, California Quadrangles

09/21/2021

LEGEND

- Survey Route
- Survey Area (1,200' total width)

KEY TO LAND COVER

Solar Facility	64 Ac.
Irrigated Pasture	82 Ac.
Oats	47 Ac.
Dry Pasture	108 Ac.
Alfalfa	60 Ac.
Ruderal/Developed	160 Ac.
Wheat	25 Ac.
Tilled	
Vineyard	175 Ac.
Grassland	
Orchard	107 Ac.
Idle/Fallow	18 Ac.
Riparian/Woodland/ Wetland	4 Ac.

ROTATED LAND COVER

Wheat to Corn	
Oats to Corn	66 Ac.
Tilled to Corn	19 Ac.

MATCH LINE (see Figure 3f)

MATCH LINE (see Figure 3d)

D E L O S

M O Q U E L U M N E S

PACIFIC

4 LANE

99

104

MINGO ROAD

MC KENZIE ROAD

ROAD

SPRING ST

MIDWAY AVE

WALNUT AVE

TWIN

WALDO RD

HAUSCHILDT RD

Laguna

Skunk

Need

Twin Cities

BM 37

BM 43

BM 42

Well

09/21/2021

Figure 3e
Survey Route and Land Cover Types

NORTH

0 1,000 2,000

FEET

BASE MAP: USGS 7.5' Bruceville and Galt, California Quadrangles

MATCH LINE (see Figure 3g)

LEGEND

- Survey Route
- Survey Area (1,200' total width)

KEY TO LAND COVER

Solar Facility	
Irrigated Pasture	
Oats	22 Ac.
Dry Pasture	15 Ac.
Alfalfa	44 Ac.
Ruderal/Developed	33 Ac.
Wheat	
Tilled	22 Ac.
Vineyard	27 Ac.
Grassland	183 Ac.
Orchard	
Idle/Fallow	
Riparian/Woodland/ Wetland	29 Ac.

ROTATED LAND COVER

Wheat to Corn	9 Ac.
Oats to Corn	40 Ac.
Tilled to Corn	

MATCH LINE (see Figure 3e)

Figure 3f
Survey Route and Land Cover Types

NORTH
0 1,000 2,000
FEET

BASE MAP: USGS 7.5' Bruceville and Galt, California Quadrangles

12021/09

LEGEND

- Survey Route
- Survey Area (1,200' total width)

KEY TO LAND COVER

Solar Facility	
Irrigated Pasture	20 Ac.
Oats	140 Ac.
Dry Pasture	76 Ac.
Alfalfa	81 Ac.
Ruderal/Developed	15 Ac.
Wheat	
Tilled	
Vineyard	
Grassland	85 Ac.
Orchard	
Idle/Fallow	
Riparian/Woodland/ Wetland	

ROTATED LAND COVER

Wheat to Corn	44 Ac.
Oats to Corn	
Tilled to Corn	

MATCH LINE (see Figure 3f)

09/21/2021

Figure 3g
Survey Route and Land Cover Types

NORTH

0 1,000 2,000

FEET

BASE MAP: USGS 7.5' Bruceville and Galt, California Quadrangles

LEGEND

- Survey Route
- Survey Area (1,200' total width)

KEY TO LAND COVER

Solar Facility	26 Ac.
Irrigated Pasture	
Oats	
Dry Pasture	166 Ac.
Alfalfa	19 Ac.
Ruderal/Developed	27 Ac.
Wheat	
Tilled	
Vineyard	18 Ac.
Grassland	
Orchard	65 Ac.
Idle/Fallow	
Riparian/Woodland/ Wetland	

ROTATED LAND COVER

- Wheat to Corn
- Oats to Corn
- Tilled to Corn

Figure 3h
Survey Route and Land Cover Types

NORTH

0 1,000 2,000

FEET

BASE MAP: USGS 7.5' Sloughhouse, California Quadrangle

12/07/2020

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Appendix B
Observed Species Compendium

Plant Species

VASCULAR SPECIES

EUDICOTS

ADOXACEAE—MUSKROOT FAMILY

Sambucus nigra—blue elderberry

AMARANTHACEAE—AMARANTH FAMILY

Amaranthus albus—prostrate pigweed[1]

APIACEAE—CARROT FAMILY

Conium maculatum—poison hemlock[1]
Eryngium castrense—Great Valley eryngo
Foeniculum vulgare—fennel[1]
Torilis arvensis—spreading hedgeparsley[1]

ASTERACEAE—SUNFLOWER FAMILY

Baccharis pilularis—coyote brush
Carduus pycnocephalus—Italian plumeless thistle[1]
Centaurea solstitialis—yellow star-thistle[1]
Dittrichia graveolens—stinkwort[1]
Erigeron canadensis—Canadian horseweed
Holocarpha virgata—yellowflower tarweed
Hypochaeris glabra—smooth cat's ear[1]
Hypochaeris radicata—hairy cat's ear[1]
Lactuca serriola—prickly lettuce[1]
Matricaria discoidea—disc mayweed
Psilocarphus brevissimus—short woollyheads
Sonchus arvensis—field sowthistle[1]
Xanthium strumarium—cocklebur

BORAGINACEAE—BORAGE FAMILY

Plagiobothrys bracteatus—bracted popcornflower

BRASSICACEAE—MUSTARD FAMILY

Brassica nigra—black mustard[1]
Lepidium latifolium—perennial pepper weed[1]

CARYOPHYLLACEAE—PINK FAMILY

Spergularia rubra—red sandspurry[1]

CONVOLVULACEAE—MORNING-GLORY FAMILY

Convolvulus arvensis—field bindweed[1]

CUCURBITACEAE—GOURD FAMILY

Cucurbita foetidissima—Missouri gourd

EUPHORBIACEAE—SPURGE FAMILY

Croton setiger—dove weed

FABACEAE—LEGUME FAMILY

Lupinus microcarpus—valley lupine
Trifolium hirtum—rose clover[1]

FAGACEAE—OAK FAMILY

Quercus agrifolia—coast live oak
Quercus lobata—valley oak

GERANIACEAE—GERANIUM FAMILY

Erodium botrys—longbeak stork's bill[1]
Erodium cicutarium—redstem stork's bill[1]

JUGLANDACEAE—WALNUT FAMILY

Juglans hindsii—Northern California black walnut

LAMIACEAE—MINT FAMILY

Trichostema lanceolatum—vinegarweed

LYTHRACEAE—LOOSESTRIFE FAMILY

Lythrum hyssopifolia—hyssop loosestrife[1]

MALVACEAE—MALLOW FAMILY

Malva parviflora—cheeseweed mallow[1]

ONAGRACEAE—EVENING PRIMROSE FAMILY

Epilobium brachycarpum—tall annual willowherb
Epilobium ciliatum—fringed willowherb

POLYGONACEAE—BUCKWHEAT FAMILY

Polygonum aviculare—prostrate knotweed[1]
Rumex crispus—curly dock[1]
Rumex dentatus—toothed dock[1]
Rumex pulcher—fiddle dock[1]

RANUNCULACEAE—BUTTERCUP FAMILY

Ranunculus aquatilis—white water crowfoot
Ranunculus sceleratus—cursed buttercup

ROSACEAE—ROSE FAMILY

Rubus armeniacus—Himalayan blackberry[1]

SALICACEAE—WILLOW FAMILY

Populus fremontii—Fremont cottonwood
Salix gooddingii—Goodding's willow

SOLANACEAE—NIGHTSHADE FAMILY

Solanum elaeagnifolium—silverleaf nightshade[1]

VERBENACEAE—VERVAIN FAMILY

Phyla nodiflora—turkey tangle fogfruit

VITACEAE—GRAPE FAMILY

Vitis californica—California wild grape

MONOCOTS

CYPERACEAE—SEDGE FAMILY

Cyperus eragrostis—tall flatsedge
Eleocharis macrostachya—pale spike rush

JUNCACEAE—RUSH FAMILY

Juncus balticus—Baltic rush
Juncus effusus—soft rush

POACEAE—GRASS FAMILY

Alopecurus saccatus—Pacific foxtail
Avena barbata—slender oat[1]
Avena fatua—wild oat[1]
Briza minor—little quakinggrass[1]
Bromus diandrus—ripgut brome[1]
Bromus hordeaceus—soft brome[1]
Crypsis schoenoides—swamp pricklegrass[1]
Cynodon dactylon—Bermudagrass[1]
Elymus caput-medusae—medusahead[1]
Festuca myuros—rat-tail fescue[1]
Festuca perennis—perennial rye grass[1]
Gastridium phleoides—nit grass[1]
Hordeum marinum—seaside barley[1]
Hordeum murinum—mouse barley[1]
Melica californica—California melicgrass
Phalaris aquatica—Harding grass[1]
Poa secunda—onesided bluegrass
Polypogon monspeliensis—annual rabbitsfoot grass[1]

THEMIDACEAE—BRODIAEA FAMILY

Brodiaea elegans—harvest brodiaea
Triteleia laxa—Ithuriel's spear

TYPHACEAE—CATTAIL FAMILY

Typha latifolia—broadleaf cattail

Wildlife Species

VERTEBRATES

BIRDS

BLACKBIRDS, ORIOLES & ALLIES

ICTERIDAE—BLACKBIRDS

Agelaius phoeniceus—red-winged blackbird
Agelaius tricolor—tricolored blackbird[2,3]
Euphagus cyanocephalus—Brewer's blackbird
Molothrus ater—brown-headed cowbird[1]

FALCONS

FALCONIDAE—CARACARAS & FALCONS

Falco peregrinus anatum—American peregrine falcon[1]

HAWKS

ACCIPITRIDAE—HAWKS, KITES, EAGLES, & ALLIES

Buteo jamaicensis—red-tailed hawk[2]
Buteo swainsoni—Swainson's hawk[2,3]
Elanus leucurus—white-tailed kite[2]
Haliaeetus leucocephalus—bald eagle[2]
Circus hudsonius—northern harrier[2]

HERONS & BITTERNS

ARDEIDAE—HERONS, BITTERNS, & ALLIES

Ardea alba—great egret
Ardea herodias—great blue heron

JAYS, MAGPIES & CROWS

CORVIDAE—CROWS & JAYS

Corvus brachyrhynchos—American crow
Pica nuttalli—yellow-billed magpie[2]

NEW WORLD VULTURES

CATHARTIDAE—NEW WORLD VULTURES

Cathartes aura—turkey vulture

OWLS

STRIGIDAE—TYPICAL OWLS

Athene cunicularia—burrowing owl[2,3]

PIGEONS & DOVES

COLUMBIDAE—PIGEONS & DOVES

Zenaida macroura—mourning dove

SHOREBIRDS

CHARADRIIDAE—LAPWINGS & PLOVERS

Charadrius vociferus—killdeer

STARLINGS & ALLIES

STURNIDAE—STARLINGS

Sturnus vulgaris—European starling[1]

WATERFOWL

ANATIDAE—DUCKS, GEESE, & SWANS

Anas platyrhynchos—mallard

Branta canadensis—Canada goose

CRANES

GRUIDAE—CRANES

Antigone canadensis tabida—greater sandhill crane[2]

NEW WORLD SPARROWS

PASSERELLIDAE—NEW WORLD SPARROWS

Melospiza melodia—song sparrow[1]

VIREOS

VIREONIDAE—VIREOS

Vireo sp.—Vireo species

MAMMALS

CANIDS

CANIDAE—WOLVES & FOXES

Canis latrans—coyote[3]

Vulpes vulpes—red fox[1]

HARES & RABBITS

LEPORIDAE—HARES & RABBITS

Lepus californicus—black-tailed jackrabbit

MUSTELIDS

MUSTELIDAE—WEASELS, SKUNKS, & OTTERS

Taxidea taxus—American badger[2,3]

POCKET GOPHERS

GEOMYIDAE—POCKET GOPHERS

Thomomys bottae—Botta's pocket gopher

SQUIRRELS

SCIURIDAE—SQUIRRELS

Otospermophilus beecheyi—California ground squirrel

REPTILES

SNAKES

COLUBRIDAE—COLUBRID SNAKES

Thamnophis sirtalis—common garter snake

TURTLES

EMYDIDAE—OLD AND NEW WORLD TURTLES

Unknown sp.—Freshwater turtle species[3]

AMPHIBIANS

FROGS

HYLIDAE—TREE FROGS AND THEIR ALLIES

Pseudacris regilla—northern pacific treefrog[3]

Insects

AQUATIC INSECTS

CORIXIDAE-AQUATIC INSECTS

Corixa sp.—water boatmen

HYDRACHNELLAE-BENTHIC ARTHROPODS

Various sp.—water mites

INVERTEBRATES

Crustaceans

CHIROCEPHALIDAE—FAIRY SHRIMP

Linderiella occidentalis—California linderiella

CYZICIDAE—CLAM SHRIMP

Cyzicus californicus—clam shrimp

CANDONIDAE

Cladocera sp.—water flea species

Copepod sp.—freshwater copepod species

Ostracod sp.—seed shrimp species

1 Signifies introduced (non-native) species

2 Signifies special-status species

3 Signifies secondary species observation such as nest, ben, burrow, skat/larvae, and/or tracks

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Appendix C

Special-Status Plants with Potential to Occur

Appendix B. Special-Status Plants with Potential to Occur

Common Name	Scientific Name	Status (Federal/State/CRPR/SSHCP)	Primary Habitat Associations, Lifeforms/ Blooming Period/and Elevation Range (Feet)	Potential to Occur
Arctostaphylos myrtifolia	Ione manzanita	FT/None/1B.2/None	Chaparral, Cismontane woodland; acidic, Ione soil, clay, or sandy/perennial evergreen shrub/Nov–Mar/197–1,900.	**Not expected to occur.** Habitat for this species is absent in the PSA. The nearest known occurrence for this species is located to the east of the PSA in the 'Carbondale' U.S. Geological Survey (USGS) 7.5-Minute Quadrangle (Quad) (CNPS 2020; USFWS 2020a).
Brodiaea rosea ssp. *vallicola*	valley brodiaea	None/None/4.2/None	Valley and foothill grassland (swales), Vernal pools; Old alluvial terraces; silty, sandy, and gravelly loam/perennial bulbiferous herb/Apr–May (June)/33–1,095.	**Moderate potential to occur.** The PSA is within the known range of the species, and habitat for this species is present. Specifically, within the PSA suitable habitat for this species is located throughout both the solar development area and adjacent other lands in grasslands, floodplains, terraces, and vernal pools where silt, sandy or loam soils are present. The nearest known occurrence for this species is recorded approximately 4 miles northwest of the PSA (CDFW 2020; Jepson eFlora 2021).
Crocanthemum suffrutescens	Bisbee Peak rush-rose	None/None/3.2/None	Chaparral; Often gabbroic or Ione soil; often burned or disturbed areas/perennial evergreen shrub/Apr–Aug/246–2,195.	**Not expected to occur.** Habitat for this species is absent in the PSA. The nearest known occurrence for this species is located to the east of the PSA in the 'Carbondale' USGS 7.5-Minute Quad (CNPS 2020).
Downingia pusilla	dwarf downingia	None/None/2B.2/Covered	Valley and foothill grassland (mesic), Vernal pools/annual herb/Mar–May/3–1,455.	**Moderate potential to occur.** The PSA is within the known range of the species, and habitat for the species is present. There is observed suitable habitat for this species, as well as SSHCP modeled habitat in the PSA. Specifically, within the PSA suitable habitat for this species is located throughout both the solar development area and adjacent other lands, specifically in the vernal pools, wetlands

Appendix B. Special-Status Plants with Potential to Occur

Common Name	Scientific Name	Status (Federal/State/CRPR/SSHCP)	Primary Habitat Associations, Lifeforms/ Blooming Period/and Elevation Range (Feet)	Potential to Occur
				swales and seasonal wetlands. The nearest known occurrences for this species are located west of the PSA in the 'Elk Grove' USGS 7.5-Minute Quad, and south to southwest in the 'Clay' and 'Galt' USGS 7.5-Minute Quads (CNPS 2020; Sacramento County 2018).
Eriogonum apricum var. *apricum*	Ione buckwheat	FE/SE/1B.1/None	Chaparral (openings, Ione soil)/perennial herb/July–Oct/197–475.	**Not expected to occur.** Habitat for this species is absent in the PSA. The nearest known occurrence for this species is located to the east of the PSA in the 'Carbondale' USGS 7.5-Minute Quad (CNPS 2020; USFWS 2020a).
Eriogonum apricum var. *prostratum*	Irish Hill buckwheat	FE/SE/1B.1/None	Chaparral (openings, Ione soil)/perennial herb/June–July/295–395.	**Not expected to occur.** Habitat for this species is absent in the PSA. The nearest known occurrence of this species is located to the east of the PSA in the 'Carbondale' USGS 7.5-Minute Quad (CNPS 2020).
Eryngium pinnatisectum	Tuolumne button-celery	None/None/1B.2/None	Cismontane woodland, Lower montane coniferous forest, Vernal pools; mesic/annual / perennial herb/May–Aug/230–3,000.	**Low potential to occur.** This species has not been documented in the vicinity of the PSA, but the PSA is within the known range of the species. Habitat for the species in the PSA is minimal and of low quality. Specifically, within the PSA suitable habitat for this species is located throughout both the solar development area and adjacent other lands, specifically in the vernal pools, wetlands swales and seasonal wetlands. The nearest known occurrences for this species are located to the east and northeast of the PSA in the 'Carbondale' and 'Folsom SE' USGS 7.5-Minute Quads (CNPS 2020).
Gratiola heterosepala	Boggs Lake hedge-hyssop	None/SE/1B.2/Covered	Marshes and swamps (lake margins), Vernal pools;	**Moderate potential to occur.** The PSA is within the known range of the species, and suitable

Appendix B. Special-Status Plants with Potential to Occur

Common Name	Scientific Name	Status (Federal/State/CRPR/SSHCP)	Primary Habitat Associations, Lifeforms/ Blooming Period/and Elevation Range (Feet)	Potential to Occur
			clay/annual herb/Apr–Aug/33–7,790.	habitat for the species and SSHCP modeled habitat is present. Specifically, within the PSA suitable habitat for this species is located throughout both the solar development area and adjacent other lands, specifically in the vernal pools, wetlands swales and seasonal wetlands. The nearest known occurrence for this species is within five miles of the PSA, located approximately 0.85 miles southwest of the junction at Sloughhouse Road and Jackson Road (Highway 16) (CDFW 2020; Sacramento County 2018).
Horkelia parryi	Parry's horkelia	None/None/1B.2/None	Chaparral, Cismontane woodland; Ione formation and other soils/perennial herb/Apr–Sep/262–3,510.	**Not expected to occur.** Habitat for this species is absent in the PSA. There are no known Ione soils in the PSA. The nearest known occurrence for this species is located to the east of the PSA in the 'Carbondale' USGS 7.5-Minute Quad (CNPS 2020; USDA 2021a).
Juncus leiospermus var. *ahartii*	Ahart's dwarf rush	None/None/1B.2/Covered	Valley and foothill grassland (mesic)/annual herb/Mar–May/98–750.	**Low potential to occur.** This species has not been documented in the vicinity of the PSA but is within the known range of the species. Habitat for the species is minimal and of low quality in the PSA, though the PSA does include SSHCP modeled habitat. Specifically, within the PSA suitable habitat for this species is located throughout both the solar development area and adjacent other lands, specifically in the vernal pools, wetlands swales and seasonal wetlands. The nearest known occurrence for this species is within five miles of the PSA, located at the southeast corner of Keifer Boulevard and Sunrise

Appendix B. Special-Status Plants with Potential to Occur

Common Name	Scientific Name	Status (Federal/State/CRPR/SSHCP)	Primary Habitat Associations, Lifeforms/ Blooming Period/and Elevation Range (Feet)	Potential to Occur
				Boulevard (CDFW 2020; Sacramento County 2018).
Legenere limosa	legenere	None/None/1B.1/Covered	Vernal pools/annual herb/Apr–June/3–2,885.	**Moderate potential to occur.** The PSA is within the known range of the species, and habitat for the species is present. There is also SSHCP modeled habitat in the PSA. Specifically, within the PSA suitable habitat for this species is located throughout both the solar development area and adjacent other lands, specifically in the vernal pools, wetlands swales and seasonal wetlands. The nearest known occurrences for this species are within five miles of the PSA, located approximately 2 miles northeast of the Nimbus Fish Hatchery and 1.8 miles east of the junction of Apple Road and Dillard Road (CDFW 2020; Sacramento County 2018).
Navarretia eriocephala	hoary navarretia	None/None/4.3/Covered	Cismontane woodland, Valley, and foothill grassland; vernally mesic/annual herb/May–June/344–1,310.	**Moderate potential to occur.** The PSA is within the known range of the species, and minimal habitat for the species present. Specifically, within the PSA suitable habitat for this species is located throughout both the solar development area and adjacent other lands, specifically in the vernal pools, wetlands swales and seasonal wetlands. The nearest known occurrence for this species is located to the west of the PSA in the 'Elk Grove' USGS 7.5-Minute Quad (CNPS 2020; Jepson eFlora 2021).
Navarretia myersii ssp. *myersii*	pincushion navarretia	None/None/1B.1/Covered	Vernal pools; often acidic/annual herb/Apr–May/66–1,080.	**Moderate potential to occur.** The PSA is within the known range of the species, and habitat for the species is present. The PSA is also

Appendix B. Special-Status Plants with Potential to Occur

Common Name	Scientific Name	Status (Federal/State/CRPR/SSHCP)	Primary Habitat Associations, Lifeforms/ Blooming Period/and Elevation Range (Feet)	Potential to Occur
				mapped as SSHCP modeled habitat for the species. Specifically, the Hadselville-Pentz and Redding Gravelly Loam soil complexes within the are slightly acidic, therefore vernal pools located in these soils provide potential suitable habitat. The nearest known occurrence for this species is within five miles of the PSA, located approximately 6 miles east of Highway 16, south of the Schneider Ranch property near Meiss Road (CDFW 2020; Sacramento County 2018; USDA 2021).
Orcuttia tenuis	slender Orcutt grass	FT/SE/1B.1/Covered	Vernal pools; Often gravelly/annual herb/May–Sep (Oct)/115–5,770.	**Moderate potential to occur.** The PSA is within the known range of the species, and habitat for the species is present. Specifically, within the PSA suitable habitat for this species is located throughout both the solar development area and adjacent other lands, specifically in the vernal pools, wetlands swales and seasonal wetlands. Designated Critical Habitat (DCH) is located approximately 4 miles northwest of the PSA. A known occurrence is also recorded for this species to the west of the PSA in the 'Elk Grove' USGS 7.5-Minute Quad (CNPS 2020; USFWS 2020e).
Orcuttia viscida	Sacramento Orcutt grass	FE/SE/1B.1/Covered	Vernal pools/annual herb/Apr–July (Sep)/98–330.	**Moderate potential to occur**. The PSA is within the known range of the species, and habitat for the species is present. Specifically, within the PSA suitable habitat for this species is located throughout both the solar development area and adjacent other lands, specifically in the vernal pools, wetlands swales and seasonal wetlands. DCH is located

Appendix B. Special-Status Plants with Potential to Occur

Common Name	Scientific Name	Status (Federal/State/CRPR/SSHCP)	Primary Habitat Associations, Lifeforms/ Blooming Period/and Elevation Range (Feet)	Potential to Occur
				approximately 4 miles northwest of the PSA. There are also several known occurrences for this species within five miles of the PSA, including numerous locations off Kefeir Boulevard near the intersection with Grant Line Road (CDFW 2020; USFWS 2020d).
Sagittaria sanfordii	Sanford's arrowhead	None/None/1B.2/Covered	Marshes and swamps (assorted shallow freshwater)/perennial rhizomatous herb (emergent)/May–Oct (Nov)/0–2,130.	**Low potential to occur.** The PSA is within the known range of the species, and habitat for the species is present however minimal and of low quality. The PSA also includes SSHCP modeled habitat for the species. Specifically, within the PSA, there is limited and low-quality habitat for this species (perennially inundated habitat). The nearest known occurrence for this species is within five miles of the PSA, located approximately 0.60 miles south of Meiss Road and southeast of Sloughhouse (CDFW 2020; Sacramento County 2018).

Sources: CDFW 2020; CNPS 2021b; Jepson eFlora 2021; Sacramento County 2018; USDA 2021a; USFWS 2020a; USFWS 2020d; USFWS 2020e

Federal Status

FE: Federally listed as endangered.
FT: Federally listed as threatened

State Status

SE: State listed as endangered

California Rare Plant Rank (CRPR) Status

1B: plants rare, threatened, or endangered in California and elsewhere.
2B: plants rare, threatened, or endangered in California but more common elsewhere.
3: Plants about which more information is needed – A Review List.
4: Plants of limited distribution – A Watch List.

Threat Rank

0.1: Seriously threatened in California (over 80% of occurrences threatened/high degree and immediacy of threat).
0.2: Moderately threatened in California (20%–80% occurrences threatened/moderate degree and immediacy of threat).
0 .3: Not very threatened in California (less than 20% of occurrences threatened/low degree and immediacy of threat or no current threats known).
None: No conservation status.

SSHCP (South Sacramento Habitat Conservation Plan)

Covered: Currently listed as threatened or endangered under the California Endangered Species Act (ESA) or the federal ESA and covered within the Plan Area by the SSHCP.
None: Not covered under the SSHCP.

Potential for Occurrence Ranks

Moderate Potential to Occur: the species has not been documented in the vicinity, but the Project site is within the known range of the species, and habitat for the species is present.
Low Potential to Occur: The species has not been documented in the vicinity and the PSA is within the known range of the species, but habitat for the species is of low quality.
Not Expected to Occur: The PSA is outside the known range of the species, and habitat for the species is either absent or of low quality.

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Appendix D

Special-Status Wildlife with Potential to Occur

Appendix C. Special-Status Wildlife with Potential to Occur

Scientific Name	Common Name	Status (Federal/State/SSHCP)	Habitat	Potential to Occur
Amphibians				
Ambystoma californiense	California tiger salamander (CTS)	FT/ST, WL/Covered	Upland habitat is annual grassland, valley–foothill hardwood, and valley–foothill riparian habitats; aquatic breeding habitat is vernal pools and other ephemeral pools, and less commonly in man-made pools and along stream courses and if predatory fishes are absent.	**Low potential to occur.** This species has not been documented in the PSA, however this species is known to occur in the Project vicinity, some suitable habitat is present, as well as South Sacramento Habitat Conservation Plan (SSHCP) modeled aquatic and upland habitat (Sacramento County 2018). Specifically, there are known occurrences for this species within five miles of the PSA, located southeast of Laguna Creek, approximately 0.25 miles southeast of Katena Lane at Clay Station Road (CDFW 2020, USFWS 2021a). No CTS were identified during aquatic larval surveys conducted by Dudek 2021.
Rana draytonii	California red-legged frog (CRLF)	FT/SSC/None	Lowland streams, wetlands, riparian woodlands, livestock ponds; dense, shrubby, or emergent vegetation associated with deep, still, or slow-moving water; uses adjacent uplands.	**Low potential to occur.** This species has not been documented in the vicinity of the PSA and the habitat on site is of low quality. This species has been eliminated from the valley floor and populations along the western slope of the Sierra Nevada have been fragmented or eliminated (USFWS 2002a, USFWS 2020a). There are no known occurrences within five miles of the PSA (CDFW 2020).
Spea hammondii	western spadefoot toad (WST)	None/SSC/Covered	Primarily grassland and vernal pools, but also in ephemeral wetlands that persist at least 3 weeks in chaparral, coastal scrub, valley–foothill woodlands, pastures, and other agriculture.	**Moderate potential to occur.** This species has not been documented in the PSA, however this species is known to occur in the Project vicinity, habitat is present, as well as SSHCP modeled aquatic and upland habitat (Sacramento County

Appendix C. Special-Status Wildlife with Potential to Occur

Scientific Name	Common Name	Status (Federal/State/SSHCP)	Habitat	Potential to Occur
				2018). There are known occurrences for this species within five miles of the PSA, located on the west side of Sloughhouse Road, approximately 0.9 miles south of Highway 16 (CDFW 2020, USFWS 2021a). No WST were identified during focused field studies conducted by Dudek in 2021.
Fishes				
Hypomesus transpacificus	Delta smelt	FT/SE/None	Sacramento–San Joaquin Delta; seasonally in Suisun Bay, Carquinez Strait, and San Pablo Bay.	**Not expected to occur.** The PSA is just outside the known range for this species, and habitat for the species is either absent or of low quality. There are no known occurrences within five miles of the PSA (CDFW 2020, USFWS 2021a).
Oncorhynchus mykiss irideus pop. 11	steelhead - Central Valley DPS	FT/None/None	Coastal basins from Redwood Creek south to the Gualala River, inclusive; does not include summer-run steelhead.	**Known to occur.** Known to occur. This species has been documented in the Cosumnes River in the PSA (CDFW 2020). There is Essential Fish Habitat (ESH) for this species located approximately 10 miles northwest of the PSA along the American River in Rancho Cordova (USFWS 2021a).
Reptiles				
Actinemys marmorata	northwestern pond turtle	None/SSC/Covered	Slow-moving permanent or intermittent streams, ponds, small lakes, and reservoirs with emergent basking sites; adjacent uplands used for nesting and during winter.	**Moderate potential to occur.** This species has not been documented in the PSA. However, this species is known to occur in the Project vicinity, and habitat and SSHCP modeled aquatic and upland habitat is present (Sacramento County 2018). There are known occurrences for this species within five miles of the PSA, located at Laguna Creek approximately

Appendix C. Special-Status Wildlife with Potential to Occur

Scientific Name	Common Name	Status (Federal/State/SSHCP)	Habitat	Potential to Occur
				2.7 miles northeast of Clay Station Road (CDFW 2020, USFWS 2021a).
Thamnophis gigas	giant garter snake	FT/ST/Covered	Freshwater marsh habitat and low-gradient streams; also uses canals and irrigation ditches.	**Low potential to occur.** This species has not been documented in the vicinity of the PSA and the habitat on site is of low quality. There are no known occurrences within five miles of the PSA (CDFW 2020, USFWS 2021a).
Birds				
Agelaius tricolor (nesting colony)	tricolored blackbird (TRBL)	BCC/SSC, ST/Covered	Nests near freshwater, emergent wetland with cattails or tules, but also in Himalayan blackberry; forages in grasslands, woodland, and agriculture.	**Known to occur.** Quality suitable habitat is present within the PSA for this species. SSHCP modeled nesting and foraging habitat is located within the western and eastern development sites (Sacramento County 2018). There are several known occurrences of this species within five miles of the PSA, with the nearest approximately 0.40 miles south of Dillard Road and the intersection of Highway 16 (CDFW 2020, USFWs 2021a). This species was documented within the PSA during TRBL focused surveys conducted by Dudek in 2021. No nesting activity was observed during these surveys.
Aquila chrysaetos (nesting and wintering)	golden eagle	BCC, FP/WL/None	Nests and winters in hilly, open/semi-open areas, including shrublands, grasslands, pastures, riparian areas, mountainous canyon land, open desert rimrock terrain; nests in large trees and on cliffs in open areas and forages in open habitats.	**Low potential for occurrence.** The PSA provides suitable foraging habitat for this species. There are no known occurrences of this species within five miles of the PSA (CDFW 2020, USFWS 2021a).

Appendix C. Special-Status Wildlife with Potential to Occur

Scientific Name	Common Name	Status (Federal/State/SSHCP)	Habitat	Potential to Occur
Athene cunicularia (burrow sites and some wintering sites)	burrowing owl (BUOW)	BCC/SSC/Covered	Nests and forages in grassland, open scrub, and agriculture, particularly with ground squirrel burrows.	**Known to occur.** There is suitable habitat for this species in the PSA as well as recorded presence. One BUOW was recorded as occupying an exposed pipe on APN 126-0110-001 during a November 2018 site visit, and presumably the same BUOW was observed the following day within APN 126-0110-003. There is some SSHCP modeled wintering habitat within the western and eastern development sites (Sacramento County 2018). There are additional known occurrences for this species within five miles of the PSA (CDFW 2020, USFWS 2021a). Active burrows and BUOW presence were observed within the PSA during protocol-level surveys conducted by Dudek in 2021.
Buteo swainsoni (nesting)	Swainson's hawk (SWHA)	BCC/ST/Covered	Nests in riparian, open woodland, and savanna, and in isolated large trees; forages in nearby grasslands and agricultural areas such as wheat and alfalfa fields and pasture.	**Known to occur.** There are known occurrences for this species within the PSA (CDFW 2020). One SWHA was observed foraging in the undeveloped portion of APN 126-0110-003 during the November 2018 site visit. The SSHCP shows several SWHA nesting occurrences along the riparian habitat adjacent to the Cosumnes River, including at the northern edge of APN 126-0110-001 (Sacramento County 2018). Suitable nesting habitat is concentrated along the Cosumnes River corridor, and suitable foraging habitat is located throughout the PSA. SWHA were observed foraging and courting within the PSA during protocol-level surveys

Appendix C. Special-Status Wildlife with Potential to Occur

Scientific Name	Common Name	Status (Federal/State/SSHCP)	Habitat	Potential to Occur
				conducted by Dudek in 2021. Observations were concentrated to the western vicinity of the PSA, within the adjacent other lands. No nesting activity was observed during these surveys.
Elanus leucurus (nesting)	white-tailed kite	None/FP/Covered	Nests in woodland, riparian, and individual trees near open lands; forages opportunistically in grassland, meadows, scrubs, agriculture, emergent wetland, savanna, and disturbed lands.	**Known to occur.** There are known occurrences for this species within the PSA (CDFW 2020). The SSHCP shows one white-tailed kite occurrence and modeled nesting habitat along the riparian habitat adjacent to the Cosumnes River at the northern edge of APN 126-0110-001.There is also SSHCP modeled foraging habitat within the site (Sacramento County 2018). This species was observed during reconnaissance-level surveys conducted by Dudek in 2021. No nesting activity was observed during these surveys.
Geothlypis trichas sinuosa	common yellowthroat	BCC/SSC/None	Nests and forages in emergent wetlands including woody swamp, brackish marsh, and freshwater marsh.	**Low potential for occurrence.** The PSA provides suitable foraging habitat for this species. There are no known occurrences of this species within five miles of the PSA (CDFW 2020, USFWS 2021a).
Haliaeetus leucocephalus (nesting and wintering)	bald eagle	FDL, BCC/SE/None	Nests in forested areas adjacent to large bodies of water, including seacoasts, rivers, swamps, large lakes; winters near large bodies of water in lowlands and mountains.	**Known to occur.** Nesting habitat for the species is either absent or of low quality, however foraging habitat for this species is present within the PSA. There are no known occurrences of this species within five miles of the PSA (CDFW 2020, USFWS 2021a). This species was observed in various locations throughout the PSA and

Appendix C. Special-Status Wildlife with Potential to Occur

Scientific Name	Common Name	Status (Federal/State/SSHCP)	Habitat	Potential to Occur
				vicinity during the reconnaissance-level surveys conducted by Dudek in 2021.
Melospiza melodia ("Modesto" population)	song sparrow ("Modesto" population)	None/SSC/None	Nests and forages in emergent freshwater marsh, riparian forest, vegetated irrigation canals and levees, and newly planted valley oak (*Quercus lobata*) restoration sites.	**Not expected to occur.** Habitat for the species is either absent or of low quality. The PSA is outside the range for this sub-population. There are no known occurrences of this species within five miles of the PSA (CDFW 2021a, USFWS 2021a).
Riparia (nesting)	bank swallow	None/ST/None	Nests in riparian, lacustrine, and coastal areas with vertical banks, bluffs, and cliffs with sandy soils; open country and water during migration.	**Moderate potential for occurrence.** The PSA provides suitable migratory habitat for this species but is outside the breeding range for this species. There are known occurrences of this species within five miles of the PSA, located on the Cosumnes River approximately 0.25 miles downstream of Bridge House (CDFW 2020, Cornell Lab 2021, USFWS 2021a).
Insects				
Hydrochara rickseckeri	Ricksecker's water scavenger beetle	None/None/Covered	Aquatic	**Moderate potential to occur.** The PSA is within the known range of the species, and habitat for the species is present. There are several potential vernal pools and SSHCP modeled habitat within the PSA (County of Sacramento et al. 2018). There are known occurrences for this species within 5 miles of the PSA, located at Mather Field Regional Park (CDFW 2020).
Desmocerus californicus dimorphus	valley elderberry	FT/None/Covered	Occurs only in the Central Valley of California, in association with blue	**Known to occur.** There is suitable habitat for this species within the PSA, specifically observed elderberry shrubs (*Sambucus*

Appendix C. Special-Status Wildlife with Potential to Occur

Scientific Name	Common Name	Status (Federal/State/SSHCP)	Habitat	Potential to Occur
	longhorn beetle (VELB)		elderberry (*Sambucus nigra* ssp. *caerulea*).	sp.). In addition, there are known occurrences of this species documented in the western part of the PSA (CDFW 2020, USFWS 2021a). During VELB focused surveys conducted by Dudek in 2021, no presence or ancillary data for this (e.g., bore holes, scat) were observed when assessing elderberry shrubs within the PSA.
Invertebrates				
Branchinecta conservatio	Conservancy fairy shrimp	FE/None/None	Larger, more turbid vernal pools, playa pools.	**Not expected to occur.** The PSA is outside the known range of the species, and habitat for the species is either absent or of low quality. This species is known to occur in 10 populations; the closest two are Yolo Bypass Wildlife Area in Yolo County and Jepson Prairie in Solano County (USFWS 2012, USFWS 2021a).
Branchinecta lynchi	vernal pool fairy shrimp	FT/None/Covered	Vernal pools, seasonally ponded areas within vernal swales, and ephemeral freshwater habitats.	**Low potential to occur.** This species has not been documented in the PSA; however, this species is known to occur in the PSA vicinity. Suitable habitat and SSHCP modeled habitat are present in the PSA, including vernal pools (Sacramento County 2018). There are various Designated Critical Habitat (DCH) areas for this species within five miles of the PSA, with the nearest 1.3 miles southeast of the PSA (USFWS 2021). There are several known occurrences for this species within five miles of the PSA, with the nearest being located within 0.25 miles of the PSA on the south side of Meiss Road,

Appendix C. Special-Status Wildlife with Potential to Occur

Scientific Name	Common Name	Status (Federal/State/SSHCP)	Habitat	Potential to Occur
				approximately 0.75 miles southeast of the Dillard Road intersection (CDFW 2020). Protocol-level wet and dry season large listed branchiopod surveys conducted in 2020 through 2021 yielded no presence.
Branchinecta mesovallensis	mid-valley fairy shrimp	None/None/Covered	Small, shallow, grass-bottomed, ephemeral vernal pools and swales; also, artificial habitats such as railroad toe-drains	**High potential to occur.** This species has not been documented in the PSA, however this species is known to occur in the Project vicinity, suitable habitat is present including vernal pools in the PSA, as well as modeled habitat (County of Sacramento et al. 2018). There are various known occurrences for this species within 5 miles of the PSA, with the nearest being located northwest of the junction at Florin Road and Sinrise Boulevard on the north and south sides of Highway 16 (CDFW 2020).
Lepidurus packardi	vernal pool tadpole shrimp	FE/None/Covered	Ephemeral freshwater habitats including alkaline pools, clay flats, vernal lakes, vernal pools, and vernal swales.	**Known to occur.** This species has historically been documented in the PSA, and suitable habitat and SSHCP modeled habitat is present in the PSA, including vernal pools (Sacramento County 2018). There are various DCH areas for this species within five miles of PSA, with the nearest 1.3 miles southeast of the PSA (USFWS 2021a). This species has known occurrences within the PSA (CDFW 2020). Protocol-level wet and dry season large listed branchiopod surveys conducted in 2020 through 2021 yielded no presence.

Appendix C. Special-Status Wildlife with Potential to Occur

Scientific Name	Common Name	Status (Federal/State/SSHCP)	Habitat	Potential to Occur
Mammals				
Taxidea taxus	American badger	None/SSC/Covered	Dry, open, treeless areas; grasslands, coastal scrub, agriculture, and pastures, especially with friable soils.	**High potential to occur.** This species has not been documented in the PSA. However, this species is known to occur in the Project vicinity, and suitable habitat and SSHCP modeled habitat is present (Sacramento County 2018). There are known occurrences for this species within five miles of the PSA, with one located 0.4 miles east of Sunrise Boulevard in southeast Rancho Cordova (CDFW 2020, USFWS 2021a). A den characteristic of this species was observed within the PSA during the reconnaissance-level surveys conducted by Dudek in 2021.

Sources: CDFW 2020; Cornell Lab 2021; Sacramento County 2018; USFWS 2002a; USFWS 2012; USFWS 2020a

Federal Status

BCC: USFWS Bird of Conservation Concern
FDL: Federally delisted
FE: Federally listed as endangered
FP: Fully Protected
FT: Federally listed as threatened

State Status

FP: fully protected
SSC: Species of Special Concern
ST: State listed as threatened
WL: Watch List
None: No conservation status
None: No conservation status.

SSHCP (South Sacramento Habitat Conservation Plan)

Covered: Currently listed as threatened or endangered under the California Endangered Species Act (ESA) or the federal ESA and covered within the Plan Area by the SSHCP.
None: Not covered under the SSHCP.

Potential for Occurrence Ranks

Known to Occur: The species has been documented in the PSA.
High Potential to Occur: The species has not been documented in the Project site but is known to occur in the vicinity and species habitat is present.
Moderate Potential to Occur: The species has not been documented in the vicinity, but the PSA is within the known range of the species, and habitat for the species is present.
Low Potential to Occur: The species has not been documented in the vicinity and the PSA is within the known range of the species, but habitat for the species is of low quality. is either absent or of low quality.
Not Expected to Occur: The Project site is outside the known range of the species, and habitat for the species is either absent or of low quality.

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Appendix E
Photo Record

Photo 1: Example of an aquatic resource/wetland feature within the Project Study Area (PSA).

Photo 2: Annual grassland and general overview of the PSA.

Photo 3: Annual grassland and general overview of the PSA.

Photo 4: Example of an aquatic resource/pond feature within PSA, adjacent to annual grasslands.

Photo 5: Grading within the PSA during the October/November field surveys.

Photo 6: Example of an aquatic resource/vernal pool feature within PSA, showing the concentric rings of hydrophytic vegetation. Adjacent to annual grassland (i.e., upland habitat).

Photo 7: Upland vegetation within the PSA.

Photo 8: Western vicinity of PSA, agricultural land cover.

Photo 9: PSA and Intersection at Meiss Road.

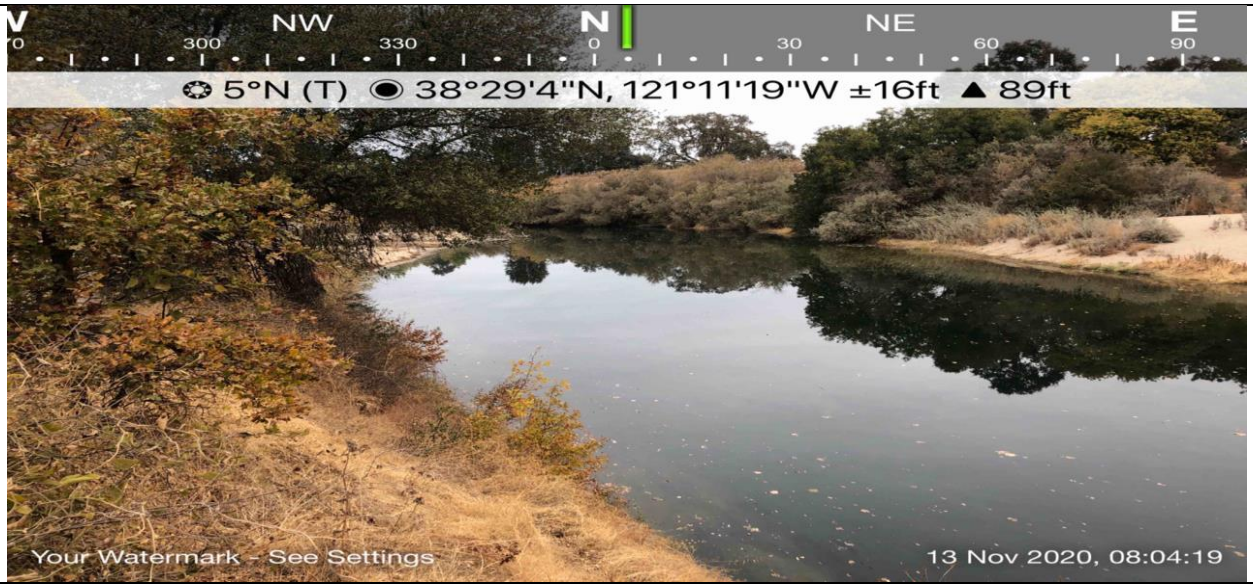

Photo 10: A portion of the Cosumnes River flowing within the western boundary of the PSA.

Photo 11: Annual grassland and seasonal wetland, and general overview of the PSA.

Photo 12: Annual grassland/uplands, and general overview of the PSA. Existing solar facility in the foreground.