3.3. Biological Resources

This section describes the biological resources known or with potential to occur on the project site. The analysis discusses existing environmental conditions, methods used for the assessment, potential environmental impacts of the project, and mitigation measures proposed to reduce significant and potentially significant impacts. This section also presents an overview of federal, state, and local laws and regulations pertaining to the protection of biological resources in Solano County.

The biological resources information in this section was collected from:

- the results of a search of biological resources databases;
- technical reports prepared for previous proposed phases of the Solano 4 Wind Project, and other project sites in the Wind Resource Area (WRA);
- project-specific biological resources studies; and
- a site reconnaissance conducted by AECOM biologists in February 2019.

AECOM reviewed the following databases to develop a list of special-status wildlife, plants, and sensitive natural communities that have the potential to occur in the vicinity of the proposed project:

- California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB) records for the Antioch North, Birds Landing, Jersey Island, and 12 surrounding U.S. Geological Survey (USGS) 7.5-minute quadrangles (CDFW 2019a);
- California Native Plant Society (CNPS) online Inventory of Rare and Endangered Plants of California for the Antioch North, Birds Landing, Jersey Island, and 12 surrounding USGS 7.5-minute quadrangles (CNPS 2019);
- U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation Trust Resource report species list for the project site (USFWS 2019a);
- records for 2018 and 2019 from eBird, an online citizen-based bird observation network (Sullivan et al. 2009); and
- final designated critical habitat as mapped by the USFWS Environmental Conservation Online System (USFWS 2019b).

AECOM also reviewed data from previous studies, reports, and surveys conducted in the WRA and surrounding areas, along with the following other information sources for known biological resources in the area:

- *SMUD Solano Wind Project, Phase 3 Draft Environmental Impact Report* (SMUD 2007);

- *Habitat Assessment for the California Tiger Salamander* (Ambystoma californiense), *California Red-Legged Frog* (Rana draytonii), *and Giant Gartersnake* (Thamnophis gigas) *on the Collinsville Wind Project Site, Solano County, California* (Rana Resources 2009a);
- *Revised Draft Addendum Habitat Assessment for the California Tiger Salamander* (*Ambystoma californiense*), *California Red-Legged Frog* (*Rana draytonii*), *and Giant Gartersnake* (*Thamnophis gigas*) *on the Proposed Tie-In Transmission Line at the Collinsville Wind Project Site, Solano County, California* (Rana Resource 2009b);
- *Second Addendum Habitat Assessment for the California Tiger Salamander* (*Ambystoma californiense*), *California Red-Legged Frog* (*Rana draytonii*), *and Giant Gartersnake* (*Thamnophis gigas*) *on the Proposed Tie-In Transmission Line Substation at the Collinsville Wind Project Site, Solano County, California* (Rana Resources 2010);
- *Avian Use Study for the Collinsville Wind Power Project, Solano County, California* (Curry & Kerlinger 2011);
- *Bald and Golden Eagle Survey Report Memo for Proposed Collinsville Wind Project, Solano County, California* (GANDA 2011); and
- *Avian and Bat Protection Plan for the Proposed Collinsville Wind Project* (ICF International and H.T. Harvey & Associates 2011).

Between 2016 and 2019, numerous project-specific biological resources surveys were completed in the proposed project subareas, Solano 4 West and Solano 4 East, and along the electrical transmission collection lines that run northward and westward, respectively, from each subarea to the centrally located Russell Substation (Exhibit 2-2 in Chapter 2, "Project Description"). Area West Environmental, Inc. (AWE) conducted agency coordination and field surveys in the Solano 4 West subarea and along the associated collection line in 2016 and 2017 (AWE 2017a, 2017b, 2017c, 2017d). Also in 2017, Althouse and Meade Biological and Environmental Services conducted invasive-species monitoring in both subareas (Althouse and Meade 2017). In 2018, Estep Environmental Consulting (2018a, 2018b) and AECOM (2018a, 2018b, 2018c, 2018d, 2019a, 2019b) conducted field surveys for remaining portions of Solano 4 West and Solano 4 East and the associated collection lines.

Appendix C presents the technical studies prepared by AECOM and Estep Environmental Consulting. Combined, the reports listed below represent a thorough and complete biological analysis of the entire proposed project area.

- Solano 4 West subarea and collection line:
    - *Eagle Survey Report* (AWE 2017a)
    - *Preliminary Jurisdictional Determination* (AWE 2017b)

  - *Protocol-Level Special-status Plant Surveys Conducted for the Solano Phase 4 Wind Project* (AWE 2017c)
  - *Habitat Assessment and Vegetation Mapping Summary Report* (AWE 2017d)

- Solano 4 West and Solano 4 East subareas, excluding collection lines:
  - *Invasive Species Monitoring Report for Solano Wind Farm* (Althouse and Meade 2017)

- Solano 4 West, Solano 4 East, and all collection lines:
  - *Burrowing Owl Habitat Assessment for the Solano 4 Wind Project* (AECOM 2018a)
  - *Sacramento Municipal Utility District Solano 4 Wind—California Tiger Salamander Habitat Assessment* (AECOM 2018b)
  - *California Red-legged Frog Habitat Assessment for the Solano 4 Wind Project* (AECOM 2018c)
  - *Giant Garter Snake Habitat Assessment for the Solano 4 Project* (AECOM 2018d)
  - *Solano 4 Wind Project Eagle Survey Report* (Estep Environmental Consulting 2018a)
  - *Solano 4 Wind Project Avian Use Report* (Estep Environmental Consulting 2018b)

- Solano 4 West, Solano 4 East, and collection line from Solano 4 East to the Russell Substation:
  - *Sacramento Municipal Utility District Solano Wind 4 Project Botanical Survey Report* (AECOM 2019a)

- Solano 4 East and collection line:
  - *Preliminary Delineation of Waters of the United States, Including Wetlands—SMUD Solano 4 Wind Project* (AECOM 2019b)

3.3.1. Regulatory Setting

Federal

Federal Endangered Species Act

The federal Endangered Species Act (ESA) of 1973 and subsequent amendments govern the conservation of endangered and threatened species and the ecosystems on which they depend. USFWS and the National Marine Fisheries Service (NMFS) oversee the ESA. USFWS has jurisdiction over plants, wildlife, and resident fish and NMFS has jurisdiction over anadromous fish and marine fish and mammals. ESA Section 7 requires federal agencies to consult with USFWS and NMFS if they determine that a proposed project may affect a listed species or destroy or adversely modify designated critical habitat. If the action may result in take of listed species or adverse modification of critical habitat, the lead federal agency must obtain an incidental take authorization or a letter of concurrence stating that the project is not likely to adversely affect federally listed species. Section 7 requirements do not apply to nonfederal actions.

Projects that do not involve a federal action, but that would adversely affect (result in take of) a federally listed species, must comply with ESA Section 10. To comply with Section 10, the project proponent must prepare a habitat conservation plan, which results in the issuance of an incidental take permit by USFWS and/or NMFS.

ESA Section 9 prohibits take of any fish or wildlife species listed as endangered, including the destruction of habitat that prevents the species' recovery. "Take" is defined as any action or attempt to hunt, harm, harass, pursue, shoot, wound, capture, kill, trap, or collect a species. Section 9 prohibitions also apply to threatened species unless a special rule governing take was defined at the time the species became listed.

The take prohibition in ESA Section 9 applies only to fish and wildlife species. However, Section 9 also prohibits the unlawful removal and possession, or malicious damage or destruction, of any endangered plant from federal land. Section 9 prohibits acts to remove, cut, dig up, damage, or destroy an endangered plant species in nonfederal areas in knowing violation of any state law or in the course of criminal trespass. Candidate species and species that are proposed for or under petition for listing receive no protection under Section 9.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 USC 703 et seq.), first enacted in 1918, provides for the protection of international migratory birds and authorizes the Secretary of the Interior to regulate the taking of migratory birds. The MBTA states that it is unlawful, except as permitted under MBTA, to pursue, take, or kill any migratory bird, or any part, nest, or egg of any such bird. The current list of species protected by the MBTA can be found in Title 50, Section 10.13 of the Code of Federal Regulations (50 CFR 10.13). The list includes nearly all birds native to the United States.

The U.S. Court of Appeals for the Ninth Circuit, the controlling federal appellate court for California, has held that habitat modification that harms migratory birds "does not 'take' them within the meaning of the MBTA" *Seattle Audubon Soc. v. Evans,* 952 F.2d 297, 303 (1981).

Additionally, in December 2017, the U.S. Department of the Interior's Office of the Solicitor issued a revised legal interpretation (Opinion M-37050) of the MBTA's prohibition on the take of migratory bird species. Opinion M-37050 concludes that "consistent with the text, history, and purpose of the MBTA, the statute's prohibitions on pursuing, hunting, taking, capturing, killing, or attempting to do the same apply only to affirmative actions that have as their purpose the taking or killing of migratory birds, their nests, or their eggs" (DOI 2017). According to Opinion M-37050, take of a migratory bird, its nest, or eggs that is incidental to another lawful activity does not violate the MBTA, and the MBTA's criminal provisions do not apply to those activities. Opinion M-37050 may affect how MBTA is interpreted but does not legally change the regulation itself.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act affords additional legal protection to bald eagles and golden eagles. This law prohibits the take, sale, purchase, barter, offer of sale, purchase, or barter, transport, export or import, at any time or in any manner of any bald or golden eagle, alive or dead, or any part, nest, or egg thereof (16 U.S.C 668–668d). The Bald and Golden Eagle Protection Act also defines "take" to include "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb," and includes criminal and civil penalties for violating the statute. USFWS further defines the term "disturb" as agitating or bothering an eagle to a degree that causes or is likely to cause injury, or either a decrease in productivity or nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior.

Clean Water Act

Section 404

Section 404 of the Clean Water Act (CWA) requires project proponents to obtain a permit from the U.S. Army Corps of Engineers (USACE) before performing any activity involving a discharge of dredged or fill material into waters of the United States. Waters of the United States include:

- navigable waters of the United States,
- interstate waters,
- all other waters where the use or degradation or destruction of the waters could affect interstate or foreign commerce,
- tributaries to any of these waters, and

- wetlands that meet any of these criteria or that are adjacent to any of these waters or their tributaries.

Many surface waters and wetlands in California meet the criteria for waters of the United States.

Section 402

CWA Section 402 regulates construction-related stormwater discharges to surface waters through the National Pollutant Discharge Elimination System program, which is administered by the U.S. Environmental Protection Agency. In California, the State Water Resources Control Board is authorized by the U.S. Environmental Protection Agency to oversee the program through the regional water quality control boards (RWQCBs)—in this case, the Central Valley (Region 5) RWQCB.

Section 401

Under CWA Section 401(a)(1), the applicant for a federal license or permit to conduct an activity that may result in a discharge into waters of the United States must provide the federal licensing or permitting agency with a certification that any such discharge will not violate state water quality standards. The RWQCBs administer the Section 401 program to prescribe measures for projects that are necessary to avoid, minimize, and mitigate adverse effects on water quality and ecosystems.

Plant Protection Act of 2000

Some nonnative plant species are officially categorized as "noxious weeds" because they are highly invasive or interfere with an area's management objectives, or both. Both the U.S. and California governments maintain lists of plants that are considered threats to the well-being of the nation or the state. The Federal Noxious Weed Act of 1974, as amended (7 U.S.C 2801 et seq.; 88 Stat. 2148), established a federal program to control the spread of noxious weeds. The act was superseded by the federal Plant Protection Act of 2000 (7 U.S.C 7701 et seq.; 114 Stat. 438), which consolidated and modernized all major statutes pertaining to plant protection and quarantine (e.g., Federal Noxious Weed Act and Plant Quarantine Act).

The Plant Protection Act revised the original definition of a "noxious weed" as listed in the Federal Noxious Weed Act to include:

> any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment.

Under the Plant Protection Act, the Secretary of Agriculture was authorized to designate plants as "noxious weeds" by regulation, and to prohibit or restrict all such weeds from

entering the United States or moving through interstate commerce. The secretary was also giv1en authority to inspect, seize, and destroy products and to quarantine areas, if necessary, to prevent the spread of such weeds. The Secretary of Agriculture was also authorized to cooperate with other federal, state, and local agencies, farmers' associations, and private individuals in measures to control, eradicate, or prevent or retard the spread of such weeds.

U.S. Fish and Wildlife Service Guidance

Land-Based Wind Energy Guidelines

On March 23, 2012, USFWS issued the voluntary *Land Based Wind Energy Guidelines*, which replaced interim voluntary guidance published by USFWS in 2003. The guidelines discuss various risks of wind energy projects to species of concern (e.g., migratory birds, bats, and bald and golden eagles), including:

- collisions with wind turbines and associated infrastructure;
- loss and degradation of habitat from turbines and infrastructure;
- fragmentation of large habitat blocks into smaller segments that may not support sensitive species;
- displacement and behavioral changes; and
- indirect effects such as increased predator populations or introduction of invasive plants.

The USFWS guidelines use a tiered approach for assessing potential adverse effects on species of concern and their habitats. This approach provides an iterative process for quantifying possible risks of proposed wind energy projects to species of concern and their habitats, and for evaluating those risks to make siting, construction, and operational decisions.

In the *Land Based Wind Energy Guidelines*, USFWS recommends that developers prepare written records of their actions to avoid, minimize, and compensate for potential adverse impacts. In the past, USFWS referred to these records as avian and bat protection plans. More recently, however, avian and bat protection plans have been used for transmission projects and less for other types of development. For this reason, USFWS introduced a distinct concept for wind energy projects, called the "bird and bat conservation strategy."

Typically, a project-specific bird and bat conservation strategy explains the analyses, studies, and reasoning that support progressing from one tier to the next in the tiered approach. A wind energy project–specific bird and bat conservation strategy is an example of a document or compilation of documents describing the steps a developer

could take or has taken to apply the USFWS guidelines to mitigate adverse impacts and address the developer's intended postconstruction monitoring efforts.

A developer may prepare a bird and bat conservation strategy in stages, over time, as analysis and studies are undertaken for each tier. The strategy also addresses postconstruction monitoring efforts for mortality and habitat effects, and may use many of the components suggested in the *Suggested Practices for Avian Protection on Power Lines* (APLIC 2006).

Eagle Conservation Plan Guidance

The eagle conservation plan guidance issued by USFWS in April 2013 supplements the USFWS *Land Based Wind Energy Guidelines.* This guidance describes recommended actions for complying with the requirements of the Bald and Golden Eagle Protection Act for an eagle take permit (50 CFR 22.26 and 22.27). The guidance provides a national framework for assessing and mitigating risks specific to eagles through development of eagle conservation plans and issuance of programmatic incidental takes of eagles at wind turbine facilities.

Compliance with the eagle conservation plan guidance is voluntary. Such compliance is intended to help project operators comply with regulatory requirements and avoid unintentional take of eagles at wind energy facilities. It also assists the wind energy industry in providing the biological data needed to support permit applications for facilities that may pose a risk to eagles.

State

California Endangered Species Act

The California Endangered Species Act (CESA) (California Fish and Game Code Section 2050 et seq.) establishes state policy to conserve, protect, restore, and enhance threatened or endangered species and their habitats. The CESA outlines the state policy for state agencies to not approve projects that would take threatened or endangered species if that take would jeopardize the continued existence of threatened or endangered species, if reasonable and prudent alternatives are available that would avoid jeopardy. Take "means hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill" (California Fish and Game Code, Section 86), but does not include harm or habitat modification.

Two state-listed species, Swainson's hawk and tricolored blackbird, have the potential to occur on the project site and may be affected by the project. If the project cannot avoid take, a Section 2081 permit would be required.

California Fish and Game Code

Several sections of the California Fish and Game Code apply to the project, as described below.

Fully Protected Species

Sections 3511, 4700, 5050, and 5515 of the California Fish and Game Code describe protection of fully protected species. These statutes prohibit take or possession of fully protected species and no statutes authorize incidental take of fully protected species. CDFW enforces this prohibition against nonfederal agencies and private parties.

Section 1602—Streambed Alteration

Diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California that adversely affect fish and wildlife resources are subject to regulation by CDFW under Section 1602 of the California Fish and Game Code. Under Section 1602, it is unlawful for any person, governmental agency, or public utility to do the following without first notifying CDFW:

- substantially divert or obstruct the natural flow of, or substantially change or use any material from, the bed, channel, or bank of any river, stream, or lake; or
- deposit or dispose of debris, waste, or other material where it may pass into any river, stream, or lake.

A "stream" is defined as a body of water that flows at least periodically or intermittently through a bed or channel that has banks and supports fish or other aquatic life. This definition includes watercourses with a surface or subsurface flow that supports or has supported riparian vegetation. CDFW's asserted jurisdiction in altered or artificial waterways is based on the value of those waterways to fish and wildlife. A CDFW streambed alteration agreement is normally required for any project that would result in an impact on a river, stream, or lake unless CDFW fails to respond to the notice in a timely manner.

Sections 3503 and 3503.5—Protection of Bird Nests and Raptors

Section 3503 of the California Fish and Game Code states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 specifically states that it is unlawful to take, possess, or destroy any raptors (i.e., species in the orders Falconiformes and Strigiformes), including their nests or eggs. Typical violations of these codes include destruction of active nests resulting from the removal of vegetation in which the nests are located. Violation of Section 3503.5 could also include failure of active raptor nests resulting from disturbance of nesting pairs by nearby project construction. This statute does not provide for the issuance of any type of incidental take permit.

Section 3513—Protection of Migratory Birds

This section protects California's migratory birds by making it unlawful to take or possess any migratory nongame bird as designated by the federal MBTA, except as authorized in a regulation adopted by the federal government under the MBTA.

Section 3800(a)—Protection of Nongame Birds

All birds occurring in California that are not resident game birds, migratory game birds, or fully protected birds are nongame birds. It is unlawful to take any nongame bird except as provided in Section 3800(a) of the California Fish and Game Code or in accordance with regulation of the California Fish and Game Commission or, when relating to a mining operation, a mitigation plan approved by CDFW.

Section 4150—Protection of Nongame Mammals

Bats are nongame mammals under California Fish and Game Code Section 4150. As such, bats are protected from being taken or possessed without a permit (Fish and Game Code Section 4152). "Take" means to hunt, pursue, catch, capture, or kill, or attempt any of these (Section 86). The State of California may pursue civil damages for violation of these sections.

Porter-Cologne Water Quality Control Act

Under the Porter-Cologne Water Quality Control Act (Porter-Cologne Act), waters of the state fall under the jurisdiction of the appropriate RWQCB. The RWQCB must prepare and periodically update water quality control plans, also known as basin plans. Each basin plan establishes numerical or narrative water quality objectives to protect established beneficial uses, which include wildlife, fisheries, and their habitats. Projects that affect wetlands or waters of the state, including groundwater, must meet the discharge requirements of the RWQCB, which may be issued in addition to a water quality certification or waiver under Section 401 of the CWA.

California Noxious Weed Laws and Regulations (California Food and Agriculture Code)

The California Department of Food and Agriculture (CDFA) lists noxious weeds for the State of California and implements various management and eradication efforts, as defined in four main sections of the California Food and Agriculture Code. Section 5004 defines a "noxious" weed as:

> any species of plant that is, or is liable to be, troublesome, aggressive, intrusive, detrimental, or destructive to agriculture, silviculture, or important native species, and difficult to control or eradicate, which the director, by regulation, designates to be a noxious weed.

Sections 7201 et seq. authorize CDFA to consult with other state and federal agencies responsible for forest management and protection of native species, to declare an area of the state as "weed free." Noxious weeds are prohibited from entering these areas.

California Energy Commission and California Department of Fish and Game Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development

The voluntary guidelines described in this 2007 final report provide information to help reduce impacts on birds and bats from new development or repowering of wind energy projects in California. The guidelines include recommendations for:

- conducting preliminary screening of proposed wind energy project sites;
- creating a pre-permitting study design and methods;
- assessing direct, indirect, and cumulative impacts on birds and bats in accordance with federal and state laws;
- developing avoidance and minimization measures;
- establishing appropriate compensatory mitigation; and
- using appropriate monitoring, analysis, and reporting methods during postconstruction operations.

Local

Solano County General Plan

The Resource Conservation and Open Space and Land Use and Circulation elements of the *Solano County General Plan* establish policies to protect marsh and wetland habitats.

The *Solano County General Plan* Conservation Element and Open Space Element (Solano County 2008) include the following policies that may be applicable to resources affected by the project.

<u>Biological Resources Policies</u>

- **Policy RS.P-1:** Protect and enhance the county's natural habitats and diverse plant and animal communities, particularly occurrences of special-status species, wetlands, sensitive natural communities, and habitat connections.
- **Policy RS.P-2:** Manage the habitat found in natural areas and ensure its ecological health and ability to sustain diverse flora and fauna.
- **Policy RS.P-3:** Focus conservation and protection efforts on high-priority habitat areas depicted in Figure RS-1 [of the *Solano County General Plan*].

- **Policy RS.P-4:** Together with property owners and federal and state agencies, identify feasible and economically viable methods of protecting and enhancing natural habitats and biological resources.
- **Policy RS.P-5:** Protect and enhance wildlife movement corridors to ensure the health and long-term survival of local animal and plant populations. Preserve contiguous habitat areas to increase habitat value and to lower land management costs.
- **Policy RS.P-6:** Protect oak woodlands and heritage trees and encourage the planting of native tree species in new developments and along road rights-of-way.

General Marsh-Delta Policies

- **Policy RS.P-7:** Preserve and enhance the diversity of habitats in marshes, delta to maintain these unique wildlife resources.
- **Policy RS.P-8:** Protect marsh waterways, managed wetlands, tidal marshes, seasonal marshes, and lowland and grasslands because they are critical habitats for marsh-related wildlife and are essential to the integrity of the marshes.
- **Policy RS.P-9:** Encourage restoration of historic marshes to wetland status, either as tidal marshes or managed wetlands. When managed wetlands are no longer used for waterfowl hunting, restore them as tidal marshes.

Solano County Wind Turbine Siting Plan and Environmental Impact Report

The *Solano County Wind Turbine Siting Plan and Environmental Impact Report* (Solano County 1985) recommends siting wind turbine generators at least 100 feet from sensitive biological communities; burying transmission lines; minimizing clearing and grading; and revegetating with native plants.

Solano County Water Agency Solano Multispecies Habitat Conservation Plan

In October 2012, Solano County Water Agency published a draft of the *Solano Multispecies Habitat Conservation Plan* (HCP) (SCWA 2012), but the HCP has not yet been adopted. The draft HCP establishes a framework for complying with federal and state endangered species regulations while accommodating future urban growth, infrastructure development, and ongoing operations and maintenance for flood control, irrigation facilities, and other public infrastructure undertaken by or under the permitting authority/control of the plan participants in Solano County over the next 30 years (SCWA 2012).

A total of 36 species are proposed to be covered under the HCP. The WRA is not included as part of the HCP covered activity zones, nor is wind energy development an HCP covered activity (SCWA 2012).

Solano County Grading, Drainage, Land Leveling, and Erosion Control Ordinance

Except as exempted in Sections 31-21 and 31-22, the Solano County Grading, Drainage, Land Leveling, and Erosion Control Ordinance, no person shall commence or perform any of the following acts without having first obtained a grading and drainage permit from the Resource Management Department:

- changing the topography of any land in a manner that alters or interferes with existing water drainage;
- filling, closing, or diverting any stormwater drainage channel or watercourse; or
- grading, filling, excavating, or clearing vegetation for any purpose.

Section 31-16 of the ordinance states that work performed shall not occur at a time outside of the construction season, defined as April 15–October 15, without the written approval of the Director. Section 31-30, General Design Principles and Standards, includes basic design principles and standards that apply to all projects requiring building, grading, and development permits to minimize adverse effects on existing terrain and minimize erosion potential. Control measures apply to all aspects of the proposed grading and are intended to be operational during all stages of development.

The following basic design principles and standards serve as minimum guidelines for grading plans and erosion, sediment, and runoff control plans:

(a) Stripping or burning of vegetation, tilling, grading, or other soil disturbance shall be done in a manner which will minimize soil erosion.

(b) Existing natural vegetation shall be retained, protected, and supplemented wherever feasible. Site development shall be accomplished so that existing trees are preserved whenever possible and practical.

(c) Exposure of soil to erosion by removal of vegetation shall be limited to the smallest area practical and for the shortest time practical. Soil exposure shall not exceed an area in which development will be completed during a single construction season to ensure that soils are stabilized and vegetation is established by the end of the construction season. Grading and drainage permits will be withheld during this time; however, extensions to or restrictions of this time period may be established by the Director on a case-by-case basis.

(d) Facilities shall be constructed to retain sediment produced on-site.

(e) Sediment basins, sediment traps, diversions, or similar required measures shall be installed well in advance of any clearing or grading and maintained throughout any such operations until removal is authorized by the Director. The design of such structures should account for abating potential mosquito problems.

(f) Temporary and final seeding, mulching, or other suitable stabilization measures shall be used to protect exposed erodible areas during development and by the end of the construction season (April 15–October 15).

(g) Permanent control structures and final vegetation should be installed as soon as practical in the development and a long-range maintenance plan developed and adhered to.

(h) The plan shall identify mitigation measures that result in no net increase in peak runoff due to the development.

(i) Development that creates impervious surfaces in excess of 5,000 square feet must ensure that surface runoff rates exceeding predevelopment levels shall be retarded by appropriate structural and vegetative measures to be maintained on an annual basis.

(j) Runoff water from impervious surface areas resulting from grading activities shall be treated with biofiltration or another approved alternative before leaving the property or entering any waters of the state or federal government.

(k) Slopes, both cut and fill, shall not be steeper than two horizontal to one vertical (2:1) unless a thorough geological and engineering analysis indicates that steeper slopes are safe and appropriate erosion control measures are specified.

(l) Cuts and fills shall not encroach upon natural watercourses, their floodplains, or constructed channels in a manner so as to adversely affect other properties.

(m) Disposal of cleared vegetation and excavated materials shall be done in a manner which reduces the risk of erosion and shall strictly conform to the provisions of the approved grading permit. Topsoil shall be conserved for reuse in revegetation of disturbed areas whenever possible.

(n) Proposed development and roadway alignments shall be done in accordance with the county Road Improvement Standards and fitted to the topography and soils to minimize erosion.

(o) Waterways shall be designed to avoid erosion as much as practical. Wide channels should be constructed with flat side slopes surfaces and the channel and slopes should be lined with grass or other appropriate vegetation. Every effort must be made to preserve natural channels and drainage ways.

(p) Except as limited by Solano County Code Section 28-51, Watershed and Conservation (W) District, filling, grading, excavating, or obstructing the bed or banks of a watercourse and removal of the riparian vegetation shall be allowed only where no reasonable alternative is available and, where allowed, shall be limited to the minimum amount necessary. In the Suisun Marsh, stream

modification should be permitted only if necessary to ensure the protection of life or existing structures from floods, and only the minimum amount of modification necessary shall be allowed in such cases.

(q) Cuts and fills are not allowed within 5 feet of property boundaries unless a retaining wall is placed. The height of the wall must not exceed its distance from the property line. Exemptions are allowed with the approval of adjoining land owner(s) and county staff.

As discussed in Section 1.2, construction of facilities for the production of electrical energy by a local agency like SMUD is exempt from County zoning and building ordinances (Government Code ARTICLE 5. Regulation of Local Agencies by Counties and Cities [53090 - 53097.5]).

Solano Weed Management Area

The Solano County Weed Management Area (SCWMA) was formed in 2001 to coordinate activities and education necessary for the prevention and control of noxious and invasive weeds in Solano County. The SCWMA emphasizes preventing and controlling noxious weeds through education and promoting healthy and sustainable ecosystems in Solano County. Since 2004, the SCWMA has worked with public and private partners to implement mapping and control of noxious weeds, including targeted projects and programs to control artichoke thistle, tree of heaven, fig, English ivy, Himalayan blackberry, perennial pepperweed, arundo, and red sesbania. In 2010, the SCWMA carried out herbicide treatment of artichoke thistle in the Montezuma Hills area through a cooperative effort on SMUD property and private farmland (Solano County 2019).

3.3.2. Environmental Setting

The project site is in the Sacramento Valley portion of the Great Central Valley subdivision of the California Floristic Province (Baldwin et al. 2012) and in the Mediterranean California Subregion (Land Resource Region) specified by the U.S. Natural Resources Conservation Service. This subregion includes the San Francisco Bay area and the Sacramento–San Joaquin Delta (Delta). The climate is hot and subhumid, with a mean annual precipitation of 16–20 inches falling entirely as rain during the winter and spring months. The project area is characterized by the low, rolling Montezuma Hills and bordered by the Sacramento River to the south.

Surrounding land uses consist of existing wind energy resource development, including Phases 1, 2, and 3 of the SMUD Solano 4 Wind Project, intermixed with cattle grazing and field cropping. The landscape is characterized by rolling hills vegetated with nonnative annual grassland and planted wheat fields, interspersed with seasonal wetlands, swales, and intermittent drainages. In addition, developed and disturbed sites are common and include paved and graveled roads, firebreaks, parking areas, operations facilities, substations, and areas previously used for construction staging.

The topography of the project site is characterized by low undulating hills that crest at elevations between 150 and 250 feet above mean sea level, separated by narrow valleys and intermittent drainages. The study area is primarily within the boundary of the Lower Sacramento watershed (USGS Hydrologic Unit Code 180201630703, Threemile Slough–Sacramento River). A small segment of the western end, at the Russell Substation, overlays the Suisun Bay watershed (Hydrologic Unit Code 180500010106, Lucol Hollow–Frontal Suisun Bay Estuaries). The site's hydrology results from direct precipitation, which drains via a network of intermittent drainages and seasonal wetland swales that direct overland flows in an easterly and southerly direction toward the Sacramento River channel.

Vegetation in the area is characterized by pasture and grain crops. Vegetation communities identified in the study area consist primarily of agricultural land; grazed nonnative annual grasslands; and patches of ruderal vegetation along roadsides, wind turbines, and other facilities. Sporadic seasonal wetlands and a single willow thicket are present along intermittent drainages and swales.

Land Cover Types

AECOM biologists mapped land cover types on the project site based on a review of current aerial imagery and biological resources field surveys conducted for the project. These surveys include delineations of waters of the United States in Solano 4 West (AWE 2017b) and Solano 4 East (AECOM 2019b), botanical surveys (AWE 2017c; AECOM 2019a), and a habitat assessment (AWE 2017d). The predominant land cover type on the project site is grazed annual grassland. Nine land cover types were identified on the project site, as described below. The acreage of each land cover type is summarized in Table 3.3-1 and depicted in Exhibit 3.3-1.

Table 3.3-1 Land Cover Types on the Project Site

Land Cover Type	Acres on the Project Site
Grazed annual grassland	1,673.49
Annual grassland	587.86
Agricultural	31.16
Riparian	0.11
Urban	1.13
Estuarine and marine wetland	62.08
Freshwater wetlands	96.57
Tidal marsh upland	93.86
Tidal/brackish wetlands	2.40
TOTAL	**2,548.66**

Source: Data compiled by AECOM in 2019 based on geographical data from SMUD and results from biological resources field surveys (AWE 2017b, 2017c, 2017d; AECOM 2019a, 2019b)

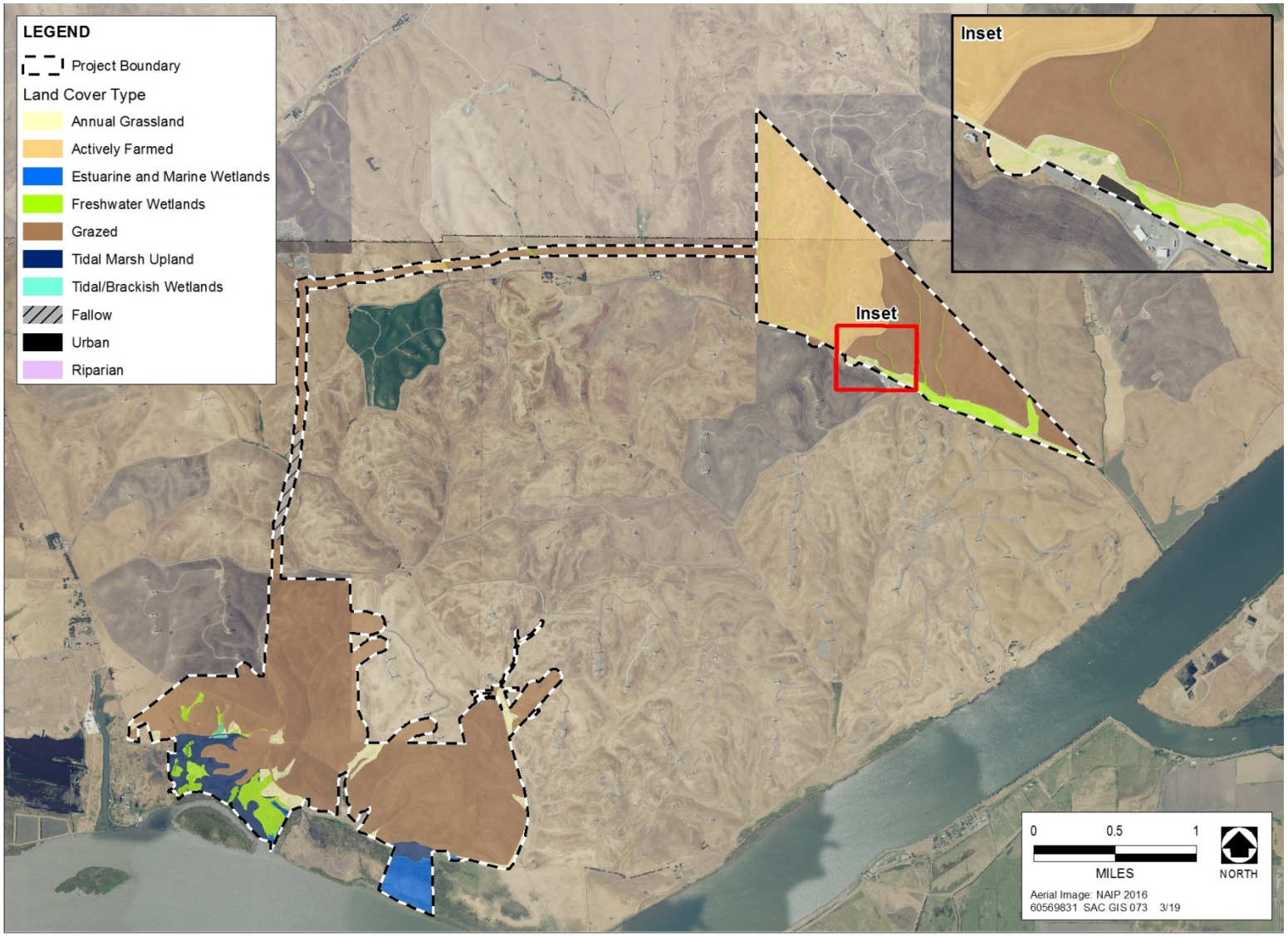


Exhibit 3.3-1 Project Site Land Cover

Grazed Annual Grassland

Grazed annual grasslands are the predominant land cover type on the project site (approximately 1,673.5 acres), supporting a variety of nonnative grasses as well as native and nonnative forbs. Typically, the grazed annual grasslands on the project site are highly disturbed by cattle, resulting in low-profile vegetation and no thatch layer.

The grazed annual grassland vegetation community is dominated by nonnative grass species such as wild oats (*Avena barbata*), ripgut brome (*Bromus diandrus*), soft chess (*B. hordeaceus*), and Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*) (AWE 2017d; AECOM 2019a). Scattered native and nonnative forbs also grow among grasses. Common forbs include blow wives (*Achyrachaena mollis*), Mediterranean linseed (*Bellardia trixago*), and scarlet pimpernel (*Lysimachia arvensis*) (AECOM 2019a).

Agricultural

Agricultural land (approximately 31.2 acres) consists of areas of active dryland farming. Agricultural practices generally follow a 1- to 3-year crop rotation cycle (i.e., wheat [*Triticum asestivum*], barley [*Hordeum vulgare*], and oats [*Avena sativa*]), with predominantly sheep grazing and fallow years following planting. The fields that are dryland farmed are densely planted, and little to no other vegetation is present (AECOM 2019a).

Annual Grassland

Annual grassland on the project site comprises approximately 588 acres, including 25 acres of fallow agricultural fields. Annual grasslands are interspersed within the agricultural vegetation community, occurring on hillslopes and draws that are too steep to cultivate. Because they receive less grazing pressure and little to no ground disturbance (i.e., disking), annual grasslands outside of tilled areas generally consist of taller vegetation than grazed annual grassland.

The annual grassland vegetation community is dominated by nonnative annual grasses and forbs, including wild oats, ripgut brome, soft chess, short pod mustard (*Hirschfeldia incana*), and prickly lettuce (*Lactuca serriola*) (AWE 2017d; AECOM 2019a). Fallow agricultural lands tend to be dominated by soft chess brome, wild oats, and hare barley with scattered patches of native forbs including owl's clover (*Castilleja exserta*), annual lupine (*Lupinus bicolor*), and fiddleneck (*Amsinckia intermedia, A. menziesii*) (AWE 2017d). Nonnative annual forbs are also prevalent in these areas and include yellow starthistle (*Centaurea solstialis*), filarees (*Erodium* sp.), and clovers (*Trifolium* sp.) (AWE 2017d).

Riparian

Drainages in the study area support very little riparian vegetation (approximately 0.11 acre) (AECOM 2019a). Riparian vegetation on the project site consists of a single

small thicket of arroyo willow (*Salix lasiolepis*) in a swale along the southeastern edge of the Solano 4 East subarea. In addition, a small patch of tamarisk (*Tamarix* sp.) was mapped by AECOM botanists in a drainage outside of the project boundaries, south of the Solano 4 East subarea's homerun corridor.

Urban

Urban land cover (approximately 1.13 acre) is characterized by developments such as roads, wind turbines, residential areas, and ornamental plantings within the project area (AWE 2017d). While most of these features (roads, turbines, and buildings) lack vegetation, areas surrounding residential buildings in the southwestern corner and eastern edge of the project area support ornamental vegetation dominated by eucalyptus trees (*Eucalyptus* sp.) and Peruvian pepper trees (*Schinus molle*) (AWE 2017d).

Roadsides and graded areas that surround existing wind turbines and the Russell Substation are colonized by weedy species, with minimal grass cover, comprising a ruderal vegetation community. Dominant ruderal species include black mustard (*Brassica nigra*), fennel (*Foeniculum vulgare*), and bristly ox-tongue (*Helminthotheca echioides*) (AECOM 2019a).

Freshwater Wetlands

Freshwater wetlands in the project area include seasonal wetlands, swales, and drainages as well as freshwater emergent marsh and open water, totaling approximately 96.57 acres (AWE 2017d). Please note that "freshwater wetlands" in this context refers to a mapped *habitat type* and does not indicate wetlands that have been delineated using the standard USACE methodology (Environmental Laboratory 1987; USACE 2008). Marshes exhibit a vegetation community dominated by California bulrush (*Schoenoplectus californicus*), hardstem bulrush (*S. acutus*), and cattail (*Typha angustifolia, T. domingensis, T. latifolia*) (AWE 2017d; AECOM 2019a). Seasonal wetlands, swales, and drainages typically dry up rapidly with the onset of summer. Larger seasonal wetlands at the bases of hillsides along the southern portion of Solano 4 East and southwestern portion of Solano 4 West also contain tules and cattails, with smaller areas of perennial rye grass (*Festuca perrenis*) (AECOM 2019a). Smaller seasonal wetlands and swales throughout the project site are composed primarily of perennial rye grass. Associated species in seasonal wetlands include Mediterranean barley, Mexican rush (*Juncus mexicanus*), and hyssop loosestrife (*Lythrum hyssopifolia*) (AECOM 2019a).

Estuarine and Marine Wetland

Estuarine and marine wetlands (approximately 62.1 acres) occur within the southern edge of the Solano 4 West subarea, adjacent to the Sacramento River (AWE 2017d). This area is tidally influenced and is inundated for most of the year.

Tidal Marsh Upland

Tidal marsh upland habitat (approximately 93.9 acres) occurs in the southern portion of the Solano 4 West subarea (AWE 2017d). This area is a transitional zone characterized by expansive, gently sloping land between grassland uplands and estuarine and marine wetlands along the Sacramento River, resulting in a vegetation community that is a mixture of upland and wetland species.

Tidal/Brackish Wetlands

Approximately 2.4 acres of brackish aquatic features, such as tidal marsh and brackish emergent marsh, occur in the southwestern section of the Solano 4 West subarea in a low, depressional portion of a large seasonal swale complex along Stratton Lane (AWE 2017d). Much of this area is inundated/saturated throughout the year and supports emergent marsh vegetation typical of freshwater perennial marshes: cattails, tules, and chairmaker's club-rush (*Schoenoplectus americanus*) (AWE 2017d). Because of elevated salt concentrations in the soil and water, this vegetation community also supports salt-tolerant species, including seacoast bulrush (*Bolboschoenus robustus*), saltmarsh sandspurry (*Spergularia marina*), and western sea-purslane (*Sesuvium verrucosum*) (AWE 2017d).

Nonnative Invasive/Noxious Weeds

Noxious weeds are known to occur or have potential to occur on the project site (Table 3.3-2). Several thistles are known from the project site, including artichoke thistle, Italian thistle, purple starthistle, and yellow starthistle (Althouse and Meade 2017). These thistles often compete with crops and native plants for nutrients and water, and may restrict grazing in areas where infestations are high (Bossard et al. 2000). Thistles and other species such as fennel (*Foeniculum vulgare*) are common along roadsides, drainages, and other disturbed areas, including some of the access roads leading to the locations of the proposed wind turbine generators.

Table 3.3-2 lists the noxious weeds known or with potential to occur on the project site. The information in the table was compiled by AECOM biologists during a review of project-specific botanical survey reports (AWE 2017c; AECOM 2019a), an invasive-species monitoring report for other phases of the Solano Wind Project (Althouse and Meade 2017), the CDFA Encycloweedia (CDFA 2016), and the California Invasive Plant Council's Invasive Plant Inventory Database (Cal-IPC 2019).

Sensitive Biological Resources

Sensitive biological resources include those species, natural communities, and habitats that receive special protection through the ESA, CESA, CWA, California Fish and Game Code, Porter-Cologne Act, or local plans, policies, and regulations; or that are otherwise considered sensitive by federal, state, or local resource conservation agencies. Sensitive

Table 3.3-2 Nonnative Invasive and Noxious Weeds Known or with Potential to Occur on the Project Site[1]

Common Name	Scientific Name	Cal-IPC Rating	CDFA Rating
Annual falsebrome	*Brachypodium distachyon*	Moderate	NA
Artichoke thistle*	*Cynara cardunculus*	Moderate	List B
Barb goatgrass	*Aegilops triuncialis*	High	List B
Bellardia	*Bellardia trixago*	Limited	NA
Bermuda grass	*Cynodon dactylon*	Moderate	NA
Big quakinggrass	*Briza maxima*	Limited	NA
Black mustard*	*Brassica nigra*	Moderate	NA
Blackwood acacia	*Acacia melanoxylon*	Limited	NA
Bristly ox-tongue*	*Helminthotheca echioides*	Limited	NA
Broadleaved pepperweed*	*Lepidium latifolium*	High	List B
Bull thistle	*Cirsium vulgare*	Moderate	List C
Camelthorn	*Alhagi maurorum*	Moderate	List A
Canada thistle	*Cirsium arvense*	Moderate	List B
Capeweed	*Arctotheca prostrata*	Moderate	NA
Common brassbuttons	*Cotula coronopifolia*	Limited	NA
Creeping bent	*Agrostis stolonifera*	Limited	NA
European beachgrass	*Ammophila arenaria*	High	NA
Fennel*	*Foeniculum vulgare*	High	NA
Fertile capeweed	*Arctotheca calendula*	Moderate	List A
Field mustard	*Brassica rapa*	Limited	NA
Five-hook bassia	*Bassia hyssopifolia*	Limited	NA
Giant reed	*Arundo donax*	High	List B
Hare barley*	*Hordeum murinum*	Moderate	NA
Italian ryegrass*	*Festuca perennis*	Moderate	NA
Italian thistle*	*Carduus pycnocephalus*	Moderate	List C
Japanese brome	*Bromus japonicus*	Limited	NA
Mediterranean barley*	*Hordeum marinum*	Moderate	NA
Medusahead	*Elymus caput-medusae*	High	NA
Milk thistle*	*Silybum marianum*	Limited	NA
Pacific bentgrass	*Agrostis avenacea*	Limited	NA
Poison hemlock	*Conium maculatum*	Moderate	NA
Purple starthistle*	*Centaurea calcitrapa*	Moderate	List B
Red brome	*Bromus madritensis* ssp. *rubens*	High	NA
Redstem filaree	*Erodium cicutarium*	Lmited	NA
Ripgut brome*	*Bromus diandrus*	Moderate	NA
Rush skeleton weed*	*Chondrilla juncea*	Moderate	List A
Russian knapweed	*Acroptilon repens*	Moderate	List A
Shortpod mustard*	*Hirschfeldia incana*	Moderate	NA
Silver wattle	*Acacia dealbata*	Moderate	NA
Slenderflower thistle	*Carduus tenuiflorus*	Limited	List C
Soft brome*	*Bromus hordeaceous*	Limited	NA
Stinkwort	*Dittrichia graveolens*	Moderate	NA
Sweet vernal grass	*Anthoxanthum odoratum*	Limited	NA
Tocalote	*Centaurea melitensis*	Moderate	List B
Tree of heaven	*Ailanthus altissima*	Moderate	List C
White horsenettle*	*Solanum eleagnifolium*	NA	List B
Wild oats*	*Avena fatua*	Moderate	NA
Yellow starthistle*	*Centaurea solstitialis*	High	List B

Notes for Table 3.3-2

Notes:
Cal-IPC = California Invasive Plant Council; CDFA = California Department of Food and Agriculture; NA = not applicable
[1] Species whose names are denoted by an asterisk have been observed on the project site.
CDFA Pest Ratings:
A Weeds of known economic significance, subject to action by CDFA including eradication, quarantine, containment, rejection of shipments, or other holding action at the state-county level. Quarantine interceptions are to be rejected or treated at any point in the state.
B Weeds subject to action by CDFA only when found in a nursery, and otherwise subject to eradication, containment, control, or other holding action at the discretion of the local county agricultural commissioner.
C Not subject to state action except to provide for general pest cleanliness in nurseries; reject by CDFA only when found in a crop seed for planting or at the discretion of the commissioner, action to retard spread outside of nurseries at the discretion of the county agricultural commissioner.
Cal-IPC Pest Ratings:
High: These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.
Moderate: These species have substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.
Limited: These species are invasive, but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.
Sources: AWE 2017c; AECOM 2019a; Althouse and Meade 2017; CDFA 2016; Cal-IPC 2019

biological resources evaluated as part of this analysis include sensitive natural communities and special-status plant and animal species. These resources are discussed below.

Special-Status Species

For the purpose of this analysis, special-status species are plants and animals that fall within any of the following categories:

- species that are listed under the federal ESA and/or CESA as rare, threatened, or endangered;
- species considered as candidates and proposed for federal or state listing as threatened or endangered;
- wildlife designated by CDFW as fully protected and/or species of special concern;
- birds designated by CDFW as watch list species;
- birds protected under the MBTA;

- bats designated by the Western Bat Working Group (WBWG) as high (red) or medium (yellow) priority;
- plants ranked by CDFW to be rare, threatened, or endangered in California; or
- species that are considered locally significant, that is, a species that is not rare from a statewide perspective but is rare or unique in a local context, such as within a county or region (State CEQA Guidelines Section 15125[c]), or is so designated in local or regional plans, policies, or ordinances (State CEQA Guidelines, Appendix G).

CNPS has identified five categories of California Rare Plant Ranks (CRPRs):

- List 1A—Plants presumed to be extinct in California
- List 1B—Plant species considered rare, threatened, or endangered in California and elsewhere
- List 2—Plant species considered rare, threatened, or endangered in California but more common elsewhere
- List 3—Plants about which more information is needed (a review list)
- List 4—plants of limited distribution (a watch list)

Each CRPR category may include an extension indicating the level of endangerment in California:

- 1—Seriously endangered in California (more than 80 percent of occurrences are threatened and/or high degree and immediacy of threat)
- 2—Fairly endangered in California (20–80 percent of occurrences are threatened)
- 3—Not very endangered in California

CDFW recommends hat CEQA reviews of proposed projects address plants on Lists 1A, 1B, and 2.

Special-Status Plants

AECOM biologists compiled a list of special-status plant species with potential to occur in the project region. The list was compiled using information provided in the CNDDB database (CDFW 2019a); documentation of species in technical reports prepared for the project (AWE 2017c; AECOM 2019a); and the results of a search of the CNPS (2019) and USFWS databases (USFWS 2019a) for the following local USGS quadrangles (USGS 2013): Birds Landing, Antioch North, Antioch South, Jersey Island, Brentwood, Clayton, Honker Bay, Denverton, Elmira, Dozier, Liberty Island, Rio Vista, Isleton, Bouldin Island, and Woodward Island.

The database searches resulted in a total of 77 special-status plant species evaluated for their potential to occur on the project site or in the vicinity. Table 3.3-3 summarizes the regulatory status, habitat, potential for occurrence, and results of botanical surveys within the project site for each species. Exhibit 3.3-2 shows special-status plant occurrences documented in the CNDDB within 5 miles of the project site.

Protocol-level botanical surveys were conducted by Area West Environmental (AWE) botanists on July 26 and 27, 2016, and April 6, 2017 (AWE 2017c), and by AECOM botanists on April 24 and 25, 2018, and May 10, 2018 (AECOM 2019a). Surveys were conducted according to CNPS and CDFW protocols for botanical surveys (CNPS 2001; CDFW 2018a). The surveys were timed to cover the blooming periods of all special-status plant species identified as having potential to occur in the region. AWE conducted a comprehensive botanical survey of approximately 900 acres of the Solano 4 West subarea, including a 250-foot buffer from proposed project components (i.e., collection homerun lines, access roads, and wind turbine generator locations) (AWE 2017c).

In 2018, AECOM conducted a botanical survey for 307 acres of the Solano 4 West subarea that had not been previously surveyed by AWE, as well as the Solano 4 East subarea and the electrical collection system and homerun corridor connecting Solano 4 East to the Russell Substation (AECOM 2019a). The AECOM botanical survey area included buffers extending 500 feet beyond the locations of the proposed wind turbine generators and 250 feet beyond roadways (AECOM 2019a). No special-status plants were found on the project site during any of the protocol-level surveys. Therefore, special-status plants are considered absent from the project site.

Special-Status Wildlife

AECOM biologists compiled a list of special-status wildlife species with the potential to occur in the project area, using information obtained from:

- the CNDDB database (CDFW 2019a);
- technical reports prepared for the project (AWE 2017a, 2017d; AECOM 2018a, 2018b, 2018c, 2018d; Rana Resources 2009a; Estep Environmental Consulting 2018a, 2018b);
- specific requests by resource agencies during project scoping to address certain species (CDFW 2019b); and
- a search of the USFWS database (USFWS 2019a) for the following local USGS quadrangles: Birds Landing, Antioch North, Antioch South, Jersey Island, Brentwood, Clayton, Honker Bay, Denverton, Elmira, Dozier, Liberty Island, Rio Vista, Isleton, Bouldin Island, and Woodward Island.

These searches initially identified a total of 58 special-status wildlife species. Of these, 40 special-status wildlife species are known or have the potential to occur in the project area (Table 3.3-4).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Amsinckia grandiflora	large-flowered fiddleneck	FE	SE	1B.1	Cismontane woodland, valley and foothill grassland.	885–1,805	April–May	**Not likely to occur.** Marginally suitable grassland habitat present on the project site. However, most of the project site is regularly disked for agricultural planting. No CNDDB occurrences within 5 miles. The nearest CNDDB occurrence is approximately 8 miles south of the project area. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Arctostaphylos auriculata	Mt. Diablo manzanita	–	–	1B.3	Chaparral (sandstone) and cismontane woodland.	440–2,135	January–March	**No potential to occur.** No suitable habitat on the project site, and elevations in the project area are too low for this species. No nearby occurrences. This species is a shrub that would be detectable year-round; no *Arctostaphylos* were observed during botanical surveys (AECOM 2019a; AWE 2017c).
Arctostaphylos manzanita ssp. *laevigata*	Contra Costa manzanita	–	–	1B.2	Chaparral (rocky).	1,410–3,610	January–April	**No potential to occur.** No suitable habitat on the project site, and elevations in the project area are too low for this species. No nearby occurrences. This species is a shrub that would be detectable year-round; no *Arctostaphylos* were observed during botanical surveys (AECOM 2019a; AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Astragalus tener var. *ferrisiae*	Ferris' milk-vetch	–	–	1B.1	Meadows and seeps (vernally mesic), valley and foothill grassland (subalkaline flats).	5–245	April–May	**Not likely to occur.** Marginally suitable grassland habitat present on the project site. However, most of the project site is regularly disked for agricultural planting. No CNDDB occurrences within 5 miles. The nearest CNDDB occurrence is more than 16 miles north of the project area, in a vernal meadow. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Astragalus tener var. *tener*	alkali milk-vetch	–	–	1B.2	Alkaline and adobe clay soils in playas, valley and foothill grassland, and vernal pools.	0–195	March–June	**Not likely to occur.** Marginally suitable grassland habitat present in the project area, but no playas or vernal pools are present. One CNDDB occurrence approximately 2.5 miles west of the project site. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Atriplex cordulata var. *cordulata*	heartscale	–	–	1B.2	Saline or alkaline soils in chenopod scrub, meadows and seeps, valley and foothill grassland. Prefers sandy areas.	0–1,835	April–October	**Not likely to occur.** Marginally suitable grassland habitat present on the project site. However, most of the project site is regularly disked for agricultural planting. One CNDDB occurrence approximately 3.2 miles northwest of the project area. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Atriplex depressa	brittlescale	–	–	1B.2	Alkaline clay soils in chenopod scrub, meadows and seeps, playas, valley and foothill grassland, and vernal pools.	0–1,050	April–October	**Not likely to occur.** Marginally suitable grassland habitat present on the project site. However, most of the project site is regularly disked for agricultural planting. One CNDDB occurrence approximately 3.5 miles west of the project area. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Atriplex persistens	vernal pool smallscale	–	–	1B.2	Alkaline vernal pools.	30–375	June, August–October	**No potential to occur.** No vernal pools on the project site. No CNDDB occurrences within 5 miles. The nearest CNDDB occurrence is more than 9 miles to the north in an alkaline playa. Not observed during surveys conducted during the appropriate bloom time (AWE 2017c).
Blepharizonia plumosa	big tarplant	–	–	1B.1	Valley and foothill grassland, generally in clay soils.	95–1,655	July–October	**Not likely to occur.** Marginally suitable grassland habitat present on the project site. However, most of the project site is regularly disked for agricultural planting. Three CNDDB occurrences approximately 5 miles to the south, across the Bay-Delta, but these occurrences are from the 1920s and 1930s. The nearest more recent occurrence, from 1991, is approximately 8 miles away. Not observed during surveys conducted during the appropriate bloom time (AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Brasenia schreberi	watershield	–	–	2B.3	Freshwater marshes and swamps.	95–7,220	June–September	**No potential to occur.** No suitable habitat present on the project site, and no CNDDB occurrences within 5 miles. The nearest CNDDB occurrence is approximately 12 miles east, in a slough. Not observed during surveys conducted during the appropriate bloom time (AWE 2017c).
Calochortus pulchellus	Mt. Diablo fairy-lantern	–	–	1B.2	Generally wooded slopes, rarely in chaparral, and valley and foothill grassland. Generally on slopes with a north-facing aspect.	95–2,775	April–June	**No potential to occur.** No wooded slopes on the project site, and the grassland habitat is too disturbed to support this species. No CNDDB occurrences in Solano County; the nearest CNDDB occurrence is approximately 9 miles southeast of the project area. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Campanula exigua	chaparral harebell	–	–	1B.2	Chaparral (rocky, usually serpentinite).	900–4,100	May–June	**No potential to occur.** No chaparral or serpentinite soils on the project site, and no CNDDB occurrences of this species within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Carex comosa	bristly sedge	–	–	2B.1	Coastal prairie, marshes and swamps (lake margins), valley and foothill grassland.	0–2,050	May–September	**Not likely to occur.** Marginally suitable grassland and marsh habitat present on the project site. However, most of the project site is regularly disked for agricultural planting. No CNDDB occurrences within 5 miles. The nearest CNDDB occurrence is 7 miles east, along a pond margin. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Centromadia parryi ssp. *congdonii*	Congdon's tarplant	–	–	1B.1	Alkaline soils in valley and foothill grassland. Terraces, swales, and floodplains, disturbed sites.	0–755	May–November	**Not likely to occur.** Marginally suitable grassland habitat present on the project site. However, most of the project site is regularly disked for agricultural planting. No CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Centromadia parryi ssp. *parryi*	pappose tarplant	–	–	1B.2	Often in alkaline soils in grassland, chaparral, coastal prairie, coastal salt marshes, and alkaline springs and seeps.	0–1,380	May–November	**Not likely to occur.** Marginally suitable grassland habitat present on the project site. However, most of the project site is disked regularly for agricultural planting. No CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Chloropyron molle ssp. *hispidum*	hispid bird's-beak	–	–	1B.1	Alkaline and saline areas in playas, meadows, marshes, and seeps.	0–510	June–September	**No potential to occur.** No suitable habitat on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AWE 2017c).
Chloropyron molle ssp. *molle*	soft bird's-beak	FE	SR	1B.2	Coastal salt marshes and swamps.	0–10	July–September	**No potential to occur.** No suitable habitat on the project site. Two CNDDB occurrences within 5 miles, one of which is less than a mile to the southwest. However, these occur in marsh habitat along the Sacramento River. Not observed during surveys conducted during the appropriate bloom time (AWE 2017c).
Cicuta maculata var. *bolanderi*	Bolander's water-hemlock	–	–	2B.1	Coastal marshes and swamps.	0–655	July–September	**No potential to occur.** No suitable habitat on the project site. Two CNDDB occurrences within 5 miles, one of which is less than a mile to the southwest. However, these occur in marsh habitat along the Sacramento River. Not observed during surveys conducted during the appropriate bloom time (AWE 2017c).
Cirsium hydrophilum var. *hydrophilum*	Suisun thistle	FE	–	1B.1	Salt marshes and swamps.	0–5	June–September	**No potential to occur.** No suitable habitat on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Cordylanthus nidularius	Mt. Diablo bird's-beak	–	SR	1B.1	Serpentine soils in chaparral.	1,965–2,525	June–August	**No potential to occur.** No chaparral or serpentinite soils on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AWE 2017c).
Cryptantha hooveri	Hoover's cryptantha	–	–	1A	Inland dunes and sandy areas in valley and foothill grassland.	25–490	April–May	**No potential to occur.** No dunes or sandy soils on the project site. One CNDDB occurrence approximately 3.7 miles to the south. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Delphinium californicum ssp. *interius*	Hospital Canyon larkspur	–	–	1B.2	Openings in chaparral, coastal scrub, and cismontane woodland. Mesic.	635–3,595	April–June	**No potential to occur.** No chaparral, scrub, or woodland on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Delphinium recurvatum	recurved larkspur	–	–	1B.2	Alkaline soils in chenopod scrub, cismontane woodland, and valley and foothill grassland.	5–2,590	March–June	**No potential to occur.** No chenopod scrub or woodland on the project site. Grasslands are regularly disked for agricultural planting and would not support this species. No CNDDB occurrences within 5 miles of the project site. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Downingia pusilla	dwarf downingia	–	–	2B.2	Vernal pools in valley and foothill grasslands.	0–1,460	March–May	**No potential to occur.** No vernal pools on the project site. Two CNDDB occurrences within 5 miles, the closest approximately 1.7 miles to the northwest. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Eriastrum ertterae	Lime Ridge eriastrum	–	–	1B.1	Sandy, alkaline soils. Opening or edges in chaparral.	655–950	June–July	**No potential to occur.** No sandy soils or chaparral habitats on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AWE 2017c).
Eriogonum nudum var. *psychicola*	Antioch Dunes buckwheat	–	–	1B.1	Inland dunes.	0–65	July–October	**No potential to occur.** No inland dunes on the project site. One CNDDB occurrence approximately 3.7 miles to the south. Not observed during surveys conducted during the appropriate bloom time (AWE 2017c).
Eriogonum truncatum	Mt. Diablo buckwheat	–	–	1B.1	Sandy soils in chaparral, coastal scrub, and valley and foothill grassland.	5–1,150	April–December	**No potential to occur.** No sandy soils, chaparral, or coastal scrub on the project site. Grasslands are regularly disked for agricultural planting and would not support this species. One CNDDB occurrence approximately 3.7 miles south of the project site. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Eryngium jepsonii	Jepson's coyote thistle	–	–	1B.2	Vernal pools with clay soils in valley and foothill grassland.	5–985	April–August	**No potential to occur.** No vernal pools on the project site. No CNDDB occurrences within 5 miles; the nearest occurrence is approximately 8 miles to the south at Black Diamond Mines Preserve. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Eryngium recemosum	Delta button-celery	–	SE	1B.1	Vernally mesic clay depressions in riparian scrub.	5–100	June–October	**No potential to occur.** No suitable habitat on the project site, and no CNDDB occurrences within 5 miles. The nearest CNDDB occurrence is 15 miles southeast in alkali wetland adjacent to Kellogg Creek. Not observed during surveys conducted during the appropriate bloom time (AWE 2017c).
Erysimum capitatum var. *angustatum*	Contra Costa wallflower	FE	SE	1B.1	Inland dunes	5–65	March–May	**No potential to occur.** No inland dunes on the project site. Four CNDDB occurrences within 5 miles, the closest 2.5 miles to the southwest. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Eschscholzia rhombipetala	diamond petaled California poppy	–	–	1B.1	Alkaline, clay soils in valley and foothill grassland.	0–3,200	March–April	**Not likely to occur.** Marginally suitable grassland habitat present on the project site. However, most of the project site is regularly disked for agricultural planting. One CNDDB occurrence approximately 3.7 miles to the south. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Etriplex joaquinana	San Joaquin spearscale	–	–	1B.2	Alkaline soils in chenopod scrub, meadows and seeps, playas, and valley and foothill grassland.	0–2,740	April–October	**Not likely to occur.** Marginally suitable habitat present on the project site. However, most of the project site is regularly disked for agricultural planting. One CNDDB occurrence approximately 2.5 miles to the west. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Fritillaria liliacea	fragrant fritillary	–	–	1B.2	Adobe clay soils in chaparral, cismontane woodland, and valley and foothill grassland.	5–1,345	February–April	**Not likely to occur.** Marginally suitable grassland habitat present on the project site. However, most of the project site is regularly disked for agricultural planting. No CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Fritillaria pluriflora	adobe lily	–	–	1B.2	Clay soil in marshes, swamps, vernal pools, and lake margins.	195–2,315	April–August	**No potential to occur.** No marshes, swamps, vernal pools, or lake margins on the project site. The nearest CNDDB occurrence is 9 miles from the project site. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Gratiola heterosepala	Boggs Lake hedge-hyssop	–	SE	1B.2	Clay soil in marshes, swamps, vernal pools, and lake margins.	30–7,790	April–August	**No potential to occur.** No marshes, swamps, vernal pools, or lake margins on the project site. The nearest CNDDB occurrence is 9 miles from the project site. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Grimmia torenii	Toren's grimmia	–	–	1B.3	Chaparral, cismontane woodland, and lower montane coniferous forest.	1,065–3,805	Year-round	**No potential to occur.** No chaparral, woodland, or coniferous forest on the project site, which is also outside the known elevation range for this species. No CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AWE 2017c).
Helianthella castanea	Diablo helianthella	–	–	1B.2	Open, grassy sites in broadleaf upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, and valley and foothill grassland.	195–4,265	March–June	**Not likely to occur.** Marginally suitable grassland habitat present on the project site. However, most of the project site is regularly disked for agricultural planting. No CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Hesperolinon breweri	Brewer's western flax	–	–	1B.2	Chaparral, cismontane woodland, and valley and foothill grassland. Occasionally on serpentine.	95–3,100	May–July	**Not likely to occur.** Marginally suitable grassland habitat present on the project site. However, most of the project site is regularly disked for agricultural planting. No CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Hibiscus lasiocarpos var. *occidentalis*	woolly rosemallow	–	–	1B.2	Freshwater wetlands, wet banks, marshes. Often in riprap on sides of levees.	0–395	June–September	**No potential to occur.** No suitable habitat (freshwater wetlands or marshes) present on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AWE 2017c).
Isocoma arguta	Carquinez goldenbush	–	–	1B.1	Alkaline soils and flats, valley and foothill grassland.	0–65	August–December	**Not likely to occur.** Marginally suitable grassland habitat present on the project site. However, most of the project site is regularly disked for agricultural planting. Two CNDDB occurrences within 5 miles, the closest 4 miles to the north. This species is a shrub that would be detectable year-round. No *Isocoma* were observed by AECOM in 2018 or by AWE in 2017 (AECOM 2019a; AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Juglans hindsii	Northern California black walnut	–	–	1B.1	Riparian forest and riparian woodland.	0–1,445	April–May	**No potential to occur**. No riparian forest or woodland on the project site. One CNDDB occurrence 4.75 miles to the northeast. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Lasthenia conjugens	Contra Costa goldfields	FE	–	1B.1	Mesic soils in cismontane woodland, alkaline playas, valley and foothill grassland, and vernal pools.	0–1,540	March–June	**Not likely to occur.** Marginally suitable mesic grassland habitat present on some parts of the project site. However, most of the grasslands on the project site are regularly disked for agricultural planting and grazed. One CNDDB occurrence 5 miles to the south. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Lathyrus jepsonii var. *jepsonii*	Delta tule pea	–	–	1B.2	Marshes and swamps, both freshwater and brackish.	0–15	May–September	**No potential to occur.** No marshes or swamps on the project site. A total of 24 CNDDB occurrences within 5 miles, the closest 0.2 mile to the southwest. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Legenere limosa	legenere	–	–	1B.1	Wet areas, vernal pools, ponds.	0–2,885	April–June	**No potential to occur.** No vernal pools or ponds on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Lepidium latipes var. *heckardii*	Heckard's pepper-grass	–	–	1B.2	Alkaline flats in valley and foothill grassland.	5–655	March–May	**Not likely to occur.** Marginally suitable grassland habitat present on the project site. However, most of the project site is regularly disked for agricultural planting. No CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Lilaeopsis masonii	Mason's lilaeopsis	–	SR	1B.1	Freshwater or brackish marshes and swamps, riparian scrub.	0–35	April–November	**No potential to occur.** No marshes or swamps on the project site. A total of 34 CNDDB occurrences within 5 miles, the closest 0.2 mile to the southwest. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Limosella australis	Delta mudwort	–	–	2B.1	Muddy or sandy intertidal flats, mud banks in marshes and swamps (freshwater or brackish), and riparian scrub.	0–10	April–August	**No potential to occur.** No intertidal flats, marshes, or swamps on the project site. A total of 11 CNDDB occurrences within 5 miles, the closest 0.2 mile to the southwest. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Madia radiata	showy golden madia	–	–	1B.1	Grassy or open slopes, vertic clay, rarely serpentine. Cismontane woodland and valley and foothill grassland.	80–3,985	March–May	**Not likely to occur.** Marginally suitable grassland habitat present on the project site. However, most of the project site is regularly disked for agricultural planting. No CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Malacothamnus hallii	Hall's bush-mallow	–	–	1B.2	Open chaparral, coastal scrub.	30–2,495	May–October	**No potential to occur.** No chaparral or coastal scrub on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Microseris paludosa	marsh microseris	–	–	1B.2	Moist grassland and open woodland in closed-cone coniferous forest, cismontane woodland, coastal scrub, and valley and foothill grassland.	15–1,165	April–July	**Not likely to occur.** Marginally suitable grassland habitat present on the project site. However, most of the project site is regularly disked for agricultural planting. No CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Monolopia gracilens	woodland woolythreads	–	–	1B.2	Serpentine grassland, open chaparral, oak woodland, and openings in North Coast coniferous forest.	325–3,935	February–July	**No potential to occur.** No serpentine soils, chaparral, oak woodland, or North Coast coniferous forest on the project site. No CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Navarretia gowenii	Lime Ridge navarretia	–	–	1B.1	Clay, serpentine soils. Chaparral.	590–1,000	May–June	**No potential to occur.** No chaparral or serpentine soil on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Navarretia leucocephala ssp. *bakeri*	Baker's navarretia	–	–	1B.1	Cismontane woodland, meadows and seeps, vernal pools, valley and foothill grasslands, and lower montane coniferous forest.	15–5,710	April–July	**No potential to occur.** No meadows, seeps, vernal pools, or forest habitats on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Navarretia nigelliformis ssp. *radians*	shining navarretia	–	–	1B.2	Vernal pools, clay depressions in cismontane woodland, valley and foothill grassland.	210–3,280	April–July	**No potential to occur.** No vernal pools or clay depressions on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Neostapfia colusana	Colusa grass	FT	SE	1B.1	Large vernal pools in adobe clay.	15–655	May–August	**No potential to occur.** No vernal pools on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Oenothera deltoides ssp. *howellii*	Antioch Dunes evening-primrose	FE	SE	1B.1	Inland dunes.	0–100	March–September	**No potential to occur.** No inland dunes on the project site. Four CNDDB occurrences within 5 miles, the closest 4 miles to the southwest. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Orcuttia inaequalis	San Joaquin Valley Orcutt grass	FT	SE	1B.1	Vernal pools.	30–2,475	April–September	**No potential to occur.** No vernal pools on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Phacelia phacelioides	Mt. Diablo phacelia	–	–	1B.2	Rocky soils in chaparral and cismontane woodland.	1,640–4,495	April–May	**No potential to occur.** No chaparral or woodland on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Plagiobothrys hystriculus	bearded popcorn-flower	–	–	1B.1	Margins of vernal pools, mesic grasslands, often in vernal swales.	0–900	April–May	**Not likely to occur.** Some mesic grasslands and swales are present on the project site. However, most grasslands in the project site are regularly disked for agricultural planting and grazed. Four CNDDB occurrences within 5 miles; the population polygon for the closest CNDDB occurrence overlaps the northern boundary of the project site. This overlapping occurrence is a large polygon that encompasses the entire Birds Landing quadrangle. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Potamogeton zosteriformis	eel-grass pondweed	–	–	2B.2	Freshwater marshes and swamps.	0–6,100	June–July	**No potential to occur.** No marshes or swamps on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AWE 2017c).
Puccinellia simplex	California alkali grass	–	–	1B.2	Alkaline soil in vernally mesic areas such as sinks, flats, and lake margins. Chenopod scrub, valley and foothill grassland, and vernal pools.	5–3,050	March–May	**No potential to occur.** No alkaline seeps, lake margins, chenopod scrub, or vernal pools on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Sagittaria sanfordii	Sanford's arrowhead	–	–	1B.2	Shallow freshwater marshes and swamps.	0–2,135	May–November	**No potential to occur.** No marshes or swamps on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Sanicula saxatilis	rock sanicle	–	SR	1B.2	Rocky soils in broadleafed upland forest, chaparral, and valley and foothill grassland.	2,030–3,855	April–May	**No potential to occur.** No rocky soils or forest, and the listed elevation for this species is higher than the project site. No CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Scutellaria galericulata	marsh skullcap	–	–	2B.2	Lower montane coniferous forest, meadows and seeps (mesic), marshes and swamps.	0–6,890	June–September	**Not likely to occur.** Marginally suitable marsh habitat present on the project site. No CNDDB occurrences within 5 miles. The nearest CNDDB occurrence is approximately 10 miles east along the South Fork of the Mokelumne River. Not observed during surveys conducted during the appropriate bloom time (AWE 2017c).
Scutellaria lateriflora	side-flowering skullcap	–	–	2B.2	Meadows and seeps (mesic), marshes and swamps.	0–1,640	July–September	**Not likely to occur.** Marginally suitable marsh habitat present on the project site. No CNDDB occurrences within 5 miles. The nearest CNDDB occurrence is approximately 11 miles east in the Delta (Bouldin Island). Not observed during surveys conducted during the appropriate bloom time (AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Senecio aphanactis	chaparral ragwort	–	–	2B.2	Chaparral, cismontane woodland, and coastal scrub. Sometimes on alkaline soil.	45–2,625	January–April	**No potential to occur.** No chaparral, woodland, or scrub on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Sidalcea keckii	Keck's checkerbloom	FE	–	1B.1	Grassy slopes in clay soil, sometimes serpentinite.	245–2,135	April–June	**Not likely to occur.** Marginally suitable grassland habitat present on the project site, but no serpentine. Most grasslands on the project site are regularly disked for agricultural planting and grazed. One CNDDB occurrence 0.8 mile west of the project site. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Streptanthus albidus ssp. *peramoenus*	most beautiful jewelflower	–	–	1B.2	Serpentine soils in chaparral, cismontane woodland, and valley and foothill grassland.	310–3,280	March–October	**No potential to occur.** No serpentine soils on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Streptanthus hispidus	Mt. Diablo jewel-flower	–	–	1B.3	Rocky soils in chaparral and valley and foothill grassland.	1,195–3,935	March–June	**No potential to occur.** No rocky soils on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Stuckenia filiformis ssp. *alpina*	slender-leaved pondweed	–	–	2B.2	Shallow freshwater marshes and swamps.	980–7,055	May–July	**No potential to occur.** No marshes or swamps on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Symphyotrichum lentum	Suisun Marsh aster	–	–	1B.2	Brackish and freshwater marshes and swamps.	0–10	May–November	**No potential to occur.** No marshes or swamps on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Trifolium amoenum	two-fork clover	FE	–	1B.1	Coastal bluff scrub and valley and foothill grassland. Sometimes serpentinite soils.	15–1,360	April–June	**No potential to occur.** No serpentine soils, and most grasslands on the project site are regularly disked for agricultural planting and grazed. No CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Trifolium hydrophilum	saline clover	–	–	1B.2	Marshes and swamps. Valley and foothill grassland (mesic, alkaline) and vernal pools.	0–985	April–June	**No potential to occur.** No marshes and swamps, vernal pools, or mesic alkaline areas on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).

Table 3.3-3 Special-Status Plant Species' Potential to Occur in the Project Region and Potential for Occurrence on the Project Site

Scientific Name	Common Name	Regulatory Status			Habitat Requirements	Elevation Range (feet above msl)	Blooming Period	Potential for Occurrence*
		Fed	State	CRPR				
Triquetrella californica	coastal triquetrella	–	–	1B.2	Soil in coastal bluff scrub, coastal scrub.	30–330	Year-round	**No potential to occur.** No coastal scrub habitat on the project site, and no CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Tropidocarpum capparideum	caper-fruited tropidocarpum	–	–	1B.1	Alkaline hills in valley and foothill grassland.	0–1,495	March–April	**Not likely to occur.** Marginally suitable grassland habitat present on the project site. However, most of the project site is regularly disked for agricultural planting. No CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Tuctoria mucronata	Crampton's tuctoria	FE	SE	1B.1	Vernal pools and mesic areas in valley and foothill grassland with Pescadero clay soil.	15–35	April–August	**No potential to occur.** No vernal pools on the project site. No CNDDB occurrences within 5 miles. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).
Viburnum ellipticum	oval-leaved viburnum	–	–	2B.3	Chaparral, cismontane woodland, and lower montane coniferous forest.	705–4,595	May–June	**No potential to occur.** No chaparral, woodland, or coniferous forest on the project site. Not observed during surveys conducted during the appropriate bloom time (AECOM 2019a; AWE 2017c).

Notes for Table 3.3-3

Notes: AWE = Area West Environmental, Inc.; Bay-Delta = San Francisco Bay/Sacramento–San Joaquin Delta; CNDDB = California Natural Diversity Database; CRPR = California Rare Plant Rank; Delta = Sacramento–San Joaquin Delta; msl = mean sea level

* **Potential for Occurrence:**

No Potential to Occur: No suitable habitat is present within or near the project site, the species' range does not include the project site, or the species is presumed extinct in California (CRPR 1A).

Unlikely to Occur: Project site is within the species' range; however, the species has not been recorded within the project site or vicinity, and habitat present is marginal for the species or habitat is reasonably suitable, but other factors, such as competition with nonnative plants or heavy disturbance (i.e., grazing, soil disking) indicate that presence of the species is not expected.

Could Occur: Project site is within the species' range and suitable habitat for the species is present; however, the species has not been recorded within the project site or existing records are historical and/or locational information is problematic/inaccurate, and species occurrence records may or may not occur in the project vicinity.

Known to Occur: The project site is within the species' range, suitable habitat for the species is present, and the species has been recorded within the project site and current conditions appear to approximate those at the time of the recorded occurrence.

Federal Status Categories:

FE = Listed as endangered under the federal Endangered Species Act

FT = Listed as threatened under the federal Endangered Species Act

California State Status Categories:

CE = Listed as endangered under the California Endangered Species Act

CR = Listed as rare under the California Endangered Species Act

California Rare Plant Rank (CRPR) Categories:

1B = Plant species considered rare or endangered in California and elsewhere (protected under CEQA, but not legally protected under the federal Endangered Species Act or California Endangered Species Act)

2B = Plant species considered rare or endangered in California but more common elsewhere (protected under CEQA, but not legally protected under the federal Endangered Species Act or California Endangered Species Act)

3 = Plants about which more information is needed (a review list); and

4 = Plants of limited distribution (a watch list).

California Rare Plant Rank (CRPR) Threat Rank Extensions:

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

.2 = Fairly endangered in California (20% to 80% of occurrences are threatened)

.3 = Not very threatened in California (less than 20% of occurrences threatened/low degree and immediacy of threat or no current threats known)

Sources: CDFW 2019a; CNPS 2019; USFWS 2019a; Baldwin et al. 2012; AWE 2017c; AECOM 2019a

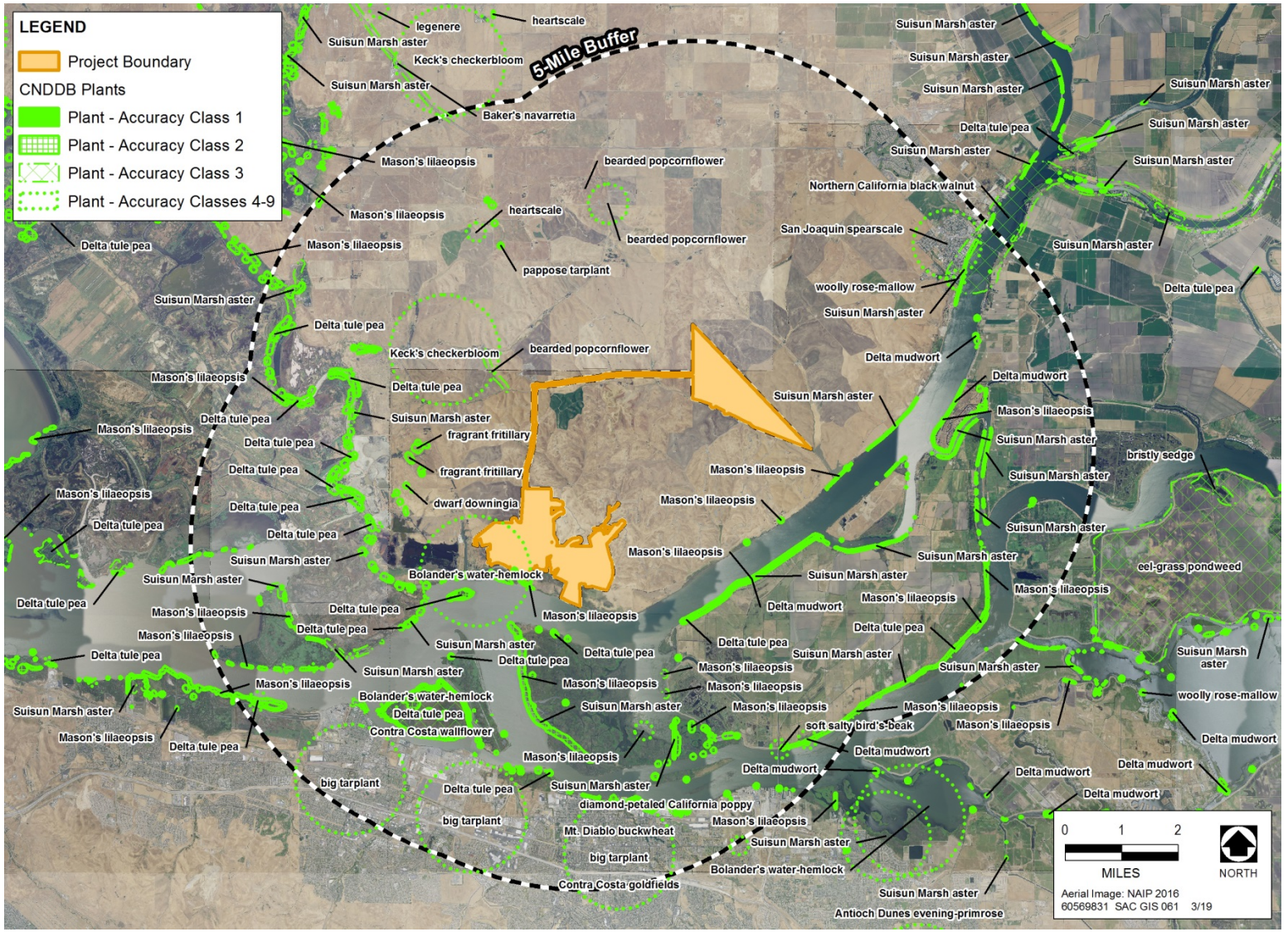


Exhibit 3.3-2 Special-status Plant Occurrences within 5 Miles of the Project Site

Table 3.3-4 Special-Status Wildlife Species' Potential to Occur in the Project Area and Potential for Occurrence on the Project Site

Species	Regulatory Status[1]			Habitat	Potential for Occurrence[2]
	Federal	State	WBWG[3]		
Invertebrates					
Lange's metalmark butterfly *Apodemia mormo langei*	E	–	–	Found only in a sand dune habitat along the shore of the San Joaquin River in Contra Costa County.	**No potential to occur**. The butterfly is exclusively found in the Antioch Dunes National Wildlife Refuge, and the larva's main host plant, naked stemmed buckwheat (*Eriogonum nudum* var. *articulatum*), is not found on the project site.
Conservancy vernal fairy shrimp *Branchinecta conservatio*	E	–	–	Vernal pools and seasonal wetlands with moderately turbid water. Tulare County to Shasta County.	**No potential to occur**. No suitable vernal pool habitat present on the project site. The nearest observations are located in the North Suisun Mitigation Bank and Jepson Prairie Preserve, approximately 10 miles north of the project site.
Vernal pool fairy shrimp *Branchinecta lynchi*	T	–	–	Vernal pools and other seasonal wetlands in valley and foothill grasslands. Tends to occur in smaller wetland features (less than 0.05 acre in size).	**No potential to occur**. No suitable vernal pool habitat present on the project site. The nearest observations are located in the North Suisun Mitigation Bank and Jepson Prairie Preserve, approximately 10 miles north of the project site.
San Bruno elfin butterfly *Callophrys mossii bayensis*	E	–	–	Inhabits rocky outcrops and cliffs in coastal scrub on the San Francisco peninsula.	**No potential to occur**. One CNDDB occurrence recorded in 2005 on Mount Diablo. No suitable habitat present on the project site.
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	T	–	–	Elderberry shrubs below 3,000 feet in elevation, typically in riparian habitats. Found in stems measuring 1 inch or greater at ground level.	**No potential to occur**. No suitable habitat present on the project site and no occurrences were generated in the CNDDB query.

Table 3.3-4 Special-Status Wildlife Species' Potential to Occur in the Project Area and Potential for Occurrence on the Project Site

Species	Regulatory Status[1]			Habitat	Potential for Occurrence[2]
	Federal	State	WBWG[3]		
Delta green ground beetle *Elaphrus viridis*	T	–	–	Habitat preference not well studied. Observed mostly in open habitats in grassland-playa on the edges of pools, trails, roads, and ditches. May also prefer denser cover.	**Not likely to occur**. The nearest CNDDB occurrences were documented in the Jepson Prairie Preserve and in the vernal pool–grassland matrix between the Jepson Prairie Preserve and Travis Air Force Base, north of the project site.
Vernal pool tadpole shrimp *Lepidurus packardi*	E	–	–	Vernal pools and other seasonal wetlands in valley and foothill grasslands that pond for sufficient duration to allow the species to complete its life cycle. Typically found in ponds ranging in size from 0.1 acre to 80 acres.	**No potential to occur**. No suitable vernal pool habitat present on the project site. The nearest observations are located in the North Suisun Mitigation Bank and Jepson Prairie Preserve, approximately 10 miles north of the project site.
Fish					
Sacramento Perch *Archoplites interruptus*	–	SSC	–	Found in sloughs, slow-moving rivers, and large lakes, including floodplain lakes of the Central Valley. Favors rivers, large lakes, and estuaries that are fairly cool and fresh.	**No potential to occur**. Habitat for the species occurs in the Delta. The nearest recorded observation was in 2009, when juvenile fish were pulled out of an intake screen at the Contra Costa Power Plant, approximately 5 miles southeast of the project site; however, no suitable habitat was mapped on the project site.

Table 3.3-4 Special-Status Wildlife Species' Potential to Occur in the Project Area and Potential for Occurrence on the Project Site

Species	Regulatory Status[1]			Habitat	Potential for Occurrence[2]
	Federal	State	WBWG[3]		
Delta Smelt *Hypomesus transpacificus*	T	E	–	Inhabits open waters of bays, tidal rivers, channels, and sloughs; rarely occurs in water with salinity of more than 10–12 ppt; when not spawning, found where salt water and freshwater mix; typically spawns upstream, but some spawning events have been documented in estuaries.	**No potential to occur**. Critical habitat for the species occurs in the Delta. The nearest CNDDB occurrence was recorded in 2017, in the lower Sacramento River between Sherman Island and Rio Vista. Interagency ecological monitoring (MER11A0001) records the area as having the highest density of subadults and juveniles in the area. This area is approximately 1.04 miles south of the Solano 4 East portion of the project; however, no suitable habitat was mapped on the project site.
Steelhead–Central Valley DPS *Oncorhynchus mykiss irideus* pop. 11	T	–	–	Cool, clear streams with abundant cover and well-vegetated banks, with relatively stable flows. Pool and riffle complexes and cold gravelly streambeds for spawning.	**No potential to occur**. This species is known to occur in the Delta from Chipps Island to the San Joaquin River at Dos Reis and Sacramento River at Garcia Bend, which is found within a mile of the project site; however, no suitable habitat was mapped on the project site.
Sacramento Splittail *Pogonichthrys hystriculus*	–	SSC	–	Lives in fluctuating environments and can tolerate water with high salinity and low oxygen levels.	**No potential to occur**. CNDDB records from 1998–2013 document the species occurring with other native fish within 10 miles of the project site, near Bradmoor Island and Liberty Island. Most likely also occurs in the Delta region.

Table 3.3-4 Special-Status Wildlife Species' Potential to Occur in the Project Area and Potential for Occurrence on the Project Site

Species	Regulatory Status[1]			Habitat	Potential for Occurrence[2]
	Federal	State	WBWG[3]		
Longfin Smelt *Spirinchus thaleichthys*	C	T, SSC	–	Uses estuaries, nearshore waters, and the lower portions of freshwater streams. Found in the San Francisco estuary and Delta, Humboldt Bay, and the estuaries of the Eel River and Klamath River.	**No potential to occur**. The species' main spawning grounds are located in the Sacramento River, south of Rio Vista and approximately 2.5 miles northeast of the Solano 4 East project subarea; however, no suitable habitat occurs on the project site.
Amphibians and Reptiles					
California tiger salamander *Ambystoma californiense*	T	T	–	Small ponds, lakes, or vernal pools in grasslands and oak woodlands for larvae; rodent burrows, rock crevices, or fallen logs for cover for adults and for summer dormancy.	**Not likely to occur**. Two aquatic features on-site provide elements of suitable breeding habitat, but species is not likely to occur because of the highly disturbed nature of upland habitat on-site, limited upland refugia, regular disruptions/barriers to dispersal, and habitat fragmentation (Rana Resources 2009; AWE 2017e; AECOM 2018b).
Northern California legless lizard *Anniella pulchra*	–	SSC	–	Occurs in sparsely vegetated habitats such as coastal sand dunes, chaparral, pine-oak woodland, desert scrub, open grassland, and riparian areas with sandy or loose loamy substrates.	**No potential to occur**. The project site is just outside the species' most northern range; the nearest CNDDB occurrence was in 2015 and was approximately 2.5 miles south of the project site in the sand dunes on the south bank of the San Joaquin River (CDFW 2019a). The Sacramento River is a physical barrier for dispersal into the project area and years of tilling of the land also preclude suitable habitat within the project site.

Table 3.3-4 Special-Status Wildlife Species' Potential to Occur in the Project Area and Potential for Occurrence on the Project Site

Species	Regulatory Status[1]			Habitat	Potential for Occurrence[2]
	Federal	State	WBWG[3]		
California glossy snake *Arizona elegans occidentalis*	–	SSC	–	Subspecies found primarily in grasslands, fields, coastal sage scrub, and chaparral.	**No potential to occur**. The nearest recorded occurrence was in 1958 in the Antioch Dunes (CDFW 2019a).
Alameda whipsnake *Masticophis lateralis euryxanthus*	T	T	–	Chaparral foothills, shrublands with scattered grassy patches, rocky canyons and watercourses, and adjacent habitats.	**No potential to occur**. All occurrences from Contra Costa County; no suitable habitat for the species present in the project area (CDFW 2019a).
Coast horned lizard *Phrynosoma blainvillii*	–	SSC	–	Occurs in most of California from the Central Valley and Coast Ranges and into Baja California north along the coast. Inhabits coastal sage scrub and chaparral in arid and semiarid climates. Prefers friable, rocky, or shallow sandy soils.	**No potential to occur**. No suitable habitat on-site; the nearest CNDDB occurrence is 12 miles south of the project site (CDFW 2019a).
Western pond turtle *Emys marmorata*	–	SSC	–	Forages in ponds, marshes, slow-moving streams, sloughs, and irrigation/drainage ditches; nests in nearby uplands with low, sparse vegetation.	**Not likely to occur**. Suitable aquatic habitat is present in the Solano 4 West project subarea near the Sacramento River. Pond turtles could potentially move through the project site during wet periods to disperse between aquatic sites and to nest within annual grassland habitats.
Foothill yellow-legged frog *Rana boylii*	–	C-T	–	Found in most major Pacific-slope Sierra Nevada watersheds between upper Sacramento River and the Tehachapi Mountains. Streams and rivers with rocky substrate and open, sunny banks, in forests, chaparral, and woodlands from sea level to 6,700 feet. Sometimes found in isolated pools, vegetated backwaters, and deep, shaded, spring-fed pools	**No potential to occur**. No CNDDB records within 5 miles of the project site. No suitable habitat for the species was observed during the technical studies for the project (AECOM 2018b, 2018c).

Table 3.3-4 Special-Status Wildlife Species' Potential to Occur in the Project Area and Potential for Occurrence on the Project Site

Species	Regulatory Status[1]			Habitat	Potential for Occurrence[2]
	Federal	State	WBWG[3]		
California red-legged frog *Rana draytonii*	T	SSC	–	Occurs throughout California and northern Baja California. Lowlands and foothills in or near permanent sources of deep water with dense, shrubby, or emergent riparian vegetation. Requires 11–20 weeks of permanent water for larval development and must have access to aestivation habitat. Endemic to California and Baja California, at elevations ranging from sea level to 1,524 meters (5,000 feet). Has a distinct aquatic and upland habitat requirement that includes pools of slow-moving streams, perennial or ephemeral ponds, and upland sheltering habitats.	**Not likely to occur**. No CNDDB records within 5 miles of the project site. The habitat assessment conducted for this species in 2018 concluded that the project site is outside the species' range, and that physical barriers prevent dispersal into the project site from the nearest occurrence (AECOM 2018c).
Giant garter snake *Thamnophis gigas*	T	T	–	Slow-moving streams, sloughs, ponds, marshes, inundated floodplains, rice fields, and irrigation/drainage ditches on the Central Valley floor with mud bottoms, earthen banks, emergent vegetation, abundant small aquatic prey, and absence or low numbers of large predatory fish. Requires permanent water during the active season. Also requires upland refugia not subject to flooding during the snake's inactive season.	**Not likely to occur**. No suitable habitat in the Solano 4 East project subarea. In Solano 4 West, three wetlands were identified as potential suitable aquatic habitat; however, the aquatic habitat provides only limited refugia/dispersal because of the scarcity of mammal burrows or soil cracks (AECOM 2018d).
Birds					
Cooper's hawk *Accipiter cooperii*	–	WL	–	Breeds in mixed deciduous forest, riparian forest, open woodlands, and urban areas.	**Low potential to occur**. No suitable nesting habitat; no accounts documented in the avian use summary (Estep Environmental Consulting 2018b).
Tricolored blackbird *Agelaius tricolor*	–	T SSC	–	Forages in agricultural lands and grasslands; nests in marshes, riparian scrub, and other areas that support cattails or dense thickets of shrubs or herbs. Requires open water and protected nesting substrate, such as flooded, spiny, or thorny vegetation.	**Known to occur**. No nesting colonies recorded on-site; occurs on the project site in the nonbreeding season in mixed winter flocks of starlings and blackbirds (Estep Environmental Consulting 2018b).

Table 3.3-4 Special-Status Wildlife Species' Potential to Occur in the Project Area and Potential for Occurrence on the Project Site

Species	Regulatory Status[1]			Habitat	Potential for Occurrence[2]
	Federal	State	WBWG[3]		
Grasshopper sparrow *Ammodramus savannarum* (nesting)	–	SSC	–	Nests and forages in dense grasslands; favors a mix of native grasses, forbs, and scattered shrubs.	**Low potential to occur**. Annual grassland throughout the project site provides suitable nesting and foraging habitat; however, this species has not been documented within the WRA (Estep Environmental Consulting 2018b).
Golden eagle *Aquila chrysaetos* (nesting)	–	FP	–	Prefers open terrain for hunting, such as grasslands, meadows, deserts, savannas, and early successional stages of forest and shrub habitats. Nests in rugged, open habitats with canyons and escarpments, typically on cliffs and rock outcroppings; however, will also nest in large trees in open areas, including oaks, sycamores, redwoods, pines, and eucalyptus, overlooking open hunting habitat.	**Known to occur**. No cliffs, trees, or other structures for nesting are present on the project site. Golden eagles migrate through and winter in the Central Valley, but the valley floor is not within the core breeding range, and typical habitat is present in rolling foothills, mountains, and deserts. Possible nesting in the Meins Landing area in the future (Estep Environmental Consulting 2018a). Five golden eagle territories within 10 miles were identified during a 2011 eagle survey for the Collinsville Wind Project, which corresponds with the Solano 4 West subarea of the current project (GANDA 2011). Species could forage in grassland habitat on the project site.

Table 3.3-4 Special-Status Wildlife Species' Potential to Occur in the Project Area and Potential for Occurrence on the Project Site

Species	Regulatory Status[1]			Habitat	Potential for Occurrence[2]
	Federal	State	WBWG[3]		
Short-eared owl *Asio flammeus*	–	SSC	–	Usually found in grasslands, dunes, meadows, and saline and fresh emergent wetlands with low perches. Nests on the ground in vegetation.	**Low potential to occur**. The species is known to occur within the WRA (Estep Environmental Consulting 2018b). Suitable habitat occurs in the southern portions of the Solano 4 East and West project subareas near the Sacramento River.
Burrowing owl *Athene cunicularia* (year-round)	–	SSC	–	Nests and forages in grasslands, agricultural lands, open shrublands, and open woodlands with existing ground squirrel burrows or friable soils. Suitable burrow sites consist of short, herbaceous vegetation with only sparse cover of shrubs or taller herbs.	**Known to occur**. Annual grassland throughout the project site represents suitable nesting and foraging habitat. The project site is within the year-round range of the species. Wintering birds have been observed by SMUD in the study area, but no breeding activity has been documented in the project area (AECOM 2018a).
Ferruginous hawk *Buteo regalis*	–	WL	–	Breeds outside of California and forages in grasslands.	**Could occur**. The species is known to occur in the fall and winter months in the study area. Suitable foraging habitat is present on the project site (Estep Environmental Consulting 2018b).

Table 3.3-4 Special-Status Wildlife Species' Potential to Occur in the Project Area and Potential for Occurrence on the Project Site

Species	Regulatory Status[1]			Habitat	Potential for Occurrence[2]
	Federal	State	WBWG[3]		
Swainson's hawk *Buteo swainsoni* (nesting)	–	T	–	Forages in grasslands, irrigated pastures, and agricultural lands; nests in riparian and isolated trees.	**Known to occur**. Several individuals have been recorded during bird abundance surveys on several wind projects in the WRA; no suitable nesting habitat on the project site, although the species is known to nest elsewhere in the WRA (Estep Environmental Consulting 2018a, 2018b).
Mountain plover *Charadrius montanus*	–	SSC	–	Forages on grasslands and plowed fields. Will roost in depressions of ungulate hoof prints and plowed furrows.	**Low potential to occur**. A known wintering site occurs 5 miles north of the project site (CDFW 2019a).
Yellow rail *Coturnicops noveboracensis*	–	SSC	–	Requires sedge marshes and meadows with moist soil and shallow standing water.	**Low potential to occur**. Suitable habitat for the species may be found in the southernmost end of the Solano 4 West project subarea near the Sacramento River; however, no recent observations have been found within the past 20 years (CDFW 2019a).
Northern harrier *Circus hudsonius* (nesting)	–	SSC	–	Uses a variety of open grassland, wetland, and agricultural habitats. Breeding habitats include marshy meadows, wet and lightly grazed pastures, and freshwater and brackish marshes; and dry upland habitats, such as grassland, cropland, drained marshland, and shrub-steppe in cold deserts.	**Known to occur**. Annual grassland throughout the project site represents suitable nesting and foraging habitat. Common resident raptor species within the project study area (Estep Environmental Consulting 2018b).

Table 3.3-4 Special-Status Wildlife Species' Potential to Occur in the Project Area and Potential for Occurrence on the Project Site

Species	Regulatory Status[1]			Habitat	Potential for Occurrence[2]
	Federal	State	WBWG[3]		
White-tailed kite *Elanus leucurus* (nesting)	–	FP	–	Individuals prefer open grasslands with dispersed trees for nesting and perching. Frequently found along tree-lined river valleys with contiguous open areas.	**Known to occur**. The species is known to occur within the project site and throughout the WRA. Annual grassland throughout the project site provides suitable foraging habitat. Nesting habitat is not found on the project site (Estep Environmental Consulting 2018b).
California horned lark *Eremophilia alpestris actia*	–	WL	–	Nests and forages in short-grass prairie, fallow fields, alkali flats, mountain meadow, and coastal plain.	**Known to occur**. Observed within the project site and one of the most common bird species to occur in the WRA. Suitable habitat is present on the project site (Estep Environmental Consulting 2018b).
American peregrine falcon *Falco peregrinus anatum*	D	D, CDFW-FP	–	Distributed throughout the United States. The habitat of the peregrine falcon includes many terrestrial biomes in North America. Most often, breeding peregrine falcons use habitats containing cliffs and almost always nest near water (Wheeler 2003:477; White et al. 2002). Peregrine falcons generally use open habitats for foraging. Nonbreeding peregrine falcons may also occur in open areas without cliffs. Many artificial habitats like towers, bridges, and buildings are also used by peregrine falcons (White et al. 2002).	**Could occur**. Occurs seasonally throughout the WRA. Suitable foraging habitat is found within the project site. CNDDB location is suppressed and the only occurrence was in 2015 in the Rio Vista quadrangle (CDFW 2019a).
Saltmarsh common yellowthroat *Geothlypis trichas sinuosa*	–	SSC	–	Breeds in woody swamp, brackish marsh, and freshwater marsh.	**Low potential to occur**. The species has been documented only in the Solano 4 project site within the WRA. Suitable habitat may occur within wetland features of the project (Estep Environmental Consulting 2018b).

Table 3.3-4 Special-Status Wildlife Species' Potential to Occur in the Project Area and Potential for Occurrence on the Project Site

Species	Regulatory Status[1]			Habitat	Potential for Occurrence[2]
	Federal	State	WBWG[3]		
Bald eagle *Haliaeetus leucocephalus* (nesting and wintering)	D	E, FP	–	Individuals forage primarily in large inland fish-bearing waters with adjacent large trees or snags; occasionally in uplands with abundant rabbits, other small mammals, or carrion. They often roost communally in winter.	**Low potential to occur**. The species is known to occur in the WRA. The nearest possible breeding territory would be centered on Grizzly Island approximately 4–5 miles west of the WRA; however, because no eagle activity was observed at the time of the survey (2016–2018), it is considered inactive (Estep Environmental Consulting 2018b).
Loggerhead shrike *Lanius ludovidianus* (nesting)	–	SSC	–	Forages in grasslands and agricultural fields, and nests in scattered shrubs and trees.	**Known to occur**. The species is known to occur within the project site and annual grassland throughout the project site represents suitable foraging habitat. Nesting habitat is limited to scattered trees and shrubs (Estep Environmental Consulting 2018b).
California black rail *Laterallus jamaicensis coturniculus*	–	T	–	Inhabits freshwater marshes, wet meadows, and shallow margins of saltwater marshes bordering larger bays.	**Low potential to occur**. Suitable habitat may be present along the Sacramento River near the project site (CDFW 2019a). This species has also been documented in the Montezuma I Wind Project in the Year 2 report (H. T. Harvey & Associates 2015a).

Table 3.3-4 Special-Status Wildlife Species' Potential to Occur in the Project Area and Potential for Occurrence on the Project Site

Species	Regulatory Status[1]			Habitat	Potential for Occurrence[2]
	Federal	State	WBWG[3]		
Song sparrow ("Modesto population") *Melospiza melodia mailliardi*	–	SSC	–	Prefers riparian willow thickets, valley oak riparian with understory of blackberry, ruderal areas along levees and irrigation canals, and cattail and tule marshes.	**Low potential to occur**. Suitable habitat may be present along the Sacramento River; however, the nearest CNDDB occurrence was in Discovery Bay, approximately 20 miles southeast of the project site (CDFW 2019a).
Suisun song sparrow *Melospiza melodia maxillaris*	–	SSC	–	Range confined to tidal salt and brackish marshes from the Carquinez Strait and Suisun Bay east to the confluence of the San Joaquin and Sacramento rivers.	**Low potential to occur**. Suitable habitat may be present along the Sacramento River; however, the nearest CNDDB occurrence was in Suisun Bay, approximately 7 miles southwest of the project site (CDFW 2019a).
Double-crested cormorant *Phalacrocorax auritus*	–	WL	–	Colonial nester on coastal cliffs, offshore islands, and along lake margins in the interior of the state. Nests along the coast on sequestered islets, usually on ground with a sloping surface or in tall trees along lake margins (CDFW 2019a).	**Low potential to occur**. Unlikely to nest in the project site; however, could potentially be found along the river or islets near the project site. A rookery site was found during the Collinsville Wind Project preconstruction surveys, which correspond with Solano 4 West portion of the project site (GANDA 2011).
California Ridgway's rail *Rallus obsoletus obsoletus*	E	E	–	Lives in brackish water marshes in dense pickleweed and cordgrass.	**Low potential to occur**. Suitable habitat may be present along the Sacramento River near the project site; however, no known occurrences have been documented within 10 miles of the project site (CDFW 2019a).

Table 3.3-4 Special-Status Wildlife Species' Potential to Occur in the Project Area and Potential for Occurrence on the Project Site

Species	Regulatory Status[1]			Habitat	Potential for Occurrence[2]
	Federal	State	WBWG[3]		
Bank swallow *Riparia riparia*	–	T	–	Forages in open riparian areas, grassland, wetlands, water, and cropland and nests in vertical banks and cliffs with fine-textured or sandy soils near streams, rivers, ponds, and lakes.	**No potential to occur**. No suitable nesting habitat present on the project site. One CNDDB occurrence documented approximately 4 miles east of the Solano 4 East project subarea (CDFW 2019a).
California least tern *Sternula antillarum browni*	E	E	–	Seacoasts, beaches, bays, estuaries, lagoons, lakes, and rivers. Nests, rests, and loafs on sandy beaches, mudflats, and salt-pond dikes.	**Low potential to occur**. A nesting colony has been documented within 3 miles west of the Solano 4 West project subarea in the Montezuma wetlands (Frost 2015).
Mammals					
Pallid bat *Antrozous pallidus*	–	SSC	High	Grasslands, shrublands, oak woodlands, forests; most common in open, dry habitats; individuals roost in rock crevices, cliffs, caves, mines, and hollows of oaks and redwoods, and under sloughing bark, and human structures (e.g., bridges, buildings).	**Not likely to occur**. No suitable roost habitat is present within or near the project site and this species typically forages near its roost.
Townsend's big-eared bat *Corynorhinus townsendii*	–	SSC	High	Uncommon colonial bat associated with coniferous forests, mixed mesophytic forests, deserts, agricultural areas, native prairies, riparian communities, and coastal habitat types; individuals typically roost in caves and mines, but also in basal hollows of trees, including redwoods, and human structures (e.g., bridges, buildings).	**Not likely to occur**. No suitable roost habitat is present within or near the project site for this uncommon species (CDFW 2019a).
Silver-haired bat *Lasionycteris noctivagans*	–	–	Medium	Common bat distributed in coastal and montane forests. Individuals roost in hollow trees, snags, buildings, rock crevices, caves, and under bark. Females congregate in small maternity colonies inside trees.	**Known to occur**. The species was recorded in the High Winds Project during fatality monitoring from 2003–2004 (Kerlinger et al. 2006).

Table 3.3-4 Special-Status Wildlife Species' Potential to Occur in the Project Area and Potential for Occurrence on the Project Site

Species	Regulatory Status[1]			Habitat	Potential for Occurrence[2]
	Federal	State	WBWG[3]		
Western red bat *Lasiurus blossevillii*	–	SSC	High	Solitary foliage-roosting bat associated with riparian habitat (particularly willows, cottonwoods, sycamore, and eucalyptus), but individuals also use orchards, agricultural, and sometimes urban environments.	**Known to occur**. No suitable roost trees are present on the project site; however, this species is known to migrate through the project study area and has been documented within the WRA during fatality monitoring at several wind projects (SMUD 2007).
Hoary bat *Lasiurus cinereus*	–	–	Medium	Uncommon, solitary foliage-roosting bat. The most widespread North American bat. Individuals rear young in woodlands and forests with medium-sized to large trees with dense foliage.	**Known to occur**. This species is known to occur in the area and has been documented in several fatality monitoring reports throughout the history of the WRA.
Long-eared myotis *Myotis evotis*	–		Medium	Colonial bat found in coniferous forests; individuals prefer to roost in hollow trees or under bark.	**Low potential to occur**. This species' range falls within the project site; however, no suitable roost habitat is present within or near the project site.
Fringed myotis *Myotis thysanodes*	–	–	High	Uncommon colonial forest/woodland bat that roosts in crevices in buildings, underground mines, rocks, cliff faces, bridges, and large decadent trees and snags.	**Low potential to occur**. This species' range falls within the project site; however, no suitable roost habitat is present within the project site.
Long-legged myotis *Myotis volans*	–	–	High	Colonial bat found in coniferous forests at 4,000–9,000 feet in elevation.	**No potential to occur**. This species' range falls within the project site; however, no suitable habitat or suitable roost habitat is present within the project site.

Table 3.3-4 Special-Status Wildlife Species' Potential to Occur in the Project Area and Potential for Occurrence on the Project Site

Species	Regulatory Status[1]			Habitat	Potential for Occurrence[2]
	Federal	State	WBWG[3]		
San Francisco dusky-footed woodrat *Neotoma fuscipes annectens*	–	SSC	–	Found throughout the San Francisco Bay Area in grasslands, scrub, and wooded areas.	**No potential to occur**. The nearest CNDDB occurrence, documented approximately 11 miles southwest of the project site, was a dead-on-arrival individual in 2015 (CDFW 2019a).
Salt-marsh harvest mouse *Reithrodontomys raviventris*	E	E	–	The southern subspecies inhabits salt marshes of the San Francisco Bay Area. Prefers marshes with dense stands of pickleweed that are adjacent to upland, salt-tolerant vegetation, for escape during high tide.	**Low potential to occur**. Suitable habitat may be present in the Solano 4 West project subarea near the Sacramento River. The nearest CNDDB occurrence is in Grizzly Island, approximately 7 miles west of Solano 4 West (CDFW 2019a).
Suisun shrew *Sorex ornatus sinuosus*	–	SSC	–	Found in salt and brackish marshes around the northern margins of San Pablo and Suisun bays. Prefers areas of low and dense vegetation for coverage and food supply.	**Low potential to occur**. Suitable habitat is present near the project site near the shore. However, most recent CNDDB occurrence was from 1983 near Grizzly Island (CDFW 2019a).
American badger *Taxidea taxus*	–	SSC	–	Most abundant in the drier open stages of most shrub, forest, and herbaceous habitats with friable soils; generally associated with treeless regions, prairies, parklands, and desert areas. Needs open, uncultivated land.	**Low potential to occur**. Annual grassland throughout the project site represents suitable habitat; however, land disturbance from disking precludes establishment of burrows or dens on most of the project site; the nearest CNDDB occurrence is 7 miles south of the project site (CDFW 2019a).

Table 3.3-4 Special-Status Wildlife Species' Potential to Occur in the Project Area and Potential for Occurrence on the Project Site

Species	Regulatory Status[1]			Habitat	Potential for Occurrence[2]
	Federal	State	WBWG[3]		
San Joaquin kit fox *Vulpes macrotis mutica*	E	T	–	Alkali sink, valley grassland, and woodland, in valleys, and adjacent gentle foothills; hunts in areas with low sparse vegetation that allows good visibility and mobility.	**Not likely to occur**. Annual grassland throughout the project site represents suitable habitat; however, the nearest CNDDB occurrence is 7 miles south of the project site (CDFW 2019a).

Notes: CDFW = California Department of Fish and Wildlife; CNDDB = California Natural Diversity Database; Delta = Sacramento–San Joaquin Delta; DPS = Distinct Population Segment; WRA = Wind Resource Area; ppt = parts per thousand; SMUD = Sacramento Municipal Utility District; WBWG = Western Bat Working Group

[1] Legal Status Definitions:

Federal:
E Endangered (legally protected)
T Threatened (legally protected)
D Delisted (no Endangered Species Act protection)
PT Proposed as threatened
R Under review
No status

State:
FP Fully protected (legally protected)
SSC Species of special concern (no formal protection other than CEQA consideration)
E Endangered (legally protected)
T Threatened (legally protected)
CE Candidate endangered
WL Watch listed
No status

[2] Potential for Occurrence:

No Potential to Occur: The project site is outside the species' range or suitable habitat for the species is absent from the project site and adjacent areas.

Not Likely to Occur: No occurrences of the species have been recorded within or immediately adjacent to the project site, and either habitat for the species is marginal or potentially suitable habitat may occur, but the species' current known range is restricted to areas far from the project site.

Low Potential to Occur: The species was identified during literature review as potentially occurring near the project site and habitat for the species is marginal or potentially suitable habitat may occur, but there are no records of species occurrence within the project site or its vicinity.

Could Occur: The project site is within the species' range, and no occurrences of the species have been recorded within the project site; however, suitable habitat for the species is present and recorded occurrences of the species are generally present in the vicinity.

Known to Occur: The project site is within the species' range, suitable habitat for the species is present, and the species has been recorded from within the project site.

[3] Western Bat Working Group (WBWG) Western Bat Species Regional Priority Matrix:

High = bat species considered the highest priority for funding, planning, and conservation actions.
Medium = species that warrant closer evaluation, more research, and conservation actions addressing both the species and possible threats.
Low = species for which the available data indicate that populations are stable and the potential for major changes in status in the near future are considered unlikely.

Sources: CDFW 2019a; eBird 2012; USFWS 2019a, 2019b; data compiled by AECOM in 2019.

A search of the CNDDB database results identified 21 special-status wildlife species that occur within a 5-mile radius of the project components. These species are listed in Table 3.3-5 and their locations shown in Exhibit 3.3-3 below.

Table 3.3-5 Special-Status Wildlife Species Occurring within a 5-Mile Radius of the Project Components

Common Name	Scientific Name
Birds	
tricolored blackbird	*Agelaius tricolor*
short-eared owl	*Asio flammeus*
burrowing owl	*Athene cunicularia*
mountain plover	*Charadrius montanus*
yellow rail	*Coturnicops noveboracensis*
saltmarsh common yellowthroat	*Geothlypis trichas sinuosa*
song sparrow "Modesto" (population)	*Melospiza melodia*
Suisun song sparrow	*Melospiza melodia maxillaris*
double-crested cormorant	*Phalacrocorax auritus*
California least tern	*Sternula antillarum browni*
Mammals	
western red bat	*Lasiurus blossevillii*
salt-marsh harvest mouse	*Reithrodontomys raviventris*
Amphibians and Reptiles	
California tiger salamander	*Ambystoma californiense*
Northern California legless lizard	*Anniella pulchra*
California glossy snake	*Arizona elegans occidentalis*
western pond turtle	*Emys marmorata*
Alameda whipsnake	*Masticophis lateralis euryxanthus*
giant garter snake	*Thamnophis gigas*
Fish	
Sacramento Perch	*Archoplites interruptus*
Delta Smelt	*Hypomesus transpacificus*
Longfin Smelt	*Spirinchus thaleichthys*
Source: CDFW 2019a; data compiled by AECOM in 2019	

The CNDDB suppresses precise information on golden eagle nesting sites to protect the species; therefore, Exhibit 3.3-3 does not show the known nesting locations of this species. Migratory birds, which are addressed below, are not addressed individually in Tables 3.3-4 and 3.3-5 unless they have been otherwise designated as special-status species by CDFW or USFWS.

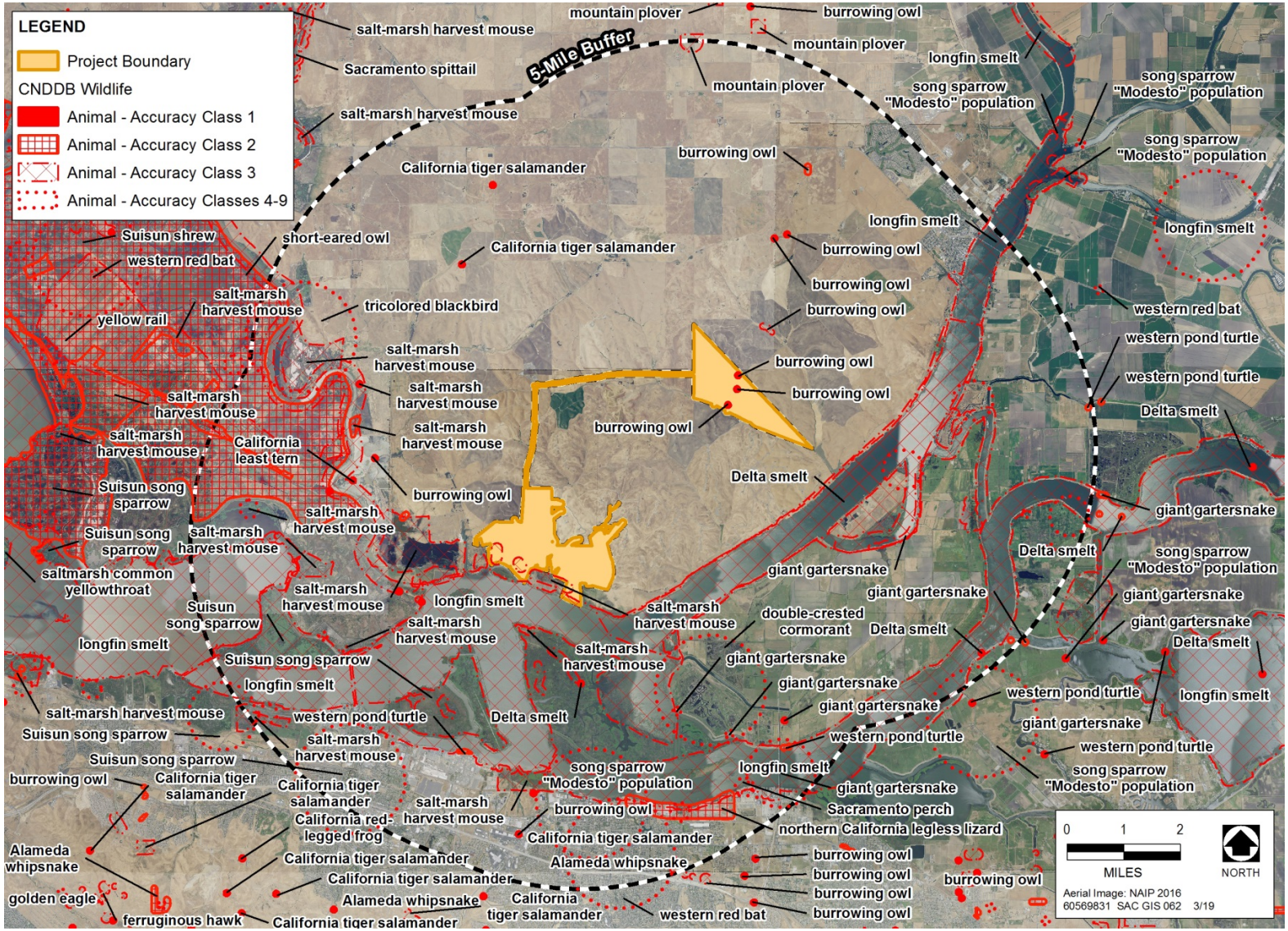


Exhibit 3.3-3 Special-Status Wildlife Species within 5 Miles of the Project Components

Based on field survey results, and the assemblage of a 30-year period of avian use and abundance data in the WRA (Estep Environmental Consulting 2018b), the following special-status species are known to occur in the project area: Swainson's hawk, golden eagle, bald eagle, burrowing owl, loggerhead shrike, northern harrier, tricolored blackbird, American white pelican, American peregrine falcon, double-crested cormorant, white-tailed kite, prairie falcon, and short-eared owl (Estep Environmental Consulting 2018b).

The life history and ecology of special-status species known or with potential to occur on the project site is discussed further below and in Appendix C. The following species are not discussed further because they and/or suitable habitats are absent from the project area: Delta Smelt, Longfin Smelt, and Steelhead.

Amphibians and Reptiles

California Tiger Salamander

The endemic California tiger salamander is a large terrestrial salamander that typically inhabits grassland and oak woodland habitats below 1,500 feet in elevation that have scattered ponds, intermittent streams, vernal pools, and artificial pools. The population is divided into three distinct population segments (DPSs) based on their geographical distribution: the Santa Barbara DPS, Sonoma DPS, and Central California DPS. The Santa Barbara and Sonoma DPSs are federally listed as endangered, while the Central California DPS is federally listed as threatened. The California tiger salamander is a California Species of Special Concern throughout its range. Threats from habitat loss, introduction of invasive predators, and habitat fragmentation have led to the species' rapid decline (Collins et al. 1988; Shaffer et al. 1993; Jennings and Hayes 1994).

AECOM biologists conducted a habitat assessment and focused aquatic surveys for California tiger salamander in the project area (AECOM 2018b). The focused aquatic surveys included dip-net sampling and eDNA sampling. Two of the aquatic features on the project site are ponds with deep standing water and mature emergent and shoreline vegetation that could provide potentially suitable breeding habitat for California tiger salamander. Four other wetlands on or near the project site provide moderately suitable habitat. However, upland areas adjacent to all of these aquatic features provide only limited upland refugia/dispersal habitat, with either infrequent or no small-mammal burrowing activity or cracks and fissures.

All aquatic features on or near the project site are 2.27 miles or more from the nearest known California tiger salamander occurrence (Occurrence No. 1037), and 3.57 miles or more from the nearest known breeding occurrence of this species (Occurrence No. 1180). In addition, the upland habitat between these occurrences and the aquatic features within the habitat assessment study area consist of fallow, grazed, and dryland farmland. These lands are regularly disturbed by active farming practices, making them inhospitable and impassible to dispersing salamanders for an average of 3 of every 5 years. California tiger salamanders have a typical age to first reproduction of 4–5 years, with 1.4 reproduction events in a lifetime and a life span of up to 10 years (USFWS 2017). Given these life

history characteristics, ongoing land use practices near the project site limit opportunities for California tiger salamanders to successfully migrate and disperse between upland refugia habitat and aquatic breeding habitat.

This conclusion is consistent with previous habitat assessments conducted for California tiger salamander in or near portions of the project study area. In its habitat assessment for the Solano 4 West project subarea (formerly the Collinsville Wind Project), Rana Resources (2010) determined that the absence of suitable aquatic habitat on-site and lack of nearby California tiger salamander records in both aquatic and upland habitats indicate that this species is not present. The California tiger salamander habitat assessment at Solano 4 West in 2017 (AWE 2017d) concluded that despite the presence of potentially suitable upland habitat in the project area, multiple barriers to movement by and dispersal of California tiger salamanders exist between the nearest known occurrences and the project area, in the form of roads and developed habitat. These barriers include the multiple wind turbine access roads and Birds Landing Road, which would restrict movements by California tiger salamanders between the nearest known CNDDB occurrences and the northernmost point of the project area. Additional wind turbine access roads and Montezuma Hills Road and Talbert Lane act to restrict California tiger salamander movement to the more southern portions of the project area. The Sacramento River forms a barrier to movement from the south and east, and Suisun Marsh a barrier from the west.

Annual monitoring reports prepared for the neighboring Montezuma wetlands restoration site also provide information about habitat conditions for California tiger salamanders west of Collinsville Road. The Montezuma Wetlands Restoration Project began in 2004 with the goal of converting 1,800 acres of reclaimed tidelands into tidal and seasonal wetlands along the northeastern side of Montezuma Slough over a 15-year period. Although biological monitoring efforts for special-status aquatic species include surveys for listed branchiopods and amphibians, the California tiger salamander was not included as a target species, and no evidence of recolonization by California tiger salamander has been reported to date (Acta Environmental 2011).

Any California tiger salamanders remaining in the Montezuma Hills are unlikely to breed successfully under the adverse conditions that characterize this area. These adverse conditions include highly disturbed uplands that remain subject to disturbance by land use practices, limited upland refugia, regular disruptions/barriers to dispersal, and habitat fragmentation. These conditions make recruitment of future generations of salamanders unlikely. This conclusion is supported by eDNA sampling, which did not detect the presence of California tiger salamanders in representative ponds in the study area.

Thus, based on the ongoing land use practices, the Montezuma Hills likely represent a population sink where California tiger salamander persistence is unlikely, and recolonization is unlikely to be successful. For these reasons, California tiger salamander is not expected to occur on the project site.

California Red-Legged Frog

The California red-legged frog, a federally listed threatened species, is the largest native frog found throughout California, with a few populations occurring in Baja California, Mexico. The species has special habitat conditions that must include aquatic and upland habitat components for it to breed successfully (USFWS 2006).

AECOM biologists conducted a habitat assessment and aquatic sampling surveys for the California red-legged frog (AECOM 2018c). The aquatic sampling involved visual encounter surveys to minimize disturbance to aquatic breeding habitat. If no California red-legged frogs were detected, the surveyors entered the aquatic feature and conducted dip-net sampling. Aquatic sampling was performed after March 15 to avoid affecting egg masses. The survey results indicate what previous surveys (Rana Resources 2010; AWE 2017f) in the area have found: no suitable aquatic or upland habitat for California red-legged frog was observed in the Solano 4 East project subarea. The Solano 4 West subarea had two aquatic features with limited upland refugia because of the scarcity of small-mammal burrows or soil cracks and fissures present at those wetlands; they were determined to not be suitable habitat for California red-legged frog (AECOM 2018c).

Giant Garter Snake

The giant garter snake is federally listed and state-listed as threatened, and has the potential to occur in the project area. The giant garter snake is one of the largest snakes found in California and can reach up to 63 inches in length. Giant garter snake is active primarily from March to September, and will hibernate through the rest of the year and typically occur in aquatic features in the Sacramento and San Joaquin valleys. Like the previously discussed special-status species, giant garter snake has both aquatic and upland habitat requirements to thrive successfully in their environment. These requirements include the presence of water during the species' active season, protective emergent vegetative cover, upland refugia for over-wintering habitat that does not flood, availability of small prey, and the absence of large predatory fish (USFWS 2015).

AECOM biologists conducted a desktop review for CNDDB database occurrences within the project site and a 5-mile buffer; they also conducted a habitat assessment for giant garter snake on the project site and within a 1,884-foot buffer around the project footprint boundaries (AECOM 2018d). The surveys determined that no suitable habitat is present in the Solano 4 East subarea or along the proposed collection line. The Solano 4 West subarea includes three aquatic features that provide suitable habitat, with deep standing water and mature emergent and shoreline vegetation. The upland habitat adjacent to all three aquatic features provides limited giant garter snake refugia because few to no small-mammal burrows or soil cracks are present (AECOM 2018d).

Previous habitat assessments conducted for giant garter snake on or near portions of the project site also concluded that giant garter snake habitat in the Solano 4 West subarea is limited or unavailable (Rana Resources 2010). Jennings (2009) addressed the Collinsville property, which covered some but not all of the current Solano 4 West

subarea, and that study determined that giant garter snake was not present because of the absence of suitable aquatic habitat. AWE (2017d) concluded that although no suitable habitat was present in the Solano 4 West subarea, off-site aquatic features along the Sacramento River south of the Solano 4 West subarea could provide potential aquatic habitat.

Unsurveyed aquatic features bordering the Sacramento River in the floodplain between the river and the Montezuma Hills may provide suitable habitat for giant garter snake, and the presence of giant garter snake in these locations cannot be ruled out. This potentially suitable habitat is beyond the boundaries of the project area, but was within the 1,884-foot study area buffer.

Birds

American White Pelican

American white pelican is a California species of concern. In California, American white pelican nests only at large lakes in the Klamath Basin, from April through August. Throughout the rest of the year, American white pelican inhabits river sloughs, freshwater marshes, large lakes, estuaries, salt ponds, and coastal bays. Migrant flocks can pass overhead almost any month, but mainly in the spring and fall throughout the state.

American white pelicans have been observed during avian surveys in the WRA (Estep Environmental Consulting 2018b). However, no suitable breeding or foraging habitat occurs in the project area.

California Horned Lark

California horned lark is on the CDFW watch list. California horned lark is a resident in a variety of open habitats in California: in the grasslands along the coast and deserts to open habitat above the tree line. Horned larks prefer open, barren country with bare ground and short grasses. Adults feed on seeds but will feed insects to their young. The species is a ground nester, with nests woven of grass or other plant material, lined with filler material, and placed in a depression or cavity in the ground.

California horned lark is among the most common birds in the WRA and on the project site (Estep Environmental Consulting 2018b). The project site provides suitable foraging and breeding habitat for California horned lark, particularly the open annual grasslands and agricultural lands.

Loggerhead Shrike

Loggerhead shrike, a California species of special concern, is a resident and winter visitor in the lowlands and foothills throughout California, including the project area. Loggerhead shrike tends to occur in open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches. It requires tall trees or shrubs for nesting; open

areas such as annual grasslands for hunting; and sharp, thorny, or multi-stemmed plants and barbed-wire fences on which to impale prey.

The project area provides suitable foraging habitat for loggerhead shrike, but no nesting habitat. This species has been observed in the WRA and on the project site.

Tricolored Blackbird

Ninety-nine percent of the tricolored blackbird population is known to occur in California, making it mostly endemic to the state. More than 75 percent of the breeding population occurs in the Central Valley (Beedy and Hamilton 1999). The tricolored blackbird is a highly colonial bird and can form one of the largest colonies of any of the North American passerines. The colonies require open water, open foraging habitat, and suitable nesting habitat to breed successfully.

Tricolored blackbird nesting habitat typically includes dense thickets of vegetation such as cattails, tules, blackberry, or wild rose surrounded by foraging habitats that may include semi-natural grasslands, agricultural croplands, or alkali scrub habitats, and a nearby source of freshwater. During the nonbreeding season, tricolored blackbirds often form mixed-species flocks with other blackbird species such as red-winged blackbirds, Brewer's blackbirds, brown-headed cowbirds, and European starlings.

The tricolored blackbird has been observed within the WRA during the nonbreeding season, typically in mixed flocks with other blackbird species (Estep Environmental Consulting 2018b). The only potentially suitable nesting habitat in the project area is the brackish marsh near the shores of the Sacramento River. However, no suitable breeding habitat for the species occurs within the Solano 4 Wind project site.

Burrowing Owl

Western burrowing owl is a California species of special concern. Burrowing owls primarily inhabit low-lying grasslands or prairies. They also have been known to occur in disturbed habitats such as farmlands, levee banks, and other disturbed habitats where burrows or burrow-like shelters are present for roosting and nesting.

AECOM biologists conducted a habitat assessment for burrowing owl throughout the project site and found no evidence of owl occupancy. Potential habitat for the species is present in areas of nonnative annual grassland (456 acres of the 8,997-acre study area), and where agricultural land is left to fallow or is grazed. Sparsely vegetated grassland habitat, undisked agricultural lands, and unvegetated areas near fence lines or buildings, or where erosion produces exposed soils could provide suitable habitat (AECOM 2018a).

Burrowing owls were documented in the northeast portion of the project footprint from December 1999 to May 2000 (CDFW 2019a). The closest owl sighting occurred in 2014 and was recorded in Montezuma, approximately 1.5 miles from the project site (eBird

2012). SMUD staff members and consultants have also observed burrowing owl over-wintering on the project site during the nonbreeding season (Rice, pers. comm., 2018).

Ferruginous Hawk

Ferruginous hawk is on the CDFW watch list. Ferruginous hawk does not breed in California, but is a winter resident and migrant in the lower elevations and open grasslands in the Modoc Plateau, Central Valley, Coast Ranges, and southwestern California. The species prefers open country, primarily prairies, plains, and shrub steppe. Ferruginous hawks may forage for small mammals over cultivated areas, and perches such as poles, lone trees, knolls, and rocky outcrops are essential foraging habitat.

Ferruginous hawk has been observed in the WRA (Estep Environmental Consulting 2018a). The project site provides suitable foraging habitat, primarily in the annual grasslands.

Golden Eagle

The golden eagle is found in most of North America and has been well documented in and adjacent to the WRA. Golden eagles can be found in a range of habitats, from forests, canyon, and scrublands to grasslands and oak woodlands. They typically breed from January through August, with March and April being the peak months for activity. Their nests are found on the platforms of steep cliffs or in large trees, and a female will lay one to three eggs. Golden eagles occur at lower densities in the WRA than in the Coast Ranges, partly because of the WRA's limited nesting habitat and prey populations (Kerlinger et al. 2009).

Surveys for nesting activity by golden and bald eagles were conducted over the 3 breeding seasons between 2016 and 2018, within a 10-mile radius of the project site (Estep Environmental Consulting 2018a). No eagles were observed at the four historic golden eagle nest sites within the WRA during these surveys. The most recent activity reported at these sites occurred at one location in 2012; the other three nest sites have not been occupied by golden eagles since 2008 and are currently occupied by other raptor species. Nesting activity at five golden eagle nesting territories that lie within a 10-mile buffer, but outside of the WRA, was not confirmed. However, these nesting territories are considered extant because of incidental eagle observations and the limited ability to confirm nest occupancy (Estep Environmental Consulting 2018a).

Merlin

Merlin is on the CDFW watch list. Merlin occurs throughout California, except in high-elevation mountain areas, as a winter, nonbreeding migrant and resident from September to May. In California, merlins frequent coastlines, open grasslands, savannas, woodlands, lakes, wetlands, edges, and early successional woodland habitats. In general, they prefer a mix of low and medium-height vegetation with some trees, and avoid dense forests and treeless arid regions. Merlins feed primarily on small birds, and to a lesser extent, on small

mammals and insects. They rely on speed and agility to hunt their prey, and often hunt by flying fast and low, typically less than 1 meter above the ground.

Merlins have been observed in the WRA infrequently (Estep Environmental Consulting 2018b).

Northern Harrier

Northern harrier, a California species of special concern, forages and breeds in a variety of lowland terrestrial and aquatic habitats including marshes, wet meadows, annual grasslands, irrigated pastures, and some croplands. This species is known to nest in nearby Suisun Marsh. Northern harrier breeds from April to September, with peak breeding activity from June through July. Northern harriers are ground nesters, preferring dense patches of tall, undisturbed vegetation. Rodents, particularly California voles, are a main staple of their diet, and these species can be found in large numbers near wet habitats (Shuford and Gardali 2008).

The project site provides suitable foraging and marginal nesting habitat for this raptor, and harriers have been observed on the project site.

Peregrine Falcon

Peregrine falcon, a California fully protected species, is widely distributed and occurs throughout the Central Valley, and in coastal areas and northern mountains of California. Riparian areas, wetlands, lakes, and other aquatic features provide important breeding and foraging habitat for this species. Nests are constructed on depressions or ledges in cliffs, banks, and dunes, usually near water, although this species is also known to nest on human-made structures (buildings and bridges) and old tree snags.

Peregrine falcon has been observed infrequently during bird use surveys in the WRA (Estep Environmental Consulting 2018b). The project site provides suitable foraging habitat, but no nesting habitat.

Prairie Falcon

Prairie falcon is on the CDFW watch list. This species occurs primarily as a year-round resident in California from the southeastern deserts northwest throughout the Central Valley and along the inner Coast Ranges and Sierra Nevada. Prairie falcon tends to occur in open habitats such as grasslands, savannas, rangeland, desert scrub, and some agricultural fields. Prairie falcons eat mostly small mammals, small birds, and reptiles and breed from mid-February through mid-September, with peak breeding occurring from April through early August. Most prairie falcon nests are on overhanging, south-facing cliffs up to 500 feet high. Prairie falcons also nest in trees, on power lines, on buildings, in caves, or in stone quarries.

Prairie falcon has been observed in the WRA (Estep Environmental Consulting 2018b). The project site provides suitable foraging habitat, but lacks suitable nesting habitat.

Swainson's Hawk

Swainson's hawk is listed by CDFW as a threatened species. This species breeds in the western United States and Canada, and winters in South America. In California, the Swainson's hawk prefers to occupy and breed in desert, grassland, and agricultural habitats. The species is adapted for aerial foraging, and will spend a large amount of time soaring and flying over open habitats. Swainson's hawks are known to travel long distances to find habitat that offer abundant prey. Nest placement is also dependent on the ability to find suitable foraging prey nearby, and nests will be often built from materials not found near the location where the nest was placed (Woodbridge 1998).

AECOM conducted an eagle and raptor survey within a 10-mile radius of the Solano 4 East project subarea. During this survey, all nesting raptors and common raven nests were recorded. A total of 58 non-eagle raptor and raven nests were located, including 20 Swainson's hawk nests. The surveys determined that no Swainson's hawk nests are present on the project site. Most nests observed were located north of the project site, within the Jepson Prairie Grasslands (Estep Environmental Consulting 2018a). Swainson's hawks do not nest on the project site, but they have been observed there, particularly during disking of agricultural lands; disking results in the emergence of small mammals and large insects that attract foraging raptors, including Swainson's hawks (Estep, pers. comm., 2018).

White-tailed Kite

White-tailed kite, a California fully protected species, is commonly found in lowland valley and coastal areas throughout California. This species forages in open grasslands, meadows, wetlands, and agricultural areas and feeds primarily on small rodents and mammals. White-tailed kites hunt over lightly grazed or ungrazed fields that may support larger prey populations than more heavily grazed areas. Kites typically nest in the upper third of trees that may be 10–160 feet tall. These can be open-country trees growing in isolation, or at the edge of or within a forest, usually near open foraging spaces.

The project area provides suitable foraging habitat for white-tailed kite, but no nesting habitat, and the species has been observed in the WRA (Estep Environmental Consulting 2018b).

Bats

Most North American bats are insectivorous, are unusually long-lived (approximately 15–30+ years), and have unusually low reproductive rates (typically one or two surviving offspring every few years) for a mammal their size. For this reason, they require high adult survivorship to avoid population declines (Baerwald et al. 2009 in DTU 2013; Barclay and

Harder 2003 in Thompson et al. 2017). Studies have shown that migratory bat species are affected disproportionately by wind farms (Frick et al. 2017).

The project site overlaps with the ranges of eight bat species of conservation concern: pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), silver-haired bat (*Lasionycteris noctivagans*), Western red bat (*Lasiurus blossevillii*), hoary bat (*L. cinereus*), long-eared myotis (*Myotis evotis*), long-legged myotis (*M. volans*), and fringed myotis (*M. thysanodes*). Three of these bats, Townsend's big-eared bat, western red bat, and pallid bat, are species of special concern (Table 3.3-4). A ninth bat species, Mexican free-tailed bat (*Tadarida brasiliensis*), is a common and abundant species that also roosts and moves through the region in large numbers.

All of these species roost in trees, structures, caves, and rock features. No roosting bats have been found in existing structures on the project site (the old wind turbines), and no other roost habitat exists on-site. Some potential exists for any of these bat species to move through the project site. Given their habitat preferences and distance from potential roost sites, none are anticipated to routinely occur at the project site in large numbers (Table 3.3-4). However, four of these species, hoary bat, Mexican free-tailed bat, western red bat, and silver-haired bat, are considered migratory species known to move through the project area, and all four have been found in the spring and fall during mortality studies conducted at other wind farms in the WRA.

Hoary Bat

Hoary bat is a widespread species of particular conservation concern relative to wind energy production (Frick et al. 2017). This is a generally solitary species that roosts in clumps of tree foliage. Hoary bats do not exhibit high roost fidelity and change roosts frequently. To forage at night, they can travel over large areas and/or over long distances from their roost sites. Although hoary bats are typically associated with riparian habitat, they can be found in a wide variety of habitats during migration in the spring and fall. The winter behavior of this species is not well understood. Evidence suggests that in California, some individuals of the species conduct short seasonal migrations to the coast, while others migrate long distances or hibernate (Weller et al. 2016; Kennedy et al. 2014).

Western Red Bat

Western red bat exhibits a similar life history as hoary bat, with a noted exception. The red bat is the only North American bat species that has four mammary glands instead of two, and it typically bears two to four young per year rather than a single pup. The survival rates of these young are unknown. Although this species is generally solitary, during the maternity season two or more females and their young have been documented roosting together, forming a small maternity colony in tree foliage.

Mexican Free-tailed Bat

Mexican free-tailed bat is a common colonial species found in a wide variety of habitats. It roosts under bridges and in buildings, caves, abandoned mines, and hollow trees. Colonies of dozens to millions of individuals exhibit high roost fidelity, returning to the same roosts year after year. They are fast fliers known to forage at high altitudes (1,000–10,000 feet) and at long distances from their roost sites. Most colonies migrate south to Mexico and beyond in the winter, although in California some individuals regularly remain over the winter, dropping in and out of torpor depending on weather conditions and prey availability. This species is thought to be one of the only bat species with expanding populations in North America.

Silver-haired Bat

Silver-haired bat is a wide-ranging, fairly common tree-roosting migratory bat. It is often found roosting alone, but females have been documented roosting together in small maternity colonies inside tree cavities. As with the hoary bat and western red bat, the winter behavior of silver-haired bat is not well understood, but it is also thought that in California, some individuals of these species conduct short seasonal migrations to the coast, while others migrate long distances or hibernate.

Townsend's Big-Eared Bat

Townsend's big-eared bat occur in a variety of communities including: coastal conifer and broad-leaf forests; oak and conifer woodlands; arid grasslands and deserts; and high-elevation forests and meadows. Throughout most of its geographic range, it is most common in mesic sites. Known roosting sites in California include limestone caves, lava tubes, mine tunnels, buildings, and other human-made structures. Habitat for Townsend's big-eared bats must include appropriate roosting, maternity, and hibernacula sites free from disturbances by humans.

U.S. Fish and Wildlife Service Critical Habitat and Recovery Plan Areas

USFWS designates critical habitat, defined as a geographic area that contains features essential to the conservation of a species listed as threatened or endangered under the ESA and that may require special management considerations and protection. It represents the habitat that is essential to the species' recovery and may include areas not currently occupied by the species. Habitat need contain only one biological or physical feature necessary to the species to qualify as critical habitat. ESA Section 7 requires that federal agencies ensure, through consultation with USFWS, that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse modification of critical habitat.

The project site is near designated critical habitat for the Delta Smelt (*Hypomesus transpacificus*), Steelhead (*Oncorhynchus mykiss*), Chinook Salmon (*O. tshawytscha*), delta green ground beetle (*Elaphrus viridis*), California tiger salamander Central Valley

DPS (*Ambystoma californiense*), vernal pool fairy shrimp (*Branchinecta lynchi*), and vernal pool tadpole shrimp (*Lepidurus packardi*) (USFWS 2019a). However, no critical habitat for the listed species aforementioned falls within the project site.

Several species recovery plans occur for species occurring near the project area:

- *Sacramento–San Joaquin Delta Native Fishes Recovery Plan*
- *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon*
- *Recovery Plan for the Central California Distinct Population Segment of the California Tiger Salamander*
- *Recovery Plan for the California Red-legged Frog*
- *Recovery Plan for Giant Garter Snake.*

The objective of the *Sacramento–San Joaquin Delta Native Fishes Recovery Plan* is to conserve the ecosystems upon which endangered and threatened species depend. These species include Delta Smelt; Sacramento Splittail; Longfin Smelt; Green Sturgeon; Spring-Run, Late Fall–Run, and San Joaquin Fall-Run Chinook Salmon; and Sacramento Perch (USFWS 1995).

Connectivity and Migration Corridors

The WRA is within the Pacific Flyway, a broad migration corridor that extends the length of the Central Valley. The WRA and the project site are adjacent to the Sacramento–San Joaquin Important Bird Area (Exhibit 3.3-4), which provides habitat and a movement corridor for resident and migratory birds. However, the topographic conditions and bird observation data from the WRA do not suggest any specific movement corridors within the WRA (SMUD 2011). For some species groups, such as waterfowl, most movement appears to go around the Montezuma Hills, either to the north and west toward Suisun Marsh or along the Sacramento River corridor into the Delta (SMUD 2011).

Linkage Corridors

The California Essential Habitat Connectivity Project identifies the privately held wind resource lands (the WRA), including SMUD-owned lands, that overlap the project site as part of an Essential Connectivity Area between nearby Natural Landscape Blocks (i.e., state parks and reserves) (Spencer et al. 2010) (Exhibit 3.3-4). Essential Connectivity Areas, characterized as being more fragmented and less protected than Natural Landscape Blocks, serve an important function to connect the most ecologically intact and well-conserved lands in a region (Spencer et al. 2010). The Essential Connectivity Area that overlaps the Solano 4 East project subarea is made up of mostly developed wind resource lands and agricultural lands and is less permeable to wildlife movements; however, this portion of the project area still provides functional connectivity across the landscape for wide-ranging species.

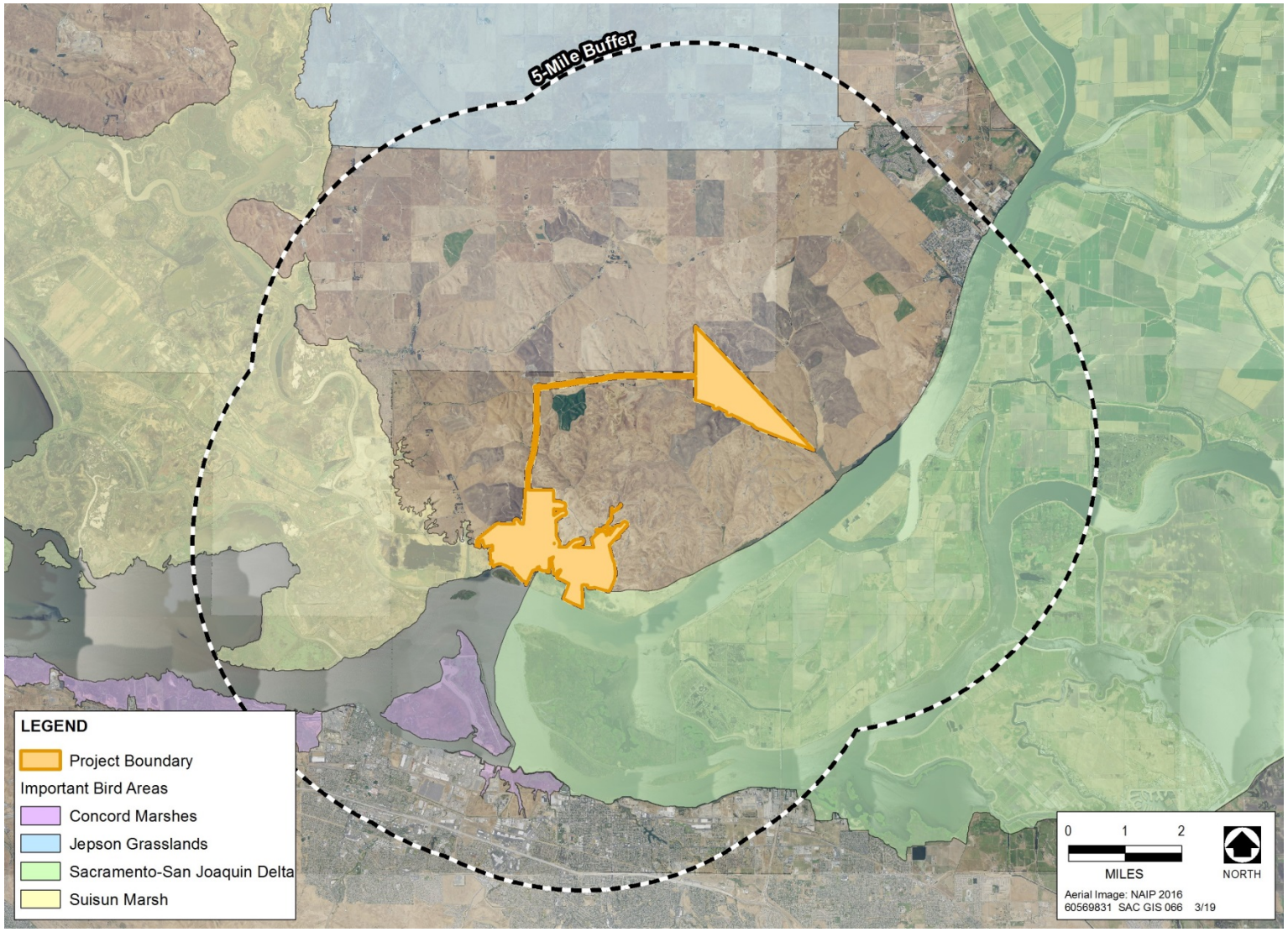


Exhibit 3.3-4 Important Bird Areas in the Vicinity of the Proposed Project

Major rivers (the Sacramento and San Joaquin rivers, which are adjacent to the project area) are also shown on the Essential Habitat Connectivity map to represent where aquatic and riparian corridors may further contribute to ecological connectivity (Exhibit 3.3-5). The aquatic habitats in the Sacramento and San Joaquin rivers, and in numerous tributary creeks and streams, represent important migration corridors for anadromous fish, including several listed species. The project area does not provide any riparian or aquatic habitat corridors that would facilitate movement of terrestrial or aquatic wildlife.

Sensitive Habitats and Sensitive Natural Communities

Sensitive habitats are those that are of special concern to resource agencies or are afforded specific consideration through the State CEQA Guidelines, Section 1602 of the California Fish and Game Code, Section 404 of the CWA, and the state's Porter-Cologne Act (see Section 3.3.1, "Regulatory Setting"). Sensitive habitats may be of special concern to these agencies and conservation organizations for a variety of reasons, including their locally or regionally declining status, or because they provide important habitat to common and special-status species.

Waters of the United States

A wetland delineation was conducted in summer 2017 by Area West Environmental, Inc. on 1,172 acres of the project site comprising the Solano 4 West subarea and homerun collection line running northward to the Russell Substation, including the Russell Substation footprint (AWE 2017b). In 2018, AECOM completed a wetland delineation in the 961.5-acre Solano 4 East subarea, including the associated west-running homerun collection line corridor (AECOM 2019b). Together, these delineation survey reports represent comprehensive coverage of the proposed project, and they are included in Appendix C of this EIR. Appendix C presents details regarding the mapping and wetland delineation methodology, delineation maps, data sheets, and descriptions of each wetland and drainage type.

The wetland delineation surveys by Area West Environmental, Inc. and AECOM included delineation of wetlands and other waters of the United States subject to USACE and Central Valley RWQCB jurisdiction under Section 404 of the federal CWA. The wetland delineation and mapping of the ordinary high-water mark of drainages were conducted according to methods identified in the USACE wetlands delineation manual (Environmental Laboratory 1987) and the revised procedures in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (USACE 2008); and the *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE 2010). In addition, ditches, swales, and drainage channels on the project site could be regulated by CDFW under Section 1602 of the California Fish and Game Code.

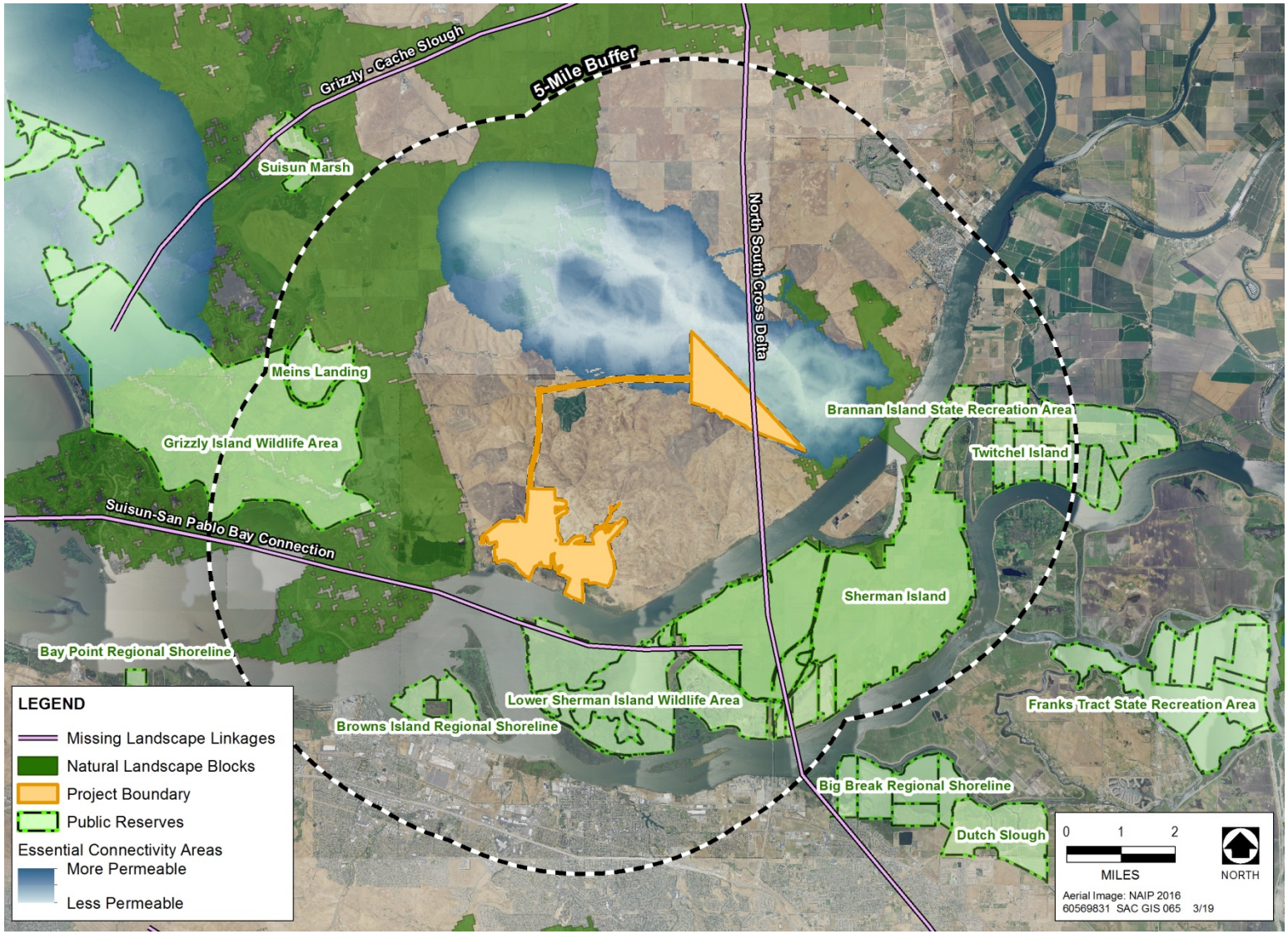


Exhibit 3.3-5 Linkage Corridors and Essential Connectivity Areas

Preliminary jurisdictional determinations have been submitted to the USACE Sacramento District for each subarea (Solano 4 West and Solano 4 East), but the wetland delineation and drainage mapping have not been verified (AWE 2017b; AECOM 2019b). Table 3.3-6 summarizes each aquatic feature and the approximate acreage and/or length mapped within the project site.

Table 3.3-6 Potentially Jurisdictional Aquatic Features Mapped within the Project Site

Feature Type	Acres	Linear Feet
Wetlands[1]		
Alkaline pool	0.09	NA
Emergent marsh brackish	2.42	NA
Seasonal wetland	33.72	NA
Wetland ditch	0.05	313.3
Total Wetlands:	*36.28*	*313.3*
Other Waters[2]		
Open water	0.05	NA
Ephemeral drainage	0.50	16,525.8
Ephemeral swale	0.25	4,734.6
Intermittent drainage	1.00	10,700.5
Perennial swale	0.91	748.2
Seasonal swale	11.36	975.0
Total Other Waters:	14.07	33,684.1
Total Jurisdictional Area	**50.35**	**33,997.5**

Notes:
NA = not applicable
[1] Wetlands under U.S. Army Corps of Engineers jurisdiction must have the following field indicators: a prevalence of hydrophytic vegetation; hydric soils; and wetland hydrology.
[2] Other waters refer to waterways and other water bodies that may lack hydrophytic vegetation and/or evidence of hydric soils but have a defined bed and bank up to the "ordinary high-water mark."
Sources: AWE 2017b; AECOM 2019b

A total of 50.35 acres of potential waters of the United States, consisting of 36.28 acres of wetlands and 14.07 acres of other waters, were mapped on the project site (AWE 2017b; AECOM 2019b). In addition, ditches, swales, drainages, and drainage segments were calculated for total length, accumulating 33,997.5 linear feet (AWE 2017b; AECOM 2019b). Wetland soil samples were classified primarily as clay or silty clay, with the predominant hydric soil indicators being redox dark surface and depleted matrix (AWE 2017b; AECOM 2019b). The primary indicators of wetland hydrology were surface soil cracks, biotic crust, and oxidized rhizospheres along living roots (AWE 2017b; AECOM 2019b).

CDFW-Jurisdictional Riparian Habitat

Riparian habitats were classified, mapped, and quantified separately as part of wetland delineation surveys on the project site (AECOM 2019b). Riparian habitats are defined as tree or shrub vegetation that overlap waterways and may be subject to regulation by CDFW under Section 1602 of the California Fish and Game Code.

A total of 0.11 acre of riparian habitat occurs on the project site, consisting of a small thicket of arroyo willow (*Salix lasiolepis*) along a swale in the southeastern edge of Solano 4 East. This area of riparian vegetation conforms to arroyo willow thickets as described in the *Manual of California Vegetation, Second Edition* (Sawyer et al. 2009) and would be considered upland following Cowardin et al. (1979) (AECOM 2019b).

Sensitive Natural Communities

California natural communities are organized by CDFW and partner organizations, such as CNPS, based on vegetation type classification, and are ranked using the same system to assign global and state rarity ranks for plant and animal species in the CNDDB (CDFW 2018b). CDFW considers natural communities ranked S1–S3 to be sensitive natural communities, to be addressed in the environmental review processes (CDFW 2019c). Sensitive natural communities are defined as being of limited distribution statewide or within a county or region and often vulnerable to the environmental effects of projects (CDFW 2019c).

As described above, a total of eight vegetation communities were mapped on the project site (AWE 2017d; AECOM 2019a). None of these vegetation communities are considered sensitive natural communities (CDFW 2018b). Therefore, sensitive natural communities are considered absent from the project site.

3.3.3. Environmental Impacts and Mitigation Measures

Methods and Assumptions

This impact analysis is was conducted using the assumption that wind turbine generators (WTGs) with a rotor diameter of either 136 meters (136m) or 150 meters (150m) would be installed on the project site. Because of differences in WTG quantity and siting locations as a result of differences in rotor size, the two WTG size options (136m versus 150m) were evaluated separately for potential impacts on biological resources.

Potential impacts of wind power development on biological resources generally fall into two categories: project construction and project operations and maintenance. For example, project construction would result in ground-disturbing activities that could degrade and remove wildlife habitat, while project operation could result in impacts on birds and bats over the life of the project.

To determine the total acreage of potential construction-related impacts on habitat and other biological resources, the disturbance areas for each rotor size option (136m versus 150m) were overlain with the land cover, habitat, and wetland maps prepared by AWE and AECOM during the field habitat assessments and aquatic resources delineations. From this, acreages of temporary and permanent disturbance were quantified for the potential loss of common habitats (agricultural and grazed annual grassland) and sensitive habitats (wetlands and riparian). The potential effects of this habitat loss on common and special-status species and other potential direct and indirect effects were then evaluated.

This impact analysis was developed from the technical data presented in biological resources technical reports prepared for the project (AWE 2017a, 2017b, 2017c, 2017d; AECOM 2018a, 2018b, 2018c, 2018d, 2019a, 2019b; Estep Environmental Consulting 2018a, 2018b) (Appendix D).

The collision risk assessment for birds and bats is based on assessments of collisions from the postconstruction monitoring data collected in the region during the past 25 years at adjacent wind energy project sites in the WRA (i.e., enXco V; High Winds; Shiloh I, II, III, and IV; SMUD Solano Wind Phases 1, 2, and 3; and Montezuma I and II). These adjacent wind energy facilities are all within about 6.5 miles of the project site, and some are immediately adjacent to the site (Exhibit 3.3-6).

Habitat across the WRA, including on the project site, is relatively homogeneous and consists primarily of rolling hills supporting treeless grasslands used for dryland wheat farming, livestock grazing, and wind energy generation (see Section 3.3.2, "Environmental Setting"). Habitat on the project site does not differ substantially from that in other areas in the WRA, except that it lies closer to the Sacramento River. For these reasons, bird and bat use and WTG-related fatalities on surrounding project sites are expected to be indicative of what would be observed on the project site.

Thresholds of Significance

The following thresholds of significance are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. Implementing the proposed project would result in a significant impact related to biological resources if it would:

- have a substantial adverse effect, either directly or through habitat modification, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFW or USFWS;

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

- have a substantial adverse effect on federally protected waters of the United States, including wetlands, as defined by 33 CFR Part 328 of USACE's regulations

and 40 CFR Parts 110, 112, 116, 117, 122, 230, 232, 300, 301, and 401 of the U.S. Environmental Protection Agency's regulations, through direct removal, filling, hydrological interruption, or other means;

- interfere substantially with the movement of any native resident or migratory wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;

- conflict with any local policies or ordinances protecting biological resources, such as a grading and erosion control policy or ordinance; or

- conflict with the provisions of an adopted HCP, natural community conservation plan, or other approved local, regional, or state HCP.

Issues Not Discussed Further

The "Impact Analysis" section will not further analyze the proposed project against thresholds of significance for which no significant impacts have been identified based on technical studies conducted in the vicinity of the project site (AWE 2017c, AWE 2017d, AECOM 2019a). Therefore, the following issues will not be discussed further in the impact analysis.

Sensitive Natural Communities

No sensitive natural communities (other than wetlands) occur in the project area. Therefore, sensitive natural communities would not be directly or indirectly affected by the project, and this issue will not be discussed further.

Special-Status Fish

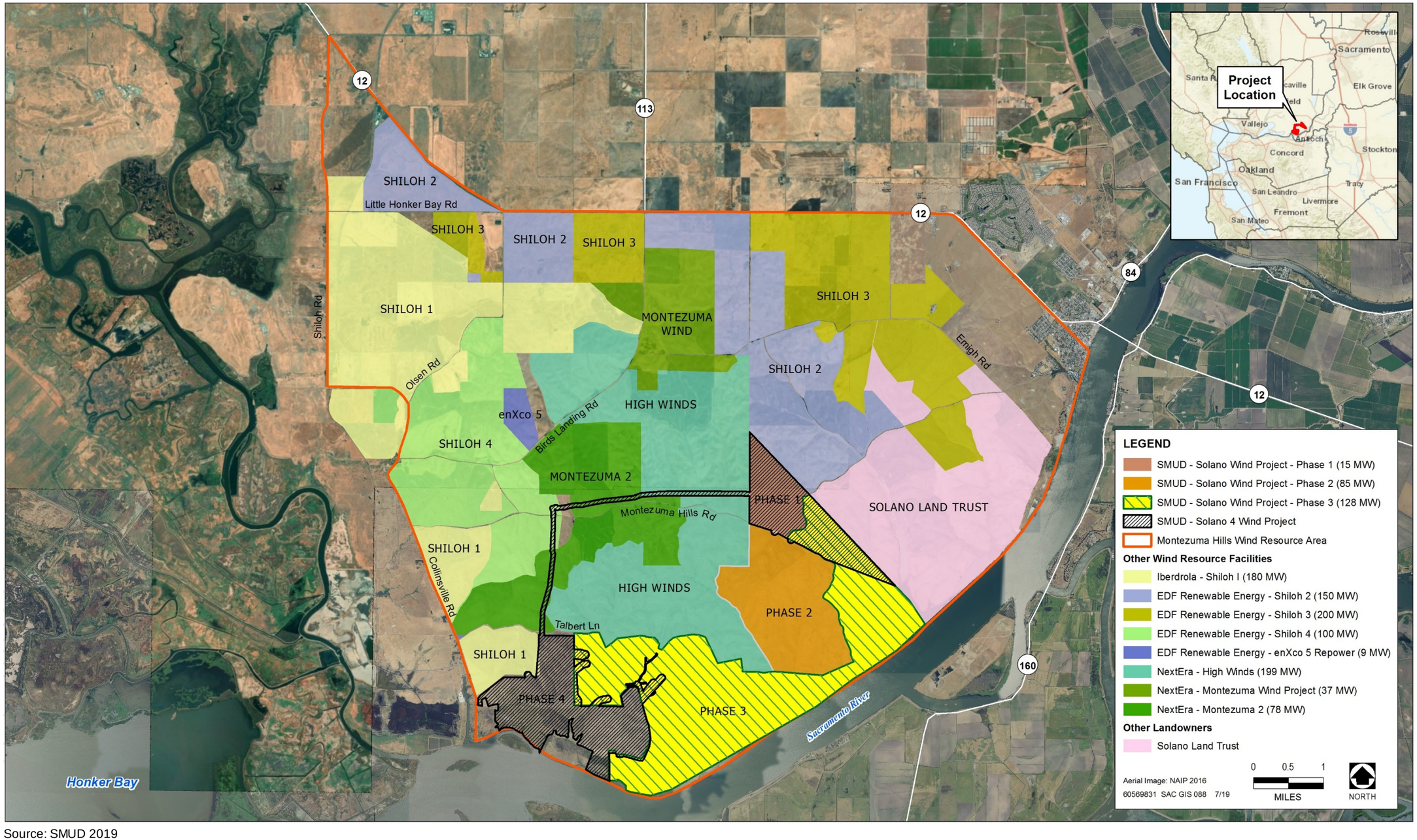
No habitat for special-status fish species occurs on the project site; therefore, this issue will not be discussed further.

Special-Status Invertebrates

No habitat for special-status invertebrates (e.g., vernal pools, elderberry shrubs, sand dunes, rocky sites, buckwheat plants) is present on the project site; therefore, this issue will not be discussed further.

Consistency with Local Policies

There are no policies related to biological resources in the *Solano County General Plan* or other local planning documents that apply to the project; therefore, this issue will not be discussed further.



Source: SMUD 2019

Exhibit 3.3-6 Adjacent Wind Energy Facilities

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Consistency with an Adopted HCP or Natural Community Conservation Plan

The Solano County Water Agency Multispecies HCP has been under development, but has not been adopted yet; SMUD is not a participatory party and wind resource development is not a covered activity. No potential for conflict exists; therefore, this issue will not be discussed further.

Impact Analysis

Construction-Related Impacts on Wildlife Species

Project construction would result in temporary and permanent impacts on habitat. Temporary construction-related impacts include vegetation removal and grading of temporary staging areas, temporary access roads to accommodate delivery of project components, and temporary project component laydown and work areas. Areas of temporary impacts would be reclaimed and revegetated after completion of their use. Construction of the 136m WTGs would temporarily disturb approximately 403.75 acres of habitat, while construction of the 150m WTGs would temporarily disturb approximately 352.49 acres of habitat.

For this evaluation, it is assumed that permanent habitat loss would occur only in the areas occupied by the following features: project access roads, WTG foundations, and permanent work areas surrounding the WTGs. The area of permanent impacts would be approximately 37.06 acres for the 136m WTG option or 35.2 acres for the 150m WTG option. Improvements to the Russell Substation would occur in previously developed areas and would not result in habitat loss. Existing vegetation would remain in all areas not occupied by permanent facilities or infrastructure.

During construction, direct and indirect impacts on sensitive biological resources present on the project site could result from:

- vegetation removal and grading at the WTG locations and for access roads;
- trenching for underground home run lines;
- earth work to excavate the foundations for WTG towers;
- temporary stockpiling of construction materials or other construction wastes;
- siltation from the construction site into adjacent areas; and
- potential runoff of diesel fuel, gasoline, oil, or other toxic materials used for project construction into adjacent wetlands and habitat for special-status species.

The following assumptions were used in assessing the magnitude of possible impacts on biological resources as a result of project construction:

- Staging (including vehicle parking), storage, and access areas would be restricted to the project's disturbance area or other existing developed sites.

- Indirect impacts on habitats adjacent to the project site would be avoided by establishing appropriate buffers, or through existing topographical barriers.

- The impacts of future decommissioning would be similar to the impacts of project construction, and the same mitigation measures for minimizing impacts would apply.

Construction Impacts on Special-Status Amphibians and Reptiles

Impact 3.3-1: Temporary and permanent construction impacts on special-status amphibians and reptiles.

Special-status amphibians or reptiles could be killed or injured by construction equipment or personnel, should they be present on the project site during construction. This impact would be **potentially significant**.

Construction of the proposed project has the potential to result in injury or mortality of special-status amphibians and reptiles, namely California red-legged frog, giant garter snake, and California tiger salamander. Potential effects on each of these species are described separately below.

California Red-Legged Frog

As discussed above in Section 3.3.2, "Environmental Setting," the project site is out of the range of California red-legged frog, and no suitable aquatic or upland habitat for this species is present on the project site. Because this species is absent from the project site, direct or indirect impacts on California red-legged frog are not expected to result from project construction or operation, nor would the project result in the loss of upland or aquatic habitat for this species. This impact would be **less than significant**. No mitigation is required.

Giant Garter Snake

Habitat assessments conducted on or near portions of the project site in 2018 (AECOM 2018d) and in previous years (Rana Resources 2010; AWE 2017e) found that the project site provides only limited aquatic and upland habitat for giant garter snake. The Solano 4 East project subarea and the alignment for the proposed collection lines do not provide any suitable upland or aquatic habitat for this species.

Off-site aquatic features along the Sacramento River south of the Solano 4 West subarea could provide potential aquatic habitat for giant garter snake. In addition, three wetland features in the western portion of Solano 4 West (aquatic features J, N, and P described in AECOM 2018d) offer suitable or moderately suitable aquatic habitat for the species. However, these aquatic features are more than 1,000 feet from any proposed project

disturbance. Because it is subject to ongoing disturbance by agricultural operations, the upland habitat in Solano 4 West would provide only limited potential upland refugia for giant garter snake, with only a few small-mammal burrows or soil cracks and fissures.

Because aquatic and upland habitat for giant garter snakes does not occur in or near any areas proposed for project construction, project construction and operation are not expected to cause direct or indirect impacts on giant garter snake, nor would the project result in the loss of upland or aquatic habitat for this species. This impact would be **less than significant**. No mitigation is required.

California Tiger Salamander

As described above and in studies conducted on or near the project site (AECOM 2018b; Rana Resources 2010; AWE 2017d), California tiger salamanders are not likely to occur on the project site. This conclusion is based on the highly disturbed nature of the uplands throughout the project site, which remain subject to land use practices involving ground disturbance, and which feature limited upland refugia, regular disruptions and barriers to dispersal, and habitat fragmentation.

Suitable aquatic habitat is also limited on the project site. Two aquatic features (aquatic features J and N in AECOM 2018b) occur in Solano 4 West. These are intact ponds with deep standing water and mature emergent and shoreline vegetation that could provide potentially suitable breeding habitat for California tiger salamander. Four other wetlands on or near the project site (aquatic features B, P, 4, and 13 in AECOM 2018b) provide moderately suitable habitat. However, upland areas adjacent to all of these aquatic features provide only limited upland refugia/dispersal habitat, with either infrequent or no small-mammal burrowing activity or cracks and fissures (AECOM 2018b).

No evidence of California tiger salamander eggs, larvae, juveniles, or adults was detected during dip-net and eDNA sampling conducted in 2018 (AECOM 2018b). Negative results from such sampling do not provide definitive evidence of absence; however, this information, combined with the habitat assessment, adds weight to the conclusion that California tiger salamanders are unlikely to occur on the project site.

All aquatic features in or near the project site are 2.27 miles or more from the nearest known California tiger salamander occurrence, and 3.57 miles or more from the nearest known breeding occurrence of this species. In addition, the upland habitat located between these occurrences and the aquatic features identified in the habitat assessment study area consists of fallow, grazed, and dryland farmlands. These lands undergo regular disturbance as part of the active farming practices underway, making them inhospitable to and impassible by dispersing salamanders for an average of 3 of every 5 years. These ongoing land use practices limit opportunities for California tiger salamanders to successfully migrate and disperse between upland refugia habitat and aquatic breeding habitat.

California tiger salamanders are highly unlikely to breed on-site. Individuals typically remain close to their breeding ponds, but this species has been known to travel large distances between breeding ponds and their upland refugia. The 2003 *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (USFWS and DFG 2003) references 1.24 miles as the observed mobility of California tiger salamander. The possibility that a wandering California tiger salamander would occur on the project site during construction cannot be ruled out. A wandering individual would be most likely to occur in or near the project area's drainages, particularly during warm winter rains (Shaffer and Fisher 1991; Barry and Shaffer 1994).

If a wandering California tiger salamander individual were to be present on the project site during construction, it could be killed or injured by construction activities. In addition, a wandering individual could be trapped in steep-walled holes or trenches, or become entangled in erosion control material. This impact would be **potentially significant**.

Mitigation Measure 3.3-1a: Avoid and minimize impacts on California tiger salamander.

SMUD will implement the following measures to avoid and minimize potential construction impacts on California tiger salamander:

- A qualified California tiger salamander biologist (defined as an individual with 3 years of experience conducting surveys for California tiger salamander and habitat in the project region) will be present on-site to conduct monitoring during project construction and decommissioning activities that disturb surface soils within 250 feet of drainages or any other aquatic features identified as suitable for California tiger salamander (AECOM 2018b).

- To the extent possible, SMUD will confine all project-related parking, storage areas, laydown sites, equipment storage, and any other surface-disturbing activities to previously disturbed areas.

- All steep-walled holes or trenches that are 1 foot deep or greater and located within 250 feet of aquatic habitat that is suitable for CTS will have at least one escape ramp constructed of earthen fill or wooden planks. All such holes or trenches will be completely covered before sunset of each workday using boards or metal plates that are placed flush to the ground, and will be inspected before the start of daily construction activities.

- To prevent inadvertent entrapment of California tiger salamanders during project construction, maintenance, and decommissioning, all construction pipes, culverts, conduits, and other similar structures stored on-site overnight will be inspected before the structure is buried. Plastic monofilament netting will not be used for sediment control because it could pose an entrapment hazard to California tiger salamanders and other wildlife.

Mitigation Measure 3.3-1b: Develop and implement a worker environmental awareness program.

Before the start of any construction activity, SMUD will develop a worker environmental awareness program that will be provided to all personnel working on the project site during construction and operation. Training materials and briefings will include but not be limited to the following elements:

- A discussion of applicable requirements established by the following laws and regulations, consequences of noncompliance, and the specific conditions of permits obtained for the project from regulatory agencies (USACE, the RWQCB, USFWS, and CDFW) under these laws and regulations:
    - the federal ESA and CESA;
    - the Bald and Golden Eagle Protection Act;
    - the Migratory Bird Treaty Act;
    - the Clean Water Act;
    - Sections 3503, 3503.5, 3511, 3513, 3800(a), 4150, 4700, 5050, 5515, and 1602 of the California Fish and Game Code;
    - California Code of Regulations Title 14, Sections 30.10 and 251.1;
    - the Porter-Cologne Water Quality Control Act;
    - Sections 5004 and 7201 of the CDFA Code; and
    - California Coastal Act.
- Information about workers' responsibilities with regard to California tiger salamander, an overview of the species' appearance and habitat, and a description of the measures being taken to reduce potential effects on the species during project construction.
- Identification and values of the special-status plant and wildlife species to be protected by the project; identification of important wildlife habitat and sensitive natural communities to be protected; and identification of special-status species, life history descriptions, habitat requirements during various life stages, and the species' protected status.
- Fire protection measures, measures to avoid introduction and minimize the spread of invasive weeds during construction and operation; procedures for managing trash and food waste to prevent attracting corvids or nuisance wildlife to the site; and procedures for preventing and containing spills of hazardous substances.

SMUD will conduct the worker-training program for new employees coming on the project site before the start of any construction, maintenance, or decommissioning activity that would disturb surface soils. SMUD will ensure that all personnel working on-site receive the training, including construction contractors and personnel who will operate and maintain project facilities. The training program will be recorded and subsequently shown to any project personnel who are unable to attend the initial training program.

If a California tiger salamander, alive or dead, is encountered (i.e., observed, killed, or otherwise taken) at any location on the project site during the project's lifetime, SMUD will notify USFWS and CDFW on the same day as the detection. Project personnel will not move the salamander encountered unless instructed to do so by USFWS and CDFW.

If instructed to move the California tiger salamander by USFWS, a USFWS-approved and permitted biologist will carefully relocate the salamander by hand to a suitable, nearby active burrow system (e.g., for Botta pocket gopher or California ground squirrel) outside the area where project activities could injure or kill the animal. (The USFWS-approved and permitted biologist will be an individual with a Section 10[a][1][A] handler's permit for California tiger salamander.) The qualified biologist will monitor the rescued California tiger salamander until it enters the burrow.

In addition to the measures described above, SMUD will implement the following measures, listed after Impact 3.3-13 below, to protect water quality and drainages during construction:

- Mitigation Measure 3.3-13a, "Avoid and Minimize Impacts on Wetlands and Other Waters of the United States"
- Mitigation Measure 3.3-13b, "Avoid and Minimize Potential Effects on Waters of the United States Associated with Installation of Access Road Culvert Crossings"
- Mitigation Measure 3.3-13c, "Comply with Section 1602 Streambed Alteration Agreement"
- Mitigation Measure 3.3-13d, "Avoid and Minimize Potential Effects on Waters of the United States from Horizontal Directional Drilling"

Significance after Mitigation

Mitigation Measures 3.3-1a and 3.3-1b describe minimization and avoidance measures to avoid or reduce potential construction impacts on California tiger salamander. They require avoiding and minimizing effects on aquatic resources, conducting biological monitoring, and providing environmental awareness training to construction personnel. Implementing these mitigation measures to minimize impacts on drainages would reduce potential impacts on California tiger salamander to a **less-than-significant** level.

Construction Impacts on Birds and Bats

This section addresses the impacts of project construction on eagles and other raptors, special-status bird species, common birds, and bats. Bird use has been well documented since wind energy development in the Montezuma Hills began in the mid-1980s (Estep Environmental Consulting 2018b). Avian abundance and use surveys conducted from 1987 through 2015 at wind energy projects in the WRA (High Winds; Montezuma Wind I and II; Shiloh I, II, III, and IV; Collinsville; and previous phases of the Solano 4 Wind Project) provide a thorough description of the distribution and abundance of bird species in the Montezuma Hills and surrounding areas (Estep Environmental Consulting 2018b).

As described by Estep Environmental Consulting (2018b), multiple bird use studies in the WRA indicate that the most frequently observed bird group among all projects combined was blackbirds (Brewer's blackbird, red-winged blackbird, tricolored blackbird, European starling, brown-headed cowbird [*Molothrus ater*], mixed flocks), at 84 percent of the total observations. The most frequently observed species was the red-winged blackbird, at 13.016 birds per hour. Totals for the 10 most frequently observed nonblackbird species in descending order include horned lark, rock pigeon, western meadowlark, turkey vulture, red-tailed hawk, barn swallow, American pipit, house finch, white-crowned sparrow, and common raven. Raptors, which include 17 species (including owls and turkey vultures), composed approximately 3 percent of the total observations. The three most commonly observed raptors—turkey vulture, red-tailed hawk, and American kestrel—contributed to 84 percent of the total raptors observed. Less common raptor species and those that are present seasonally in the WRA, including ferruginous hawk, rough-legged hawk, merlin, peregrine falcon, and prairie falcon, were observed with much less consistency between survey efforts among the bird use surveys in the WRA. All waterbirds (waterfowl, shorebirds, wading birds, seabirds) combined, which included 29 species, represented less than 1 percent of the total observations.

Impact 3.3-2: Construction impacts on nesting birds (nonraptors).

Project construction could affect avian nesting success if active nests would be directly affected or if construction activity would disturb nest sites, thereby reducing adults' nest attentiveness and productivity. This impact would be **potentially significant.**

No project construction activities would occur in or near riparian habitat or seasonal wetlands with emergent vegetation that could support nesting birds. The project would not remove any trees or structures that support nesting raptors, other than the old WTGs that would be removed. Project construction activities and disturbance would occur primarily on agricultural lands that are routinely disturbed by dryland farming and livestock grazing operations. This ongoing disturbance to the landscape from agricultural operations generally discourages ground-nesting birds from becoming established. It also eliminates burrows made by ground squirrels and other animals that could provide habitat for the special-status western burrowing owl. Therefore, project construction activities on agricultural lands are unlikely to affect ground-nesting bird species. An exception to this would be construction activities on agricultural lands that are not subject to ongoing

disturbance, such as along fence lines, private access roads, or other areas where private landowners have staged equipment.

Project construction activities could destroy the nests and eggs of ground-nesting birds such as western meadowlarks, horned larks, northern harrier, burrowing owl, and killdeer. Construction near ground-nesting birds could create noise and vibration that could disturb breeding behavior and/or active nests, potentially leading to nest abandonment and reproductive failure. No trees would be removed by project construction, but the WTGs could support the nests of species such as house finch or mourning dove.

Direct and indirect effects on nesting birds, including special-status species, on and near the project site during construction could result in nest destruction, abandonment, and failure. This impact would be **potentially significant**.

Mitigation Measure 3.3-2: Avoid impacts on nesting birds.

In addition to Mitigation Measure 3.3-1b, "Develop and Implement a Worker Environmental Awareness Program," and measures for biological monitors, SMUD will implement the following measures to avoid directly or indirectly affecting nesting birds during project construction:

- SMUD will conduct preconstruction nesting bird surveys to locate all active nests of special-status birds and birds protected under the MBTA and California Fish and Game Code Sections 3503 and 3503.5. No more than one week before any construction activities occur during the nesting season (February 1–August 31), including vegetation removal if necessary, a qualified biologist shall conduct nesting bird surveys to identify any nests within 100 feet of proposed work areas. The qualified biologist is defined as an individual knowledgeable about the distribution, habitat, life history, and identification of Northern California birds, and with 3 years of experience in nest searching for birds that may be present in the project area.

- If nests are detected during the preconstruction surveys, a 100-foot exclusion zone will be established around the nest in which no work will be allowed until the young have successfully fledged or nesting activity has ceased. The qualified biologist will make the determination of fledging or cessation of nesting. In consultation with a qualified avian biologist, USFWS, and CDFW, the size of the exclusion zone may be modified depending on the species and the type of construction activity and associated disturbance anticipated near the nest.

Significance after Mitigation

The mitigation measures described above would reduce potential construction-related impacts on avian nesting success because the locations of active nests would be identified and the nests would be protected during construction. Therefore, implementing these mitigation measures would reduce impacts on nesting birds to a **less-than-significant** level.

Impact 3.3-3: Loss of foraging and nesting habitat for resident and migratory birds (nonraptors).

Project construction would result in permanent and temporary impacts on foraging and nesting habitat for resident and migratory birds. Because the permanent loss of foraging and nesting habitat caused by the project would be small, and because the habitat types that would be permanently lost are abundant in the project area, this impact would be **less than significant**.

Resident birds such as red-winged blackbirds nest in freshwater marshes in the project area, and horned larks and western meadowlark nest in grasslands. Migratory birds like barn and tree swallows, white-crowned sparrows, and American pipits forage in or over areas that support grasslands, grazed fields, and actively farmed areas. The project would not directly affect freshwater marsh or riparian habitat, and the project's net permanent impacts on vegetation communities would be only 43.82 acres for the 136m WTG option or 39.56 acres for the 150m WTG option (Table 3.3-7).

Table 3.3-7 Temporary and Permanent Impacts of Project Construction on Vegetation Communities in the Project Area, 136-Meter and 150-Meter Wind Turbine Generator Options

136-Meter Wind Turbine Generator Option				150-Meter Wind Turbine Generator Option			
Vegetation Communities	**Disturbance Type**	**Acres**	**Total Acreage**	**Vegetation Communities**	**Disturbance Type**	**Acres**	**Total Acreage**
Actively Farmed	Permanent	11.26	65.65	Actively Farmed	Permanent	10.08	57.17
	Temporary	54.39			Temporary	47.08	
Annual Grassland	Permanent	0.66	1.13	Annual Grassland	Permanent	0.66	1.13
	Temporary	0.47			Temporary	0.47	
Fallow	Permanent	0.00	5.56	Fallow	Permanent	0.00	5.56
	Temporary	5.56			Temporary	5.56	
Freshwater Drainages and Wetlands	Permanent	0.03	0.10	Freshwater Drainages and Wetlands	Permanent	0.02	0.09
	Temporary	0.07			Temporary	0.07	
Grazed	Permanent	31.91	179.16	Grazed	Permanent	28.82	162.71
	Temporary	147.25			Temporary	133.89	
Urban	Permanent	0.00	0.40	Urban	Permanent	0.00	0.40
	Temporary	0.40			Temporary	0.40	
Total	**Permanent**	**43.82**	**251.90**	**Total**	**Permanent**	**39.56**	**226.97**
	Temporary	**208.07**			**Temporary**	**187.41**	

Source: Data compiled by AECOM in 2019

The impact acreages shown in Table 3.3-7 reflect the net impact of project construction minus the acreage of habitats restored from reclaimed access roads. SMUD would remove and restore 14.22 acres of access roads that would no longer be needed after project construction. Table 3.3-7 shows only the net increase in habitat acreage from

restoration of roads that overlap with the project footprint (a net gain of 0.86 acre for the 136m WTG option or 0.02 acre for the 150m WTG option).

Most of these permanent impacts would occur on grazed, actively farmed, or fallow agricultural lands, which are abundant throughout the WRA. Temporary impacts on these habitat types would be greater than permanent impacts (208.07 acres for the 136m WTG option or 187.41 acres for the 150m WTG option). The temporary construction impacts on these habitat types would not differ substantially from the ongoing agricultural disturbance that is a constant feature of land use on the project site.

Because the project-related loss of foraging and nesting habitat for resident and migratory birds would be small, and because these habitats are abundant throughout the project area, this impact would be **less than significant**.

Mitigation Measures

No mitigation is required.

Impact 3.3-4: Construction impacts on raptor nesting activity.

Project construction could affect raptor nesting success if active nests would be directly affected or if construction activity would disturb nest sites, thereby reducing adults' nest attentiveness and nest productivity. This impact would be **potentially significant**.

The project area supports resident raptors that breed and overwinter in the WRA and surrounding areas, and raptors that breed elsewhere but migrate through or overwinter there. The most commonly recorded raptors in the WRA are the four year-round breeding resident species: American kestrel (*Falco sparverius*), red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), and turkey vulture (*Cathartes aura*). This section describes the potential impacts of project construction on raptors that could nest on or near the project site. Construction impacts on eagle nesting success are addressed separately below (see Impact 3.3-6).

Numerous studies have been conducted to document the presence of nesting raptors in the WRA and surrounding areas. Estep Environmental Consulting (2018a) conducted a nest survey within 10 miles of the project area during the 2018 breeding season and reported 23 red-tailed hawk nests, 20 Swainson's hawk nests, nine common raven nests, six great horned owl nests, and one white-tailed kite nest. White-tailed kite and northern harrier have also been documented nesting in or adjacent to the WRA (Hunt et al. 2008), but not within the project area.

Potential nest trees are sparse in the project area, but clusters of trees are present. These include a grove of eucalyptus along the southern boundary of the Solano 4 East project subarea; several groups of large trees around rural residences along Montezuma Hills Road; and some large trees along Stratton Road in Solano 4 West around old barns/residences. These trees are large enough to provide nest sites for common raptors

such as red-tailed hawk, great horned owl, and American kestrel, but they could also be used by special-status raptors such as Swainson's hawks or white-tailed kites.

Although most raptors present in the project area nest in trees, several raptor species nest on the ground or underground rather than in trees, and could potentially be affected by a loss of nesting habitat. These species include the short-eared owl, northern harrier, and burrowing owl. The short-eared owl and northern harrier have not been documented nesting on the project site, and most of the site would be considered unlikely nesting habitat for both species. Although they are known to nest in undisturbed dry grassland habitat, 97 percent of the land in the project area is used for dryland farming and subject to regular disturbance from crop planting, growth, and harvest within a 3-year period. In addition, the project area is located at the southern extent of the breeding range for short-eared owl, and because the species is rarely observed in the project area, it is considered an unlikely breeder. Small areas of undisturbed annual grassland or wetland in the project area could provide suitable nesting habitat for these two species.

Burrowing owls are uncommon winter residents in the WRA and potential breeders (AECOM 2018a). The species occupies underground burrows, typically those of the California ground squirrel (*Spermophilus beecheyi*), and other structures such as concrete culverts, debris piles, and openings under roads. Nonnative annual grasslands in the immediate uplands surrounding aquatic features, and in the interstitial valleys and drainages that are too steep to farm, provide marginal habitat because ground squirrel activity is limited and foraging habitat is fragmented. Likewise, when agricultural land is left fallow or grazed, the potential exists for small mammals to recolonize the study area and burrow, which would also provide suitable nesting and wintering habitat for burrowing owls. Most habitat in the project area is grazed or actively farmed and of relatively low quality with regard to its potential to support burrow structures. Nonetheless, project construction could affect burrowing owls in all suitable habitat within the project boundary, particularly if occupied burrows are present near construction areas where ground disturbance is planned.

The likelihood of construction impacts on raptors that nest in trees or other structures (red-tailed hawk, Swainson's hawk, American kestrel, white-tailed kite, great-horned owl) is expected to be low because no trees or structures are proposed for removal. However, if construction activities were to occur near nests located near but not within the project site, they could disturb active nests, thereby reducing adults' nest attentiveness and productivity. Project construction could have direct impacts on ground-nesting raptors (northern harrier and burrowing owl). Construction equipment could crush the nests or burrows of ground-nesting birds, destroying eggs and/or young, and disturbance of raptor nesting activity by nearby construction could cause nest abandonment. This impact would be **potentially significant**.

Mitigation Measure 3.3-4a: Avoid and minimize impacts on nesting raptors.

SMUD will implement the following measures to avoid and minimize impacts on nesting raptors:

- If construction activities are scheduled to occur during the breeding season (February 1–August 31), SMUD will conduct preconstruction surveys in all potential suitable raptor nesting habitat within 0.25 mile of proposed construction areas, including trees, shrubs, grasslands, and wetland vegetation. A qualified wildlife biologist shall determine the timing of preconstruction surveys based on the time of year and habitats that are present, and shall conduct the surveys no more than 30 days before construction. The 30-day survey period allows flexibility in order for surveys to be conducted when the likelihood of nest detection is maximized (e.g., during courtship, nest building, or when feeding young).

- SMUD will maintain no-disturbance buffers around active raptor nests during the breeding season, or until it is determined the young have fledged. The no-disturbance zone shall include a 500-foot buffer around all raptor nests (including owls) and a 0.25-mile buffer for any active Swainson's hawk nests.

    - No-disturbance buffer sizes for non-special-status species raptors may be increased or decreased by a qualified biologist based on the sensitivity of the species of raptor, or based on site conditions that affect disturbance, such as the type of work, vegetation structure or density, and the line of sight between construction work and the nest to nesting raptors.

    - No-disturbance buffer sizes for special-status raptor species may be increased or decreased by the qualified biologist in consultation with USFWS and CDFW as appropriate.

    - Buffers will not apply to construction-related traffic using existing roads that are not limited to project-specific use (e.g., county roads, highways, farm roads).

    - If no nests are observed during the preconstruction survey but nesting occurs after the start of construction, it will be assumed that the individuals are acclimated to the level of ongoing disturbance.

- SMUD will clearly identify the locations of no-disturbance buffers (e.g., 250 feet, 500 feet, or 0.25 mile) on maps that will be made available to construction crews.

- Before and during construction, a qualified biologist shall identify all active nest setback areas on construction drawings, and if appropriate, shall flag or fence the setback areas.

- If construction is scheduled to occur during the non-nesting season, then no nesting bird surveys are required before construction activity begins, except provisions for surveys for burrowing owls outside the nesting season (September 1–January 31), as specified below in Mitigation Measure 3.3-4b.

Mitigation Measure 3.3-4b: Avoid and minimize impacts on burrowing owls.

To avoid and minimize impacts on burrowing owls, SMUD will implement the following guidelines adapted from the CDFW *Staff Report on Burrowing Owl Mitigation* (CDFG 2012):

- SMUD will have preconstruction burrowing owl surveys conducted in all areas that may provide suitable nesting habitat according to CDFW (CDFG 2012) guidelines. A qualified wildlife biologist shall conduct take avoidance surveys, including documentation of burrows and burrowing owls, in all suitable burrowing owl habitat within 500 feet of proposed construction. The take avoidance surveys, consisting of up to four visits, shall be initiated within 30 days of and completed at least 14 days before construction is initiated at a given location. In areas with burrows or refuge that could potentially support burrowing owls, a clearance visit shall be conducted within 24 hours of construction, including when construction work is reinitiated after a lapse of two or more weeks.

- SMUD will avoid disturbing active western burrowing owl nests and occupied nesting burrows.

    - In accordance with standard CDFW mitigation guidelines, SMUD and its construction contractor will avoid disturbance at occupied burrows in accordance with the following seasonal distance buffers for low, medium, and high levels of disturbance (CDFG 2012):

        - April 1 – August 15: 200 m (low), 500 m (medium), and 500 m (high)

        - August 16 – October 15: 200 m (low), 200 m (medium), and 500 m (high)

        - October 16 – March 31: 50 m (low), 100 m (medium), and 500 m (high)

    - These distances may be increased or decreased if, as determined by a qualified biologist, a different distance is required to ensure construction activities will not adversely affect occupied burrows or disrupt breeding behavior.

- If a qualified biologist, in consultation with CDFW, determines that construction could adversely affect occupied burrows during the September 1–January 31 nonbreeding season, the qualified biologist shall implement passive relocation using one-way doors, in accordance with guidelines prepared by the California Burrowing Owl Consortium (CDFG 2012) and through coordination with CDFW.

Significance after Mitigation

The mitigation measures described above would reduce potential impacts of project construction on raptor nesting success because the locations of occupied nests would be determined and the nests would be protected during construction. Therefore, implementing these mitigation measures would reduce impacts on raptor nesting success to a **less-than-significant** level.

Impact 3.3-5: Removal and modification of raptor nesting, foraging, and roosting habitat during construction.

Project construction would result in permanent and temporary impacts on raptor nesting and foraging habitat. This impact on nesting habitat would be **less than significant** while the impact on foraging habitat would be **potentially significant**.

Construction of access roads, home run collection lines, and other project facilities would result in temporary or permanent impacts on up to 251.90 acres (208.07 acres temporary and 43.82 acres permanent) of potential nesting and foraging habitat for special-status raptor species for the 136m WTG option, or up to 226.97 acres (187.41 acres temporary and 39.56 acres permanent) for the 150m WTG option (Table 3.3-8) Impacts on raptor nesting habitat are expected to be relatively low, whereas numerous special-status raptor species forage within the habitat to be affected. Burrowing owls may also winter in the project area and the potential exists to affect their burrows. Impacts of project construction on nesting habitat and foraging habitat are described separately below.

Nesting Habitat

Raptor nesting habitat in the WRA is limited because of the area's low density of suitable nest trees. However, the impact of project construction on raptor nesting habitat is expected to be low because the project has been designed in a way that would avoid affecting any trees large enough for raptors to use for nesting. As discussed above (Impact 3.3-4), northern harrier and short-eared owl are ground-nesting species that have the potential to nest on the project site. However, the projected impacts on these habitat types would be very small (less than 2 acres; Table 3.3-8), and higher quality habitat is present in greater abundance in areas adjacent to the project site. Based on this assessment, impacts of project construction on raptor nesting habitat would be **less than significant**. No mitigation is required.

Foraging Habitat

Surveys conducted in the WRA and summarized by Estep Environmental Consulting (2018b) indicate that 17 species of raptors (including vultures and owls), including 11 special-status species (Table 3.3-4), have the potential to be present in the WRA. Given the proximity of these surveys to the project site (including two conducted on the project site) and the similarity in habitat throughout the WRA, all of these species are assumed

to have the potential to be present on the project site, even if they have only been detected in other areas of the WRA.

The WRA is used during the breeding season by common species such as red-tailed hawks and American kestrels, and by special-status species including northern harrier and the state-listed Swainson's hawk. During the nonbreeding season, additional special-status species are present, including overwintering ferruginous hawks, and burrowing owls. The numbers of certain species, such as red-tailed hawks, also increase in winter (Estep Environmental Consulting 2018b) as individuals arrive from breeding sites farther north. Although a diverse assemblage of raptor species uses the site, the vast majority forage in grasslands and agricultural lands where prey such as rodents, lagomorphs (rabbits/hares), and birds are present.

If 136m WTGs were installed, project construction of access roads, home run collection lines, and other project facilities would result in impacts on up to 208.07 acres and permanently affect up to 43.82 acres of raptor foraging habitat. If 150m WTGs were selected instead, then the project would temporarily affect up to 187.41 acres and permanently affect up to 39.56 acres of foraging habitat for Swainson's hawk and other raptor species (Table 3.3-8). Net impacts would be lower than these amounts with

Table 3.3-8 Acreages of Potential Raptor Foraging Habitat Affected by Project Construction, 136-Meter and 150-Meter Wind Turbine Generator Options

Wildlife Habitat Type	Disturbance Type	136-Meter Wind Turbine Generator Option		150-Meter Wind Turbine Generator Option	
		Acres	Total Acreage	Acres	Total Acreage
Actively Farmed	Temporary	54.39	65.65	47.08	57.17
	Permanent	11.26		10.08	
Annual Grassland	Temporary	0.47	1.13	0.47	1.13
	Permanent	0.66		0.66	
Fallow	Temporary	5.56	5.56	5.56	5.56
	Permanent	0.00		0.00	
Freshwater Wetlands and Drainages	Temporary	0.07	0.10	0.07	0.09
	Permanent	0.03		0.02	
Urban	Temporary	0.40	0.40	0.40	0.40
	Permanent	0.00		0.00	
Grazed	Temporary	147.25	179.16	133.89	162.71
	Permanent	31.91		28.82	
TOTAL	Temporary	**208.07**	**257.90**	**187.41**	**226.97**
	Permanent	**43.82**		**39.56**	

Source: Data compiled by AECOM in 2019

implementation because temporary impact areas would be restored to their original condition. Thus, the maximum amount of suitable raptor foraging habitat permanently affected by project construction would be 39.56 to 43.82 acres.

Common raptor species and those that overwinter in the area are unlikely to experience discernible population-level effects from the expected amount of habitat loss. However, the loss of foraging habitat could affect the reproductive success of special-status species raptors that breed in the project area, particularly Swainson's hawks. In California's Central Valley, CDFW (DFG 1994) considers the development of suitable Swainson's hawk foraging habitat on a graded scale, based on the distance of the foraging habitat to the nearest active Swainson's hawk nest. Impacts are considered greatest for projects within 1 mile of an active nest, followed by projects within 5 and 10 miles, respectively. Of 20 Swainson's hawk nests identified within 10 miles of the project area during the 2018 breeding season by Estep Environmental Consulting (2018a), two nests were within 5 miles of the project area and one of these was less than 1 mile away (Exhibit 3.3-7). The entire project area lies within 5 miles of an active Swainson's hawk nest, but a small proportion lies within 1 mile of the nearest nest. However, only temporary impacts on habitat are anticipated in areas within the 1-mile buffer.

As part of the repowering process, SMUD would remove and restore 14.22 acres of access roads associated with the previous project. The reclamation would involve removing gravel from the roadways, restoring roadway surfaces to support surrounding agricultural uses (grazing or dryland farming). Approximately 0.86 acre of this restoration area overlaps with the project footprint for the 136m WTG option and 0.02 acre overlaps with the footprint for the 150m WTG option. This acreage would be reclaimed as part of project activities. Therefore, the net restoration acreages associated with each project option are slightly less than 14.22 acres. These areas would be restored to the conditions of the immediately surrounding habitat as shown below (Table 3.3-9), thereby offsetting the impact of project construction on raptor foraging habitat. The maximum net acreage of permanently affected habitat would be reduced from 39.59 or 44.69 acres to 25.38 or 30.49 acres under the 150m option or 136m WTG option, respectively.

Project construction would affect a variety of habitats used by raptors. As described above, the impact on raptor nesting habitat is expected to be low. Impacts on the foraging habitat of breeding and wintering raptors would be more substantial, including foraging habitat within 5 miles of active nests of the state-listed Swainson's hawk, which may be used by other breeding special-status raptor species such as northern harrier and white-tailed kite. This impact would be **potentially significant**.

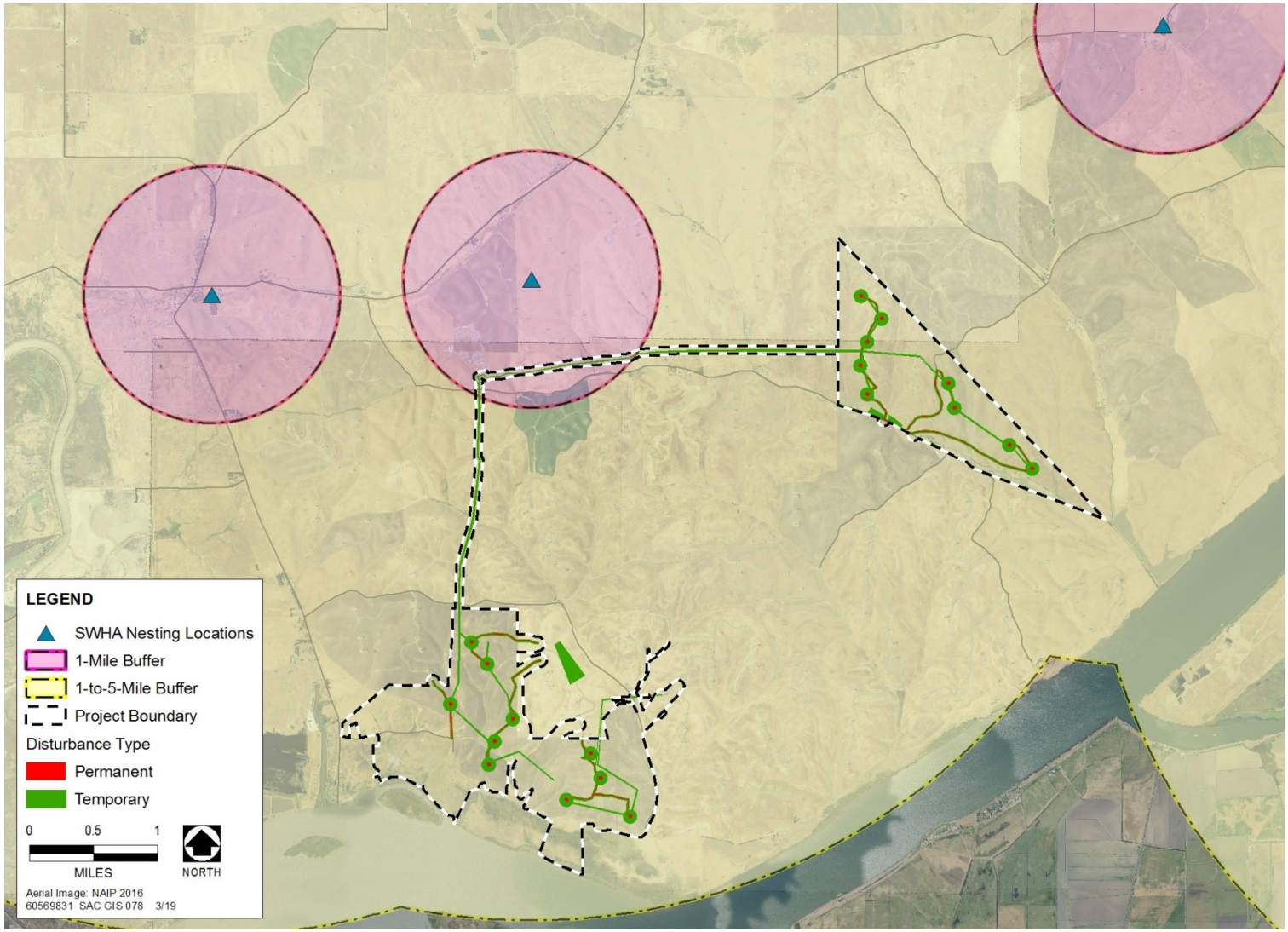

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Exhibit 3.3-7 Swainson's Hawk Nesting Locations

Table 3.3-9 Acreages of Potential Raptor Foraging Habitat Created versus Permanently Removed by Project Construction, 136-Meter and 150-Meter Wind Turbine Generator Options

Wildlife Habitat Type	136-Meter Wind Turbine Generator Option			150-Meter Wind Turbine Generator Option		
	Action	Acres	Net Acreage Affected	Disturbance Type	Acres	Net Acreage Affected
Actively Farmed	Created	7.39	3.87	Created	8.17	1.91
	Removed	11.26		Removed	10.08	
Annual Grassland	Created	0.02	0.64	Created	0.02	0.64
	Removed	0.66		Removed	0.66	
Fallow	Created	0.00	0.00	Created	0.00	0.00
	Removed	0.00		Removed	0.00	
Freshwater Wetlands and Drainages	Created	0.00	0.03	Created	0.00	0.02
	Removed	0.03		Removed	0.02	
Grazed	Created	5.95	25.96	Created	6.01	22.81
	Removed	31.91		Removed	28.82	
TOTAL	Created	**13.36**	**30.49**	Created	**14.20**	**25.38**
	Removed	**43.05**		Removed	**39.58**	

Source: Data compiled by AECOM in 2019

Mitigation Measure 3.3-5: Acquire off-site mitigation to replace lost raptor foraging habitat.

SMUD will implement the following compensatory mitigation to offset net impacts on foraging habitat for breeding Swainson's hawks and other raptor species. Based on Swainson's hawk nest locations documented in recent years, no permanent project impacts on foraging habitat will occur within 1 mile of an active Swainson's hawk. Depending on whether the 150m WTG option or the 136m WTG option is selected, 25.38 acres or 30.49 acres of suitable Swainson's hawk foraging habitat will be required to mitigate this loss.

SMUD will mitigate the loss of Swainson's hawk foraging habitat in accordance with CDFW recommendations (DFG 1994) by providing mitigation lands as follows:

- Foraging habitat permanently lost within 5 miles of an active Swainson's hawk nest tree but more than 1 mile from the nest tree (either 25.38 acres or 30.49 acres, depending on the WTG option selected) will be replaced with 0.75 acre of mitigation land for each acre of foraging habitat permanently lost because of project construction (0.75:1 ratio). All mitigation lands protected under this requirement shall be protected in a form acceptable to CDFW (e.g., through fee title acquisition or conservation easement) on agricultural lands or other suitable habitats that provide foraging habitat for Swainson's hawk.

- Management authorization holders/project sponsors will provide for management of the mitigation lands in perpetuity by funding a management endowment.

Significance after Mitigation

The mitigation measure described above would replace foraging habitat for Swainson's hawks and other raptors at a 0.75:1 ratio. Depending on which WTG option is selected, 19 acres or 23 acres of mitigation lands would be provided to provide Swainson's hawk foraging habitat. These mitigation lands would replace and offset the foraging habitat lost because of project construction. As a result, implementing this mitigation measure would reduce this impact on raptor foraging habitat to a **less-than-significant** level.

Impact 3.3-6: Construction impacts on bald and golden eagle nesting activity.

Project construction activities could affect eagle nesting success if they would disturb nest sites, thereby reducing adults' nest attentiveness and nest productivity. This impact would be **potentially significant**.

Construction impacts on bald and golden eagle nesting habitat are expected to be minimal because the project would not affect any trees or structures large enough for eagles to use for nesting. However, project construction could affect bald and golden eagle nesting success if construction activity were to disturb nest sites or nesting territories, thereby reducing adults' nest attentiveness and productivity.

Between March 2016 and May 2018, ground-based daytime surveys were conducted on the project site and in a 10-mile-radius survey area to determine the presence of active eagle nests and occupied eagle breeding territories, and to record eagle occurrences in the project area (AWE 2017a; Estep Environmental Consulting 2018a). Known historic nest locations within the WRA consist of eucalyptus groves and one transmission tower.

Golden Eagle

Based on a review of numerous previous surveys conducted in and around the WRA since 1987, Estep Environmental Consulting (2018a) identified four historic golden eagle nesting territories within the WRA. Recent surveys between 2016 and 2018 added another five golden eagle nesting territories outside of the WRA within a 10-mile survey radius of the project boundaries (Estep Environmental Consulting 2018a). During the 2016 spring, 2016–2017 winter, and 2018 spring surveys, no eagles were detected at any of the previously identified golden eagle nests or other potential nesting areas in the WRA. All historic nests in the WRA were found either to be no longer present or to consist of remnants of the previously used nests. Although no active nests were reported in the WRA, golden eagles were observed in the survey area during the 2016–2018 surveys. In spring 2016, a foraging adult golden eagle was observed approximately 0.25 mile northeast of the Solano 4 West subarea along Talbert Lane; and in spring 2018, a subadult golden eagle was observed interacting with a Swainson's hawk above Birds Landing Road just east of Birds Landing (Estep Environmental Consulting 2018a).

Outside of the WRA, but within 10 miles of the project site, locations of golden eagle nests are known from small eucalyptus groves near Grizzly Island and the Potrero Hills Landfill, and from several locations in the steep hilly terrain south of Antioch and Pittsburg. Because of the presence of eagles in the survey area, and the limited survey effort outside of the WRA, the Potrero Hills golden eagle nesting area and the three golden eagle territories in the southern end of the survey area south of Antioch and Pittsburg are considered potentially extant (Estep Environmental Consulting 2018a). In addition, golden eagle nesting activity was reported as recently as 2017 from Meins Landing, approximately 5 miles northwest of the Solano 4 West subarea (Estep Environmental Consulting 2018a).

Eagle activity can vary between years in a given location for several reasons, including variability in territory occupancy, nesting status and location, and prey abundance and distribution. Changes in nesting activity or occupancy of territories near the project site could cause golden eagles to increase their use of the area over the lifetime of the proposed project, particularly if nesting occurs at any of the nine (four historic and five extant) nest sites located within 10 miles of the project boundaries. Surveys conducted in the WRA and summarized by Estep Environmental Consulting (2018a) documented the presence of golden eagles in the project vicinity, and demonstrated that golden eagles use the area during the breeding season.

Golden eagles have reoccupied territories that were vacant for as long as 16 years, and have used alternate nest sites that sat dormant for as long as 22 years (Kochert and Steenhof 2012; Millsap et al. 2015). Therefore, the presence of historically documented golden eagle nesting territories and alternate nest sites in the project vicinity indicates the strong probability that nesting golden eagles would use the project site in the future.

Bald Eagle

GANDA (2011) reported sightings of bald eagles in 2011 near Bradmoor Island and Grizzly Island west of the WRA, within 10 miles of the project site. Based on flight patterns and behavioral observations, a bald eagle breeding territory centered on Grizzly Island approximately 4–5 miles west of the WRA and 6–7 miles northwest of the Solano 4 West subarea is considered possible, but a nest was not confirmed (GANDA 2011). During recent surveys, juvenile bald eagles were observed foraging with a group of turkey vultures (*Cathartes aura*) and common crows (*Corvus brachyrhynchos*) just west of the Solano 4 West subarea on March 31, 2016, and again on April 5, 2016.

Although bald eagles have been observed intermittently in and around the WRA, nesting has not been confirmed within the 10-mile radius area. Even though an active nest, breeding behavior, or hatching-year bald eagles have not been reported, the WRA is considered an undetermined, unverified breeding territory (Estep Environmental Consulting 2018a).

Impacts on bald eagle nesting may be lower than impacts on golden eagles because no bald eagle nest sites have been documented near the project site, and because the

species tends to associate more strongly with riparian and open water habitats, which are not present on the project site. During the nesting season and overwintering periods, bald eagle activity is expected to be concentrated along the main river corridors and expansive tidal marsh areas to the west, where preferred prey such as fish and waterfowl are abundant. However, as evidenced by the survey results, bald eagles may take advantage of orographic lift provided by the WRA's rolling hills and travel through the project area.

Construction of the proposed project could result in indirect impacts on nesting bald and golden eagles. Disturbance caused by project construction activities may indirectly affect nesting behavior, particularly for golden eagles, which are more likely to be present in the project area. For example, construction and associated noise and human presence in the project area could prevent eagles from using preferred foraging habitat, deter them from nesting at nest sites near construction areas, or prevent them from tending to their eggs or young if construction activities occur near an active nest. This impact would be **potentially significant**.

Mitigation Measure 3.3-6: Avoid and minimize impacts on nesting eagles.

SMUD will implement the following measures to avoid and minimize impacts on nesting eagles:

- Ground-based surveys will be conducted to assess the status of all previously documented eagle nest locations (CNDDB or other reliable sources) within the 2-mile buffer of the project area, and will follow guidance set forth in USFWS (2013) for ground-based surveys to determine occupancy, including the following site-specific recommendations:
    - Two 4-hour observations shall be conducted at each nest (multiple nests may be observed simultaneously), one in late January and the other in late February, to determine whether territories are occupied by adult eagles and identify nesting activity where possible.
    - If an active nest is located, no further ground monitoring is required. However, if nesting behavior is observed within 2 miles of the project buffer and a nest site is not located, an aerial inspection of the area shall be conducted.
    - The results of the surveys shall be documented in a report and submitted to USFWS and CDFW no later than August of the breeding season in which the survey was conducted (e.g., August 2020 for winter/spring 2020 surveys).

SMUD will implement the following avoidance buffer distances for bald eagle and golden eagle (respectively) for the indicated construction activity, assuming a direct line of sight between the construction activity and the active nest:

- *Human foot traffic:* 400 meters/800 meters
- *Pass-through vehicular traffic:* 200 meters/400 meters
- *Any other construction work except the types described below:* 800 meters/1,600 meters
- *Blasting:* 1,600 meters for both species
- *Helicopter flight:* 1,600 meters (horizontal and vertical) for both species

Active eagle nests and associated buffers will be indicated in construction drawings for the project and will be discussed in the worker environmental awareness program training for construction workers (Mitigation Measure 3.3-1b).

Significance after Mitigation

The mitigation measure described above would reduce the potential impacts of project construction on bald and golden eagle nesting success because the locations of occupied nests would be determined and the nests would be protected during construction. Therefore, implementing this mitigation measure would reduce impacts on nesting eagles to a **less-than-significant** level.

Impact 3.3-7: Removal and modification of golden eagle foraging habitat during construction.

Project construction would result in temporary and permanent impacts on golden eagle foraging habitat, resulting in decreased prey availability. This impact would be **potentially significant.**

Bald eagles forage in riparian and open water habitats, which are not present in the project construction areas and would not be affected by project construction. Therefore, no impacts on bald eagle foraging habitat are anticipated**.**

Construction could directly affect golden eagles by causing the permanent loss of habitat types on which the species relies. For golden eagles, loss of habitat would result from the temporary or permanent removal of grassland and agricultural habitats in the project area (Table 3.3-9). On the project site, these habitats represent the primary potential foraging areas of golden eagles because they support prey species such as rabbits and small rodents. Permanent loss of these habitats as a result of construction could reduce available prey and adversely affect at least one golden eagle breeding territory.

Construction of access roads, home run collection lines, and other project facilities would temporarily affect up to 208.07 acres and permanently affect up to 43.82 acres of foraging habitat for golden eagles if 136m WTGs were installed. Should the 150m WTG option be selected instead, the project would temporarily affect up to 187.41 acres and permanently

affect up to 39.56 acres of foraging habitat for golden eagles (Table 3.3-9). Actual impacts would be lower than these amounts because temporary impact areas would be restored to their original condition. Thus, the maximum amount of suitable golden eagle foraging habitat that would be permanently affected would be 39.56 to 43.82 acres. This impact would be **potentially significant**.

Mitigation Measure 3.3-7: Implement Mitigation Measure 3.3-5.

SMUD will implement Mitigation Measure 3.3-5, "Acquire Off-site Mitigation to Replace Disturbed Raptor Foraging Habitat," listed above.

Significance after Mitigation

With Mitigation Measure 3.3-7, SMUD would avoid or offset impacts on golden eagle foraging habitat; this mitigation measure would reduce the potential impacts of construction on golden eagle foraging habitat. Impacts on suitable golden eagle habitat would be offset through compensatory mitigation in the form of acquisition, creation, and/or preservation of land of equal or greater value to the species. Therefore, implementing this mitigation measure would reduce the impact to a **less-than-significant** level.

Impact 3.3-8: Construction impacts on bats and bat habitat.

Project construction would result in temporary disturbance of foraging bats and loss of foraging habitat. This impact would be **less than significant**.

Most California bat species form nursery colonies in the summer that number from dozens to hundreds of thousands of individuals (Zeiner et al. 1988). This colonial trait can make entire local populations vulnerable during their sensitive summer and winter seasons. If construction activities remove or disturb an occupied maternity roost or hibernacula, an entire colony may be killed by roost removal, abandonment of nonvolant pups (pups that cannot fly), or arousal of hibernating bats. However, bats roost in trees, structures, caves, mines, and rock outcroppings. No bats have been found roosting in the old WTGs that would be removed from the project site, and no other roost habitat features exist in the project area; therefore, project construction would not be expected to affect roosting bats.

Project construction would temporarily disturb habitat expected to be used by foraging bats. However, most construction activities would occur during the daytime, and no direct disturbance of foraging bats would occur. Construction activities would also have the potential to decrease the suitability of foraging habitat by altering the landscape and prey base. However, because abundant foraging habitat exists in the project area, a temporary decrease in suitability at the project site would not be expected to cause a substantial adverse effect on bat populations.

Potential impacts of project construction on bats and bat habitat would be **less than significant.**

Mitigation Measures

No mitigation is required.

Operational Impacts on Wildlife Species

Operational Impacts on Birds and Bats

The subsections below describe the potential impacts of project operation on birds and bats, with separate discussions for common birds, both raptors and nonraptors, and for special-status birds and bats. This analysis is based on fatality monitoring data obtained from postconstruction mortality monitoring studies from eight WRA wind energy projects. The data used for the analysis were collected between 2003 and 2015 and were from wind energy projects with new-generation WTGs at least 200 feet tall and constructed with a tubular tower design.

Impact 3.3-9: Injury to and mortality of raptors, other birds, and bats from project operation.

Project operation could result in injury to and mortality of bats and birds, including eagles and other special-status birds, as a result of collisions with wind turbine generators. This impact would be **potentially significant**.

The project would involve the operation of up to 10 WTGs in Solano 4 East and up to 12 larger WTGs in Solano 4 West, for a total nameplate capacity of up to 91 megawatts (MW). The WTGs would have a maximum hub height of 492–590 feet and a maximum rotor diameter of 446–492 feet. Operation of the proposed project could result in mortality of or injury to birds and bats, including special-status species, from interaction with WTGs and this impact is discussed in detail below.

Estimates of Avian Mortality

Avian postconstruction mortality monitoring data from eight projects across the WRA were used to predict rates of avian mortality that would result from project operation. The information from these studies is expected to reflect probable levels of project-related avian mortality because of the similarity in landscape and habitat between the proposed project site and other projects in the WRA. Mortality data from 18 monitoring years (1–3 years per study) from these eight wind farms were compiled to determine the average number of fatalities observed for raptors, other birds, and bats. All studies were conducted between 2003 and 2015 at wind farms in the WRA. Details for each wind farm and study period are provided below (Table 3.3-10).

Table 3.3-10 Wind Farm and Turbine Specifications for Eight Postconstruction Avian and Bat Mortality Studies in the WRA between 2003 and 2015

Wind Farm	Years Studied	# Years	# Turbines	Per-Turbine Capacity (MW)	Facility Nominal Capacity (MW)	Source(s)
High Winds	2003–2005	2	90	1.8	162	Curry & Kerlinger 2006
Shiloh I	2006–2009	3	100	1.5	150	Curry & Kerlinger 2009
Shiloh II	2009–2012	3	75	2	150	Curry & Kerlinger 2010, 2013a
Solano I, IIA, and IIB	2008–2010	1	23/29	0.66/3.0	102.18	Burleson Consulting, Inc. 2010
Shiloh III	2012–2013	1	50	2.05	102.5	Curry & Kerlinger 2013b
Solano 3	2012–2015	3	24/31	1.8/3.0	128	SMUD 2016
Montezuma I	2011–2012	2	16	2.3	36.8	ICF International 2013
Montezuma II	2012–2015	3	34	2.3	78.2	H. T. Harvey & Associates 2013, 2015

Note: WRA = Wind Resource Area; MW = megawatts; Solano 3 = Solano 4 Wind Project, Phase 3
Source: Data compiled by AECOM in 2019

Mortality rates from each study are presented below for select common and special-status bird species (Table 3.3-11). The common species selected for inclusion in Table 3.3-11 were those from major taxonomic groups (e.g., raptors, waterbirds, marsh birds, blackbirds, migrant songbirds) that were characterized by high mortality rates compared to other species in their group, and that shared common habitat preferences with special-status species to provide a plausible index of risk to those rarer species. The special-status species with the highest collision risks were included in the table.

Mortality rates are expressed as the estimated number of mortalities per MW of capacity per year and have been adjusted to account for variability in carcass detection probabilities. Mortality rates are presented on a per-MW basis rather than a per-WTG basis to allow for a more direct comparison of mortality rates across wind farms with WTGs of different sizes. However, in an effort to provide the most comparable data for the WTGs proposed for the project, only studies of mortality at wind farms with new-generation WTGs at least 200 feet tall and constructed with tubular tower design were included.

A weighted-average mortality rate was calculated for raptors, all birds, and each species listed. The weighting was based on the number of years of each study, with greater weight given to estimates derived from multiyear studies. The number of annual mortalities predicted for the proposed project was calculated for each taxonomic group as the product of the annual weighted-average per-MW mortality rate and the maximum proposed nameplate capacity for the project (91 MW).

The predicted number of annual mortalities is conservatively based on values ranging from the weighted average of all studies (lower number) to the maximum estimated

mortality rate observed across all eight studies. This range is considered conservative because the maximum estimated mortality rates represent the extreme upper end of possible mortality rates, while the observed mortality rates would most likely be closer to the weighted mean, and could be lower than that.

Table 3.3-11 Predicted Annual Avian Mortalities for the Proposed Project Based on Observed Annual Mortality Rates for Raptors and Other Birds at Eight Wind Farms in the WRA, 2005–2015

	Annual per-MW Adjusted Mortality Rates										
	High Winds[1]	Shiloh I[2]	Shiloh II[3]	Solano I/IA & IIB[4]	Shiloh III[5]	Solano 3[6]	Montezuma I[7]	Montezuma II[8]	Wt. Avg.[9]	Max[10]	Predicted Annual Mortalities (Solano 4)[11]
American kestrel	0.205	0.280	0.033	0.063	+	0.230	0.408	0.045	0.210	0.408	19.1 - 37.1
Red-tailed hawk	0.133	0.073	0.093	0.152	+	0.090	0.231	0.051	0.112	0.231	10.2 - 21.0
Northern harrier*	0.000	0.007	+	0.000	+	0.020	0.068	0.045	0.022	0.068	2.0 - 6.2
Golden eagle*	0.006	0.007	0.000	0.000	0.000	+	0.000	0.000	0.002	0.007	0.2 - 0.6
White-tailed kite*	0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.022	0.2 - 2.0
Peregrine falcon*	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.007	0.1 - 0.6
Ferruginous hawk*	0.006	0.010	+	0.000	0.000	0.000	0.000	0.000	0.003	0.010	0.3 - 0.9
Swainson's Hawk*	0.000	0.000	0.000	0.000	0.000	0.000	0.027	0.019	0.005	0.027	0.5 - 2.5
All Raptors	**0.410**	**0.427**	**0.510**	**0.215**	**0.700**	**0.540**	**0.924**	**0.313**	**0.508**	**0.924**	46.2 - 84.1
Mallard	0.000	0.027	0.093	0.000	0.000	0.020	0.068	0.000	0.025	0.093	2.2 - 8.5
American Coot	0.009	0.107	+	0.000	+	0.060	0.109	+	0.053	0.109	4.8 - 9.9
Sora	0.032	0.013	0.040	0.000	0.000	0.000	0.054	0.058	0.024	0.058	2.2 - 5.2
Black Rail*	0.000	0.000	0.080	0.000	0.000	0.000	0.000	0.000	0.008	0.032	0.7 - 2.9
Loggerhead Shrike*	0.000	0.000	+	0.000	+	0.040	0.068	0.000	0.018	0.068	1.7 - 6.2
Horned Lark*	0.180	0.660	0.113	0.000	+	0.130	0.109	0.032	0.223	0.660	20.3 - 60.1
Red-winged Blackbird	0.148	1.320	0.193	0.000	+	0.490	0.652	0.045	0.522	1.320	47.5 - 120.1
Western Meadowlark	0.032	0.793	0.247	0.000	+	0.630	1.033	0.134	0.494	1.033	44.9 - 94.0
Wilson's Warbler	0.009	0.220	0.040	0.000	0.000	0.020	0.054	0.000	0.059	0.220	5.4 - 20.0
Yellow Warbler*	0.022	0.127	0.040	0.000	+	0.000	0.095	0.000	0.047	0.127	4.3 - 11.5
All Birds	**1.284**	**6.960**	**2.500**	**0.341**	**3.300**	**2.550**	**7.052**	**0.991**	**3.431**	**7.052**	312.2 - 641.7
Proportion Raptors	**0.319**	**0.061**	**0.204**	**0.630**	**0.212**	**0.212**	**0.131**	**0.316**	**0.224**	**0.630**	**–**

Notes for Table 3.3-11

Notes:
WRA = Wind Resource Area; MW = megawatt; Solano 4 = Solano 4 Wind Project, Phase 4 (the proposed project)
* Special-status species
+ Mortality detected, but adjusted rates not reported.
[1] Group values from Curry & Kerlinger 2006, Tables 43 and 44 (adjusted totals/162 MW); species values from Table 45 ("adjusted totals"/2 years/158.3 MW [total "surveyed" MW per year]).
[2] Group and species values from Curry & Kerlinger 2009, Table 32 ("Estimated # Incidents/MW/Year" column).
[3] Group values from Curry & Kerlinger 2013a (final 3-year report: Tables 5, 6 and 7); adjusted species values were not reported in Curry & Kerlinger 2013a 3-year report. Where species values are given, they are from Curry & Kerlinger 2010 (Year 1 report: Table 21 "Estimate of mortality (Incidents/year"/150 MW) and reflect 1 year of data only. An "x" in this column indicates that mortality was recorded for a species in year 2 or 3, but not year 1. A zero value indicates that mortality was not recorded in any year.
[4] Group values from Burleson Consulting 2010, Tables 2 and 3 ("adjusted" incidents/102.2 MW); species values from Tables D-1 to D-4 ("Adjusted Total"/102.2 MW)
[5] Group values from Curry & Kerlinger 2013b, Tables 4 and 5 (per MW values); species information from Table 1 and Table 2 (adjusted mortality rates not reported); an "x" in this column indicates that mortality was recorded for a species. A zero value indicates that mortality was not recorded.
[6] Group and species values from AECOM 2016, Table 6 ("Average Rate" column).
[7] Group and species values from ICF 2013, Table 3-6 (sum of "Estimated Total adjusted" for 2011 and 2012/2 years/36.8 MW).
[8] Group and species values calculated as average of Year 1 and Year 3 adjusted per MW rates from H. T. Harvey & Associates 2013 (Table 9) and 2015 (Table 11), respectively ("Site Total Estimate" (Year 1) + "Facility Estimate" (Year 2)/2 years/78.2 MW).
[9] Average of mortality rates from all projects, weighted by the number of years per project.
[10] Maximum mortality rate from among all projects.
[11] Range reflects expected number of annual mortalities based on weighted average and maximum mortality rates from among all projects, based on a nominal project capacity of 91 MW.
Sources: AECOM 2016; Burleson Consulting 2010; Curry & Kerlinger 2006, 2009, 2013a, 2013b; H. T. Harvey & Associates 2013, 2015; ICF 2013; data compiled by AECOM in 2019

Impacts on Common Bird Species

Based on the mortality rates presented in Table 3.3-11, project operation would result in 313 avian mortalities annually, with an upper estimate as high as 642 mortalities. On average, mortalities at wind farms in the WRA consisted of about 78 percent nonraptors and 22 percent raptors. The vast majority of mortalities caused by project operation would involve common, nonraptor bird species, such as blackbirds, western meadowlarks, and a variety of songbird species that migrate or overwinter on-site. Project operation is not expected to have significant effects on local or regional populations of these species, which are generally abundant and, in the case of migrants, are passing through the area and represent individuals from breeding populations over a much broader region.

A study by Johnston et al. (2013) used radar to track movements of nocturnal migrant birds and bats through the WRA during fall migration. The study found that the site experienced higher passage rates than other sites in the western United States that have been evaluated. However, the study found that targets flew higher than at other sites, with 90 percent of radar targets (birds and bats combined) passing over the High Winds and

Shiloh I sites at more than 150 meters above ground level. The authors concluded that the WRA is relatively benign with respect to impacts on migrating birds. Gamebirds, waterbirds, and waterfowl are generally uncommon in the WRA and experience low mortality rates from WTG collisions. These groups are not expected to experience significant adverse effects from project operation.

The annual mortality rate for raptors as a group was reported for all eight studies and ranged from 0.215 to 0.924 mortality per MW per year, with a weighted average of 0.508 mortality per MW per year. This suggests that the project would likely result in about 47 raptor mortalities per year, but possibly as many as 85. About 65 percent of this total (31 of the 47 mortalities) is predicted to involve two common raptor species: red-tailed hawk and American kestrel. The abundance of red-tailed hawks in the WRA increases substantially during the migratory and wintering seasons (Estep Environmental Consulting 2018a), suggesting an influx of birds from outside the region. Taken together with evidence that raptor mortality tends to be higher during these seasons (Curry & Kerlinger 2006), it is likely that much of the mortality for this species would be distributed among birds from different areas rather than affecting only local breeding birds, thus reducing the impact on any one population.

Avian mortalities would involve primarily common species, which are characterized as having relatively large and stable populations. Impacts on many of these species would be dispersed across populations from a broad geographic area, particularly for species that breed elsewhere and experience mortality when migrating through or overwintering on the project site. Therefore, impacts on common bird species would be **less than significant.** No mitigation is required.

Impacts on Eagles

Golden eagles are present in the WRA and the project area with some regularity despite the fact that the last active golden eagle nest in the WRA was documented in 2012. Estep Environmental Consulting (2018b) reported the average rate of golden eagle detections from nine studies across the WRA between 2000 and 2015 to be 0.196 individual per hour, with the highest rates—0.86 and 0.21 individual per hour—observed at High Winds during 2000–2001 and 2003–2005, respectively. In the seven other studies conducted in the WRA since 2004, eagle detection rates have been lower than 0.10 individual per hour. One of these seven studies took place in 2015 at the Collinsville site, which overlaps with the Solano 4 West project subarea. That study reported detecting golden eagles at the rate of 0.083 individual per hour.

Bald and golden eagles are present near the WRA and have the potential to be injured or killed by project operation. Bald eagles forage in riparian and open water habitats, which are not present near the locations of the proposed project WTGs. Although bald eagles have been observed infrequently in the WRA, nesting has not been confirmed within the 10-mile radius area. Nonetheless, in 2016, juvenile bald eagles were twice observed foraging with a group of turkey vultures and American crows just west of the Solano 4 West subarea. Bald eagles could be injured or killed by project WTGs, but this

potential is considered low. Based on the results of the fatality monitoring studies summarized in Table 3.3-11, the project could result in about 0.2 to 0.6 golden eagle mortality per year.

Golden eagles are present year-round in the WRA, with no distinct increase in numbers during the spring or fall (Estep Environmental Consulting 2018b). This suggests that the project area is not a focal area for migrants and that most individuals probably belong to the local population.

SMUD has been working with USFWS since 2012 to discuss approaches to reducing the potential for the Solano 4 Wind Project to affect eagles and other birds. SMUD submitted the *Solano Wind Project Avian and Bat Protection Plan* (SMUD 2011) to USFWS in 2012. The avian and bat protection plan was revised and submitted as the *Solano Wind Bird and Bat Conservation Strategies* (BBCS) in 2013 (SMUD 2013). A preliminary draft eagle conservation plan (ECP) was prepared and submitted to USFWS in 2014. SMUD and USFWS continued to coordinate on revisions to the ECP, and submitted the final ECP in August 2014 (SMUD 2014), as part of their permit application package. Under the 2011 version of the USFWS ECP Guidance, USFWS classified the SMUD Solano 4 Wind Project as Category 2: "high to moderate risk to eagles but there are opportunities to mitigate the impacts."

In February 2019, USFWS published an environmental assessment (EA) to assess the impacts of the issuance of an eagle take permit for the Solano 4 Wind Project (USFWS 2019c). The EA describes alternatives for issuing a 5-year permit to take up to 10–12 golden eagles, with associated conditions, as allowed by regulation. The permit would incorporate all conservation commitments described in SMUD's ECP and BBCS. The eagle take permit would cover eagle take within SMUD's Solano Wind Project Phases 1, 2, and 3. SMUD anticipates including Solano 4 Wind (the proposed project) in its reapplication for an eagle take permit when the 5-year permit term is up for the other phases of the Solano Wind Project.

A total of 13 golden eagle fatalities have occurred within the WRA since approximately 2000 (USFWS 2019c). Three golden eagle fatalities have been documented at the Solano Wind Project, on the following dates: October 17, 2014, September 30, 2016, and November 26, 2018.

The mortality of a nesting adult would likely result in the mortality of dependent young as well. Golden eagles have a low reproductive rate, with adults generally producing less than one chick per year on average (Kochert et al. 2002), making their populations particularly vulnerable to the effects of mortality. Nonbreeding eagles, including nonterritorial adults and subadults, help to provide population stability by providing individuals to fill vacancies when territorial adults are removed from the population (Hunt et al. 1995). The mortality of a single breeding or nonbreeding individual could therefore have adverse effects on the local eagle population both immediately and in the long term. Based on the anticipated level of golden eagle mortality and the potential population

impacts associated with that level of mortality, impacts of project operation on eagles would be **potentially significant**.

Impacts on Special-Status Raptors and Other Special-Status Birds (Other than Eagles)

Regional populations of special-status raptors and other special-status birds have greater potential than common species to be adversely affected by project operation because of their smaller population size and vulnerable status. Average predicted annual mortality rates for special-status raptor species are low overall, and generally much less than one individual per year. Northern harriers are the special-status raptor species with the highest predicted average annual mortality, at 2.0 mortalities per year. Although mortality rates for special-status raptors are expected to be relatively low, the upper range of annual mortality rates could be as high as two to three individuals per year for species such as white-tailed kites and Swainson's hawks. However, these represent the most extreme mortality rates observed from eight wind energy projects in the WRA over 18 years of mortality studies and are considered unlikely to occur.

Nonraptor special-status species such as the horned lark and loggerhead shrike also experience moderate mortality rates at wind farms in the WRA. As noted above, mortality rates for waterfowl, waterbirds, and gamebirds in the WRA are generally low. Nonetheless, special-status waterbird species such as the black rail could potentially collide with project WTGs while flying to and from wetlands surrounding the project.

Mortality rates for special-status bird species (including special-status raptors and nonraptors) in the WRA are generally low. However, the upper range of predicted mortality estimates for these species could potentially result in population-level impacts because they have populations that are smaller and more vulnerable than common species. Special-status raptor species that could be adversely affected by project operation include merlin, peregrine falcon, northern harrier, golden eagle, ferruginous hawk, Swainson's hawk, and white-tailed kite. Project operation could also adversely affect populations of special-status nonraptor bird species such as black rail and loggerhead shrike and, to a lesser extent, horned lark and yellow warbler. These adverse effects would be more substantial for resident populations that breed on and near the project site than for species that pass through the project site as migrants. Impacts on special-status bird species would be **potentially significant**.

Impacts on Bats

Most bat species are vulnerable to mortality and injury at wind farms. Survey data suggest bat mortality from North American wind farms of up to 70 bats per WTG per year (Arnett et al. 2008). Studies suggest that cumulative bat fatalities for all North American wind energy projects combined range from more than 650,000 to 1.3 million bats annually (Arnett and Baerwald 2013; Hayes 2013; Smallwood 2013 in Frick et al. 2017). Researchers have hypothesized that bat fatalities at WTGs may result from mating behaviors that center around the tallest trees in the landscape. Reproductive bats may be attracted to WTGs when looking for mating opportunities, mistaking WTGs for the

tallest trees (Cryan 2008; Cryan et al. 2012). Barclay et al. (2007) found that bat fatalities increased exponentially with tower height, with modern WTG towers approximately 200 feet (65 meters) or taller having the highest fatality rates.

Three migratory tree-roosting bat species—hoary bat, western red bat, and silver-haired bat—have been found to compose the greatest proportion of bat fatalities at wind farms in North America, and are thought to have declining population numbers. Mortality monitoring across North America has documented that hoary bats make up the highest proportion of bat fatalities (38 percent) at wind energy facilities (Arnett and Baerwald 2013 in Frick et al. 2017). In southwestern states, the migratory Mexican free-tailed bat also experiences high bat fatalities. The western red bat is considered a species of special concern by CDFW and a high priority species for conservation by the WBWG (2019). Both hoary bat and silver-haired bat are considered medium priority species by the WBWG. The Mexican free-tailed bat is abundant and thought to have stable or expanding population numbers, and is considered a low priority species by the WBWG.

Based on postconstruction mortality monitoring data from projects in the WRA, overall bat mortality rates were found to range from 0.310 to 3.920 mortality per MW per year. The mortality monitoring data come from eight facilities with modern WTGs with maximum rotor heights of at least 200 feet above ground level. Species-specific data from these mortality studies are presented below in Table 3.3-12, and generally reflect bat fatality patterns similar to those seen nationwide. Migratory bats (predominantly hoary bats and Mexican free-tailed bats) make up the greatest proportion of documented mortality, with the highest mortality occurring during the fall and spring migrations. The predicted number of annual bat mortalities can be determined by extrapolating per-MW mortality rates to the project's proposed capacity of 91 MW. Predicted bat mortalities range from approximately 170 bats per year, based on the weighted mean for all eight WRA studies of 2.07 bat mortalities per MW per year, to 357 bats per year, based on the maximum observed mortality rate of 3.92 bat mortalities per MW per year. On average, the percentage of species affected is 45.5 percent hoary bats, 49.7 percent Mexican free-tailed bats, 3.6 percent western red bats, and 1.2 percent silver-haired bats. The proposed project would be expected to cause similar impacts, equating to weighted-average mortality estimates of 73 hoary bats, 79 Mexican free-tailed bats, six western red bats, and two silver-haired bats per year.

Fatalities of small numbers of western red bats, silver-haired bats, and other bat species would not be expected to cause substantial adverse effects on populations of these or other local bat species. Given what the biological community knows about the size, distribution, and probable stability of colonial Mexican free-tailed bat populations, fatalities of approximately 79 bats per year, with an upper estimate of 171 bats per year, would not be expected to cause population-scale impacts on this common species.

Table 3.3-12 Predicted Annual Bat Mortalities for the Proposed Project Based on Observed Annual Mortality Rates for Bats at Eight Wind Farms in the WRA, 2005–2015

	Annual per-MW Adjusted Mortality Rates										
	High Winds	Shiloh I	Shiloh II	Solano I/IA/IIB	Shiloh III	Solano 3	Monte-zuma I	Monte-zuma II	Wt. Avg.	Max	Predicted Annual Mortalities (Solano 4)
Western red bat*	0.066	0.060	0.253	0.245	0.000	0.040	0.000	0.000	0.062	0.253	5.6 - 23.1
Hoary bat	1.045	1.900	0.680	0.000	+	0.140	0.625	0.473	0.792	1.900	72.1 - 172.9
Mexican free-tailed bat	0.809	1.873	1.787	0.000	+	0.050	0.734	0.729	0.864	1.873	78.6 - 170.5
Silver-haired bat	0.035	0.087	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.087	2.0 - 7.9
All Bats	1.907	3.920	3.300	0.245	0.400	0.310	1.372	0.908	1.859	3.920	169.2 - 356.7

Notes:
WRA = Wind Resource Area; MW = megawatt; Solano 4 = Solano 4 Wind Project, Phase 4 (the proposed project)
* California Department of Fish and Wildlife Species of Special Concern.
+ Mortality detected, but adjusted rates not reported.
[1] Group values from Curry & Kerlinger 2006, Tables 43 and 44 (adjusted totals/162 MW); species values from Table 45 ("adjusted totals"/2 years/158.3 MW [total "surveyed" MW per year]).
[2] Group and species values from Curry & Kerlinger 2009, Table 32 ("Estimated # Incidents/MW/Year" column).
[3] Group values from Curry & Kerlinger 2013a (final 3-year report: Tables 5, 6 and 7); adjusted species values were not reported in Curry & Kerlinger 2013a 3-year report. Where species values are given, they are from Curry & Kerlinger 2010 (Year 1 report: Table 21 "Estimate of mortality (Incidents/year"/150 MW) and reflect 1 year of data only. An "x" in this column indicates that mortality was recorded for a species in years 2 or 3, but not year 1. A zero value indicates that mortality was not recorded in any year.
[4] Group values from Burleson Consulting 2010, Tables 2 and 3 ("adjusted" incidents/102.2 MW); species values from Tables D-1 to D-4 ("Adjusted Total"/102.2 MW).
[5] Group values from Curry & Kerlinger 2013b, Tables 4 and 5 (per-MW values); species information from Table 1 and Table 2 (adjusted mortality rates not reported); an "x" in this column indicates that mortality was recorded for a species. A zero value indicates that mortality was not recorded.
[6] Group and species values from AECOM 2016, Table 6 ("Average Rate" column).
[7] Group and species values from ICF 2013, Table 3-6 (sum of "Estimated Total adjusted" for 2011 and 2012/2 years/36.8 MW).
[8] Group and species values calculated as average of Year 1 and Year 3 adjusted per MW rates from H. T. Harvey & Associates 2013 (Table 9) and 2015 (Table 11), respectively ("Site Total Estimate" (Year 1) + "Facility Estimate" (Year 2)/2 years/78.2 MW).
[9] Average of mortality rates from all projects, weighted by the number of years per project.
[10] Maximum mortality rate from among all projects.
[11] Range reflects expected number of annual mortalities based on weighted-average and maximum mortality rates from among all projects, based on a nominal project capacity of 91 MW.
Sources: AECOM 2016; Burleson Consulting 2010; Curry & Kerlinger 2006, 2009, 2013a, 2013b; H. T. Harvey & Associates 2013, 2015; ICF 2013; data compiled by AECOM in 2019

Little empirical demographic and population data exist for the uncommon, solitary, foliage-roosting hoary bat. This paucity of information makes it difficult to evaluate the significance of such high mortality rates, and limits the ability to quantitatively assess the potential impact of wind energy on these species (Diffendorfer et al. 2015 in Frick et al. 2017). However, given what the biological community knows about this widespread species, it is unlikely that fatalities of approximately 73 bats per year (upper estimate of 173 bats per year) would cause population-scale impacts on hoary bats.

Although the project by itself would not be expected to cause a local or regional population of hoary bats to drop below self-sustaining levels, it would contribute to the overall cumulative impacts of wind energy projects on bats. Bat fatalities for all North American wind energy projects combined range from more than 650,000 to 1.3 million bats annually, and hoary bats make up the highest proportion (38 percent) (Arnett and Baerwald 2013 in Frick et al. 2017). Bat fatalities from wind energy projects are likely to increase in the United States because of the growing focus on development of renewable energy sources.

Researchers conducting population projection modeling suggest that fatalities at WTGs may drastically reduce the population size and increase the risk of extinction of migratory bats in North America over the next 50 years, with hoary bats at particular risk (Frick et al. 2017). Their modeling results suggest that the hoary bat population could decline by as much as 90 percent in the next 50 years, with the possibility of near or total extinction from wind energy–related fatalities (Frick et al. 2017).

In the context of increased wind energy development throughout North America and cumulative impacts on hoary bats, operation of the proposed project and other facilities in the WRA could contribute to the cumulatively significant impact of wind energy development on populations of North American hoary bat. This impact would be **potentially significant**.

Mitigation Measure 3.3-9a: Avoid and minimize operational impacts on birds and bats.

SMUD will design and operate the project to minimize potential operational impacts on birds and bats by adhering to impact avoidance and minimization measures, including those described the *SMUD Solano Wind Bird and Bat Conservation Strategies* (SMUD 2013), and SMUD's Eagle Conservation Plan (SMUD 2014). These measures include the following:

- Maintain a landscape that does not encourage bird or bat occurrence by conducting regular rotational agricultural activities to keep rodent prey populations to relatively low levels. In addition, implement a prey management program to reduce the availability of rabbits, ground squirrels, and other prey that could attract eagles and other raptors.

- Adhere to the general guidelines for turbine and WTG tower design and operation to minimize bird and bat mortality:
    - Use turbines and WTG tower designs lacking potential raptor perches that may encourage bird activity near the moving rotors.
    - Use turbines with rotor tips at least 25 meters, preferably 30 meters, above the ground.
- Avoid guy wires on meteorological towers.
- Select WTG sites using the following guidelines designed to minimize the extent of potential avian and bat mortality:
    - Minimize the density of WTGs on the landscape and avoid placing WTGs close together in long strings, which creates barriers to movement by restricting the available space for birds and bats to negotiate through a WTG field.
    - Establish setbacks from roads, residences, and wetlands and other unique habitats where birds and bats are more likely to congregate.
    - Where possible, avoid steep slopes, canyons, saddles, and other high-risk topographic features.

Mitigation Measure 3.3-9b: Conduct bird and bat mortality monitoring.

To assess operational impacts on birds and bats and inform potential adaptive management and mitigation approaches, SMUD will conduct 1 year of postconstruction mortality monitoring in the project area, as follows:

- Qualified biologists shall monitor bird and bat mortality annually throughout the project area in accordance with the requirements set forth below, which incorporate guidelines described in SMUD's Solano BBCS (SMUD 2013), SMUD's *Final Eagle Conservation Plan* (SMUD 2014), and the *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development* (CEC and DFG 2007). The monitoring shall be conducted so that sufficient information is available to allow evaluation of WTG design characteristics and location effects that contribute to mortality, including information about the species, number, location, and distance of dead birds relative to WTG locations; availability of raptor prey species; and cause of bird and bat mortalities.
- Monitoring will be conducted for 1 year at all turbines in the Solano 4 Wind Project area after the first delivery of power, and will include but not be limited to the following methods unless otherwise determined appropriate by SMUD:

- The standard search radius will be 100 meters to account for terrain and WTG height.
- A sufficient number of "road and pad" searches will be conducted to 150 meters to determine the proportion of carcasses falling outside of the standard (100-meter) search radius.
- Searcher efficiency trials will be conducted for four seasons and will be sufficient to analyze differences in carcass size (small/medium/large) and vegetative cover.
- Data will be analyzed using procedures described by the California Energy Commission and CDFW (CEC and CDFG 2007), or newer approaches (e.g., General Estimator [Dalthorp et al. 2018], the Evidence of Absence model [Dalthorp et al. 2017]). The data analysis will address adjusted fatality rates annually, seasonally, and by species. An annual report will be prepared each year and a final report will be prepared after the 1-year monitoring period.
- If a carcass with a band is found in the project area, SMUD will promptly report the banding information to USFWS's Bird Banding Laboratory. SMUD will coordinate with the laboratory to include any information provided by USFWS that is pertinent to avian mortality at the project site, if any, in the annual monitoring reports.

- After postconstruction monitoring data have been obtained, SMUD will review the data. In consultation with USFWS and CDFW, SMUD will determine which specific WTGs, if any, generate disproportionately high levels of avian mortalities (based on evidence of statistically significant higher levels of mortality relative to other WTGs), and whether adaptive management measures are needed to reduce or avoid mortalities at those specific WTGs.
- If unauthorized take of a federally listed or state-listed endangered or threatened avian or bat species occurs during project operation, SMUD will notify the appropriate agency (USFWS and/or CDFW) within 48 hours of the discovery, and will submit written documentation of the take to the appropriate agency within 2 calendar days. The documentation will describe the date, time, location, species, and if possible, cause of unauthorized take. SMUD will implement any actions required or recommended by USFWS and/or CDFW as a result of the unauthorized take.

SMUD will design and conduct postconstruction mortality monitoring in a way that ensures at least a 50 percent chance of detecting mortality of large raptors (including golden eagle and Swainson's hawk) caused by a collision with a project WTG. Modeling tools such as the Evidence of Absence model (Dalthorp et al. 2017) can be used to design studies with such an objective in mind. This may require adjusting the radius of the search

area around the WTGs, the proportion of WTGs searched, or other standard parameters set forth above.

After postconstruction monitoring activities, incidental monitoring of the project area will continue through reporting of incidental fatalities or injured birds by on-site staff to the Avian Reporting System (see Mitigation Measure 3.3-9h, "Implement Adaptive Management to Address Disproportionate Mortality of Special-Status Birds or Bats," below). SMUD will also continue to report incidental fatalities or injured birds in compliance with its USFWS Special Purpose Utility Permit (Permit #MB98730A).

Mitigation Measure 3.3-9d: Implement a training program for construction and project personnel.

SMUD will implement a training program so that on-site staff will have a thorough understanding of eagle mortality issues and corresponding protocols. The training program focuses on staff members with direct and indirect implementation responsibilities, including managers, supervisors, engineers, and on-site field crews. The training program will include the following elements:

- introduction and description of eagle mortality issues;
- description of SMUD's environmental stewardship policy (SMUD Board Policy SD-7);
- description of avian resources in the project area and the species most susceptible to collision mortality or injury;
- discussion of federal and state regulations that protect birds, legal implications, and the need for compliance;
- protocols for recording/reporting avian incident data and procedures for carcass collection and injured wildlife; and
- responsibilities of staff members to implement the BBCS.

Mitigation Measure 3.3-9e: Provide funding for raptor recovery and rehabilitation.

SMUD will contribute $5,000 each year for the duration of project operation to the University of California, Davis, California Raptor Center (UC Davis Raptor Center) or its successors for rehabilitation of injured avian species, including eagles and other raptors. The UC Davis Raptor Center is authorized by USFWS and CDFW to rehabilitate injured and orphaned raptors. The UC Davis Raptor Center successfully returns approximately 60 percent of the sick, injured, and orphaned birds it receives to the wild each year (UC Davis California Raptor Center 2019).

Mitigation Measure 3.3-9f: Reduce vehicle collision risks to wildlife.

SMUD's operators will enforce a speed limit of 15 miles per hour on all roads on the project site to minimize the risk of collisions with small mammals and other wildlife, thereby

reducing the number of roadkills, a potential food source that could attract eagles and increase their risk of vehicle collisions.

Mitigation Measure 3.3-9g: Secure an eagle incidental take permit for Solano 4 Wind from USFWS and implement permit conditions.

SMUD will compensate for the loss of any golden or bald eagles injured or killed as a result of project operation by complying with the conditions described in SMUD's Eagle Take Permit. Compensatory mitigation for eagle fatalities may include paying for the retrofitting of electrical utility poles that present a high risk of electrocution to eagles, as prescribed in the *Eagle Conservation Plan Guidance*, Appendix G (USFWS 2013). The performance standard for this compensatory mitigation would be to implement sufficient measures (e.g., electric utility retrofits) to offset all eagle fatalities directly attributable to project operation and resulting in permanent removal of an eagle from the wild, whether detected during structured postconstruction mortality monitoring surveys or detected incidentally.

For each instance of project-related injury or mortality that removes a bird from the population, 32 utility poles shall be retrofitted. This is based on a resource equivalency analysis performed in accordance with USFWS guidelines (USFWS 2013:Appendix G) and assumes that each retrofitted pole would result in 10 years of avoided loss because of electrocution. The resource equivalency analysis also assumes that the take of one eagle and the associated compensatory mitigation will occur during the same year. Certain utility poles may be eligible for "reframing" (as opposed to retrofitting) to avoid electrocution, which USFWS assumes will result in 30 years of avoided loss rather than 10 years. The reframing of 14 eligible utility poles is sufficient to offset take of a single eagle, according to the resource equivalency analysis.

Compensatory mitigation for the loss of each eagle shall be completed within 1 year of each instance of documented take. Retrofitted poles must be considered "high-risk" for electrocution (per USFWS 2013:Appendix G). For instances of bald eagle take, retrofitted poles must be located in areas where both species occur and within the Pacific Flyway north of 40 degrees North latitude. For instances of golden eagle take, retrofitted poles must be located within the Pacific Flyway. These areas represent the USFWS-designated "Eagle Management Units" at the project site for bald eagles and golden eagles, respectively (USFWS 2016).

SMUD will comply with the federal eagle incidental take permit that will be secured for the project. Any mitigation completed toward fulfillment of the eagle take permit requirements will be counted toward the mitigation requirements described above. If mitigation requirements specified in the USFWS eagle take permit differ from those described above, the USFWS permit requirements shall prevail.

Mitigation Measure 3.3-9h: Implement adaptive management to address disproportionate mortality of special-status birds or bats.

SMUD will implement adaptive management strategies if postconstruction mortality monitoring studies determine that project operation is resulting in disproportionate mortality of one or more avian or bat species. The goal of the adaptive management strategies is to avoid a local population of avian or bat species dropping below self-sustaining levels. In accordance with the Solano BBCS (SMUD 2014), a determination to implement adaptive management based on "disproportionate mortality" will consider the factors listed below.

- Number of annual fatalities per turbine
- Disproportionate representation of a particular species
- Comparison to other wind energy facilities

As part of the annual survey and monitoring program described in Mitigation Measure 3.3-3b above, SMUD will analyze information related to these factors. Through this process of data collection, analysis, and consideration of these factors, disproportionate mortality at individual WTGs will be analyzed.

A project-related fatality of one or more federal- or California-listed species or one or more California Fully Protected Species would trigger consultation with USFWS and/or CDFW, and implementation of the adaptive management and compensatory mitigation measures described below. If avian or bat mortality resulting from operation of the Solano 4 Wind Project exceeds the maximum estimated fatality rates described in Tables 3.3-11 and 3.3-12 for special-status birds or bats as well as common species, SMUD will develop and implement a comprehensive set of biologically based, reasonable, and feasible management and/or mitigation measures for responding to the fatality threshold exceedance, along with a timeline for implementation. SMUD will consult the USFWS and CDFW in development of the adaptive management and compensatory mitigation strategies for special-status birds and bats. Potential adaptive management actions to be considered include but are not limited to the following:

- *Implement avian or bat detection/deterrent systems.* This involves testing and implementing systems that detect birds and bats and taking actions designed to reduce the probability of a collision (e.g., informed WTG curtailment, utter deterrents designed to warn or frighten birds and bats from operating WTGs), including:
    - DT Bird/DT Bat Systems
    - IdentiFlight Eagle Detection System
- *Implement passive avian or bat deterrents.* This involves testing and implementing deterrents designed to warn or frighten birds and bats from operating WTGs, including:

- improved blade marking (compatible with Solano County visual guidelines) such as variations in paint color and color patterns;
- blade designs that produce bird warning "whistles" (without upsetting blade integrity or exceeding ambient noise limits); and
- ultrasonic devices that infuse the blade-swept area with high-frequency sounds that alert or frighten bats.

- *Reduce on-site hazards.* Additional techniques for reducing on-site hazards, including possible operational adjustments, should be discussed if mortality rates substantially exceed study estimates. This could include making adjustments to cut-in speed or changes during migratory periods, if such actions are demonstrated to be effective as avoidance and minimization techniques.

- *Reduce off-site hazards.* This can include installing safety features, such as anti-perching devices on poles or anti-electrocution retrofits and diverters on power lines, outside the project area (with concurrence from landowners and Pacific Gas and Electric Company or their successors) to discourage bird use. This should take advantage of Avian Power Line Interaction Committee guidelines and use hazard reduction techniques identified in SMUD's avian protection plan.

- *Implement operational minimization protocols (curtailment) during high-risk periods for bats.* High-risk periods include nighttime when wind speeds are low, spring and autumn migration periods, and certain weather conditions such as before and after storms (Arnett et al. 2011), Standard curtailment protocols can reduce bat fatalities by up to 93 percent, and feathering turbine blades can reduce bat fatalities by an average of 35 percent. Refined curtailment approaches such as the predictive algorithm-based curtailment approach developed by Korner-Nievergelt et al. (2013 in Sutter 2018) and Behr et al. (2017 in Sutter 2018), and activity-based curtailment strategies based on bat detection (Sutter 2018) have also been shown to substantially reduce bat mortality.

- Contribute to ongoing conservation efforts. Examples include acquisition of additional conservation property (or easements) that provide habitat for species affected by project operations, and additional direct contributions to habitat restoration organizations or facilities such as the UC Davis Raptor Center.

Significance after Mitigation

Mitigation Measures 3.3-19a through 3.3-9f would avoid and minimize potential impacts of project operation on birds and bats to the maximum extent feasible. The mitigation measures described above provide a comprehensive program of avoidance, minimization, and compensation consistent with SMUD's BBCS (SMUD 2013) and ECP (SMUD 2014). Any unavoidable impacts resulting in mortality of or injury to eagles would be offset through compensatory mitigation in accordance with requirements described in

SMUD's Eagle Take Permit (Mitigation Measure 3.3-9g). Therefore, implementing the above mitigation measures would reduce the impacts of project operation on eagles to a **less-than-significant** level.

With implementation of the adaptive management and compensatory mitigation measures described above, impacts on special-status raptors and other special-status birds and bats would also be reduced to **less than significant** levels because bird and bat collision risks would be minimized with the proposed adaptive management strategies, and project-related bird and bat fatalities would be offset with compensatory mitigation such as habitat acquisition and other conservation efforts.

Impacts on Special-Status Plants

Impact 3.3-10: Loss of special-status plants and their habitat.

Project construction activities could degrade or destroy special-status plants and their habitat. However, because no special-status plants are present on the project site, this impact would be **less than significant**.

Of the 77 species of special-status plants identified as occurring in the region, 24 species associated with seasonal wetland, seasonal swale, and annual grassland habitats have the potential to be present on the project site; however, because of historic and continuous ground disturbance throughout the project area for rotational disking, planting, and grazing farming practices, these species are unlikely to occur on the project site (AWE 2017c; AECOM 2019a). The other 53 species of special-status plants were determined to have no potential to be present because of the absence of suitable habitat (e.g., serpentine soil, vernal pool, chaparral, and cismontane woodland). No special-status plants were found during protocol-level botanical surveys conducted at the project site during 2017 and 2018 (AWE 2017c; AECOM 2019a).

Table 3.3-13 summarizes potential permanent and temporary impacts of project construction on potentially suitable special-status plant habitat identified on the project site. The actual acreage disturbed would be refined and likely reduced during the process of engineering and siting, as project components would be designed to minimize impacts on habitat where possible. Temporary impacts on habitat are defined as ground disturbance activities restricted solely to the construction phase, such as widening roads and clearing staging areas. For the 136m WTG option, up to 1.15 acres of potentially suitable habitat for special-status plants may be disturbed by project activities (0.49 acre of temporary impacts and 0.66 acre of permanent impacts); and for the 150m WTG option, up to 1.83 acres of potentially suitable habitat for special-status plants may be disturbed by project activities (0.5 acre of temporary impacts and 0.68 acre of permanent impacts).

Table 3.3-13 Potential Temporary and Permanent Impacts of Project Construction on Special-Status Plant Habitat in the Project Area, 136-Meter and 150-Meter Wind Turbine Generator Options

Habitat Type	136-Meter Wind Turbine Generator Option			150-Meter Wind Turbine Generator Option		
	Disturbance Type	Acres	Total Acreage	Disturbance Type	Acres	Total Acreage
Seasonal Swale	Temporary	0.00	0.00	Temporary	0.03	0.05
	Permanent	0.00		Permanent	0.02	
Seasonal Wetland	Temporary	0.02	0.02	Temporary	0.02	0.02
	Permanent	0.00		Permanent	0.00	
Annual Grassland	Temporary	0.47	1.13	Temporary	0.47	1.13
	Permanent	0.66		Permanent	0.66	
TOTAL	Temporary	**0.49**	**1.15**	Temporary	**0.50**	**1.83**
	Permanent	**0.66**		Permanent	**0.68**	

Sources: AWE 2017c; AECOM 2019a; data compiled by AECOM in 2019.

No special-status plants were found during protocol-level surveys, and special-status plants are considered absent from the project site. Therefore, project construction would not directly affect any special-status plant population or habitat occupied by a special-status plant. Moreover, because of historic and ongoing agricultural practices, existing habitats are considered unsuitable or only marginally suitable for special-status plants. Any potential impact on habitat on the project site would be relatively small (up to 1.14 acres of permanent impacts) compared to the availability of high-quality protected grassland and wetland habitats for special-status plants elsewhere in the region, such as the Jepson Prairie Preserve to the north, Grizzly Island Wildlife Area to the west, and Lower Sherman Island Wildlife Area to the south.

Special-status plants are considered absent from the project site, suitable habitat on the project site is marginal with limited potential for impact, and large areas of intact habitat for special-status plants are available elsewhere in the region. Therefore, impacts of project construction on special-status plants and associated habitats would be **less than significant**.

3.3.4. Mitigation Measures

No mitigation is required.

Impacts on Riparian Habitat and Sensitive Natural Communities

Impact 3.3-11: Loss of or direct impacts on riparian habitat.

Project construction could directly affect riparian habitat, but because no riparian habitat would be directly affected by construction, this impact would be **less than significant**.

Riparian habitat is under the jurisdiction of CDFW under Section 1600 of the California Fish and Game Code, and includes vegetation growing in association with waterways (e.g., swales and drainages). The total area of riparian habitat mapped on the project site is 0.11 acre, consisting of two small patches of riparian vegetation located entirely outside of proposed project disturbance areas (AECOM 2019b). A small thicket of tamarisk (*Tamarix* sp.) was mapped during wetland surveys in a drainage located outside of the project boundaries, south of the Solano 4 East home run corridor. The other portion of riparian habitat is within the project site and consists of a small thicket of arroyo willow (*Salix lasiolepis*) in a swale along the southeastern edge of Solano 4 East, where no project infrastructure or associated construction activities (i.e., clearing and grading for WTG pads, staging areas, and access roads) are proposed.

Project construction would result in no direct temporary or permanent loss of riparian habitat or removal of riparian vegetation. Therefore, this impact would be **less than significant**.

Mitigation Measures

No mitigation is required.

Impact 3.3-12: Indirect impacts on riparian habitat.

Project construction and operation could indirectly affect riparian habitat by altering existing topography and hydrology, causing fugitive dust to accumulate on vegetation, and potentially contributing to the introduction and spread of nonnative invasive plant species. This impact would be **potentially significant**.

Project construction has the potential to indirectly affect approximately 0.11 acre of riparian habitat mapped near the project components. Ground-disturbing activities would alter existing topography and hydrology regimes; cause an accumulation of fugitive dust on vegetation; disrupt native seed banks; and potentially cause colonization of disturbed areas of the project site by nonnative invasive plant species.

Ongoing operational impacts on riparian habitat could occur during routine inspection and maintenance of project facilities. These impacts could include trampling or crushing of native vegetation by vehicles or foot traffic if maintenance personnel leave access roads; increased erosion and sedimentation; and introduction of nonnative invasive plants as a result of increased human presence. Operational impacts, including the potential for introduction and spread of invasive plant species, would be addressed by continuing

implementation of SMUD's land management plan, which includes management of invasive weeds (Althouse and Meade 2018).

Approximately 0.11 acre of CDFW-jurisdictional riparian habitat could be indirectly affected by construction and operation of the proposed project. This impact would be **potentially significant**.

Mitigation Measure 3.3-12a: Avoid indirect impacts on riparian habitat.

SMUD will avoid and minimize indirect impacts on riparian habitat by implementing the following mitigation measures:

- Mitigation Measure 3.5-1, "Prepare and Implement a SWPPP and Associated BMPs," listed in Section 3.5, "Geology, Soils, Paleontological Resources, and Mineral Resources"
- Mitigation Measure 3.7-1b, "Establish and Implement an Environmental Training Program," listed in Section 3.7, "Hazards and Hazardous Materials"
- Mitigation Measure 3.7-1c, "Prepare and Implement a Hazardous Substance Control and Emergency Response Plan," listed in Section 3.7, "Hazards and Hazardous Materials"
- Mitigation Measure 3.7-1d, "Prepare and Implement a Spill Prevention, Control, and Countermeasures Plan," listed in Section 3.7, "Hazards and Hazardous Materials"

In addition, SMUD will implement the following measures:

- Before any construction activity, SMUD will assign a qualified biologist to identify the locations of riparian habitat and corresponding setbacks required by project permits, for avoidance. Identification of riparian habitat for avoidance will be in addition to and distinguished from any required construction boundary fencing or flagging. Setback requirements will be identified as appropriate (e.g., 100-foot setback) on project maps to comply with requirements specified in 404, 401, or 1602 permit conditions.

Mitigation Measure 3.3-12b: Comply with Section 1600 streambed alteration agreement and CWA Sections 401 and 404 or the state's Porter-Cologne Act.

SMUD will obtain all necessary permits under Section 1602 of the California Fish and Game Code (Lake and Streambed Alteration Agreement) and Sections 401 and 404 of the CWA or the state's Porter-Cologne Act and will implement all conditions and requirements of these state and federal permits obtained for the project.

Mitigation Measure 3.3-12c: Develop a reclamation and revegetation plan.

Before project construction, SMUD will develop and implement a reclamation and revegetation plan to restore sites disturbed by construction, and to reclaim abandoned access roads that will be restored to agricultural uses. The plan will describe reclamation and revegetation efforts to be conducted during project construction, both to stabilize the

site and to return temporarily affected areas to pre-project conditions or restore abandoned roads to agricultural uses.

The goals of the reclamation and restoration plan will be to:

- avoid the introduction and spread of invasive weeds,
- develop vegetative cover in disturbed areas to prevent erosion, and
- restore abandoned roads to agricultural uses (livestock grazing and dryland farming).

The reclamation and restoration plan will be consistent with the goals and objectives described in SMUD's *Land Management Plan for the Solano Wind Farm* (Althouse and Meade 2018) or subsequent updates to that plan. The targets for percent vegetative cover and percent non-native species composition will be based on pre-project baseline surveys in areas that will be subject to disturbance. Monitoring to assess success (i.e., achieving the target pre-project vegetative cover and species composition) will occur for a period of 2 years. If the success criteria are not met at the end of 2 years, adaptive management measures for weed and erosion control, as described in SMUD's Land Management Plan (Althouse and Meade 2018), will be implemented.

The reclamation and revegetation plan will be developed and implemented to reclaim existing vegetation communities and agricultural land uses in the project area to the maximum extent feasible. Reclamation and revegetation of temporarily disturbed sites immediately after the completion of construction activities will help protect against indirect effects on riparian habitat by stabilizing soil and reducing the potential for invasion by nonnative invasive and noxious weeds.

The plan will include, at a minimum, the following provisions:

- Reclamation of all areas disturbed by project construction, including temporary disturbance areas around construction sites, laydown/staging areas, temporary access roads, and the home run collection lines. Pest species listed by CDFA as List A or B, listed by the California Invasive Plant Council as Moderate or High, and/or targeted by the Solano Weed Management Area for eradication in Solano County shall not be used. A qualified biologist with demonstrated experience with the land cover types to be revegetated will have oversight for the selection of reclamation species.
- Revegetation of areas of temporary disturbance as soon as construction is complete to reduce erosion and inhibit the establishment of invasive weeds.
- A description of proven available revegetation techniques and procedures (such as hydroseeding, drill seeding, and broadcast seeding, adapted to local conditions) on all disturbed areas.

- Salvage of topsoil in all areas subject to grading or excavation. Topsoil will be removed, stockpiled on-site, and returned to the original site (reclaimed) or used in habitat reclamation activities elsewhere on the site.

- Monitoring of revegetated and reclaimed habitat for a minimum of 2 years or until herbaceous cover meets or exceeds preproject conditions. Success criteria are defined as minimum thresholds for herbaceous vegetative cover, and maximum thresholds for noxious weeds, based on preproject (baseline) conditions for each habitat type to be revegetated (e.g., grazed annual grassland, farmland).

- Weed control measures, which may include cultural, mechanical, and/or chemical methods. Any application of herbicides shall be in compliance with all federal and state laws and regulations and implemented by a licensed qualified applicator. Herbicides shall not be applied during or within 72 hours of a scheduled rain event. In riparian areas and near streams and wetlands, only water-safe herbicides shall be used. Herbicides shall not be applied when wind velocities exceed 6 miles per hour.

- Adaptive management measures and a remedial planting plan. Remedial measures (e.g., additional planting, weeding, or erosion control) will be taken during the monitoring period if necessary to ensure success of the revegetation or reclamation effort.

- Maintenance, monitoring, and reporting procedures.

If the revegetation/reclamation fails to meet the established performance criteria for vegetative cover within the maintenance and monitoring period, monitoring of remedial planting shall extend beyond the initial period until the criteria are met, unless otherwise approved by the permitting agencies.

If elements of the revegetated/reclaimed area(s) meet their success criteria before the end of 2 years of monitoring, they may be eliminated from future monitoring with approval from the permitting agencies.

Mitigation Measure 3.3-12d: Conduct worker awareness training.

SMUD will implement Mitigation Measure 3.3-1b, “Develop and Implement a Worker Environmental Awareness Program,” to include specific information regarding riparian habitat that occurs on the project site and that would be identified for avoidance. Training will be conducted before the start of construction. The training will include information about the locations and extent of riparian habitat, methods of resource avoidance, permit conditions, and possible fines for violating permit conditions and federal and/or state environmental laws. The training will also include guidance on methods to avoid the introduction and spread of invasive plant species.

Significance after Mitigation

Implementing Mitigation Measures 3.3-12a through 3.3-12d would reduce indirect impacts of project construction and operation on riparian habitat to a **less-than-significant** level.

Impacts on Federally Protected Waters of the United States

Impact 3.3-13: Loss and degradation of federally protected waters of the United States.

Project construction for installation of wind turbine generators and associated infrastructure would result in the loss and degradation of federally protected wetlands and other waters of the United States. Federally protected waters could also be disturbed indirectly by activities associated with staging areas and laydown of project components. This impact would be **potentially significant**.

Clearing and grading in the project area to facilitate installation of up to 22 WTGs and associated infrastructure (access roads) would result in impacts on wetlands and other waters of the United States subject to USACE jurisdiction under Section 404 of the federal CWA. Wetlands and other waters of the United States could also be disturbed indirectly by activities associated with staging areas and laydown of project components.

Implementing the proposed project would require a CWA Section 404 permit from USACE and a CWA Section 401 certification from the Central Valley RWQCB. SMUD requested a preliminary jurisdictional determination, by which USACE presumes that all wetlands and other waters are jurisdictional. Therefore, all wetlands and other waters mapped in the project area are subject to USACE jurisdiction. Aquatic resources mapped in the project area (AWE 2017b; AECOM 2019b) include wetlands, open water, drainages (intermittent and ephemeral), and swales (perennial, seasonal, and ephemeral). The aquatic resources surveys (AWE 2017b; AECOM 2019b) identify the delineated locations and boundaries of the wetlands and other waters on the project site (Appendix D).

Because of differences in temporary impact areas, the total impact on waters of the United States differs between the 136m WTG option and the 150m WTG option (Table 3.3-14). If the 136m WTG option were selected, the total impact on waters of the United States associated with the proposed project would be up to 0.10 acre (approximately 0.07 acre of temporary impacts and 0.03 acre of permanent impacts). If the 150m WTG option were selected, the total impact on waters would be up to 0.12 acre (approximately 0.09 acre of temporary impacts and 0.03 acre of permanent impacts) (Table 3.3-14).

Regardless of WTG size (i.e., 136m or 150m), the project would result in permanent fill of up to 0.03 acre of swales (Table 3.3-14). The actual disturbance acreage would be refined during site design and engineering and permitting and would likely be reduced, because project components would be sited to avoid and minimize impacts on wetlands and other waters of the United States where possible.

Table 3.3-14 Potential Temporary and Permanent Impacts of Project Construction on Waters of the United States in the Project Area, 136-Meter and 150-Meter Wind Turbine Generator Options

Waters of the United States	136-Meter Wind Turbine Generator Option			150-Meter Wind Turbine Generator Option		
	Disturbance Type	Acres	Total Acreage	Disturbance Type	Acres	Total Acreage
Wetlands						
Seasonal Wetland	Temporary	0.02	0.02	Temporary	0.02	0.02
	Permanent	0.00		Permanent	0.00	
Drainages						
Perennial Swale	Temporary	0.00	0.00	Temporary	0.02	0.02
	Permanent	0.00		Permanent	0.00	
Seasonal Swale	Temporary	0.03	0.05	Temporary	0.03	0.05
	Permanent	0.02		Permanent	0.02	
Ephemeral Swale	Temporary	0.02	0.03	Temporary	0.02	0.03
	Permanent	0.01		Permanent	0.01	
TOTAL	Temporary	**0.07**	**0.10**	Temporary	**0.09**	**0.12**
	Permanent	**0.03**		Permanent	**0.03**	

Sources: AWE 2017b; AECOM 2019b; data compiled by AECOM in 2019.

Construction activities encroaching on aquatic features have the potential to result in the loss of area and/or habitat functions, through direct or indirect impacts on vegetation, degradation of water quality, and/or changes in hydrology. Construction-related and operational spills, worker errors, and soil erosion in or near aquatic features are other potential sources of impacts on waters of the United States. Introduction of nonnative invasive species, dust, and settling of contaminants associated with vehicular emissions during project construction and ongoing through project operation may also indirectly affect aquatic resources.

Placing permanent project infrastructure in wetlands and other waters would generate fill, resulting in permanent impacts. Temporary indirect impacts on wetlands and other waters may result from ground disturbance for project component delivery, construction staging, and laydown areas. Other sources of temporary indirect impacts include construction-related disturbance during installation of access road culverts, and horizontal directional drilling (HDD) to install underground collection lines. These activities are considered temporary, provided that wetlands and other waters of the United States would not be filled or replaced; that the site's hydrology would not be permanently altered; and that restoration would be deemed feasible before project implementation.

Construction of permanent project infrastructure, i.e., access roads, in drainages would result in permanent impacts because culverts would be placed for crossings. Temporary direct impacts on waters include construction-related disturbance for installation of the

access road culverts. Construction-related activities would produce temporary impacts, as the project proposes restoration of the affected areas to their preconstruction condition. Road widths would be reduced from 30 feet to approximately 16 feet and the excess gravel would be removed and the areas revegetated. Thus, as long as a site's hydrology would not be permanently altered, or restoration is deemed feasible, the areas would experience no permanent adverse effects.

Installing the underground home run collection lines would require crossing several drainages and swales. Horizontal directional drilling techniques may be used to install the home run collection lines beneath drainages and swales to avoid potential impacts on waters. When implemented properly, HDD is less intrusive and would minimize erosion and loss of vegetation relative to traditional open-cut trenching. However, a direct temporary impact could result from an inadvertent release of bentonite slurry, which is a nontoxic clay mixed with water that is used as a lubricant during HDD. Such an inadvertent release, known as a frac-out, can occur during drilling activities when such activities fracture the surrounding bedrock, thus allowing bentonite slurry to travel upward through the fracture, emerge through the surface, and contaminate aquatic resources.

In addition to on-site waters, aquatic resources adjacent to the project site could be indirectly affected by grading and trenching activities proposed for adjacent uplands. Potential indirect impacts on off-site waters include sedimentation or alteration of the hydrologic regime through modification of surface flows (i.e., changes in runoff patterns caused by the installation of permanent infrastructure). Temporary impacts of project construction on water quality, including increased turbidity and chemical runoff, may also affect the downstream portions of waters that are outside the project footprint. Implementing best management practices and the project's storm water pollution prevention plan, as described in Section 3.8, "Hydrology and Water Quality," would help to prevent indirect impacts and sedimentation of off-site aquatic resources.

However, because of the potential for permanent loss and degradation of federally protected waters of the United States, this impact would be **potentially significant**.

Mitigation Measure 3.3-13a: Avoid and minimize impacts on wetlands and other waters of the United States.

SMUD will avoid and minimize impacts on wetlands and other waters of the United States by implementing the following mitigation measures:

- Mitigation Measure 3.3-12c, "Develop a Reclamation and Revegetation Plan"
- Mitigation Measure 3.5-1a, "Prepare and Implement a SWPPP and Associated BMPs," listed in Section 3.5, " Geology, Soils, Paleontological Resources, and Mineral Resources"
- Mitigation Measure 3.7-1b, "Establish and Implement an Environmental Training Program," listed in Section 3.7, "Hazards and Hazardous Materials"

- Mitigation Measure 3.7-1c, "Prepare and Implement a Hazardous Substance Control and Emergency Response Plan," listed in Section 3.7, "Hazards and Hazardous Materials"

- Mitigation Measure 3.7-1d, "Prepare and Implement a Spill Prevention, Control, and Countermeasures Plan," listed in Section 3.7, "Hazards and Hazardous Materials"

SMUD will obtain and implement the terms of all necessary permits under Section 1602 of the California Fish and Game Code (Lake and Streambed Alteration Agreement) and CWA Sections 401 and 404, and will comply with the conditions and requirements of all other federal and state permits obtained for the project. In addition, SMUD will implement the following measures:

- SMUD will identify corresponding setback requirements as appropriate (e.g., 100-foot setback) on project maps to comply with setback requirements described in permit conditions. Any required setback will be shown on project construction drawings and plans (e.g., grading and improvement plans). Construction activities and project components will be located at least 100 feet from aquatic resources wherever feasible.

- Before the start of any construction activity, SMUD will assign a qualified biologist to identify the locations of wetlands and other waters and their corresponding setbacks (if applicable) as required by project permits, for avoidance. Identification of wetlands and other waters for avoidance will be in addition to and distinguished from any required construction boundary fencing or flagging.

Mitigation Measure 3.3-13b: Avoid and minimize potential effects on waters of the United States from installation of access road culvert crossings.

SMUD will comply with the following mitigation measures to minimize potential effects on waters of the United States caused by installation of culvert crossings to allow vehicular access across waters:

- Before project construction, SMUD will design culvert crossings to maintain hydrological connectivity while allowing vehicular access across aquatic features. A hydrology study of the proposed culvert location(s) will be conducted to analyze existing drainage conditions and calculate appropriate culvert size(s).

- Before project construction, the contractor will obtain a grading permit from Solano County. During construction, the contractor will comply with all terms and conditions of the permit, including any supplemental conditions if applicable, and with the provisions of Chapter 31 of the Solano County Code, "Grading, Drainage, Land Leveling, and Erosion Control Ordinance." All grading work will be performed in accordance with good design and construction practice. SMUD will supply a bond if requested by Solano County.

- The contractor for culvert installation shall adhere to the following general design principles and standards, which shall serve as minimum guidelines for grading and erosion control work performed pursuant to the project's grading permit:
    - All work shall be done in a manner that will minimize soil erosion.
    - Existing natural vegetation shall be retained and preserved wherever possible and practical.
    - Increased potential for erosion by removal of vegetation shall be limited by minimizing the area and time of vegetation removal to the extent practical. Exposure of barren soils shall be limited by completing work before the onset of the rainy season, to ensure that the soil is stabilized and vegetation is established in advance of the rainy season (October 15–April 15).
    - Facilities shall be constructed to retain sediment produced on-site. Sediment basins, sediment traps, and similar required measures shall be installed before any clearing or grading activities, and shall be maintained throughout any such operations until removal is authorized.
    - Seeding, mulching, and other suitable stabilization measures shall be used to protect exposed erodible areas in advance of the rainy season.
    - Provisions shall be made to mitigate any increased runoff caused by altered soil conditions during and after construction.
    - Neither cut nor fill slopes shall be steeper than two parts horizontal to one part vertical (2:1) unless a geological or engineering analysis indicates that steeper slopes are safe and appropriate erosion control measures are specified.
    - Cleared vegetation and excavated materials shall be disposed of in a manner that reduces the risk of erosion, and in conformance with the provisions of the approved grading permit. Topsoil shall be conserved for use in revegetation of disturbed areas whenever possible or practical.
    - Every effort shall be made to preserve existing channels and watercourses. No work shall be performed within a channel or watercourse unless no reasonable alternative is available. If such work is performed, it shall be limited to the minimum amount necessary.
    - All fill material shall not include organic, frozen, or other deleterious materials. No rock or similar irreducible material greater than 12 inches in any dimension shall be included in fills.

- All fill supporting a structure shall be compacted to 90 percent of maximum density as determined by ASTM D 1557, modified proctor, in lifts not exceeding 12 inches in depth.

Mitigation Measure 3.3-13c: Comply with Section 1602 streambed alteration agreement for construction activities in jurisdictional areas.

Before construction, SMUD will submit a notification of streambed alteration to CDFW under Section 1602 of the Fish and Game Code. If CDFW concludes that the project will result in adverse impacts to fish and wildlife resources, it will provide a proposed Streambed Alteration Agreement, which must obtain reasonable conditions. SMUD will implement all reasonable permit conditions, including requirements for compensatory mitigation (if any). Where feasible, the compensatory mitigation requirement may be combined with those for other mitigation measures or mitigation required for the CWA Section 404 and 401 permits. These conditions may include the following measures:

- Pre-construction Measures: Before any construction activities begin, a qualified wetland biologist will identify and flag the boundaries of all wetlands in the project area. Appropriate barriers (straw bales, silt, fences, etc.) will be installed near sensitive resources to prevent sedimentation outside the work areas. During construction, wetlands will be treated as exclusion areas and activities within them will be strictly limited to those pertaining to this permit application.

- SWPPP: The construction contractor shall prepare and implement a SWPPP and associated BMPs.

- Hazardous Substance Control Plan. SMUD shall prepare and implement a construction-specific hazardous substance control and emergency response plan for quick**,** safe cleanup of accidental spills.

- Buffer from Drainages. All staging and stockpile areas will be adjacent to the proposed road crossings, but away from sensitive areas. A minimum buffer of 100 feet from drainages would be used for refueling and storage.

- Worker Education: Prior to construction, Environmental Awareness Training will be provided to all construction workers. This will consist of tailgate environmental training sessions conducted by a qualified biologist for the purpose of informing all personnel about the wetlands and intermittent streams in the project area and the importance of spill prevention, emergency response measures, and proper implementation of BMPs. Any sensitive species in the project region will also be discussed. Personnel will be trained on the locations of sensitive areas and species as well as rules and methods for avoiding these resources. They will also be briefed on all permit conditions as well as the potential disciplinary actions that could result from violations of state or federal laws.

- Construction Monitoring. A qualified biologist will be on site during grading and construction activities to ensure protection of biological and other resources.

- Erosion Control: Erosion control and slope stabilization best management practices will be implemented. These practices may include installation of orange construction fencing, silt fencing, hay wattles, hay bales and other protective measures to avoid impacts to unvegetated areas.

Mitigation Measure 3.3-13d: Avoid and minimize potential effects on waters of the United States from horizontal directional drilling.

SMUD will implement the following mitigation measures to avoid and minimize potential effects on aquatic resources from horizontal directional drilling underneath drainage and swale features during installation of the underground home run collection lines:

- SMUD will provide notification regarding the HDD to CDFW as part of the streambed alteration agreement application. SMUD will assign a qualified biological monitor with previous HDD monitoring experience and knowledge of the environmental sensitivities of the project area to monitor all HDD activities. The monitor shall be on-site for the duration of HDD activities and shall provide brief reports of daily activities to CDFW.

- SMUD's biologist shall conduct on-site briefings for all HDD workers to ensure that all field personnel understand the locations of aquatic resources and their responsibility for timely reporting of frac-outs.

- Barriers (e.g., straw bales, sedimentation fences) shall be erected between the bore site and all nearby aquatic resources before drilling to prevent any material from reaching aquatic resource areas. The distance between the bore site and aquatic resource areas shall be compliant with requirements for protective setback boundaries as specified the CDFW permit.

- If the biological monitor suspects a potential frac-out that is not yet visible at the surface (e.g., loss of bentonite slurry in the drill pit but no frac-out at the surface), the HDD contractor shall immediately cease HDD activities and implement measures to reduce the potential for a frac-out (e.g., increase the density of the drilling mud or reduce the pressure of the drill). The contractor shall then be allowed to continue HDD activities.

- The HDD contractor shall keep necessary response equipment and supplies (e.g., vacuum truck, straw bales, sediment fencing, sand bags) on-site during HDD operations so that they are readily available in the event of a frac-out.

- SMUD shall prepare a frac-out contingency plan. In the event a frac-out is detected, the HDD contractor shall implement the following measures to reduce or minimize effects on the affected aquatic resource:

- All work shall stop until the frac-out has been contained and cleaned up.
- The frac-out area shall be isolated with straw bales, sandbags, or silt fencing to surround and contain the drilling mud; cleanup shall be performed using a vacuum truck supported by construction workers on foot using hand tools, as necessary. (To avoid affecting the stream bed and banks, mechanized equipment shall not be used to scoop or scrape up frac-out materials.)
- If a frac-out occurs, SMUD shall notify the appropriate jurisdictional agency (USACE, the Central Valley RWQCB, and/or CDFW) by telephone and in writing (email is acceptable) within 24 hours. The required notification shall describe the frac-out and cleanup measures implemented.

If a frac-out occurs and, based on consultation with appropriate agencies, is considered to have negatively affected waters of the United States, SMUD will implement appropriate measures to restore the area to pre-HDD conditions in consultation with the permitting agencies.

Mitigation Measure 3.3-13e: Conduct worker awareness training.

SMUD will implement Mitigation Measure 3.3-1b, "Develop and Implement a Worker Environmental Awareness Program," to include specific information regarding wetlands and other waters that occur on the project site and that either will be affected or have been identified for avoidance. Training will be conducted before the start of construction and will include information about the locations and extent of wetlands and other waters, methods of resource avoidance, permit conditions, and possible fines for violating permit conditions and federal and/or state environmental laws.

Mitigation Measure 3.3-13f: Restore temporarily affected waters of the United States.

SMUD will require the construction contractor to restore temporarily disturbed wetlands and other waters of the United States by returning them to preconstruction conditions after construction in accordance with the project's reclamation and restoration plan (Mitigation Measure 3.3-12c). SMUD will comply with all conditions and requirements of federal and state permits obtained for the project.

Mitigation Measure 3.3-13g: Compensate for loss of waters of the United States.

The acreage and function of all wetlands and other waters lost as a result of project implementation will be replaced and restored on a "no-net-loss" basis.

SMUD will compensate for the loss of aquatic resources by purchasing credits from a USACE-approved mitigation bank; purchasing in-lieu fee credits; or restoring, preserving, creating, or enhancing similar habitats at another USACE-approved mitigation area as determined during CWA Section 404 and Section 401 permitting.

The minimum wetland compensation ratio to achieve no net loss of the functions and services of wetlands and other waters will be at least 1:1. Final ratios will be determined during the permitting process.

Significance after Mitigation

Mitigation Measures 3.3-13a through 3.3-13g would result in no net loss of the functions and acreage of federally protected wetlands and other waters of the United States. Therefore, implementing these mitigation measures would reduce potential impacts on federally protected waters to a **less-than-significant** level.

Impacts on Migratory Corridors or Nursery Sites

Impact 3.3-14. Adverse effects on migratory corridors or nursery sites.

Project construction and operation could adversely affect migratory corridors or nursery sites. Because no migratory corridors or nursery sites are present on the project site, this impact would be **less than significant**.

The California Essential Habitat Connectivity Project identifies the privately held wind resource lands (the WRA), including SMUD-owned lands, that overlap the project site as part of an Essential Connectivity Area between nearby Natural Landscape Blocks (e.g., state parks and reserves) (Spencer et al. 2010) (Exhibit 3.3-4). The Essential Connectivity Area that overlaps the Solano 4 East project subarea is made up of mostly developed wind resource lands and agricultural lands and is less permeable to wildlife movements; however, this portion of the project area still provides functional connectivity across the landscape for wide-ranging species. Most potential construction-related disturbance of the existing habitats on the project site would be temporary, and most of the project area would be reclaimed to its former condition after construction concludes. The Sacramento River, south of the project site, provides a migration and dispersal corridor for anadromous fish and other aquatic species, and birds and mammals use riparian corridors along the river as avenues for movement, migration, and dispersal. However, project construction would not affect the river or its adjacent riparian habitat.

Wildlife abundance and diversity are somewhat limited in the Montezuma Hills because the landscape is generally monotypic (annual grassland or dryland farming) and mostly treeless, and supports limited wetlands or other distinctive biological communities. Because of the extensive wetland habitats present south and west of the Montezuma Hills, waterfowl, shorebirds, and other waterbirds are occasionally observed in the WRA; however, typical observations have been of birds or groups of birds flying above and through the area, but not using it otherwise. All waterfowl, shorebird, and other waterbird species combined accounted for only 3.24 percent of all observations across all surveys in the WRA (Estep Environmental Consulting 2018a).

Overall, the data do not suggest that the Montezuma Hills support any unique flight corridors, given the monotypic landscape. Use patterns by many species are likely

dictated more by the availability and quality of habitat outside of the Montezuma Hills than the habitat present within this area. Project construction and operation would not adversely affect any migration or movement corridors.

Because the project would not introduce new barriers to wildlife movement corridors and large expanses of suitable habitat are available elsewhere, construction impacts on migration corridors would be **less than significant**.

The project site does not support maternity roosts for bats or nursery sites for any other species; therefore, the impact of project construction and operation on nursery sites would be **less than significant**.

Mitigation Measures

No mitigation is required.

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