Sacramento Municipal Utility District
Solano 4 Wind Project EIR

Draft Environmental Impact Report • July 2019
State Clearinghouse No. 2019012016

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July 2019

Lead Agency:

Sacramento Municipal Utility District
6201 S Street, MS H201
Sacramento, CA 95817-1899

or

P.O. Box 15830 MS H201
Sacramento, CA 95852-1830
Attn: Ammon Rice
(916) 732-7406 or ammon.rice@smud.org

Prepared by:

AECOM
2020 L Street, Suite 400
Sacramento, CA 95811
Contact: Ken Koch
ken.koch@aecom.com

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Acronyms and Abbreviations

°F	degrees Fahrenheit
AB	Assembly Bill
AC	alternating current
Alquist-Priolo Act	Alquist-Priolo Earthquake Fault Zoning Act of 1972
ARC	anti-reflection coating
ATV	all-terrain vehicles
B.P.	before present
BESS	battery energy storage system
CAA	Clean Air Act
CAAA	Clean Air Act Amendments of 1990
CAAQS	California Ambient Air Quality Standards
CAFE	corporate average fuel economy
CAL FIRE	California Department of Forestry and Fire Protection
Cal/OSHA	California Occupational Safety and Health Administration
CalEEMod	California Emissions Estimator Model
Caltrans	California Department of Transportation
CAP	climate action plan
CARB	California Air Resources Board
CBC	California Building Code
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CGS	California Geologic Survey
CNDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CNPS	California Native Plant Society
CNRA	California Natural Resources Agency
CO	carbon monoxide
CPP	Cosumnes Power Plant

CPUC	California Public Utilities Commission
CRPR	California Rare Plant Rank
CWA	Clean Water Act
dB	decibels
dbh	diameter at breast height
DC	direct current
Delta	Sacramento River–San Joaquin River Delta
DTSC	California Department of Toxic Substances Control
DWQ	Division of Water Quality
EAP	Energy Action Plan
EIR	environmental impact report
EMF	electric and magnetic field
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPAct	Energy Policy Act of 1992
EPCRA	Emergency Planning and Community Right-to-Know Act of 1986
ESA	Endangered Species Act
FDCP	fugitive dust control plan
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
General Plan	Solano County General Plan
GHG	greenhouse gas
HAPs	hazardous air pollutants
HCP	habitat conservation plan
Hz	hertz
IBC	International Building Code
IEPR	Integrated Energy Policy Report
IESNA	Illuminating Engineering Society of North America
IPCC	Intergovernmental Panel on Climate Change

kV	kilovolt
lb/day	pounds per day
L_{dn}	day-night level
L_{eq}	equivalent continuous sound level
L_{max}	maximum sound level
LSAA	lake or streambed alteration agreement
MBTA	Migratory Bird Treaty Act
mPa	micro-Pascals
MS4s	municipal separate storm sewer systems
$MTCO_2e$	metric tons of carbon dioxide equivalent
MW	megawatt
NAAQS	national ambient air quality standards
NAHC	California Native American Heritage Commission
NEHRP	National Earthquake Hazards Reduction Program
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NHTSA	National Highway Traffic Safety Administration
NO	nitric oxide
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
OPR	Governor’s Office of Planning and Research
OSHA	Occupational Safety and Health Administration
ozone	photochemical smog
PM_{10} and $PM_{2.5}$	respirable and fine particulate matter
PPV	peak particle velocity
PRC	Public Resources Code
project	Rancho Seco Solar II Project
PV	photovoltaic
RMS	root-mean-square

ROG	reactive organic gases
RPS	renewable portfolio standard
RWQCB	Regional Water Quality Control Board
Siting Plan	Solano County Wind Turbine Siting Plan and Environmental Impact Report
SACOG	Sacramento Area Council of Governments
SAF Plan	*State Alternative Fuels Plan*
SARA	Superfund Amendments and Reauthorization Act
SB	Senate Bill
SCBMP	*Sacramento County Bicycle Master Plan*
SIP	state implementation plan
SMAQMD	Sacramento Metropolitan Air Quality Management District
SMUD	Sacramento Municipal Utility District
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SPL	sound pressure level
SR	State Route
SSHCP	South Sacramento Habitat Conservation Plan
SVAB	Sacramento Valley Air Basin
SWPPP	stormwater pollution prevention plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminant
TCCR	Transportation Corridor Concept Report
TCR	tribal cultural resource
UAIC	United Auburn Indian Community of the Auburn Rancheria
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
VdB	vibration decibels
VMT	vehicle miles traveled
WDRs	Waste Discharge Requirements

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Executive Summary

Introduction

This summary is provided in accordance with Section 15123 of the California Environmental Quality Act (CEQA) Guidelines (State CEQA Guidelines). As stated in State CEQA Guidelines Section 15123(a), “an environmental impact report (EIR) shall contain a brief summary of the proposed actions and its consequences. The language of the summary should be as clear and simple as reasonably practical.” As required by the State CEQA Guidelines, this section includes:

1. a summary description of the project;
2. a synopsis of environmental impacts and recommended mitigation measures;
3. identification of the alternatives evaluated and of the environmentally superior alternative; and
4. a discussion of the areas of controversy associated with the project.

Summary Description of the Project

Sacramento Municipal Utility District (SMUD) is proposing the Solano Wind Energy Project, Phase 4 (Solano 4 Wind Project or project). The project would involve

- decommissioning of existing wind turbine generators (WTGs);
- construction of new, more technologically advanced WTGs, an associated electrical collection system, and access roads, along with minor upgrades to the existing Russell Substation; and
- operation and maintenance of the new WTGs.

Project Objectives

SMUD’s objectives for the project include the following:

- Contribute to a diversified energy portfolio that will aid in the continued improvement of air quality in the Sacramento air basin by decreasing reliance on fossil fuel combustion for the generation of electricity, and reduce SMUD's exposure to price volatility associated with electricity and natural gas.
- Assist SMUD in achieving the Board of Directors’ directive of using dependable renewable resources to meet 50 percent of SMUD's load by 2030. This goal is consistent with Senate Bill (SB) 350, which was signed into law in 2015.

- Support SMUD's ability to meet the SB 100 goals of a 100 percent clean energy portfolio by 2045.

- Develop an economically feasible wind project that will produce a reliable supply of up to 92 megawatts (MW) of electrical capacity.

- Accommodate the long-term viability of agricultural use within the Montezuma Hills.

Project Location

The project site is located within the Solano County Wind Resource Area (WRA) (formerly known as the Montezuma Hills Wind Resource Area or MHWRA) in southern Solano County. The WRA lies north of the confluence of the Sacramento and San Joaquin rivers and southwest of the city of Rio Vista.

The project site comprises two geographically distinct areas owned by SMUD, Solano 4 East and Solano 4 West, and the collection and home run lines, which total 2,549 acres. State Route (SR) 12 provides regional access to the project area. Montezuma Hills Road and Birds Landing Road provide local access to Solano 4 East, while Collinsville Road and Shiloh Road provide local access to Solano 4 West.

Project Characteristics

The project would involve the decommissioning of 59 existing WTGs and the construction and operation of up to 22 new WTGs. The project would have a net energy production capacity of up to 91 MW, resulting in a net increase in capacity at the Solano Wind Project from the existing 230 MW to 306 MW. Individual WTGs would have a maximum height of 492 to 590 feet (150 to 180 meters) and a maximum rotor diameter of 446 to 492 feet (136 to 150 meters). Associated access roads and collection lines would be installed to support the new WTGs.

For additional project details, see Chapter 2, “Project Description.”

Potential Approvals and Permits Required

Elements of the project could be subject to permitting and/or approval authority of other agencies. As the lead agency pursuant to CEQA, SMUD is responsible for considering the adequacy of the EIR and determining whether the project should be approved. Other permits that may be required from other agencies are listed below.

Federal

- **Federal Aviation Administration:** Notice of proposed construction or alteration **U.S. Army Corps of Engineers:** Clean Water Act Section 404 permit

- **State Historic Preservation Office:** Section 106 of the National Historic Preservation Act consultation

- **U.S. Fish and Wildlife Service:** Biological opinion or consultation and a Special purpose utility permit

State

- **State Water Resources Control Board:** Clean Water Act Section 402, construction stormwater permit
- **San Francisco Bay Regional Water Quality Control Board:** Clean Water Act Section 401, water quality certification
- **California Department of Fish and Wildlife:** Streambed alteration agreement
- **California Department of Transportation:** Haul truck and overload permit

Local

- **Solano County Department of Resource Management:** Encroachment permit

Environmental Impacts and Recommended Mitigation Measures

Table ES-1, at the end of this chapter, provides a summary of the environmental impacts of the project, the level of significance of each impact before mitigation, recommended mitigation measures, and the level of significance of each impact after implementation of mitigation measures.

Summary of Alternatives

Alternatives evaluated in this draft EIR include:

- No Project Alternative: The project would not be constructed on the project site.
- Reduced Turbine Height Alternative: A total of 27 WTGs would be placed on the property (13 at Solano 4 east and 14 at Solano 4 west) in a configuration similar to that of the proposed project. Total capacity for the Reduced Turbine Alternative would be 62 MW compared to the 912 MW for the proposed project.

For a more thorough discussion of project alternatives, see Chapter 6, “Alternatives.”

Environmentally Superior Alternative

CEQA calls for the identification of an environmentally superior alternative in an EIR, and further states that, “if the environmentally superior alternative is the ‘no project’ alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives” (Section 15126.6).

Reduced Turbine Height Alternative

Areas of Controversy

In accordance with Public Resources Code (PRC) Section 21092 and California Code of Regulations Title 14, Section 15082, SMUD issued a notice of preparation (NOP) on January 9, 2019, to inform agencies and the general public that an EIR was being prepared and to invite comments on the scope and content of the document (Appendix A). SMUD accepted comments on the scope of the EIR between January 9 and February 8, 2019. A noticed scoping meeting for the EIR occurred on January 22, 2019.

Based on the comments received during the NOP comment period, the major areas of controversy associated with the project include:

- Potential for unknown tribal resources
- Water quality and construction activity
- Emissions from heavy trucks hauling components
- Impacts to special status species
- Dust from recycled concrete used in paving roads
- Night lighting and use of strobes
- Microclimate effects

Areas of controversy that fall within the scope of CEQA are addressed in this draft EIR. Issues that fall outside the scope of CEQA are not evaluated in this draft EIR; however, SMUD will continue to respond to these issues through the project planning process.

All of the substantive environmental issues raised in the NOP comment letters have been addressed or otherwise considered during preparation of this draft EIR.

Significant and Unavoidable Impacts

Sections 3.1 through 3.11 of this draft EIR describe the potential environmental impacts of the project and recommend various mitigation measures to reduce impacts, to the extent feasible. Chapter 4, "Cumulative Impacts," determines whether the incremental effects of this project would be significant when viewed in connection with the effects of past projects, other current projects, and probable future projects. After implementation of the recommended mitigation measures, project implementation would result in the following significant and unavoidable impacts:

Air Quality

- Construction emissions of criteria air pollutants and ozone precursors (significant and unavoidable)

Biological Resources

- Operation of the project would result in direct mortalities to special-status raptors and other special-status birds (significant and unavoidable)

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
3.1 Aesthetics			
Impact 3.1-1 Project impacts on scenic vistas and potential for substantial degradation of existing visual character or quality of public views of the site and surroundings, including those within the viewshed of a state or locally designated scenic highway. Project decommissioning, construction, and eventual decommissioning activities would be visible to motorists, recreationists, and residents near the project site; however, these changes in views would be temporary. Placement and operation of WTGs under the Solano 4 Project reduces the number of WTGs operating onsite but places taller WTGs in replacement. Views would remain of a utility scale wind energy facility and any permanent change in views would be incremental. Under either condition WTGs are the dominant visual feature. The greatest visual change would be seen from Collinsville and West Sherman Island. Therefore, the project would not result in a substantial degradation of visual character. This impact would be **less than significant.**	LTS	**Mitigation Measure 3.1-1a: Design the Project to Avoid Aesthetic Impacts**. SMUD or its contractor shall consider topography when siting wind turbines and shall avoid major modifications to natural landforms or other characteristic parts of the landscape. The turbines shall be clustered or grouped to break up overly long lines of turbines. The turbines shall be similar in shape and size. Each WTG shall be painted a uniform white or light-grey color, “RAL 7035” or similar, per manufacturer’s requirements. To minimize the structures’ reflectivity, the paint used shall have a gloss level that does not exceed 30 percent, or 60–70 gloss units,1 as calculated by the manufacturer. The surfaces of all other structures (e.g., meteorology towers) shall be given low-reflectivity finishes with neutral colors to minimize the contrast of the structures with their backdrops. Fewer, larger turbines shall be preferred over more, smaller turbines. Commercial messages and symbols shall be prohibited on wind turbines. Collection and home run lines shall be underground; no overhead transmission lines shall be used. To minimize ground disturbance, to the extent feasible, existing roadways shall be used to access turbine pads. All construction-related areas shall be kept clean and tidy, with construction materials and equipment stored in the construction staging and laydown areas and/or generally away from public view. SMUD or its contractor shall remove	LTS

[1] Gloss units is a measurement scale based on a highly polished reference black glass standard with a refractive index of 100 gloss units at the specified angle of measurement. A measurement of 70 gloss units represents a low-gloss condition.

NI = No impact B = Beneficial LTS = Less than significant PS = Potential significant S = Significant SU = Significant and unavoidable

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		construction debris promptly at intervals of 2 weeks or less, at any one location. **Mitigation Measure 3.1-1b: Implement Operational Measures to Reduce Aesthetic Impacts.** Wind turbines shall be kept clean and in good repair. Nacelle covers and rotor nose cones shall always be maintained in place and undamaged. Inoperative turbines shall be repaired, replaced, or removed as quickly as feasible because a turbine that is broken or disabled will create a health and safety hazard and disrupt the visual experience of the casual observer. SMUD or its contractor shall remove derelict WTGs and derelict parts and pieces. Similarly, operations and maintenance areas shall be kept clean and tidy, with all equipment, parts, and supplies stored in areas that are screened from view and/or are generally not visible to the general public. Grading and landscape treatment around tower foundations shall match the conditions of surrounding landscape and habitat to recreate a pleasing visual environment.	
Impact 3.1-2: Creation of new sources of substantial light or glare that would adversely affect day or nighttime views in the area. Project construction and operation would introduce permanent sources of light and glare, mainly to comply with FAA safety lighting requirements. Therefore, this impact would be **significant.**	S	**Mitigation Measure 3.1-2: Use Technology to Reduce Night Sky Impacts.** To reduce the potential for visual impacts associated with lighting, lighting for the turbine doorways shall be limited to the illumination required for safety of personnel and security of project infrastructure. To minimize the effect of light pollution in the surrounding area, all lighting shall be motion-activated and downcast.	LTS
Impact 3.1-3: Shadow flicker effects. The project would not result in substantial shadow flicker. This impact would be **less than significant.**	LTS	No mitigation is required.	LTS

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
3.2 Air Quality			
Impact 3.2-1: Construction-related exceedance of thresholds of significance established by the air districts for criteria air pollutants. Project construction activities would emit NO_X and PM_{10} at levels that could exceed YSAQMD and BAAQMD daily emissions thresholds for these pollutants. Construction would occur over a 17 to 20-month period, with several construction phases occurring simultaneously at several points. In addition, given the size and characteristics of the project, which would involve substantial grading activity, fugitive dust emissions would contribute to an exceedance of these thresholds and could violate applicable air quality standards. This impact would be **significant**.	S	**Mitigation Measure 3.2-1: Reduce construction-related exhaust and dust emissions.** The construction contractor shall prepare a fugitive dust control plan for the project's construction phases. Before the start of construction, the plan shall be submitted to YSAQMD and BAAQMD for review and approval. The fugitive dust control plan shall include but not be limited to the following measures for all construction phases to reduce fugitive dust emissions and emissions of PM and NO_X exhaust: <u>Fugitive Dust Control Plan</u> • All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered at a frequency adequate to maintain minimum soil moisture of 12 percent (at least two times per day). Moisture content can be verified by lab samples or moisture probe. • All haul trucks transporting soil, sand, or other loose material off-site shall be covered. • All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited. • All vehicle speeds on unpaved roads shall be limited to 15 miles per hour. • All roadways, driveways, and wind turbine generator foundations and work areas to be paved or graveled shall be completed as soon as possible. These areas shall be paved or graveled as soon as possible after grading unless seeding or soil binders are used. • Idling times shall be minimized either by shutting equipment off when not in use or by reducing the	SU

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		maximum idling time to 2 minutes. Clear signage shall be provided for construction workers at all access points. • All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition before operation. • A publicly visible sign shall be posted identifying the name and telephone number of the person to contact at SMUD regarding dust complaints. This person shall respond and take corrective action within 48 hours. The air districts' phone numbers shall also be visible to ensure compliance with applicable regulations. • All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 miles per hour. • Vegetative ground cover (e.g., fast-germinating native grass seed) shall be planted in disturbed areas as soon as possible and watered appropriately until vegetation is established. • The simultaneous occurrence of excavation, grading, and ground-disturbing construction activities on the same area at any one time shall be limited. Activities shall be phased to reduce the surface area disturbed at any one time. • All trucks and equipment, including their tires, shall be washed off before leaving the site. • Site access areas shall be covered with a 6- to 12-inch compacted layer of wood chips, mulch, or gravel to a distance of 100 feet from the paved road.	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		• Sandbags or other erosion control measures shall be installed to prevent silt runoff to public roadways from sites with a slope greater than 1 percent. • The project shall develop a plan demonstrating that off-road equipment exceeding 50 horsepower) to be used in the construction project (owned, leased, and subcontractor vehicles) would achieve project-wide, fleet-average emissions reductions of 20 percent for NOX and 45 percent for PM, compared to the most recent ARB fleet average. Acceptable options for reducing emissions include the use of late-model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, add-on devices such as particulate filters, and/or other options as they become available. • Low-VOC (i.e., ROG) coatings shall be used beyond local requirements (Regulation 8, Rule 3, "Architectural Coatings"). • All construction equipment, diesel trucks, and generators shall be equipped with best available control technology for reduction of NO_X and PM emissions. • All contractors shall use equipment that meets ARB's most recent certification standard for off-road heavy-duty diesel engines (BAAQMD 2017:Tables 8-2 and 8-3).	
Impact 3.2-2: Potential for conflict with or obstruction of implementation of the applicable air quality plan. Implementing the proposed project would not conflict with or obstruct implementation of any YSAQMD or BAAQMD air quality attainment plans. For this reason, this impact would be **less than significant**.	LTS	No mitigation is required.	LTS

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
3.3 Biological Resources			
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.**	PS	**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 on-call to conduct monitoring during project construction as needed. • 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 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	LTS

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		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: o the federal ESA and CESA; o the Bald and Golden Eagle Protection Act; o the Migratory Bird Treaty Act; o the Clean Water Act; o Sections 3503, 3503.5, 3511, 3513, 3800(a), 4150, 4700, 5050, 5515, and 1602 of the California Fish and Game Code; o California Code of Regulations Title 14, Sections 30.10 and 251.1; o the Porter-Cologne Water Quality Control Act; o Sections 5004 and 7201 of the CDFA Code; and o 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	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		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	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		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"	
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.**	PS	**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. Not 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	LTS

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		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.	
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.**	LTS	No mitigation is required.	LTS
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.**	PS	**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	LTS

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		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. o 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. o 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. o 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). o 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.	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		• 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 (DFG 2012): • SMUD will have preconstruction burrowing owl surveys conducted in all areas that may provide suitable nesting habitat according to CDFW (DFG 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 re-initiated after a lapse of two or more days.	

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		• SMUD will avoid disturbing active western burrowing owl nests and occupied nesting burrows. o 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) o 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.	
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.**	LTS and PS	**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	LTS

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		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 management of the mitigation lands in perpetuity by funding a management endowment.	
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.**	PS	**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: o Two 4-hour observations shall be conducted at each nest (multiple nests may be observed simultaneously),	LTS

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		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. o 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. o 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 2020192019 for winter/spring 2020192019 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).	
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	PS	**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.	LTS

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
eagle foraging habitat, resulting in decreased prey availability. This impact would be **potentially significant.**			
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.**	LTS	No mitigation is required.	LTS
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.**	PS	**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: o Use turbines and WTG tower designs lacking potential raptor perches that may encourage bird activity near the moving rotors. o Use turbines with rotor tips at least 25 meters, preferably 30 meters, above the ground. • Avoid guy wires on meteorological towers.	LTS

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		• Select WTG sites using the following guidelines designed to minimize the extent of potential avian and bat mortality: o 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. o Establish setbacks from roads, residences, and wetlands and other unique habitats where birds and bats are more likely to congregate. o 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	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		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: o The standard search radius will be 100 meters to account for terrain and WTG height. o 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. o 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. o Data will be analyzed using procedures described by the California Energy Commission and CDFW (CEC and DFG 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. o 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.	

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		• 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,	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		"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	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		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: Comply with measures described in SMUD's Eagle Take Permit**. 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	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		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	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		or bat species. 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. The goal of the adaptive management strategies is to avoid a local population of avian or bat species dropping below self-sustaining levels. If avian or bat mortality resulting from operation of the Solano 4 Wind Project exceeds the maximum estimated fatality rates described in Tables 3.3-12 and 3.3-13, 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. 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: o DT Bird/DT Bat Systems	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		o 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: o improved blade marking (compatible with Solano County visual guidelines) such as variations in paint color and color patterns; o blade designs that produce bird warning "whistles" (without upsetting blade integrity or exceeding ambient noise limits); and o 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	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		(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.	
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.**	LTS	No mitigation is required.	LTS
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.**	LTS	No mitigation is required.	LTS
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.**	PS	**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,	LTS

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		“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. • Solano County Wind Turbine Siting Plan and Environmental Impact Report requires that construction activities and project components be located at least 100 feet from riparian habitat wherever feasible. Any required setback will be shown on project construction drawings and plans (e.g., grading and improvement plans). While SMUD is not required to comply with Solano County’s zoning and building ordinance requirements, SMUD would incorporate the County’s setback requirements in their project construction drawings and plans.	

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Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		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 and submit 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	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		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.	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		• 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	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		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.	
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.**	PS	**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"	LTS

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		• 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 Solano County 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	

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		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, SMUD will prepare a grading plan. • 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 plan: o All work shall be done in a manner that will minimize soil erosion. o Existing natural vegetation shall be retained and preserved wherever possible and practical. o 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). o 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.	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		o Seeding, mulching, and other suitable stabilization measures shall be used to protect exposed erodible areas in advance of the rainy season. o Provisions shall be made to mitigate any increased runoff caused by altered soil conditions during and after construction. o 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. o Cleared vegetation and excavated materials shall be disposed of in a manner that reduces the risk of erosion. Topsoil shall be conserved for use in revegetation of disturbed areas whenever possible or practical. o 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. o 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. o 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,	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		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 USACE CWA Section 404 permit. **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	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		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 in the CDFW permits. • 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: o All work shall stop until the frac-out has been contained and cleaned up. o 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.) o If a frac-out occurs, SMUD shall notify the appropriate jurisdictional agency (USACE, the Central Valley	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		RWQCB, and/or CDFW) by telephone and in writing (e-mail 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	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		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.	
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.**	LTS	No mitigation is required.	LTS
3.4 Archaeological, Historical, and Tribal Cultural Resources			
Impact 3.4-1: Impacts on unique archaeological resources. Previous investigations resulted in the documentation of four archaeological resources, a ranch complex, and the potential Montezuma Hills Rural Historic Landscape. These resources have been evaluated for the NRHP and CRHR but do not appear to be eligible; therefore, they are not considered unique archaeological resources. However, project-related ground-disturbing activities could result in the discovery of or damage to as-yet undiscovered archaeological resources as defined in Section 15064.5 of the State CEQA Guidelines. This impact would be **potentially significant.**	PS	**Mitigation Measure 3.4-1a: Avoid or conduct subsurface testing and/or monitoring during construction in areas with high potential for the presence of buried archaeological sites.** The construction contractor shall avoid conducting ground-disturbing activities in the few locations within the direct APE that have high or the highest potential for buried archaeological sites. If these areas cannot be avoided and project-related ground disturbance in those areas would be sufficiently deep that they could encounter buried archaeological resources, then additional actions may be necessary to mitigate any impacts on as-yet unidentified buried resources. These minimization efforts could include conducting subsurface testing before project construction and/or monitoring during the construction period.	LTS

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		Mitigation Measure 3.4-1b: Prior to the start of construction, SMUD shall provide worker awareness training to the construction contractor and SMUD's project superintendent regarding the potential for cultural and tribal cultural resources that could be encountered during ground disturbance, the regulatory protections afforded to such finds, and the procedures to follow in the event of discovery of a previously unknown resource, including notifying SMUD representatives. SMUD shall invite representatives of UAIC to periodically inspect the active areas of the project, including any soil piles, trenches, or other disturbed areas. UAIC shall be notified at least 48 hours prior to start of construction. In the event that tribal representatives or construction workers find evidence of potential tribal cultural resources, the procedures identified in Mitigation Measure 3.4-1c and 3.4-2 shall be implemented. **Mitigation Measure 3.4-1c: Halt ground-disturbing activity upon discovery of subsurface archaeological features.** If any prehistoric or historic-era subsurface archaeological features or deposits, including locally darkened soil ("midden"), that could conceal cultural deposits are discovered during construction, all ground-disturbing activity shall cease within 100 feet of the resource(s) discovered. A qualified cultural resources specialist and Native American representatives and monitors from culturally affiliated Native American Tribes shall assess the significance of the find and make recommendations for further evaluation and treatment as necessary. These recommendations shall be documented in the project record. For any recommendations made by interested Native American Tribes that are not implemented, the project record shall provide a justification explaining why the recommendation was not followed.	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		If the qualified archaeologist determines the find to be significant (because the find constitutes either a historical resource, a unique archaeological resource, or a tribal cultural resource), and if an adverse impact on a TCR, unique archaeology, or other cultural resource occurs, then SMUD shall consult with interested Native American groups and individuals regarding mitigation contained in PRC Sections 21084.3(a) and 21084.3(b) and State CEQA Guidelines Section 15370. Potential mitigation measures developed in coordination with interested Native American groups may include: • preservation in place (the preferred manner of mitigating impacts on archaeological sites), • archival research, • replacement of cultural items for educational or cultural purposes, • preservation of substitute TCRs or environments and/or subsurface testing, or • contiguous block unit excavation and data recovery (when it is the only feasible mitigation, and pursuant to a data recovery plan).	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Impact 3.4-2: Impacts on tribal cultural resources. Consultation with the Wilton Rancheria is ongoing and could result in the identification of TCRs as described under AB 52 and PRC Section 21074. Because consultation has not yet been completed, this impact would be **potentially significant.**	PS	**Mitigation Measure 3.4-2: Complete AB 52 consultation.** SMUD concluded consultation with the UAIC and Wilton Rancheria under AB 52.If TCRs are identified that have the potential to be adversely affected by the project, SMUD shall notify Tribal Historic Preservation Officer Matthew Moore (THPO@auburnrancheria.com) and Antonio Ruiz (aruiz@wiltonrancheria-nsn.gov) should an inadvertent discovery of TCRs occur, and will develop mitigation measures in consultation with interested Native American groups and individuals to minimize those impacts. These mitigation measures could include the following or equally effective mitigation measures (as identified in PRC Section 21084.3): (1) Avoidance and preservation of the resources in place, including but not limited to planning and construction to avoid the resources and protect the cultural and natural context, or planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria. (2) Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including but not limited to the following: (A) protecting the cultural character and integrity of the resource; (B) protecting the traditional use of the resource; or (C) protecting the confidentiality of the resource. (3) Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places. (4) Protecting the resource.	LTS

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		(5) Preserving substitute TCRs, resources, or environments.	
Impact 3.4-3: Impacts on previously unidentified human remains. Excavation during project construction could disturb previously undiscovered human remains. This impact would be **potentially significant.**	PS	**Mitigation Measure 3.4-3: Halt ground-disturbing activity upon discovery of human remains.** If human remains are discovered during any demolition/construction activities, potentially damaging ground-disturbing activities within 100 feet of the remains shall be halted immediately, and SMUD will notify the Solano County coroner and the NAHC immediately, according to PRC Section 5097.98 and Section 7050.5 of the California Health and Safety Code. If the remains are determined by the NAHC to be Native American, the guidelines of the NAHC shall be followed during the treatment and disposition of the remains. SMUD will also retain a professional archaeologist with Native American burial experience to conduct a field investigation of the specific site and consult with the Most Likely Descendant, if any, identified by the NAHC. Following the coroner's and NAHC's findings, the archaeologist and the NAHC-designated Most Likely Descendant shall determine the ultimate treatment and disposition of the remains and take appropriate steps to ensure that additional human interments are not disturbed. PRC Section 5097.94 identifies the responsibilities for acting upon notification of a discovery of Native American human remains.	LTS
Impact 3.4-4: Indirect impacts on a historical resource. The Hastings Adobe (a historical resource listed in the NRHP and CRHR) is located outside of the project's direct APE. Project-related construction vibration and visual effects would not result in an indirect substantial adverse change. This impact would be **less than significant.**	LTS	No mitigation is required.	LTS

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
3.5 Geology and Soils			
Impact 3.5-1: Substantial soil erosion or loss of topsoil. The proposed project has the potential to disturb approximately 91 acres during decommissioning, rehabilitation, and construction. Although these activities would be temporary, grading, excavation, and other ground-disturbing activities would expose soil and could result in accelerated erosion. Therefore, this impact would be **potentially significant.**	PS	**Mitigation Measure 3.5-1: Prepare and implement a SWPPP and associated BMPs.** Before any ground-disturbing activities begin, the construction contractor shall apply for and maintain coverage under the Construction General Permit. The contractor shall prepare and implement a SWPPP, including an erosion control plan, that includes erosion control measures and construction waste containment measures to ensure that waters of the United States and the state are protected during and after project construction. The SWPPP shall include site design measures to minimize off-site stormwater runoff that might otherwise affect surrounding habitats. The SWPPP shall be provided to SMUD for review and approval before it is provided to the SWRCB. The Central Valley Regional Water Quality Control Board and/or San Francisco Bay Regional Water Quality Control Board will review and monitor the effectiveness of the SWPPP through mandatory reporting by SMUD and the construction contractor as required. The SWPPP shall be prepared with the following objectives: • Identify all pollutant sources, including sources of sediment, that may affect the quality of stormwater discharges from construction of the project. • Identify BMPs that effectively reduce or eliminate pollutants in stormwater discharges and authorized nonstormwater discharges from the site during construction to the Best Available Technology/Best Control Technology standard. • Provide calculations and design details as well as BMP controls for site run-on that are complete and correct. • Identify project discharge points and receiving waters.	LTS

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		• Provide stabilization BMPs to reduce or eliminate pollutants following construction. The construction contractor shall implement the SWPPP, including all BMPs, and shall inspect all BMPs during construction. Potential SWPPP BMPs could include but would not be limited to the following: • Preserve existing vegetation where possible. • Roughen the surfaces of final grades to prevent erosion, decrease runoff, increase infiltration, and aid in vegetation establishment. • Place riparian buffers or filter strips along the perimeter of the disturbed area to intercept pollutants before off-site discharge. • Place fiber rolls around on-site drain inlets to prevent sediment and construction-related debris from entering inlets. • Place fiber rolls along down-gradient disturbed areas of the site to reduce runoff flow velocities and prevent sediment from leaving the site. • Place silt fences down-gradient of disturbed areas to slow down runoff and retain sediment. • Stabilize the construction entrance to reduce the tracking of mud and dirt onto public roads by construction vehicles. • Stage excavated and stored construction materials and soil stockpiles in stable areas and cover or stabilize materials to prevent erosion. • Stabilize temporary construction entrances to limit transport/introduction of invasive species and control fugitive dust emissions.	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Impact 3.5-2: Location of the project on a geologic unit or soil that is unstable, or that would become unstable as a result of the project. Historically the project area has experienced a low level of seismic activity; however, the potential exists for unstable soils to be present in the project area. Therefore, this impact would be **potentially significant.**	PS	**Mitigation Measure 3.5-2: Conduct a site-specific geotechnical investigation.** Before final design of the project, the construction contractor shall complete a design level geotechnical investigation and report for the project, to be prepared by a California Registered Civil Engineer or Geotechnical Engineer. The report will set forth design and construction measures intended to ensure site stability in compliance with applicable seismic and building codes. The report shall address and make recommendations on the following: • road, pavement, and parking area design; • structural foundations; • grading practices; • erosion/winterization; • special problems discovered on-site (e.g., groundwater, expansive/unstable soils); and • slope stability. All recommendations of the geotechnical report shall be incorporated into the construction plans and specifications that are reviewed and stamped by a licensed engineer of the appropriate discipline. SMUD must include the measures in the contract for implementation by the construction contractor for the duration of construction related activities.	LTS
Impact 3.5-3: Creation of a substantial risk as a result of expansive soils. Expansive soils are composed largely of clays, and extensive areas of clay soils are present on the project site. Although these soils are not expected to adversely affect WGTWTG foundations, clay soils are subject to shrinkage and swelling that can affect ancillary site improvements, such as roadways that are supported by shallow foundations. Therefore, this impact would be **potentially significant.**	PS	**Mitigation Measure 3.5-3: Implement Mitigation Measure 3.5-2, "Implement all recommendations from the geotechnical investigation."** The construction contractor shall implement Mitigation Measure 3.5-2, above, which requires the completion of a design level geotechnical investigation and report for the project and the implementation of all design and construction measures contained therein.	LTS

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Impact 3.5-4: Degradation or destruction of a unique paleontological resource. The proposed project has the potential to disturb approximately 91 acres during decommissioning, rehabilitation, and construction. The Montezuma Hills, including the project site, have been determined by Solano County to be a sensitive resource area with respect to paleontological resources. A site-specific paleontological investigation has not been prepared for the site to confirm the presence or absence of paleontological resources. Therefore, this impact would be **potentially significant.**	PS	**Mitigation Measure 3.5-4: Conduct a site-specific paleontological resource investigation and implement identified protective measures.** Before the start of any ground-disturbing activities, SMUD shall have prepared a site-specific analysis of paleontological resources. At a minimum, the site-specific analysis shall include a review of the types of the geologic formation(s) present at the project site and a determination of the likelihood that those formation(s) would contain a “unique paleontological resource” as stated in Title 14, California Code of Regulations, Appendix G (the CEQA checklist). If a site-specific analysis determines that a project may have an adverse effect on a “unique paleontological resource,” project-specific mitigation measures shall be identified and implemented to address the following requirements: • Cessation of work in the vicinity of the find and notification to SMUD. • Retention of a qualified paleontologist to evaluate the resource and prepare a proposed mitigation plan, which may include some or all of the following elements: a field survey, construction monitoring, sampling and data recovery procedures, museum storage coordination for any specimen recovered, and a report of findings. • Implementation of recommendations made by the paleontologist, where SMUD determines that such recommendations are necessary and feasible. All recommendations of the report shall be incorporated into the construction plans and specifications that are reviewed and stamped by a licensed engineer of the appropriate discipline. SMUD must include the measures in the contract for implementation by the construction contractor for the duration of construction related activities.	LTS

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
3.6 Greenhouse Gas Emissions and Energy			
Impact 3.6-1: Direct or indirect generation of GHG emissions that may have a significant impact on the environment or conflict with an applicable plan, policy, or regulation of an agency adopted for the purpose of reducing emissions of GHGs. The fundamental purpose of the project is to reduce GHG emissions produced in the SMUD service area and in California, or to support beneficial uses there. The project is expected to reduce GHG emissions by approximately 2,446,322 MTCO2e over the project's 35-year life. Although project construction activities would make a relatively small contribution of 4,603 MTCO2e to overall GHG emissions, implementing the project would not result in a substantial cumulative contribution to GHG emissions or conflict with any applicable plan, policy, or regulation regarding GHGs. This impact would be **less than significant**.	LTS	No mitigation is required.	LTS
Impact 3.6-2: Impacts of climate change on the project. Climate change is anticipated to result in various changes to local weather patterns in the future. The project does not propose any new residences and would not expose people to increased risks from climate change. This impact would be **less than significant**.	LTS	No mitigation is required.	LTS
Impact 3.6-3: Wasteful, inefficient, and unnecessary consumption of energy. Project construction activities would consume energy. However, because the project, once operational, would serve as a power generation facility and increase SMUD's capacity to generate power, the project would not result in the wasteful, inefficient, and unnecessary consumption of energy. Therefore, this impact would be **less than significant**.	LTS	No mitigation is required.	LTS
3.7 Hazards and Hazardous Materials			
Impact 3.7-1: Exposure of people and the environment to hazardous materials. Construction, operation, and eventual decommissioning activities would involve the storage, transport,	PS	**Mitigation Measure 3.7-1a: Implement Mitigation Measure 3.5-1, "Prepare and implement a SWPPP and associated BMPs."** The contractor shall implement	LTS

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
and/or handling of hazardous materials. Transport or use of these materials on-site could expose workers or the environment to hazards. Therefore, this impact would be **potentially significant.**		Mitigation Measure 3.5-1 listed in Section 3.5, “Geology, Soils, and Mineral Resources.” This measure requires the preparation of a project-specific SWPPP and implementation of the SWPPP by the construction contractors, including all necessary BMPs. **Mitigation Measure 3.7-1b: Establish and implement an environmental training program.** Before the start of construction, SMUD or its contractor shall establish an environmental training program to communicate environmental concerns and appropriate work practices to all field personnel. The training program shall cover the use of hazardous materials, waste management, spill prevention, emergency response measures, and proper implementation of BMPs. The program shall emphasize site-specific physical conditions to improve hazard prevention (e.g., identification of potentially hazardous substances) and shall include a review of all site-specific plans, including but not limited to the project’s SWPPP, health and safety plan (as required by OSHA), fugitive dust control plan, and hazardous substances control and emergency response plan. **Mitigation Measure 3.7-1c: Prepare and implement a hazardous substance control and emergency response plan.** Before the start of construction, SMUD or its contractor shall prepare a construction-specific hazardous substance control and emergency response plan. The plan shall include preparations for quick and safe cleanup of accidental spills; prescribe procedures for handling hazardous materials to reduce the potential for a spill during construction; and include an emergency response program to ensure quick and safe cleanup of accidental spills. The hazardous substance control and emergency response plan shall also identify BMPs in the event a spill occurs. BMPs may include but are not limited to the following: use of oil-absorbent materials, tarps, and storage drums to contain	

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		and control any minor releases; and storage and use of emergency-spill supplies and equipment in locations adjacent to work and staging areas. The hazardous substance control and emergency response plan shall identify areas where refueling and vehicle maintenance activities and storage of hazardous materials, if any, will be permitted. **Mitigation Measure 3.7-1d: Prepare and implement a spill prevention, control, and countermeasures (SPCC) plan.** If more than 1,320 gallons of petroleum products will be stored on-site (excluding vehicles), SMUD's construction contractor shall prepare and implement a SPCC plan in accordance with state and federal requirements, including 40 CFR 112. The SPCC plan shall identify engineering and containment measures for preventing releases of oil into waterways. The SPCC plan shall be submitted to SMUD for review and approval before the start of operations, or during construction. If less than 1,320 gallons of petroleum products will be stored on-site (excluding vehicles), this mitigation measure is not required. **Mitigation Measure 3.7-1e: Prepare and implement a hazardous materials business plan.** If the project will use or store hazardous materials equal to or greater than 55 gallons of liquids, 500 pounds of solids, and/or 200 cubic feet (at standard temperature and pressure) of compressed gases, SMUD's construction contractor shall prepare a hazardous materials business plan that will conform with Solano County Environmental Health requirements. The contractor shall file the plan with SMUD annually. The hazardous materials business plan shall identify site activities; list the contact information for the business owner/operator; provide an inventory of hazardous	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		materials used on-site; provide a facilities map; and identify an emergency response plan/contingency plan. During the construction phase, if threshold quantities of any hazardous materials are stored on-site for more than 90 consecutive days, then the hazardous materials business plan shall be filed and maintained for as long as any of those thresholds are met or exceeded. During the operations phase, if the threshold for any hazardous materials is met or exceeded for more than 30 consecutive days, then the hazardous materials business plan shall be to SMUD and shall be maintained as long as the thresholds are met or exceeded. The regulations require annual submittal of the hazardous materials business plan as long as the project meets the conditions for the continued applicability of the regulations. If less than 55 gallons of liquids, 500 pounds of solids, and/or 200 cubic feet (at standard temperature and pressure) of compressed gases will be used or stored on-site, this mitigation measure is not required.	
Impact 3.7-2: Exposure of people and the environment to subsurface hazardous materials disturbed during construction. Construction could result in a short-term hazard to the public and/or the environment if subsurface hazardous materials were to be disturbed during construction activities. Therefore, this impact would be **potentially significant.**	PS	**Mitigation Measure 3.7-2a: Implement Mitigation Measures 3.7-1a through 3.7-1e.** SMUD or its construction contractor shall implement Mitigation Measures 3.7-1a through 3.7-1e, listed above. These measures establish and require implementation of various plans to minimize the risk of accidental release of hazardous materials. **Mitigation Measure 3.7-2b: Delineate any construction areas where the presence of hazardous materials is known or suspected.** Before the start of construction, SMUD or its contractor shall delineate construction areas where the presence of hazardous materials is known or suspected. Such areas shall be avoided during construction to the extent feasible. These areas include but are not limited to abandoned gas wells and underground gas pipelines. Underground utilities, such as gas pipelines and	LTS

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		high-voltage lines, shall be identified and marked clearly. If necessary, appropriate encroachment permits shall be obtained before work begins. A Spill Discovery Response Plan shall be developed before construction begins. The plan shall be implemented in the event that hazardous materials are unexpectedly encountered during construction. The plan shall include instructions for work crews to stop work immediately, notify the appropriate emergency response agency, and in the case of natural gas pipelines, notify the pipeline operator. **Mitigation Measure 3.7-2c: Maintain access to gas wells.** Should a gas well location be verified, SMUD and its construction contractor shall implement the following measures: • Maintain physical access to any gas well encountered. • Ensure that the abandonment of gas wells is to current standards. • If one or more unknown wells is discovered during project development, immediately notify the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources so that the newly discovered well(s) can be incorporated into the records and investigated. Any wells found during implementation of the project, and any pertinent information obtained, shall be communicated to the Solano County Recorder for inclusion in the title information of the subject real property. This is to ensure that present and future property owners are aware of (1) the wells located on the property, and (2) potentially significant issues associated with any improvements near oil or gas wells. • Avoid performing work on any oil or gas well without written approval from the California Department of Conservation, Division of Oil, Gas, and Geothermal	

NI = No impact B = Beneficial LTS = Less than significant PS = Potential significant S = Significant SU = Significant and unavoidable

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		Resources in the form of an appropriate permit. This includes but is not limited to mitigating leaking fluids or gas from abandoned wells, modifications to well casings, and/or any other re-abandonment work.	
Impact 3.7-3: Safety hazard to air traffic. The project site lies within the planning boundary of the Travis AFB LUCP, which contains policies designed to promote land use compatibility with airport operations. Placement of WTGs have the potential to intrude into navigable airspace, thereby increasing the risk of aircraft collision, or causing interference with radar signals used by air traffic control. Therefore, this impact would be **potentially significant.**	PS	**Mitigation Measure 3.7-3: Mark and light wind turbine generators during construction.** SMUD will e-file FAA Form 7460-2, Part 1, Notice of Actual Construction or Alteration, at least 60 days before the start of construction, so that appropriate action can be taken to amend the affected procedure(s) and/or altitude(s), if necessary. To ensure proper conspicuity of turbines at night during construction, all WTGs shall be lit with temporary lighting once they reach a height of 200 feet or greater until the permanent lighting configuration is turned on. As the height of the structure continues to increase, the temporary lighting shall be relocated to the uppermost part of the structure. The temporary lighting may be turned off for periods when they would interfere with construction personnel. If practical, permanent obstruction lights shall be installed and operated at each level as construction progresses. An FAA Type L-810 steady red light fixture shall be used to light the structure during the construction phase. If power is not available, WTGs shall be lit with self-contained, solar-powered light-emitting diode (LED) steady red light fixtures that meet the photometric requirements of an FAA Type L-810 lighting system. The lights shall be positioned to ensure that a pilot has an unobstructed view of at least one light at each level. The use of a Notice to Airmen (NOTAM) (D) to avoid lighting WTGs within the project site until completion of the entire project is prohibited. This measure includes temporary construction equipment such as cranes and derricks, which may be used during actual construction of the structures. However, this equipment shall not exceed a height of 200 feet. Separate	LTS

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		notice shall be provided to the FAA for any equipment taller than 200 feet.	
Impact 3.7-4: Exposure of employees and the public to hazards from accidental rotor failure. If a blade on a project WTG were to fail, the blade could become a projectile, exposing employees and the public to a hazard. As part of final design and siting, SMUD requires that the contractor prepare a blade throw analysis to inform the final site layout, and ensure sufficient setback is provided to minimize the risk of exposure to such a hazard. This impact would be **less than significant.**	LTS	**Mitigation Measure 3.7-4: Conduct Safety Evaluation of WTGs.** The Contractor shall provide a safety evaluation of the proposed siting plan, and ensure that the design and layout of the Project considers the safety evaluation. The Contractor's safety evaluation shall include an analysis of the following types of failure that could occur: a. Blade Throw Risk Analysis: Probability of Loss of an entire blade by failure at the hub attachment. b. Tower Failure. Complete failure of the tower, particularly at the base. c. Rotor Delamination. Failure of the fiberglass rotor skin, resulting in flying fragments. d. Blade-Throw Strike. Impact of a failed rotor blade on the tubular tower	LTS
Impact 3.7-5: Exposure of people or structures to a significant risk of loss, injury, or death involving wildfires. The project site is not located in an area classified as a High Fire Hazard Severity Zone. Although the project would adhere to applicable fire regulations, the use of construction equipment in grass-covered areas could expose people or structures to a significant fire risk. Therefore, this impact would be **potentially significant.**	PS	**Mitigation Measure 3.7-5a: Prepare and implement a grass fire control plan.** SMUD or its construction contractor will develop a grass fire control plan. The plan shall be implemented for use during construction and operation of the project to reduce potential impacts on public services relative to fire protection services in the project area. The plan shall include notification procedures and emergency fire precautions, as discussed in Section 4.8, "Hazards and Hazardous Materials." This shall include the training of construction workers in the use of firefighting equipment available on-site (e.g., fire extinguishers) and communicating with the Montezuma Fire Protection District. Additionally, the nearby Montezuma Fire Protection District stations are equipped for grass fires, and the proposed access roads for WTG maintenance shall be used to improve access by fire trucks during emergency situations and serve as a fire break. The operations and maintenance	LTS

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		building shall be designed to SMUD's safety standards and shall include a fire alarm. In addition, construction and maintenance crews shall be trained in fire prevention, carry fire extinguishers in all vehicles, and have access to one or more water trucks. **Mitigation Measure 3.7-5b: Implement Mitigation Measure 3.11-1b, "Create and implement an emergency access plan and notify emergency services providers of anticipated roadway obstructions."** SMUD will implement Mitigation Measure 3.11-2 listed in Section 3.11, "Transportation and Traffic." This measure requires the development and implementation of a plan to maintain emergency access during WTG transport and throughout the construction period.	
3.8 Hydrology and Water Quality			
Impact 3.8-1: Short-term degradation of water quality. Decommissioning of existing wind power facilities, project construction, and future project decommissioning or repowering activities would require the grading and movement of soil. Such activities could result in erosion, sedimentation, and discharge of other nonpoint-source pollutants to stormwater, which could then drain off-site and degrade local water quality. This impact would be **potentially significant.**	PS	**Mitigation Measure 3.8-1a: Implement Mitigation Measure 3.5-1, "Prepare and implement a SWPPP and associated BMPs."** SMUD shall prepare and the construction contractor to implement Mitigation Measure 3.5-1 listed in Section 3.5, "Geology, Soils, and Mineral Resources." This measure requires the construction contractor to implement a SWPPP, including all necessary BMPs. **Mitigation Measure 3.8-1b: Implement Mitigation Measure 3.7-1b, "Establish and implement an environmental training program."** The construction contractor shall implement Mitigation Measure 3.7-1b listed in Section 3.7, "Hazards and Hazardous Materials." This measure requires SMUD to establish and require implementation of an environmental training program for all field personnel that communicates spill prevention, emergency response measures, and proper implementation of BMPs.	LTS

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		Mitigation Measure 3.8-1c: Implement Mitigation Measure 3.7-1c, "Prepare and implement a hazardous substance control and emergency response plan." The construction contractor shall implement Mitigation Measure 3.7-1c listed in Section 3.7, "Hazards and Hazardous Materials." This measure requires SMUD to prepare and implement a construction-specific hazardous substance control and emergency response plan for quick, safe cleanup of accidental spills. **Mitigation Measure 3.8-1d: Implement Mitigation Measure 3.7-1d, "Prepare and implement a spill prevention, control, and countermeasures plan."** The construction contractor shall implement Mitigation Measure 3.7-1d listed in Section 3.7, "Hazards and Hazardous Materials." This measure requires SMUD to prepare and the construction contractor to implement a spill prevention control and closures plan to prevent the discharge of petroleum products into waterways.	
Impact 3.8-2: Alteration of the site's existing drainage pattern. The project would include limited grading of the project site, with only a small portion of the site to be developed with compacted materials and concrete pads. Therefore, installation of project facilities would not alter existing on-site drainage patterns and flow paths sufficiently to alter the way in which stormwater flows onto and off the site during major events. This impact would be **less than significant.**	LTS	No mitigation is required.	LTS
Impact 3.8-3: Long-term degradation of water quality. The project would alter the types, quantities, and timing of contaminant discharges in stormwater runoff. Overall, if the system is not designed properly, the project could cause or contribute to a long-term increase in discharges of urban contaminants (e.g., oil and grease, trace metals and organics, trash) into the stormwater drainage system compared with existing conditions. SMUD would comply with federal and state	LTS	No mitigation is required.	LTS

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
stormwater management regulations and would incorporate appropriate BMPs into project design to prevent long-term degradation of water quality. Therefore, this impact would be **less than significant.**			
Impact 3.8-4: Substantial decrease in groundwater supplies. The project is expected to use up to several million gallons of water during construction for dust control and other activities. Water use would vary over time depending on the construction phasing. SMUD or its contractor plans to obtain construction water from the City of Rio Vista. Because Rio Vista has forecast that it would have excess water capacity during project construction, this impact would be **less than significant.**	LTS	No mitigation is required.	LTS
3.9 Land Use			
Impact 3.9-1: Division of an established community. The proposed project is not located within an existing community and does not have any features that would divide a community. This impact would be **less than significant.**	LTS	No mitigation is required.	LTS
Impact 3.9-2: Conflict with a plan, policy, or regulation adopted to avoid or mitigate an environmental effect. The proposed project is consistent with local plans, policies, and regulations. This impact would be **less than significant.**	LTS	No mitigation is required.	LTS
3.10 Noise			
Impact 3.10-1: Generation of a Substantial Temporary Increase in Ambient Noise Levels in the Vicinity of the Project in Excess of Standards Established in the Local General Plan or Noise Ordinance, or Applicable Standards of Other Agencies due to Short-term construction noise impacts. Proposed construction areas are located mostly far from existing noise-sensitive receptors, the only closest receptor (LT-2) being approximately 275 feet from where construction activities (underground cabling) would occur. Most noise-generating construction activity would be performed during	LTS	No mitigation is required.	LTS

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
daytime hours, when people are less sensitive to noise. This impact would be **less than significant**.			
Impact 3.10-2: Temporary and Short-Term Exposure of Sensitive Receptors to, or Temporary and Short-Term Generation of, Excessive Groundborne Vibration. Construction activities, including but not limited to the use of large dozers, would not expose existing nearby sensitive residential or historical receptors and structures to levels of ground vibration that could result in structural damage and/or disturbance to people occupying nearby buildings because of the project's distance from the closest sensitive receptor (275 feet). This impact would be **less than significant.**	LTS	No mitigation is required.	LTS
3.11 Transportation			
Impact 3.11-1: Short-term construction transport-related traffic hazards and incompatible uses. Construction-related transport of WTG components could result in hazardous conditions on state routes and local roadways because of the transport vehicle's weight, length, width, height, and speed. This impact would be **potentially significant.**	PS	**Mitigation Measure 3.11-1a: Create and implement a traffic control plan and notify the public of anticipated roadway obstructions.** SMUD or its construction contractor will work with Caltrans, Solano County, and the City of Napa to determine the lowest hourly traffic flows on affected facilities and develop a traffic control plan. The traffic control plan shall specify travel times and days and provide for public notification of anticipated roadway obstructions before transporter travel days. Traffic control plan measures shall include the use of pilot cars for oversize loads; traffic safety measures, such as warning signs; coordination with local jurisdictions; and safety personnel to direct traffic as needed. To minimize impacts on roadway traffic flows, transporters shall travel under loaded conditions during off-peak hours and possibly during evenings or at night. The final plan shall be submitted to all affected agencies for review and approval. After agency approvals have been received, the traffic control plan shall be implemented during transport of the WTG components.	LTS

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Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		Mitigation Measure 3.11-1b: Create and implement an emergency access plan and notify emergency services providers of anticipated roadway obstructions. SMUD or its construction contractor will work with affected emergency services providers to develop and implement a plan to maintain emergency access during transport of WTG components and throughout the construction period. The plan shall identify alternative emergency access routes; the need to station emergency equipment in areas where access will be reduced; and notification protocols between SMUD, its contractors, and affected providers. The final plan shall be submitted to all affected agencies for review and approval. After agency approvals have been received, the emergency access plan shall be implemented during transport of WTG components and throughout the construction period as necessary. **Mitigation Measure 3.11-1c: Obtain an agency transportation permit for each load exceeding weight, length, width, and height standards.** SMUD or its construction contractor will submit an application to Caltrans, Solano County, and the City of Napa for a transportation permit for each load that exceeds weight, length, width, or height standards. The applications shall identify the specific transporter to be used and provide details about the turbine components' load specifications, the requested route, and the time and date of transport. All permit conditions shall be implemented during transport of WTG components. **Mitigation Measure 3.11-1d: Improve roadways to enable safe use or use shorter transporters, and obtain agency transportation permits for transport of extra-legal length vehicles.** SMUD or its construction contractor will make improvements to public roads to enable delivery of WTG components and provide access for construction equipment. These improvements shall accommodate all	

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		turning movements of the maximum-size transporter. A detailed topographic survey shall be conducted to determine the exact limits, and to identify additional areas that may be affected. All roadway improvements shall be designed and implemented in close cooperation with Solano County (and other jurisdictions, if applicable). An alternative mitigation measure is to use shorter transporters to reduce the impact, although this measure is also expected to require a reduction in the size of the WTG components, which likely will increase the number of trips if the overall turbine dimensions remain the same.	
Impact 3.11-2: Short-term increase in construction traffic on physically deficient roadway segments. Construction activities would result in a short-term increase in heavy vehicle traffic on state routes and local roads. The project could result in the degradation of pavement conditions along these roadways. This impact would be **potentially significant.**	PS	**Mitigation Measure 3.11-2: Monitor the physical condition of roadway segments along primary access routes to the project site and restore the physical condition of affected roadways to the extent damaged by the project.** SMUD or its construction contractor will conduct a preconstruction survey and assessment of existing pavement conditions along SR 12 east, Shiloh Road, Collinsville Road, Talbert Lane, Stratton Road, Birds Landing Road, and Montezuma Hills Road. If the preconstruction pavement conditions are deficient, the preconstruction pavement analysis shall establish the baseline for required improvements. If the preconstruction pavement conditions are acceptable, improvements shall be required only if the postconstruction pavement condition is deficient, and only to the extent that the project demonstrably contributed to such deficiencies. If deficient following construction, any segments of SR 12 east and Shiloh Road, Collinsville Road, Talbert Lane, Stratton Road, Birds Landing Road, and Montezuma Hills Road that are affected by the project shall be returned to preconstruction conditions after construction. Implementing this measure will ensure that construction activities will not worsen pavement conditions, relative to existing conditions.	LTS

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
		Before construction, SMUD will make a good-faith effort to enter into mitigation agreements with Caltrans (for SR 12 east) and Solano County (for Shiloh Road, Collinsville Road, Talbert Lane, Stratton Road, Birds Landing Road, and Montezuma Hills Road) to verify the location, extent, timing, and fair-share cost to be paid by SMUD for any necessary pre- and postconstruction physical improvements. The fair-share amount will be either the cost to return the affected roadway segment to its preconstruction condition or a contribution to programmed planned improvements. Repairs may include overlays or other surface treatments.	

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1 Introduction

This draft environmental impact report (EIR) evaluates the potential environmental impacts of the proposed Solano 4 Wind Project. This draft EIR has been prepared under the direction of Sacramento Municipal Utility District (SMUD) in accordance with the requirements of the California Environmental Quality Act (CEQA) (Public Resources Code [PRC] Sections 21000–21177) and the State CEQA Guidelines (California Code of Regulations [CCR], Title 14, Division 6, Chapter 3, Sections 15000–15387). SMUD is the lead agency for consideration of this EIR and potential project approval.

1.1 Purpose and Intended Uses of the Draft Environmental Impact Report

CEQA requires that public agencies consider the potentially significant adverse environmental effects of projects over which they have discretionary approval authority before taking action on those projects (PRC Section 21000 et seq.). CEQA also requires that each public agency avoid or mitigate to less-than-significant levels, wherever feasible, the significant adverse environmental effects of projects it approves, funds or implements. If a project would result in significant and unavoidable environmental impacts (i.e., significant effects that cannot be feasibly mitigated to less-than-significant levels), the project can still be approved; however, the lead agency's decision-maker, in this case the SMUD Board of Directors, must prepare findings and issue a "statement of overriding considerations" explaining in writing the specific economic, social, or other considerations that they believe, based on substantial evidence, outweigh those significant effects and thus make them acceptable (PRC Section 21002, 14 CCR Section 15093).

According to 14 CCR Section 15064(f)(1), preparation of an EIR is required whenever a project may result in a significant adverse environmental impact. An EIR is an informational document used to inform public agency decision makers and the general public of the significant environmental effects of a project; identify possible ways to mitigate or avoid the significant effects; and describe a range of reasonable alternatives to the project that could feasibly attain most of the basic objectives of the project while substantially lessening or avoiding any of the significant environmental impacts. Public agencies are required to consider the information presented in the EIR when determining whether to approve a project.

In accordance with 14 CCR Section 15161, this document is a project EIR that examines the environmental impacts of a specific project. This type of EIR focuses on the changes in the environment that would result from a specific project. In accordance with 14 CCR Section 15161, a project EIR must examine the environmental effects of all phases of the project, including construction and operation.

Because it has the principal authority over approval or denial of the project, SMUD is the lead agency, as defined by CEQA, for this EIR. Other public agencies with jurisdiction over the project are listed below in Section 1.4, "Agency Roles and Responsibilities."

1.2 Scope of the Draft Environmental Impact Report

Pursuant to CEQA and the State CEQA Guidelines, a lead agency shall focus an EIR's discussion of significant environmental effects and may limit discussion of other effects to brief explanations about why they would not be significant (PRC Section 21002.1, 14 CCR Section 15128). The impacts of this project that would be potentially significant were determined based on comments received during the public scoping process (Appendix A), and on research and analysis of relevant project data conducted during preparation of this draft EIR.

SMUD has determined that the project has the potential to result in significant environmental impacts on the following resources, which are addressed in detail in this draft EIR:

- Aesthetics
- Air Quality
- Biological Resources
- Archaeological, Historical, and Tribal Cultural Resources
- Geology and Soils
- Greenhouse Gas Emissions and Energy
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use
- Noise
- Transportation

Chapters 3.1 through 3.11 of the draft EIR consider plans, policies, and regulations adopted for the protection of the environment and public safety when making impact determinations. Local plans and policies are listed, but a consistency analysis against County policy is not included in the draft EIR because the project is exempt from County zoning and building ordinances. Section 53091 of the CA Government Code (Subdivisions d and e) states that zoning and building ordinances of a county or city shall not apply to the location or construction of facilities for the generation of electrical energy. SMUD is a municipal utility district that serves as a local agency with the ability to establish regulations, and the project would be an electrical generation facility that would use wind turbines to generate energy. Consequently, the project is determined to be exempt from County policy.

1.3 Effects Found Not to Be Significant

CEQA allows a lead agency to limit the detail of the discussion of environmental effects that are not considered potentially significant (PRC Section 21100, 14 CCR Sections 15126.2[a] and 15128). Based on comments received during public scoping (Appendix A) and additional research and analysis conducted during preparation of this draft EIR, the following resource areas were identified as those that would not experience any significant environmental impacts from the project.

- Agriculture and Forestry Resources
- Mineral Resources
- Population and Housing
- Public Services
- Recreation
- Utilities and Service Systems

Accordingly, impacts on these resources are not analyzed further in this draft EIR. Section 5.1, "Effects Found Not to Be Significant," in Chapter 5, "Other CEQA Sections," explains why significant impacts on these resources are not anticipated.

1.4 Agency Roles and Responsibilities

SMUD and CEQA responsible and trustee agencies will use this draft EIR to ensure that they have met their requirements under CEQA before deciding whether to approve or permit project elements over which they have jurisdiction. This draft EIR may also be used by other state and local agencies that may have an interest in resources that could be affected by the project, or that have jurisdiction over portions of the project. In addition, federal agencies may use information in the EIR to assist in their environmental evaluation in connection with permits they would need to issue.

As the lead agency pursuant to CEQA, SMUD is responsible for considering the adequacy of the EIR and determining whether the project should be approved.

Under CEQA, a responsible agency is a public agency, other than the lead agency, that has responsibility to carry out or approve a project (PRC Section 21069). A trustee agency is a state agency that has jurisdiction by law over natural resources that are held in trust for the people of the State of California (PRC Section 21070).

The state and local agencies listed below may serve as responsible and trustee agencies for the project.

- California Department of Fish and Wildlife
- California Department of Transportation
- California State Office of Historic Preservation
- Central Valley Regional Water Quality Control Board
- Yolo-Solano Air Quality Management District

Although they are not state or local agencies, the federal agencies listed below may use environmental information in this EIR to inform their permitting actions.

- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service

1.5 California Environmental Quality Act Public Review Process

1.5.1 Notice of Preparation

The purpose of a notice of preparation (NOP) is to provide sufficient information about the project and its potential environmental impacts to allow agencies and interested parties the opportunity to provide a meaningful response related to the scope and content of the EIR, including mitigation measures that should be considered and alternatives that should be addressed (14 CCR Section 15082[b]). Comments submitted in response to the NOP are used by the lead agency to identify broad topics to be addressed in the EIR.

In accordance with PRC Section 21092 and 14 CCR Section 15082, SMUD issued an NOP on January 9, 2019, to inform agencies and the general public that an EIR was being prepared and to invite comments on the scope and content of the document (Appendix A). The NOP was submitted to the State Clearinghouse, which then distributed the NOP to potential responsible and trustee agencies; posted on SMUD's website (https://www.smud.org/en/Corporate/About-us/Company-Information/Reports-and-Statements/CEQA-Reports); posted with the Solano County Clerk; and made available at SMUD's offices. In addition, the NOP was distributed directly to adjacent property owners, and was noticed in the *Sacramento Bee* and the *River News-Herald* newspapers. The NOP was circulated for a 30-day review period, with comments accepted through February 8, 2019.

In accordance with 14 CCR Section 15082(c), two noticed scoping meetings for the EIR occurred on January 22, 2019, at the Rio Vista Veterans Memorial Building in Rio Vista, California.

Comments on environmental issues received during the NOP public comment period are considered and addressed in this draft EIR. Appendix A contains a scoping report with letters submitted during the NOP public comment period.

1.5.2 Public Review of This Draft Environmental Impact Report

This draft EIR is being circulated for public review and comment for a period of 45 days, from **July 23, 2019, to August 6, 2019**.

A public meeting will be held on **August 20, 2019,** to receive input from agencies and the public on the draft EIR.

During the public comment period, written comments from organizations, agencies, and the public on the draft EIR's accuracy and completeness may be submitted to SMUD. Written comments (including via e-mail) must be received by 5:00 p.m. on **August 5, 2019**. Written comments should be addressed to:

SMUD–Environmental Management
P.O. Box 15830 MS H201
Sacramento, CA 95852-1830
Attn: Ammon Rice

E-mail comments may be addressed to ammon.rice@smud.org. If you have questions regarding the draft EIR, please call Ammon Rice at (916) 732-7466.

Digital copies of the draft EIR are available at https://www.smud.org/en/Corporate/About-us/Company-Information/Reports-and-Statements/CEQA-Reports. Printed copies of the draft EIR are available for public review at the following locations:

Sacramento Municipal Utility District
Customer Service Center
6301 S Street
Sacramento, CA 95817

Sacramento Municipal Utility District
East Campus Operations Center
4401 Bradshaw Road
Sacramento, CA 95827

1.5.3 Final Environmental Impact Report

After the end of the public comment period, responses to comments on environmental issues will be prepared. Consistent with 14 CCR Section 15088(b), commenting agencies will be provided a minimum of 10 days to review the proposed responses to their comments before any action is taken on the final EIR or project. The final EIR (containing this draft EIR and the responses to comments document) will then be considered for possible certification and approval by SMUD's Board of Directors. If the board finds that the final EIR is "adequate and complete," the board may certify the final EIR in accordance with CEQA. The rule of adequacy generally holds that an EIR can be certified if:

1. The EIR shows a good faith effort at full disclosure of environmental information; and

2. The EIR provides sufficient analysis to allow decisions to be made regarding the proposed project with consideration given to its environmental impacts.

The level of detail contained throughout this EIR is consistent with Section 15151 of the State CEQA Guidelines and recent court decisions, which provide the standard of adequacy on which this document is based. The State CEQA Guidelines state as follows:

> An EIR should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of the environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but

> the EIR should summarize the main points of disagreement among the experts. The courts have looked not for perfection but for adequacy, completeness, and a good faith effort at full disclosure.

CEQA states that when a public agency makes findings based on an EIR, the public agency must adopt a reporting or monitoring program for those measures it has adopted or made a condition of the project approval to mitigate significant adverse effects on the environment. The reporting or monitoring program must be designed to ensure compliance during project implementation.

1.6 Organization of the Draft Environmental Impact Report

This draft EIR is organized as follows:

Executive Summary: This chapter introduces the proposed Solano 4 Wind Project; provides a summary of the environmental review process, effects found not to be significant, and key environmental issues; and lists significant environmental impacts and mitigation measures to reduce significant impacts to a less-than-significant level.

Chapter 1, "Introduction": This chapter describes the legal authority and purpose of the EIR, the scope of the environmental analysis, agency roles and responsibilities, the CEQA public review process, and organization of this draft EIR.

Chapter 2, "Project Description": This chapter describes the project background, objectives, and location, and provides a detailed description of the characteristics associated with the proposed Solano 4 Wind Project.

Chapter 3, "Environmental Setting, Impacts, and Mitigation Measures": The resource sections in this chapter evaluate the expected environmental impacts generated by the project. In each subsection of Chapter 3, the regulatory setting, environmental setting, methods and assumptions, and the thresholds of significance are described. The anticipated changes to the existing environmental conditions after development of the project are then evaluated for each resource. For any significant or potentially significant impact that would result from project implementation, mitigation measures are presented along with the remaining level of significance. Environmental impacts are numbered sequentially throughout the sections of Chapter 3 (e.g., Impact 3.1-1, Impact 3.1-2). Any required mitigation measures are numbered to correspond to the impact numbering; therefore, the mitigation measure for Impact 3.1-1 would be Mitigation Measure 3.1-1.

Chapter 4, "Cumulative Impacts": This chapter provides information regarding the potential cumulative impacts that would result from implementation of the project together with other past, present, and probable future projects.

Chapter 5, "Other CEQA Sections. This chapter discusses effects found to be not significant, potential significant and unavoidable impacts, significant and irreversible commitment of resources, and growth-inducing impacts.

Chapter 6, "Alternatives": This chapter discusses alternatives to the project, including the No Project Alternative; alternatives considered but removed from further consideration; and the environmentally superior alternative.

Chapter 7, "List of Preparers": This chapter identifies the individuals who contributed to the preparation of this draft EIR.

Chapter 8, "References": This chapter lists the references used in preparation of this draft EIR.

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2 Project Description

2.1 Project Location

Sacramento Municipal Utility District (SMUD) is proposing to construct and operate the Solano 4 Wind Project (project). The project would involve:

- decommissioning of existing wind turbine generators (WTGs);
- construction of new, more technologically advanced WTGs, an associated electrical collection system, and access roads, along with minor upgrades to the existing Russell Substation; and
- operation and maintenance of the new WTGs.

The project site is located within the Solano County Wind Resource Area (WRA) (formerly known as the Montezuma Hills Wind Resource Area or MHWRA) in southern Solano County. The WRA lies north of the confluence of the Sacramento and San Joaquin rivers and southwest of the city of Rio Vista (Exhibit 2-1).

The project site comprises two geographically distinct areas owned by SMUD, Solano 4 East and Solano 4 West, and the collection and home run lines, which total 2,549 acres. The project proposes to repower facilities in both project subareas. Solano 4 East is approximately 3.5 miles southwest of Rio Vista and Solano 4 West is adjacent to the Sacramento–San Joaquin Delta near the town of Collinsville (Exhibit 2-2). State Route (SR) 12 provides regional access to the project area. Montezuma Hills Road and Birds Landing Road provide local access to Solano 4 East, while Collinsville Road and Shiloh Road provide local access to Solano 4 West.

2.2 Project Background and History

California's energy supply is continually evolving as a result of state mandates to address climate change. SMUD has designed its current plans relative to the Renewables Portfolio Standard[1] to meet the directive by its Board of Directors to use dependable renewable resources to meet 50 percent of SMUD's electrical load by 2030. This goal is consistent with Senate Bill 350, which was signed into law in 2015. The recently enacted Senate Bill 100 moved up the deadline for reaching the 50 percent milestone to 2026, stepping to 60 percent by 2030. The law also states that renewable energy resources and zero-carbon resources are to supply 100 percent of retail sales of electricity by 2045.

[1] California Renewables Portfolio Standard program required the California Public Utilities Commission to establish and implement a renewable portfolio standard that directed nonpublic electric service providers to increase procurement from eligible renewable energy resources by at least 1 percent of their retail sales annually, until they reached 20 percent by 2010.

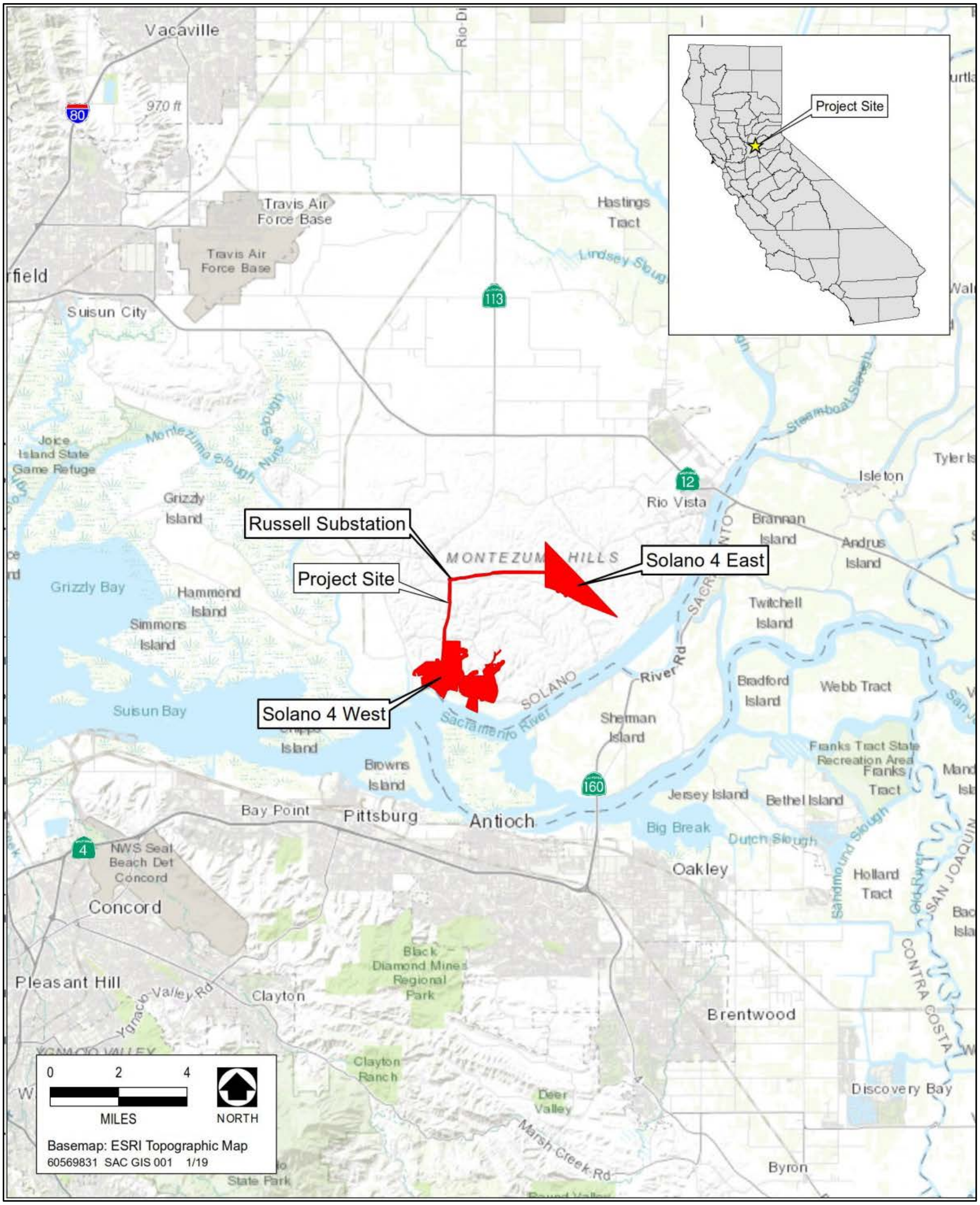

Exhibit 2-1 Regional Location Map

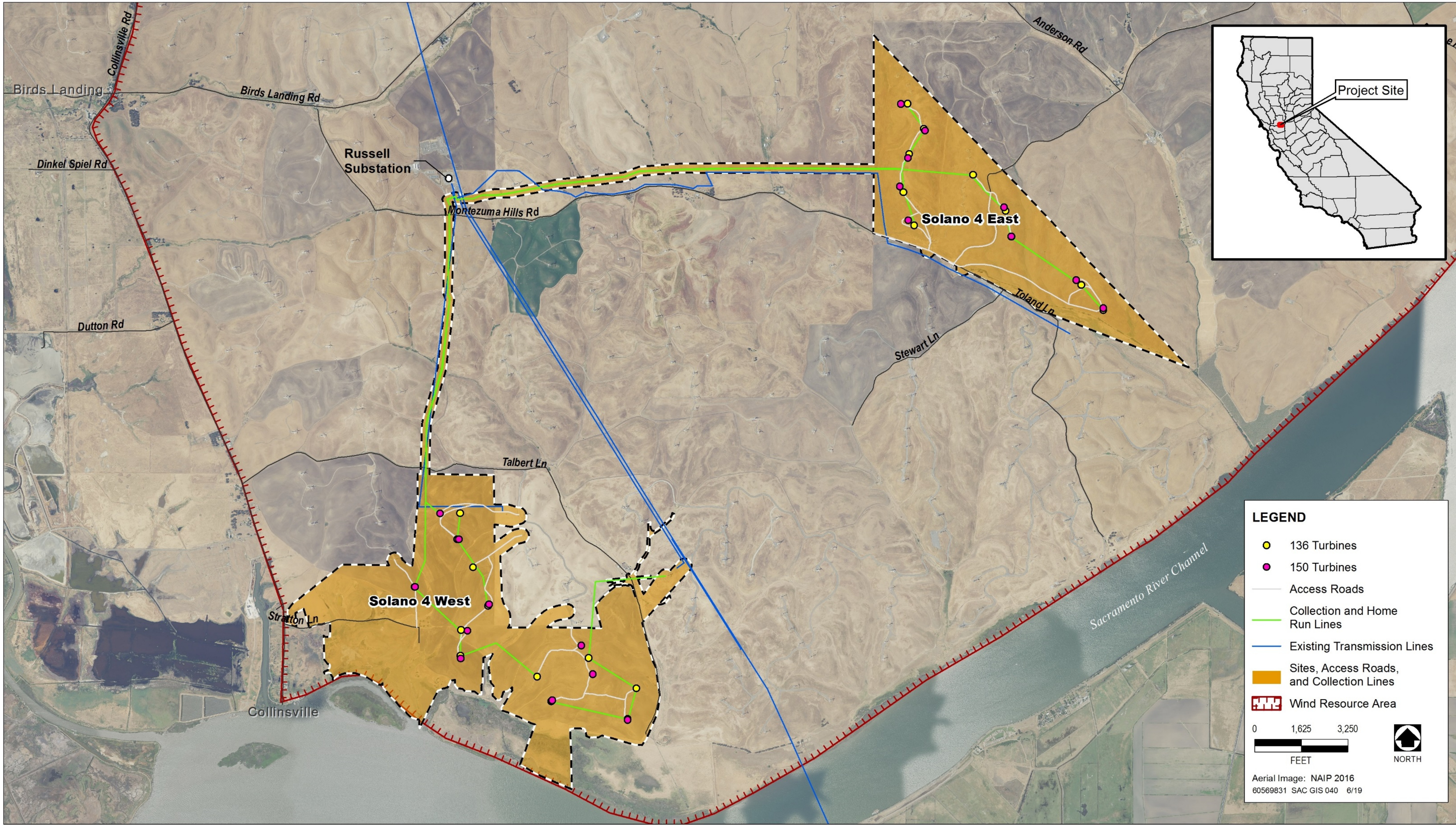

Exhibit 2-2 Project Site Map
Source: Data provided by SMUD in 2018

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Current projections for SMUD's energy portfolio indicate that through a combination of existing renewable energy projects, existing power-purchase agreements, and banked renewable-energy credits, SMUD will achieve compliance with the state mandates through 2025. Beyond this date, however, SMUD will need new resources to achieve the 2045 goal.

SMUD's goal is to ensure that sufficient economically viable, renewable energy, primarily in the form of wind and solar energy, is always on the planning horizon. To meet this goal, SMUD seeks either to own and operate its own renewable-energy facilities or to enter into power-purchase agreements with independent power producers. Rapid technological advancements in the past decade allow SMUD to evaluate the economics of its wind and solar energy projects. Specifically, SMUD can determine whether to continue operating its existing facilities, or to repower the project sites by replacing facilities with new, more advanced technologies that would harvest more energy on the same plot of land. To this end, SMUD's Resource Planning Coordination Committee has authorized staff to repower the Solano 4 East and Solano 4 West subareas, essentially replacing existing wind turbines with newer models.

The project area has a long and continued history of farming and ranching. Eight separate wind energy facilities currently operate in the WRA (Table 2-1).The wind energy facilities listed in Table 2-1 occupy approximately 88 percent of the WRA's acreage, and 970 WTGs operate there.

Table 2-1 Operating Wind Energy Facilities in the Solano County Wind Resource Area

Name and (Operator)	Generating Capacity (MW)	Number of WTGs	Maximum Height of WTGs (feet)
Shiloh I (Avangrid)	36	24	390
Shiloh II (EDF)	66	33	413
Shiloh III (EDF)	94.3	46	410
Shiloh IV (EDF)	92.3	45	410
EDF Renewable V (EDF)	–	–	–
Labrisa (EDF)	9	6	340
High Winds (NextEra)	162	90	350
Montezuma I (NextEra)	37	16	415
Montezuma II (NextEra)	78	34	428
Solano Wind Project Phases 1, 2, and 3 (SMUD)	230	107	410

Notes:
MW = megawatts; WTG = wind turbine generator
The maximum height of a WTG is equivalent to the highest point of turbine blade tips above ground level.
Source: USGS 2019

The WRA is home to the first three developmental phases of SMUD's overall Solano Wind Project, which are currently operational. Phase 1, a 15-megawatt (MW) asset, was repowered from an earlier wind project into its current configuration in 2003–2004; Phase

2, an 87 MW asset, was commissioned in two stages between May 2006 and December 2007; and Phase 3, a 128 MW asset, was commissioned in May 2012.

With a total of 107 WTGs ranging in size from 660 kilowatts (kW) to 3.0 MW, the overall Solano Wind Project currently has a total site rated capacity of 230 MW. The proposed project would have a net energy production capacity of up to 91 MW, resulting in a net increase in capacity of the overall Solano Wind Project from 230 MW to 306 MW (factoring in the elimination of 15 MW from the current turbines). Each phase has undergone environmental review pursuant to the California Environmental Quality Act (CEQA). Table 2-2 summarizes the history of CEQA review for the first three phases of the Solano Wind Project.

Table 2-2 History of CEQA Review for Previous Phases of the Solano Wind Project

Release Date	CEQA Review Document
Phases 1 and 2	
December 1993	Final EIR
July 2002	Supplemental Final EIR
August 2003	Addendum to the Supplemental EIR
February 2004	Supplemental Final EIR #2
July 2011	Addendum to Supplemental Final EIR #2
Phase 3	
September 2007	Draft EIR
October 2009	Recirculated Draft EIR
February 2010	Recirculated Final EIR

Notes: CEQA = California Environmental Quality Act; EIR = environmental impact report
Source: Data compiled by AECOM in 2019

2.3 Project Objectives

The Solano 4 Wind Project would more fully develop the renewable wind energy resources to generate and deliver the maximum feasible quantity of renewable energy to the electric grid, to achieve the objectives listed below.

- Contribute to a diversified energy portfolio that will aid in the continued improvement of air quality in the Sacramento Valley Air Basin by decreasing reliance on fossil fuel combustion for the generation of electricity, and reduce SMUD's exposure to price volatility associated with electricity and natural gas.

- Assist SMUD in achieving the Board of Directors' directive of using dependable renewable resources to meet SMUD's renewable portfolio standards (RPS) obligations. This goal is consistent with Senate Bill 100, which was enacted in 2018.

- Develop an economically feasible wind project that will deliver a reliable supply of up to 91 MW of electrical capacity at the point of interconnection with the grid managed by the California Independent System Operator (CAISO).

- Accommodate the long-term viability of agricultural use within the Montezuma Hills.

2.4 Project Site and Surrounding Area

2.4.1 Wind Resource Area (formerly MHWRA)

The *Solano County Wind Turbine Siting Plan and Environmental Impact Report* (Siting Plan) (Solano County 1987) designated the WRA as suitable for wind energy development, based on wind monitoring and assessment studies prepared in the late 1970s and 1980s by the California Energy Commission, Pacific Gas and Electric Company (PG&E), and the U.S. Bureau of Reclamation. With adoption of the *Solano County General Plan* in 2008, the Siting Plan is no longer in effect and the 2008 *Solano County General Plan* describes wind resources areas of the County as located in the Collinsville–Montezuma Hills south of SR 12. The County defers to the California Energy Commission to define areas suitable for commercial wind energy. The California Energy Commission's map of operational wind projects in the Solano Wind Resource Area (CEC 2018) describes the project site and surrounding area as having high sustainable winds suitable for wind energy.

2.4.2 Topography and Natural Habitat

The WRA consists of a series of gently rolling hills of similar texture and size. The hills crest at a relatively constant elevation, generally 150–250 feet above mean sea level. Valleys in the project area transition to sloped hillsides with relatively flat ridgelines.

The vegetation in the WRA and the project area is generally monotypic (annual grassland or dryland farming) and is mostly treeless. The few trees in the Montezuma Hills are mostly nonnative and are associated with rural farmsteads. Permanent and seasonal wetlands occur on the project lands and adjacent to Suisun Marsh; some of the land has been reclaimed with levees. Vegetation is primarily pasture and grain crops, with intermittent wetland swales and sporadic eucalyptus windbreaks. Varied shrub vegetation is present only in the drainage swales and around existing and abandoned settlements. Native vegetation is limited; most of the area is nonnative annual grassland. Some of the lowland vegetation includes native willows, blackberry, rushes, and tules. Marsh vegetation is present in some of the shallow sloughs, which drain portions of the project area into the Sacramento River to the south.

2.4.3 Existing Land Uses

The project area is designated for agricultural use and leased for dryland farming and grazing. The water-dependent industrial zoning of the WRA and the properties' covenants, conditions, and restrictions preclude new residential development in the WRA. Visible developments include electric transmission towers, and WTGs on the surrounding hilltops.

Except for the home run lines (cable or conductor taking power from the site to the substation) running between the two main WTG project subareas (Solano 4 East and Solano 4 West) and the Russell Substation, all project facilities would be constructed on land owned by SMUD. Solano 4 East is dominated by nonnative grasslands and used for seasonal livestock grazing and rotational dry cropland farming. Solano 4 East also currently supports Solano Phase 1, which includes 23 Vestas V-47 WTGs, gravel pads and roads, underground collection lines, and pad-mounted transformers. Solano Phase 1 would be decommissioned and removed as part of this project.

Solano 4 West is dominated by nonnative grasslands and used for seasonal livestock grazing and rotational dry crop farming. A portion of Solano 4 West previously supported 59 Kenetech KCS-56-100 WTGs and contains gravel access roads, and underground collection lines and other infrastructure associated with this earlier wind development project. However, the WTGs and their associated infrastructure reached their end of life. Accordingly, the WTGs were removed in 2019 as part of a separate and independent project. The project owner plans to abandon the underground infrastructure in place. Existing access roads that would not be repurposed for use at the Solano 4 Wind Project would be reclaimed and restored to land suitable for agriculture or grazing. Exhibit 2-3 and Exhibit 2-4 show existing and past land uses on the properties, including WTGs and soil disking in preparation for spring planting.

2.5 Project Characteristics and Components

With the Solano 4 Wind Project, SMUD would construct up to 22 new WTGs: up to 10 in Solano 4 East and up to 12 in Solano 4 West. The proposed project would have a net power production capacity of up to 91 MW delivered at the point of interconnection with the grid managed by the CAISO, resulting in a net increase in capacity at SMUD's Solano Wind Project from the existing 230 MW to 306 MW (factoring in the elimination of 15 turbines from the current Solano 4 East project subarea).

Associated access roads and collection lines would be installed to support the new WTGs. Power generated by the new WTGs would be transmitted from Solano 4 East and West to the point of interconnection with the CASISO grid at the existing Russell Substation on Montezuma Hills Road via new, underground direct-buried electrical cable. The power would be distributed from the substation via the adjacent Birds Landing Switching Station through the existing 230-kilovolt Vaca–Dixon–Contra Costa transmission line (two circuits), which runs through the WRA (Exhibit 2-2).

Exhibit 2-3 Former Wind Turbine Generators, Solano 4 West

Exhibit 2-4 Disking of Soil on the Project Site, Solano 4 East

2.5.1 Wind Turbine Generators

The WTGs to be used for the Solano 4 Wind Project have not yet been selected. WTG selection criteria include efficient wind power collection facilities, siting considerations, construction and operating costs, product availability, product life, ability to meet SMUD's design criteria, project schedule, and delivered cost of power. Various manufacturers offer WTGs in the size ranges proposed for the project. The sizes contemplated for the project reflect the current state-of-the-industry standards for land-based WTGs deployed throughout the United States and overseas. In keeping with these standards, individual WTGs would have a maximum height of approximately 492–591 feet (150–180 meters) and a maximum rotor diameter of approximately 446–492 feet (136–150 meters). Exhibit 2-2 shows the potential siting areas (footprints) within which WTGs would be installed for the Solano 4 Project. Although the final locations of WTGs would be determined after SMUD completes the procurement process, this analysis assumes that the 136-meter or 150-meter rotor diameter WTGs would be located in or near the locations shown in Exhibit 2-2.

2.5.2 Towers

The WTGs would be assembled on hollow, tubular steel towers erected at each pad site or possibly precast steel reinforced section for the tower bases. The height of each tower would depend on the turbine selected. Turbine technology available at the time of procurement would likely include tower heights of approximately 269–345 feet (82–105 meters), depending on the manufacturer's model. To reduce their visibility, the towers would be painted a neutral color, with a nonreflective exterior finish. Operations and maintenance (O&M) personnel would access tower equipment through a door at the base of each tower. A computerized control cabinet would be located inside, at the base of the tower.

2.5.3 Rotor Blades

Each WTG would have three rotor blades attached to a central hub at the top of the tower. The hub would provide the connection point for the blades and would include microprocessor-controlled blade pitch mechanisms to maximize the efficiency of wind generation. The central connection rotor would connect to a generator housed inside the nacelle (the large housing behind the hub). The low rotor speed would be increased mechanically through a gearbox in the nacelle, and the resulting high-speed shaft would drive the generator. Rotor blades would vary in size depending on the selected model (see Exhibit 2-5 for an illustration of each WTG model under consideration). The rotors may be up to 492 feet (150 meters) in diameter. For all designs, the maximum tip speed of the blades is estimated to be up to 211 miles per hour.

2.5.4 Braking System

The WTG rotors would have a redundant control system to protect the WTG during times of extremely high or gusty winds. During excessive wind speeds (typically greater than

56 miles per hour), the control systems would slow the rotation of the WTG rotor. O&M personnel also would be able to stop, start, and rotate each blade to be parallel to the prevailing wind direction by using the control panel inside the nacelle, or from the bottom of the tower.

2.5.5 Safety, Lighting, and Grounding

For turbines equal to or less than 499 feet above ground level, the Federal Aviation Administration (FAA) regulations require red flashing lights on WTGs, spaced at intervals of approximately 1,000–1,500 feet, and at the ends of WTG strings to form perimeter warning lights. For turbines above this height but below 699 feet, the FAA requires dual red flashing lights on each turbine nacelle. The Solano 4 Wind Project would be constructed and operated in accordance with FAA rules for structural lighting, locations, and height. Safety lighting would be installed on the exterior of nacelles, as required, to comply with FAA rules for structural lighting. Specific requirements for the project would be established for compliance with FAA determinations made based on the WTG heights and site-specific conditions.

If the FAA approves, SMUD anticipates installing an Aircraft Detection Lighting System (ADLS) meeting the performance requirements for automatic lighting activation identified in Chapter 14 of FAA Advisory Circular AC 70/7460-1L. ADLS is a system that continuously monitors the airspace for aircraft and when the detection system detects one heading toward the coverage area, it sends an electronic signal to the lighting control unit, which turns on the lights. Once the aircraft clears the obstruction area and there is no longer a risk of collision, the detection system turns the lights off and the system returns to standby mode.

The ADLS contains multiple components including multiple sensor arrays placed to provide complete detection coverage for aircraft that enter a three-dimensional volume of airspace around the WTGs. A typical ALDS system consists of a sensor array typically (1) mounted directly on the obstruction, (2) positioned on a dedicated tower close to the obstruction, or (3) mounted on a stand-alone structure located near the vicinity of the obstruction at an optimized vantage point to ensure volume coverage. The ADLS system to be selected would activate the obstruction lighting system in enough time to allow the lights to illuminate and synchronize to flash simultaneously prior to an aircraft penetrating the coverage envelope. In the event of an ADLS component or system failure, the ADLS would automatically turn on all the obstruction lighting and operate in accordance with AC 70/7460-1L as if it was not controlled by an ADLS.

The WTGs would be among the tallest structures on the land, thus increasing their potential for experiencing lightning strikes. Each WTG, including the hub and blades, would be equipped with a lightning protection system. This system would be connected to an underground grounding grid to allow the electrical current from a lightning strike to discharge to the ground. All mechanical and electrical equipment, cables, and associated structures that make up the WTGs would be connected to a metallic grounding network that would comply with International Electrotechnical Commission standard 61400-24 for wind turbine Lightning protection.

2.5.6 Power Collection System

The Solano 4 Wind Project's power collection system would ultimately deliver power to PG&E's high-voltage transmission grid. The system would interconnect with PG&E's transmission grid via the existing connection between the generation step-up transformer at the Russell Substation, owned by SMUD, and the Birds Landing Switchyard, owned and operated by PG&E. The Russell Substation's generation step-up transformer is near Montezuma Hills Road, 1 mile east of the intersection of Montezuma Hills Road and Birds Landing Road (Exhibit 2-2). Components of the collection system include the WTG interties, underground cable, a step-up transformer, and associated protective switching. The step-up transformer includes a protective relay system, power circuit breakers, above-grade bus work, and revenue metering instrumentation. A control building houses supervisory control and data acquisition equipment that includes controls for the power circuit breaker that ties the step-up transformer into the PG&E transmission line. The above equipment was installed as part of a previous project.

The proposed WTG towers may include an integral transformer or a pad-mounted transformer at the base of the tower and circuit protection. The power, which would leave each WTG transformer at a medium voltage, typically 34.5 kilovolts, would be interconnected with adjacent WTGs. These joined circuits would convey power to the Russell Substation via new underground electrical cable. Exhibit 2-6 illustrates a typical cable and trench that convey the power to a splice box, which would then send the combined power from multiple WTGs in a direct-buried trench within the "home run" alignment (Exhibit 2-7). The home run alignment is the corridor containing cables that would conduct electricity generated by the turbines to the Russell Substation. From Solano 4 East, the new electrical lines would be placed within the home run easement, then travel west to reach the Russell Substation; electrical lines along that part of the home run alignment connecting with Solano 4 West would travel north to reach the substation (Exhibit 2-2).

Approximately 17.1 miles of trenching would be required to install the collection and home run lines for the Solano 4 Wind Project. All collection and home run lines would be insulated underground and buried directly in accordance with California Public Utilities Commission regulations. Designs would also meet the requirements of the National Electrical Safety Code; Title 8 of the California Code of Regulations; Articles 35, 36, and 37 of the "High Voltage Electric Safety Orders"; the National Electrical Code (NFPA 70); applicable interconnection standards; and related industry standards. The proposed alignment for the power collection system has been selected on the basis of several considerations and constraints:

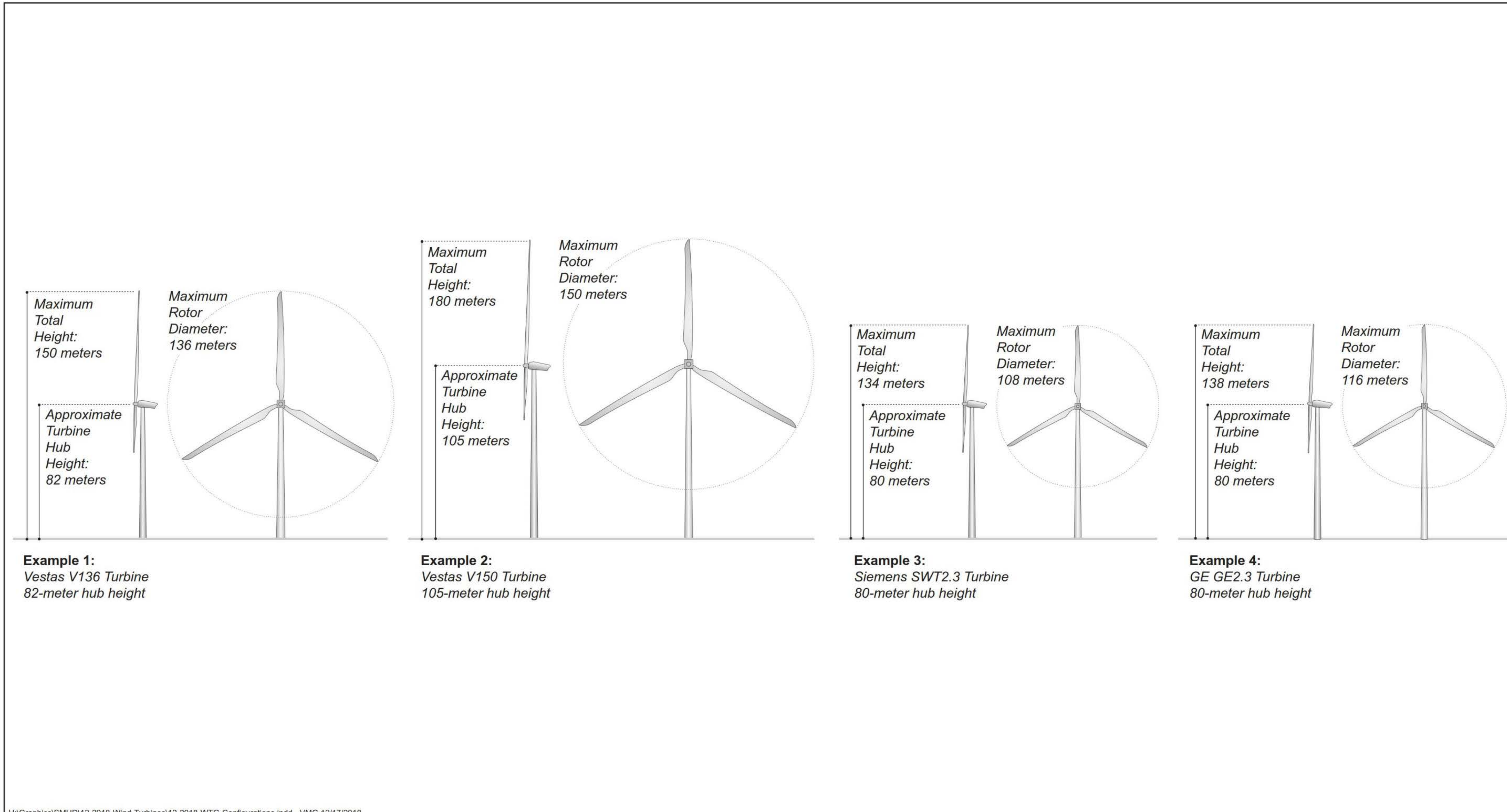

Exhibit 2-5 Typical Wind Turbine Generators

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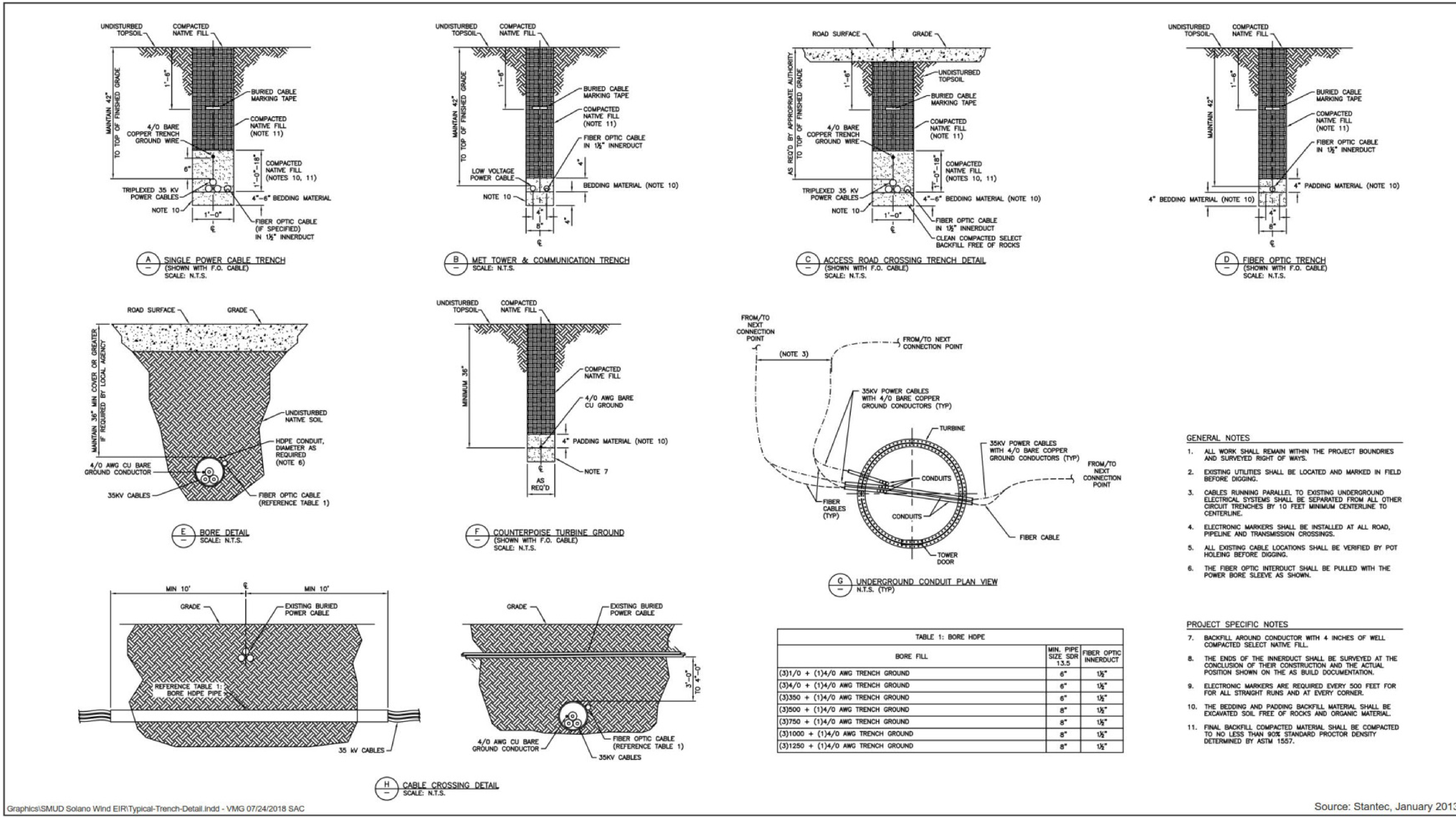

TABLE 1: BORE HDPE

BORE FILL	MIN. PIPE SIZE SDR 13.5	FIBER OPTIC INNERDUCT
(3)1/0 + (1)4/0 AWG TRENCH GROUND	6"	1½"
(3)4/0 + (1)4/0 AWG TRENCH GROUND	6"	1½"
(3)350 + (1)4/0 AWG TRENCH GROUND	6"	1½"
(3)500 + (1)4/0 AWG TRENCH GROUND	8"	1½"
(3)750 + (1)4/0 AWG TRENCH GROUND	8"	1½"
(3)1000 + (1)4/0 AWG TRENCH GROUND	8"	1½"
(3)1250 + (1)4/0 AWG TRENCH GROUND	8"	1½"

GENERAL NOTES

1. ALL WORK SHALL REMAIN WITHIN THE PROJECT BOUNDRIES AND SURVEYED RIGHT OF WAYS.
2. EXISTING UTILITIES SHALL BE LOCATED AND MARKED IN FIELD BEFORE DIGGING.
3. CABLES RUNNING PARALLEL TO EXISTING UNDERGROUND ELECTRICAL SYSTEMS SHALL BE SEPARATED FROM ALL OTHER CIRCUIT TRENCHES BY 10 FEET MINIMUM CENTERLINE TO CENTERLINE.
4. ELECTRONIC MARKERS SHALL BE INSTALLED AT ALL ROAD, PIPELINE AND TRANSMISSION CROSSINGS.
5. ALL EXISTING CABLE LOCATIONS SHALL BE VERIFIED BY POT HOLEING BEFORE DIGGING.
6. THE FIBER OPTIC INTERDUCT SHALL BE PULLED WITH THE POWER BORE SLEEVE AS SHOWN.

PROJECT SPECIFIC NOTES

7. BACKFILL AROUND CONDUCTOR WITH 4 INCHES OF WELL COMPACTED SELECT NATIVE FILL.
8. THE ENDS OF THE INNERDUCT SHALL BE SURVEYED AT THE CONCLUSION OF THEIR CONSTRUCTION AND THE ACTUAL POSITION SHOWN ON THE AS BUILD DOCUMENTATION.
9. ELECTRONIC MARKERS ARE REQUIRED EVERY 500 FEET FOR FOR ALL STRAIGHT RUNS AND AT EVERY CORNER.
10. THE BEDDING AND PADDING BACKFILL MATERIAL SHALL BE EXCAVATED SOIL FREE OF ROCKS AND ORGANIC MATERIAL.
11. FINAL BACKFILL COMPACTED MATERIAL SHALL BE COMPACTED TO NO LESS THAN 90% STANDARD PROCTOR DENSITY DETERMINED BY ASTM 1557.

Exhibit 2-6 Typical Trench Detail—Collections

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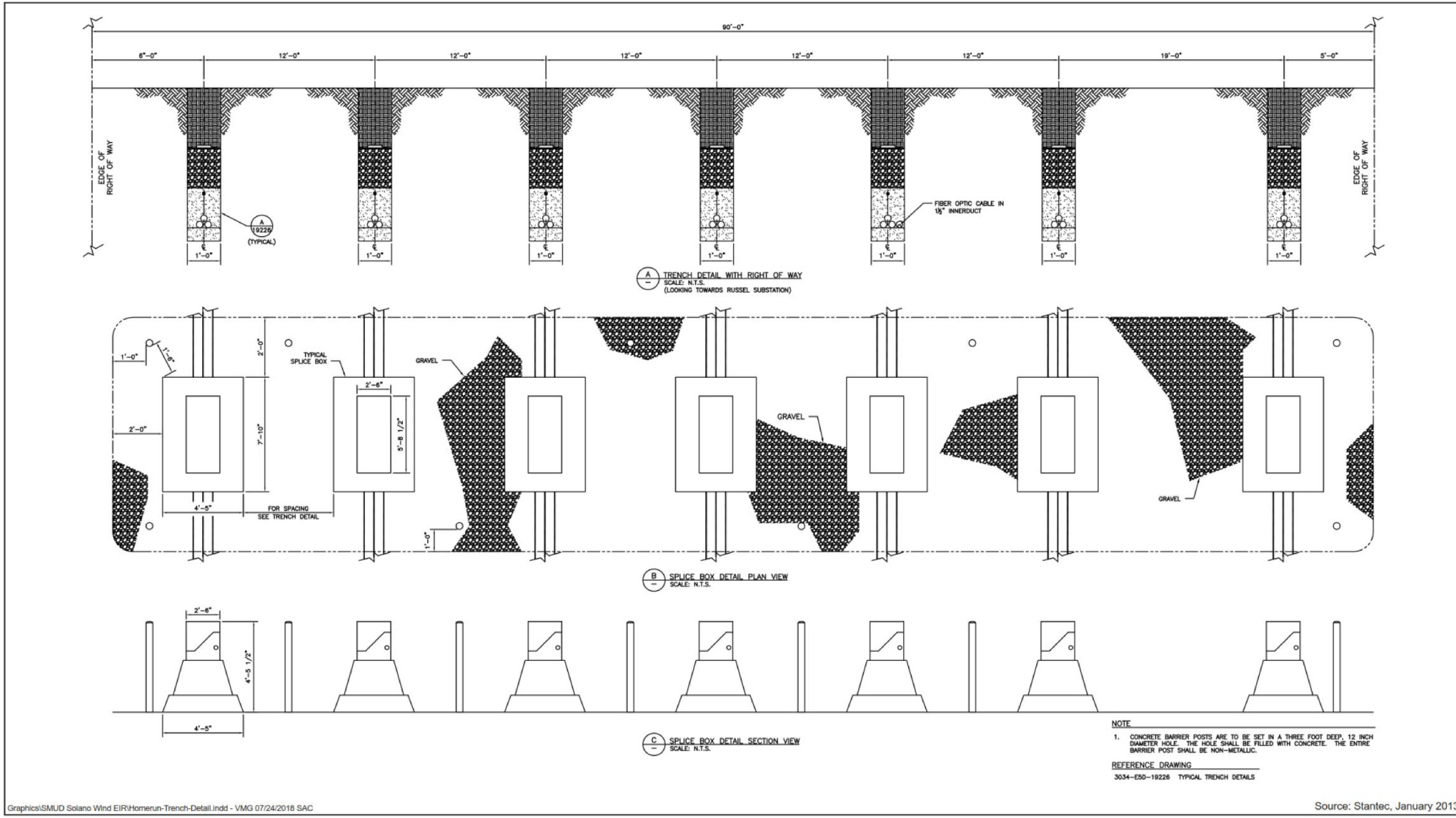

Exhibit 2-7 Trench Detail—"Home Run"

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- Total length of power collection lines. The collection system route is designed to minimize the distance between the WTGs and the Russell Substation's generation step-up transformer location and the transmission line's designated interconnection point.

- Sensitive biological resources. The collection system route has been developed to avoid or minimize impacts on waters of the United States, protected species, and other sensitive natural features, to the extent feasible.

- Existing underground systems. The collection system has been designed to avoid as many crossings of other underground structures as possible.

2.5.7 Meteorological Towers

As part of the Solano 4 Wind Project, up to two meteorological towers would be installed in the project area, one in Solano 4 East and one in Solano 4 West, to measure weather and wind resources. The towers would be constructed to a height of up to 105 meters, essentially comparable to the hub height of the WTGs selected for the project. They would be constructed as freestanding towers (without guy wires). Each tower's foundation would either consist of three piers in a circle measuring approximately 5 feet in diameter or one central foundation.

2.5.8 Russell Substation Upgrades

The existing Russell Substation has capacity to handle electricity generated by the project. Improvements to the substation would be limited to installation of new disconnect switches and the associated appurtenances to connect the home run feeders. All improvements would occur within the footprint of the existing substation.

2.5.9 Roads

A number of existing and newly constructed roads as well as paved and gravel roads would be used for construction and operation of the Solano 4 Wind Project. The roads can generally be categorized either as transport roads, used to convey equipment to the project area, or as access roads, which would be gravel roads leading to the WTGs and used during construction and routine O&M. WTG components would likely be transported by rail, offloaded to a yard, and loaded on tractor trailers for transport to the site. The largest WTG component is the turbine blade. Thus, transport roads would consist of existing local roads that meet minimum standards for roadway geometry (turning radius, road width, and grade) to ensure clearance during swing-out of turbine blade tips (Exhibit 2-8).

Source: Photograph by Vestas Americas in 2017

Exhibit 2-8 Clearance for Blade Tip Swing-out

Based on existing roadway geometry, the WTG components, including the blades, would likely be transported to Solano 4 West via SR 12, then south on Shiloh Road to Collinsville Road, and east on Talbert Lane or Stratton Lane. Trucks delivering WTG components to Solano 4 East may take Birds Landing Road south to Montezuma Hills Road or Collinsville Road to reach the project site (Exhibit 2-9). To transport the WTG blades to Solano 4 East, an alternative route to Montezuma Hills Road from Birds Landing Road may be used consisting of a road through private land adjacent to Solano 4 East.

It may be necessary to improve existing public roads or use areas adjacent to the roads during construction to accommodate transportation of material. These improvements could be temporary or permanent, depending on the agreement. If such improvements are required, SMUD or the project contractor would consult with the Solano County Public Works and Building divisions, as needed. Temporary improvements would be restored to grassland, grazing lands, or other agricultural uses, as required, after completion of the project.

Approximately 5.5 miles of new access roads would be constructed and 3 miles of roads would be improved to access the new WTGs within the project boundary. The new access roads would have a minimum width of 16 feet and would be sited along existing contours to ensure safe passage of heavy construction equipment. Roadways would be wider in some areas to accommodate the turning radius necessary to bring WTG components to their specific locations by truck. Where a road crosses a drainage, reinforced concrete culverts would be placed in the drainage and reinforced with concrete headwalls, then covered with soil and compacted gravel. Riprap and straw wattle or similar appropriate materials would be installed downstream, to avoid erosion, if necessary. The surface and embankment or subgrade of new roads would be designed with appropriate materials, gradation, thickness, soil stabilization, and/or auxiliary support (e.g., geotextile and/or geogrid) specifically for the site and anticipated weather conditions. improvements would total approximately 14.2 acres.

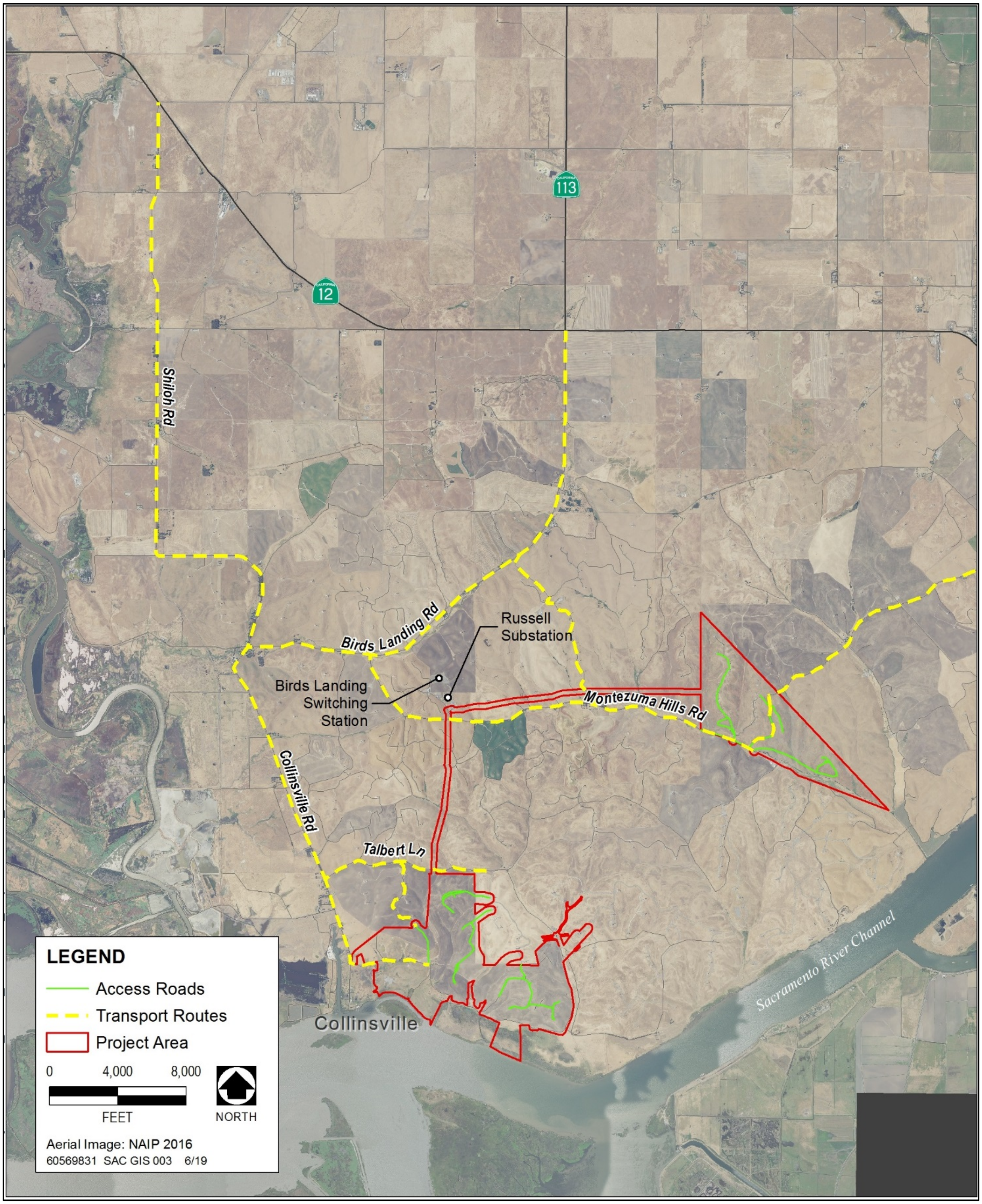

Exhibit 2-9 Access Roads and Transport Routes Map

2.6 Construction Methods and Schedule

2.6.1 Decommissioning of Solano Phase 1

Decommissioning of the Solano Wind Project, Phase 1, would involve removing the turbines and pad-mounted electrical equipment. The foundations would be abandoned in place by removing the foundations several feet below ground surface and backfilling the hollow foundations with fill or slurry. Direct-buried cables would be abandoned in place, and pads and access roads that are no longer needed would be reclaimed and restored to match the surrounding land use. The V-47 turbines would be dismantled and hauled off-site to be recycled or sold for reuse.

2.6.2 Site Preparation and Access

Construction crews, materials, and equipment would access the project site primarily by using SR 12 and either traveling along Birds Landing Road from Rio Vista, or traveling south on Shiloh Road and Collinsville Road from Fairfield. Construction of the project would involve ground-disturbing activities, including grading and vegetation clearing in conjunction with the construction of necessary work areas, structure foundations, and access/spur roads.

The project may require SMUD contractors to widen existing public roads so material can be transported to the project site safely. Disturbance of public roadways would require SMUD or the contractor to obtain an encroachment permit from Solano County or the California Department of Transportation, depending on the road under consideration. Construction of new access roads within the project boundary would also be required to reach foundation pads. No soil would be exported as part of the grading operation.

The project would require two laydown areas totaling about 10 acres to store construction equipment and materials as they arrive on-site. The project would also use two existing gravel areas totaling about 4 acres for job trailers, vehicle parking, and staging. Preparation for the laydown would include clearing and grubbing the existing vegetation, then grading the surface to be flat for a safe work environment and compacted gravel as required. At the completion of construction activities, staging areas would be returned to pre-project conditions. Sections of the new access roads would be reduced in width to that required to support operations and maintenance activities and would be revegetated with an appropriate seed mix. Native seed mix would be used except where nonaggressive nonnatives would provide additional value for wildlife habitat and would not become invasive in native communities. Areas that traditionally have been dry cropped may be planted in these crops.

Before the start of ground disturbance, SMUD would obtain coverage under the State Water Resources Control Board's General Permit for Storm Water Discharges Associated with Construction Activity Order No. 2009-0009-DWQ. Appropriate best management practices would be developed for each activity that has the potential to degrade surrounding water quality through erosion, sediment runoff, and other pollutants. These best management practices would then be implemented and monitored throughout the project by a qualified storm water pollution prevention plan practitioner.

2.6.3 Wind Generator Turbines

Each wind turbine would occupy approximately 184,727-square feet of land to provide space for temporary work areas, a laydown area for stockpiling material and equipment, a crane pad, access ramp and the foundation footprint. Typically, temporary work areas would be directly adjacent to the site access roads or would encompass a portion of the permanent access roads to be constructed at the individual turbine sites. Each work area would include a crane mobilization area and the final footprint of the wind turbine. Before use, each work area would be cleared, graded, and compacted to the specifications of the turbine manufacturer. The portion of the work area within 45 feet of the turbine would be maintained as a permanent work pad once construction has been completed, to facilitate operation and maintenance of the turbines. The remaining portion of the work area would be revegetated after construction and returned to preconstruction uses.

Tower foundations would be supported by a reinforced concrete gravity base that would be cast in place. The foundations would have a diameter of approximately 72 feet and an approximate depth of 10 feet. Each gravity base foundation would require excavation and removal of approximately 2,365 cubic yards of soil, to allow construction. Depending on soil characteristics, a gravity base mat may be needed, which would require an additional 1,275 cubic yards of earthwork. Most of the removed soil would be replaced on top of the foundation after construction is completed. Construction of tower foundations and associated structures would require delivery and placement of aggregate base, reinforcing steel, and concrete. A crane would be used to construct each WTG; therefore, the project is expected to include construction of a crane pad and laydown area adjacent to each WTG foundation. The sources of aggregate, cement, sand, and water (and/or ready-mix concrete) would be determined when SMUD selects the project's construction contractor(s). Depending on the volumes required, concrete could be supplied from on-site or off-site concrete batch plants.

All excavated materials would be temporarily stockpiled in the turbine work area. If needed for foundation construction, a mud mat would be placed to help stabilize and level the excavation. The base mat rebar would then be placed in the excavation along with the pedestal insert, which includes the embedment plate and anchor bolts. The top mat rebar and required conduit would then be installed and the foundation concrete would be placed. After the concrete foundation has cured, crews would backfill the excavation with stockpiled native materials and/or engineered fill, based on the manufacturer's specifications. The base of the turbine would then be leveled using shims, and a final layer of grout would be placed. Any remaining stockpiled materials would be spread evenly over the turbine work area. The turbine assembly work area, including the crane pad, would then be covered with a layer of crushed aggregate, similar to the permanent access roads to be constructed for each turbine.

On completion of the foundation and work area the pad would be ready for the WTG. Turbine components would arrive sequentially in several pieces. The first step in assembly would be the installation of the tower base. The tower base would be positioned using a crane and then bolted to the turbine foundation. Following the turbine base, the additional tower sections and nacelle would be installed using a crane positioned in the turbine work area once the grout has been confirmed to be of sufficient strength. The three turbine blades would then be attached to the hub on the ground. A crane would lift the hub and blades into place. In some instances, a small crane may be used to provide stability and support during lifting operations. The hub and blades would then be attached to the nacelle and final electrical assembly would be completed. Alternatively, the hub and nacelle may be installed on top of the tower and each blade individually installed on the hub. The WTGs are anticipated to be delivered and erected over a 7-month period.

2.6.4 Underground Collection System

The Solano 4 Wind Project is expected to require installation of four underground collection lines extending from the junction box adjacent to the last turbine in the respective collection string to the appropriate Russell Substation disconnect switch. Two lines each would run from Solano 4 East and Solano 4 West. Each line would be buried in a separate trench measuring approximately 2 feet wide by 4 feet deep and spaced at least 12 feet apart. Home run cables would be placed on bedding material and compacted native soil would be used to backfill the trenches. Electronic markers would be placed every 500 feet along straight runs and at corners. Trenching for the underground collection system would extend approximately 18 miles around the site, disturbing 1,520,640 cubic feet of soil. Trenching and placement of underground collection and home run lines would occur over a period of 3 months.

2.6.5 Clean-up and Restoration

After the completion of the turbine construction, SMUD or its contractor would remove all construction waste and dispose of it properly in accordance with all applicable federal, state, and local laws regarding solid and hazardous waste disposal. Construction waste would be transported to either the Potrero Hills Landfill in Suisun City or the Hay Road Landfill in Vacaville. All remaining stockpiled native materials either would be spread on-site or hauled off-site. Non-native plant materials would be removed. Disturbed areas at each turbine work site would be restored, graveled, or used for maintenance and equipment staging during operation. Access roads would be narrowed to the widths required for operation and maintenance of the project. The widened road area and staging and laydown areas would be returned to pre-project conditions and revegetated with an appropriate seed mix. Native seed mix would be used except where nonaggressive nonnatives would provide additional value for wildlife habitat and would not become invasive in native communities.

2.6.6 Typical Construction Equipment

Table 2-3 lists the types of equipment SMUD's construction contractors would use to construct the facility.

Table 2-3 Typical Construction Equipment for Wind Energy Facilities

Equipment	Use
Dozer	Road and pad construction
Grader	Road and pad construction
Water trucks	Compaction; erosion and dust control
Compacter	Road, trench and pad compaction
Backhoe	Excavation of trenches for underground utilities
Cable trenching machine	Excavation of trenches for underground utilities
Loader/skid steer	Movement and transport of soils and other construction debris/equipment
Rollers	Compaction; erosion and dust control
Concrete and pump truck	Placement of tower foundations
Heavy and intermediate cranes	Off-loading and erection of towers, nacelles, and rotors
Semi-trailer trucks	Delivery of towers, nacelles, rotors, and other equipment
Truck-mounted drilling rig	Drilling tower foundations
Rough terrain forklift	Lifting of equipment
Pickup trucks	General use and hauling of employees and equipment to and from site
Source: Data provided by SMUD in 2018	

2.6.7 Schedule

SMUD anticipates that the Board of Directors would consider the project for possible certification and approval in Fall 2019, and that permit applications would be submitted to regulatory agencies to prepare for project construction starting in 2020. SMUD would conduct a procurement process and select the WTG supplier after the CEQA process is completed. After this period, SMUD contractors would spend approximately 2 months decommissioning the existing WTGs at Solano 4 East. SMUD contractors would spend approximately 4 months constructing roads, 3 months installing the home run cables, and 6 months constructing the foundations. Turbine delivery, construction of WTGs and ancillary facilities, and commissioning is expected to take 6 months, depending on weather and availability of equipment. Preliminary restoration of the temporary work areas is expected to take 3 months. Project cconstruction would take between 17 and 20 months. SMUD anticipates the project would become operational in 2022.

2.7 Operation and Maintenance Activities

2.7.1 Employment and On-Site Workforce

Construction of the Solano 4 Wind Project would proceed after certification of the final EIR and approval of all permits. On-site construction activities would be restricted to 6 a.m. to 7 p.m., Monday through Friday, and 7 a.m. to 6 p.m. on Saturday and Sunday, with only crane mobilization and transportation of heavy components occurring during the nighttime hours. To minimize disruption to traffic patterns, transportation of oversized project components would be conducted at night. Approximately 70 people would be employed during construction.

2.7.2 Maintenance Activities

At the completion of project construction, SMUD contractors would operate and maintain the WTGs and associated facilities. The project would employ approximately five full-time staff members to provide periodic maintenance and monitoring of the project area. The employees would work normal work shifts, from approximately 6 a.m. to 5 p.m., except during emergency situations, in which case additional hours might be necessary. The WTGs would receive routine maintenance to maximize their performance and prevent future mechanical problems. SMUD would follow an O&M protocol outlining routine WTG maintenance and inspection activities. These activities would include the maintenance program recommended by the WTG manufacturer. Each WTG would undergo scheduled maintenance every 6 or 12 months, depending on the WTG, and would require an average of 40–50 manhours of scheduled mechanical and electrical maintenance per year. O&M personnel would perform routine maintenance, including periodically replacing lubricating fluids and checking parts for wear. In addition to mechanical maintenance, all roads, pads, and trenched areas would be inspected and maintained regularly to minimize erosion. Maintenance activities associated with the new access roads and other new facilities would be incorporated into the existing land management plan for the overall Solano Wind Project.

The project's supervisory control and data acquisition system would continuously monitor facilities in the project area. Each WTG would be equipped with monitors to indicate the major aspects of operation. If any operational control were to fall outside of the designed limits, alarm systems would activate and the appropriate personnel would be dispatched to address the issue.

2.8 Decommissioning

SMUD is committed to long-term generation of renewable energy in the WRA. At the end of this project's operational life, SMUD would likely repower the Solano 4 Wind Project using current industry technology, or would remove the turbines and restore the project to conform with the surrounding land use. Decommissioning the project would involve removing the turbines and pad-mounted electrical equipment, abandoning the foundations in place by removing the foundations several feet below ground surface, and backfilling the hollow foundations with fill or slurry. Direct-buried cables would be abandoned in place, and pads and access roads that are no longer needed would be reclaimed and restored to match the surrounding land use. If the project is repowered, old turbines would be dismantled and removed, and new turbines and associated equipment, collection lines, and home run lines would be constructed or installed. Access roads would be constructed to accommodate the new project layout. This future action would be evaluated under a new CEQA review and in compliance with applicable laws and regulations.

2.9 Intended Uses of the EIR

2.9.1 Decision Making

SMUD is the lead agency for approval of the Solano 4 Wind Project and certification of the EIR. The lead agency cannot certify the EIR and approve a project if it identifies one or more significant impacts, unless the agency makes one or more written findings in a statement of overriding considerations for each of those significant impacts, as specified in Section 15091 of the State CEQA Guidelines. A statement of overriding considerations provides specific reasons why the benefits of a proposed project outweigh its adverse effect(s).

SMUD must make the following decisions regarding the project:

- whether to certify the EIR;
- whether to approve the project and adopt a mitigation monitoring and reporting plan; and
- to adopt a statement of overriding considerations, if required.

If the Solano 4 Wind Project is approved, the SMUD Board of Directors would issue one or more solicitations for contractors to supply, site, and prepare final engineering drawings for the project. The board would approve contract(s) with the selected contractor(s) to complete the design.

2.9.2 Responsible and Trustee Agencies Expected to Use the EIR

The Solano 4 Wind Project would be developed, carried out, and approved, owned, and operated by SMUD. Responsible and trustee agencies with potential permitting or approval authority over the project, or elements thereof, would have the opportunity to review this draft EIR during the public review period, and would be able to use this information when considering issuance of any permits required for the project. Table 2-4 lists the federal, state, and local agencies that may have jurisdiction over specific activities associated with the project.

Table 2-4 Other Agency Permits and Approvals Required for the Proposed Project		
Agency Name	**Type of Permit**	**Purpose**
Federal		
Federal Aviation Administration	Notice of proposed construction or alteration	Provide notification regarding structures taller than 200 feet for potential hazards to air navigation.
U.S. Army Corps of Engineers	Clean Water Act Section 404 permit	Allow fill or dredging in waters of the United States and wetlands.
State Historic Preservation Office	Section 106 of the National Historic Preservation Act consultation	Comply with requirements of the Clean Water Act Section 404 permit; address the potential for effects on cultural resources.
U.S. Fish and Wildlife Service	Biological opinion or consultation	Comply with requirements of the Clean Water Act Section 404 permit; address the potential for take of threatened or endangered species.
	Special purpose utility permit	Authorize utilities to collect, transport, and temporarily possess migratory birds found dead on utility property, structures, and rights-of-way for mortality monitoring purposes.
State		
State Water Resources Control Board	Clean Water Act Section 402, construction stormwater permit	Prevent discharge of construction-related pollutants to waters of the United States.
San Francisco Bay Regional Water Quality Control Board	Clean Water Act Section 401, water quality certification	Prevent the discharge of construction-related pollutants to waters of the United States.
California Department of Fish and Wildlife	Streambed alteration agreement	Allow the project to alter a bank or streambed located in California.
California Department of Transportation	Haul truck and overload permit	Permit oversize trucks to travel on local roadways.
Local		
Solano County Department of Resource Management	Encroachment permit	Meet local requirements for access road entrances within public rights-of-way and widening of any public road.
Source: Data compiled by AECOM in 2018		

3 Environmental Setting, Impacts, and Mitigation Measures

This chapter is organized by environmental resource category. Each resource category is organized to provide an integrated discussion of existing environmental conditions (the regulatory setting and environmental setting), potential environmental effects (direct and indirect impacts), and measures to reduce significant effects, where feasible, of construction and operation of the Solano 4 Wind Project.

Cumulative and growth-inducing impacts are discussed in Chapter 4, “Cumulative Impacts,” and Chapter 5, “Other CEQA Sections,” respectively.

Approach to the Environmental Analysis

In accordance with Section 15126.2 of the State CEQA Guidelines (California Code of Regulations, Title 14), this draft EIR identifies and focuses on the significant direct and indirect environmental effects of the project, giving due consideration to both short-term and long-term effects. Generally speaking, short-term effects are those associated with construction, and long-term effects are those associated with facility operations. As described in Chapter 1, “Introduction,” topics removed from further consideration are identified in Section 5.1, “Effects Found Not to Be Significant,” in Chapter 5.

The remainder of this chapter addresses the following resource topics:

- Section 3.1, “Aesthetics”
- Section 3.2, “Air Quality”
- Section 3.3, “Biological Resources”
- Section 3.4, “Archaeological, Historical, and Tribal Cultural Resources”
- Section 3.5, “Geology and Soils”
- Section 3.6, “Greenhouse Gas Emissions and Energy”
- Section 3.7, “Hazards and Hazardous Materials”
- Section 3.8, “Hydrology and Water Quality”
- Section 3.9, “Land Use”
- Section 3.10, “Noise”
- Section 3.11, “Transportation”

Sections 3.1 through 3.11 follow the same general format:

Regulatory Setting presents the laws, regulations, plans, and policies that are relevant to each issue area. Federal, state, and local regulations are each discussed as appropriate.

Environmental Setting presents the existing environmental conditions at the project site and in the surrounding area as appropriate, in accordance with Section 15125 of the State CEQA Guidelines. This setting generally serves as the baseline against which environmental impacts are evaluated. The extent of the environmental setting area evaluated (the project study area) differs among resources, depending on the locations where impacts would be expected. For example, air quality impacts are assessed for the air basin (macroscale) and the site vicinity (microscale), whereas noise impacts are assessed for the project site vicinity only.

Environmental Impacts and Mitigation Measures identifies the thresholds of significance used to determine the level of significance of the environmental impacts for each resource topic, in accordance with the State CEQA Guidelines (Sections 15126, 15126.2, and 15143). The thresholds of significance used in this draft EIR are based on the checklist presented in Appendix G of the State CEQA Guidelines; best available data; and regulatory standards of federal, state, and local agencies. The level of each impact is determined by comparing the effects of the project to the environmental setting. This subsection also describes key methods and assumptions used to frame and conduct the impact analysis, as well as issues or potential impacts not discussed further (issues for which the project would have no significant impact).

Project impacts are organized numerically in each subsection (e.g., Impact 3.1-1, Impact 3.1-2, Impact 3.1-3). A bold-font impact title, an impact summary, and the impact's level of significance precede the discussion of each impact. The discussion following the impact summary includes the substantial evidence to support the significance conclusion for the impact.

The draft EIR must describe any feasible measures that could avoid, minimize, rectify, reduce, or compensate for significant adverse impacts, and the measures are to be fully enforceable through incorporation into the project and adoption of a mitigation monitoring and reporting plan (Public Resources Code Section 21081.6[b]). Mitigation measures are not required for impacts that are found to be less than significant. Where feasible mitigation for a significant impact is available, the mitigation measure is described after the impact, along with its effectiveness at addressing the impact. Each identified mitigation measure is labeled numerically to correspond with the number of the impact that would be mitigated by the measure. Where sufficient feasible mitigation is not available to reduce an impact to a less-than-significant level, or where SMUD lacks the authority to ensure that the mitigation is implemented when needed, the impact is identified as being "significant and unavoidable."

Terminology Used In the EIR

This draft EIR uses the following terms to describe the level of significance of impacts identified during the environmental analysis:

Significant and Unavoidable Impact: An impact that exceeds the defined threshold of significance and cannot be eliminated or reduced to a less-than-significant level through implementation of feasible mitigation measures.

Potentially Significant Impact: An impact that exceeds the defined thresholds of significance, and can be reduced to a less-than-significant level through implementation of feasible mitigation measures. If feasible mitigation measures are not available or would not reduce the magnitude of the impact below the threshold of significance, the impact would be determined to be significant and unavoidable.

Less-than-Significant Impact: An impact that does not exceed the defined thresholds of significance, or that would be potentially significant but can be eliminated or reduced to a less-than-significant level through implementation of feasible mitigation measures.

No Impact: The conclusion reached when the analysis of an environmental issue determines that the project would have no effect on the issue. In this case, the impact analysis states that the proposed Solano 4 Wind Project would have “no impact” and no further analysis is presented.

Cumulative Impacts: As defined by Section 15355 of the State CEQA Guidelines, “two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.” CEQA requires that the impact analysis discuss cumulative impacts when the “project’s incremental effect is cumulatively considerable… [or] … provide a basis for concluding that the incremental effect is not cumulatively considerable” (State CEQA Guidelines, Section 15130[a]).

Mitigation Measures: The State CEQA Guidelines (Section 15370) define mitigation as:

(a) avoiding the impact altogether by not taking a certain action or parts of an action;

(b) minimizing impacts by limiting the degree of magnitude of the action and its implementation;

(c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment;

(d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and

(e) compensating for the impact by replacing or providing substitute resources or environments.

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3.1. Aesthetics

Visual resources are defined as the natural and human-built features of the landscape that can be seen and that contribute to an attractive landscape appearance and the public's enjoyment of the environment.

This section describes the existing visual resources on the project site and within the surrounding area and provides an assessment of potential changes to those conditions that would result from implementation of the project. Effects of the project on the visual environment are generally defined in terms of the project's physical characteristics and the potential visibility of those changes (including changes in lighting and glare), the extent to which the project would change the perceived visual character and quality of the visual environment where it is located, and the expected level of sensitivity of the viewing public in the area.

3.1.1. Regulatory Setting

Federal

Federal Aviation Administration

The Federal Aviation Administration (FAA) has strict notification policies and standards for marking and lighting structures to promote aviation safety. FAA Advisory Circular 70/7460-1L (FAA 2018) is dedicated to marking and lighting wind turbine farms (defined as wind turbine developments containing three or more turbines of heights more than 200 feet above ground level). The project is required to comply with the relevant Chapters of FAA 2018.

State

California Scenic Highway Program

The California Department of Transportation (Caltrans) manages the California Scenic Highway Program. The goal of the program is to preserve and protect scenic highway corridors from changes that would affect the aesthetic value of the land adjacent to the highways. No highways in Solano County in the project vicinity are designated as state scenic highways. However, State Route (SR) 160 in Sacramento County is designated as a state scenic highway. Portions of SR 160 lie within one mile of the project area. SR 160 parallels the Sacramento River and is designated scenic between the Contra Costa/Sacramento County line and the south city-limit line for the City of Sacramento. (Caltrans 2019)

Local

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

(Section 53091 of the Government Code (Subdivisions d and e). The following policies are provided for the purpose of disclosure, and to allow informed decision-making

Solano County General Plan

The *Solano County General Plan* (2008) Resources Element includes the following policies and implementation program that apply to the project:

<u>Scenic Resources Section</u>

- **Policy RS.P-35:** Protect the unique scenic features of Solano County, particularly hills, ridgelines, wetlands, and water bodies.
- **Policy RS.P-36:** Support and encourage practices that reduce light pollution and preserve views of the night sky.
- **Policy RS.P-37:** Protect the visual character of designated scenic roadways.

The Scenic Resources Chapter identifies three roadways in the project vicinity as scenic roadways: State Route 12, State Route 113, and Grizzly Island Road (Solano County 2008).

<u>Energy Resources and Conservation Section</u>

- **Policy RS.P-53:** Enable renewable energy sources to be produced from resources available in Solano County, such as solar, water, wind, and biofuels to reduce the reliance on energy resources from outside the county.
- **Policy RS.P-58:** Require the siting of energy facilities in a manner compatible with surrounding land uses and in a manner that will protect scenic resources.
  - **Program RS.I-37:** Amend and maintain the Zoning Ordinance to guide the siting of commercial, nonaccessory wind turbine installations. Include the following standards into the ordinance (*excerpt*):
    - Require a setback of 1/4 mile from the right-of-way of any scenic roadway.

3.1.2. Environmental Setting

Aesthetic resources are generally defined as both the natural and built features of the landscape that contribute to the public's experience and appreciation of the environment. Therefore, the environmental setting consists of the quality and character of the site and its surroundings as well as sensitivity of viewers.

Project Site and Surroundings

The project site is located in southeastern Solano County, west of the City of Rio Vista, south of SR 12 within the Wind Resource Area (see Exhibits 2-1 and 2-2 in Chapter 2, “Project Description”). The Montezuma Hills within the Wind Resource Area comprise an agricultural landscape dominated by a series of smoothly rolling, contoured hills of similar texture and size. The Wind Resource Area and the Solano 4 Wind Project site are defined by SR 12 to the north, the Sacramento River and Sacramento–San Joaquin Delta to the south, the Suisun Marsh to the west, and the City of Rio Vista to the east. Nearby and adjacent land uses include dry-land farming, grazing, several small residential communities, scattered rural residences, Travis Air Force Base (AFB), and existing wind resource developments.

Sherman Island, Twitchell Island, and Brannan Island within the Delta and the cities of Pittsburg and Antioch are located south of the Sacramento River within the viewshed of the project.

Large-scale transmission towers and WTGs are established landscape elements within the Montezuma Hills viewshed. The wind energy facilities listed in Table 3.1-1 occupy approximately 88 percent of the Wind Resource Area’s acreage, and 970 WTGs operate within the area.

Table 3.1-1 Operating Wind Energy Facilities in the Montezuma Hills Wind Resource Area

Name and (Operator)	Number of WTGs	Maximum Height of WTGs (feet)
Shiloh I (Avangrid)	24	390
Shiloh II (EDF)	33	413
Shiloh III (EDF)	46	410
Shiloh IV (EDF)	45	410
EDF Renewable V (EDF)	–	–
Labrisa (EDF)	6	340
High Winds (NextEra)	90	350
Montezuma I (NextEra)	16	415
Montezuma II (NextEra)	34	428
Solano Wind Energy Project Phases 1, 2, and 3 (SMUD)	107	410
Mean Height	–	396

Notes:

MW = megawatts; SMUD = Sacramento Municipal Utility District; WTG = wind turbine generator

The maximum height of a WTG is equivalent to the highest point of turbine blade tips above ground level.

Source: USGS 2019

The presence of these WTGs and other infrastructure facilities contributes to the area’s visually distinctive landscape. The resulting scene can be viewed with varied responses. On one hand, it can be observed as one in which the rural character has been lost or diminished by the presence of prominent, highly visible, and dynamic structures. Alternatively, the scene can be valued for the special visual interest it offers. For example, the WTGs themselves can be considered to be visually interesting structures, representative of the technology that is available to produce renewable energy. The strings of WTGs seen along the ridgelines can be viewed as delineating and emphasizing the area's topographic variations. The movement of the WTGs in the wind can be seen as introducing an unusual kinesthetic aspect to the visual experience. To some members of the public, the Montezuma Hills WTGs can be regarded as a point of interest that demonstrates the viability of wind as a renewable energy resource.

Existing Project Site Visual Features

The project would be located along the Sacramento River in the Montezuma Hills, an agricultural landscape dominated by a series of smoothly rolling, contoured hills of similar texture and size. Developed features include existing WTGs, access roadways, and power lines. Views from both the Solano 4 West and East project subareas consist of the rolling hills and existing WTGs in the immediate foreground and middleground, to more distantly the rivers and delta islands and the urban areas of Antioch and Pittsburg to the south. Elevations on the project site range from approximately 4 feet to 230 feet above mean sea level.

Except for the red obstruction lighting required by the FAA, lighting at the site is minimal and typical of agricultural and rural areas. Existing sources of glare during the day include windshields of vehicles, which are transient. Night-time glare is produced by traffic traveling on local roadways.

As discussed previously, large-scale transmission towers and WTGs are established landscape elements within the Montezuma Hills viewshed. (Table 3.1-1). The presence of these WTGs and other infrastructure facilities contributes to the area's visually distinctive landscape.

Project Site Visibility

The general area from which the proposed project would be visible, known as the project viewshed, includes close range and more distant viewing locations in the vicinity. The viewshed for the project includes locations along public roadways within and bordering the project area and within rural residential areas and urban communities. The project site and WTGs would also be visible from numerous developed and undeveloped recreation areas along the shorelines of the Sacramento River, Delta islands, Suisun Marsh, and Suisun Bay.

Distance Zones

Distance zones are based on the position of the viewer in relationship to the landscape. They are measured from one static point. There are three defined distance zones:

- **Foreground*:*** 0.25 to 0.5 mile from the viewer
- **Middleground*:*** Extends from the foreground zone to 3–5 miles from the viewer

- **Background**: Extends from middleground zone to infinity.

Surrounding Views of the Project Site

State Route 12

Views from SR 12 include foreground views of rolling grassland, scattered agricultural structures, and rural residences. As shown in the existing-conditions exhibit for Viewpoint 3, below (Exhibit 3.1-3), views from this roadway include the Montezuma Hills area with several existing wind projects and transmission lines. Under clear atmospheric conditions, Mount Diablo appears in the backdrop. Motorists driving southeast along SR 12 toward the town of Rio Vista traverse a roadway that gently rises and falls with the rolling hills, often dipping down into road cuts that obscure views toward the project area. The nearest WTG proposed by the project would be located within the Solano 4 East project subarea, 3.6 miles south of SR 12.

The Western Railway Museum on SR 12 offers scenic railroad trips on weekends and during special events throughout the year (Western Railway Museum 2019). The nearest WTGs on the project site (Solano 4 West and East) would be more than 7 miles to the southeast of the railway museum. Railroad trips use a Sacramento Northern Railway track route that runs south from the museum to the west of the project area. Passengers on the railroad would have middleground views of the project area, which is 3 miles or more away from the line. Views from the museum and track include several existing wind projects, some of which would appear in front of the proposed project.

State Route 113

SR 113 runs north-south and terminates at SR 12. The site would be visible in the distance for motorists traveling on SR 113 southbound from Interstate 80 (I-80) as they approached SR 12. The nearest WTG associated with the project (Solano 4 East) would be approximately 4 miles away from this intersection. Views from this location would include rolling hills in the foreground, along with the Shiloh I wind project, the High Winds project, enXco V projects, and WTGs previously constructed by SMUD. (SMUD 2007)

City of Rio Vista

The City of Rio Vista is approximately 4 miles east of the project area. Given the intervening development and terrain, views of the project area could be constrained. However, project facilities could be seen from some residential areas within the town. Existing WTGs, as well as transmission lines, between the town and the project site would be visible in the middleground from this location.

Montezuma Hills Road

Montezuma Hills Road, a winding two-lane roadway, lies to the north of the Solano 4 West project subarea, and transects the Solano 4 East subarea. The roadway passes through rolling grass-covered hillsides and numerous existing wind energy facilities. Many of these wind projects would appear in the foreground views from this road. Several isolated rural residences and other agricultural structures lie along this roadway in the general project area.

Birds Landing Road/Birds Landing

Birds Landing Road, another winding two-lane rural road, lies more than 2.5 miles away from the nearest proposed WTGs. Several isolated rural residences lie along this roadway, as well as the community of Birds Landing at the intersection with Collinsville Road, approximately 3.5 miles from the Solano 4 West project subarea. Birds Landing Road passes through several existing wind energy facilities, and both foreground and middleground views from this road would include WTGs and transmission lines.

Collinsville Road/Collinsville

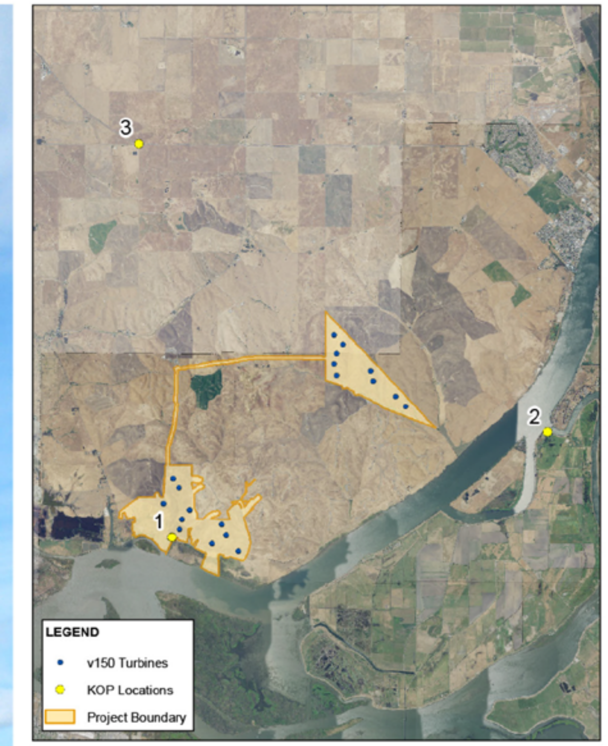
Collinsville Road extends from Shiloh Road, approximately 3.5 miles north of the Solano 4 West subarea boundary, south to the Sacramento River. Collinsville is a small residential community of approximately 15 homes located at the southern end of Collinsville Road, on the edge of the Sacramento River, approximately 1 mile west of the nearest WTG in Solano 4 West. Views from Collinsville would include wind energy facilities previously developed by SMUD and the Shiloh I wind energy facilities, as well as radio towers a half mile to the east (Exhibit 3.1-1). From Collinsville, views to the south across the Sacramento River would encompass the stacks of a power plant in Pittsburg and other large industrial structures.

Grizzly Island Road

The nearest portion of Grizzly Island Road is approximately 3.3 miles from the nearest WTG within Solano 4 West. Travelers on this road would see marshland, flat grassland, flat cropland, and rolling grassland in the foreground. Several previously developed wind energy facilities would be visible from this roadway. The project area would appear in the background of these existing projects.

State Route 160

SR 160 runs south and east of the project area on the opposite side of the Sacramento River. Views from this highway corridor would encompass open grassland and riverfront landscape scenery. The project area would be visible from a segment of SR 160 approximately 10 miles long between SR 12 and the Antioch Bridge. Portions of the route would lie as close as 2.4 miles away from the nearest proposed new WTG. Exhibit 3.1-2 depicts views along SR 160. Views toward the north from SR 160 would include various existing wind energy facilities.



Photograph Information

Time of photograph:	2:10 PM
Date of photograph:	2-28-18
Weather condition:	Partly Cloudy
Viewing direction:	North
Latitude:	38° 4'35.69"N
Longitude:	121°49'54.27"W
Distance to Structure:	0.6 Mile

Graphics\SMUD Solano Wind EIR\04-2019-SMUD View Sims.indd - 1 VMG 04/01/2019 SAC

Exhibit 3.1-1 Existing View from Viewpoint 1: View North from Stratton Lane, East of Collinsville

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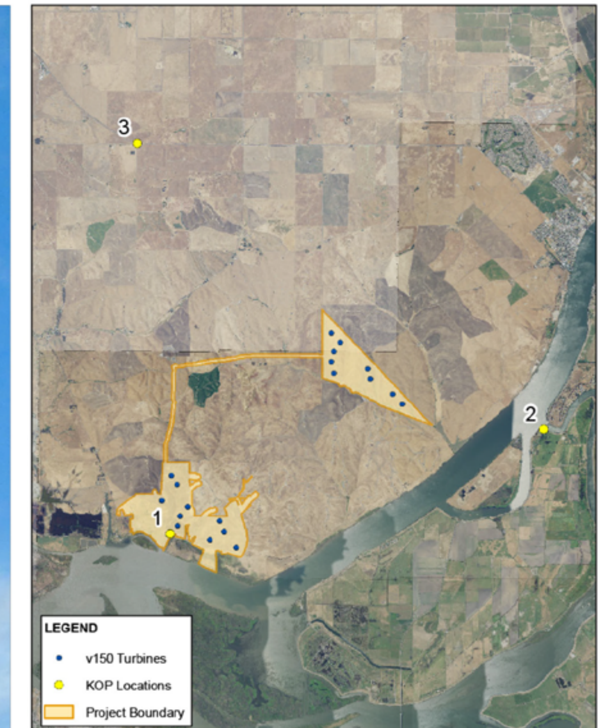

Photograph Information

Time of photograph:	4:41 PM
Date of photograph:	2-28-18
Weather condition:	Partly Cloudy
Viewing direction:	Northeast
Latitude:	38° 6'18.48"N
Longitude:	121°42'6.67"W
Distance to Structure:	2.7 Miles

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Exhibit 3.1-2 Existing View from Viewpoint 2: View Northwest from State Route 160

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West Sherman Island Road

West Sherman Island Road lies across the Sacramento River, southeast of the Solano 4 West project subarea, and runs along the top of the Sherman Island levee from SR 160 to the western edge of Sherman Island. The road is approximately 1.6 miles from the nearest proposed WTG in the Solano 4 West subarea. A small residential community and a recreational vehicle camp lie to the south of the road below the height of the levee. At the western end of the road is the Sherman Island Wildlife Refuge and Recreation Area, a public park that allows overnight and recreational vehicle camping as well as day use. This area is heavily used by windsurfers accessing the Sacramento River. Views toward the project area would be available along the length of this roadway and from the recreation area. Tall shrubs and trees on the northern side of the levee would partially screen some views. The levee would also partially screen views of the project area from residences because they generally lie below the levee. Views to the north from West Sherman Island Road would include various existing wind energy facilities.

Recreation Resources

The Delta in the project area hosts a variety of recreational resources, ranging from city parks to state recreation areas. Table 3.1-2 describes recreation resources within the viewshed of the project.

Table 3.1-2 Recreation Areas in the Vicinity of the Project Area

Recreation Area	Managing Agency	Distance from Nearest Solano 4 WTG (miles)
Sandy Beach County Park and Campground	Solano County Parks and Recreation	3.5
Brannan Island State Recreation Area	California Department of Parks and Recreation	2.7
Delta National Heritage Area	California Delta Protection Commission	-
Sherman Island County Park	Sacramento County	1.6
Lower Sherman Island Waterfowl Area	California Department of Fish and Wildlife	1.1
Antioch Dunes National Wildlife Refuge	U.S. Fish and Wildlife Service	3.9
Barbara Price Marina Park	City of Antioch	3.7
Dow Wetlands Preserve	Dow	3.5
Browns Island Regional Shoreline	East Bay Regional Parks District	2.8
Riverview Park	City of Pittsburg	4.2

Note: WTG = wind turbine generator

Sources: Data from Solano County, California Department of Parks and Recreation, Sacramento County, CDFW, USFWS, City of Antioch, Dow, EBRPD, and City of Pittsburg in 2019.

City of Antioch

The City of Antioch lies north of SR 160 along the San Joaquin River, approximately 3.9 miles south of the Solano 4 West project subarea. Views of the project area would be available northward from the East Bay Regional Park District’s Antioch/Oakley Regional Shoreline. This park is heavily used by the public for fishing and picnicking. Views from the public pier would encompass the Antioch Bridge as well as power plant stacks and other industrial development to the west of the park. Views of the project area also would be available from the waterfront promenade, adjacent to downtown Antioch. From some locations along the promenade, mature vegetation on Kimball Island and the Sherman Island Waterfowl Management Area would partially screen views toward the project. Views from Antioch also would include portions of existing wind energy facilities.

City of Pittsburg

The City of Pittsburg lies west of the City of Antioch, approximately 4.6 miles from the project area. Views of the Solano 4 West project subarea would be available to the northeast from the Riverview Park, approximately 4.3 miles from the nearest planned WTG within the Solano 4 West project subarea. Views from Pittsburg also would include portions of existing energy facilities.

Viewer Groups and Sensitivity

Viewer groups in the Solano 4 project area predominantly consist of motorists traveling along SR 12, SR 113, and SR 160; rural residents near the project site; urban residents of Rio Vista, Antioch, and Pittsburg; and recreationists.

Viewer Sensitivity

Accepted visual assessment methods, including those adopted by the Federal Highway Administration (FHWA) and other federal agencies, establish sensitivity levels as a measure of public concern for changes to scenic quality. Viewer sensitivity, one of the criteria for evaluating the significance of visual impacts, is generally divided into high, moderate and low categories. The factors considered in assigning a sensitivity level include viewer activity, view duration, viewing distance, adjacent land use, and any special management or planning designation. Research on the subject suggests that certain activities tend to heighten viewer awareness of visual and scenic resources, while others tend to be distracting (FHWA 2015). For example, recreational activities tend to favor attention to scenery, while working at a construction site does not.

The project viewshed includes several types of concerned viewer groups. These groups may overlap at times, but for the purposes of this discussion they are described separately. These viewer groups include:

- motorists on scenic SR 160, West Sherman Island Road, and Delta Island Levee Roads;
- motorists on scenic SRs 12 and 113 and Grizzly Island Road;
- residents proximate to the project area, including residents of Birds Landing, Collinsville, Sherman Island, and scattered rural residences;

- motorists on local roads including Montezuma Hills Road, Collinsville Road, and Birds Landing Road;
- visitors to and recreational users of the area, surrounding communities, or the Sacramento River; and
- residents in Rio Vista, Antioch, and Pittsburg.

Motorists on Scenic Highway State Route 160, West Sherman Island Road, and Delta Island Levee Roads

The project area would be visible intermittently from almost 10 miles of SR 160 and from locations along West Sherman Island Road and Delta Island Levee roads. At its closest, the project would lie within 1.6 miles of these roadways, and it would be prominent in middleground views from these locations. Because of the scenic designations of these roadways, the sensitivity of drivers on these roadways is considered moderate to high.

Motorists on Locally Scenic Highways State Route 12 and State Route 113, and Grizzly Island Road

The project area would be visible in the distance for portions of a 10-mile stretch of SR 12 and from limited portions of SR 113 and Grizzly Island Road. Although the project area is 3 miles or more in the distance from these areas, the rural nature of these roadways, the scenic designation of Grizzly Island Road, and the medium duration of the views increase the sensitivity of this group from moderate to high.

Residents near the Project Area

Views from residential areas are long in duration, and the sensitivity of this group is generally considered to be high.

Visitors to the Area

This group includes recreational users engaged in windsurfing, camping, fishing, and boating. The estimated duration of views ranges from a few hours to several days. Sensitivity of this group is considered high.

Motorists on Local Roads

Drivers on local roads include local residents and commuters and, to a lesser degree, visitors. The duration of views from these roads is moderate. These roads are not designated as scenic roadways and, to varying degrees, they pass through existing wind energy facilities. Therefore, the sensitivity of this group is considered low to moderate.

Viewpoints

Three viewpoints were selected as representative of the existing visual character of the site. Each viewpoint is discussed below in terms of visual character and quality.

Visual quality depends on the following attributes:

- **Vividness:** The extent to which the landscape is memorable, which is associated with the distinctiveness, diversity, and contrast of visual elements.
- **Intactness:** The integrity of visual order in the landscape and the extent to which the existing landscape is free from nontypical visual intrusions.
- **Unity:** The extent to which visual intrusions are sensitive to and in visual harmony with the existing landscape.

The viewer's distance from landscape elements plays an important role in the determination of an area's visual quality. Visibility and visual dominance of landscape elements depend on their placement within a viewshed.

Viewpoint 1: View North from Stratton Lane, East of Collinsville

Viewpoint 1, shown in Exhibit 3.1-1, represents the view looking north from Stratton Lane, approximately 1.1 miles east of Collinsville. The primary elements within the view include an existing gravel roadway, a fence on the northern side of the roadway, trees and existing WTGs in the middleground. The existing WTGs encroach on and stand out against the sky. Rolling hills are visible in the middleground, and the view to the horizon is largely unobstructed. The visual character is rural and agricultural.

Vividness is moderate because of the presence of WTGs and rolling hills, which make for a somewhat distinctive visual combination. Intactness is moderately high because the visual intrusions—the fence, road, and power lines—are consistent with a rural and agricultural landscape, and do not substantially degrade the visual character. Unity is moderate because the intrusions are in somewhat visual harmony with the landscape—the rows of existing WTGs mimic the gentle curving of the rolling hills on the horizon. Overall, scenic quality for this view is moderate.

This and other views from nearby (i.e., from residences in Collinsville and recreational areas to the south) are experienced by residents and recreationists. Residents and recreationists generally have high sensitivity.

Viewpoint 2: View Northwest from State Route 160

Viewpoint 2, shown in Exhibit 3.1-2, represents the view northwest from SR 160 near the northeast corner of Sherman Island. The primary elements within the view are the top of a levee and vegetation in the foreground, and the Sacramento River and the Montezuma Hills in the middleground. Existing WTGs and powerlines can be seen along the ridgetops of the Montezuma Hills, and these features encroach into and stand out against the sky. The visual character is primarily rural with some existing WTGs.

Vividness is high because the landscape is dominated by the distinct visual element of the Sacramento River, the natural appearance of which makes the landscape memorable. Intactness is moderate because the distant WTGs encroach into the natural landscape. The river and sky throughout the view provide a visual coherence that is not disrupted by the distant WTGs on ridgelines. The forms, colors, and vertical and horizontal lines represent visual harmony, indicating high unity. Overall scenic quality for this view is high.

This and other views from nearby (i.e., from SR 160, Delta levee roadways, recreational areas) are experienced by travelers and recreationists. Motorists generally have moderately low sensitivity. Recreationists generally have high sensitivity.

Viewpoint 3: View South from State Route 12 near Olsen Road

Viewpoint 3, shown in Exhibit 3.1-3, represents the view looking southeast from SR 12. The primary elements within this view are the existing WTGs extending through the foreground to the middleground. Grazing lands and the sky are other visually dominant components of the view at this location. The existing WTGs encroach into and stand out against the sky. The visual character is a combination of rural and open space, although the existing WTGs dominate this view.

The view presents an intrusion of an industrial landscape into the rural setting. Vividness is high because the existing WTGs dominate the landscape and make it memorable. Intactness is low to moderate because the WTGs encroach into the natural landscape. The sky throughout the view provides visual coherence that is disrupted by the WTGs. The forms, colors, and vertical and horizontal lines represent visual disharmony, indicating low unity. Overall, scenic quality for this view is medium.

This view is experienced by motorists. Motorists on mainline roadways generally have moderately low sensitivity.

3.1.3. Environmental Impacts and Mitigation Measures

Project Characteristics

The project site is located within the Wind Resource Area in southern Solano County. The proposed project area occupies 2,237 acres within the Montezuma Hills. Details about the project design and layout are provided in Chapter 2, “Project Description”; Figure 2-2 shows the proposed project area. As noted in the description, the final WTG locations would be determined upon completion of SMUD’s procurement process and selection of the WTG supplier in late 2019 or 2020; however, the WTGs would be located within the areas depicted in Figure 2-2.

With the Solano 4 Wind Project, SMUD would construct up to 22 new WTGs. Of these new WTGs, up to 10 would be constructed in Solano 4 East and up to 12 in Solano 4

West. The proposed project would have a net power production capacity of up to 91 MW, resulting in a net increase in capacity at SMUD's Solano Wind Project from the existing 230 MW to 306 MW (factoring in the elimination of 15 turbines from the current Solano 4 East project subarea). Associated access roads and collection lines would be installed to support the new WTGs. Power generated by the new WTGs would be transmitted to the existing Russell Substation on Montezuma Hills Road from new, underground direct-buried electrical cable extending from Solano 4 East and West to Russell Substation. The power would be distributed from the substation via the adjacent Birds Landing Switching Station through the existing 230 kilovolts (kV) Vaca–Dixon–Contra Costa transmission line (two circuits), which runs through the Wind Resource Area.

Individual WTGs would have a maximum height of approximately 492 to 592 feet (150 to 180 meters) and a maximum rotor diameter of approximately 446 to 492 feet (136 to 150 meters). Figure 2-3 includes elevation drawings of potential WTG configurations that could be selected for the project site. As indicated in Table 3.1-1, the maximum heights of existing WTGs in the Wind Resource Area range from 340 feet to 428 feet, with a mean height of 396 feet.

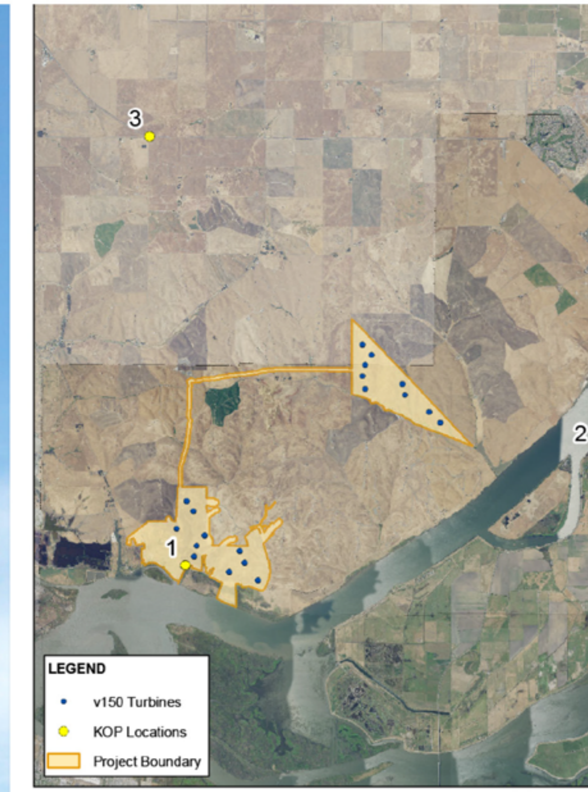
Methods and Assumptions

The assessment of the site's visual characteristics and the viewer groups is based on review of aerial photographs of the project site and photographs taken during a site visit by AECOM in March 2019.

This visual resources impact analysis is based on visual simulations prepared by AECOM in March 2019. Viewpoints for the simulations were selected to represent the most common public places from which the project would be viewed. Digital photos were entered into simulation modeling software and combined with conceptual engineering drawings and assumptions provided by SMUD to create an electronic, three-dimensional (3D) rendering of the project site. The simulations reflect a rendering of the project as if seen by an observer standing or driving in the location where the source photo was taken. The simulations illustrate the conditions on the project site at the completion of construction.

To assess the visual changes, the following factors were considered:

- specific changes in the affected visual environment's composition and character;
- extent to which the affected environment includes features that have been designated in plans and policies for protection and/or special consideration;
- numbers and types of affected viewers; and
- duration of the affected view.



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Distance to Structure:	5.2 Miles

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Exhibit 3.1-3 Existing View from Viewpoint 3: View South from State Route 12 near Olsen Road

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Thresholds of Significance

Based on Appendix G of the State CEQA Guidelines, the project would result in a potentially significant impact related to aesthetics if it would:

- have a substantial adverse effect on a scenic vista;
- substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;
- in nonurbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings, (Public views are those that are experienced from publicly accessible vantage points.) If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality; or
- create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

Impact Analysis

Impact 3.1-1: Project impacts on scenic vistas and potential for substantial degradation of existing visual character or quality of public views of the site and surroundings, including those within the viewshed of a state or locally designated scenic highway.

Project decommissioning, construction, and eventual decommissioning activities would be visible to motorists, recreationists, and residents near the project site; however, these changes in views would be temporary. Placement and operation of WTGs under the Solano 4 Project reduces the number of WTGs operating onsite but places taller WTGs in replacement. Views would remain of a utility scale wind energy facility and any permanent change in views would be incremental. Under either condition WTGs are the dominant visual feature. The greatest visual change would be seen from Collinsville and West Sherman Island. Therefore, the project would not result in a substantial degradation of visual character. This impact would be **less than significant**.

Decommissioning and Construction

Decommissioning and project construction activities would occur over approximately 14 months. Equipment storage and construction activities would be visible on-site to nearby viewers during that time. Detailed construction plans and specifications for the proposed project have not yet been developed. However, the decommissioning of existing facilities and foundations and project construction would involve ground-disturbing activities, including grading and vegetation removal during construction and improvement of new and existing on-site access roads, collection line and homerun trenching, and foundation installation for the WTGs and meteorological towers. Construction and eventual decommissioning would require typical equipment, such as scrapers, a mobile crane, water trucks, and other heavy equipment. Residential viewers in Collinsville and recreationists on West Sherman Island and other similar viewpoints would see intermittent construction activities in certain parts of the project site, based on the viewer location, activity location, and intervening topography. The presence of construction equipment, as well as storing equipment onsite, would be visually consistent with equipment used for maintenance of existing WTGs in the area. Overall, construction and eventual decommissioning activities would be temporary and short term, no viewers would be able to see the entire project site, and many viewers along adjacent local roadways are of moderately low to low sensitivity. Therefore, this impact would be **less than significant**.

Operation

Potential impacts from project operation are analyzed below for the three representative viewpoints previously described (as shown in the exhibits throughout this chapter) and the other residential, recreational, or travelling viewers defined above, as summarized in Table 3.1-3. The analysis focuses on viewer sensitivity and changes to visual quality via changes in vividness, unity, and intactness.

<u>Viewpoint 1: View North from Stratton Lane, East of Collinsville</u>

The existing view from Viewpoint 1 is shown in Exhibit 3.1-1. The visual simulations of the project from this viewpoint are shown in Exhibit 3.1-4 and Exhibit 3.1-5. The simulations show the proposed WTGs following the rolling topography of the site. Existing WTGs would appear in the middleground, behind the proposed Solano 4 WTGs. Because of their nearness and height, the new WTGs would be more prominent than the existing WTGs. The mean height for the existing WTGs is 396 feet; the mean height for the largest of the WTGs proposed for the Solano 4 Wind Project (150 meter WTG) is 592 feet. This would represent a 50 percent increase in the height of WTGs seen from this location. Grazing lands and rolling hills are visible surrounding the WTGs.

The new WTGs would be consistent with the existing industrial element associated with the WRA. Viewers would primarily be residents of Collinsville and recreationists south of the Sacramento River, both groups of which have high sensitivity and would be exposed to views of long duration. However, given the WRA is home to hundreds of WTGs, the project would not substantially reduce the intactness and unity of this viewpoint, and this change would not substantially reduce the visual character. Changes in views from Viewpoint 1 would therefore be **less than significant**.

<u>Viewpoint 2: View Northwest from State Route 160</u>

The existing view from Viewpoint 2 is shown in Exhibit 3.1-2. This viewpoint is a proxy for views from West Sherman Island Road and various recreation facilities as described above in Table 3.1-2. Distances from these viewpoints to planned Solano 4 WTGs range from 1.1 to 4.2 miles.

Table 3.1-3 Viewer Summary of the Project Area

Viewer Location	Distance from Nearest WTG (miles)	Distance Zone	Type of Viewer	Sensitivity	Scenic Designation
SR 12	3.6	Middleground	Motorists	Moderate to High	Solano County
SR 12/Olsen Road	3.0	Middleground	Motorists	Moderate to High	Solano County
Western RR Museum	7.0	Background	Recreationists	Moderate	–
Western RR Museum Tracks	3.0	Middleground	Recreationists	Moderate to High	–
SR 113	4.0	Middleground	Motorists	Moderate to High	Solano County
Rio Vista	4.0	Middleground	Residents, Recreationists	Moderate to High	–
Montezuma Hills Road	0.0	Foreground	Motorists	Low to Moderate	–
Birds Landing Road	2.5	Middleground	Motorists	Low to Moderate	–
Birds Landing	3.5	Middleground	Residents	Moderate to High	–
Collinsville Road	1.0	Middleground	Motorists	Low to Moderate	–
Collinsville	1.0	Middleground	Residents	Moderate to High	–
Grizzly Hills Road	3.3	Middleground	Recreationists	Moderate to High	Solano County
SR 160	2.4	Middleground	Motorists, Recreationists	Moderate to High	State
West Sherman Island Road	1.6	Middleground	Motorists, Recreationists	Moderate to High	–
Sacramento County Delta Island levee roads	2.0 to 2.75	Middleground	Motorists, Recreationists	Moderate to High	Sacramento County
Recreational Resources (Table 3.1-2)	1.1 to 4.2	Middleground	Recreationists	High	–
Antioch	3.9	Middleground	Residents	Moderate	–
Pittsburg	4.6	Middleground	Residents	Moderate	–

Notes: RR = Railroad; SR = State Route; WTG = wind turbine generator

Source: Data compiled by Planning Partners in 2019.

Visual simulations of the project from this viewpoint are shown in Exhibit 3.1-6 and Exhibit 3.1-7. Though not shown in the visual simulations for Viewpoint 2, the project includes installation of new WTGs up to approximately 592 feet in height (see Exhibit 2-3 in Chapter 2, "Project Description").

For closer recreational viewers (e.g., those on West Sherman Island and other nearby recreation venues), vividness would be altered by the introduction of taller visual elements or patterns. This change would be offset by decommissioning of the existing Phase 1 WTGs such that moderate visual intactness and unity of the visual landscape is maintained. Views of the river and sky that dominate the visual setting in the area provide visual coherence that would not be affected by the Solano 4 Wind Project. Recreation viewers are considered to have high sensitivity to visual change. For these reasons, changes in views from Viewpoint 2 and other nearby recreation venues would **be less than significant.**

Viewpoint 3: View South from State Route 12 near Olsen Road

The existing view from Viewpoint 3 is shown in Exhibit 3.1-3, and visual simulations of the project from this viewpoint are shown in Exhibit 3.1-8 and Exhibit 3.1-9. This viewpoint represents typical conditions as seen from SR 12 and SR 113.

The view presents an intrusion of an industrial landscape into the rural setting. Vividness is high because the existing WTGs dominate the landscape and make it memorable. Intactness is low to moderate because the WTGs encroach into the natural landscape. The sky throughout the view provides visual coherence that is disrupted by the WTGs. The forms, colors, and vertical and horizontal lines represent visual disharmony, indicating low unity. Overall, scenic quality for this view is medium.

The simulations show barely-noticeable changes on the horizon from implementation of the project. Given the distance between viewers and proposed new WTGs, the increased height of the WTGs would be barely perceptible to the travelling public. The remainder of the view would be unchanged.

The project would be barely visible in Viewpoint 3 and would be therefore nearly unnoticeable to the viewer. As a result, the vividness, intactness, and unity of the view would remain moderately low, low, and low, respectively. The visual character of this viewpoint would remain the same with the project. As a result, changes in views from Viewpoint 3 would be **less than significant**.

Post-decommissioning

As described in Chapter 2, "Project Description," the project would be decommissioned at the end of its useful life (anticipated to be 30 to 35 years or more). Active decommissioning activities would be similar to construction activities and, therefore, impacts resulting from these activities are discussed together, above. Following

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Distance to Structure:	0.6 Mile

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Exhibit 3.1-4 Simulated Conditions from Viewpoint 1—150 meter Turbine

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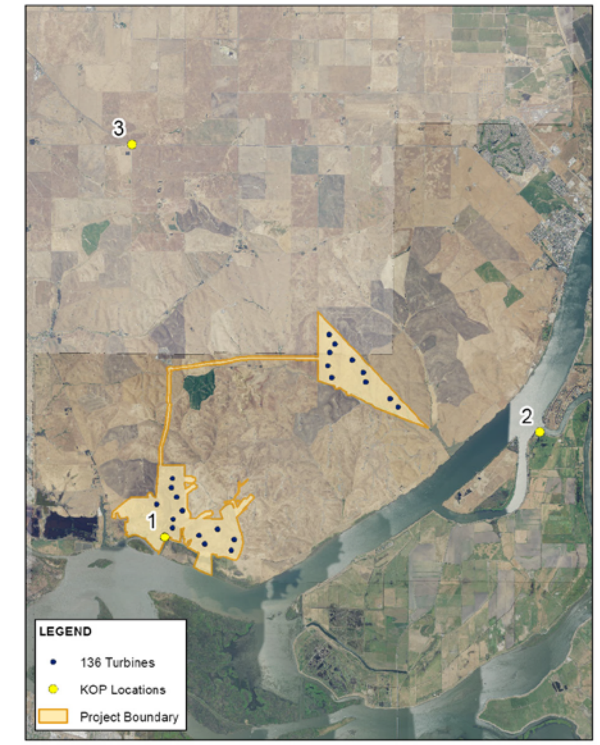

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Exhibit 3.1-5 Simulated Conditions from Viewpoint 1—136 meter Turbine

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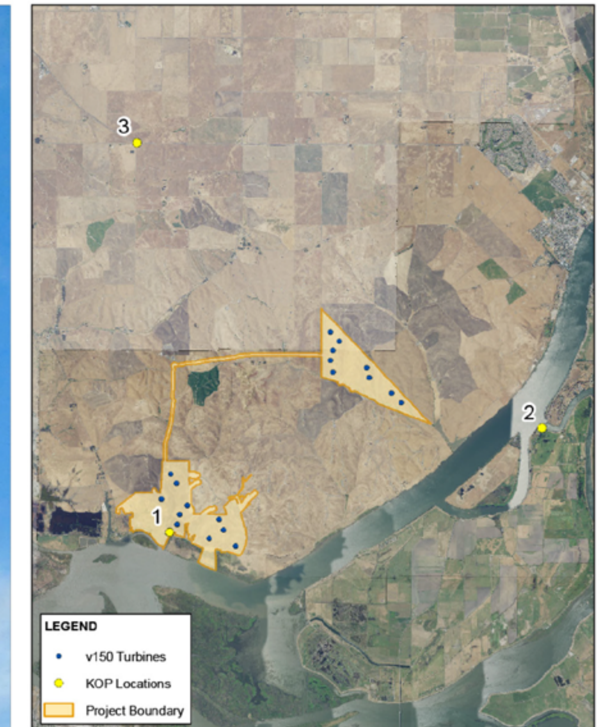

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Exhibit 3.1-6 Simulated View from Viewpoint 2—150 meter Turbine

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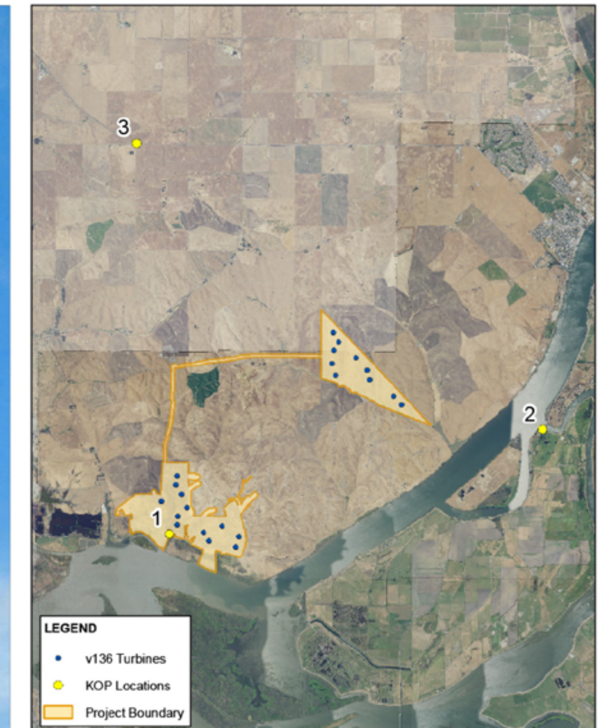

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Exhibit 3.1-7 Simulated View from Viewpoint 2—136 meter Turbine

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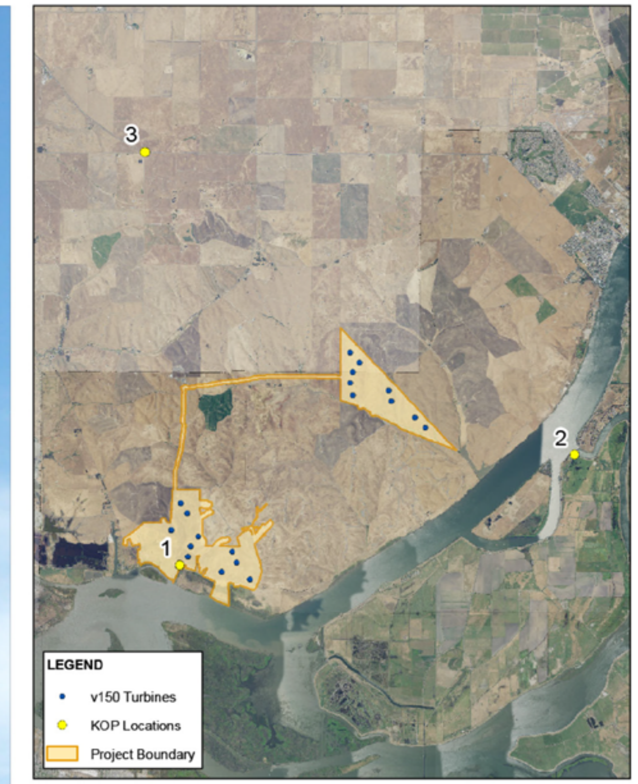

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Distance to Structure:	5.2 Miles

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Exhibit 3.1-8 Simulated View from Viewpoint 3—150 meter Turbine

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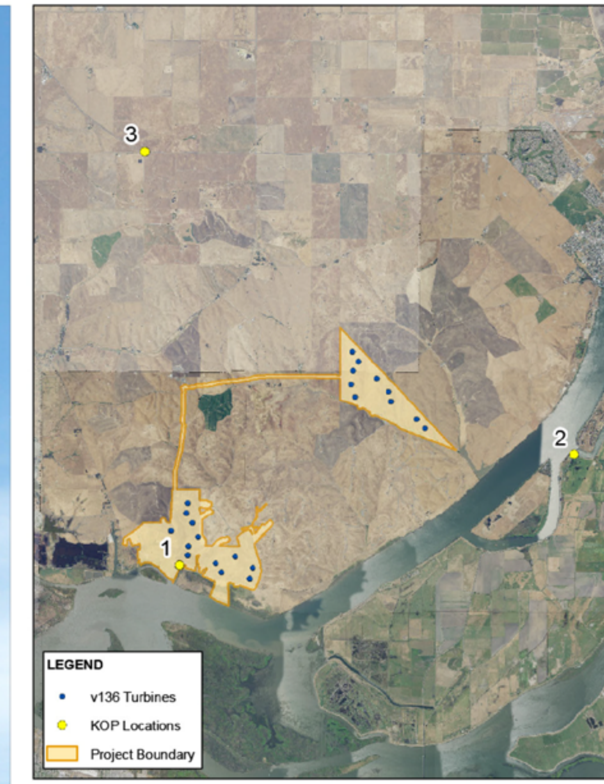

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Exhibit 3.1-9 Simulated View from Viewpoint 3—136 meter Turbine

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decommissioning activities, portions of the project site may be graded to recontour access roads or address erosion. Future site restoration activities are assumed to be similar to the procedures used during construction to restore temporarily disturbed areas. From nearby viewpoints, decommissioning activities would largely return the project site to preproject conditions, as the WTGs would no longer be seen from these viewpoints. Therefore, decommissioning of the project would have a **less-than-significant** impact on the visual character of the project site or its surroundings.

Mitigation Measure 3.1-1a: Design the Project to Avoid Aesthetic Impacts.

SMUD or its contractor shall consider topography when siting wind turbines and shall avoid major modifications to natural landforms or other characteristic parts of the landscape. The turbines shall be clustered or grouped to break up overly long lines of turbines. The turbines shall be similar in shape and size.

Each WTG shall be painted a uniform white or light-grey color, “RAL 7035” or similar, per manufacturer’s requirements. To minimize the structures’ reflectivity, the paint used shall have a gloss level that does not exceed 30 percent, or 60–70 gloss units,[1] as calculated by the manufacturer. The surfaces of all other structures (e.g., meteorology towers) shall be given low-reflectivity finishes with neutral colors to minimize the contrast of the structures with their backdrops.

Fewer, larger turbines shall be preferred over more, smaller turbines. Commercial messages and symbols shall be prohibited on wind turbines. Collection and home run lines shall be underground; no overhead transmission lines shall be used.

To minimize ground disturbance, to the extent feasible, existing roadways shall be used to access turbine pads. All construction-related areas shall be kept clean and tidy, with construction materials and equipment stored in the construction staging and laydown areas and/or generally away from public view. SMUD or its contractor shall remove construction debris promptly at intervals of 2 weeks or less, at any one location.

Mitigation Measure 3.1-1b: Implement Operational Measures to Reduce Aesthetic Impacts.

Wind turbines shall be kept clean and in good repair. Nacelle covers and rotor nose cones shall always be maintained in place and undamaged. Inoperative turbines shall be repaired, replaced, or removed as quickly as feasible because a turbine that is broken or disabled will create a health and safety hazard and disrupt the visual experience of the casual observer. SMUD or its contractor shall remove derelict WTGs and derelict parts and pieces. Similarly, operations and maintenance areas shall be kept clean and tidy, with all equipment, parts, and supplies stored in areas that are screened from view and/or are generally not visible to the general public. Grading and landscape treatment around tower

[1] Gloss units is a measurement scale based on a highly polished reference black glass standard with a refractive index of 100 gloss units at the specified angle of measurement. A measurement of 70 gloss units represents a low-gloss condition.

foundations shall match the conditions of surrounding landscape and habitat to recreate a pleasing visual environment.

Significance after Mitigation

implementation of Mitigation Measures 3.1-1a and 3.1-1b would reduce potential visual effects during construction by preventing visual degradation. Therefore, the impact on scenic vistas and the visual character of the site and adjacent scenic roadways would be **mitigated to less than significant levels**.

Impact 3.1-2: Creation of new sources of substantial light or glare that would adversely affect day or nighttime views in the area.

Project construction and operation would introduce permanent sources of light and glare, mainly to comply with FAA safety lighting requirements. Therefore, this impact would be **significant**.

Wind turbines would be painted off-white or light grey with a matte finish, in accordance with FAA requirements, and no reflective surfaces are proposed. In accordance with FAA Advisory Circular AC 70/7460-1L, safety lighting would be required on turbines 200 feet or taller to reduce potential hazards to aircraft traveling to nearby airports. These regulations would require either a single incandescent or rapid-discharge flashing red light on each end turbine in a line and on interior turbines, such that no lighted turbine would be 0.5 mile or more from the nearest lighted turbine (FAA 2018).

The tallest turbine considered for the project would be approximately 592 feet tall, and therefore, would require appropriate obstruction lighting. Lighting would be installed on the exterior of the nacelles, in compliance with FAA rules. The FAA has determined that tower lighting could use aircraft detection lighting systems (See Appendix F). Lights would not be mounted on every turbine, but would be located on several strategically selected turbines, to mark the extent of the turbines adequately. Installation of an Aircraft Detection Lighting System (ADLS) would limit the period when WTGs are lighted to those times when aircraft enter the detection zone. A minimum number of lights would be used as required to minimize attractants for birds during night migrations.

The FAA lighting associated with the project, which would appear higher than and separated from any existing source of light in the project area, would not be visible under most conditions and does not represent asubstantial source of contrast in nighttime views. Turbine lights would only be visible to residents, travelers, and others in the area when activated by the ADLS. The WTGs to be decommissioned use high intensity blinking lights that are constantly on. Therefore, the project would reduce the intensity of safety lighting and would not contribute toward an increase in nighttime lighting to an intensity that cause viewers to redirect their attention from their immediate surroundings toward the project site. This impact would be **less than significant.**

Mitigation Measure 3.1-2: Use Technology to Reduce Night Sky Impacts.

To reduce the potential for visual impacts associated with lighting, lighting for the turbine doorways shall be limited to the illumination required for safety of personnel and security of project infrastructure. To minimize the effect of light pollution in the surrounding area, all lighting shall be motion-activated and downcast.

Level of Significance

To minimize night sky impacts from hazard navigation lighting associated with wind facilities, ADLS technology will be employed as described in the FAA Determination of No Hazard. ADLS is a radar-based obstacle avoidance system that activates obstruction lighting and audio signals only when an aircraft is close to an obstruction on which an ADLS unit is mounted, such as a wind turbine. Implementation of the ADLS would reduce impacts to **less than significant with mitigation.**

Impact 3.1-3: Shadow flicker effects.

The project would not result in substantial shadow flicker. This impact would be **less than significant**.

Neither SMUD or Solano County have adopted a significance threshold for this impact, and shadow flicker impacts are not regulated in applicable state or federal law. The following discussion is provided for the general information of the public and SMUD decision-makers.

Shadow flicker is the term used to refer to the alternating changes in light intensity that can occur at times when the rotating blades of wind turbines cast moving shadows on the ground or on structures. Shadow flicker occurs only when the wind turbines are operating during sunny conditions and is most likely to occur early and late in the day, when the sun is at a low angle in the sky.

The intensity of shadow flicker is defined as “the difference or variation in brightness at a given location in the presence or absence of a shadow” (NRC 2007). The intensity of the shadows cast by moving blades of wind turbines, and thus the perceived intensity of the flickering effect, is determined by the distance of the affected area from the turbine, with the most intense, distinct, and focused shadows occurring closest to the turbine. The following additional factors could affect the total amount of shadow flicker:

- haze or particulate matter in the air could reduce the intensity of light and reduce distances at which shadows could be cast.
- potential structures and vegetation between receptors and the turbines would block shadows created by the rotating turbine blades, and thus would prevent shadow flicker from occurring at receptors. Receptors normally would have much less window than wall space on any given side.

The frequency of shadow flicker is a function of the number of blades making up the wind turbine rotor and rotor speed. Shadow flicker frequency is measured in terms of alternations per second, or hertz (Hz). Flicker normally is considered a nuisance above 2.5 Hz (Clarke 1991). Flicker frequency from a wind turbine is on the order of the rotor frequency (i.e., 0.6–1.0 Hz), which is harmless to humans. Only frequencies above 10 Hz are likely to cause epileptic seizures (NRC 2007).

To evaluate the potential for shadow flicker originating from the Solano 4 Project, a flicker study was prepared under the direction of SMUD by Black and Veatch engineering consultants (Black and Veatch 2019). This study is summarized below.

Shadow Receptors are defined as structures that may experience the impacts from the shadow flicker of turbines. To evaluate flicker effects, 29 potential receptors were identified and evaluated. Once potential receptors were identified, evaluators used a wind park design and production modeling software to predict shadow flicker from proposed WTGs within the Solano 4 West and East project subareas.

WindFarmer 5.3.38, a wind park design and production modeling software, was used to predict shadow flicker from Solano 4 Wind Project. The program calculated sun positions throughout the year and determined those positions relative to the wind turbines and any Shadow Receptors throughout a full year. The presence of shadow flicker at a given location and time was determined based on a line of sight calculation between the sun and the turbines, and the projection of the shadow from the turbine rotor to the receptor. Flicker was modelled from each turbine out to 0.9 mile (1,500 meters), as beyond this point shadows are known to diffuse and become indistinguishable.

Modeling was completed for both the 136m and the 150m WTG models being considered by SMUD. For further information regarding the configuration of these two models, see Chapter 2, “Project Description.”

The shadow model made several assumptions that overestimate the number of hours that flicker may be visible, and tended to present what could be considered a “worst case” scenario. These assumptions included that the sky is always clear, the turbines are always operating, and are always facing directly into the sun, creating maximum shadowed areas behind them. Under actual operating conditions, cloudy or hazy weather may reduce or eliminate the casting of defined shadows; turbines will face into oncoming wind, which will not correspond to the position of the sun; and low wind or turbine maintenance periods may result in turbines idling during shading hours. At this stage, the model also did not consider window location, height, direction, or shading, and did not include shading from trees or other structures, which typically greatly diminishes shadow flicker. Modeling using this protocol resulted in a “worst-case” analysis.

For a more realistic result, the analysts attempted to account for the first of the conservative assumptions listed. That is that the sky, in reality, will not always be clear and the possibility for shadows will not always be present. Quantifying this required review of historical cloud patterns in the area.

Historical monthly sunshine hours data were obtained for multiple locations in California from the Automated Surface Observing Systems (ASOS) program. The ASOS station at Travis Air Force Base in Fairfield, CA was the closest available data point. Analysts reviewed this source and selected the most recent 20-year period of record for assessment. Based on this information, it was determined that on an annual basis, approximately 77 percent of the area is considered sunny, capable of casting shadows.

In addition to cloud coverage, it is also likely that turbines will not operate continuously because of low winds and maintenance, and would not always be oriented directly between the sun and homes. Therefore, it is realistic that actual shadow flicker at the project site would be substantially lower than the worst-case forecast by the shadow model. Actual flicker is expected to be less than 60 percent of that forecasted. Moreover, flicker would also be reduced by features such as window placement on residences and the presence of trees and awnings, which would also serve to reduce the actual perceived flicker hours. Flicker of approximately 40 percent of the extent of the maximum worst case of that forecasted by the shadow model is anticipated to reasonably represent the actual shadow flicker from the project. This resulted in the generation of a "realistic case."

Of the 29 receptors initially identified, only seven locations would experience flicker. Results for both the worst-case and the realistic case for these seven locations are presented in Tables 3.1-4 and 3.1-5 for both WTG models being considered by SMUD.

Table 3.1-4 Shadow Flicker Impact for 136 m WTG

Receptor	Worst Case (hr/yr)	Real Case (hr/yr)	Status
R010	26	20	Unknown
R011	12	9	Unknown
R012	14	11	Unknown
R121	35	28	Unoccupied Barn
R162	324	249	Unoccupied Barn
R177	30	23	Unoccupied
R178	15	12	Unoccupied

Note: hr/yr = hours per year
Source: Black & Veatch 2019

Table 3.1-5 Shadow Flicker Impact for 150 m WTG

Receptor	Worst Case (hr/yr)	Real Case (hr/yr)	Status
R010	39	30	Unknown
R011	20	15	Unknown
R012	21	16	Unknown
R121	35	28	Unoccupied Barn
R162	287	221	Unoccupied Barn
R177	41	31	Unoccupied
R178	19	15	Unoccupied

Note: hr/yr = hours per year

Source: Black & Veatch 2019

Because most of the affected structures would be unoccupied, for most locations the annual hours of flicker would be 30 hours or fewer, and the lack of strong evidence of any health impacts regarding shadow flicker, this impact would be **less than significant**.

Mitigation Measures

No mitigation is required.

3.2. Air Quality

This section describes the project area's existing air quality conditions and applicable regulations, and analyzes potential short- and long-term impacts of the project on air quality.

Air quality influences public health and welfare, the economy, and quality of life. Air pollutants have the potential to adversely affect public health, the production and quality of agricultural crops, visibility, native vegetation, and buildings and structures.

Criteria pollutants are those that are regulated by either the federal or California Clean Air Act. Noncriteria pollutants are not regulated by these acts, but are a concern as precursors to criteria pollutants and/or for their potential for harm or nuisance.

The criteria pollutants of most interest in the project area are ozone and particulates (dust). Ozone is not emitted directly into the environment; rather, it is generated from complex chemical reactions in the presence of sunlight between reactive organic gases (ROG) (or nonmethane hydrocarbons) and oxides of nitrogen (NO_X). Ozone is a powerful respiratory irritant. Particulate matter (PM) is classified as respirable particulate matter (PM_{10}) and fine particulate matter ($PM_{2.5}$). Exposure to elevated PM levels causes irritation of the eyes and respiratory system, and exposure is implicated in increased levels of disease and death.

Important noncriteria pollutants include air toxics. Air toxics are generated from industrial processes (e.g., gas stations, dry cleaners, or car repairs), mobile sources using diesel engines, and agricultural sources.

3.2.1. Regulatory Setting

The project area is located at the boundary of the San Francisco Bay Area Air Basin (SFBAAB) and the Sacramento Valley Air Basin (SVAB). Air quality in Solano County is regulated by the U.S. Environmental Protection Agency (EPA), the California Air Resources Board (ARB), and both the Bay Area Air Quality Management District (BAAQMD) and Yolo-Solano Air Quality Management District (YSAQMD).[1] These agencies develop rules, regulations, policies, and/or goals to comply with applicable legislation. Although EPA regulations may not be superseded, state and local regulations may be more stringent.

Federal

EPA is responsible for enforcing the many federal environmental and hazardous waste laws, including the federal Clean Air Act (CAA). California is under the jurisdiction of EPA Region IX, with offices in San Francisco. The CAA, established in 1963, was substantially

1 The northeastern portion of the project site is located within the boundaries of YSAQMD, while the southwestern portion is within the jurisdiction of BAAQMD.

modified in 1970 and again amended in 1990 to authorize the establishment of national health-based air quality standards, set deadlines for their attainment, and establish actions required by areas of the nation that exceeded these standards.

Criteria Air Pollutants

The CAA required EPA to establish national ambient air quality standards (NAAQS). EPA has established primary and secondary NAAQS for the following criteria air pollutants: photochemical smog (ozone), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable and fine particulate matter (PM_{10} and $PM_{2.5}$, respectively), and lead (Table 3.2-1). The primary standards protect public health and the secondary standards protect public welfare.

The CAA also required each state to prepare an air quality control plan referred to as a state implementation plan (SIP). The federal Clean Air Act Amendments of 1990 added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is modified periodically to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins as reported by their jurisdictional agencies. EPA is responsible for reviewing all SIPs to determine whether they conform to the mandates of the CAA and its amendments, and whether implementation will achieve air quality goals. If EPA determines a SIP to be inadequate, a federal implementation plan that imposes additional control measures may be prepared for the nonattainment area. If an approvable SIP is not submitted or implemented within the mandated time frame, sanctions may be applied to transportation funding and stationary air pollution sources in the air basin.

Toxic Air Contaminants/Hazardous Air Pollutants

Toxic air contaminants (TACs), or hazardous air pollutants, are a defined set of airborne pollutants that pose a present or potential hazard to human health. A TAC is defined as an air pollutant that may cause or contribute to an increase in mortality or serious illness, or may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations.

A wide range of sources, from industrial plants to motor vehicles, emits TACs. The health effects associated with TACs are quite diverse and generally are assessed locally, rather than regionally. TACs can cause long-term health effects such as cancer, birth defects, neurological damage, asthma, bronchitis, or genetic damage; or short-term acute affects such as eye watering, respiratory irritation (a cough), running nose, throat pain, and headaches.

Table 3.2-1 Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	California[2,3]	National[1]	
			Primary[3]	**Secondary[3]**
Ozone	1-hour	0.09 ppm (180 µg/m^3)	–	Same as primary standard
	8-hour	0.070 ppm (137 µg/m^3)	0.070 ppm (137 µg/m^3)	
Carbon monoxide (CO)	1-hour	9.0 ppm (10 mg/m^3)	35 ppm (40 mg/m^3)	Same as primary standard
	8-hour	6 ppm[f] (7 mg/m^3)	9 ppm (10 mg/m^3)	
Nitrogen dioxide (NO_2)	Annual arithmetic mean	0.030 ppm (57 µg/m^3)	53 ppb (100 µg/m^3)	Same as primary standard
	1-hour	0.18 ppm (339 µg/m^3)	100 ppb (188 µg/m^3)	–
Sulfur dioxide (SO_2)	24-hour	0.04 ppm (105 µg/m^3)	0.14 ppm (365 µg/m^3)	–
	3-hour	–	–	0.5 ppm (1,300 µg/m^3)
	1-hour	0.25 ppm (655 µg/m^3)	75 ppb (196 µg/m^3)	–
Respirable particulate matter (PM_{10})	Annual arithmetic mean	20 µg/m^3	–	Same as primary standard
	24-hour	50 µg/m^3	150 µg/m^3	
Fine particulate matter ($PM_{2.5}$)	Annual arithmetic mean	12 µg/m^3	12.0 µg/m^3	15.0 µg/m^3
	24-hour	–	35 µg/m^3	Same as primary standard
Lead[4]	Calendar quarter	–	1.5 µg/m^3	Same as primary standard
	30-day average	1.5 µg/m^3	–	–
	Rolling 3-month average	–	0.15 µg/m^3	Same as primary standard
Hydrogen sulfide	1-hour	0.03 ppm (42 µg/m^3)	No national standards	
Sulfates	24-hour	25 µg/m^3		
Vinyl chloride[4]	24-hour	0.01 ppm (26 µg/m^3)		
Visibility-reducing particulate matter	8-hour	Extinction coefficient of 0.23 per km—visibility of 10 miles or more		

Notes: µg/m^3 = micrograms per cubic meter; ARB = California Air Resources Board; km = kilometers; ppb = parts per billion; ppm = parts per million.

[1] National standards (other than ozone, PM, and those based on annual averages or annual arithmetic means) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. The PM_{10} 24-hour standard is attained when 99% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. The $PM_{2.5}$ 24-hour standard is attained when 98% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact EPA for further clarification and current federal policies.

[2] California standards for ozone, CO (except in the Lake Tahoe Basin), SO_2 (1 and 24-hour), NO_2, PM, and visibility-reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[3] Concentration expressed first in units in which it was promulgated (i.e., parts per million [ppm] or micrograms per cubic meter [µg/m^3]). Equivalent units given in parentheses are based on a reference temperature of 25 degrees Celsius (°C) and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; “ppm” in this table refers to ppm by volume, or micromoles of pollutant per mole of gas. Secondary national standards are also available from EPA.

[4] ARB has identified lead and vinyl chloride as toxic air contaminants with no threshold of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

Sources: ARB 2016a; EPA 2016a.

For evaluation purposes, TACs are separated into carcinogens and noncarcinogens, based on the nature of the physiological effects of exposure to the pollutant. Carcinogens are assumed to have no safe threshold below which health impacts would not occur. This contrasts with criteria air pollutants, for which acceptable levels of exposure can be determined and ambient standards have been established (Table 3.2-1). Cancer risk from TACs is expressed as excess cancer cases per million exposed individuals, typically over a lifetime of exposure.

EPA and, in California, ARB regulate hazardous air pollutants and TACs, respectively, through statutes and regulations that generally require the use of the maximum available control technology or best available control technology for toxics to limit emissions.

State

ARB is the agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementing the California Clean Air Act. California law authorizes ARB to set ambient (outdoor) air pollution standards (California Health and Safety Code, Section 39606) in consideration of public health, safety, and welfare (the California ambient air quality standards [CAAQS]) (Table 3.2-1).

Criteria Air Pollutants

ARB is responsible for preparing and enforcing the federally required SIP in an effort to achieve and maintain the NAAQS and CAAQS, which were developed as part of the California Clean Air Act adopted in 1988. The CAAQS for criteria pollutants equal or surpass the NAAQS, and include other pollutants for which there are no NAAQS. Differences in the standards are generally explained by the health effects studies considered during the standard-setting process and the interpretation of the studies. In addition, the CAAQS incorporate a margin of safety to protect sensitive individuals.

The California Clean Air Act requires that all local air districts in the state endeavor to achieve and maintain the CAAQS by the earliest date practical. The act specifies that local air districts should focus particular attention on reducing emissions from transportation and areawide emission sources, and provides districts with the authority to regulate indirect sources.

Among ARB's other responsibilities are overseeing local air districts' compliance with federal and state laws; approving local air quality plans; submitting SIPs to EPA; monitoring air quality; determining and updating area designations and maps; and setting emissions standards for new mobile sources, consumer products, small utility engines, off-road vehicles, and fuels.

Toxic Air Contaminants

TACs in California are regulated primarily through the Tanner Air Toxics Act (Assembly Bill [AB] 1807, Chapter 1047, Statutes of 1983) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588, Chapter 1252, Statutes of 1987). AB 1807 sets forth a formal procedure for ARB to designate substances as TACs. Research, public participation, and scientific peer review are required before ARB can designate a substance as a TAC. To date, ARB has identified more than 21 TACs, including diesel PM, and adopted EPA's list of hazardous air pollutants as TACs.

Once a TAC is identified, ARB adopts an airborne toxics control measure for sources that emit that particular TAC. If a safe threshold exists for a substance at which there is no toxic effect, the control measure must reduce exposure below that threshold. If no safe threshold exists, the measure must incorporate best available control technology for toxics to minimize emissions.

ARB has adopted diesel exhaust control measures and more stringent emissions standards for various on-road mobile sources of emissions, including transit buses, and off-road diesel equipment (e.g., tractors, generators). Recent milestones included the low-sulfur diesel fuel requirement and tighter emissions standards for heavy-duty diesel trucks (effective in 2007 and subsequent model years) and off-road diesel equipment (2011).

Over time, replacing older vehicles will result in a vehicle fleet that produces substantially lower levels of TACs than under current conditions. Mobile-source emissions of TACs (e.g., benzene, 1-3-butadiene, diesel PM) in California have been reduced substantially over the last decade; such emissions will be reduced further through a progression of regulatory measures (e.g., low emission vehicle/clean fuels and Phase II reformulated-gasoline regulations) and control technologies.

Regional and Local

ARB is the oversight agency responsible for regulating statewide air quality, but implementation and administration of the NAAQS and CAAQS is delegated to several regional air pollution control districts and air quality management districts. These districts have been created for specific air basins, and have principal responsibility for:

- developing plans to meet the NAAQS and CAAQS;
- developing control measures for nonvehicular sources of air pollution necessary to achieve and maintain the NAAQS and CAAQS;
- implementing permit programs established for construction, modification, and operation of air pollution sources;
- enforcing air pollution statutes and regulations governing nonvehicular sources; and
- developing employer-based trip reduction programs.

To regulate air pollutant emissions in California, the state has been divided into 15 air basins based on similar meteorological and geographic conditions, and consideration of political boundary lines whenever practicable. Solano County is situated on the boundary of two air basins, under the jurisdiction of two different air quality management districts (Exhibit 3.2-1). YSAQMD attains and maintains air quality conditions in northeastern Solano County and BAAQMD regulates air pollutant emissions in the southwestern portion of the county. Both districts prepare plans and programs for the attainment of ambient air quality standards, adopt and enforce rules and regulations, and issue permits for stationary sources.

Yolo-Solano Air Quality Management District

The YSAQMD staff has produced the *Handbook for Assessing and Mitigating Air Quality Impacts* (YSAQMD 2007) to guide lead agencies, consultants, and project applicants on how to accurately assess and mitigate project-related impacts on air quality.

All projects in northeastern Solano County are subject to adopted YSAQMD rules and regulations in effect at the time of construction. Specific rules applicable to construction of the project may include but are not limited to the following:

- **District Rule 2.3, Ringelmann Chart**: Visible emissions from stationary diesel-powered equipment are not allowed to exceed 40 percent opacity for more than 3 minutes in any 1 hour.
- **District Rule 2.5, Nuisance**: Dust emissions must be prevented from creating a nuisance to surrounding properties.
- **Rule 2.11, Particulate Matter Concentrations**: The purpose of this rule is to protect ambient air quality by establishing a PM emission standard.
- **District Rule 2.14, Architectural Coatings**: Architectural coatings and solvents used at the project shall be compliant with volatile organic compound (VOC) limits.
- **District Rule 2.28, Cutback and Emulsified Asphalt Paving Materials**: This rule regulates cutback and emulsified asphalt application.
- **District Rule 9.9, Asbestos**: In the event that demolition, renovation, or removal of asbestos-containing materials is involved, this rule requires district consultation and a permit before the start of demolition or renovation work.
- Portable equipment greater than 50 horsepower, other than vehicles, must be registered with either the ARB Portable Equipment Registration Program (http://www.arb.ca.gov/perp/perp.htm) or with the district.
- All stationary equipment, other than internal combustion engines less than 50 horsepower, emitting air pollutants controlled under District rules and regulations require an Authority to Construct and Permit to Operate from the district.

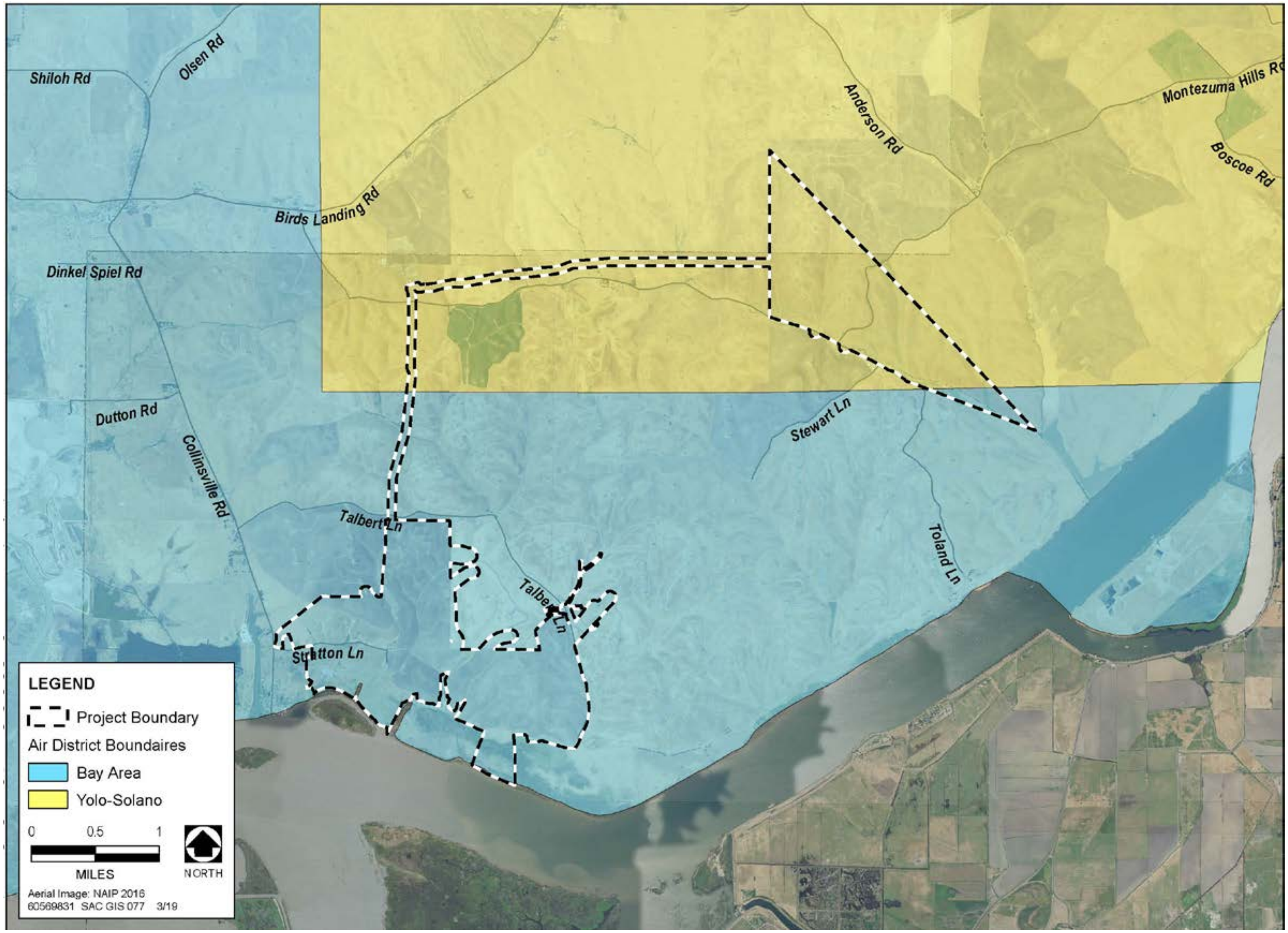

Exhibit 3.2-1 Air District Boundaries

Air Quality Plans

YSAQMD is the primary agency responsible for planning to meet the NAAQS and CAAQS in northeastern Solano County. YSAQMD is considered to be part of a regional nonattainment area for ozone and $PM_{2.5}$. As set forth by YSAQMD, ozone levels in the district are in the healthy range on most days. However, ozone and its precursors do not respect political boundaries, and emissions in Yolo and Solano counties do affect neighboring communities, especially those in the greater Sacramento region. Therefore, EPA has included YSAQMD in the Sacramento Federal Nonattainment Area.

YSAQMD works with other local air districts in the Sacramento region to maintain the region's portion of the SIP for ozone. The SIP is a compilation of plans and regulations that govern how the region and state will comply with the federal CAA requirements to attain and maintain the NAAQS for ozone. The Sacramento region was classified as a severe nonattainment area for the 1997 8-hour NAAQS of 84 parts per billion. In 2013, the regional air districts developed the Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan to address how the region would attain the 1997 8-hour standard. EPA approved this plan effective March 2, 2015 (80 *Federal Register* [FR] 4795).

YSAQMD is nonattainment for $PM_{2.5}$. Most of the time, fine particulate pollution levels in the district are in the healthy range. However, there are typically several days a year when air quality is considered unhealthy for sensitive groups because of increased particulate pollution. Although the district generally does not experience unhealthy levels of particulates, EPA has included YSAQMD in the Sacramento Federal Nonattainment Area. To show attainment of the 24-hour fine particulate standard, an area must demonstrate that it has met the standard during 3 consecutive years. The Sacramento $PM_{2.5}$ planning region was classified as attainment for the 2012 annual average $PM_{2.5}$ NAAQS of 12 micrograms per cubic meter ($\mu g/m^3$), and classified as nonattainment in 2009 for the 2006 24-hour $PM_{2.5}$ NAAQS of 35 $\mu g/m^3$. The region prepared the $PM_{2.5}$ Maintenance Plan and Redesignation Request (2013) to address how the region attained and would continue to attain the 24-hour $PM_{2.5}$ standard. The region attained the standard based on 2009–2011 monitoring data, but postponed submittal of the plan because high concentrations in 2012 caused exceedances.

On May 10, 2017, EPA found that the area attained the 2006 24-hour $PM_{2.5}$ NAAQS by the attainment date of December 31, 2015 (82 FR 21711). This finding was based on complete, quality-assured and certified $PM_{2.5}$ monitoring data for 2013–2015. The $PM_{2.5}$ Maintenance Plan and Redesignation Request will be updated and submitted in the future based on the clean data finding made by EPA.

EPA has determined that the Sacramento Federal Nonattainment Area is required to develop a mitigation plan to minimize public exposure from $PM_{2.5}$ emissions generated during wildfire events. The air districts in the Sacramento Federal Nonattainment Area for $PM_{2.5}$ have jointly prepared the draft *Wildfire Mitigation Plan for the Sacramento Federal*

Nonattainment Area for $PM_{2.5}$ as required by Title 40, Part 51.930 of the Code of Federal Regulations.

Bay Area Air Quality Management District

In May 2017, BAAQMD released a revision to its 2010 CEQA guidelines, which serves the same function and contains similar components as the YSAQMD guidance document discussed above. BAAQMD has been updating its CEQA guidelines and thresholds of significance based on substantive changes to the data and assumptions underlying the analytical methodologies, thresholds, and mitigation strategies since the last update of the CEQA Guidelines in June 2010 (revised May 2017).

All projects in southwestern Solano County are subject to BAAQMD rules and regulations in effect at the time of construction. Specific rules applicable to construction of the project may include but are not limited to the following:

- **Regulation 2, Rule 1: General Permit Requirements**. Includes criteria for issuance or denial of permits, exemptions, appeals against decisions of the Air Pollution Control Officer and district actions on applications.
- **Regulation 6: Particulate Matter and Visible Emissions**. This regulation provides definitions and test methods for particulate matter rules.
- **Regulation 7: Odorous Substances**. Establishes general limitations on odorous substances and specific emissions limitations on certain odorous compounds.
- **Regulation 8, Rule 3: Architectural Coatings**. Limits the quantity of VOCs in architectural coatings.
- **Regulation 8, Rule 15: Emulsified and Liquid Asphalts**. Limits the emissions of volatile organic compounds caused by the use of emulsified and liquid asphalt in paving materials and paving and maintenance operations.
- **Regulation 11, Rule 2: Asbestos**. Controls emissions of asbestos to the atmosphere during demolition, renovation, milling, and manufacturing and establishes appropriate waste disposal procedures.

Air Quality Plans

The 2017 Bay Area Clean Air Plan provides a regional strategy for protecting public health and the climate. To protect public health, the plan describes how BAAQMD will continue progress toward attaining all federal and state air quality standards and eliminating health risk disparities from exposure to air pollution among Bay Area communities. To protect the climate, the plan defines a vision for transitioning the region to a post-carbon economy needed to achieve ambitious greenhouse gas (GHG) reduction targets for 2030 and 2050.

The plan also provides a regional climate protection strategy that will put the Bay Area on a pathway to achieve those GHG reduction targets.

The 2017 plan includes a wide range of control measures designed to decrease emissions of the air pollutants that are most harmful to Bay Area residents, such as PM, ozone, and TACs; to reduce emissions of methane and other “super-GHGs” that are potent climate pollutants in the near term; and to decrease emissions of carbon dioxide by reducing fossil fuel combustion.

The 2010 Multi-Pollutant Clean Air Plan was adopted in September 2010. The Bay Area 2010 Clean Air Plan provides a comprehensive plan to improve Bay Area air quality and protect public health. The 2010 Clean Air Plan has been prepared in close collaboration with the BAAQMD regional agency partners, and has been informed by extensive outreach to the public and interested stakeholders.

BAAQMD and its partners have been working to reduce PM emissions in the Bay Area and to meet state and national standards and to protect public health. Although the Bay Area is in attainment for annual $PM_{2.5}$ state and national standards, the Bay Area is not in attainment of the 24-hour $PM_{2.5}$ national standard.

Toxic Air Contaminants

At the local level, air pollution control or air quality management districts may adopt and enforce ARB control measures. YSAQMD’s Air Toxics Hot Spots Program requires certain facilities with the potential to emit certain amounts of toxic air pollutants to submit emissions inventories to the district and, in some cases, pursue risk reduction strategies. Under YSAQMD Rule 3-1 (“General Permit Requirements”), Rule 3-4 (“New Source Review”), and Rule 3-8 (“Federal Operating Permit”), all sources with the potential to emit TACs must obtain permits from the district. Similarly, permits under BAAQMD Regulation 2 (“Permits”) may be granted to these operations if they are constructed and operated in accordance with applicable regulations, including new-source-review standards and air toxics control measures.

YSAQMD and BAAQMD limit emissions and public exposure to TACs through a number of programs and prioritize TAC-emitting stationary sources based on the quantity and toxicity of the TAC emissions and the proximity of the facilities to sensitive receptors.[2]

[2] For the purpose of this document, “receptors” are defined as people—children, adults, and seniors—occupying or residing in residential dwellings, schools, daycare centers, hospitals, or senior-care facilities. “Sensitive receptors” are facilities that house or attract children, the elderly, people with illnesses, or others who are especially sensitive to the effects of air pollutants. Hospitals, schools, convalescent facilities, and designated residential areas are examples of sensitive receptors. “Sensitive uses” include jails, public parks, federally or state-owned and managed wildlife areas, in addition to sensitive receptors listed above.

Solano County General Plan

As discussed in Section 1.2, construction of facilities for generation of electrical energy by a local agency like SMUD is exempt from County zoning and building ordinances (CA Government Code Section 53091, subdivisions (d) and (e). The following summary of County Policy is provided in the interest of full disclosure and to support informed decisionmaking.

The following are the air quality policies and implementation programs from the *Solano County General Plan* (General Plan) (Solano County 2008):

- **Policy HS.P-43:** Support land use, transportation management, infrastructure and environmental planning programs that reduce vehicle emissions and improve air quality.

- **Policy HS.P-47:** Promote GHG emission reductions by supporting carbon-efficient farming methods (e.g., methane capture systems, no-till farming, crop rotation, cover cropping, residue farming); installation of renewable energy technologies; protection of grasslands, open space, and farmlands from conversion to other uses; and encouraging development of energy-efficient structures.

Environmental Setting

The project site is located in Solano County, California, which is in a geographically unique situation because of its orientation across two air basins. Northeastern Solano County lies within the Sacramento Valley Air Basin. The SVAB also makes up all of Butte, Colusa, Glenn, Sacramento, Shasta, Sutter, Tehama, Yolo, and Yuba counties and western Placer County. Southwestern Solano County is located in the San Francisco Bay Area Air Basin, which also comprises all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara counties and southern Sonoma County.

Ambient concentrations of air pollutant emissions are determined by the amount of emissions released by the sources of air pollutants and the atmosphere’s ability to transport and dilute such emissions. Natural factors that affect transport and dilution include terrain, wind, atmospheric stability, and sunlight. Therefore, existing air quality conditions in the area are determined by such natural factors as topography, meteorology, and climate, in addition to the amount of emissions released by existing air pollutant sources, as discussed separately below.

Climate, Meteorology, and Topography

The SVAB is a relatively flat area bordered by the north Coast Ranges to the west and the northern Sierra Nevada to the east. In contrast, the SFBAAB is characterized by complex terrain consisting of the Coast Ranges, inland valleys, and bays, which distorts normal wind flow patterns. In this area, the Coast Ranges split, allowing air to flow out of the SFBAAB and carry pollution into the SVAB.

The climate of the project area is influenced by cool air that flows from the Pacific Ocean and San Francisco Bay through the Carquinez Strait (the only breach in the western mountain barrier) into the SVAB, where it mixes with the warmer valley air. The temperature and atmospheric surface pressure differences result in high winds in the project area. In addition to predominant high winds, the climatic transition results in hot, dry summers and cool, rainy winters, which are typical of most of California (Solano County 2008).

The local meteorology of eastern Solano County is represented by measurements recorded at the Davis station. The normal annual precipitation is approximately 18 inches. January temperatures range from a normal minimum of 37 degrees Fahrenheit (°F) to a normal maximum of 54°F. July temperatures range from a normal minimum of 55°F to a normal maximum of 94°F (Solano County 2008; WRCC 2019). The predominant wind direction is from the north-northwest (Solano County 2008).

The local meteorology of western Solano County is represented by measurements recorded at the Fairfield station. The normal annual precipitation, which occurs primarily from November through March, is approximately 23 inches. January temperatures range from a normal minimum of 38°F to a normal maximum of 55°F. July temperatures range from a normal minimum of 56°F to a normal maximum of 89°F (Solano County 2008; WRCC 2019). The predominant wind direction is from the southwest (Solano County 2008).

Criteria Air Pollutants

Concentrations of emissions from criteria air pollutants are used to indicate the quality of the ambient air. Key criteria air pollutants in the SFBAAB and SVAB and their health effects are described briefly below. Criteria air pollutants include ozone, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead. However, for the purposes of this analysis, the criteria air pollutants that are of primary concern because of their nonattainment status include ozone (and ozone precursors) and PM. Table 3.2-2 provides monitoring data applicable to the project site, and Table 3.2-3 shows Solano County's attainment status for the CAAQS and NAAQS.

Ozone

Ozone is a photochemical oxidant (a substance whose oxygen combines chemically with another substance in the presence of sunlight) and the primary component of smog. Ozone is not directly emitted into the air, but is formed through complex chemical reactions between precursor emissions of ROG and NO_X in the presence of sunlight. Because photochemical reaction rates depend on the intensity of ultraviolet light and air temperature, ozone is primarily a summer air pollution problem. ROG are VOCs that are photochemically reactive. ROG emissions result primarily from incomplete combustion and the evaporation of chemical solvents and fuels. NO_X are a group of gaseous compounds of nitrogen and oxygen that result from the combustion of fuels.

Emissions of the ozone precursors ROG and NO_X have decreased over the past several years because of more stringent motor vehicle standards and cleaner burning fuels. ROG and NO_X emissions decreased from 2000 to 2010 and are projected to continue decreasing from 2010 to 2035 (ARB 2013:Table 3-1). In Solano County, only 4 days in 2014–2016 were rated as a high-ozone days (American Lung Association 2018).

Ozone is a respiratory irritant that increases susceptibility to respiratory infections. It is also an oxidant that can cause substantial damage to vegetation and other materials. Acute health effects of ozone exposure include increased respiratory and pulmonary resistance, cough, pain, shortness of breath, and lung inflammation. Long-term health effects include chronic bronchitis and chronic obstructive pulmonary disease (EPA 2018a).

Oxides of Nitrogen

NO_X are a family of highly reactive gases that are primary precursors to the formation of ground-level ozone and include NO_2 and nitric oxide (NO). Oxides of nitrogen are produced from natural sources, motor vehicles, and other fuel combustion processes. NO_X are critical components of photochemical smog. NO_2 produces the yellowish-brown color of smog. Because NO_2 is formed and depleted by reactions associated with ozone, the NO_2 concentration in a particular geographical area may not be representative of the local sources of NO_X emissions (EPA 2016b, 2018b).

NO_X can irritate the lungs, cause lung damage, and lower resistance to respiratory infections such as influenza. The effects of short-term exposure are still unclear, but continued or frequent exposure to elevated concentrations may cause an increased incidence of acute respiratory illness in children. Health effects associated with NO_X are an increase in the incidence of chronic bronchitis and lung irritation. Chronic exposure to NO_2 may lead to aggravation of the eyes and mucous membranes along with pulmonary dysfunction. NO_X can cause fading of textile dyes and additives, deterioration of cotton and nylon, and corrosion of metals through the production of particulate nitrates. Airborne NO_X can impair visibility.

Particulate Matter

Respirable particulate matter with an aerodynamic diameter of 10 micrometers or less is referred to as PM_{10}. PM_{10} consists of particulate matter emitted directly into the air, such as fugitive dust, soot, and smoke from mobile and stationary sources, construction operations, fires and natural windblown dust, and particulate matter formed in the atmosphere by reaction of gaseous precursors (ARB 2013:1-20).

$PM_{2.5}$ is a subgroup of smaller particles that have an aerodynamic diameter of 2.5 micrometers or less. Direct emissions of $PM_{2.5}$ in both the SFBAAB and the SVAB declined between 2000 and 2010 and are projected to increase slightly through 2035. Direct emissions of PM_{10} are projected to remain relatively constant through 2035. PM emissions are dominated by emissions from area sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, farming operations, construction and demolition, and particles from residential fuel combustion (ARB 2013:4-17 and 4-47).

The size of PM particles is directly linked to their potential for causing health problems. Small particles less than 10 micrometers in diameter pose the greatest problems, because they can get deep into the lungs, and some may even get into the bloodstream. Exposure to such particles can affect both the lungs and the heart. Numerous scientific studies have linked particle pollution exposure to a variety of problems: premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms such as irritation of the airways, coughing, or difficulty breathing. People with heart or lung disease, children, and older adults are most likely to be affected by exposure to particle pollution (EPA 2018c).

Monitoring Station Data and Attainment Area Designations

Concentrations of criteria air pollutants are measured at several monitoring stations in Solano County. The Fairfield–Chadbourne Road station is the closest station to the project site with recent data for ozone. Where data were not available at the Fairfield station, data for $PM_{2.5}$ and PM_{10} were taken from the Vallejo–304 Tuolumne Street and Vacaville–Merchant Street stations, respectively. Table 3.2-2 summarizes the air quality data from the last 3 years for which data are available (2015–2017).

Table 3.2-2 Summary of Annual Data on Ambient Air Quality (2015–2017)

	2015	2016	2017
Ozone			
Maximum concentration (1-hr/8-hr avg, ppm)	0.084/0.072	0.081/0.067	0.080/0.062
Number of days state standard exceeded (1-hr/8-hr)	0/1	0/0	0/0
Number of days national standard exceeded (8-hr)	1	0	0
Fine Particulate Matter ($PM_{2.5}$)			
Maximum concentration[1] (24-hour µg/m^3)	41.4	23.0	101.9
Number of days national standard exceeded[1] (24-hour measured)	3	0	9.3
Respirable Particulate Matter (PM_{10})			
Maximum concentration[2] (µg/m^3)	42.5	24.7	242.0
Number of days state standard exceeded[2]	*	*	12.7
Number of days national standard exceeded[2]	0	0	6.1

Notes: µg/m^3 = micrograms per cubic meter; avg = average; hr = hour; ppm = parts per million; * = insufficient data available

[1] Data unavailable for Fairfield station; the next closest station with available data was Vallejo.

[2] Data unavailable for Fairfield station; the next closest station with available data was Vacaville.

Source: ARB 2019

EPA and ARB use this type of monitoring data to designate areas according to attainment status for criteria air pollutants established by the agencies. Air basins are designated as being in attainment if the levels of a criteria air pollutant meet the NAAQS or CAAQS for the pollutant. Basins are designated as being in nonattainment if the level of a criteria air pollutant is higher than the corresponding NAAQS or CAAQS. “Unclassified” is used in areas that cannot be classified on the basis of available information as meeting or not meeting the standards. The purpose of these designations is to identify areas with air quality problems and thereby initiate planning efforts for improvement. Table 3.2-3 shows the current national and state attainment designations for the Solano County portion of the SVAB and SFBAAB for each criteria air pollutant.

Emissions Inventory

ARB provides estimates for Solano County’s 2012 air pollutant inventory, the most recent available inventory, for various source categories. According to this inventory, mobile sources are the largest contributor to the estimated annual average for air pollutant levels of ROG and NO_X, accounting for approximately 44 percent and 80 percent of these emissions, respectively. Areawide sources, which include solvent evaporation (e.g., consumer products and architectural coatings) and miscellaneous processes (e.g., residential fuel combustion and farming operations), account for approximately 81 percent and 59 percent of Solano County’s PM_{10} and $PM_{2.5}$ emissions, respectively (ARB 2016b).

Table 3.2-3 Attainment Status Designations for the Yolo-Solano Air Quality Management District and Bay Area Air Quality Management District

<table>
<tr><th colspan="2">Pollutant</th><th>Federal Standard</th><th>State Standard</th></tr>
<tr><td rowspan="2">Ozone</td><td>1-hour</td><td>Attainment [1]</td><td>Nonattainment</td></tr>
<tr><td>8-hour</td><td>Nonattainment (Marginal) / Nonattainment (Moderate)</td><td>Nonattainment</td></tr>
<tr><td rowspan="2">Respirable particulate matter (PM_{10})</td><td>24-hour</td><td>Unclassified/Attainment</td><td>Nonattainment</td></tr>
<tr><td>Annual</td><td>–</td><td>Nonattainment</td></tr>
<tr><td rowspan="2">Fine particulate matter ($PM_{2.5}$)</td><td>24-hour</td><td>Nonattainment</td><td>–</td></tr>
<tr><td>Annual</td><td>Attainment</td><td>Unclassified/Attainment</td></tr>
<tr><td colspan="2">Carbon monoxide (CO)</td><td>Attainment</td><td>Attainment</td></tr>
<tr><td rowspan="2">Nitrogen dioxide (NO_2)</td><td>1-hour</td><td>–</td><td>Attainment</td></tr>
<tr><td>Annual</td><td>Unclassified/Attainment</td><td>–</td></tr>
<tr><td colspan="2">Sulfur dioxide (SO_2)</td><td>Attainment</td><td>Attainment</td></tr>
<tr><td>Lead (Particulate)</td><td></td><td>Attainment</td><td>Attainment</td></tr>
<tr><td colspan="2">Hydrogen Sulfide</td><td rowspan="4">No Federal Standard</td><td>Unclassified (1-hour)</td></tr>
<tr><td colspan="2">Sulfates</td><td>Attainment (24-hour)</td></tr>
<tr><td colspan="2">Visibility-Reducing Particles</td><td>Unclassified (8-hour)</td></tr>
<tr><td colspan="2">Vinyl Chloride</td><td>Unclassified (24-hour)</td></tr>
</table>

Notes:

[1] The national 1-hour ozone standard was revoked by the U.S. Environmental Protection Agency on June 15, 2005, but some associated requirements still apply. Standards still apply in the northeastern and southwestern portions of Solano County.

Sources: BAAQMD 2018; YSAQMD 2019; EPA 2019.

Toxic Air Contaminants

Concentrations of TACs are also used to indicate the quality of ambient air. A TAC is an air pollutant that may cause or contribute to an increase in mortality or in serious illness, or may pose a hazard to human health. TACs are usually present in trace quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations.

According to the *California Almanac of Emissions and Air Quality* (ARB 2013), most estimated health risks from TACs can be attributed to relatively few compounds, the most important being diesel PM. Diesel PM differs from other TACs in that it is not a single substance, but rather a complex mixture of hundreds of substances. Although diesel PM is emitted by diesel-fueled internal combustion engines, the composition of the emissions varies depending on engine type, operating conditions, fuel composition, lubricating oil, and whether an emissions control system is being used.

Unlike the other TACs, no ambient monitoring data were available for diesel PM because no routine measurement method currently exists. However, ARB has made preliminary estimates of concentrations based on a PM exposure method. This method uses the ARB emissions inventory's PM_{10} database, ambient PM_{10} monitoring data, and the results of several studies to estimate concentrations of diesel PM. In addition to diesel PM, the TACs for which data were available that pose the greatest existing ambient risk in California are benzene, 1,3-butadiene, acetaldehyde, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride, and perchloroethylene.

Diesel PM poses the greatest health risk among these 10 TACs mentioned. Based on receptor modeling techniques, ARB estimated the health risk of diesel PM to be 360 excess cancer cases per million people in the SVAB and 480 excess cases in the SFBAAB in the year 2000. Since 1990, the health risk associated with diesel PM has been reduced by 52 percent in the SVAB and 36 percent in the SFBAAB. Overall, levels of most TACs, except para-dichlorobenzene and formaldehyde, have decreased since 1990 (Solano County 2008).

Area sources of TAC emissions in Solano County include Travis Air Force Base (use of jet fuel) and the Western Electric railyard located along the Sacramento Northern Rail Road line between Rio Vista and Fairfield (Solano County 2008). There are no major sources of TACs in the vicinity of the project site.

Naturally Occurring Asbestos

Asbestos is the common name for a group of naturally occurring fibrous silicate minerals that can separate into thin but strong and durable fibers. Naturally occurring asbestos, which ARB identified as a TAC in 1986, is located in many parts of California and is commonly associated with serpentine soils and rocks.

According to a 2011 U.S. Geological Survey study, ultramafic rocks or serpentine rocks have only been identified in a small area of southwestern Solano County on the border with Napa County. Based on this map, asbestos would not likely occur on the project site or in the project vicinity (Van Gosen and Clinkenbeard 2011).

Odors

Odors are generally regarded as an annoyance rather than a health hazard. However, manifestations of a person's reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache).

The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals can smell minute quantities of specific substances; others may not have the same sensitivity but may be sensitive to odors from other substances. In addition, people may have different reactions to the same odor; an odor that is offensive to one person may be perfectly acceptable to another (e.g., fast food restaurant).

It is important to note that an unfamiliar odor is more easily detected and more likely to cause complaints than a familiar one. This is because of the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor and recognition occurs only with a change in the intensity.

Sensitive Land Uses

Sensitive land uses are generally considered to include those uses where exposure to pollutants could result in health-related risks to individuals. Residential dwellings and places where people recreate or congregate for extended periods of time, such as parks or schools, are of primary concern because of the potential for increased and prolonged exposure of individuals to pollutants.

The project area is designated for agricultural use and leased for dryland farming and grazing. There are no sensitive receptors near the project area. A few rural residences are located outside of the project area along rural roads that would be used to bring materials to the project site.

3.2.2. Environmental Impacts and Mitigation Measures

Methods and Assumptions

Air quality modeling was based on project-specific construction information for each phase of the construction period. Short-term construction-related emissions of criteria air pollutants and precursors were estimated using the Sacramento Metropolitan Air Quality Management District's Roadway Construction Emissions Model (Version 9.0) computer program. Specific information used in the construction modeling included a typical list of construction equipment by construction phase and a set of reasonable assumptions based on provided materials and information.[3]

Emissions calculations were calculated for identified phases of project construction. These estimates were then summed to generate maximum daily emissions during overlapping phases of construction. Project construction was assumed to begin in 2021 and conclude in 2022, and to occur over a period of approximately 14 months. For a detailed description of model input and output parameters and assumptions, see Appendix C.

Regional and local criteria air pollutant emissions and associated impacts, as well as impacts from TACs, were assessed in accordance with YSAQMD- and BAAQMD-recommended methodologies. The project's emissions were compared to YSAQMD and BAAQMD significance thresholds for construction-phase emissions.

Thresholds of Significance

Based on Appendix G of the State CEQA Guidelines, the project would result in a potentially significant impact on air quality if it would:

- conflict with or obstruct implementation of the applicable air quality plan;
- result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard;
- expose sensitive receptors to substantial pollutant concentrations; or
- result in other emissions (such as those leading to odors affecting a substantial number of people).

In addition to these criteria, YSAQMD (2007) and BAAQMD (2017) have established thresholds for certain criteria pollutants to determine whether a project would have a significant air quality impact. Construction-related and operational emissions are calculated separately. The significance thresholds are presented in Table 3.2-4.

3 Because project-specific information such as the duration and type of equipment to be used was not available, minimal off-model calculations were possible.

Table 3.2-4 Yolo-Solano Air Quality Management District and Bay Area Air Quality Management District Thresholds of Significance

Criteria Air Pollutant	Construction Thresholds	Operational Thresholds	
	Average Daily Emissions (lb/day)	Average Daily Emissions (lb/day)	Annual Average Emissions (tons/year)
ROG	54 (B)	54 (B)	10 (Y&B)
NO_X	54 (B)	54 (B)	10 (Y&B)
PM_{10}	80(Y)/82(B)(Exhaust)*	80(Y)/82(B)*	15 (B)
$PM_{2.5}$	54(B)(Exhaust)	54 (B)	10 (B)
Fugitive Dust	Best Management Practices	None	
CO	Not Applicable	9.0 ppm (8-hour average) or 20.0 ppm (1-hour average)	

* YSAQMD threshold of significance for construction and operation PM_{10} is 80 lb/day, while BAAQMD threshold of significance for PM_{10} exhaust only is 82 lb/day. YSAQMD threshold of significance for construction-related and operational NO_X and ROG emissions is 10 tons/year.

Note: (Y) = Yolo-Solano Air Quality Management District; (B) = Bay Area Air Quality Management District; NO_X = oxides of nitrogen, $PM_{2.5}$ = fine particulate matter or particulates with an aerodynamic diameter of 2.5 micrometers (µm) or less; PM_{10} = coarse particulate matter or particulates with an aerodynamic diameter of 10 µm or less, ROG = reactive organic gases.

Sources: YSAQMD 2007; BAAQMD 2017.

Toxic air emissions would be considered significant if the project would expose sensitive receptors to a substantial incremental increase in health risks associated with TAC emissions that would exceed 10 in 1 million for carcinogenic risk (i.e., the risk of contracting cancer) and/or a noncarcinogenic hazard index of 1.0 or greater.

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. Therefore, the following issue is not discussed further in the impact analysis:

- *Project-generated ROG, NO_X, and PM_{10} emissions during long-term project operation that would exceed the applicable thresholds of significance*

Project operation would require five full-time employees for periodic maintenance and monitoring of the proposed facilities. Routine maintenance of each wind turbine generator would occur every 6 or 12 months, requiring an average of 40–50 hours of scheduled mechanical and electrical work per year. Routine maintenance would include periodically replacing lubricating fluids and checking parts for wear. In addition to mechanical maintenance, all roads, pads, and trenched areas would be inspected and maintained regularly to minimize erosion. Because the project's maintenance and operational activities would be limited, emissions of criteria pollutants or fugitive dust from mobile sources, such as vehicles and equipment, would not be substantial.

Project implementation, which would involve installing a renewable-energy generation facility, would also result in a reduction in criteria air pollutants by reducing the overall emissions associated with electricity generated and/or purchased by SMUD for delivery to customers. Generation of electricity through traditional fossil fuel–based power plants emits criteria air pollutants at rates that depend on the applied technologies and fuel sources used to generate electricity. For example, in power plants that use natural gas to generate electricity, NO_X, SO_2, and PM are emitted as byproducts of the electricity generation process (Union of Concerned Scientists 2019). The emissions rates for power purchased from electricity utilities depend largely on the power mix and percent renewable sources in electricity generation by each utility. The project would generate approximately 290,800 megawatt-hours per year of emissions-free energy, serving to reduce emissions of criteria air pollutants associated with electricity generation in the area served by CAISO. Based on general rates of criteria air pollutant emissions during electricity generation, project implementation would result in “avoided” emissions of approximately 7.97 pounds per day (lb/day) of ROG, 159.34 lb/day of CO, 451.74 lb/day of NO_X, 3.19 lb/day of N_2O, 49.95 lb/day of PM_{10}, and 31.87 lb/day of $PM_{2.5}$ (see Appendix C for calculations).

It is not anticipated that mobile sources, such as vehicles and equipment, would emit substantial amounts of criteria pollutants or fugitive dust during project operation, because maintenance and operational activities for the wind energy generation facility would be limited. Further, long-term operation of the wind turbines would result in a net emissions benefit, as operation would reduce emissions from conventional electrical generation sources that use fossil fuels. Therefore, the beneficial properties of the proposed project would offset the project’s minimal operational emissions. This issue will not be discussed further.

- *Exposure of sensitive receptors to substantial TAC concentrations during short-term construction or long-term project operation*

Project construction would result in short-term emissions of diesel exhaust from heavy-duty on- and off-road equipment. Diesel exhaust could result in health and nuisance impacts on nearby receptors. ARB identified particulate exhaust emissions from diesel PM as a TAC in 1998.

Construction vehicles would be required to limit idling time in compliance with ARB guidelines. The dose to which receptors are exposed is the primary factor used to determine the health risk from TACs (i.e., potential exposure to TAC emissions at levels that exceed applicable standards). Dose is a function of the concentration of the substance(s) in the environment and the duration of exposure to the substance. Dose is positively correlated with time: A longer exposure period would result in a higher level of exposure. Thus, an exposed individual faces a higher estimated health risk if a fixed exposure occurs over a longer period of time. According to the California Office of Environmental Health and Assessment’s *Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*, a 30-year exposure duration is used for estimating cancer risk at residential land uses (OEHHA 2015). Project construction activities that would emit fugitive dust and diesel PM would be temporary, short-term, and intermittent.

Construction equipment would be the project's primary source of diesel PM. There are no sensitive receptors near the project area. Given the highly dispersive properties of diesel PM (Zhu et al. 2002), temporary and intermittent duration of construction activity, and lack of sensitive receptors, project-related TAC emissions are not expected to result in an incremental increase in cancer risk at the nearest receptors that would exceed YSAQMD and BAAQMD thresholds of 10 in 1 million.

Because off-road construction equipment would be used only temporarily, diesel PM has highly dispersive properties, and no sensitive receptors are near the project site, short-term construction activities would not expose sensitive receptors to significant TAC emissions. Measures included in Mitigation Measure 3.2-1 that focus on reducing exhaust emissions, particularly those requiring alternative fuels and fuel-efficient construction equipment, would also serve to reduce diesel PM exhaust emissions and the overall cancer risk associated with these pollutants. Long-term operation and maintenance activities would be minimal and would not generate substantial TAC emissions. This issue will not be discussed further.

Exposure of sensitive receptors to substantial odor emissions during short-term construction and long-term operation

The proposed project would not involve the development of any new odor sources, and no sensitive receptors are present near the project area. Therefore, the project would not create objectionable odors at nearby sensitive receptors. In addition, construction activities would be temporary, and any generation of objectionable odors (such as from diesel exhaust) would occur only temporarily when construction activities take place near residences. Therefore, odor impacts of the project will not be analyzed further.

Impact Analysis

Impact 3.2-1: Construction-related exceedance of thresholds of significance established by the air districts for criteria air pollutants.

Project construction activities would emit NO_X and PM_{10} at levels that could exceed YSAQMD and BAAQMD daily emissions thresholds for these pollutants. Construction would occur over a 17 to 20-month period, with several construction phases occurring simultaneously at several points. In addition, given the size and characteristics of the project, which would involve substantial grading activity, fugitive dust emissions would contribute to an exceedance of these thresholds and could violate applicable air quality standards. This impact would be **significant**.

Project construction would result in short-term emissions (present in exhaust and fugitive dust) of NO_X, PM_{10}, and $PM_{2.5}$, the pollutants for which YSAQMD and BAAQMD are currently not in attainment. These pollutants would be emitted during the use of heavy-duty equipment for the various construction phases, truck trips transporting materials, and worker commute trips to and from the project site.

Construction of the proposed project is anticipated to occur over approximately 17 to 20 months. Various construction phases are anticipated to overlap, resulting in the potential for simultaneous use of heavy-duty construction equipment for more than one construction phase. In addition, some or all workers from various construction phases could be commuting at the same time. Emissions were modeled based on the activities expected to occur during each construction phase, and Table 3.2-5 identifies the maximum daily emissions during the overlapping phases. See Appendix C for a detailed summary of the construction schedule and modeling inputs and assumptions. Table 3.2-5 shows estimated construction emissions.

As shown in Table 3.2-5, construction-related emissions of NO_X and PM_{10} would exceed YSAQMD and BAAQMD daily significance thresholds for these pollutants for overlapping phases of project construction. For example, during months 4 and 5 of construction, four construction phases would occur simultaneously, resulting in the highest levels of daily emissions (i.e., 191 lb/day of NO_X and 150 lb/day of PM_{10}). Thus, construction-related emissions of ozone precursors could exceed adopted standards and contribute substantially to an existing or projected air quality violation. This would be a significant effect.

For all proposed projects, BAAQMD recommends implementing all Basic Construction Mitigation Measures whether or not construction-related emissions would exceed the applicable thresholds of significance (BAAQMD 2017). YSAQMD recommends that all projects implement best management practices to reduce dust emissions and avoid localized health impacts (YSAQMD 2007). YSAQMD best management practices mostly overlap with the BAAQMD Basic Construction Mitigation Measures (BAAQMD 2017:Table 8-2), which are included in Mitigation Measure 3.2-1 below.

As directed by BAAQMD, if implementing the BAAQMD-recommended Basic Construction Mitigation Measures would not reduce all construction-related emissions of criteria air pollutants and precursors to levels below the applicable thresholds of significance, the impact on air quality would be significant. BAAQMD recommends that proposed projects with construction-related emissions that would exceed the applicable thresholds of significance implement the Additional Construction Mitigation Measures (BAAQMD 2017:Table 8-3). See Table 3.2-5 above for calculated reductions from construction mitigation measures.

As shown in Table 3.2-5, construction of the proposed project would result in emissions that would exceed YSAQMD and BAAQMD daily emissions thresholds for NO_X, even with mitigation implemented. As described in Section 3.2.2, "Environmental Setting," exposure to criteria pollutant emissions can affect human health. Potential health effects vary depending primarily on the pollutant type, concentration of pollutants during exposure, and duration of exposure. Air pollution does not affect every individual in the same way, and some groups are more sensitive than others to adverse health effects. However, there are no sensitive receptors near the project area.

Table 3.2-5 Summary of Unmitigated and Mitigated Daily Construction-Generated Emissions of Criteria Air Pollutants and Precursors

Construction Phase	Active Construction Phases	NO_X Emissions (lb/day)	PM_{10} Exhaust Emissions (lb/day)	Total PM_{10} Emissions (lb/day)	$PM_{2.5}$ Exhaust Emissions (lb/day)	Total $PM_{2.5}$ Emissions (lb/day)
1	Demolition	58	3	9	2	4
2	Road Construction	47	2	32	2	8
3	Home Run Collection Construction	24	1	41	1	9
4	Foundation Construction	62	3	23	2	7
5	WTG Delivery and Erection	60	1	15	1	5
	Total Max in Overlapping Phases	**191**	9	**105**	8	28
YSAQMD/BAAQMD Significance Threshold		54*	82* (exhaust)	80*	54 (exhaust)	–
Total Basic Mitigated Emissions		**181**	8	**104**	7	27
Additional Mitigated Emissions		**145**	4	52	4	14

Notes:
BAAQMD = Bay Area Air Quality Management District; CEQA = California Environmental Quality Act; lb/day = pounds per day; Max = maximum; NO_X = oxides of nitrogen; $PM_{2.5}$ = particulate matter smaller than or equal to 2.5 micrometers in diameter; PM_{10} = particulate matter smaller than or equal to 10 micrometers in diameter; WTG = wind turbine generator; YSAQMD = Yolo-Solano Air Quality Management District
Summation may not equal totals because of rounding. Areas in grey represent overlapping phases.
* The YSAQMD threshold of significance for construction and operation PM_{10} is 80 lb/day, while the BAAQMD threshold of significance is 82 lb/day. The YSAQMD threshold of significance for construction and operation NO_X is 10 tons/year. For the purposes of this analysis, the BAAQMD maximum daily threshold is used.
Source: Modeling conducted by Planning Partners in March 2019. See Appendix C.

As described in Section 3.2.2, “Environmental Setting,” ROG and NO_X are precursors to ozone, increased concentrations of which can cause health effects generally associated with reduced lung function. The contribution of VOCs and NO_X to a region’s ambient ozone concentrations is the result of complex photochemistry. Because of the reaction time involved, peak ozone concentrations often occur far downwind of the precursor emissions. Therefore, ozone is a regional pollutant that often affects large areas. In general, ozone concentrations over or near urban and rural areas reflect an interplay of emissions of ozone precursors, transport, meteorology, and atmospheric chemistry. It takes a large amount of additional ROG and NO_X emissions to result in a quantifiable increase in ambient ozone levels over a region; a project emitting only 10 tons per year of NO_X or ROG is small enough that its regional impact on ambient ozone levels may not be detected in the regional air quality models used to determine ozone levels (SCAQMD 2014:21–22).

Although construction-related NO_X emissions would be high during a potential maximum daily emissions scenario, potential emissions at this level would be intermittent and short-term. Over the entire construction period, the project could emit a total of approximately 10.23 tons of NO_X following implementation of mitigation measures. These increased emissions would end after construction is completed. Because construction-related emissions would be of short duration and relatively low on a regional scale, their contribution to regional ozone concentrations and the associated health impacts is expected to be minimal. For this reason, and because emissions would not be concentrated in the immediate vicinity of sensitive receptors, it is reasonably foreseeable to conclude that the project would not result in significant health impacts.

However, given that uncontrolled daily emissions during project construction activities would exceed YSAQMD and BAAQMD thresholds for NO_X, PM_{10}, and $PM_{2.5}$, this impact would be **significant**.

Mitigation Measure 3.2-1: Reduce construction-related exhaust and dust emissions.

The construction contractor shall prepare a fugitive dust control plan for the project's construction phases. Before the start of construction, the plan shall be submitted to YSAQMD and BAAQMD for review and approval. The fugitive dust control plan shall include but not be limited to the following measures for all construction phases to reduce fugitive dust emissions and emissions of PM and NO_X exhaust:

<u>Fugitive Dust Control Plan</u>

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered at a frequency adequate to maintain minimum soil moisture of 12 percent (at least two times per day). Moisture content can be verified by lab samples or moisture probe.
- All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads shall be limited to 15 miles per hour.
- All roadways, driveways, and wind turbine generator foundations and work areas to be paved or graveled shall be completed as soon as possible. These areas shall be paved or graveled as soon as possible after grading unless seeding or soil binders are used. No recycled concrete will be utilized on the roadways.

- Idling times shall be minimized either by shutting equipment off when not in use or by reducing the maximum idling time to 2 minutes. Clear signage shall be provided for construction workers at all access points.

- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition before operation.

- A publicly visible sign shall be posted identifying the name and telephone number of the person to contact at SMUD regarding dust complaints. This person shall respond and take corrective action within 48 hours. The air districts' phone numbers shall also be visible to ensure compliance with applicable regulations.

- All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 miles per hour.

- Vegetative ground cover (e.g., fast-germinating native grass seed) shall be planted in disturbed areas as soon as possible and watered appropriately until vegetation is established.

- The simultaneous occurrence of excavation, grading, and ground-disturbing construction activities on the same area at any one time shall be limited. Activities shall be phased to reduce the surface area disturbed at any one time.

- All trucks and equipment, including their tires, shall be washed off before leaving the site.

- Site access areas shall be covered with a 6- to 12-inch compacted layer of wood chips, mulch, or gravel to a distance of 100 feet from the paved road.

- Sandbags or other erosion control measures shall be installed to prevent silt runoff to public roadways from sites with a slope greater than 1 percent.

- The project shall develop a plan demonstrating that off-road equipment exceeding 50 horsepower) to be used in the construction project (owned, leased, and subcontractor vehicles) would achieve project-wide, fleet-average emissions reductions of 20 percent for NO_X and 45 percent for PM, compared to the most recent ARB fleet average. Acceptable options for reducing emissions include the use of late-model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, add-on devices such as particulate filters, and/or other options as they become available.

- Low-VOC (i.e., ROG) coatings shall be used beyond local requirements (Regulation 8, Rule 3, "Architectural Coatings").

- All construction equipment, diesel trucks, and generators shall be equipped with best available control technology for reduction of NO_X and PM emissions.
- All contractors shall use equipment that meets ARB's most recent certification standard for off-road heavy-duty diesel engines (BAAQMD 2017:Tables 8-2 and 8-3).

Significance after Mitigation

Project construction activities would result in NO_X, PM_{10}, and $PM_{2.5}$ emissions that would exceed YSAQMD and BAAQMD daily significance thresholds for these pollutants. Mitigation Measure 3.2-1 includes emissions control practices for NO_X, PM_{10}, and $PM_{2.5}$ for emissions of both exhaust and fugitive dust. Mitigation Measure 3.2-1 requires that emissions reductions of 20 percent for NO_X and 45 percent for particulate matter (exhaust) be achieved using late-model year engines, alternative fuels, or other applicable engine retrofits. Additional reductions may be achieved depending on daily construction activity levels, the specific composition of the construction equipment fleet, and the type of diesel fuel used. However, the specific equipment to be used (e.g., horsepower, engine model year) and day-to-day construction activity levels are not known at this time. Therefore, the analysis of mitigation emissions conservatively assumed that implementing the appropriate Basic Construction Mitigation Measures would reduce the project's NO_X, PM_{10}, and $PM_{2.5}$ emissions by 5 percent, and that implementing the Additional Construction Mitigation Measures would reduce emissions by an additional 20 percent for NO_X and 45 percent for diesel exhaust. Incorporating all dust control measures included in the fugitive dust control plan would reduce fugitive dust emissions by 75 percent.

As shown in Table 3.2-5 above, implementing these mitigation measures would reduce NO_X, PM_{10}, and $PM_{2.5}$ emissions associated with project construction. However, even with these mitigation measures, the project's construction emissions of NO_X would exceed applicable thresholds during certain months of construction. Therefore, this short-term construction impact would be **significant and unavoidable**.

Impact 3.2-2: Potential for conflict with or obstruction of implementation of the applicable air quality plan.

Implementing the proposed project would not conflict with or obstruct implementation of any YSAQMD or BAAQMD air quality attainment plans. For this reason, this impact would be **less than significant**.

As stated above in Section 3.2.1, "Regulatory Setting," YSAQMD and BAAQMD have attainment plans in place for nonattainment criteria pollutants that identify strategies to bring regional emissions into compliance with federal and state air quality standards. Projects and uses that are consistent with the assumptions used to develop the plans, and implement strategies to implement the plans, would not jeopardize attainment of the air quality levels identified in the plans.

Implementing the project would not conflict with the assumptions and emissions estimates included in the plans as approved by ARB and EPA. Further, the project would generate energy with a minimal impact on air quality when compared to traditional sources of energy generation.

Project construction activities would comply with applicable YSAQMD and BAAQMD rules and regulations. In addition, project operation would reduce criteria air pollutant emissions from conventional electrical generation sources. Therefore, the proposed project would not conflict with or obstruct implementation of any YSAQMD or BAAQMD attainment plan or the SIP. This impact would be **less than significant**.

No mitigation is required.

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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

<u>Section 404</u>

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

<u>Land-Based Wind Energy Guidelines</u>

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)

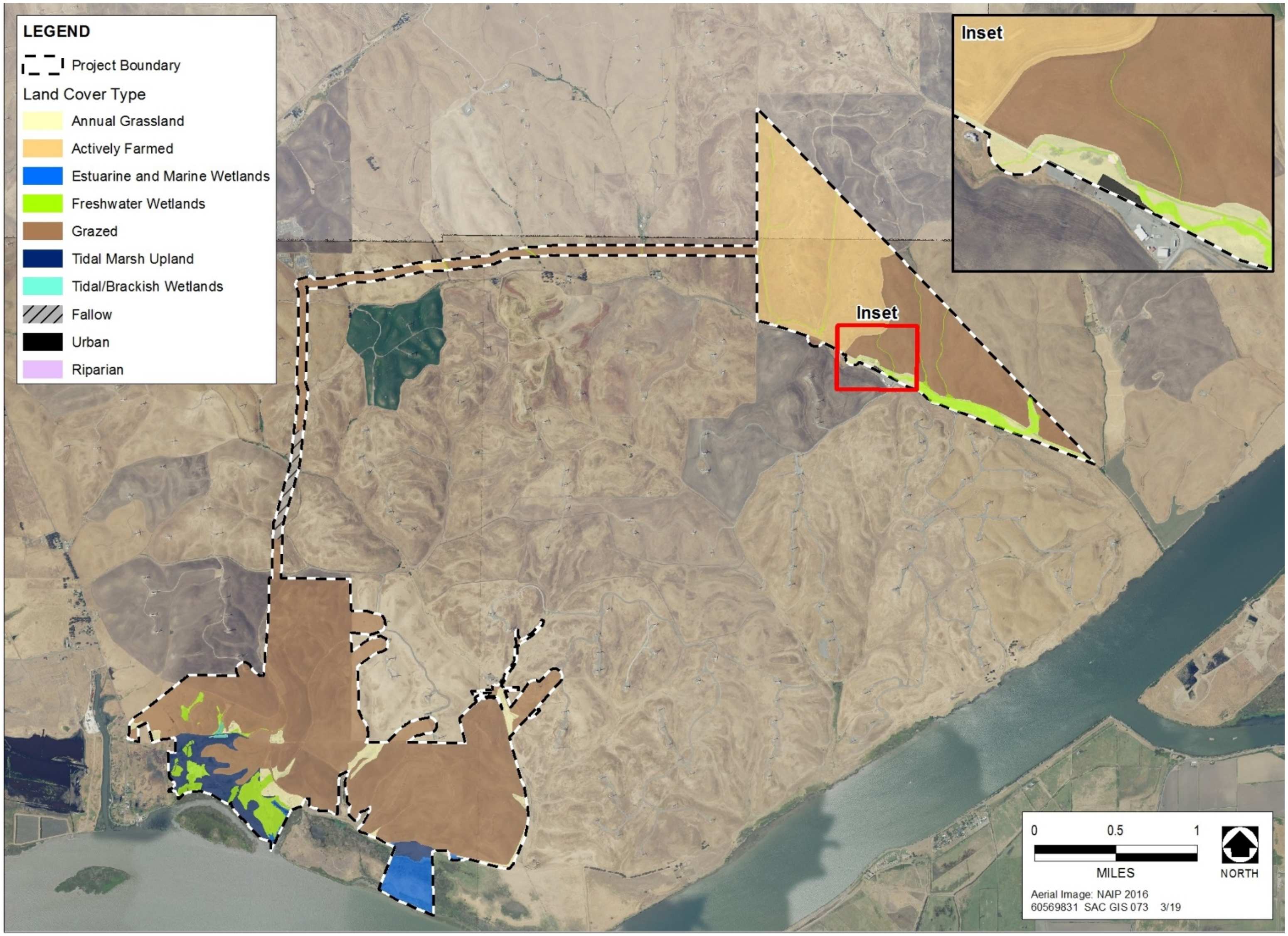


Exhibit 3.3-1 Project Site Land Cover

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

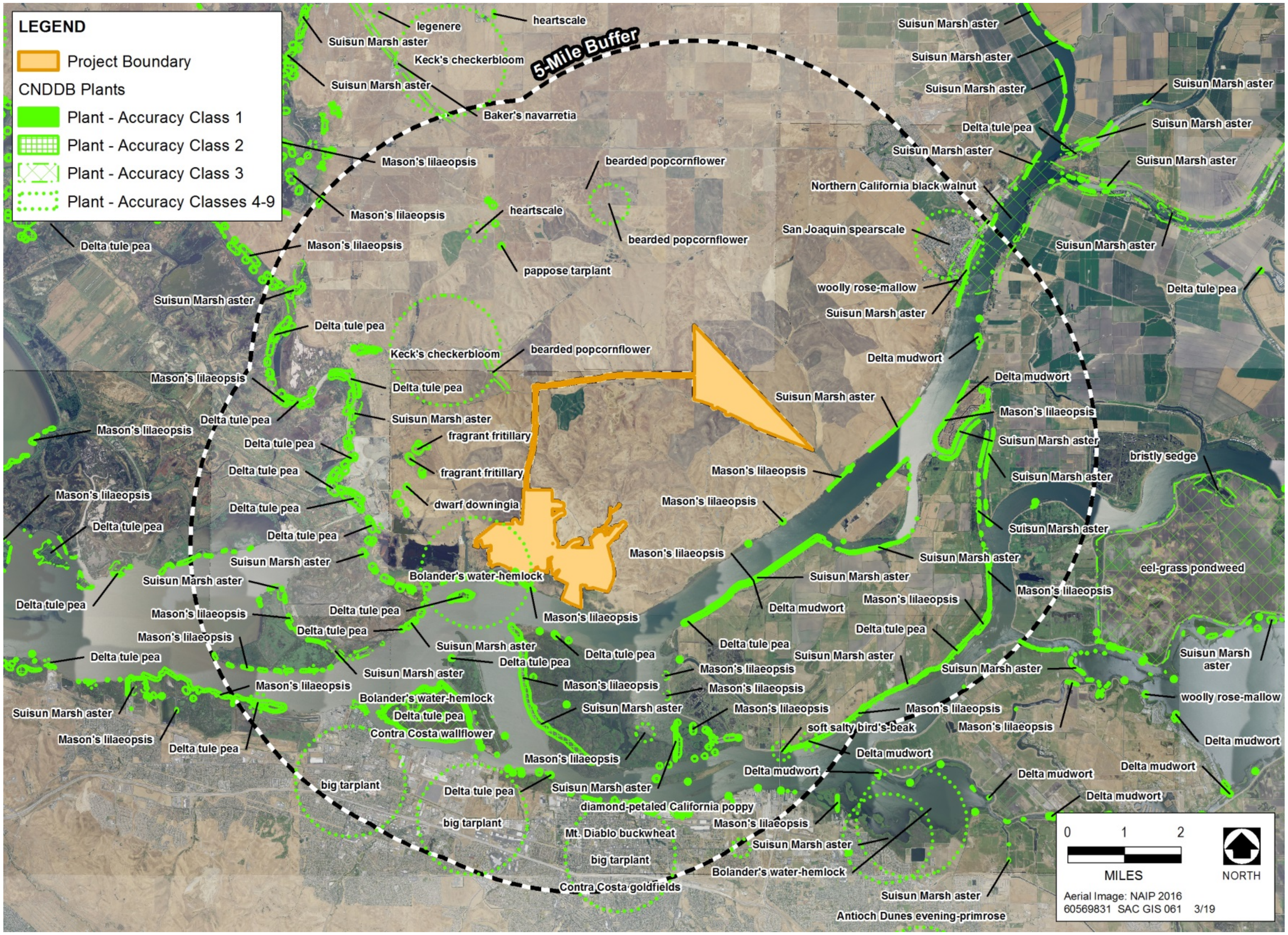


Exhibit 3.3-2 Special-status Plant Occurrences within 5 Miles of the Project Site

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] Federal	State	WBWG[3]	Habitat	Potential for Occurrence[2]
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] Federal	State	WBWG[3]	Habitat	Potential for Occurrence[2]
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] Federal	State	WBWG[3]	Habitat	Potential for Occurrence[2]
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] Federal	State	WBWG[3]	Habitat	Potential for Occurrence[2]
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] Federal	State	WBWG[3]	Habitat	Potential for Occurrence[2]
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] Federal	State	WBWG[3]	Habitat	Potential for Occurrence[2]
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] Federal	State	WBWG[3]	Habitat	Potential for Occurrence[2]
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.

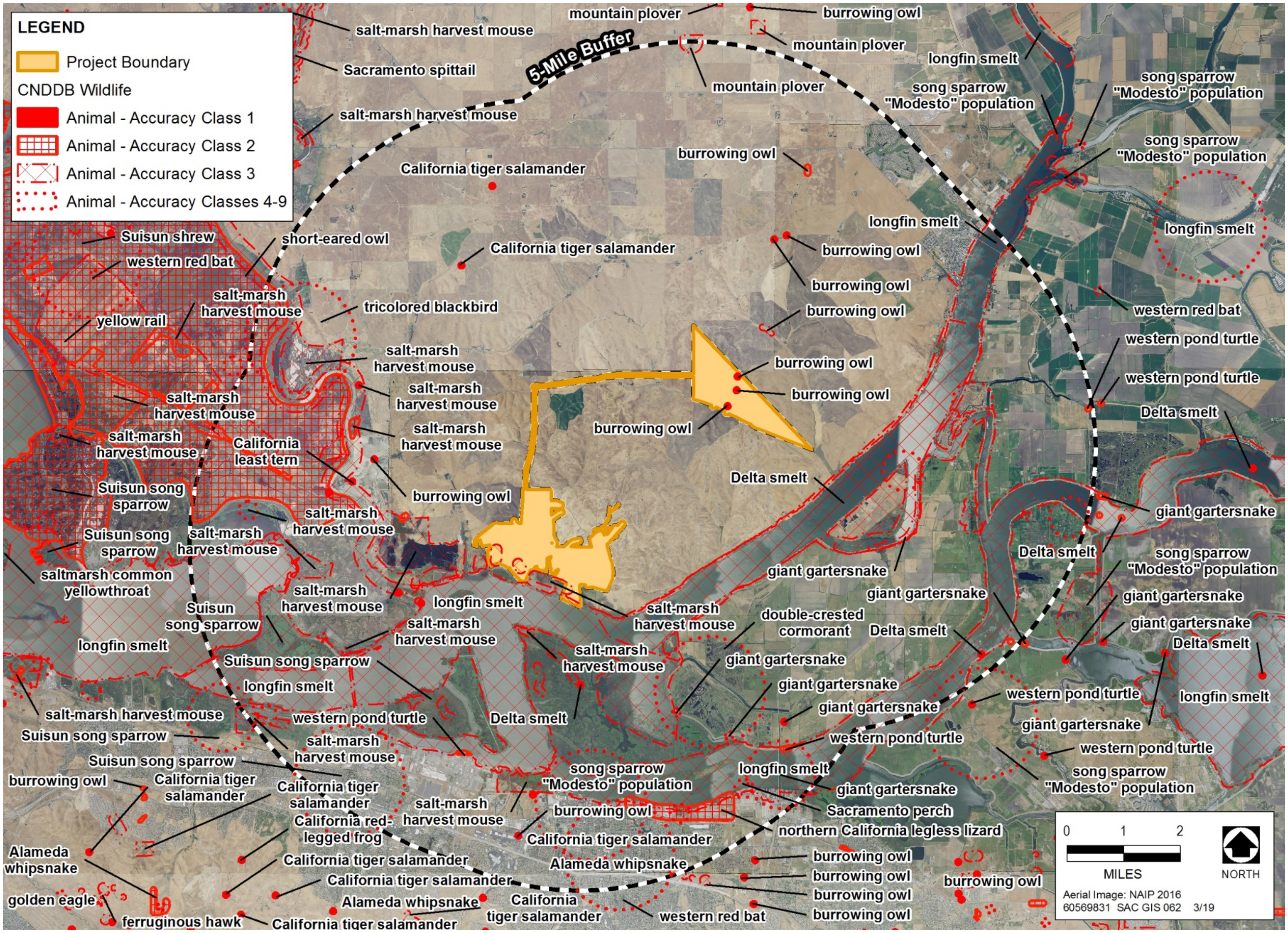


Exhibit 3.3-3 Special-Status Wildlife Species within 5 Miles of the Project Components

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.

<u>Amphibians and Reptiles</u>

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).

<u>Bats</u>

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.

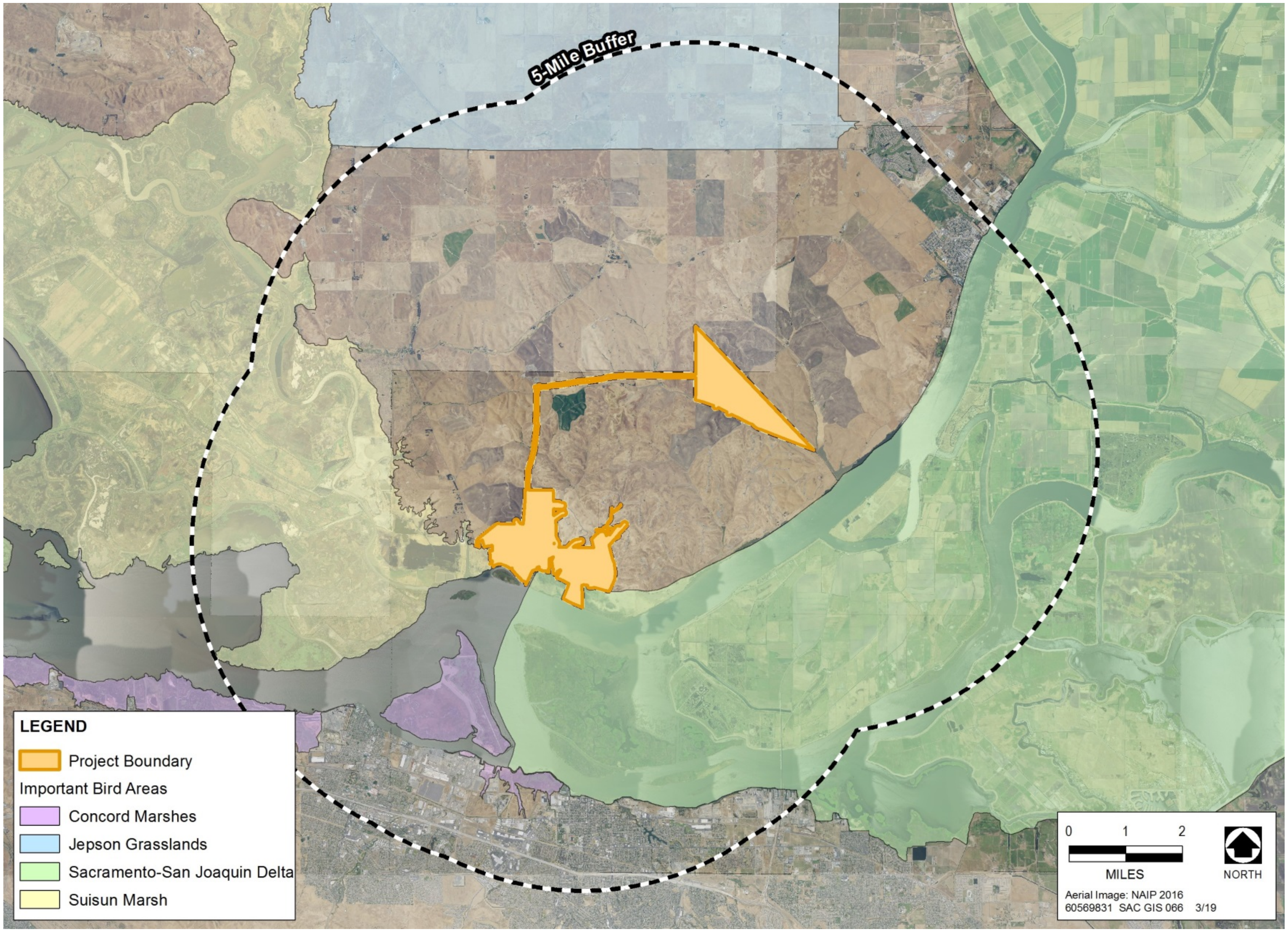


Exhibit 3.3-4 Important Bird Areas in the Vicinity of the Proposed Project

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.

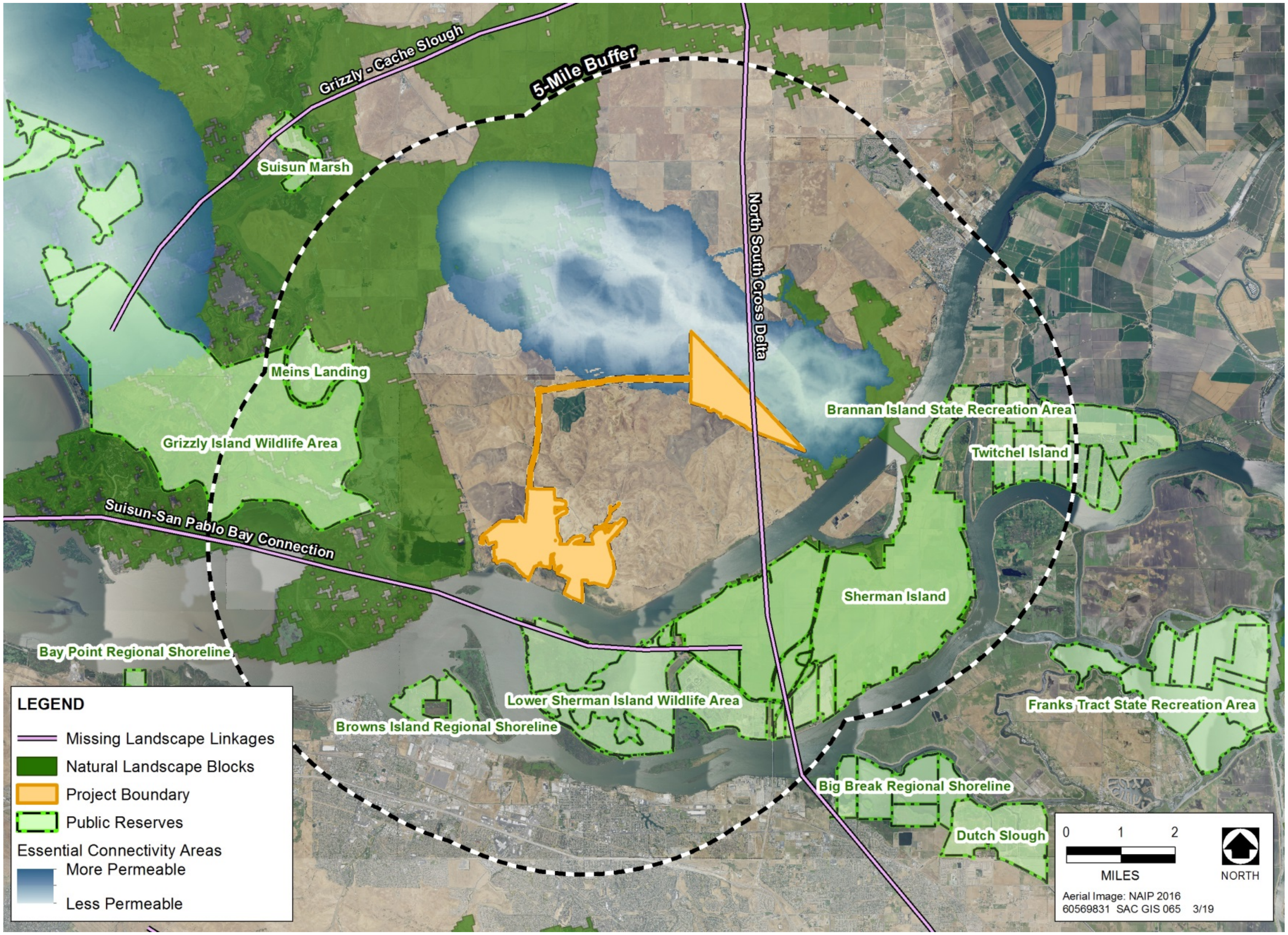


Exhibit 3.3-5 Linkage Corridors and Essential Connectivity Areas

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

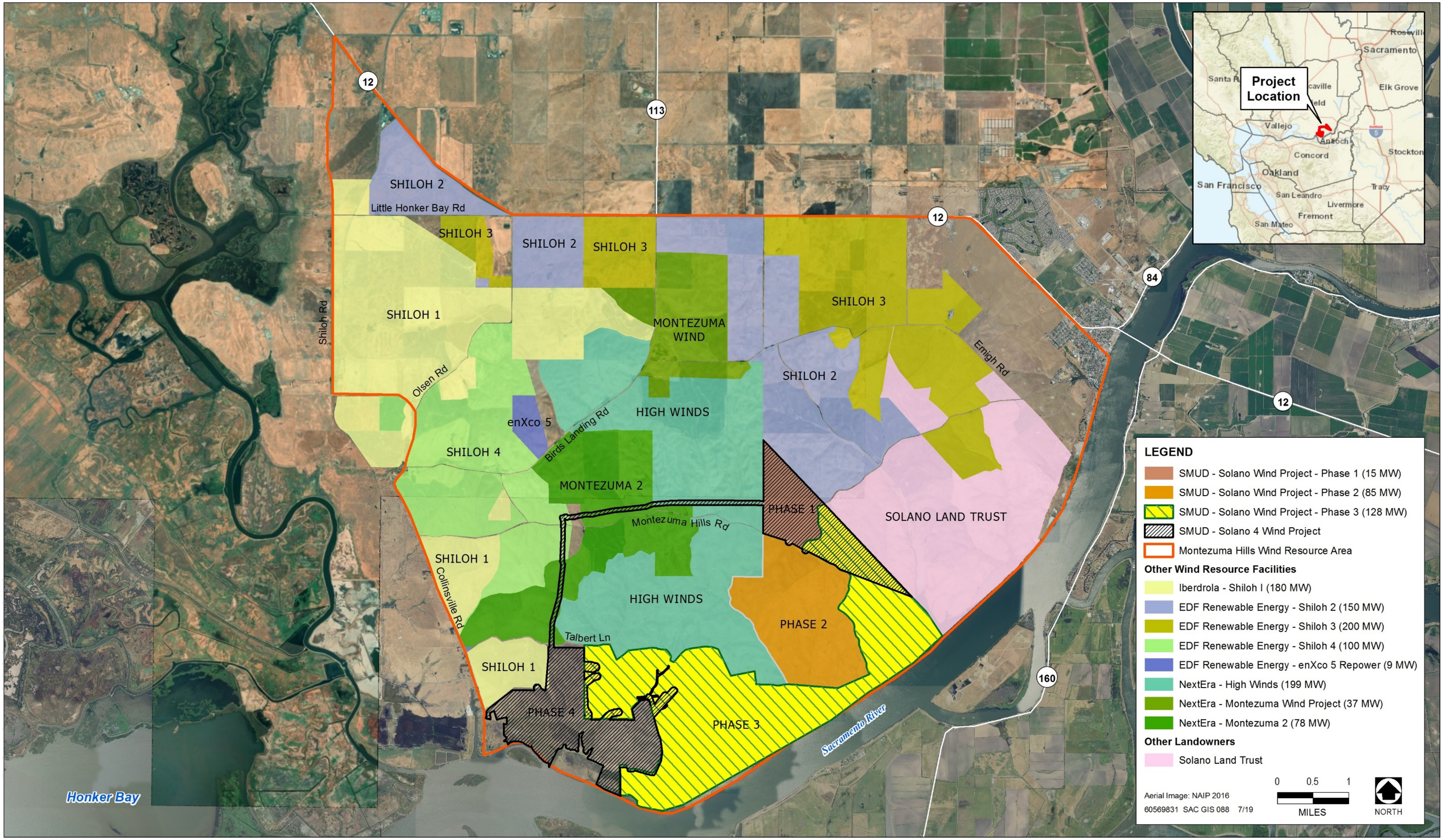
No habitat for special-status fish species occurs on the project site; therefore, this issue will not be discussed further.

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.

<u>California Red-Legged Frog</u>

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.

<u>Giant Garter Snake</u>

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"

<u>Significance after Mitigation</u>

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.

<u>Significance after Mitigation</u>

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**	

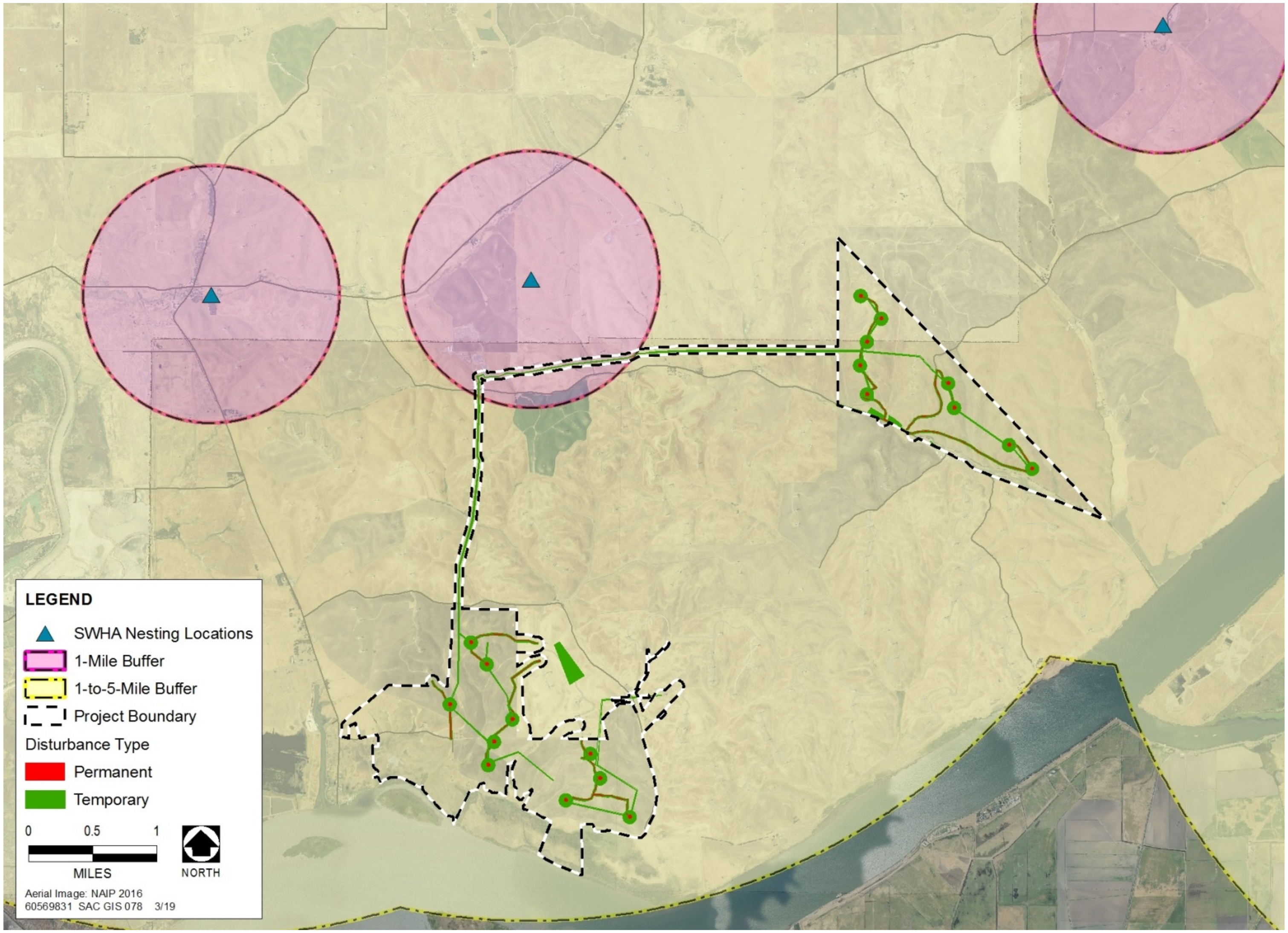
Source: Data compiled by AECOM in 2019

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**.



Estep and SMUD 2019

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.

<u>Bald Eagle</u>

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.

<u>Significance after Mitigation</u>

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**.

<u>Mitigation Measures</u>

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.

- o 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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3.4. Archaeological, Historical, and Tribal Cultural Resources

This section analyzes and evaluates the potential direct and indirect impacts of the project on known and unknown cultural resources. Cultural resources include districts, sites, buildings, structures, or objects generally older than 50 years and considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. They include prehistoric, historic-era, and tribal cultural resources (TCRs) (the latter as defined by Assembly Bill [AB] 52, Statutes of 2014, in Public Resources Code [PRC] Section 21074).

Archaeological resources are locations where human activity has measurably altered the earth or left deposits of prehistoric or historic-era physical remains (e.g., stone tools, bottles, former roads, house foundations). Historical resources include standing buildings (e.g., houses, barns, outbuildings, cabins), intact structures (e.g., dams, bridges, wells), or other remains of humans' alteration of the environment (foundation pads, remnants of rock walls). TCRs were added as a distinct resource subject to review under CEQA, effective January 1, 2015, under AB 52. This is a new category of resources under CEQA and includes site features, places, cultural landscapes, and sacred places or objects, which are of cultural value to a tribe.

3.4.1. Regulatory Setting

Federal

Section 106 of the National Historic Preservation Act

The following laws and organizations facilitate federal protection of cultural resources:

- National Historic Preservation Act (NHPA) of 1966, as amended by Title 16, Section 470 of the United States Code
- Archaeological Resource Protection Act of 1979
- Advisory Council on Historical Preservation

These laws and organizations maintain processes for determining effects on historical properties eligible for listing in the National Register of Historic Places (NRHP).

NHPA Section 106 and accompanying regulations (Title 36, Part 800 of the Code of Federal Regulations [36 CFR 800]), the main federal regulatory framework guiding cultural resources investigations, require consideration of effects on properties that are listed in or may be eligible for listing in the NRHP. The NRHP, administered by the National Park Service, is the nation's master inventory of known historic resources. It includes listings of buildings, structures, sites, objects, and districts that possess historic, architectural, engineering, archaeological, and cultural characteristics that are considered significant at the national, state, or local level.

The formal criteria (36 CFR 60.4) for determining NRHP eligibility are as follows:

1. The property is at least 50 years old. (However, properties under 50 years of age that are of exceptional importance or are contributors to a district can also be included in the NRHP.)

2. It retains integrity of location, design, setting, materials, workmanship, feeling, and associations.

3. It possesses at least one of the following criteria:

   A. Association with events that have made a significant contribution to the broad patterns of history (events).

   B. Association with the lives of persons significant in the past (persons).

   C. Distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant, distinguishable entity whose components may lack individual distinction (architecture).

   D. Has yielded, or may be likely to yield, information important to prehistory or history (information potential).

Listing in the NRHP does not entail specific protection of or assistance for a property. However, listing does guarantee the property's recognition during planning for federal or federally assisted projects, eligibility for federal tax benefits, and qualification for federal historic preservation assistance. Additionally, project effects on properties listed in the NRHP must be evaluated under CEQA.

State

California Register of Historic Resources

The California Register of Historical Resources (CRHR) established a list of properties that are to be protected from substantial adverse change (PRC Section 5024.1). A historical resource may be listed in the CRHR if it meets any of the following criteria:

1. It is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.

2. It is associated with the lives of persons important in California's past.

3. It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic value.

4. It has yielded or is likely to yield information important in prehistory or history.

The CRHR includes properties that are listed or have been formally determined to be eligible for listing in the NRHP, State Historical Landmarks, and eligible Points of Historical Interest. Other resources require nomination for inclusion in the CRHR. These may include:

- resources contributing to the significance of a local historic district,
- individual historical resources,
- historical resources identified in historic resource surveys conducted in accordance with State Historic Preservation Office procedures,
- historic resources or districts designated under a local ordinance consistent with Commission procedures, and
- local landmarks or historic properties designated under local ordinance.

California Environmental Quality Act

CEQA requires public agencies to consider the effects of their actions on historical resources, unique archaeological resources, and TCRs. Under PRC Section 21084.1, a "project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment." Under PRC Section 21084.2, a "project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment." Section 21083.2 requires agencies to determine whether projects would have effects on unique archaeological resources.

Historical Resources

"Historical resource" is a term with a defined statutory meaning (PRC Section 21084.1). The determination of significant impacts on historical and archaeological resources is described in Sections 15064.5(a) and 15064.5(b) of the State CEQA Guidelines. Section 15064.5(a) states that historical resources include the following:

1. A resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the CRHR (PRC Section 5024.1).
2. A resource included in a local register of historical resources, as defined in Section 5020.1(k) of the PRC or identified as significant in a historical resource survey meeting the requirements of Section 5024.1(g) of the PRC, will be presumed to be historically or culturally significant. Public agencies must treat any such resource as significant unless the preponderance of evidence demonstrates that it is not historically or culturally significant.

3. Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be a historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record. Generally, a resource will be considered by the lead agency to be historically significant if the resource meets the criteria for listing in the CRHR (PRC Section 5024.1).

4. The fact that a resource is not listed in or determined to be eligible for listing in the CRHR, not included in a local register of historical resources (pursuant to Section 5020.1[k] of the PRC), or identified in a historical resources survey (meeting the criteria in Section 5024.1[g] of the PRC) does not preclude a lead agency from determining that the resource may be an historical resource as defined in PRC Section 5020.1(j) or 5024.1.

Unique Archaeological Resources

CEQA also requires lead agencies to consider whether projects will affect unique archaeological resources. PRC Section 21083.2(g) states that a "unique archaeological resource" means an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

(1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.

(2) Has a special and particular quality such as being the oldest of its type or the best available example of its type.

(3) Is directly associated with a scientifically recognized important prehistoric or historic event or person.

Tribal Cultural Resources

CEQA also requires lead agencies to consider whether projects will affect TCRs. PRC Section 21074 states the following:

(a) "Tribal cultural resources" are either of the following:

(1) Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following:

(A) Included or determined to be eligible for inclusion in the California Register of Historical Resources.

(B) Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1.

(2) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Section 5024.1. In applying the criteria set forth in subdivision (c) of Section 5024.1 for the purposes of this paragraph, the lead agency shall consider the significance of the resource to a California Native American tribe.

(b) A cultural landscape that meets the criteria of subdivision (a) is a tribal cultural resource to the extent that the landscape is geographically defined in terms of the size and scope of the landscape.

(c) A historical resource described in Section 21084.1, a unique archaeological resource as defined in subdivision (g) of Section 21083.2, or a “nonunique archaeological resource” as defined in subdivision (h) of Section 21083.2 may also be a tribal cultural resource if it conforms with the criteria of subdivision (a).

Health and Safety Code, Section 7052 and 7050.5

Section 7052 of the Health and Safety Code states that the disturbance of Native American cemeteries is a felony. Section 7050.5 requires that construction or excavation be stopped in the vicinity of discovered human remains until the coroner can determine whether the remains are those of a Native American. If determined to be Native American, the coroner must contact the California Native American Heritage Commission (NAHC).

California Native American Historical, Cultural, and Sacred Sites Act

The California Native American Historical, Cultural, and Sacred Sites Act applies to both state and private lands. This law requires that if human remains are discovered, construction or excavation activity must cease and the county coroner must be notified. If the remains are of a Native American, the coroner must notify the NAHC. The NAHC then notifies those persons most likely to be descended from the Native American whose remains were discovered. The California Native American Historical, Cultural, and Sacred Sites Act stipulates the procedures the descendants may follow for treating or disposing of the remains and associated grave goods.

Public Resources Code, Section 5097

PRC Section 5097 specifies the procedures to follow in the event of the unexpected discovery of human remains on nonfederal land. The disposition of Native American burial falls within the jurisdiction of the NAHC. PRC Section 5097.5 states the following:

> No person shall knowingly and willfully excavate upon, or remove, destroy, injure, or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature,

situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor.

Assembly Bill 52

AB 52, signed by Governor Edmund G. Brown Jr. in September 2014, establishes a new class of resources under CEQA: "tribal cultural resources" (or TCRs). AB 52 (PRC Sections 21080.3.4, 21080.3.2, and 21082.3) states that upon written request by a California Native American Tribe, a CEQA lead agency must begin consultation once it determines that the project application is complete, before the agency issues a notice of preparation (NOP) of an EIR or notice of intent to adopt a negative declaration or mitigated negative declaration. AB 52 also required a revision of State CEQA Guidelines Appendix G, the environmental checklist. This revision created a new category for TCRs.

As defined in PRC Section 21074, to be considered a TCR, a resource must be either:

1. listed or determined to be eligible for listing, on the national, state, or local register of historic resources; or

2. a resource that the lead agency determines, in its discretion and supported by substantial evidence, to treat as a tribal cultural resource pursuant to the criteria in PRC Section 50241(c). PRC Section 5024.1(c) provides that a resource meets criteria for listing as an historic resource in the California Register if any of the following apply:

   (1) It is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.

   (2) It is associated with the lives of persons important in our past.

   (3) It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.

   (4) It has yielded, or may be likely to yield, information important in prehistory or history.

Local

The following information is provided in the *Solano County General Plan Update, Cultural and Paleontological Resources Background Report* (Solano County 2006).

> The Solano County General Plan's Land Use and Circulation and Resource Conservation and Open Space elements recognize that the county contains a diversity of archaeological sites and historical resources. While these elements acknowledge that additional study is needed to establish baseline cultural resource conditions for many communities and unincorporated areas, the elements also include policy goals to identify and preserve significant historical structures and features, and to establish a process for the identification and management of significant archaeological sites. Though these

policy goals exist, the elements do not contain a means to achieve the goals. In lieu of actions to achieve policy goals, and to reduce the likelihood that sensitive archaeological sites are damaged by development pursuant to the General Plan, Solano County has routinely required that land development proposals that require the preparation of an EIR be referred to the California Office of Historic Preservation (OHP) for review.

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]).

3.4.2. Environmental Setting

Prehistoric Archaeological Context

The project area is located in the Sacramento–San Joaquin Delta (Delta), a region where rapid alluvial and colluvial deposition has occurred over the last 10,000 years, resulting in the presence of deeply buried archaeological deposits throughout much of the region. The following historic context has been extracted from the *Solano Wind Project Historic Resources Inventory and Evaluation Report Update* (SMUD 2010) and the *Cultural Resources Inventory and Evaluation Report Prepared for the Solano 4 Wind Project* (SMUD 2018).

The following discussion focuses on cultural assemblages from a sequence of time periods in Solano County and neighboring counties to the south. As described below, five time periods were used to order the local archaeological record (Groza 2002; Groza et al. 2011; Meyer and Rosenthal 1997):

- Lower Archaic (10,000–6000 years Before Present [B.P.])
- Early Middle Archaic (7000–4500 B.P.)
- Terminal Middle Archaic/Early Period (4500–2500 B.P.)
- Upper Archaic or Middle Period (2500–1300 B.P.)
- Emergent Period or Late Period (1300–200 B.P.)

Lower Archaic (10,000–6000 B.P.)

The oldest archaeological component found so far in the San Francisco Bay–Delta region derives from the Los Vaqueros Reservoir area in eastern Contra Costa County. Two sites at the reservoir (CA-CCO-637 and CA-CCO-696) have recently produced artifact assemblages and human burials dated between 9,870 and 6,600 years ago (Meyer and Rosenthal 1997, 1998). These deposits were buried 2–4 meters below the surface in alluvial fan/floodplain sediments along Kellogg Creek.

The combined Lower Archaic assemblage at Los Vaqueros Reservoir included handstones and millingslabs, cobble-core tools, and a wide-stemmed obsidian projectile point, reminiscent of archaeological deposits found in the southern Clear Lake Basin and elsewhere in the southern North Coast Ranges at this time (White 2002). At least three human burials from Los Vaqueros Reservoir are known to date to this time period, one of which was buried under a stone cairn. Small but diverse floral and faunal assemblages indicate that the site inhabitant used a variety of animal and plant species. Large nuts (acorns and wild cucumber) and berries (manzanita) were the dominant plant resources represented in the archaeological deposits. Obsidian from both the North Coast Ranges and the eastern Sierra Nevada was used. Overall, the Lower Archaic assemblage from Contra Costa County appears to have affinities with assemblages assigned to the Borax Lake Pattern in the North Coast Ranges and "Milling Stone Horizon" assemblages to the south. Sites of this age are known from Solano County.

Early Middle Archaic (7000–4500 B.P.)

Extensive early Middle Archaic deposits are rare in central California, but two sites of this age are known from Los Vaqueros Reservoir (Meyer and Rosenthal 1997, 1998). Site CA-CCO-637, located in a small valley, included deeply buried components found in an alluvial fan adjacent to Kellogg Creek. The site was contained in buried soil and included a diverse assortment of habitation debris, several human burials, and residential and processing features.

Several characteristics of this important deposit, including exclusive use of the mortar and pestle, suggest that this assemblage may be affiliated with the Berkeley Pattern (associated with the West Berkeley Shellmound), previously placed no farther back in time than the Terminal Middle Archaic or Early Period (see below) (Fredrickson 1973). Among the distinctive artifacts associated with this component is one of the oldest dated shell bead lots in central California (4160 B.P.) and a unique type of pestle apparently used with a wooden mortar (Meyer and Rosenthal 1997).

Terminal Middle Archaic/Early Period (4500–2500 B.P.)

A number of archaeological sites in Contra Costa and Solano counties date to the Terminal Middle Archaic Period, including portions of CA-CCO-637 and CA-CCO-696 at Los Vaqueros Reservoir (Meyer and Rosenthal 1997, 1998), CA-CCO-308 in the San Ramon Valley (Fredrickson 1966), and CA-SOL-315 (Wiberg 1992) and CA-SOL-391 (Wohlgemuth and Rosenthal 1999) in Green Valley, just west of Vacaville. The latter two sites are the oldest well-dated archaeological deposits in Solano County. Initial use of the shell mound sites along the San Francisco estuary also appears to have begun during this time interval (Banks and Orlins 1985; Broughton 1997; Lightfoot 1997; Waechter 1992). The Terminal Middle Archaic is equivalent to the Early Period in Dating Scheme B, the earliest time period covered by that scheme.

All Terminal Middle Archaic sites in Solano and Contra Costa counties have produced human remains and most contain intact burials. A variety of artifacts are associated with this time period, including side-notched and stemmed projectile points, rectangular Haliotis (abalone) ornaments, shaped and unshaped mortars and pestles, and rectangular Olivella shell beads (Fredrickson 1966; Meyer and Rosenthal 1997). Of particular interest is the vibrant Windmiller Culture that existed in the lower Sacramento Valley during this period; however, no evidence of its distinctive mortuary pattern has been discovered in Solano County.

The use of obsidian from the North Coast Ranges and the eastern Sierra Nevada continued during this period (Jackson 1974; Meyer and Rosenthal 1997; Waechter 1992; Wiberg 1996). In Solano County, however, obsidian from a source in the northern Napa Valley was now used almost exclusively (Wiberg 1992; Wohlgemuth and Rosenthal 1999). Nut and berry crops—acorn, manzanita, and pine nut—appear to have been the primary plant resources targeted during this time period (Meyer and Rosenthal 1997). Along the bayshore, marine shellfish species were an important subsistence resource (Banks and Orlins 1985; Waechter 1992), as were marine fishes and mammals (Broughton 1997; Simons 1992). Interior sites include a similar assortment of faunal resources, but with the notable absence of marine resources.

Upper Archaic/Middle Period (2500–1300 B.P.)

The Upper Archaic is equivalent to the Early/Middle Transition and the Middle Period in Dating Scheme B of Bennyhoff and Hughes (1987). Upper Archaic deposits are found throughout the lowland valleys of the Coast Ranges and along the shores of San Francisco and Suisun bays. These sites are typically located near freshwater streams, and many have been found in buried contexts (Banks and Orlins 1979, 1981, 1985; Cook and Elsasser 1956; Fredrickson 1966, 1968; Hammel 1956; Heizer 1949; Holman and Clark 1982; Lightfoot 1997; Meyer and Rosenthal 1997; Waechter et al. 1995). Several excavated sites in Solano County date to this time interval, including sites in the following locations:

- Green Valley—CA-SOL-11 and CA-SOL-355/H (Rosenthal 1996; Snoke 1967; Wiberg 1993);
- Vaca Valley—P-48-816, CA-SOL-320/H, CA-SOL-357, CA-SOL-425/H, and CA-SOL-451 (Whitaker and Carpenter 2010; Rosenthal et al. 2009; Whitaker et al. 2009); and
- the Sacramento Valley near Dixon—CA-SOL-363, CA-SOL-379, and CA-SOL-380 (Chatten et al. 1997; Rosenthal and White 1994; Shapiro and Tremaine 1995)

Upper Archaic sites are typically composed of well-developed midden deposits containing hundreds of human burials and habitation features, representing long-term residential villages. The earliest Upper Archaic sites contain classic Berkeley Pattern assemblages, characterized by well-developed bone tool and ornament industries, numerous saucer- and saddle-shaped Olivella shell beads, steatite disk beads, Haliotis ornaments and pendants, and both unshaped and well-shaped mortars and pestles (Rosenthal 1996;

Wiberg 1993). Projectile points are typically shouldered lanceolate forms, although side-notched and stemmed points also occur, along with large lanceolate bifaces. Well-made charmstones from various types of stone, as well as baked clay, are frequently found at sites in Solano County. Human interments are typically placed in flexed position with distinct burial postures and orientations identified at different sites (Fredrickson 1973; Rosenthal 1996). In the North Bay, obsidian from the Napa Valley appears to have remained an important toolstone (Rosenthal and White 1994; Shapiro and Tremaine 1995; Wiberg 1992).

Subsistence remains indicate that acorns and other large nut and seed crops were an important part of the diet, with a growing emphasis on small-seeded resources (Meyer and Rosenthal 1997; Rosenthal and White 1994; Rosenthal et al. 2009; Whitaker et al. 2009; Wiberg 1993; Wohlgemuth 1996). Faunal assemblages continue to reflect either marine or terrestrial taxa, depending on the location of the site (Broughton 1997; Fredrickson 1966, 1968; Meyer and Rosenthal 1997; Wiberg 1992). However, during the Upper Archaic, marine shellfish first occurred in appreciable amounts in interior valley sites (Fredrickson 1966, 1968).

Well-entrenched social boundaries have been identified through analysis of burial patterns at sites in Suisun, Fairfield, Vacaville, and Dixon (Rosenthal 1996; Whitaker and Carpenter 2010; Whitaker et al. 2009). Rosenthal (1996) identified a difference between the Green Valley and Dixon aspects during this time: The Green Valley Aspect showed a regimented burial pattern, with north- and west-facing burials interred on their right or left sides, while the Dixon Aspect showed no pattern in burial orientation for interments. Whitaker et al. (2009) and Rosenthal et al. (2009) incorporated data from several sites in Vacaville (CA-SOL-320, CA-SOL-425, CA-SOL-451, and P-48-816) and deduced that the social boundary lies somewhere between Ulatis and Alamo creeks, with Alamo Creek making up the northern boundary of the Green Valley Aspect. The stark delineation of social boundaries is thought to have reduced the ability of people to access distant resource patches, perhaps requiring them to increase the diversity of resources exploited and the intensity of use for lower-ranking resources, and to rely on trade networks for exogenous resources.

Emergent Period/Late Period (1200–200 B.P.)

The distinctive cultural pattern of the Emergent Period is marked by the appearance of small, arrow-sized projectile points, beautifully trimmed “show” mortars, flanged pestles, flanged steatite pipes, and chevron-designed bird bone tubes. Emergent Period sites have been excavated at several locations in Solano County:

- CA-SOL-356 in Green Valley (Wiberg 1996),
- CA-SOL-30 in Lagoon Valley,
- the Nakamura and Glasshoff sites in Suisun Valley (Phebus 1990),

- the Peterson Mounds (CA-SOL-1, CA-SOL-2, and CA-SOL-3) west of Vaca Valley, and
- the Glenn Cove site (CA-SOL-236) near the Carquinez Bridge (Beardsley 1954).

Emergent Period deposits are documented in most interior valleys and bayshore locations, and in upland contexts, where habitation and task-specific sites are reported (Atchley 1994; Baker 1987; Banks and Orlins 1979; Bramlette 1989; Fredrickson 1966, 1968; Holson et al. 1993; Lillard et al. 1939; Meyer and Rosenthal 1997; Wills 1994). Buried sites dating to the Emergent Period have been found in some of the interior valleys (Fredrickson 1966; Meyer and Rosenthal 1997; Wiberg 1996), although most of the recorded sites are located at the surface. Typically, these sites are well-developed midden deposits containing both human cremations and standard burials. Residential features, including house floors, are common (Phebus 1990; Wiberg 1996).

It was also during the Emergent Period that bedrock mortar milling stations were first established, beginning in the East Bay area around 1,300 years ago (Meyer and Rosenthal 1997). Portable mortars and pestles continued to be used, although smaller specimens were preferred. Changes in the size of these tools may have occurred in response to the increased use of small-seeded plant resources (Meyer and Rosenthal 1997; Wohlgemuth 1996). Olivella and clam shell disc beads are frequently found with Emergent Period burials and in midden deposits. Manufacturing debris has been found, suggesting that at least some of these beads were made locally (Hartzell 1991; Meyer and Rosenthal 1997; Palumbo 1964; Wiberg 1996).

Large mammals appear to have taken a more prominent role in the diet during this period, as did small-seeded resources. Marine shellfish and marine fishes moved inland in much larger quantities during the Emergent Period (Baker 1987; Fredrickson 1968; Meyer and Rosenthal 1997). Large villages with hundreds of people are thought to have been located in the Delta region, while smaller hamlets composed of one or two extended families were located in some of the smaller valleys (Meyer and Rosenthal 1997).

Ethnographic Context

The project area is located primarily within the ethnographic boundaries of the Patwin; however, the Plains Miwok occupied both banks of the Sacramento River form Rio Vista to Freeport. The Montezuma Hills were not the sole domain of any one group, and were used by several Native American groups in recent prehistory and the historic period. It is believed that the Southeastern Patwin, the Plains Miwok, and the Bay Miwok all used the Montezuma Hills and the surrounding regions. The following discussion is summarized from Levy (1978) and Johnson (1978).

The term “Patwin” is a native word for “people” that several tribelets used to describe themselves. Patwin groups speak dialects of the Southern Wintuan language group, which belongs to the Penutian language family, along with Miwok, Maidu, and Costanoan Yokuts.

Patwin territory extends along the southern portion of the Sacramento River Valley, from Princeton (in Colusa County) to San Pablo and Suisun bays. The earliest reports from this area described this territory as being occupied by several different tribes, later referred to as “tribelets”; many distinct dialects were spoken. The Patwin had relatively early contact with explorers and settlers from Spain and elsewhere in Europe. As early as 1800, individuals were taken from Patwin settlements to the Spanish Mission Dolores and Mission San Jose, and later to Mission Sonoma. Other contact came from explorers such as Jedediah Smith and employees of the Hudson’s Bay Company. The Sacramento Valley and lower parts of the Delta were settled by the mid-1800s; and with increasing pressure from the Euro-Americans, the remaining Patwin became partially assimilated into American culture, taking temporary jobs on ranches, or were placed on federal reservations.

Central to the Patwin ritual life was the Kuksu cult, common throughout much of north-central California. Young boys and occasionally high-status women were initiated into one of three secret societies. Shamanism was also important, primarily for curing and ritual healing. The primary political unit was the tribelet: a primary village and satellite villages (Johnson 1978:354). Each tribelet was self-governing and occupied a defined territory. Small cultural differences existed between each group. Subsistence activities consisted of hunting, fishing, and collecting a wide variety of plants and seeds. Acorns were particularly important to the diet and were owned communally by each group.

The Bay Miwok tribelet, Ompin, is known to have had a village approximately 1.5 miles east of the project area; therefore, the Bay Miwok likely used the Montezuma Hills most intensively into the historic period.

Bay Miwok territory extended from the southeastern portion of the Montezuma Hills south to Mount Diablo, and from the present-day city of Walnut Creek east as far as Plains Miwok territory near Sherman Island. The Bay Miwok distributed themselves into tribelet groups that consisted of a village or groups of villages that shared linguistic and/or kinship affinities and are described variously as ranging from 20 to 300 people. Settlements were located on permanent watercourses and intermittent streams (in drier areas) and on high ground in areas near the Delta.

The Bay Miwok were semi-nomadic, employing a hunting and gathering subsistence pattern. Acorns were their principal dietary component; however, fishing in the adjacent San Joaquin and Sacramento rivers was also important. Boats were built from tule bundles. Miwok technology included bone, stone, antler, wood, and textile tools. The Bay Miwok constructed several types of structures, including conical thatch structures and semi-subterranean earth-covered lodges. Contact between the Bay Miwok and Europeans occurred in the second half of the 18th century, when Spanish explorers arrived in the area, leading to a period of hostilities, missionization, and population decline. During the late 19th and early 20th centuries, subsistence through hunting and gathering was increasingly augmented by seasonal wage labor on ranches and farms.

The Bay Miwok tribelet, *Ompin*, is known to have had a village approximately 1.5 miles east of the project area; therefore, the Bay Miwok likely used the Montezuma Hills most intensively into the historic period.

Historic Setting

The following historic context has been extracted from the *Solano Wind Project Historic Resources Inventory and Evaluation Report Update* (SMUD 2010) and the *Cultural Resources Inventory and Evaluation Report Prepared for the Solano 4 Wind Project* (SMUD 2018).

Spanish and Mexican Periods

The Delta region was first visited in historic times by Spanish explorers, including Pedro Fages and Juan Bautista de Anza, in the 1770s. Exploration of the region by the Spanish continued into the 1800s, and in 1815, Spanish missionaries made a concerted effort to bolster native populations in their mission system after an epidemic devastated the neophyte population at Mission San Francisco de Asís (in San Francisco) in 1795, and in anticipation of founding another mission: San Francisco Solano (in Sonoma), which opened in 1823 (California Mission Resource Center 2018).

In 1817, a military expedition ventured into what is now Solano County from the Carquinez Strait to explore the countryside and recruit natives into Christianity (Munro Fraser 1879:2-3). The subsequent confrontation was hard-fought by the natives, who were eventually overcome by the Spanish, leaving the region less protected and available for settlement by Euro-Americans from the east.

Early Euro-American settlement of the project vicinity began in 1844 when the Mexican government granted John Bidwell the 17,726-acre *Rancho Los Ulpinos*, located along the Sacramento River to the east of the area of potential effects (APE). The rancho took its name from the *Julpun*, a subtribe of Miwok Indians who occupied the western banks of the Sacramento River.

Individual settlers like Lansford W. Hastings also trickled into the Montezuma Hills. The area was so named by Hastings, who arrived in 1846. Lansford W. Hastings laid out Montezuma City at the head of Suisun Bay in 1847, with plans to subdivide and develop the area to establish his own republic (Gudde 1998:246). When Hastings’ plan to develop a Mormon settlement unraveled because of the United States’ annexation of California, he left his adobe home at the head of Suisun Bay and headed to Sacramento. Hastings then participated in California’s entry into the United States, serving as a representative of the Sacramento District at California’s First Constitutional Convention.

American Period

Lindsay Power Marshall and his sons purchased Hastings’ land in 1854 and subsequently reoccupied Hastings’ land grant. They developed the first agricultural operation in the hills and later began selling portions of the large landholding they had acquired to other pioneers like John Kierce, Edward Jenkins, and Samuel Stratton. Settlement along the Sacramento River increased as swamp reclamation projects created fertile and available farmland. Emery Upham, one of the more successful early pioneers of the area, owned 8,100 acres in the Montezuma Hills by 1880. Upham's lands were divided and sold upon his death in 1897.

An 1878 directory lists 23 ranches in the Montezuma Hills area, and census records indicate that immigrants came from such diverse places as England, Ireland, and Chile, and from a variety of U.S. locations, such as Pennsylvania, Maine, South Carolina, Kentucky, and Massachusetts. Area ranches distributed products via Birds Landing to San Francisco and Sacramento. Collinsville, founded by C. J. Collins in 1861, was developed as a port along the Sacramento River near the southwestern edge of the project area.

The principal economic activities in the Montezuma Hills during the late 19th and 20th centuries were wheat (dry) farming and ranching (JRP 2007). Independent farms and ranches began to grow along watercourses and in the low valleys during the first quarter of the 20th century, as shown in the 1906 Birds Landing 7.5-minute topographic quadrangle map (USGS 1906). These farms and ranches were linked by a road system that followed well-established routes that were in place by the late 19th century, many of which are still in use today.

In the first quarter of the 20th century, the open range of the Montezuma Hills, located on the outskirts of the ever-expanding California population, became the focus of planned industrial and energy production. In the 1920s, Pacific Gas and Electric Company (PG&E) began to prospect in the area for a new supply of natural gas. This exploration was unsuccessful but did not deter PG&E from returning 40 years later with a proposal for a nuclear power plant near Collinsville. The plan was not adopted, but during the 1970s, Dow Chemical Company purchased large tracts of agricultural land in hopes of establishing a multimillion-dollar industrial development. At the same time, ARCO Chemical Company attempted to develop a billion-dollar petrochemical plant near Toland Landing, but this proposal was ultimately rejected as well.

Instead, in the late 1980s, wind farms were established in the Montezuma Hills to exploit the strong winds on the area's hilltops and ridges (Righter 1996:240,280). SMUD purchased land in the early 1990s and established wind facilities in the Montezuma Hills by the late 1990s (Cutting, pers. comm., 2018). Today, the area's economic activities continue to be both ranching and wind energy production, with multiple companies producing wind energy.

Cultural Resources Study Methodology and Findings

Cultural resources investigations for the proposed project consisted of a staged approach that included pre-field research, field surveys, resource documentation, and Native American consultation. All aspects of the cultural resources study were conducted in accordance with the federal *Secretary of the Interior's Guidelines for Identification of*

Cultural Resources (48 CFR 44720–44723) and the California Office of Historic Preservation's *Instructions for Recording Historical Resources*.

Records Searches

An updated records search was conducted for the project site on May 14, 2018, by AECOM archaeologist and historian Karin G. Beck at the Northwest Information Center (NWIC) of the California Historical Resources Information System, Sonoma State University, Rohnert Park (NWIC File No. 17-2697). The NWIC, an affiliate of the California Office of Historic Preservation, is the official state repository of cultural resources records and studies for Solano County. Site records and previous studies were accessed for the APE and a 0.5-mile radius as shown on the Antioch North, Birds Landing, and Jersey Island, California, U.S. Geological Survey 7.5-minute topographic quadrangle maps. The following references also were reviewed:

- The NRHP
- The CRHR
- Historic Property Data File for Solano County (OHP 2012)
- *California State Historical Landmarks* (OHP 1996)
- *California Inventory of Historic Resources* (State Parks 1976)
- *California Points of Historical Interest* (OHP 1992)
- Antioch North, California 7.5-minute topographic quadrangle maps (USGS 1953a, 1978a)
- Birds Landing, California 7.5-minute topographic quadrangle maps (USGS 1906, 1953b, 1978b)
- Jersey Island, California 7.5-minute topographic quadrangle maps (USGS 1952, 1978c)
- Rio Vista, California 7.5-minute topographic quadrangle map (USGS 1953c)
- Antioch, California 15-minute topographic quadrangle map (USGS 1907)
- Jersey Island, California 15-minute topographic quadrangle map (USGS 1910a)
- Rio Vista, California 15-minute topographic quadrangle map (USGS 1910b)
- *Five Views: An Ethnic Historic Site Survey for California* (OHP 1988)
- *California Place Names* (Gudde 1998)

- *Historic Spots in California* (Kyle et al. 2002)
- *Historical Atlas of California* (Beck and Haase 1974)

The records search, coupled with additional background research conducted by AECOM in 2018, identified a total of 15 studies previously conducted within portions of the project site (Table 3.4-1), covering the entire project site, which includes the direct APE. The majority of these studies were conducted more than 10 years ago; therefore, three additional investigations were conducted by Far Western Anthropological Research Group, Inc. (FWARG) (2010, 2016) and AECOM (SMUD 2018) within the direct APE. These studies resulted in the identification of 17 resources within the project site, six of which are within the direct APE (Table 3.4-2). An additional seven cultural sites are within 0.5 mile of the project site (Table 3.4-3).

Table 3.4-1. Cultural Resources Studies within the Project Site

Citation	Survey Year	NWIC Study Number	Project Location(s)	Resource(s) Identified within the Project Site
Holman, Miley. Archaeological Field Inspection of the Montezuma Hills Proposed Wind Farm Area, Solano County, California. Holman & Associates, San Francisco, CA.	1987	10481	Northern home run, southern home run	None
Holman, Miley. Archaeological Literature Review and Field Inspection of Areas 1 through 9, Montezuma Hills, Solano County, California. Holman & Associates, San Francisco, CA.	1989	11766	Solano 4 East, northern home run, Solano 4 West	None
Theodoratus, Dorothea J., et al. Montezuma I & II Cultural Resources. Theodoratus Cultural Research, Fair Oaks, CA.	1980	11826	Entire	CA-SOL-33, CA-SOL-283H, CA-SOL-284H, CA-SOL-285H, CA-SOL-287H, CA-SOL-298H, CA-SOL-299H, CA-SOL-399H, CA-SOL-400H
Tremaine, Kim J. An Archaeological Inspection of the Proposed Collinsville Wind Turbine Generation Site and Transmission Line, Solano County, California. BioSystems Analysis, Inc., Sacramento, CA.	1991	13263	Southern home run, Solano 4 West	None
Archaeological Consulting and Research Services, Inc. Preliminary Archaeological Reconnaissance of a Proposed Petrochemical Complex in Southern Solano County. Archaeological Consulting and Research Services, Inc., Mill Valley, CA.	1993	17517	Solano 4 East	None
Scott, Barry. Cultural Resource Inventory Report for the Williams Communications, Inc. Fiber Optic Cable System Installation Project, Pittsburg to Sacramento, California. Jones & Stokes Associates, Inc., Sacramento, CA.	1999	22464	Solano 4 East	None

Table 3.4-1. Cultural Resources Studies within the Project Site

Citation	Survey Year	NWIC Study Number	Project Location(s)	Resource(s) Identified within the Project Site
Moratto, Michael J., et al. Archaeological Investigations PGT-PG&E Pipeline Expansion Project, Idaho, Washington, Oregon, and California. INFOTEC Research, Inc., Fresno, CA, and Far Western Anthropological Research Group, Inc., Davis, CA.	1994	23674	Northern home run	P-48-0524
Roark, Gabriel. Cultural Resource Inventory Report for the High Winds, LLC's, Proposed Wind Turbine Project in the Montezuma Hills of Solano County, California. Jones & Stokes Associates, Inc., Sacramento, CA.	2001	24272	Solano 4 East, northern home run	P-48-0524
Wohlgemuth, Eric. Archaeological Reconnaissance of the Pacific Gas and Electric Company 230 kV Delta Transmission Line Reconductoring Project, Solano, Sacramento, and Contra Costa Counties, California. Far Western Anthropological Research Group, Inc., Davis, CA.	2005	34412	Northern home run	None
Sacramento Municipal Utility District. Solano County, California, Historic Resources Inventory and Evaluation Report. Prepared by JRP Historical Consulting, LLC.	2007	–	Solano 4 West	P-48-524
Sacramento Municipal Utility District. Solano Wind Project, Solano County, California, Historic Resources Inventory and Evaluation Report Update. Prepared by JRP Historical Consulting, LLC.	2009	–	Solano 4 West	P-48-524
Pacific Gas and Electric Company. Collinsville Wind Project CEQA Analysis: Hastings Adobe. Prepared by JRP Historical Consulting, LLC.	2010	–	Solano 4 West	P-58-41
Whitaker, Adrian R., and Phillip Kaijankoski. Archaeological Survey and Geoarchaeological Sensitivity Report for the Proposed PG&E Collinsville Wind Project, Solano County, California. Far Western Anthropological Research Group, Inc., Davis, CA.	2010	38991	Northern home run, southern home run, Solano 4 West	None
Scher, Naomi, and Adrian R. Whitaker. Archaeological Survey and Geoarchaeological Sensitivity Report for the Proposed Solano Phase 4 Wind Project, Solano County, California. Far Western Anthropological Research Group, Inc., Davis, CA.	2016	–	Southern home run, Solano 4 West	P-48-0949, CA-SOL-283H, CA-SOL-284H, CA-SOL-285H, CA-SOL-298H, CA-SOL-299H
AECOM. Final Cultural Resources Inventory and Evaluation Report, Sacramento Municipal Utility District, Solano 4 Wind Project, Montezuma Hills, Solano County, California. Sacramento, CA	2018	–	Home run and Solano 4 East	P-48-0524, SMUD-1, SMUD-2, SMUD-3, SMUD-4, SMUD-5, SMUD-6

Note: NWIC = Northwest Information Center

Sources: Scher and Whitaker 2016; SMUD 2018; data compiled by AECOM in 2019 based on records search at the Northwest Information Center, Sonoma State University,

Table 3.4-2. Cultural Resources Identified within the Project Site

Resource	Project Location	Description	NRHP/CRHR Eligibility/ Significance	Proximity to Direct Area of Potential Effects
SMUD-1	Solano 4 East	Livestock watering feature (remnant)	Recommended not eligible	Within
SMUD-2	Solano 4 East	Basalt biface (isolate)	Recommended not eligible	140 feet east
SMUD-3	Solano 4 East	Concentration of habitation debris	Recommended not eligible	Within
SMUD-4	Solano 4 East	Livestock watering feature (extant)	Recommended not eligible	Within
SMUD-5	Solano 4 West	Fenceline (abandoned remnant)	Recommended not eligible	Within
SMUD-6	Solano 4 West	Ceramic plate fragments (isolate)	Recommended not eligible	Within
C-56	Solano 4 West	No site description provided	Not relocated during 2010 survey by FWARG	Approximately 0.75 mile west
P-48-41/ CA-SOL-33	Solano 4 West	Hastings' Adobe	Nominated for inclusion in the NRHP under Criteria B and C	Approximately 0.25 mile southwest
P-48-124/CA-SOL-283H	Solano 4 West	Remnant historic-era homestead (possibly Knox Marshall), with extant barn, several depressions, collapsed water tower, and artifact scatter	Unevaluated; testing recommended to determine NRHP eligibility (Whitaker and Kaijankoski 2010)	Approximately 1,000 feet west
P-48-125/ CA-SOL-284H	Solano 4 West	Remnant historic-era homestead (possibly Charles Dadami), with old well, modern well, and artifact scatter	Unevaluated; testing recommended to determine NRHP eligibility (Whitaker and Kaijankoski 2010)	More than 0.25 mile west
P-48-126/ CA-SOL-285H	Solano 4 West	Historic-era structural debris and several depressions; recorded as the former site of the Catholic church and a school	Unevaluated	More than 0.75 mile west
P-48-128/ CA-SOL-287H	Solano 4 West	Recorded (based on ethnographic accounts) as a historic-era homesite with very little surface evidence remaining; site revisited and found no evidence of archaeological remains	Recommended not eligible (Whitaker and Kaijankoski 2010)	Approximately 0.5 mile southwest
P-48-139/ CA-SOL-298H	Solano 4 West	Remnant historic-era vegetation and fenceline that represent the remains of the Simpson homesite; site disturbed by illegal off-road motorcyclists	Unevaluated; testing recommended to determine NRHP eligibility (Whitaker and Kaijankoski 2010)	Approximately 0.25 mile southwest

Table 3.4-2. Cultural Resources Identified within the Project Site

Resource	Project Location	Description	NRHP/CRHR Eligibility/ Significance	Proximity to Direct Area of Potential Effects
P-48-140/ CA-SOL-299H	Solano 4 West	Remnant historic-era vegetation that represents the remains of the Whitman homesite; site severely disturbed by illegal off-road motorcyclists	Unevaluated; testing recommended to determine NRHP eligibility (Whitaker and Kaijankoski 2010)	Approximately 0.25 mile southwest
P-48-415/ CA-SOL-399H	Solano 4 West	Remnant historic-era homesite (possibly Esperson), with structural debris, a possible privy location, and artifact scatter	Unevaluated	More than 0.5 mile west
P-48-416/ CA-SOL-400H	Solano 4 West	Remnant historic-era homesite (possibly Charles Rice), with structural debris and a radio tower and gravel road on-site	Unevaluated	Approximately 0.75 mile west
P-48-524	Home run	Historic ranch complex		Within

Notes: CRHR = California Register of Historical Resources; FWARG = Far Western Anthropological Research Group, Inc.; NRHP = National Register of Historic Places

Source: Data compiled by AECOM in 2018 based on records search at the Northwest Information Center, Sonoma State University and a review of previous investigations

Table 3.4-3. Cultural Resources Identified within 0.5 Mile of the Project Site

Resource	Project Location	Description	NRHP/CRHR Eligibility/Significance
P-48-142	Solano 4 West	Historic glass and debris, and outhouse; site of the Episcopal church near Collinsville	Unevaluated.
P-48-981	Solano 4 West	Grizzly Island Road, Collinsville Road, and Chadbourne Road, which provide access to the interior islands of Suisun Marsh	Recommended not eligible.
P-48-518	Northern home run, southern home run	Remnant historic-era ranching- or farming-related buildings or structures and vegetation	Contributing element of the potentially eligible Montezuma Hills Rural Historic Landscape.
P-48-519	Northern home run	Historic-era ranch buildings and residence	Contributing element of the potentially eligible Montezuma Hills Rural Historic Landscape.
P-48-521	Solano 4 West	Historic-era ranch buildings and residence	Contributing element of the potentially eligible Montezuma Hills Rural Historic Landscape.
P-48-523	Northern home run	Historic-era ranch buildings and residence	Contributing element of the potentially eligible Montezuma Hills Rural Historic Landscape.
P-48-949	Solano 4 West	Isolated handstone	Not eligible.

Notes: CRHR = California Register of Historical Resources; NRHP = National Register of Historic Places

Source: Data compiled by AECOM in 2018 based on records search at the Northwest Information Center, Sonoma State University

One archaeological study of the APE (not filed at the NWIC) that is of particular interest is the geoarchaeological sensitivity assessment by FWARG (Scher and Whitaker 2016) of most of the project site south of Montezuma Hills Road. That assessment concluded that the majority of the project site is not sensitive for buried archaeological sites. However, Scher and Whitaker (2016) suggested that areas of creeks and drainages, such as the unnamed creek east of Talbert Lane in Solano 4 West and along Montezuma Hills Road, have the high or highest potential for encountering buried archaeological sites (Exhibit 3.4-1).

Several built-environment historical resource studies (not filed at the NWIC) include information regarding previously identified and recorded historic-era resources in the Montezuma Hills region, including the following reports all prepared by JRP Historical Consulting, LLC:

- Solano Wind Project, Solano County, California, Historic Resources Inventory and Evaluation Report (SMUD 2007)
- Solano Wind Project, Solano County, California, Historic Resources Inventory and Evaluation Report Update (SMUD 2009)
- *Collinsville Wind Project CEQA Analysis: Hastings Adobe* (PG&E 2010)

The 2007 and 2009 reports recorded two historic-era ranch clusters that are located within the boundaries of the Solano 4 West project subarea, and the 2010 report analyzed impacts on the historic-era adobe residence listed in the NRHP (P-48-41). All three resources are located outside of the APE but within the project boundary.

The 2009 report also included an evaluation of a potential rural historic landscape within the larger Montezuma Hills region, using National Register Bulletin Number 30, “Guidelines for Evaluating and Documenting Rural Historic Landscapes,” to determine whether the area could be considered a rural historical landscape under CRHR criteria. The 2009 report concluded that the project study area and surrounding area are unlikely to be a considered a rural historic landscape because of their overall loss of historic integrity caused by wind turbine generators (WTGs), power lines, and other features that interrupt the continuity of the historic scene and introduce ahistorical characteristics.

Known Cultural Resources

NRHP and CRHR criteria were used to evaluate the significance of the historic features and archaeological sites. The NRHP criteria for eligibility are codified in 36 CFR 60 and explained in guidelines published by the Keeper of the NRHP. The NRHP and CRHR are discussed in more detail above in Section 3.4.1, “Regulatory Setting.” Eligibility for listing in the NRHP and the CRHR rests on twin factors of significance and integrity. A resource must have both significance and integrity to be considered eligible. Loss of integrity, if sufficiently great, will become more important than the historical significance a resource

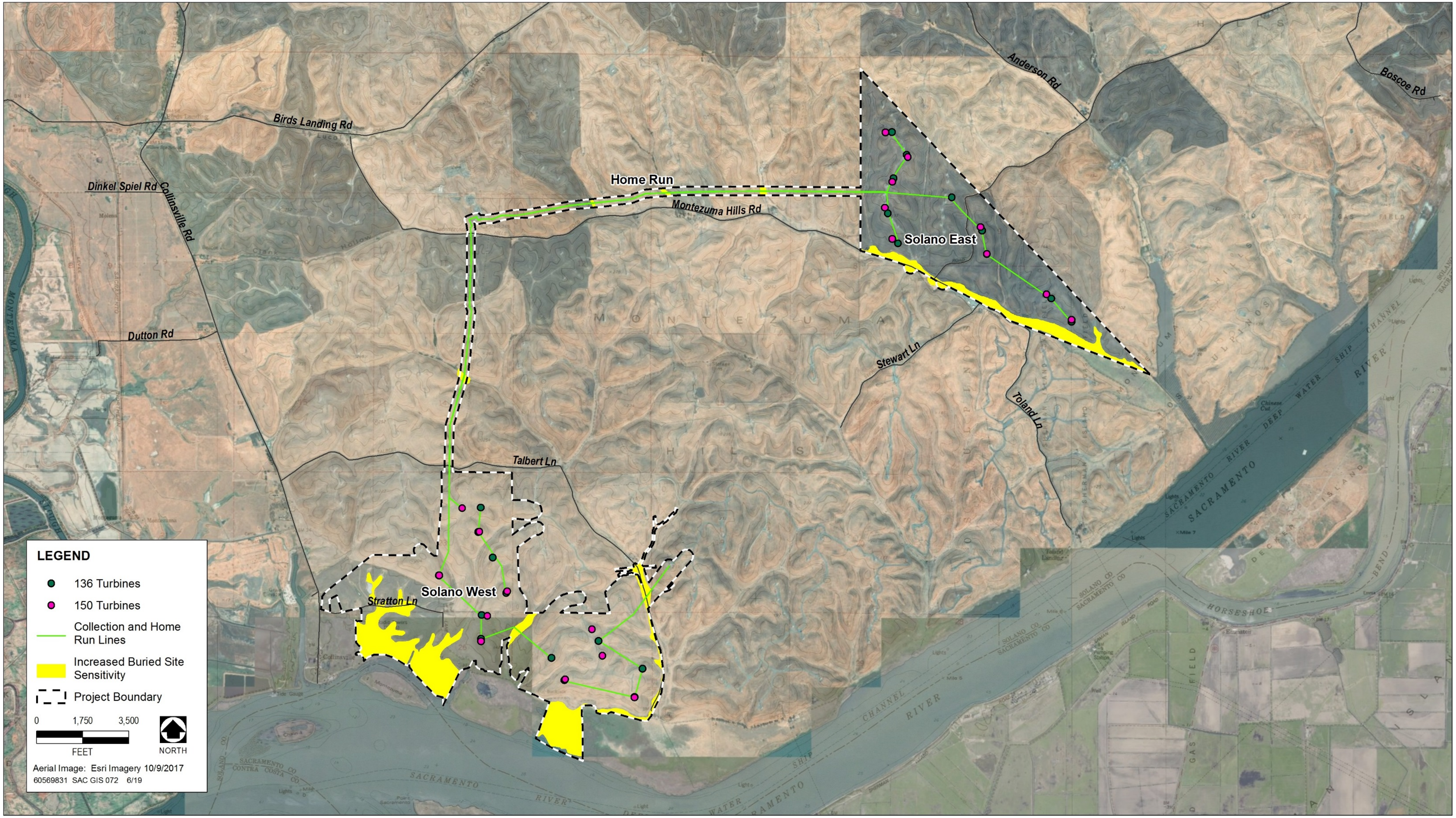

Exhibit 3.4-1 Buried Archaeological Sensitivity

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may possess and render it ineligible. Likewise, a resource can have complete integrity, but if it lacks significance, it must also be considered ineligible.

<u>Historic-Era Built Environment</u>

Hastings Adobe (P-48-41)

The Hastings Adobe is formally listed in the NRHP (Reference No. 72000260) and listed in the CRHR. The property is significant under NRHP Criterion B and CRHR Criterion 2 for its association with Lansford W. Hastings, an early California pioneer and land promoter perhaps most notable for his *Emigrants' Guide to Oregon and California*, an overland guide for would-be settlers (including the ill-fated Donner Party). The Hastings Adobe is also significant under NRHP Criterion C and CRHR Criterion 3 as a significant example of 19th century adobe construction. The period of significance for the Hastings Adobe is 1846, the year of the adobe's original construction, and the area of significance is the theme of community planning and development, and architecture (PG&E 2010).

The adobe is located within the Solano 4 West project boundary but outside the APE for project improvements, and is approximately 0.25 mile from the site of the nearest potential WTG. This property is considered a historical resource for the purposes of CEQA.

P-48-524

The 2001 recordation of this historic-era ranch complex described the property as a contributing element to the potentially eligible Montezuma Hills Rural Historic Landscape, but neither the landscape nor the property as an individual resource was evaluated for listing in the NHRP or CRHR. This ranch property does not appear eligible for listing under NRHP Criterion A and CRHR Criterion 1 because it is not associated with events that have made a significant contribution to broad patterns of history. It also is not associated with individuals significant at the local, regional, or national level (Criteria B/2). The site does not imbue those distinctive characteristics of a type, period, or method of construction, nor does it reflect the work of a master craftsman or reflect high artistic value (Criteria C/3). It is not likely to yield any additional important information about our history (Criteria D/4). In addition, the site does not retain historical integrity based on review of historic aerial imagery.

Ranch Complex 1

The 2007 and 2009 recordation and evaluations of this ranch complex flanking Talbert Lane did not meet any of the NRHP or CRHR criteria. In addition to lacking historic significance, the property was found to have suffered a loss of historic integrity. Since 2009, buildings and structures have been removed from the complex, which has left the barn and two small sheds as the property's only extant built-environment resources, resulting in a further loss of historic integrity (SMUD 2007, 2009).

Ranch Complex 2

The 2007 and 2009 recordation and evaluations of this abandoned ranch complex did not meet any of the NRHP or CRHR criteria. In addition to lacking historic significance, the property was found to have suffered a loss of historic integrity. Since 2009, buildings and structures have been removed from the complex, which has left the barn and two small sheds as the property's only extant built-environment resources, resulting in a further loss of historic integrity (SMUD 2007, 2009).

Montezuma Hills Rural Historic Landscape

A 2009 historic resources study of the Montezuma Hills region concluded that the surrounding area is unlikely to be a considered a rural historic landscape, because of the overall loss of integrity caused by WTGs, power lines, and other features that interrupted the continuity of the historic scene and introduced ahistorical characteristics. Since 2009, additional WTGs have been installed throughout the Montezuma Hills region, including east of Solano 4 West and south of Solano 4 East, further affecting the setting (SMUD 2009).

<u>Archaeological and Historic-Era Resources</u>

The following discussion summarizes documented resources by project element within the project site. Temporary site numbers SMUD-1, SMUD-2, SMUD-3, SMUD-4, SMUD-5, and SMUD-6 were documented by AECOM cultural resources staff in 2018. SMUD-4 is an actively used watering location for livestock and consists of a metal cattle water trough, galvanized steel water tank, and concrete pad with modern pump and electrical service. Historic-era aerial photographs and topographic quadrangle maps revealed that SMUD-4 is a modern feature erected after 1993 (NETR 1993); therefore, this resource will not be discussed further.

An isolated basalt projectile point (SMUD-2) was identified within Solano 4 East approximately 140 feet outside the direct APE. However, none of the identified historic-era resources embody a distinctive type of construction, and they do not appear to have the potential to yield information important in history. In addition to lacking historic significance, the historic-era resources lack integrity, given their deterioration and alteration. Thus, no historic properties (NRHP) or historical resources (CRHR) were identified within the direct APE.

Solano 4 East

SMUD-1

SMUD-1 consists of the structural remains of an old water pump/cistern and a low-density artifact scatter, located on the south bank of an unnamed waterway on the north side of Toland Lane. The structural remains consist of finished lumber, two concrete slabs/foundation fragments, corrugated metal, one red (common) brick and one fire brick, and one fragment of flat, aqua-colored glass. A 1-inch-diameter threaded pipe was observed among the structural remains. The pipe appeared to be oriented toward the creek and likely acted as part of a water-delivery system. A length of an approximately 6-inch-diameter flexible polyvinyl chloride (PVC) pipe was also observed near the metal pipe. Two “Square D,” 60-ampere breaker boxes were observed within the structural remains. The structural remains appear to be similar to those in other nearby areas where cattle are watered (see SMUD-4). The electrical breaker boxes would have been used to pump water into a tank or cistern. Schneider Electric has listed the trademark “Square D” on conduit boxes and switches since 1917, and the trademark is still in use today (Schneider Electric 2018).

Several artifacts were identified in the vicinity of the structural remains: three fragments of cobalt-colored glass (less than 1 inch); one fragment of curved, aqua-colored glass; and two curved, colorless glass fragments. Two 21-inch-diameter, ferrous metal, concave “disks” with 6-inch openings in the center were also observed. These are likely the remains of worn-out tilling equipment used to disk the fields.

In addition to the artifact deposit and structural remains, two 12-inch-diameter fragments of concrete post foundations were identified approximately 15 feet southeast of the location of the structural remains. The materials at SMUD-1 appear to be a mixture of mid-20th-century and modern materials associated with farming and ranching.

SMUD-3

SMUD-3 is a moderately dense historic-era artifact deposit located on a disked, east-facing hillside, approximately 68 feet upslope from Montezuma Hills Road. The artifact deposit consists of highly fragmentary ceramics, glass (vessel) fragments, and metal hardware. Ceramics include 15 fragments of nondiagnostic white improved earthenware and two fragments of brown glazed earthenware. The glass fragments include three green, eight aqua, and three amethyst-colored sherds. The metal fragments include two railroad spikes, 10 cast iron brackets/hooks, and several fragments of miscellaneous scrap metal. Although diagnostic artifacts are largely absent, the materials identified suggest an age range from the late 19th to early 20th century.

Because the field has been disked, it is unlikely that the artifacts are *in situ*. However, the artifacts were found concentrated in one primary location, intermixed and even embedded in the disked dirt, as opposed to just overlying the dirt. This finding indicates that the artifacts were likely in this general location when the field was disked. Sparse artifacts were identified as far as 145 feet north of the primary deposit. These artifacts may have been relocated across the landscape during disking. A review of historic-era maps and aerial photographs does not indicate that a structure was ever recorded in this location; thus, determining association is difficult.

Solano 4 West

SMUD-5

SMUD-5 is an abandoned northeast-southwest trending fence line. Only a small portion of the fence lies within the APE. The fence consists of upright square posts generally 4 feet high; some posts have been augmented by and stabilized using standard two-by-fours. The barbed wire connecting the posts has mostly been removed. All visible nails are wire cut. A concrete fence pier was found in a dry swale on the east edge of Solano 4 West. In aerial photographs, it appears that this feature is in line with SMUD-5, so it was included as part of this resource.

The fence line, located in the southeast quarter of the northwest quarter of Section 25, is likely associated with the ranch property acquired by John Kierce from Lindsay Powell Marshall Sr. in 1880, when Marshall divested some of his lands to Kierce and Edward Jenkins (Gregory 1912; Theodoratus et al. 1980:131). John and his wife Ann (O'Loughlin) Kierce (also *Kerce*, *Kearce*), were natives of Ireland who emigrated to the United States sometime in the early 1860s (U.S. Census Office 1900). John and Ann appear in the 1870 U.S. Census as residents of Denverton, northwest of the APE, in Solano County; John is listed as a farmer with real estate valued at $3,600 (U.S. Census Office 1870). When John drowned in Collinsville in January 1893 (Solano County 1915) while tending to his business interests in the area (*San Francisco Call* 1893a), this property passed to Ann and her four remaining living children, Francis, Mary (Griffin), Veronica, and Theresa. The eldest daughter, Mary, and her husband Stephen Griffin were Collinsville residents at the time of John's death (*San Francisco Call* 1893a; *Woodland Daily Democrat* 1893), while Francis (Frank) was a patent attorney living in Oakland (*San Francisco Call* 1893b). The remaining members of the Kierce family were residents of San Francisco (*San Francisco Call* 1893a).

This property has maintained (roughly) its 1890 borders and acreage into the 21st century. In about 1912, the U.S. government acquired a small portion of the parcel in the south through eminent domain, for the purpose of widening the mouth of the Sacramento River to improve navigation (Herbert and Kennedy 2007; *San Francisco Call* 1911; Solano County 1890, 1915, 2018).

SMUD-6

SMUD-6 is a broken, 9-inch-diameter, white improved earthenware dinner plate. Two pieces were identified. The rim is scalloped and the brim is decorated with a blue floral and geometric decal pattern. The base of the plate has a green mark reading "中国唐山 [China Tangshan]/Made in China," surrounded by a green ribbon. Tangshan was a major center of ceramics in China in the 20th century (Koh 2014). This mark may date to the 1960s or 1970s (eBid 2018; Nillson 2018). The plate was found in a dry swale within what was once Edward Jenkins' property, more recently belonging to James W. Roberts (Herbert and Kennedy 2007). No other artifacts were found in the vicinity.

CA-SOL-283H, P-48-000124

Historic-era archaeological site CA-SOL-283H was originally recorded by Crist and Peeler (1980) as part of the larger survey by Theodoratus et al. (1980). As recorded, the site includes a barn with a footprint of 65 feet by 65 feet; a row of eucalyptus trees; a scattering of pepper and fruit trees; three depressions, two of which may be privies and the third a cellar; and the remains of a water storage tank. Recorded artifacts associated with the site include cut nails, porcelain fragments, metal hoops for a wooden water tank, and other fragments of glass and metal. Local informants told Crist and Peeler (1980) that a two-story house had previously stood over the largest of the three depressions noted at the site. The site's location matches a home marked on the Thompson and West 1877 map of the area. Whether the reported house represented this original structure is unclear, but it is possible that artifacts from the late 19th century are buried in and around the site.

The site was revisited for the study by Whitaker and Kaijankoski (2010). The site appeared to be as originally recorded. The eucalyptus windbreak was intact and the barn standing. The barn was found to be in a state of disrepair and the rest of the site was being used as part of a larger parcel to graze sheep. Water tower debris and the southernmost depression were relocated; a small depression that might represent the privy was recorded, but was obscured by weeds during the current field effort. Bricks, ceramics, metal, and glass debris were spread over the area, particularly around the pepper tree recorded on the site map. An axle, likely related to agricultural activities, was under the pepper tree as well.

CA-SOL-284H, P-48-000125

Archaeological site CA-SOL-284H was recorded by Crist and Peeler (1980) as consisting of a scattering of crockery fragments, the remains of a septic tank, and a light scatter of brick and glass fragments within a small grove of eucalyptus trees. Features recorded at the site included a "wood covered hole" and a septic tank depression. The site is recorded as the "possible Charles Dadami homesite" as recorded on the Thompson and West 1877 map (Crist and Peeler 1980).

The site was visited by FWARG archaeologists in 2010 (Whitaker and Kaijankoski 2010). The pipe and wood-covered hole recorded on the site map were relocated and photographed. The location of the septic tank was not recorded on the original site map and could not be located during the current field effort. The artifacts recorded by Crist and Peeler (1980) could not be found, either, although visibility on the site was poor because of overgrown grass and debris from the eucalyptus trees.

CA-SOL-285H, P-48-000126

Site CA-SOL-285H was recorded by Maniery et al. (1980a) as the former site of a Catholic church and school present on historical maps, located on a knoll at the intersection of Collinsville Road and Stratton Lane. Maniery et al. (1980a) noted four depressions, one of which was a privy that contained remnant plumbing and considerable scattered wooden debris. Additional debris was found in the vicinity, including lumber planks and arches, round and square nails, metal drain pipes, ceramic drainage pipes, concrete, glass, and ceramic fragments.

CA-SOL-298H, P-48-000139

Site CA-SOL-298H was recorded as a historic-era homesite characterized by numerous objects such as various porcelain fragments, glass fragments, and a rectangular concrete slab (Gebhardt et al. 1980). Other artifacts recorded in 1980 included cast iron fragments, a pen knife fragment, a door hinge, and tin cans and bottles that postdate 1930. Gebhardt et al. (1980) refer to the homestead as the Simpson House.

FWARG archaeologists visited the site in 2010 (Whitaker and Kaijankoski 2010). The only features recorded in 1980 that could be relocated were the eucalyptus and pepper trees and the north-south trending fence line. Several pieces of concrete were found within the recorded site boundaries and may represent the recorded concrete slab. Some posts from an east-west trending fence line were noted, but the fence is no longer standing. A conversation with a local rancher who leases the property revealed that a large amount of disturbance and possible modification of the site area had occurred during the prior 5 years when the property was used illegally by off-road motorcyclists. A large number of recent shotgun shells were also noted in and around the site, indicating impacts from hunting or target practice in recent years. It is not surprising, therefore, that historic-era artifacts could not be relocated.

CA-SOL-299H, P-48-000140

Site CA-SOL-299H was recorded by Maniery et al. (1980b) as a historic-era homesite characterized by several features including a possible well, and historic-era artifacts including bottle glass, porcelain, metal, tin, and aluminum fragments. In addition, a narrow, rectangular plank-lined subsurface pit with sewer pipe was found surrounded by four vertical 4-inch by 4-inch boards. The site was recorded as the Whitman house site.

FWARG archaeologists visited the site in 2010 (Whitaker and Kaijankoski 2010). Only the pepper trees noted on the site record could be relocated. It appears that large-scale earthmoving has heavily affected the site since it was initially recorded in 1980. Impacts included three large excavations, consistent with the information provided by a local rancher regarding off-road motorcycle damage on the property. The depression mapped in 1980 was not apparent and may have been filled in with earth from the excavated areas. It appears that little of the original site deposit is left, although some subsurface artifacts may be present.

CA-SOL-33, P-48-000041, Hastings Adobe

Site CA-SOL-33 is the only prehistoric site identified in the records search area, at the southwest margin of the APE. Although it seems that CA-SOL-33 and the Hastings Adobe do not overlap, the NWIC has associated the two, and it seems that the location of the Hastings Adobe is used to approximate the location of CA-SOL-33. These sites are located outside of the 2010 survey area (Whitaker and Kaijankoski 2010).

Site CA-SOL-33 was recorded by Elsasser (1956) based on an account by a local resident who stated that people "used to collect arrowheads there." However, Elsasser notes that the site may have already been destroyed, as he could find no evidence of prehistoric occupation in the sandy soil in the purported location. The location plotted for this site is an "approximate location" and the site is not mentioned in any subsequent studies, nor are there any site record updates.

P-48-128/CA-SOL-287H

Site P-48-128/CA-SOL-287H was recorded by Maniery et al. (1980a) as a historic-period homesite with very little surface evidence remaining. The site was recorded based on oral history accounts of a house on the location. All that was recorded in 1980 were three fragments of ceramics, some cut nails, and burned boards.

FWARG archaeologists visited the site on August 31, 2010. No evidence of archaeological remains was found at the site, which had recently been disked. The area is flat, and therefore could have served as a homestead site; however, there does not appear to be any archaeological evidence to support the historical accounts. Because the resource was minimal in the first place, and subsequent farming activity apparently removed the sparse evidence of possible historic-era occupation, FWARG concluded that the site is not eligible for inclusion in the NRHP and CRHR. No further management of this resource was recommended.

P-48-415/CA-SOL-399H

Site P-48-415/CA-SOL-399H was documented in 1980 by G. Maniery, C. Peeler, and R. Ambro, and was described as possibly being the remains of the Esperson homesite. The site was described as consisting of a eucalyptus tree, a palm tree stump, a wooden gate on Stratton Lane, a privy location, a scattering of lumber, and two possible refuse deposits. Observed artifacts consist of green, brown, and blue glass fragments; brick fragments; tin cans; a car tire; crockery fragments; two metal tea kettles; and a wagon wheel hoop.

P-48-416/CA-SOL-400H

Site P-48-416/CA-SOL-400H was documented in 1980 by G. Maniery, C. Peeler, and R. Ambro, and was described as possibly being the remains of the Charles Rice homesite. Observed features consist of a cellar hole and three depressions, one of which has a considerable scatter of bricks within and surrounding the depression. Observed artifacts consist of lumber planks with square nails, and a metal pipe segment.

Tribal Cultural Resources

On behalf of SMUD, AECOM requested a search of the Sacred Lands File database for the project site. In a letter dated May 15, 2018, the NAHC indicated that its files do not include records of any sacred lands or other Native American traditional cultural properties in the immediate project vicinity. The NAHC stated that local tribes and individuals should be consulted regarding the presence of traditional cultural resources within or near the project site.

As stated previously in Section 3.4.1, "Regulatory Setting," AB 52 applies to those projects for which a lead agency issued an NOP of an EIR or notice of intent to adopt a negative declaration or mitigated negative declaration on or after July 1, 2015. The specific details of the consultations are confidential under California law; however, communication between the tribes and SMUD for this project is summarized below.

In accordance with PRC Section 21080.3.1(b), SMUD sent letters to the Ione Band of Miwok Indians, United Auburn Indian Community of the Auburn Rancheria (UAIC), Cortina Band of Indians, Yocha Dehe Wintun, and Wilton Rancheria on March 29, 2018. This letter also requested that the groups contact SMUD if they desired to consult in accordance with AB 52. Letters to the Cortina Band of Indians and the Yocha Dehe Wintun were re-sent to the correct post office box address on April 5, 2018. To date, these two groups have not responded.

SMUD received a letter from the UAIC dated April 24, 2018, requesting consultation on the Solano 4 Wind Project, including a conference call to discuss the project. SMUD proposed various meeting dates in an e-mail message to the U.S. Army Corps of Engineers on May 16, 2018. As requested, SMUD provided the UAIC with an electronic copy of the *Archaeological Survey and Geoarchaeological Sensitivity Report for the Proposed Solano Phase 4 Wind Project, Solano County, CA* on May 24, 2018, and e-mailed the UAIC a request to indicate its meeting availability. A follow-up e-mail message was sent to the UAIC on June 20, 2018, requesting availability for a conference call.

On July 20, 2018, the UAIC responded in an e-mail message stating that it would like to close consultation for this project, provided that the UAIC-recommended mitigation measures are incorporated into the environmental and planning documents. These measures address worker awareness training, a post–ground disturbance site visit, and inadvertent discoveries. In addition, the UAIC asked SMUD to notify Tribal Historic Preservation Officer Matthew Moore (THPO@auburnrancheria.com) should an inadvertent discovery of TCRs occur, and to confirm that the mitigation measures will be included in the environmental document and the adopted mitigation monitoring and reporting program. The UAIC also requested that this correspondence become a part of the project record and that SMUD provide the UAIC with a copy of the final environmental document. SMUD confirmed the mitigation language with the UAIC and closed consultation on February 21, 2019.

The Wilton Rancheria did not reply to the request letter sent in March; however, SMUD met with Wilton Rancheria representative Ed Silva on December 18, 2018, at a reoccurring monthly meeting to discuss SMUD projects. Ammon Rice of SMUD informed Mr. Silva of the Solano 4 Wind Project, stated that a letter inquiring about AB 52 consultation had been sent, and noted that SMUD had not received a reply from the Wilton Rancheria. Mr. Silva stated that the Wilton Rancheria would be interested in consulting on the project.

SMUD met with Antonio Ruiz and Troy Hatch from the Wilton Rancheria on January 24, 2019, during a reoccurring monthly meeting to discuss SMUD projects. Ammon Rice of SMUD informed Mr. Ruiz and Mr. Hatch of the Solano 4 Wind Project and provided a copy of the NOP for the project. An NOP had also been sent via regular mail. A copy of the NOP and correspondence received in response to the NOP is found in the scoping report (Appendix A). Mr. Ruiz stated that TCRs are present near the river and that the Wilton Rancheria was interested in consulting on the project. Subsequently, Ammon Rice, SMUD representative, conducted a site visit with Antonio Ruiz of Wilton Rancheria. Mr. Ruiz. Mr. Ruiz asked that the EIR include a description of the Ompin site located south of the Solano 4 West site. Due to the concentration of sensitive sites around the project area, and the longevity of habitation, and the dynamic nature of that habitation, Wilton Rancheria requested to be kept apprised of any discoveries made during the life of the proposed project.

3.4.3. Environmental Impacts and Mitigation Measures

Methods and Assumptions

The analysis is also informed by the provisions and requirements of federal, state, and local laws and regulations that apply to cultural resources.

Section 21083.2 of the State CEQA Guidelines defines “unique archaeological resource” as an archeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets one or more of the following CRHR-related criteria:

(1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.

(2) Has a special and particular quality, such as being the oldest of its type or the best available example of its type.

(3) Is directly associated with a scientifically recognized important prehistoric or historic event or person.

An impact on a “nonunique resource” is not a significant environmental impact under CEQA (State CEQA Guidelines, Section 15064.5[c][4]). If an archaeological resource qualifies as a resource under CRHR criteria, then the resource is treated as a unique archaeological resource for the purposes of CEQA.

PRC Section 21074 defines TCRs as "sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American Tribe" that are listed or determined eligible for CRHR listing, listed in a local register of historical resources, or otherwise determined by the lead agency to be a tribal cultural resource.

Thresholds of Significance

Based on Appendix G of the State CEQA Guidelines, the project would result in a potentially significant impact on archaeological, historical, and TCRs if it would:

- cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5;
- cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5;
- disturb any human remains, including those interred outside of dedicated cemeteries; or
- cause a substantial adverse change in the significance of a tribal cultural resource as defined in PRC Section 21074.

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. Therefore, the following issue will not be discussed further in the impact analysis.

Substantial adverse change in the significance of a historical resource within the direct area of potential effects

As described above, no historical resources were identified in the direct APE. Four historic-era archaeological resources were identified during the field survey:

- SMUD-5 (abandoned fence line)
- SMUD-6 (isolate ceramic plate)
- SMUD-3 (concentration of habitation debris)
- SMUD-1 (remnant livestock watering feature)

All of these historic-era resources, identified within the direct APE, date to the 20th century and do not appear to be associated with any significant events or individuals important in the history of the Montezuma Hills, Solano County, or California. Similarly, none of the identified historic-era resources embody a distinctive type of construction, and they do not appear to have the potential to yield information important in history. In addition to lacking historic significance, the historic-era resources lack integrity, given their deterioration and alteration. Thus, no historic properties (NRHP) or historical resources (CRHR) were identified within the direct APE.

Resource P-48-524, Ranch Complex 1, Ranch Complex 2, and the potential Montezuma Hills Rural Historic Landscape were evaluated and found ineligible for listing in the CRHR or NRHP. As a result, these resources would not be considered significant for the purposes of CEQA.

Therefore, project construction and operation would have no direct impact on historical resources within the direct APE. For these reasons, this issue will not be discussed further. Potential indirect effects on the Hastings Adobe, a historical resource located outside of the direct APE, are discussed in Impact 3.4-4, below.

Impact Analysis

Impact 3.4-1: Impacts on unique archaeological resources.

Previous investigations resulted in the documentation of four archaeological resources, a ranch complex, and the potential Montezuma Hills Rural Historic Landscape. These resources have been evaluated for the NRHP and CRHR but do not appear to be eligible; therefore, they are not considered unique archaeological resources. However, project-related ground-disturbing activities could result in the discovery of or damage to as-yet undiscovered archaeological resources as defined in Section 15064.5 of the State CEQA Guidelines. This impact would be **potentially significant**.

A geoarchaeological sensitivity assessment for most of the project site south of Montezuma Hills Road concluded that sensitivity for buried archaeological sites on the site is limited to very narrow areas along creeks and drainages, such as the unnamed creek east of and parallel to Talbert Lane in Solano 4 West, and along the Montezuma Hills.

Therefore, preconstruction activities or ground disturbance during the construction period could encounter previously undiscovered or unrecorded archaeological sites and materials. These activities could damage or destroy previously undiscovered archaeological resources. This impact would be **potentially significant**.

Mitigation Measure 3.4-1a: Avoid or conduct subsurface testing and/or monitoring during construction in areas with high potential for the presence of buried archaeological sites.

The construction contractor shall avoid conducting ground-disturbing activities in the few locations within the direct APE that have high or the highest potential for buried archaeological sites. If these areas cannot be avoided and project-related ground disturbance in those areas would be sufficiently deep that they could encounter buried archaeological resources, then additional actions may be necessary to mitigate any impacts on as-yet unidentified buried resources. These minimization efforts could include conducting subsurface testing before project construction and/or monitoring during the construction period.

Mitigation Measure 3.4-1b: Prior to the start of construction, SMUD shall provide worker awareness training to the construction contractor and SMUD's project superintendent regarding the potential for cultural and tribal cultural resources that could be encountered during ground disturbance, the regulatory protections afforded to such finds, and the procedures to follow in the event of discovery of a previously unknown resource, including notifying SMUD representatives. SMUD shall invite representatives of UAIC to periodically inspect the active areas of the project, including any soil piles, trenches, or other disturbed areas. UAIC shall be notified at least 48 hours prior to start of construction. In the event that tribal representatives or construction workers find evidence of potential tribal cultural resources, the procedures identified in Mitigation Measure 3.4-1c and 3.4-2 shall be implemented.

Mitigation Measure 3.4-1c: Halt ground-disturbing activity upon discovery of subsurface archaeological features.

If any prehistoric or historic-era subsurface archaeological features or deposits, including locally darkened soil ("midden"), that could conceal cultural deposits are discovered during construction, all ground-disturbing activity shall cease within 100 feet of the resource(s) discovered. A qualified cultural resources specialist and Native American representatives and monitors from culturally affiliated Native American Tribes shall assess the significance of the find and make recommendations for further evaluation and treatment as necessary. These recommendations shall be documented in the project record. For any recommendations made by interested Native American Tribes that are not implemented, the project record shall provide a justification explaining why the recommendation was not followed.If the qualified archaeologist determines the find to be significant (because the find constitutes either a historical resource, a unique archaeological resource, or a tribal cultural resource), and if an adverse impact on a TCR, unique archaeology, or other cultural resource occurs, then SMUD shall consult with interested Native American groups and individuals regarding mitigation contained in PRC Sections 21084.3(a) and 21084.3(b) and State CEQA Guidelines Section 15370. Potential mitigation measures developed in coordination with interested Native American groups may include:

- preservation in place (the preferred manner of mitigating impacts on archaeological sites),
- archival research,
- replacement of cultural items for educational or cultural purposes,
- preservation of substitute TCRs or environments and/or subsurface testing, or
- contiguous block unit excavation and data recovery (when it is the only feasible mitigation, and pursuant to a data recovery plan).

Significance after Mitigation

Mitigation Measure 3.4-1a requires identification of buried archaeological resources before project implementation and/or monitoring of such resources during construction, which would minimize the impacts and potential for destruction of the resources during project implementation. Mitigation Measure 3.4-1b requires that professionally accepted and legally compliant procedures be followed in case previously undocumented significant archaeological resources are discovered. Therefore, implementing these mitigation measures would reduce impacts on buried archaeological resources to a **less-than-significant** level.

Impact 3.4-2: Impacts on tribal cultural resources.

Consultation with the Wilton Rancheria is ongoing and could result in the identification of TCRs as described under AB 52 and PRC Section 21074. Because consultation has not yet been completed, this impact would be **potentially significant.**

During reoccurring monthly meetings, SMUD held discussions with the Wilton Rancheria regarding the potential for the presence of tribal cultural resources on and around the project site. Wilton Rancheria is aware of several highly sensitive areas within the projects general location. Due to the concentration of sensitive sites around the project area, and the longevity of habitation, and the dynamic nature of that habitation, Wilton Rancheria requested to be kept apprised of any discoveries made during the life of the proposed project.,

No unique archaeological resources have been identified on the project site and the NAHC Sacred Lands Database search was negative. However, AB 52 consultation has not yet been completed. Therefore, TCRs may exist at the project site and could be affected by the project. This impact would be **potentially significant**.

Mitigation Measure 3.4-2: Native American consultation.

SMUD concluded consultation with the UAIC and Wilton Rancheria under AB 52.

If TCRs are identified that have the potential to be adversely affected by the project, SMUD shall notify Tribal Historic Preservation Officers Matthew Moore (THPO@auburnrancheria.com) and Ralph Hatch (rhatch@wiltonrancheria-nsn.gov), and SMUD will develop mitigation measures in consultation with interested Native American groups and individuals to minimize those impacts. These mitigation measures could include the following or equally effective mitigation measures (as identified in PRC Section 21084.3):

(1) Avoidance and preservation of the resources in place, including but not limited to planning and construction to avoid the resources and protect the cultural and natural context, or planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.

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

(A) protecting the cultural character and integrity of the resource;

(B) protecting the traditional use of the resource; or

(C) protecting the confidentiality of the resource.

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

(4) Protecting the resource.

(5) Preserving substitute TCRs, resources, or environments.

<u>Significance after Mitigation</u>

Mitigation Measure 3.4-2 requires that tribal consultation be completed, and that mitigation measures be developed and implemented for any TCRs identified during consultation that have the potential to be adversely affected by the project. Therefore, implementing this mitigation measure would reduce impacts on TCRs to a **less-than-significant** level.

Impact 3.4-3: Impacts on previously unidentified human remains.

Excavation during project construction could disturb previously undiscovered human remains. This impact would be **potentially significant.**

Project construction would involve grading, trenching, excavation, soil stockpiling, and other earthmoving activities. There has been no indication that the area has been used for human burials in the recent or distant past; therefore, human remains are unlikely to be encountered. However, in the unlikely event that human remains are discovered during subsurface activities, they could be inadvertently damaged. Therefore, this impact would be **potentially significant**.

Mitigation Measure 3.4-3: Halt ground-disturbing activity upon discovery of human remains.

If human remains are discovered during any demolition/construction activities, potentially damaging ground-disturbing activities within 100 feet of the remains shall be halted immediately, and SMUD will notify the Solano County coroner and the NAHC immediately, according to PRC Section 5097.98 and Section 7050.5 of the California Health and Safety Code. If the remains are determined by the NAHC to be Native American, the guidelines of the NAHC shall be followed during the treatment and disposition of the remains. SMUD will also retain a professional archaeologist with Native American burial experience to conduct a field investigation of the specific site and consult with the Most Likely Descendant, if any, identified by the NAHC. Following the coroner's and NAHC's findings, the archaeologist and the NAHC-designated Most Likely Descendant shall determine the ultimate treatment and disposition of the remains and take appropriate steps to ensure that additional human interments are not disturbed. PRC Section 5097.94 identifies the responsibilities for acting upon notification of a discovery of Native American human remains.

Significance after Mitigation

Mitigation Measure 3.4-3 requires the performance of professionally accepted and legally compliant procedures in case of the discovery of human remains. Therefore, implementing this mitigation measure would reduce impacts associated with human remains to a **less-than-significant** level.

Impact 3.4-4: Indirect impacts on a historical resource.

The Hastings Adobe (a historical resource listed in the NRHP and CRHR) is located outside of the project's direct APE. Project-related construction vibration and visual effects would not result in an indirect substantial adverse change. This impact would be **less than significant**.

The project would involve constructing new gravel access roads and WTGs at sites at least 0.25 mile northeast and less than 0.75 mile northwest of the Hastings Adobe, a historical resource listed in the NRHP and CRHR. At these distances, these project activities have no potential to cause a direct adverse change to the Hastings Adobe because they would not result in the physical destruction or material alteration of the historical resource. Because of its general proximity to the historical resource, however, the project does have the potential to cause indirect adverse changes to the building. These indirect adverse changes include potential changes caused by construction or operational vibration and the introduction of visual changes to the setting of the historical resource.

Constructing a new gravel access road would not cause a substantial adverse change to the resource. The approximately 20-foot-wide road would not introduce new visual elements to the immediate viewshed of the resource because it would be at grade and similar to the existing gravel corridors throughout the area.

The rural setting of the Montezuma Hills surrounding the Hastings Adobe is a character-defining feature of the property (PG&E 2010); however, this setting has already been compromised by the placement of WTGs in the general vicinity to the north, northeast, and northwest of the historical resource (see Exhibit 3.1-1 in Section 3.1, "Aesthetics," for existing conditions from the Hasting Adobe). The proposed project would diminish this rural setting further with the construction of additional WTGs at Solano 4 West and Solano 4 East. Solano 4 West includes strings of WTGs in the southern portion of the project area along the crest of the hillside 0.25 mile north of the historical resource. WTGs are currently visible from the Hastings Adobe; however, the WTGs that are proposed by the project would be closer and taller, and therefore far more intrusive to the visual setting (see Exhibit 3.1-1 in Section 3.1 of this EIR for simulated conditions from the Hasting Adobe). Still, the integrity of the historic setting in the vicinity of the Hastings Adobe has already been diminished with the construction of WTGs throughout the viewshed. Therefore, the indirect visual impact of the project on the Hastings Adobe would be **less than significant**.

Mitigation Measures

No mitigation is required.

3.5. Geology, Soils, Paleontological Resources, and Mineral Resources

This section describes the existing geologic conditions of the project site, including geology, soils, seismicity, paleontological resources, and mineral resources, and analyzes potential impacts of implementing the project. Regulations and guidelines established by federal, state, and local jurisdictions provide the regulatory background that guides the assessment of potential environmental effects on these resources. The potential environmental effects of soil erosion on water quality and other stormwater issues are addressed in Section 3.8, "Hydrology and Water Quality."

3.5.1. Regulatory Setting

Federal

Earthquake Hazards Reduction Act

In October 1977, the U.S. Congress enacted the Earthquake Hazards Reduction Act of 1977 (United States Code Title 42, Sections 7701–7706) to reduce risks to life and property from future earthquakes in the United States. To accomplish this, the act established the National Earthquake Hazards Reduction Program (NEHRP). The mission of NEHRP includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improved building codes and land use practices; risk reduction through post-earthquake investigations and education; development and improvement of design and construction techniques; improved mitigation capacity; and accelerated application of research results. The NEHRP designates the Federal Emergency Management Agency as the lead agency of the program and assigns several planning, coordinating, and reporting responsibilities. Other NEHRP agencies include the National Institute of Standards and Technology, National Science Foundation, and U.S. Geological Survey.

National Pollutant Discharge Elimination System

Under Section 402 of the Clean Water Act (CWA), the National Pollutant Discharge Elimination System (NPDES) controls water pollution by regulating point sources of pollution to waters of the United States. The State Water Resources Control Board (SWRCB) administers the NPDES permit program in California. Projects that disturb 1 acre or more of soil must obtain coverage under the state's NPDES General Permit for Discharges of Storm Water Associated with Construction Activity. The entity implementing any such project must develop and implement a storm water pollution prevention plan (SWPPP) that provides specific construction-related best management practices (BMPs) to prevent soil erosion and loss of topsoil. Regulations regarding water pollution caused by erosion are discussed further in Section 3.8, "Hydrology and Water Quality."

Paleontological Resources

No federal plans, policies, regulations, or laws pertaining to paleontological resources are applicable.

Mineral Resources

No federal plans, policies, regulations, or laws pertaining to mineral resources are applicable.

State

Alquist-Priolo Earthquake Fault Zoning Act

The goal of the Alquist-Priolo Earthquake Fault Zoning Act of 1972 (Alquist-Priolo Act) (Public Resources Code Sections 2621–2630) is to reduce the risk to life and property from surface fault rupture during earthquakes by regulating construction in active fault corridors. The act defines criteria for identifying active faults, giving legal support to terms such as "active" and "inactive," and establishes a process for reviewing building proposals in earthquake fault zones.

Under the Alquist-Priolo Act, faults are zoned and construction along or across earthquake fault zones is strictly regulated if the fault zones are "sufficiently active" and "well-defined." A fault is considered sufficiently active if one or more of its segments or strands shows evidence of surface displacement during Holocene time (defined for purposes of the act as within the last 11,000 years), or if its trace is clearly detectable by a trained geologist as a physical feature at or below the earth's surface. A fault is considered well defined if its trace can be clearly identified by a trained geologist at the ground surface or in the shallow subsurface, using standard professional techniques, criteria, and judgment.

Before a project can be permitted in a designated Alquist-Priolo Earthquake Fault Zone, the city or county in which the project would be located must require a geologic investigation demonstrating that proposed buildings would not be constructed across active faults. The law addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards.

Seismic Hazards Mapping Act

The goal of the Seismic Hazards Mapping Act of 1990 (Public Resources Code Sections 2690 through 2699.6) is to reduce damage caused by earthquakes. While the Alquist-Priolo Act addresses surface fault rupture, the Seismic Hazards Mapping Act addresses other earthquake-related hazards, including ground shaking, liquefaction, and seismically induced landslides.

The provisions of the Seismic Hazards Mapping Act are similar in concept to those of the Alquist-Priolo Act: The State of California is charged with identifying and mapping areas at risk of strong ground shaking, liquefaction, landslides, and other corollary hazards, and cities and counties must regulate development within mapped seismic hazard zones. Under the Seismic Hazards Mapping Act, permit review is the primary mechanism for local regulation of development.

California Building Code

The California Building Code (CBC) (California Code of Regulations, Title 24) is based on the International Building Code (IBC). The ground motions for design that are mapped in the IBC are based on the U.S. Geological Survey's probabilistic seismic hazards analysis maps. The IBC Seismic Zone Maps of Region 1 of the United States identify the maximum considered earthquake motion for California and Nevada. Engineers use these maps when establishing design characteristics for structures. The CBC has been modified from the IBC for California conditions with more detailed and/or more stringent regulations.

Chapter 16 of the CBC sets forth specific minimum seismic safety and structural design requirements. The CBC identifies seismic factors that must be considered in structural design. Chapter 18 regulates the excavation of foundations and retaining walls, while Chapter 18A regulates construction on unstable soils, such as expansive soils and areas subject to liquefaction. Appendix J of the CBC regulates grading activities, including drainage and erosion control.

NPDES Permit System and Waste Discharge Requirements for Construction

The 1972 amendment to the CWA established the NPDES permit program. The NPDES permit program as outlined in the CWA contains effluent limitation guidelines, water quality requirements, and permit program requirements for discharges to waters of the United States.

The 1987 amendment to the CWA established a framework for regulating discharges under the NPDES. On November 16, 1990, the U.S. Environmental Protection Agency issued regulations for permitting stormwater discharges from industrial sites, including construction sites that disturb 5 acres or more, and from municipal separate storm sewer systems (MS4s) that serve populations of 100,000 people or more. The 1990 regulations, known as the Phase I regulations (55 *Federal Register* [FR] 47990), require coverage by an NPDES permit for stormwater runoff from operators of medium and large MS4s, construction activity disturbing 5 acres of land or greater, and 10 categories of industrial activity.

On December 8, 1999, the U.S. Environmental Protection Agency published regulations known as Phase II. The regulations in the Storm Water Phase II Final Rule (64 FR 68722) require permit coverage for discharges from small municipalities, including nontraditional small MS4s (governmental facilities such as military bases, public campuses, and prison and hospital complexes) and from construction sites disturbing at least 1 acre of land. Phase II is intended to further reduce adverse impacts on water quality in receiving waters and aquatic habitats by instituting controls on the unregulated sources of stormwater discharges that are most likely to continue degrading the environment. The goal of the NPDES nonpoint source regulations is to improve the quality of stormwater discharged to receiving waters to the “maximum extent practicable” through the use of BMPs.

Under Phase II regulations in California, small MS4s are covered under SWRCB Water Quality Order No. 2003-0005–Division of Water Quality (DWQ), NPDES General Permit No. CAS000004.

Construction projects that would disturb at least 1 acre of land are covered under the Construction General Permit: SWRCB Water Quality Order No. 2009-0009-DWQ, NPDES General Permit No. CAS000002. Compliance with the NPDES Construction General Permit requires applicants to submit a notice of intent to the SWRCB and to prepare a SWPPP. The SWPPP identifies BMPs that must be implemented to reduce the effects of construction on receiving water quality. The BMPs are sediment and erosion control measures and other measures to control potential chemical contaminants. The permit also requires dischargers to consider using permanent postconstruction BMPs that will remain in service to protect water quality throughout the life of the project. All NPDES permits also have inspection, monitoring, and reporting requirements.

Paleontological Resources

Paleontological resources are fossilized remains of plants and animals, and associated deposits. Appendix G of the State CEQA Guidelines requires that a determination be made as to whether a project would directly or indirectly destroy a unique paleontological resource or site or unique geological feature.

Mineral Resources

California has identified Mineral Resources Zones as described in California Surface Mining and Reclamation Act Mineral Land Classification Reports SR 146 Parts I and III, and SR 156. The classification system is intended to ensure that counties and cities consider statewide or regionally significant mineral deposits in their administration of planning and development activities. Mineral designations are intended to prevent incompatible land use development in areas determined to have significant mineral resource deposits. Permitted uses in a mineral resource zone include mining, uses that support mining such as smelting and storage of materials, or uses that will not hinder future mining.

Local

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]). The following policies are provided for purpose of disclosure and to allow informed decisionmaking.

Solano County General Plan

The Resources Element and Public Health and Safety Element of the *Solano County General Plan* (General Plan) (Solano County 2008a, 2015) include the following policies:

<u>Resources Element</u>

- **Policy RS.P-33:** The County shall preserve, for future use, areas with important mineral resources by preventing residential, commercial, and industrial development that would be incompatible with mining practices to the extent feasible.

- **Policy RS.P-69:** Preserve and maintain watershed areas characterized by slope instability, undevelopable steep slopes, high soil erosion potential, and extreme fire hazards in agricultural use. Watershed areas lacking water and public services should also be kept in agricultural use.

- **Policy RS.P-71:** Ensure that land use activities and development occur in a manner that minimizes the impact of earth disturbance, erosion, and surface runoff pollutants on water quality.

<u>Public Health and Safety Element</u>

- **Policy HS.P-12:** Require new development proposals in moderate or high seismic hazard areas to consider risks caused by seismic activity and to include project features that minimize these risks.

- **Policy HS.P-13:** Review and limit the location and intensity of development and placement of infrastructure in identified earthquake fault zones.

- **Policy HS.P-14:** Identify and minimize potential hazards to life and property caused by fault displacement and its impact on facilities that attract large numbers of people, are open to the general public, or provide essential community services and that are located within identified earthquake fault zones.

- **Policy HS.P-15:** Reduce risk of failure and reduce potential effects of failure during seismic events through standards for the construction and placement of utilities, pipelines, or other public facilities located on or crossing active fault zones.

- **Policy HS.P-16:** Require minimum setbacks for construction along creeks between the creek bank and structure, except for farm structures that are not dwellings or places of work, based on the susceptibility of the bank to lurching caused by seismic shaking.

- **Policy HS.P-17:** Restrict the crossing of ground failure areas by new public and private transmission facilities, including power and water distribution lines, sewer lines, and gas and oil transmission lines.

- **Policy HS.P-18:** Make information about soils with a high shrink-swell potential readily available. Require proper foundation designs in these areas.

- **Policy HS.P-19:** Minimize development in areas with high landslide susceptibility.

Solano County General Plan/Solano County Component of the Suisun Marsh Local Protection Program

Solano County (County) has integrated the 2018 Solano County Component of the Suisun Marsh Local Protection Program into the General Plan as Chapter 12. The requirement to manage and protect Suisun Marsh is established in the Suisun Preservation Act of 1977, which divides the marsh into the Primary and Secondary management areas. As required by the Suisun Marsh Preservation Act, all public and private development activities within the Primary and Secondary management areas of Suisun Marsh shall be consistent with the policies and provisions of the certified Suisun Marsh Local Protection Program (Solano County 2018).

A portion of the Solano 4 West project site is located within the Secondary Management Area. However, no project components are proposed in the Secondary Management Area of Suisun Marsh.

3.5.2. Environmental Setting

The project site is located in the Montezuma Hills at the western boundary of the Great Valley geomorphic province of California, a broad alluvial plain underlain by hundreds of feet of alluvial sediment (CSUN 2019). Topography in the project area is characterized by rolling hills with crest elevations ranging from a high of 237 feet above mean sea level, and the low of 18 feet above mean sea level. Intermittent streams are found in the low-lying areas. Within the Montezuma Hills, the bedrock of the Great Valley consists of Cretaceous and Cenozoic strata of the Coast Ranges geomorphic province. The Montezuma Hills consist of the Quaternary Montezuma Formation (Qmz), which is characterized by poorly stratified, slightly consolidated, clayey and pebbly sand, and locally calcareous lenses. Quaternary alluvium (Qal) deposits have also been mapped in the project area. These deposits include unconsolidated sand, silt, gravel, and clay that may be subject to liquefaction, densification, settlement, lateral spreading, expansion, and lurching that could affect project facilities (CDMG 1981).

Soils

Soil Characteristics

According to the U.S. Natural Resources Conservation Service soil survey of Solano County, the project site contains the 10 soil map units listed in Table 3.5-1.

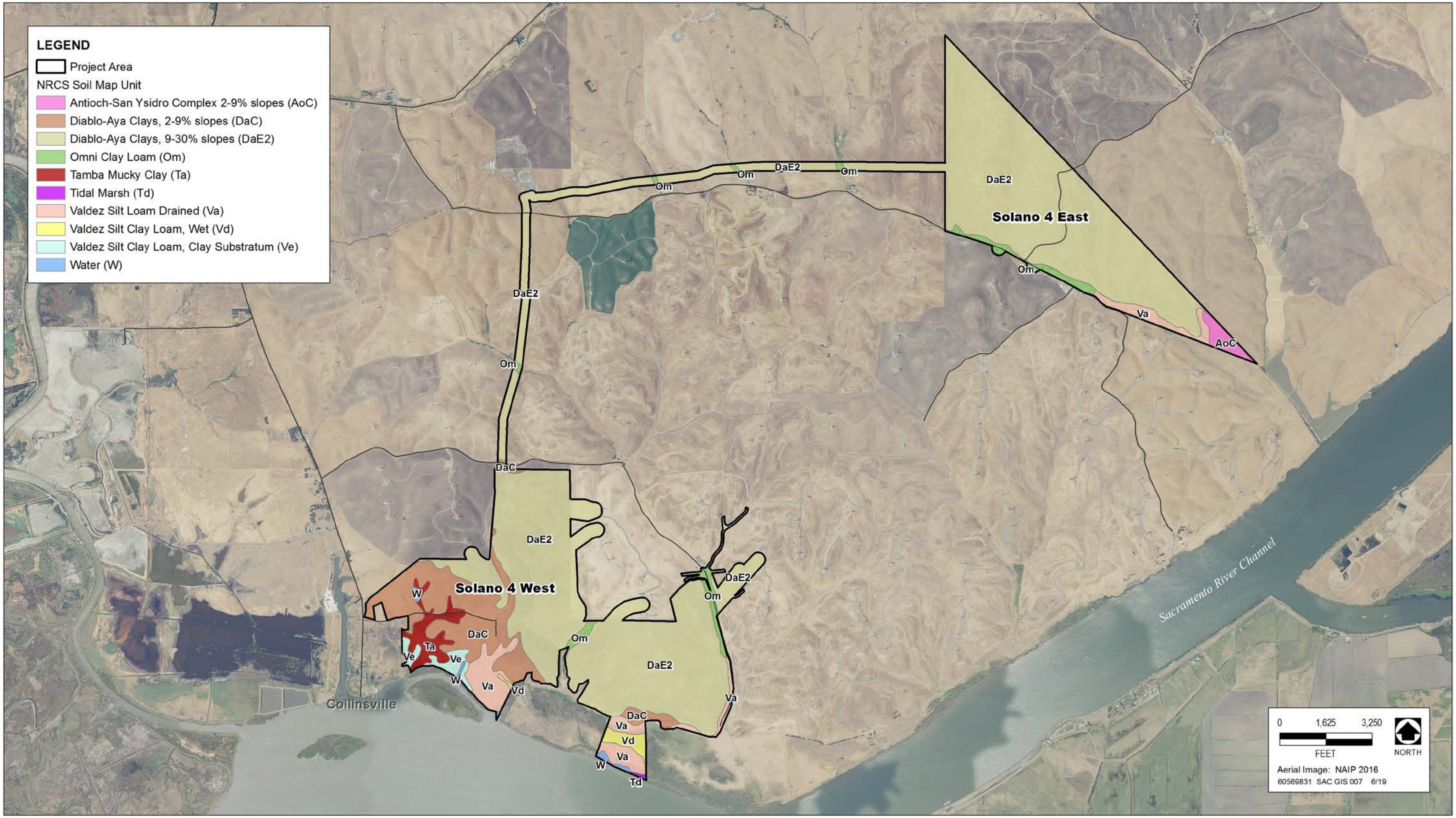

Exhibit 3.5-1 Soil Types

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Table 3.5-1 Soils Map Units	
Soil Symbol	**Soil Name**
AcC	Altamont clay, 2 to 9 percent slopes
AoC	Antioch–San Ysidro complex, 2 to 9 percent slopes
DaC	Diablo-Ayar clays, 2 to 9 percent slopes
DaE2	Diablo-Ayar clays, 9 to 30 percent slopes, eroded
Om	Omni clay loam
Ta	Tamba mucky clay, MLRA 16
Td	Tidal marsh
Va	Valdez silt loam, drained, 0 to 2 percent slopes, MLRA 16
Vd	Valdez silty clay loam, strongly saline, 0 to 2 percent slopes, MLRA 16
Ve	Valdez silty clay loam, clay substratum, MLRA 16

Note:
MLRA = Major Land Resource Area
Source: UCD CA Soil Research Lab 2019

A preliminary geotechnical investigation (Kleinfelder 2019) indicates that soil borings conducted to a depth of 75 feet below ground surface encountered interbedded, very stiff to hard lean and fat clays. Medium-dense to dense sands interbedded in upper 15 feet of the clays were identified at Boring P1R4 (Figures 2 and 3 of Appendix F). Soil borings in the west area generally encountered very stiff-to-hard lean clays interbedded with medium-dense to very dense sands underlain by a layer of hard fat clay before transitioning back to very stiff to hard lean clays to the total depth of about 75 feet below surface.

Expansive Soils

Expansive soils contain substantial amounts of clay particles that have the ability to give up water (shrink) or take on water (swell). Thus, expansive soils are referred to as having “shrink-swell potential.” When these soils swell, the change in volume can exert significant pressures on loads that are placed on them, such as building and structure foundations or underground utilities, and can result in structural distress and/or damage. Grading, site preparations, and backfill operations associated with subsurface structures can often eliminate expansion potential. Soils in the project area generally have a high shrink-swell potential (Solano County 2008b:Exhibit 4.7-7). Expansive soils are not expected to be a concern for the proposed WTG tower foundations, but may be a concern for other improvements that are supported on these soils, such as roadways and similar improvements (Kleinfelder 2019).

Groundwater

Groundwater was encountered during drilling at multiple borings conducted in the east area at depths of between 56.5 and 45 feet below ground surface. Groundwater in the western area was encountered at a depth of 61 feet below ground surface (Kleinfelder 2019).

Erosion and Runoff

Erosion is a natural process in which soil and highly weathered rock materials are worn away and transported, most commonly by wind or water. Soil erosion can become problematic when human intervention causes rapid soil loss and the development of erosional features (such as incised channels, rills, and gullies) that undermine roads, buildings, or utilities.

Clearing of vegetation and earthmoving reduces soil structure and cohesion, resulting in accelerated erosion. This typically occurs during construction that involves grading and soil-moving activities that loosen soils, making them more susceptible to wind and water erosion. Operating associated heavy machinery and vehicles over access roads, staging areas, and work areas can compact soils and reduce their capacity to absorb runoff, resulting in rills, gullies, and excessive sediment transport.

Natural erosion rates can vary depending on slope, soil type, and vegetative cover. Soils that contain high amounts of silt are typically more easily eroded, while coarse-grained (sand and gravel) soils are generally less susceptible to erosion. Upland areas of the project site that could be disturbed by decommissioning, construction, or road rehabilitation activities have a moderate risk of erosion (Solano County 2008b:Exhibit 4.7-6).

Seismic Hazards

Solano County is located in an area of Northern California known to be seismically active. Seismic activity may result in geologic and seismic hazards: seismically induced fault displacement and rupture, ground shaking, liquefaction, lateral spreading, landslides and avalanches, and structural hazards.

Faults

Geologic evidence indicates that Solano County is laced with a number of faults—fractures or fracture zones in the earth’s crust along which there has been displacement of the two sides relative to one another parallel to the fracture. The displacement may be a few inches to several feet. Cumulative displacement through geologic time may reach miles. The Kirby Hills Fault is located in the vicinity of the Solano 4 West project site but does not transect the site. The Midland–Rio Vista Fault is located east of the project area. Other potentially active faults that could result in ground motion at the site include the Mount Diablo, Concord–Green Valley, Greenville, Calaveras (Northern), West Napa, Hayward, Rodgers Creek, and San Andreas faults (Fugro 2010). Because the site is not located in an Earthquake Fault Zone as defined by the California Geologic Survey (2018), the potential for fault ground surface rupture is considered low (Kleinfelder 2019).

Ground Shaking

"Ground shaking" is a general term that refers to all aspects of motion of the earth's surface resulting from an earthquake, and is normally the major cause of damage in seismic events. The extent of ground shaking is controlled by the magnitude and intensity of the earthquake, distance from the epicenter, and local geologic conditions.

Based on historical seismic activity and mapping of faults and seismic hazards, the Montezuma Hills area of Solano County is considered to have lower potential for seismic activity, including ground shaking, than western Solano County or the greater San Francisco Bay Area (Solano County 2008b:Exhibit 4.7-2).

Liquefaction and Lateral Spreading

Soil liquefaction is caused by pressure waves moving through the ground because of earthquakes. Loose, granular soils and non-plastic silts that are saturated by relatively shallow groundwater (generally less than 50 feet) are susceptible to liquefaction. Liquefaction causes soil to lose strength and "liquefy," triggering structural distress or failure because of the dynamic settlement of the ground or a loss of strength in the soils underneath structures. Liquefaction in a subsurface layer can in turn cause lateral spreading of the ground surface, which usually takes place along weak shear zones that have formed within the liquefiable soil layer.

Based on the depth to groundwater, as well as stiff to hard silt and clay soils, and medium dense to dense sandy soils with occasional cementation encountered during soil borings at the site, the potential for liquefaction and seismic settlement is considered negligible (Kleinfelder 2019).

Slope Failure

Slope failures, commonly referred to as landslides, include many phenomena that involve the downslope displacement and movement of material, triggered by either static forces (gravity) or dynamic forces (earthquakes). Exposed rock slopes undergo rockfalls, rockslides, or rock avalanches, while soil slopes experience soil slumps, rapid debris flows, and deep-seated rotational slides. Slope stability can depend on a number of complex variables, including the geology, structure, and amount of groundwater, and external processes such as climate, topography, slope geometry, and human activity. Landslides can occur on slopes of 15 percent or less, but the probability is greater on steeper slopes that exhibit old landslide features such as scarps, slanted vegetation, and transverse ridges.

Topography in the project area is characterized by rolling hills with crest elevations 150–250 feet above mean sea level, with intermittent streams found in the low-lying areas.

The Montezuma Hills, unlike many parts of the Coast Ranges, generally are not susceptible to landsliding and slumping. The hills are relatively smooth, rounded, and low lying. Bedding in the Montezuma Hills dips gently northwest approximately 2–5 degrees, which means that bedding-parallel landsliding of the hilltop areas is uncommon. However, several small, shallow landslides have been mapped within the project area (Fugro 2010; USGS 1997). Given the potential for shallow landslides, design level geotechnical studies should be conducted to ascertain the conditions at each location proposed for a WTG and to make appropriate recommendations prior to construction (Kleinfelder 2019).

Mineral Resources

Mineral resources mined or produced in Solano County include mercury, sand and gravel, clay, stone products, calcium, and sulfur. Solano County falls within mineral resources zones (MRZs) described in California Surface Mining and Reclamation Act Mineral Land Classification Reports SR 146 Parts I and III, and SR 156. These classification projects assisted the State Mining and Geology Board in adopting and designating lands needed for their mineral content.

The classification system is intended to ensure that the County considers statewide or regionally significant mineral deposits during its planning and development administration. These mineral designations are intended to prevent development of incompatible land uses in areas determined to have substantial mineral resource deposits. Permitted uses in an MRZ include mining, uses that support mining such as smelting and storage of materials, or uses that will not hinder future mining such as grazing, agriculture, large-lot rural development, recreation, and open space.

The most important zone with respect to the presence of resources is MRZ-2, which is defined as “areas where adequate information indicates that significant mineral (aggregate) deposits are present or where it is judged that there is a high likelihood for their presence.” This zone is applied to known mineral deposits or where well- developed lines of reasoning, based on economic geologic principles and adequate data, demonstrate that the likelihood for occurrence of significant mineral deposits is high. MRZ-3 zones suggest the potential for aggregate deposits. This zone is less definitive than MRZ-2 and is defined as “areas containing mineral deposits the significance of which cannot be evaluated from available data.” No MRZs are located in within the project site, nor are any located in the greater project area (Solano County 2008a:Figure RS-4). Existing abandoned gas wells within and adjacent to the project site are discussed in Section 3.7, “Hazards and Hazardous Materials,” of this EIR.

Paleontological Resources

A fossil locality search prepared for the draft EIR for the *Solano County General Plan* identified 238 localities in Solano County where paleontological resources were found. Of these 238 occurrences, 29 percent are vertebrate and 71 percent are invertebrate. In addition to the documented occurrence of paleontological resources, most sedimentary geological units (such as those found in the Montezuma Hills) and some of the igneous geological units in the county are paleontologically sensitive (Solano County 2008b:Section 4.10).

The Montezuma Formation, which makes up the majority of the Montezuma Hills between Collinsville and the city of Rio Vista, is a quaternary deposit. The Montezuma Formation is a delta-deposited conglomerate consisting of poorly consolidated reddish-orange mudstone, sands, silts, and gravels. The Montezuma Formation is highly fossiliferous. Sixteen vertebrate fossil localities in the county have been recorded from this formation. Fossils typical of this formation represent Rancholabrean-age terrestrial faunas, and range from microvertebrate tooth and limb fossils of rodents, birds, amphibians, and reptiles, to larger fossils from animals such as horse, deer, bison, and mammoths. This formation has a high paleontological sensitivity (Solano County 2008b:Section 4.10).

Based on the guidelines issued by the Society of Vertebrate Paleontology, vertebrate fossils, their taphonomic and associated environmental indicators, and fossiliferous deposits are defined as significant nonrenewable paleontological resources. Botanical and invertebrate fossils and assemblages may also be considered significant resources (Solano County 2008b:Section 4.10).

3.5.3. Environmental Impacts and Mitigation Measures

Methods and Assumptions

The evaluation of potential geologic, soil, and mineral resource impacts is based on a review of relevant literature, including a preliminary geotechnical investigation conducted by Kleinfelder in 2019, the U.S. Natural Resources Conservation Service Soil Survey; environmental review documents for adjacent projects; background information for the project; and published geologic literature. The information obtained from these sources was reviewed and summarized to characterize existing conditions and to identify potential environmental effects related to geology, soils, paleontological resources, and mineral resources.

Thresholds of Significance

Based on Appendix G of the State CEQA Guidelines, the project would result in a potentially significant impact related to geology, soils, and paleontological resources if it would:

- directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the state geologist for the area or based on other substantial evidence of a known fault;
  - strong seismic ground shaking;
  - seismic-related ground failure, including liquefaction; or
  - landslides;

- result in substantial soil erosion or the loss of topsoil;
- be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in an on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;
- be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property;
- have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater; or
- destroy a unique paleontological resource or site, or a unique geological feature.

Based on Appendix G of the State CEQA Guidelines, the project would result in a potentially significant impact related to mineral resources if it would:

- result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state; or
- result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

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. Therefore, the following issues will not be discussed further in the impact analysis.

Rupture of a known earthquake fault or strong seismic ground shaking

The project site does not overlie any known faults and is not within an Alquist-Priolo Earthquake Fault Zone (California Geological Survey 2019). Therefore, the project would not directly or indirectly cause a potential adverse effect involving the rupture of a known earthquake fault or strong seismic ground shaking. These issues will not be discussed further.

Liquefaction

According to information provided in the Public Health and Safety Element of the *Solano County General Plan* and the General Plan EIR, the project site has a very low potential for liquefaction. Therefore, this issue will not be discussed further.

Soils supporting use of septic tanks or alternative wastewater disposal systems

The project does not include the construction of any septic tanks or other wastewater disposal systems. Therefore, this issue will not be discussed further.

Mineral resource zones

No state-delineated mineral resource zones are located within or near the project site, and no locally important mineral resource extraction sites are located within the project site. Therefore, this issue will not be discussed further.

Impact Analysis

Impact 3.5-1: Substantial soil erosion or loss of topsoil.

The proposed project has the potential to disturb approximately 91 acres during decommissioning, rehabilitation, and construction. Although these activities would be temporary, grading, excavation, and other ground-disturbing activities would expose soil and could result in accelerated erosion. Therefore, this impact would be **potentially significant**.

The proposed project has the potential to disturb approximately 91 acres during decommissioning, rehabilitation, and construction. Decommissioning, rehabilitation, and construction would involve grading, removal of vegetation, excavation for wind turbine generators and meteorological towers, construction of new roads and rehabilitation of existing roads, and other ground-disturbing activities that would expose soil and could result in accelerated erosion. In addition, native soil construction spoils would be spread on the surface in work areas. Where vegetation is removed, or where soils are unconsolidated in newly graded or disturbed areas, surface water and wind could result in the loss of topsoil. Because the project would disturb more than 1 acre of land during construction, coverage under the State of California General Construction Storm Water Permit (Construction General Permit, Order No. 2009-0009-DWQ as modified by Order No. 2010-0014-DWQ and 2012-0006-DWQ) would be required.

Because the proposed project could result in substantial soil erosion or the loss of topsoil, this impact would be **potentially significant**.

Mitigation Measure 3.5-1: Prepare and implement a SWPPP and associated BMPs.

Before any ground-disturbing activities begin, SMUD shall prepare a Project Specific SWPPP that will be implemented as part of the Construction General Permitting Process. The contractor hired by SMUD to implement the SWPPP shall review and certify they will implement the BMPS identified on the SWPPP, including an erosion control plan, and measures to eliminate construction waste measures to ensure that waters of the United States and the state are protected. The SWPPP shall include site design measures to minimize off-site stormwater runoff that might otherwise affect surrounding habitats. The Central Valley Regional Water Quality Control Board and/or San Francisco Bay Regional

Water Quality Control Board will review and monitor the effectiveness of the SWPPP through mandatory reporting by SMUD and the construction contractor as required.

The SWPPP shall be prepared with the following objectives:

- Identify all pollutant sources, including sources of sediment, that may affect the quality of stormwater discharges from construction of the project.
- Identify BMPs that effectively reduce or eliminate pollutants in stormwater discharges and authorized non-stormwater discharges from the site during construction to the Best Available Technology/Best Control Technology standard.
- Provide calculations and design details as well as BMP controls for site run-on that are complete and correct.
- Identify project discharge points and receiving waters.
- Provide stabilization BMPs to reduce or eliminate pollutants following construction.

The construction contractor shall implement the SWPPP, including all BMPs, and shall inspect all BMPs during construction. Potential SWPPP BMPs could include but would not be limited to the following:

- Preserve existing vegetation where possible.
- Roughen the surfaces of final grades to prevent erosion, decrease runoff, increase infiltration, and aid in vegetation establishment.
- Place riparian buffers or filter strips along the perimeter of the disturbed area to intercept pollutants before off-site discharge.
- Place fiber rolls around on-site drain inlets to prevent sediment and construction-related debris from entering inlets.
- Place fiber rolls along down-gradient disturbed areas of the site to reduce runoff flow velocities and prevent sediment from leaving the site.
- Place silt fences down-gradient of disturbed areas to slow down runoff and retain sediment.
- Stabilize the construction entrance to reduce the tracking of mud and dirt onto public roads by construction vehicles.
- Stage excavated and stored construction materials and soil stockpiles in stable areas and cover or stabilize materials to prevent erosion.

- Stabilize temporary construction entrances to limit transport/introduction of invasive species and control fugitive dust emissions.

Significance after Mitigation

Mitigation Measure 3.5-1 would minimize potential topsoil loss and soil erosion through soil stabilization measures. Therefore, implementing this mitigation measure would reduce the project's impact related to erosion and loss of topsoil to a **less-than-significant** level.

Impact 3.5-2: Location of the project on a geologic unit or soil that is unstable, or that would become unstable as a result of the project.

Historically the project area has experienced a low level of seismic activity; however, the potential exists for unstable soils to be present in the project area. Therefore, this impact would be **potentially significant**.

As discussed above, the project area is not in a seismically active area and the potential for on- or off-site lateral spreading, subsidence, liquefaction, or collapse is low (Kleinfelder 2019). A preliminary geotechnical investigation covering the project site indicates there is a risk of shallow landslides and other forms of mass wasting because of steep grades and the presence of previous landslide activity. Further investigation is required at the time of project design to determine whether soils at the site of the proposed WTG foundations would become unstable as a result of construction. Thus, this impact would be **potentially significant**.

Mitigation Measure 3.5-2: Conduct a site-specific geotechnical investigation.

Before final design of the project, SMUD shall have prepared a design a design level geotechnical investigation and report for the project, to be prepared by a California Registered Civil Engineer or Geotechnical Engineer. The report will set forth design and construction measures intended to ensure site stability in compliance with applicable seismic and building codes. The report shall address and make recommendations on the following:

- road, pavement, and parking area design;
- structural foundations;
- grading practices;
- erosion/winterization;
- special problems discovered on-site (e.g., groundwater, expansive/unstable soils); and
- slope stability.

All recommendations of the geotechnical report shall be incorporated into the construction plans and specifications that are reviewed and stamped by a licensed engineer of the appropriate discipline. SMUD must include the measures in the contract for implementation by the construction contractor for the duration of construction related activities.

Significance after Mitigation

Mitigation Measure 3.5-2 would minimize potential impacts associated with unstable soils by requiring an analysis of the stability of on-site soils and implementation of measures to stabilize soils as needed before construction. Therefore, implementing this mitigation measure would reduce the project's impact related to unstable soils to a **less-than-significant** level.

Impact 3.5-3: Creation of a substantial risk as a result of expansive soils.

Expansive soils are composed largely of clays, and extensive areas of clay soils are present on the project site. Although these soils are not expected to adversely affect WTG foundations, clay soils are subject to shrinkage and swelling that can affect ancillary site improvements, such as roadways that are supported by shallow foundations. Therefore, this impact would be **potentially significant**.

Expansive soils are composed largely of clays, which greatly increase in volume when water is absorbed and shrink when dried. According to Section 4.7, "Geology and Soils," of the Solano County General Plan Draft EIR, the majority of all soil types found within the Solano 4 Wind Project boundaries are considered to be expansive soils (Solano County 2008b:Exhibit 4.7-7). A site-specific geotechnical investigation confirms that clay soils with the potential for shrink-swell are present on site. The preliminary geotechnical report indicates the project is feasible with incorporation of the recommendations. However, ancillary structures supported by shallow foundations are subject to adverse effects from expansive soils. This impact would be **potentially significant.**

Mitigation Measure 3.5-3: Implement Mitigation Measure 3.5-2, Implement all recommendations from the geotechnical investigation.

The construction contractor shall implement Mitigation Measure 3.5-2, above, which requires the completion of a design level geotechnical investigation and report for the project and the implementation of all design and construction measures contained therein.

Significance after Mitigation

Mitigation Measure 3.5-2 would require an analysis of the stability of on-site soils and implementation of measures to stabilize soils as needed before construction. Therefore, implementing this mitigation measure would reduce the project's impact related to expansive soils to a **less-than-significant** level.

Impact 3.5-4: Degradation or destruction of a unique paleontological resource.

The proposed project has the potential to disturb approximately 91 acres during decommissioning, rehabilitation, and construction. The Montezuma Hills, including the project site, have been determined by Solano County to be a sensitive resource area with respect to paleontological resources. A site-specific paleontological investigation has not been prepared for the site to confirm the presence or absence of paleontological resources. Therefore, this impact would be **potentially significant**.

A fossil locality search prepared for the Solano County General Plan Draft EIR identified 238 localities in Solano County where paleontological resources have been found. Of these 238 occurrences, 29 percent are vertebrate and 71 percent are invertebrate. In addition to the documented occurrence of paleontological resources, most sedimentary geological units (such as those found in the Montezuma Hills) are considered by the County to be paleontologically sensitive (Solano County 2008a:Figure RS-4).

The Montezuma Formation, which makes up the majority of the Montezuma Hills between Collinsville and the city of Rio Vista, is a quaternary deposit. The Montezuma Formation is highly fossiliferous. Sixteen vertebrate fossil localities in the county have been recorded from this formation. Fossils typical of this formation represent Rancholabrean-age terrestrial faunas, and range from microvertebrate tooth and limb fossils of rodents, birds, amphibians and reptiles, to larger fossils from animals such as horse, deer, bison, and mammoths. This formation has a high paleontological sensitivity.

The proposed project has the potential to disturb approximately 91 acres during decommissioning, rehabilitation, and construction. Decommissioning, rehabilitation, and construction would involve grading, excavation for wind turbine generators and meteorological towers, construction of new roads and rehabilitation of existing roads, and other ground-disturbing activities that could result in the degradation or destruction of paleontological resources. No site-specific paleontological investigation has been prepared for the site to confirm the presence or absence of paleontological resources. Because the extent of paleontological resources on-site is not yet known, this impact would be **potentially significant**.

Mitigation Measure 3.5-4: Conduct a site-specific paleontological resource investigation and implement identified protective measures.

Before the start of any ground-disturbing activities, SMUD shall have prepared a site-specific analysis of paleontological resources. At a minimum, the site-specific analysis shall include a review of the types of the geologic formation(s) present at the project site and a determination of the likelihood that those formation(s) would contain a “unique paleontological resource” as stated in Title 14, California Code of Regulations, Appendix G (the CEQA checklist). If a site-specific analysis determines that the geologic conditions have a high potential to contain paleontological resources meeting the definition on a “unique paleontological resource,” project-specific mitigation measures shall be identified and implemented to address the following requirements:

- Cessation of work in the vicinity of the find and notification to SMUD.
- Retention of a qualified paleontologist to evaluate the resource and prepare a proposed mitigation plan, which may include some or all of the following elements: a field survey, construction monitoring, sampling and data recovery procedures, museum storage coordination for any specimen recovered, and a report of findings.
- Implementation of recommendations made by the paleontologist, where SMUD determines that such recommendations are necessary and feasible.

All recommendations of the report shall be incorporated into the construction plans and specifications that are reviewed and stamped by a licensed engineer of the appropriate discipline. SMUD must include the measures in the contract for implementation by the construction contractor for the duration of construction related activities.

Significance after Mitigation

Mitigation Measure 3.5-4 would reduce potential impacts related to paleontological resources by requiring an analysis of potential on-site paleontological resources, and implementing measures to identify, treat, and avoid adverse effects on such resources as needed before construction. Therefore, implementing this mitigation measure would reduce the project's impact on paleontological resources to a **less-than-significant** level.

3.6. Greenhouse Gas Emissions and Energy

This section presents the current state of climate change science and greenhouse gas (GHG) emissions sources in California; a summary of applicable regulations; quantification of project-generated GHG emissions and discussion of their contribution to global climate change; and an analysis of the project's resiliency to climate change–related risks.

This section also presents an energy analysis prepared pursuant to Section 15126 and Appendix F of the State CEQA Guidelines, which require that EIRs include a discussion of the potential energy impacts of projects. The analysis considers whether the proposed project would result in inefficient, wasteful, and unnecessary consumption of energy.

Global climate change refers to the long-term fluctuations in temperature, wind patterns, precipitation, and other aspects of the climate systems of the earth. It is widely recognized that GHG emissions associated with human activities are contributing to global climate change, which is a public health and environmental concern widely recognized around the world. As global concentrations of atmospheric GHGs increase, global temperatures increase, as do weather extremes and air pollution concentrations. GHG emissions are produced from electricity generation, road transportation, and other energy sources; industrial processes; agriculture, forestry, and other land uses; solid waste disposal; and wastewater treatment and discharge. Carbon dioxide (CO_2), methane, and nitrous oxide are the principal GHGs.

3.6.1. Regulatory Setting

Federal

Greenhouse Gas Emissions

Supreme Court Ruling

The U.S. Environmental Protection Agency (EPA) is the federal agency responsible for implementing the federal Clean Air Act and its amendments. The U.S. Supreme Court ruled on April 2, 2007, that CO_2 is an air pollutant as defined under the Clean Air Act, and that EPA has the authority to regulate emissions of GHGs. The ruling in this case resulted in EPA taking steps to regulate GHG emissions and lent support to state and local agencies' efforts to reduce GHG emissions.

Kyoto Protocol

The Kyoto Protocol is an international treaty that extends the 1992 United Nations Framework Convention on Climate Change (UNFCCC), which commits parties to reduce GHG emissions. The major feature of the Kyoto Protocol's first commitment period, which came into force in 2005, is that it sets binding targets for 37 industrialized countries and the European community for reducing GHG emissions. These amount to an average reduction of 5 percent against 1990 levels in the 5-year period of 2008–2012. In December 2012, the Doha Amendment to the Kyoto Protocol was adopted, including new commitments for the period of 2013–2020. During this second commitment period, parties committed to reduce GHG emissions by at least 18 percent below 1990 levels in the 8-year period of 2013–2020; however, the parties are different from those who participated in the first round of commitments. The United States signed but did not ratify the Kyoto Protocol, and Canada withdrew from it in 2011.

While not a part of the Kyoto Protocol, but within the framework of the UNFCCC, the Paris Agreement was adopted in December 2015 with the aim of governing GHG emissions after 2020. As of October 2017, 195 UNFCCC members had signed the agreement, and 169 had become party to it. In June 2017, U.S. President Donald Trump announced his intention to withdraw the United States from the agreement. In accordance with the conditions of the Paris Agreement, the earliest possible effective withdrawal date by the United States is November 4, 2020.

Regulations for Greenhouse Gas Emissions from Passenger Cars and Trucks and Corporate Average Fuel Economy Standards

In October 2012, EPA and the National Highway Traffic Safety Administration (NHTSA), on behalf of the U.S. Department of Transportation, issued final rules to further reduce GHG emissions and improve corporate average fuel economy standards for light-duty vehicles for model years 2017 and beyond (77 *Federal Register* [FR] 62624). NHTSA's corporate average fuel economy standards have been enacted under the Energy Policy and Conservation Act since 1978. This national program requires automobile manufacturers to build a single light-duty national fleet that meets all requirements of both federal programs and the standards of California and other states. The program would increase fuel economy to the equivalent of 54.5 miles per gallon, limiting vehicle emissions to 163 grams of CO_2 per mile for the fleet of cars and light-duty trucks by model year 2025 (77 FR 62630).

In January 2017, EPA Administrator Gina McCarthy signed her determination to maintain the current GHG emissions standards for model year 2022–2025 vehicles. However, on April 2, 2018, the new EPA administrator, Scott Pruitt, signed the Mid-term Evaluation Final Determination, which reconsidered the previous final determination and found that the model year 2022–2025 GHG standards are not appropriate in light of the record before EPA, and therefore should be revised. EPA also withdrew the previous final determination issued by the agency on January 12, 2017 (EPA 2019).

Clean Power Plan

The Clean Power Plan was unveiled by President Barack Obama on August 3, 2015. The plan aims to reduce CO_2 emissions from electrical power generation by 32 percent within 25 years, relative to 2005 levels. President Donald Trump signed an executive order on March 28, 2017, mandating EPA to review the plan. EPA Administrator Scott Pruitt announced that the formal process to change EPA rules and repeal the plan would begin on October 10, 2017. Pruitt then signed a formal proposal that would lead to the repeal of the Clean Power Plan. The standard federal regulatory procedures to implement or change a regulation will likely take up to 2 years. Potential legal challenges may cause delays in repealing the regulation.

Energy

Federal and state agencies regulate energy consumption through various policies, standards, and programs. At the local level, individual cities and counties establish policies in their general plans and climate action plans related to the energy efficiency of new development and land use permitting and to the use of renewable energy sources.

Energy conservation is embodied in many federal, state, and local statutes and policies. At the federal level, energy standards apply to numerous products (the EPA EnergyStar™ program) and transportation (e.g., fuel efficiency standards). At the state level, Title 24 of the California Code of Regulations sets forth energy standards for buildings. Further, the State of California provides rebates/tax credits for installation of renewable energy systems, and offers the Flex Your Power program to promote conservation in multiple areas.

Energy Policy Act of 1992

The Energy Policy Act of 1992 was enacted to reduce the country's dependence on foreign petroleum and improve air quality, and to increase clean energy use and energy efficiency. This law includes several parts intended to build an inventory of alternative-fuel vehicles in large, centrally fueled fleets in metropolitan areas. Titles III–V require certain federal, state, and local government fleets and private fleets to purchase a percentage of light-duty vehicles capable of running on alternative fuels each year. The Energy Policy Act of 1992 also includes financial incentives. Federal tax deductions are allowed for businesses and individuals to cover the incremental cost of alternative-fuel vehicles. States are also required to consider a variety of incentive programs to help promote alternative-fuel vehicles.

Energy Policy Act of 2005

The Energy Policy Act of 2005 provides renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

Energy Independence and Security Act of 2007

The Energy Independence and Security Act of 2007 is designed to improve vehicle fuel economy and help reduce U.S. dependence on oil. It represents a major step forward in expanding the production of renewable fuels, reducing dependence on oil, and confronting climate change. This law increases the supply of alternative-fuel sources by setting a mandatory Renewable Fuel Standard requiring fuel producers to use at least 36 billion gallons of biofuel in 2022, which represents a nearly five-fold increase over current levels; and reduces U.S. demand for oil by setting a national fuel economy standard of 35 miles per gallon in 2020 for all passenger cars and light trucks—an increase in fuel economy standards of 40 percent.

By addressing renewable fuels and corporate average fuel economy standards, the Energy Independence and Security Act of 2007 will build on progress made by the Energy Policy Act of 2005 in setting out a comprehensive national energy strategy for the 21st century.

State

Plans, policies, laws, and regulations established by state agencies and pertinent to the project are generally presented in the order they were established.

Greenhouse Gas Emissions

Executive Order S-3-05 and Associated Supreme Court CEQA Decision

Executive Order (EO) S-3-05, signed by Governor Arnold Schwarzenegger in 2005, proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra Nevada snowpack, exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the executive order established total GHG emission targets for the state. Specifically, statewide emissions are to be reduced to 2000 levels by 2010, 1990 levels by 2020, and to 80 percent below 1990 levels by 2050.

EO S-3-05 was the subject of a California Appellate Court decision, *Cleveland National Forest Foundation v. San Diego Association of Governments* (November 24, 2014) 231 Cal.App.4th 1056, which was reviewed by the California Supreme Court in January 2017. The Supreme Court decided a singular question in the case, which was released on July 13, 2017. The California Supreme Court ruled that the San Diego Association of Governments did not abuse its discretion by declining "to adopt the 2050 goal as a measure of significance in light of the fact that the Executive Order does not specify any plan or implementation measures to achieve its goal."

In addition to concluding that an EIR need not use this executive order's goal for determining significance, the court described several principles relevant to CEQA review of GHG impacts, including:

- EIRs should "reasonably evaluate" the "long-range GHG emission impacts for the year 2050"; and
- the 2050 target is "grounded in sound science" in that it is "based on the scientifically supported level of emissions reduction needed to avoid significant disruption of the climate."

The California Supreme Court ruled that "an EIR's designation of a particular adverse environmental effect as 'significant' does not excuse the EIR's failure to reasonably describe the nature and magnitude of the adverse effect." The court also recognized that the 40 percent reduction in 1990 GHG levels by 2030 is "widely acknowledged" as a "necessary interim target to ensure California meets its longer-range goal of reducing greenhouse gas emission 80 percent below 1990 levels by the year 2050." Senate Bill (SB) 32 has since defined the 2030 goal in statute (discussed below).

Assembly Bill 32, the California Global Warming Solutions Act of 2006

In September 2006, Governor Schwarzenegger signed Assembly Bill (AB) 32, the California Climate Solutions Act of 2006 (see Stats. 2006, Ch. 488, enacting Health and Safety Code, Sections 38500–38599). AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and a cap on statewide GHG emissions. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. The cap-and-trade[1] program covers major sources of GHG emissions in the state such as refineries, power plants, industrial facilities, and transportation fuels. The cap-and-trade program includes an enforceable emissions cap that will decline over time. The state will distribute allowances, which are tradable permits, equal to the emissions allowed under the cap (ARB 2014a).

Assembly Bill 32 Climate Change Scoping Plan and Updates

In December 2008, the California Air Resources Board (ARB) adopted its first version of its *Climate Change Scoping Plan,* which contained the main strategies California will implement to achieve the mandate of AB 32 to reduce statewide GHG emissions to 1990 levels by 2020.

In May 2014, ARB released and subsequently adopted the *First Update to the Climate Change Scoping Plan* to identify the next steps in reaching the goals of AB 32 and evaluate the progress made between 2000 and 2012 (ARB 2014b). According to this update, California is on track to meet the near-term 2020 GHG limit and is well positioned to maintain and continue reductions beyond 2020 (ARB 2014b). The update also reported the trends in GHG emissions from various emissions sectors (e.g., transportation, building energy, agriculture).

On December 14, 2017, ARB approved the *2017 Climate Change Scoping Plan: The Strategy for Achieving California's 2030 Greenhouse Gas Target*, which lays out the framework for achieving the 2030 reductions as established in EO B-30-15, SB 32, and AB 197 (discussed below). The Scoping Plan Update identifies reductions to be made by each

[1] **Cap-and-trade** is a market based regulation that is designed to reduce greenhouse gases (GHGs) from multiple sources. Cap-and-trade sets a firm limit or cap on GHGs and minimize the compliance costs of achieving AB 32 goals. The cap will decline approximately 3 percent each year beginning in 2013. Trading creates incentives to reduce GHGs below allowable levels through investments in clean technologies. With a carbon market, a price on carbon is established for GHGs. Market forces spur technological innovation and investments in clean energy. Cap-and-trade is an environmentally effective and economically efficient response to climate change (ARB 2017a).

sector to achieve a 40 percent reduction of 1990 levels of GHGs by 2030. The 2017 Scoping Plan contains language recommending that land use development projects demonstrate a "zero net" increase in GHG emissions as compared to baseline conditions to ensure consistency with statewide GHG reduction goals. ARB also recognizes that this approach will not be feasible for all projects, and therefore recommends that lead agencies develop bright-line numerical thresholds consistent with the state's long-term GHG goals (40 percent of 1990 levels by 2030) or consistency with GHG reduction plans (e.g., climate action plans) be demonstrated if applicable (ARB 2017a).

Executive Order B-30-15

On April 20, 2015, Governor Edmund G. Brown Jr. signed EO B-30-15 to establish a California GHG reduction target of 40 percent below 1990 levels by 2030. The Governor's executive order aligned California's GHG reduction targets with those of leading international governments such as the 28-nation European Union, which adopted the same target in October 2014.

California is on track to meet or exceed the target of reducing GHG emissions to 1990 levels by 2020, as established in the California Global Warming Solutions Act of 2006 (AB 32, discussed above). California's new emissions reduction target of 40 percent below 1990 levels by 2030 sets the next interim step in the state's continuing efforts to pursue the long-term goal expressed by then-Governor Schwarzenegger in 2005 in EO S-3-05: to ultimately reduce emissions 80 percent below 1990 levels by 2050. This is in line with the scientifically established levels needed in the U.S. to limit global warming below 2 degrees Celsius (°C), the warming threshold at which major climate disruptions such as super droughts and rising sea levels are projected.

Senate Bill 32 and Assembly Bill 197 of 2016

In August 2016, Governor Brown signed SB 32 and AB 197, which serve to extend California's GHG reduction programs beyond 2020. SB 32 amended the Health and Safety Code to include Section 38566, which contains language to authorize ARB to achieve a statewide GHG emission reduction of at least 40 percent below 1990 levels by no later than December 31, 2030. SB 32 codified the targets established by EO B-30-15 for 2030, which set the next interim step in the state's continuing efforts to pursue the long-term target expressed in EOs S-3-05 and B-30-15: 80 percent below 1990 emissions levels by 2050.

Final Proposed Short-Lived Climate Pollutant Reduction Strategy

ARB issued the Short-Lived Climate Pollutant Reduction Strategy in March 2017. The strategy lays out a range of options, including regulations, incentives, and other market-supporting activities, to accelerate emission reductions for short-lived climate pollutants in California. Recent legislation (AB 1613 and SB 859) includes a spending plan for cap-and-trade revenues that specifically target emissions reductions for short-lived climate pollutants. These include $5 million for reductions of black carbon wood smoke,

$40 million for waste reduction and management, $7.5 million for healthy soils, and $50 million for reductions in methane emissions from dairy and livestock operations.

Senate Bill X1-2, the California Renewable Energy Resources Act of 2011

SB X1-2 of 2011 requires all California utilities to generate at least 33 percent of their electricity from renewables by 2020. SB X1-2 set a three-stage compliance period requiring all California utilities, including publicly owned utilities, energy service providers, and community choice aggregators, to generate at least 20 percent of their electricity from renewables by December 31, 2013; 25 percent by December 31, 2016; and 33 percent by December 31, 2020.

SB X1-2 also requires the renewable electricity standard to be met increasingly with renewable energy that is supplied to the California grid from sources within, or directly proximate to, California. SB X1-2 mandated that renewables from these sources make up at least 50 percent of the total renewable energy for the 2011–2013 compliance period, at least 65 percent for the 2014–2016 compliance period, and at least 75 percent for 2016 and beyond.

In October 2015, Governor Brown signed SB 350, which requires retail sellers and publicly owned utilities to procure 50 percent of their electricity from renewable resources by 2030. Wind energy plays an integral role in California's electricity portfolio and in meeting the state's Renewable Portfolio Standards. As of 2016, wind energy accounted for 39 percent of California's renewable energy production for the Renewable Portfolio Standards. Wind energy projects totaled 5,644 megawatts of capacity in California at the end of 2016, providing enough electricity to power more than 2 million California households (CEC 2019).

Energy

Warren-Alquist Act

The 1975 Warren-Alquist Act established the California Energy Resources Conservation and Development Commission, now known as the California Energy Commission (CEC). This law established state policy to reduce wasteful, uneconomical, and unnecessary uses of energy by employing a range of measures.

State of California Energy Plan

CEC is responsible for preparing the State Energy Plan, which identifies emerging trends related to energy supply, demand, conservation, public health and safety, and the maintenance of a healthy economy. The current plan is the 1997 California Energy Plan. The plan calls for the State of California to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the least environmental and energy costs. To further this policy, the plan identifies a number of strategies, including assistance to public agencies and fleet operators in implementing incentive programs for zero-emission vehicles and addressing their infrastructure needs; and encouragement of urban design that reduces vehicle miles traveled and accommodates pedestrian and bicycle access.

Assembly Bill 2076: Reducing Dependence on Petroleum

Pursuant to AB 2076 (Chapter 936, Statutes of 2000), CEC and ARB prepared and adopted a joint agency report in 2003, *Reducing California's Petroleum Dependence*. Included in this report are recommendations to increase the use of alternative fuels to 20 percent of on-road transportation fuel use by 2020 and 30 percent by 2030, significantly increase the efficiency of motor vehicles, and reduce per capita vehicle miles traveled (CEC and ARB 2003). Further, in response to CEC's 2003 and 2005 *Integrated Energy Policy Reports*, Governor Gray Davis directed CEC to take the lead in developing a long-term plan to increase alternative fuel use.

A performance-based goal of AB 2076 was to reduce petroleum demand to 15 percent below 2003 demand by 2020.

Integrated Energy Policy Report

SB 1389 (Chapter 568, Statutes of 2002) required CEC to conduct assessments and forecasts of all aspects of energy industry supply, production, transportation, delivery and distribution, demand, and prices. CEC is to use these assessments and forecasts to develop energy policies that conserve resources, protect the environment, ensure energy reliability, enhance the state's economy, and protect public health and safety (Public Resources Code Section 25301[a]).

This work culminated in the Integrated Energy Policy Report. CEC adopts this report every 2 years and an update every other year. The 2018 Integrated Energy Policy Report Update, the most recent version, was adopted August 1, 2018. The 2018 Integrated Energy Policy Report summarizes priority energy issues currently facing the state, outlining strategies and recommendations to further the state's goal of ensuring reliable, affordable, and environmentally responsible energy sources. Energy topics covered in the report include:

- actions to address climate change and improve air quality;
- increases in renewable energy, both large-scale and distributed renewable energy resources;
- advancements in energy efficiency;
- developments in clean technology innovation;
- advancements in clean transportation, transportation electrification, and the development of the infrastructure needed to support zero-emission transportation; and

- efforts to improve energy equity in California.

Senate Bill 1078: California Renewable Portfolio Standards Program

SB 1078 (Chapter 516, Statutes of 2002) established the Renewable Portfolio Standards for electricity supply. The Renewable Portfolio Standards required that retail sellers of electricity, including publicly owned utilities and community choice aggregators, provide 20 percent of their supply from renewable sources by 2017. The following actions related to the Renewable Portfolio Standards subsequently occurred:

- 2003: Energy Action Plan I accelerates the 20 percent deadline to 2010.
- 2005: Energy Action Plan II recommends a further goal of 33 percent by 2020.
- 2006: SB 107 codifies the accelerated 20 percent by 2010 deadline.
- 2008: Governor Arnold Schwarzenegger issues EO S-14-08, requiring 33 percent renewables by 2020.
- 2009: Governor Schwarzenegger issues EO S-21-09 directing ARB, under its AB 32 authority, to adopt regulations by July 31, 2010, consistent with the 33 percent renewable energy target established in EO S-14-08.
- 2011: SB X1-2, signed by Governor Edmund G. Brown Jr., codifies the 33 percent by 2020 Renewable Portfolio Standards.
- 2015: SB 350, signed by Governor Brown, codifies the 50 percent by 2030 Renewable Portfolio Standards.
- 2018: SB 100, signed by Governor Brown, codifies the 60 percent by 2030 and 100 percent by 2045 Renewable Portfolio Standards.

CEC estimates that 32 percent of California's retail electricity sales in 2017 were provided by Renewable Portfolio Standards–eligible renewable resources (CEC 2018).

Senate Bill 350: Clean Energy and Pollution Reduction Act of 2015

The Clean Energy and Pollution Act of 2015 (SB 350) requires that the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources increase to 50 percent by December 31, 2030. This act also requires a doubling of energy efficiency savings in electricity and natural gas for retail customers through energy efficiency and conservation by December 31, 2030.

Energy Action Plan

The first Energy Action Plan emerged in 2003 from a crisis atmosphere in California's energy markets. The state's three major energy policy agencies (CEC, the California

Public Utilities Commission, and the Consumer Power and Conservation Financing Authority [established under deregulation and now defunct]) came together to develop one high-level, coherent approach to meeting California's electricity and natural gas needs. It was the first time that energy policy agencies formally collaborated to define a common vision and set of strategies to address California's future energy needs and emphasize the importance of the impacts of energy policy on California's environment.

In the October 2005 Energy Action Plan II, CEC and the California Public Utilities Commission updated their energy policy vision by adding some important dimensions to the policy areas included in the original Energy Action Plan, such as the emerging importance of climate change, transportation-related energy issues, and research and development activities. CEC adopted an update to Energy Action Plan II in February 2008 that supplemented the earlier energy action plans and examined the state's ongoing actions in the context of global climate change.

Assembly Bill 1007: State Alternative Fuels Plan

AB 1007 (Chapter 371, Statutes of 2005) required CEC to prepare a state plan to increase the use of alternative fuels in California. CEC prepared the State Alternative Fuels Plan in partnership with ARB and in consultation with other federal, state, and local agencies. The State Alternative Fuels Plan presents strategies and actions California must take to increase the use of alternative nonpetroleum fuels in a manner that minimizes the costs to California and maximizes the economic benefits of in-state production. The State Alternative Fuels Plan assessed various alternative fuels and developed fuel portfolios to meet California's goals to reduce petroleum consumption, increase use of alternative fuels, reduce GHG emissions, and increase in-state production of biofuels without causing a substantial degradation of public health and environmental quality.

Local

Yolo-Solano Air Quality Management District and Bay Area Air Quality Management District

The Yolo-Solano Air Quality Management District (YSAQMD) attains and maintains air quality conditions in northeastern Solano County, and the Bay Area Air Quality Management District (BAAQMD) regulates air pollutant emissions in southwestern Solano County. These air quality management districts are discussed further in Section 3.2, "Air Quality." The YSAQMD *Handbook for Assessing and Mitigating Air Quality Impacts* (YSAQMD 2007) leaves analysis and mitigation of GHG emissions to the discretion of the lead agency.

BAAQMD established a climate protection program to reduce pollutants that contribute to global climate change and affect air quality in the San Francisco Bay Area Air Basin. The climate protection program includes measures that promote energy efficiency, reduce vehicle miles traveled, and develop alternative sources of energy, all of which assist in reducing emissions of GHGs and air pollutants that affect residents' health. BAAQMD also seeks to support current climate protection programs in the region and to stimulate additional efforts through public education and outreach, technical assistance to local governments and other interested parties, and promotion of collaborative efforts among stakeholders. The BAAQMD CEQA Air Quality Guidelines (BAAQMD 2017) provide GHG thresholds of significance to provide a uniform scale for measuring the significance of GHG emissions from land use and stationary-source projects in compliance with CEQA and AB 32. BAAQMD also provides GHG reduction strategies for mitigation of GHG emissions.

Solano County General Plan

The following policies and programs from the *Solano County General Plan* (Solano County 2008) are specifically related to GHG emissions and energy, and may be applicable to the project.

<u>Air Quality</u>

- **Policy HS.P-47**: Promote GHG emission reductions by supporting carbon-efficient farming methods (e.g., methane capture systems, no-till farming, crop rotation, cover cropping, residue farming); installation of renewable energy technologies; protection of grasslands, open space, and farmlands from conversion to other uses; and encouraging development of energy-efficient structures.

<u>Climate Change</u>

- **Policy HS.P-53**: Evaluate the potential effects of climate change on Solano County's human and natural systems and prepare strategies that allow the County to appropriately respond and adapt.
    - **Program HS.I-68**: Continue to implement and monitor the measures and implementing actions contained in the Solano County Climate Action Plan adopted in 2011.

<u>Energy</u>

- **Policy RS.P-53**: Enable renewable energy sources to be produced from resources available in Solano County, such as solar, water, wind, and biofuels to reduce the reliance on energy resources from outside the county.

- **Policy RS.P-59**: Encourage on-site renewable energy production and use and energy conservation measures.
    - **Program RS.I-49**: Require all off-road diesel powered vehicles used for construction to be newer model, low-emission vehicles, or use retrofit emission control devices, such as diesel oxidation catalyst and diesel particulate filters verified by the California Air Resources Board.

Solano County Climate Action Plan and Sea Level Rise Strategic Program

Primary among the County's strategies to address climate change are implementation of the Solano County Climate Action Plan (CAP) and Sea Level Rise Strategic Program adopted by the Board of Supervisors in 2011.

The CAP addresses both GHG emissions from activities in the county (the residential, commercial, industrial, transportation, and agricultural sectors) and emissions specifically from County operations. The CAP provides a GHG emissions inventory for the base year 2005 and a forecast of GHG emissions for the year 2020, assuming no action is taken at the state or local level. The CAP determines the quantity of emissions to be reduced to meet the reduction target of 20 percent below 2005 levels.

The CAP establishes measures and implementing actions necessary to achieve the County's reduction target. *Solano County General Plan* policies and programs related to GHG reductions are referenced in the CAP. The CAP includes provisions to track countywide progress and make necessary changes to facilitate achievement of the goal (Solano County 2011a).

The Sea Level Rise Strategic Program summarizes the potential effects of sea level rise on Solano County, identifies properties and resources susceptible to sea level rise to prioritize management strategies, and develops protection and adaptation strategies to meet the County's and region's goals. The Sea Level Rise Strategic Program was prepared in 2011 with the cooperation of regional partners that included the San Francisco Bay Conservation and Development Commission and the California Bay-Delta Authority. The program also prioritizes impacts of sea level rise in the county based on a cost-benefit analysis using the San Francisco Bay Conservation and Development Commission's regional prioritization process (Solano County 2011b).

3.6.2. Environmental Setting

Greenhouse Gas Emissions

Global warming is a public health and environmental concern around the world. As global concentrations of atmospheric GHGs increase, increases in global temperatures, weather extremes, and air pollution concentrations also occur. Global warming and climate change has been observed to contribute to poor air quality, rising sea levels, melting glaciers, stronger storms, more intense and longer droughts, more frequent heat waves, increases in the number of wildfires and their intensity, and other threats to human health (IPCC 2013).

With the exception of 1998, all of the 10 warmest years in the record of global temperatures (dating to 1880) have occurred since 2005, and the last 5 years (2014–2018) have ranked as the 5 warmest years on record (NOAA 2019). Hotter days facilitate the formation of ozone, increases in smog, and greater public health impacts (e.g., premature deaths, hospital admissions, asthma attacks, and respiratory conditions) (EPA

2017). Average global combined land/ocean surface temperatures rose by roughly 0.85ºC between 1880 and 2012 (IPCC 2013). Because oceans tend to warm and cool more slowly than land areas, continental surfaces have warmed the most. Climate models predict that, if GHG emissions continue to increase, the average temperature at the earth's surface will likely increase by more than 1.5ºC by the year 2100 relative to 1850–1900 (IPCC 2013).

The Physical Scientific Basis of Greenhouse Gas Emissions and Climate Change

Certain gases in the earth's atmosphere, classified as GHGs, play a critical role in determining the earth's surface temperature. Solar radiation enters the earth's atmosphere from space. A portion of the radiation is absorbed by the earth's surface and a smaller portion of this radiation is reflected toward space. This absorbed radiation is then emitted from the earth as low-frequency infrared radiation. The frequencies at which bodies emit radiation are proportional to temperature. The earth has a much lower temperature than the sun; therefore, the earth emits lower frequency radiation. Most solar radiation passes through GHGs; however, infrared radiation is absorbed by these gases. As a result, radiation that otherwise would have escaped back into space is instead "trapped," resulting in a warming of the atmosphere. This phenomenon, known as the greenhouse effect, is responsible for maintaining a habitable climate on earth.

Prominent GHGs contributing to the greenhouse effect are CO_2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Human-caused emissions of these GHGs that exceed natural ambient concentrations are responsible for intensifying the greenhouse effect and leading to a trend of unnatural warming of the earth's climate, known as global climate change or global warming. It is "extremely likely" that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in GHG concentrations and other anthropogenic forcing (IPCC 2014).

Climate change is a global problem. GHGs are global pollutants, unlike criteria air pollutants and toxic air contaminants, which are pollutants of regional and local concern. Whereas most pollutants with localized air quality effects have relatively short atmospheric lifetimes (about 1 day), GHGs have long atmospheric lifetimes (1 year to several thousand years). GHGs persist in the atmosphere for long enough time periods to be dispersed around the globe. Although the lifetime of any GHG molecule depends on multiple variables and cannot be determined with any certainty, it is understood that more CO_2 is emitted into the atmosphere than is sequestered by ocean uptake, vegetation, and other forms of sequestration. Of the total annual human-caused CO_2 emissions, approximately 55 percent is sequestered through ocean and land uptake every year, averaged over the last 50 years, and the remaining 45 percent remains stored in the atmosphere (IPCC 2013:467).

The quantity of GHGs in the atmosphere that ultimately results in climate change is not precisely known, but is enormous: No single project alone would measurably contribute to an incremental change in the global average temperature, or to global, local, or micro climates. From the standpoint of CEQA, GHG impacts relative to global climate change are inherently cumulative.

Greenhouse Gas Emission Sources

Emissions of CO_2 are byproducts of fossil fuel combustion. Methane, a highly potent GHG, results primarily from off-gassing (the release of chemicals from nonmetallic substances under ambient or greater pressure) and is largely associated with agricultural practices and landfills. Nitrous oxide is also largely attributable to agricultural practices and soil management. CO_2 sinks or reservoirs include vegetation and the ocean, which respectively absorb CO_2 through sequestration and dissolution (CO_2 dissolving into the water), two of the most common processes for removing CO_2 from the atmosphere.

California

GHG emissions are attributable in large part to human activities associated with the transportation, industrial, electricity generation and imports, residential, commercial, and agricultural emissions sectors. In California, the transportation sector is the largest emitter of GHGs (39 percent), followed by industrial (21 percent), electric power (16 percent), commercial and residential (9 percent), agriculture (8 percent), and recycling and waste (2 percent) (ARB 2018).

Emissions from the electric power sector composed 16 percent of statewide GHG emissions in 2016. The GHG emissions inventory divides the electric power sector into two broad categories: emissions from in-state power generation (including the portion of cogeneration emissions attributed to electricity generation) and emissions from imported electricity. GHG emissions from this sector declined by 18 percent in 2016 compared to 2015. The decrease in the carbon intensity of California's electricity generation is driven primarily by the large increase in renewable energy resources that has resulted from implementation of California's Renewable Portfolio Standards and Cap-and-Trade Program. Incrementally higher energy efficiency standards have kept consumption of electricity from increasing despite the state's growing population and economy. The GHG intensity of imported electricity has been declining steadily over time as California imports a greater share of renewable power and divests from long-term contracts for coal-fired electricity (ARB 2018).

Local

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 (Section 53091 of the Government Code (Subdivisions d and e). The following policies are provided for the purpose of disclosure, and to allow informed decision-making.

Solano County

The County's 2011 CAP includes a baseline 2005 GHG inventory and emissions forecast for unincorporated Solano County. The 2005 GHG inventory is organized into a series of categories based on various emissions activities occurring in the unincorporated county: transportation, energy consumption, agriculture, water consumption, and solid waste. The inventory found that the various emissions categories accounted for the following percentages of countywide annual GHG emissions (Solano County 2011a):

- *Transportation-related activities:* Approximately 51 percent.
- *Electricity and natural gas consumption:* 22 percent. More than half of these emissions were associated with industrial processes, while commercial energy use generated approximately one-third and residential energy use generated the remaining 12 percent.
- *Agriculture, including livestock, field equipment, soil management, pesticides, and crop residue burning emissions:* Approximately 21 percent.
- *Water sector:* Approximately 4 percent.
- *Waste sector:* Approximately 2 percent.

The community's GHG emissions were projected for the year 2020 under a business- as-usual, no-plan scenario. The scenario assumes that historical and current GHG-generating practices and trends for energy consumption, transportation, agriculture, solid waste, and water consumption will continue through 2020. Under these assumptions, communitywide GHG emissions in unincorporated Solano County are anticipated to decrease 4.7 percent from the 2005 baseline. The distribution of emissions across sectors remains approximately the same in 2020 as in 2005. The projected decrease in 2020 emissions can be largely attributed to lower emission rates of GHGs from newer vehicles (Solano County 2011a).

Effects of Climate Change on the Environment

According to the Intergovernmental Panel on Climate Change, which was established in 1988 by the World Meteorological Organization and the United Nations Environment Programme, global average temperature is expected to increase by 3–7 degrees Fahrenheit (°F) by the end of the 21st century, depending on future GHG emission scenarios (IPCC 2007). According to the California Natural Resources Agency, temperatures in California are projected to increase by 2° to 5°F by 2050 and by 4° to 9°F by 2100 (CNRA 2018a).

Other environmental resources could be indirectly affected by accumulated GHG emissions and the resulting rise in global average temperature. California has been marked by extreme weather and its effects in recent years. According to the California Natural Resources Agency report *Safeguarding California Plan: 2018 Update* (CNRA 2018b), California experienced the driest 4-year statewide precipitation on record from 2012 through 2015; the warmest years on average in 2014, 2015, and 2016; and the smallest and second smallest Sierra Nevada snowpack on record in 2015 and 2014

(CNRA 2018b). In contrast, the northern Sierra Nevada experienced its wettest water year on record in 2016–17 (CNRA 2018b). These changes in precipitation exacerbate wildfires throughout California, increasing their frequency, size, and devastation. As temperatures increase, the increase in precipitation falling as rain rather than snow could also increase the potential for floods because water that normally would be held in the snowpack of the Sierra Nevada and Cascade Range until spring would flow into the Central Valley concurrently with winter rainstorms. This scenario would place more pressure on California's levee/flood control system (CNRA 2018b). Furthermore, in the extreme scenario involving rapid loss of the Antarctic ice sheet, sea level along California's coastline could rise up to 10 feet by 2100, which is approximately 30–40 times faster than sea level rose over the last century (California Ocean Science Trust 2017).

Changes in temperature, precipitation patterns, extreme weather events, and sea level rise have the potential to affect and reduce the efficiency of thermal power plans and substations, decrease the capacity of transmission lines, disrupt electrical demand, and threaten energy infrastructure with the increased risk of flooding (CNRA 2018b).

The California Department of Transportation owns and operates more than 51,000 roadway miles along 265 highways, and three of the busiest passenger rail lines in the nation. Sea level rise, storm surge, and coastal erosion are imminent threats to highways, roads, bridge supports, airports, transit systems, and rail lines near sea level and seaports. Shifting precipitation patterns, increased temperatures, wildfires, and increasingly frequent extreme weather events also threaten transportation systems across the state. Temperature extremes and increased precipitation can increase the risk of roadway and railroad track failure, reduce safety, and increase maintenance costs (CNRA 2018b).

Reduced water availability and changing temperatures, which affect prevalence of pests, disease, and species, directly affect crop development and livestock production. Other environmental concerns include declines in water quality, groundwater security, and soil health (CNRA 2018b). Vulnerabilities of water resources also include risks of watershed degradation, alteration of ecosystems and loss of habitat, impacts on coastal areas, and ocean acidification (CNRA 2018b). The ocean absorbs approximately one-third of the CO_2 released into the atmosphere every year from industrial and agricultural activities, which changes ocean chemistry by reducing the pH of seawater. This ocean acidification harms marine organisms, especially calcifying species such as oysters, clams, sea urchins, and corals.

Cal-Adapt is a climate change scenario planning tool developed by CEC that scales global climate model data down to local and regional resolution under two emissions scenarios, known as Representative Concentration Pathways (RCPs). The RCP 8.5 scenario represents a business-as-usual future emissions scenario, and the RCP 4.5 scenario represents a lower GHG emissions future. According to Cal-Adapt, annual average temperatures in the project area are projected to rise by 3.5° to 6.0°F by 2099, with the range based on low and high emissions scenarios (Cal-Adapt 2019).

Energy

Energy Services in the Project Area

Pacific Gas and Electric Company supplies electricity to Solano County. However, starting in 2020, all residents and businesses in the unincorporated county will have a new electricity provider. The Solano County Board of Supervisors voted to join Marin, Napa, and Contra Costa counties, as well as Benicia and 19 other cities, as part of the Marin Clean Energy joint powers authority, which was approved by the California Public Utilities Commission on February 19, 2019 (MCE 2019). Marin Clean Energy's primary program obtains 50 percent of its energy from renewable sources such as wind, solar, water, and landfill cogeneration. That compares to 33 percent from Pacific Gas and Electric Company.

Energy Types and Sources

California relies on a regional power system consisting of a diverse mix of natural gas, petroleum, renewable, hydroelectric, and nuclear generation resources. One-third of the energy consumed in California is produced by combusting natural gas. Almost half of California's net electricity generation in 2017 was from renewable resources, including hydropower. Natural gas–fired power plants fueled more than 40 percent of total in-state net electricity generation. Nuclear power supplies less than 10 percent of net generation, as one of the two nuclear power plants in the state was permanently retired in mid-2013. More than one-fourth of California's electricity supply comes from out-of-state generation facilities (EIA 2018).

California is among the top states for generation of electricity from renewable resources. In 2017, the state was the leader in total utility-scale electricity generation from renewable resources, including hydroelectric power. California typically leads the nation in solar, geothermal, and biomass energy generation. In 2017, the state was also the nation's second largest producer of electricity from conventional hydroelectric power and fifth largest producer of wind energy. California has six major wind resource areas and many smaller wind sites (EIA 2018).

Transportation represented approximately 39.8 percent of California's energy consumption in 2016, followed by 23.7 percent consumed by industrial land uses, 18.9 percent consumed by commercial land uses, and 17.7 percent consumed by residential uses (EIA 2018).

3.6.3. Environmental Impacts and Mitigation Measures

Methods and Assumptions

Greenhouse Gases and Climate Change

The methodology used in this EIR to analyze the project's contribution to global climate change included calculating GHG emissions using the best available methodologies for the information provided. For a full description of the GHG emissions calculation methodology, see Appendix C.

Construction-related GHG emissions were estimated using the Sacramento Metropolitan Air Quality Management District's Roadway Construction Emissions Model (Version 9.0) computer program. Specific information used in construction modeling included a list of typical construction equipment by construction phase and reasonable assumptions based on provided materials and information.[2] The analysis assumed that most project construction would begin in 2020 and conclude in 2021 after a period of approximately 17 months.

Emissions were estimated only for project construction because operational activities would be minimal. In addition, the analysis quantified the emissions that would no longer occur because of the increased use of renewable energy resources for power generation; these are referred to as "avoided" emissions.

Thresholds of Significance

Greenhouse Gas Emissions

The issue of global climate change is inherently a cumulative issue, because GHG emissions from individual projects cannot be shown to have a material effect on the global climate. Thus, the project's impact on climate change is addressed only as a cumulative impact.

- Based on Appendix G of the State CEQA Guidelines, the project would result in a potentially significant impact related to GHG emissions and energy if it would:
- generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment;
- conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing emissions of GHGs;
- result in wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation; or
- conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

In California, counties, cities, and air districts have developed guidance and thresholds of significance for determining the significance of GHG emissions that occur within their jurisdictions. SMUD is the CEQA lead agency for the project, and therefore is responsible for determining whether a particular impact would be considered significant. When local

2 Because project-specific information such as the duration of equipment use was not available, only minimal off-model calculations were possible.

agencies do not have adopted thresholds, as is the case with this project, they typically rely on thresholds and guidance from the responsible air district.

Neither YSAQMD nor BAAQMD has an adopted threshold of significance for construction-related GHG emissions. The BAAQMD threshold of significance for operational GHG emissions from land use projects is 1,100 metric tons of carbon dioxide equivalent ($MTCO_2e$) per year or 4.6 $MTCO_2e$ per service population per year (BAAQMD 2017). However, YSAQMD and BAAQMD recommend that the lead agency quantify and disclose construction-related GHG emissions and determine the significance of the resulting GHG emission impacts relative to the AB 32 GHG reduction goals, as required by Section 21082.2 of the California Public Resources Code. The lead agency is encouraged to incorporate best management practices to reduce GHG emissions during construction, as feasible and applicable.

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. Therefore, the following issues will not be discussed further in the impact analysis.

Operational Greenhouse Gas Emissions

In consideration of the minor operational activities (periodic maintenance and monitoring of the proposed facilities by five full-time employees) that would occur regularly upon completion of project construction, the impacts of project operations are not analyzed further.

Demand for Energy Services and Utilities

The project, once operational, would serve as a 91-megawatt wind power generation facility for SMUD. Aside from the proposed wind turbine generators, implementing the project would require energy-related infrastructure that would include an associated electrical collection system. This project would increase SMUD’s capacity for power generation. As a power generation facility, this project would generate much more energy than would be needed to run the facility’s operational components; therefore, the project would not demand new energy services and facilities. For this reason, the project’s demand for energy services and utilities is not discussed further in this section. (However, because the project does include construction activity, the project’s potential for wasteful, inefficient, and unnecessary consumption of energy is discussed below, in Impact 3.6-3.)

Impact Analysis

Impact 3.6-1: Direct or indirect generation of GHG emissions that may have a significant impact on the environment or conflict with an applicable plan, policy, or regulation of an agency adopted for the purpose of reducing emissions of GHGs.

The fundamental purpose of the project is to reduce GHG emissions produced in the SMUD service area and in California, or to support beneficial uses there. The project is expected to reduce GHG emissions by approximately 2,446,322 $MTCO_2e$ over the project's 35-year life. Although project construction activities would make a relatively small contribution of 4,603 $MTCO_2e$ to overall GHG emissions, implementing the project would not result in a substantial cumulative contribution to GHG emissions or conflict with any applicable plan, policy, or regulation regarding GHGs. This impact would be **less than significant**.

The use of heavy-duty off-road equipment, vehicular trips to transport materials, and workers' commutes during project construction would all generate exhaust emissions of GHGs. Table 3.6-1 shows the results of modeling results (see also Appendix C).

Table 3.6-1 Project-Generated Greenhouse Gas Emissions

Construction Activities	$MTCO_2e$ (MT/year)
Phase 1: Demolition	409
Phase 2: Road Construction	675
Phase 3: Home Run Collection Construction	203
Phase 4: Foundation Construction	574
Phase 5: Wind Turbine Generator Delivery and Erection	2,741
Summary of Construction Emissions	
Construction Year 1	1,862
Construction Year 2	2,741
Total Construction (all years)	***4,603***
Construction Amortized (35 years)	132

Notes:
MT/year = metric tons; $MTCO_2e$ = metric tons of carbon dioxide equivalent
Totals may not add due to rounding.
Source: Modeled by Planning Partners in March 2019 (Appendix C)

Short-term project construction activities would generate approximately 4,603 $MTCO_2e$ of GHG emissions (Table 3.6-1). Neither YSAQMD nor BAAQMD has an adopted threshold of significance for construction-related GHG emissions. Because of the cumulative effect of GHGs, the project's construction emissions were amortized over the operational lifetime of the project to provide a relative comparison. When amortized over the assumed 35-year lifetime of the project, the project's annual construction-related GHG emissions would be 132 $MTCO_2e$.

In addition, the project has been designed in part to help SMUD reach the Renewable Portfolio Standards goals as set forth by SB 350, requiring utilities to increase the mix of renewable energy sources to 50 percent by 2030. Although implementing the project would result in short-term construction emissions, project operation would serve to increase SMUD's renewable energy supply and would help reduce carbon dioxide equivalent emissions associated with SMUD's power generation. Using power generation estimates from engineering assessments, the project's 91-megawatt capacity would generate approximately 290,800 megawatt-hours per year and result in approximately 69,895 $MTCO_2e$ per year of avoided GHG emissions. Over the expected 30- to 35-year (or longer) life of the project, these annual avoided emissions would be approximately 2,446,322 $MTCO_2e$, which would vastly exceed the 4,603 $MTCO_2e$ associated with the project's short-term construction activities. Further, the Renewable Portfolio Standards requirements established by SB X1-2 and SB 350 are among many strategies in place to reduce statewide GHG emissions to achieve the long-term GHG reduction goals established for 2030 and 2050. Thus, implementing this project would contribute to California's efforts to meet its long-term GHG reduction goals and would not conflict with any plans, policies, or regulations adopted for the purpose of reducing GHG emissions. This impact would be **less than significant**.

Mitigation Measures

No mitigation is required.

Impact 3.6-2: Impacts of climate change on the project.

Climate change is anticipated to result in various changes to local weather patterns in the future. The project does not propose any new residences and would not expose people to increased risks from climate change. This impact would be **less than significant**.

As discussed previously in Section 3.6.2, "Environmental Setting," there is substantial evidence that human-induced increases in atmospheric GHG concentrations have intensified the greenhouse effect, thus leading to increased global average temperatures (climate change) and associated changes in local, regional, and global average climatic conditions.

Although strong scientific consensus exists that global climate change is occurring, there is less certainty regarding the timing, severity, and potential consequences of the climate phenomena, particularly at specific locations. Scientists have identified several ways in which global climate change could alter the physical environment in California (CNRA 2018b; IPCC 2014). These include:

- increased average temperatures;
- modifications to the timing, amount, and form (rain vs. snow) of precipitation;

- changes in the timing and amount of runoff;
- reduced water supply;
- deterioration of water quality; and
- elevated sea levels.

The project site is located in a rural area of Solano County and would likely be subject to only some of these impacts. The most pertinent impacts of climate change on the specific project location would be increased average temperatures and modifications to the timing, amount, and form (rain vs. snow) of precipitation.

Annual average temperatures in Solano County are projected to increase steadily over the next 90 years, based on the best available climate change projections for the region in the web-based planning tool Cal-Adapt. Cal-Adapt was developed by CEC to evaluate climate change impacts, consistent with the emissions scenarios identified in the Intergovernmental Panel on Climate Change's Fifth Assessment Report (IPCC 2014). The IPCC Fifth Assessment Report uses future emissions scenarios known as Representative Concentration Pathways to estimate scenarios in which varying (higher or lower) levels of GHGs would be emitted in the future. Emissions scenarios used in the tool are based on the RCP 4.5 and RCP 8.5 scenarios.

According to Cal-Adapt, the location of the project is projected to experience a temperature increase of 3.5° to 6.0°F by 2099 under the RCP 4.5 and RCP 8.5 scenario, respectively (Cal-Adapt 2019). These temperature increases could result in changes to winds, with some studies suggesting stronger winds and an overall increase in wind generation (British Antarctic Survey 2018). Long-term project operation would include regular maintenance of and repairs to equipment, with replacement as needed. However, the project would not add any residential uses, and therefore, would not expose people to increased or additional risks from climate change effects. This impact would be **less than significant**.

Mitigation Measures

No mitigation is required.

Impact 3.6-3: Wasteful, inefficient, and unnecessary consumption of energy.

Project construction activities would consume energy. However, because the project, once operational, would serve as a power generation facility and increase SMUD's capacity to generate power, the project would not result in the wasteful, inefficient, and unnecessary consumption of energy. Therefore, this impact would be **less than significant**.

Project construction would require the use of transportation fuels (diesel and gasoline). Heavy-duty construction equipment, vehicle trips used for transporting materials, and worker commute trips to and from the project site would all consume energy. These are all considered necessary components of the project's construction phase and would not result in wasteful, inefficient, and unnecessary consumption of energy. Once completed, the project would serve as one of SMUD's power generating facilities and would increase SMUD's overall capacity to generate power. For these reasons, this impact would be **less than significant**.

In addition, Mitigation Measure 3.2-1, "Reduce construction-related exhaust and dust emissions," in Section 3.2, "Air Quality," includes requirements for reducing air pollutant emissions. These requirements could include using more fuel-efficient, late-model diesel engines (e.g., Tier 3, Tier 4), using alternative fuels, or other options. Implementing Mitigation Measure 3.2-1 would further reduce overall usage of fuel (and fossil fuels) during project construction.

Mitigation Measures

No mitigation is required.

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3.7. Hazards and Hazardous Materials

This section evaluates the potential hazards to the public and the environment from construction, operation, and decommissioning of the project. It considers both short-term impacts from construction- and decommissioning-phase activities and impacts of long-term operations and maintenance. Hazards discussed in this section include:

- the use and potential for release of hazardous materials;
- the possibility of encountering subsurface hazardous materials during grading and excavation;
- hazards to aviation;
- exposure of people or structures to wildfires; and
- risks to the public from failure of wind turbine generator (WTG) rotors.

Impacts related to hazardous emissions (i.e., toxic air contaminants) are evaluated in Section 3.2, “Air Quality.” Potential effects of hazardous materials on water quality are evaluated in Section 3.8, “Hydrology and Water Quality.” For an evaluation of impacts on areas with high wildfire risk, see Section 5.1.7, “Wildfire.”

3.7.1. Regulatory Setting

Federal

Management of Hazardous Materials

Various federal laws address the proper handling, use, storage, and disposal of hazardous materials, and require measures to prevent or mitigate injury to health or the environment if such materials are accidentally released. The U.S. Environmental Protection Agency (EPA) is the agency primarily responsible for enforcing and implementing federal laws and regulations regarding hazardous materials. Applicable federal regulations pertaining to hazardous materials are contained mainly in Code of Federal Regulations (CFR) Titles 29, 40, and 49. Hazardous materials, as defined in the code, are listed in 49 CFR 172.101. Management of hazardous materials is governed by the following laws, among others:

- The Toxic Substances Control Act of 1976 (Title 15, Section 2601 and following sections of the U.S. Code [15 USC 2601 et seq.]) regulates the manufacturing, inventory, and disposition of industrial chemicals, including hazardous materials. Section 403 of the Toxic Substances Control Act establishes standards for lead-based paint hazards in paint, dust, and soil. This law mandates use of the Universal Hazardous Waste Manifest (or the Cortese List) to track hazardous substances from “cradle to grave.”

- The Resource Conservation and Recovery Act of 1976 (42 USC 6901 et seq.) is the law under which EPA regulates hazardous waste from the time the waste is generated until its final disposal (“cradle to grave”).

- The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (also called the Superfund Act or CERCLA) (42 USC 9601 et seq.) gives EPA authority to seek out the parties responsible for releases of hazardous substances and ensure their cooperation in site remediation.

- The Superfund Amendments and Reauthorization Act (SARA) of 1986 (Public Law 99-499; 42 USC 116), also known as SARA Title III or the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), imposes hazardous materials planning requirements to help protect local communities in the event of accidental release.

- The Spill Prevention, Control, and Countermeasure (SPCC) rule (40 CFR Part 112) includes requirements for oil spill prevention, preparedness, and response to prevent discharges of oil to navigable waters and adjoining shorelines. The rule requires specific facilities to prepare, amend, and implement SPCC plans. The SPCC rule is part of the Oil Pollution Prevention regulation, which also includes the Facility Response Plan rule.

Transport of Hazardous Materials

The U.S. Department of Transportation regulates transport of hazardous materials between states and is responsible for protecting the public from dangers associated with such transport. The federal hazardous materials transportation law, 49 USC 5101 et seq. (formerly the Hazardous Materials Transportation Act, 49 USC 1801 et seq.) is the basic statute regulating transport of hazardous materials in the United States. The Federal Highway Administration, U.S. Coast Guard, Federal Railroad Administration, and Federal Aviation Administration (FAA) enforce hazardous materials transport regulations.

Worker Safety

The federal Occupational Safety and Health Administration (OSHA) is responsible for assuring worker safety in the handling and use of chemicals identified in the Occupational Safety and Health Act of 1970 (Public Law 91-596, 29 USC 651 et seq.). OSHA has adopted numerous regulations pertaining to worker safety, contained in CFR Title 29. These regulations set standards for safe workplaces and work practices, including standards for handling hazardous materials and for excavation and trenching.

Air Traffic

The FAA regulates aviation at Travis Air Force Base (AFB) and other regional, public, and private airports; it also regulates objects that affect navigable airspace, such as the

WTGs proposed for the project. The FAA is responsible for promoting and maintaining the safe and efficient use of U.S. airspace for all users. According to 49 CFR Part 77.13:

> Any person/organization intending to sponsor any of the following construction or alterations must notify the Administrator of the FAA of:
>
> - Any construction or alteration exceeding 200 feet above the ground level;
> - Any construction or alteration:
>   - Within 20,000 feet of a public use or military airport which exceeds a 100 to 1 ratio (100:1) surface from any point on the runway;
>   - Within 10,000 feet of a public use or military airport which exceeds a 50:1 surface from any point on the runway;
>   - Within 5,000 feet of a public use heliport which exceeds a 25:1 surface;
> - Any highway, railroad, or other traverse way whose prescribed adjusted height would exceed the above noted standards;
> - When requested by the FAA; and
> - Any construction or alteration located on a public use airport or heliport regardless of height or location.

Persons failing to comply with the provisions of FAR Part 77 are subject to civil penalty under Section 902 of the Federal Aviation Act of 1958, as amended and pursuant to 49 USC 46301(a).

The U.S. Department of Transportation and California Department of Transportation (Caltrans) also require project proponents to submit FAA Form 7460-1, Notice of Proposed Construction or Alteration. According to 49 CFR Part 77.17:

- Individuals/Organizations proposing construction or alterations must submit FAA Form 7460-1, Notice of Proposed Construction or Alteration, including pertinent information about the alteration and appropriate attachments showing the type and location of the alteration. Information needed for the FAA review includes the following:
  - Perpendicular distance of the proposed alteration to the nearest runway centerlines;
  - Distance along centerline (actual or extended) from runway end to the perpendicular intercept point;
  - Ground elevation at the site of the proposed alteration;
  - Height of the proposed alteration including antennas or other appurtenances;
  - Accurate geodetic coordinates conforming to North American Datum of 1983 (NAD 83);
  - Sketches, drawings, etc., showing the type of construction or alteration being proposed; and

- Pursuant to Section 77.17(a)(1), notification shall be submitted 30 days prior to construction. Given the time required to conduct an aeronautical study, a 60-day notification is recommended to accommodate the review process and issuance of a determination letter.

Notification allows the FAA to identify potential aeronautical hazards in advance, thus preventing or minimizing any adverse impacts on the safe and efficient use of navigable airspace. This notification serves as the basis for:

- evaluating the effect of the construction or alteration on operating procedures,
- determining the potentially hazardous effect of proposed construction on air navigation,
- identifying mitigation measures to enhance safe air navigation, and
- charting new objects.

A permit must be obtained from Caltrans's Aeronautics Program for any structure that would constitute a hazard to air navigation, as defined in FAR Part 77. The permit is not required if the FAA aeronautical study determines that the structure would have no impact on air navigation.

According to FAA Order 7400.2F, *Procedures for Handling Airspace Matters* (FAA 2006), the FAA is authorized to promote the safe and efficient use of navigable airspace, whether concerning existing or proposed structures (also see 49 USC 44178). This includes safety issues regarding radar interference from structures in navigable airspace. To this end, the FAA coordinates with several other federal agencies, including Travis AFB, before issuing a No Hazard Determination.

As also provided in FAA Order 7400.2F, the FAA obstruction evaluation transcends organizational lines and includes military input as provided above. A structure is considered a hazard if it exceeds obstruction standards as outlined in FAR Part 77, and/or if it is found to have a physical or electromagnetic radiation effect on the operation of air navigation facilities (FAA 2006). This also includes airport capacity/efficiency and the effect on ground-based communications and Navigational Aid System equipment, and the signal paths between ground-based and airborne equipment. In addition, under this responsibility clause, military personnel are responsible for evaluating effects on airspace and routes used by the military.

State

Management of Hazardous Materials

In California, both federal and state community right-to-know laws are coordinated through the Governor's Office of Emergency Services. The federal law, SARA Title III or EPCRA (described above), supports emergency planning efforts at the state and local levels and enables information sharing with local governments and the public regarding potential chemical hazards in their communities. Because of the community right-to-know laws, information is collected from facilities that handle (e.g., produce, use, store) hazardous materials exceeding certain quantities. The provisions of EPCRA apply to the following major categories:

- Emergency planning
- Emergency release notification
- Reporting of hazardous chemical storage
- Inventory of toxic chemical releases

The corresponding state law is found in Chapter 6.95 of the California Health and Safety Code (Hazardous Materials Release Response Plans and Inventory). This law requires qualifying businesses to prepare a hazardous materials business plan. The plan must include procedures for managing hazardous materials and hazardous waste. In addition, the plan must describe emergency response procedures and include a list of emergency spill cleanup supplies and equipment. When an applicant begins to use hazardous materials at levels that reach applicable federal and/or state thresholds, the applicant submits the plan to the administering agency.

The California Department of Toxic Substances Control (DTSC), a division of the California Environmental Protection Agency, has primary regulatory responsibility for hazardous materials in California. DTSC works in conjunction with EPA to enforce and implement hazardous materials laws and regulations. As required by Section 65962.5 of the California Government Code, DTSC maintains a hazardous waste and substances site list for the state, known as the Cortese List. Individual regional water quality control boards (RWQCBs) are the lead agencies responsible for identifying, monitoring, and cleaning up leaking underground storage tanks.

The California Department of Conservation, Division of Oil, Gas, and Geothermal Resources, oversees the drilling, operation, maintenance, and plugging and abandonment of oil, natural gas, and geothermal wells. The regulatory program emphasizes the wise development of oil, natural gas, and geothermal resources in the state through sound engineering practices intended to protect the environment, prevent pollution, and ensure public safety.

The California Department of Forestry and Fire Protection maintains maps of fire hazard severity zones for local and state responsibility areas. These areas are mapped based on fuels, terrain, weather, and other relevant factors. These hazard zones are rated based on their potential to expose structures to wildfire. The project site is designated as a Local Responsibility Area Unzoned fire hazard severity zone (CAL FIRE 2007). Surrounding areas are in the moderate fire hazard severity zone, which is the lowest fire hazard rating. For a discussion of fire protection for the area, see Section 5.1.7, “Wildfire.”

Transport of Hazardous Materials and Hazardous Materials Emergency Response Plan

The State of California has adopted U.S. Department of Transportation regulations for the movement of hazardous materials originating within and passing through the state. State regulations are contained in Division 26, Title 13 of the California Code of Regulations. The California Highway Patrol and Caltrans have primary responsibility for enforcing state regulations and responding to hazardous materials transportation emergencies. Together, these agencies determine the container types used and issue licenses to hazardous waste haulers to transport hazardous waste on public roads.

California has developed an emergency response plan to coordinate emergency services provided by the federal, state, and local governments and private agencies. Response to hazardous materials incidents is one part of the plan. The plan is managed by the California Governor's Office of Emergency Services, which coordinates the responses of other agencies in the project area.

Management of Construction Activities

Through the Porter-Cologne Water Quality Control Act and the National Pollutant Discharge Elimination System (NPDES) program, RWQCBs have the authority to require proper management of hazardous materials during project construction. For a detailed description of the Porter-Cologne Water Quality Control Act, the NPDES program, and the role of the Central Valley RWQCB, see Section 3.8, "Hydrology and Water Quality."

The State Water Resources Control Board adopted the statewide NPDES General Permit in August 1999. The state requires that projects disturbing more than 1 acre of land during construction file a notice of intent with the RWQCB to be covered under this permit. Construction activities subject to the NPDES General Permit include clearing, grading, stockpiling, and excavation. Dischargers are required to eliminate or reduce non-stormwater discharges to storm sewer systems and other waters. A storm water pollution prevention plan (SWPPP) must be developed and implemented for each site covered by the permit. The SWPPP must include best management practices (BMPs) designed to prevent construction pollutants from contacting stormwater and keep the products of erosion from moving off-site into receiving waters throughout the construction and life of the project. The BMPs must address source control and, if necessary, pollutant control.

Worker Safety

The California Division of Occupational Safety and Health (Cal/OSHA) is the primary agency responsible for worker safety in the handling and use of chemicals in the workplace in California. Cal/OSHA standards are typically more stringent than federal OSHA regulations. Under Cal/OSHA rules, an employer is required to monitor worker exposure to listed hazardous substances and notify workers of exposure (California Code of Regulations Title 8, Sections 337–340). The regulations specify requirements for employee training, availability of safety equipment, accident-prevention programs, and warnings regarding exposure to hazardous substances.

Air Traffic

The State Aeronautics Act, codified at Public Utilities Code Section 21001 et seq., was enacted “to further and protect the public interest in aeronautics and aeronautical progress” (Public Utilities Code Section 21002). The State Aeronautics Act requires the establishment of an airport land use commission in each county. These commissions are established to provide for the orderly development of public use airports in the state and the area surrounding these airports, and to protect public health, safety, and welfare by minimizing the public’s exposure to excessive noise and safety hazards in areas around public use airports (Public Utilities Code Section 21670[a]).

Local

As discussed in Section 1.2, policies construction of facilities for the production of electrical energy by a local agency like SMUD is exempt from County zoning and building ordinances (Section 53091 of the Government Code (Subdivisions d and e). The following policies are provided for the purpose of disclosure, and to allow informed decision-making.

Solano County General Plan

The Public Health and Safety elements of the *Solano County General Plan* (Solano County 2008) include policies and programs regarding proper storage, use, and disposal of hazardous materials, setbacks to buffer uses from WTGs, and compatibility of WTG with operations at Travis AFB.

The Resources Element of the Solano County General Plan (Solano County 2008) include policies and programs regarding the siting of energy facilities in ways that avoid impacts to natural resources, including wildlife or agriculture, are compatible with surrounding land uses, and protect scenic views. Setbacks of up to 1,000 feet, or three times a total turbine, are required when near existing residential uses to ensure protection against falling objects due to either blade throw or structural failure of the tower itself.

Solano County Hazardous Materials Program

The Solano County Department of Resource Management, Environmental Health Services Division (Environmental Health), manages the Hazardous Materials Program. This program regulates the use, storage, and disposal of hazardous materials in Solano County. Solano County Environmental Health issues permits, inspects facilities, investigates complaints, and consults with both the business community and the public. Environmental Health conducts regulatory oversight of all businesses that handle hazardous materials exceeding 55 gallons, 500 pounds, or 200 cubic feet of gas through a hazardous materials business plan. The hazardous materials business plan program addresses preparedness for emergency response to incidents involving hazardous materials. These plans include an inventory of hazardous materials that is updated annually.

Solano County Air Traffic

The Solano County Airport Land Use Commission (ALUC) exists to protect public health, safety, and welfare by ensuring compatible land uses within the vicinity of Solano County's airports (Public Utilities Code Section 21670). Several airports operate in the project vicinity. Travis AFB is approximately 10 miles northwest of the project area, and the Rio Vista Municipal Airport is approximately 5 miles to the northeast. The Nut Tree Airport in Vacaville is approximately 19 miles north-northwest of the project area.

The project area is not located in the Nut Tree Airport Compatibility Zones (Solano County 2012) or the Rio Vista Municipal Airport Compatibility Zones or Airport Influence Area (Solano County ALUC 2018). The project area lies within the Travis AFB Airport Influence Area (Solano County ALUC 2015). The Airport Influence Area includes "all lands on which the uses could be negatively affected by present or future aircraft operations at Travis AFB, as well as lands on which the uses could negatively affect Travis AFB" (Solano County ALUC 2015:Section 6.1.2[a][1]).

The presence of WTGs can generate interference with air traffic control radar, rotor turbulence, and vertical obstruction hazards. To adequately prevent hazards, Section 5.6.1 of the Travis AFB Land Use Compatibility Plan (LUCP) states that all new and replacement turbines in Solano County that are greater than 100 feet in height at ground level "shall be referred to the ALUC for a consistency determination" (Solano County ALUC 2015). But as discussed above, SMUD's WTG facilities are exempt from the County's zoning and building provisions under subdivisions (d) and (e) of Section 53091 of the Government Code. Therefore, SMUD is not required to comply with the Land Use Compatibility Plan (LUCP) provisions regarding consistency determination. And, even if the LUCP provisions applied, "local agencies" such as SMUD have discretion to overrule the ALUC determinations under Sections 21676 and 21676.5 of the Public Utilities Code. (See Pub. Utilities Code, §§ 21674.7(b), 21675.1(d), 21676, 21676.5, and 21677 [allowing local agencies in Marin County to overrule an ALUC determination by a simple majority].)

3.7.2. Environmental Setting

Definition of Terms

For purposes of this section, the term "hazardous materials" refers to both hazardous substances and hazardous wastes. The Code of Federal Regulations defines a "hazardous material" as "a substance or material that … is capable of posing an unreasonable risk to health, safety, and property when transported in commerce" (49 CFR 171.8). Section 25501 of the California Health and Safety Code defines a hazardous material as follows:

> “Hazardous material” means any material that, because of its quantity, concentration, or physical, or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment. “Hazardous materials” include, but are not limited to, hazardous substances, hazardous waste, and any material which a handler or the administering agency has a reasonable basis for believing that it would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment.

Section 25141(b) of the California Health and Safety Code defines “hazardous wastes” as wastes that:

> … because of their quantity, concentration, or physical, chemical, or infectious characteristics, [may either] cause, or significantly contribute to an increase in mortality or an increase in serious illness [or] pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Surrounding Land Uses

Hazardous materials related to historic dryland farming and natural gas exploration and extraction activities may be present below the surface of the project site. Exhibit 3.7-1 shows the project area and the known subsurface locations of potential historic hazardous materials.

Dryland Farming

Historically, the project area has been undeveloped land used mostly for dryland farming and livestock grazing. Historical agricultural uses of the property may have included the use of hazardous materials or wastes, including petroleum products such as fuel, solvents, lubricants, and agricultural chemicals related to farming activities. Although residual agricultural chemicals could exist in site soils from historic use of the site for agricultural purposes, the potential presence of these constituents is considered likely to be minimal.

A Phase I Environmental Site Assessment (URS 2012) was completed in 2012 for approximately 720 acres of the project’s total 2,237 acres. The assessment indicated that no recognized environmental conditions were observed on the project site. However, a previous Phase I Environmental Site Assessment completed for most of the project area in 2004 identified evidence of both aboveground storage tanks and underground storage tanks near a former residence and farming equipment staging area (SMUD 2009). However, the project facilities would be located away from any past areas of concentrated use, and the likelihood of encountering any related hazardous materials during construction is considered low.

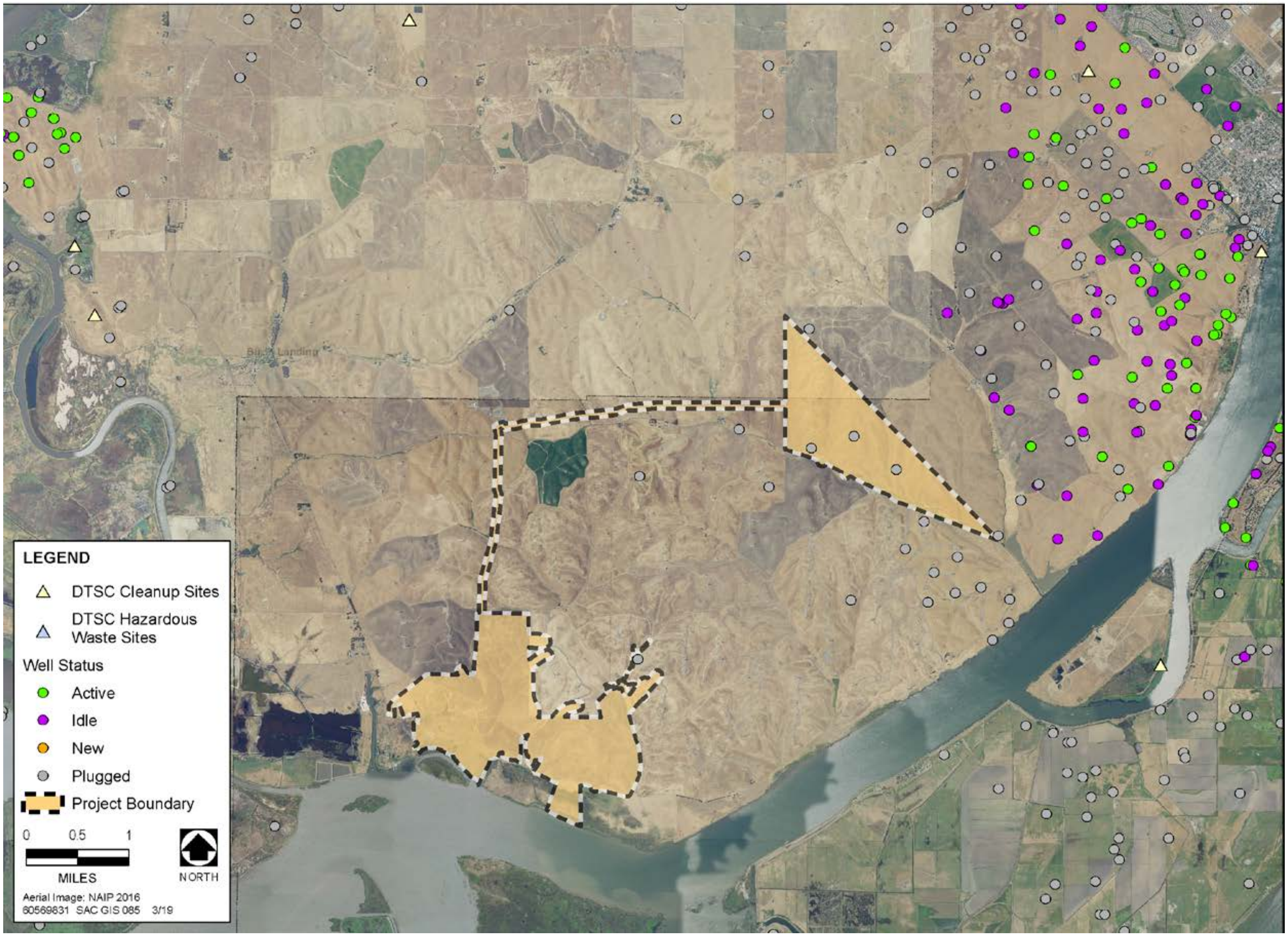

Exhibit 3.7-1 Location of Potential Hazardous Materials in the Project Area

In addition, a data search of various agency lists was conducted in 2019 for the project site and surrounding areas to identify potential hazardous contamination sites. According to the Envirofacts Web database, no sites within the project boundaries have been reported to EPA, although the Rio Vista Gas Unit is located approximately 1 mile northeast of the Solano 4 East project subarea (EPA 2019). No sites in the project area are shown in DTSC's EnviroStor database (DTSC 2019) and no underground storage tank sites in the project area are identified on the Cortese List (CalEPA 2019). Therefore, the regulatory database (Cortese) search did not identify any known hazardous wastes sites.

Natural Gas Exploration and Extraction

The project area has historical uses that include natural gas exploration and extraction. A records search of the Web site for the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources, identifies several wells in the project area (DOGGR 2019). The division's scoping letter for the project (see Appendix A) notes that there are 12 gas wells within one-quarter mile of the project area, all of which are abandoned. The actual locations of the wells have not been verified. Based on the Division of Oil, Gas, and Geothermal Resources' review of the available data, impacts on known gas wells are not likely.

Additional potential subsurface hazards include high-pressure natural gas pipelines that may be present in the project area adjacent to the Sacramento River. These pipelines could pose an explosion hazard if damaged during construction activities. Gas pipelines are generally at a depth of 8 feet and descend much deeper as they approach any crossing of the Sacramento River.

Air Traffic

Travis AFB serves as the strategic airlift and aerial refueling base on the West Coast. The base also provides support for civilian air traffic control in the base's vicinity, including airspace over the project area. As shown in the Travis AFB LUCP (Solano County ALUC 2015), the project area is located within Zones D and E of the Travis AFB Airport Influence Area (Exhibit 3.7-2). Zones D and E are the outermost zones, described as "Other Airport Environs" and the "Remainder of the Airport Influence Area." For these zones, a structure taller than 200 feet above ground level normally requires ALUC review, and proposed WTGs are required to meet line-of-sight criteria in Policy 5.6.1(b) of the Travis AFB LUCP. This policy requires completion of a radar line-of-sight analysis for WTG facilities more than 100 feet in height to demonstrate that placement of the WTG would not adversely affect radar operations. Based on a review of the LUCP and Appendix H of LUCP, which provides examples at a large scale of approximately where wind turbines that are 100 feet, 200 feet, 300 feet, 400 feet, and 500 feet in height above ground level, respectively, would likely be within the line-of-sight of the Travis AFB radar, the project as proposed is unlikely to be determined consistent with this policy of LUCP.

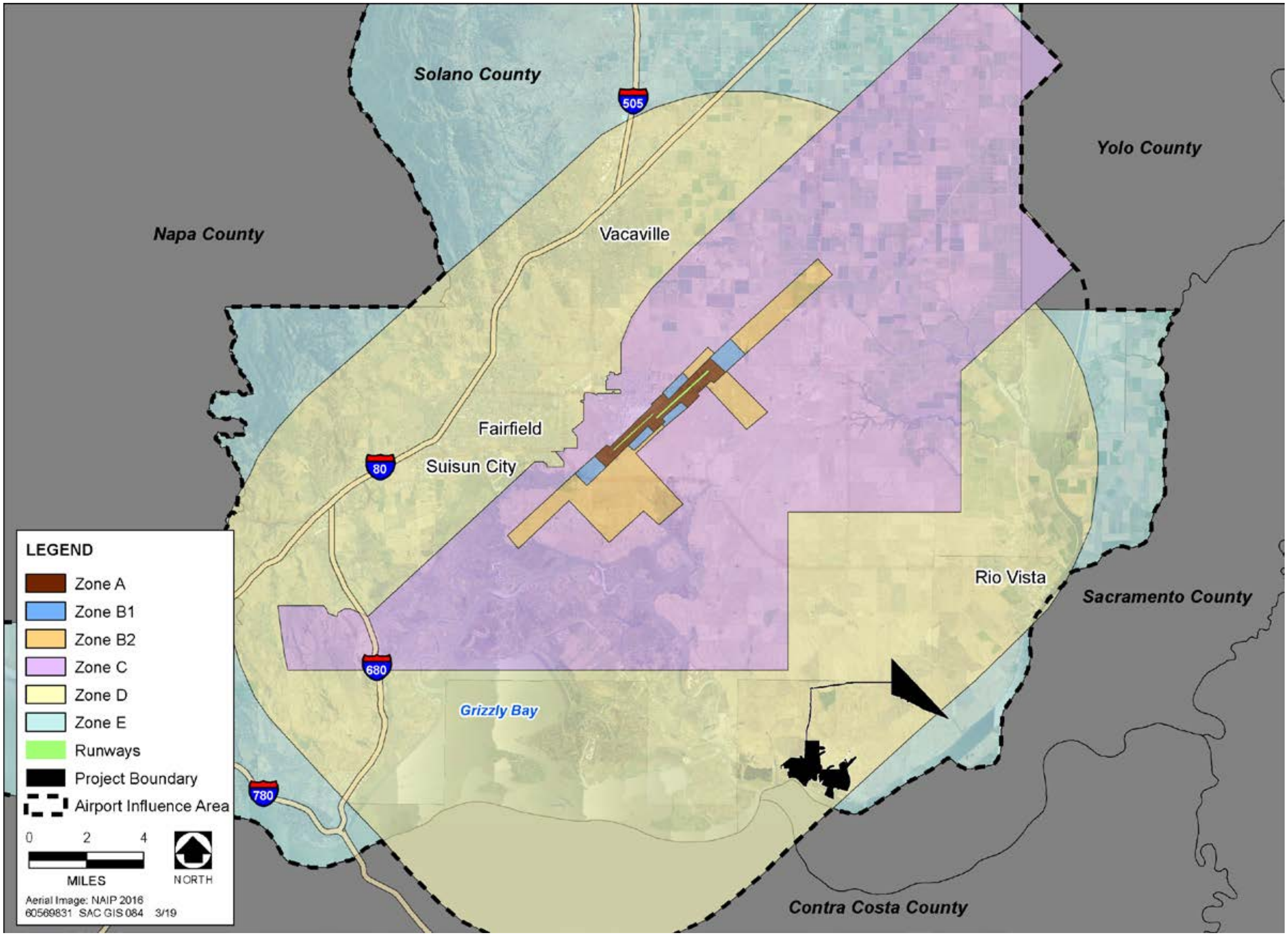

Exhibit 3.7-2 Airport Compatibility Zones

However, as discussed above, the LUCP provisions do not apply to SMUD WTG facilities. Section 53091 of the Government Code (Subdivisions d and e) states that "zoning and building ordinances of a county or city shall not apply to the location or construction of facilities for the generation of electrical energy." SMUD is a municipal utility district that serves as a local agency with the ability to establish regulations, and the project would be an electrical generation facility that would use wind turbines to generate energy. Consequently, the project is determined to be exempt from County zoning and building ordinances.

Further even if SMUD was required to obtain a determination from ALUC, SMUD, as a local agency, can overrule the ALUC determination by holding a hearing, making findings that the action is consistent with the purposes of the SAA, and obtaining a two-thirds vote of its governing body. (See Pub. Util. Code, § 21674.7(b) ["This subdivision does not limit the authority of local agencies to overrule [the ALUC] actions or recommendations pursuant to Sections 21676, 21676.5, or 21677."].)

In 2016, DoD issued the *Report to Congress on the Impact of Wind Energy Developments on Military Installations* (DoD 2016). The report discusses the risks posed by wind energy developments near military installations, ranges, or training routes. Although WTGs located in the line of sight of a radar system could adversely affect the ability of radar to locate and track airborne objects, the effect would depend on the number and location of WTGs. The report describes DoD's continued efforts to develop new strategies to identify mitigation solutions to radar interference issues, including development of new radar technology

The FAA conducted an aeronautical study of the proposed project under the provisions of 49 USC 44718 and, if applicable, 14 CFR Part 77. Issued on February 1, 2019, the FAA study considered and analyzed the following impacts:

- impacts on existing and proposed arrival, departure, and en route procedures for aircraft operating under both visual flight rules and instrument flight rules;
- impacts on all existing and planned public use airports, military airports, and aeronautical facilities; and
- cumulative impacts resulting from the studied WTGs when combined with the impacts of other existing or proposed structures.

The study found that the structures would have no substantial adverse effect on the safe and efficient use of navigable airspace by aircraft or on the operation of air navigation facilities (FAA 2019). The FAA determined that the structures would not be a hazard to air navigation, provided that the WTGs are marked with white paint and lighted using synchronized red lights in accordance with Chapters 4, 12, and 13 of FAA Advisory Circular 70/7460-1L with Change 2, *Obstruction Marking and Lighting* (FAA 2018).

According to the FAA report, the proposed WTGs would be within the line of sight of the Stockton CA (SCK) ASR-11, Travis (SUU) DASR, Mill Valley (QMV) ARSR-4, and McClellan (MCC) ASR-9 radar facilities. WTGs rarely, if ever create "electromagnetic" interference; however, if WTGs are within the line of sight of a radar sensor, they may be detected by that sensor and may therefore pose physical interference. The air traffic control system command center has sole responsibility for deciding whether the system is acceptable for performing air traffic control duties. The review concluded that the proposed project would not cause an unacceptable adverse impact on air traffic control operations at this time (FAA 2019).

Sensitive Receptors

For the purposes of CEQA, the California Air Resources Board considers a sensitive receptor to be a location that houses or attracts children, the elderly, people with illnesses, or others who are especially sensitive to the effects of air pollutants. Examples of sensitive receptors include hospitals, residences, daycare centers, convalescent facilities, schools, and parks.

The project area is designated for agricultural use and leased for dryland farming and grazing. There are no sensitive receptors near the project area. A few rural residences are located outside of the project area along rural roads that would be used to bring materials to the project site.

Electrical and Magnetic Fields

Homeowners in neighborhoods adjacent to overhead power lines frequently express concerns regarding the potential for health effects from exposure to electric and magnetic fields (EMFs). Available medical and scientific research has not demonstrated that EMFs create a health risk. However, research has not dismissed the possibility of such a risk.

Natural and human-created EMFs occur everywhere. Electric fields are created between two objects that have a different voltage potential. Magnetic fields are created only when there is current flowing through a conductor or device.

Power frequency (60 hertz [cycles per second]) EMFs are invisible fields of force created by electric voltage (electrical fields) and by electric current (magnetic fields). These fields are associated with power lines (either overhead or underground), electric appliances, and the wiring in homes, schools, and work structures. Voltage on wire produces an electrical field in the area surrounding the wire. Magnetic fields are produced by the flow of electricity (current) in a conductor (circuit) and can be calculated and measured. Typically, the main sources of EMFs associated with a WTG are the turbines themselves and the underground collector power lines. A recent study showed that magnetic field levels detected at the base of the WTGs were low and diminished rapidly with distance, becoming indistinguishable from background levels within approximately 6 feet (2 meters) of the base. Magnetic fields measured 3 feet (1 meter) above buried collector lines were also within background levels. These background levels are too low to affect human health (Environmental Health 2014).

Asbestos

Asbestos occurs naturally in association with serpentine soil formations in various parts of California. According to a 2011 study by the U.S. Geological Survey, ultramafic rocks or serpentine rocks have been identified in only a small area in southwestern Solano County on the border of Napa County. Based on this map, asbestos would not likely occur on the project site or in the project vicinity (USGS 2011).

3.7.3. Environmental Impacts and Mitigation Measures

Methods and Assumptions

This impact analysis involved reviewing applicable laws, permits, and legal requirements pertaining to hazards and hazardous materials, as discussed above. Within this framework, existing on-site hazardous materials and the potential for other safety or hazardous conditions were reviewed based on information available from SMUD; publicly available information about hazards and hazardous materials; site/location and cleanup status information; aviation requirements; and other available information.

The impact analysis considered the potential for project construction, operation, and decommissioning to cause changes to the nature or extent of hazardous conditions, such as increased potential for exposure to hazardous materials and hazardous conditions; aviation hazards; and risks from failure of a WTG rotor. The potential for hazards and hazardous conditions was reviewed in light of existing hazardous materials management plans and policies and applicable regulatory requirements.

Thresholds of Significance

Based on Appendix G of the State CEQA Guidelines, the project would result in a potentially significant impact related to hazards and hazardous materials if it would:

- create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
- emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school;
- be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, create a significant hazard to the public or the environment;

- for a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, result in a safety hazard or excessive noise for people residing or working in the project area;
- impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or
- expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires.

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. Therefore, the following issues will not be discussed further in the impact analysis.

Hazardous emissions or handling of hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school

The project site is in an area of Solano County that is generally undeveloped and used primarily for agriculture and wind farms. The nearest school is approximately 3 miles from the project site, in the city of Rio Vista. Therefore, the project would not emit or handle hazardous materials within one-quarter mile of an existing or proposed school. This issue will not be discussed further.

Location on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5, resulting in the creation of a significant hazard to the public or the environment

No known hazardous materials sites were identified on the property from the regulatory database (Cortese) search. Therefore, the project would not create a significant hazard associated with known hazardous materials sites. This issue will not be discussed further.

Exposure of potentially sensitive receptors to new sources of EMF

The project would include energy-related infrastructure, and operation of the project would involve EMFs. However, the medical and scientific communities generally agree that the available research evidence has not demonstrated that EMFs create a health risk. They also agree that the evidence has not dismissed the possibility of such a risk. Finally, they agree that while this is an important issue that needs resolution, it is uncertain when such a resolution would occur.

The present scientific uncertainty means that public health officials cannot establish any standard or level of exposure that is known to be either safe or harmful. Further, a recent study suggests that there is nothing unique to wind farms with respect to EMF exposure; in fact, magnetic field levels near wind turbines were lower than those produced by many common household electrical devices and were well below any existing regulatory guidelines with respect to human health (Environmental Health 2014).

No CEQA standards or health-based standards exist to indicate that EMF emissions are a potentially significant impact, and this issue is not discussed further. Moreover, because there are no sensitive receptors in the project area, the project would not result in the exposure of potentially sensitive receptors to new sources of EMF. This issue will not be discussed further.

Exposure of people or structures to the risk of wildfires

The project would place electrical transmission lines underground to avoid potential for arcing lines to spark a fire. The WTGs are monitored by a SCADA which is able to monitor operating conditions and inform the operators of abnormal activity so actions can be taken to avoid overheating a WTG causing potential mechanical failure.

Impact Analysis

Impact 3.7-1: Exposure of people and the environment to hazardous materials.

Construction, operation, and eventual decommissioning activities would involve the storage, transport, and/or handling of hazardous materials. Transport or use of these materials on-site could expose workers or the environment to hazards. Therefore, this impact would be **potentially significant**.

Construction and Decommissioning

Decommissioning the Solano Wind Project, Phase 1, would involve removing the WTGs and pad-mounted electrical equipment. The foundations would be abandoned in place by removing the foundations several feet below ground surface and backfilling the hollow foundations with fill or slurry. Direct-buried cables would be abandoned in place, and pads and access roads that are no longer needed would be reclaimed and restored to match the surrounding land use. The WTGs would be dismantled and hauled off-site to be recycled or sold for reuse. At the end of the proposed project's operational life, SMUD would likely repower the project using then-current industry technology or would remove the WTGs and restore the project site to conform with the surrounding land use. Decommissioning the project would involve activities similar to those described above.

Project operations would include routine maintenance, including periodically replacing lubricating fluids and checking parts for wear. In addition to mechanical maintenance, all roads, pads, and trenched areas would be inspected and maintained regularly to minimize erosion.

Construction, maintenance, and decommissioning activities would involve the storage, transport, and handling of hazardous materials. Construction equipment would use various hazardous materials (e.g., diesel fuel, oil, solvents). Equipment fuel leaks, fuel spills, and other events occurring during construction could result in accidental releases of hazardous materials, primarily fuel and lubricants. An accidental release of a hazardous material could have a significant impact on the environment. Storage, handling, and use would occur in accordance with the project's hazardous materials business plan and BMPs. However, because the project could create a hazard to the public or the environment through transport, use, disposal, or an accidental spill of hazardous materials, this impact would be **potentially significant**.

Mitigation Measure 3.7-1a: Implement Mitigation Measure 3.5-1, "Prepare and implement a SWPPP and associated BMPs."

The contractor shall implement Mitigation Measure 3.5-1 listed in Section 3.5, "Geology, Soils, and Mineral Resources." This measure requires the preparation of a project-specific SWPPP and implementation of the SWPPP by the construction contractors, including all necessary BMPs.

Mitigation Measure 3.7-1b: Establish and implement an environmental training program.

Before the start of construction, SMUD or its contractor shall establish an environmental training program to communicate environmental concerns and appropriate work practices to all field personnel. The training program shall cover the use of hazardous materials, waste management, spill prevention, emergency response measures, and proper implementation of BMPs. The program shall emphasize site-specific physical conditions to improve hazard prevention (e.g., identification of potentially hazardous substances) and shall include a review of all site-specific plans, including but not limited to the project's SWPPP, health and safety plan (as required by OSHA), fugitive dust control plan, and hazardous substances control and emergency response plan.

Mitigation Measure 3.7-1c: Prepare and implement a hazardous substance control and emergency response plan.

Before the start of construction, SMUD or its contractor shall prepare a construction-specific hazardous substance control and emergency response plan. The plan shall include preparations for quick and safe cleanup of accidental spills; prescribe procedures for handling hazardous materials to reduce the potential for a spill during construction; and include an emergency response program to ensure quick and safe cleanup of accidental spills. The hazardous substance control and emergency response plan shall also identify BMPs in the event a spill occurs. BMPs may include but are not limited to the following: use of oil-absorbent materials, tarps, and storage drums to contain and control any minor releases; and storage and use of emergency-spill supplies and equipment in locations adjacent to work and staging areas.

The hazardous substance control and emergency response plan shall identify areas where refueling and vehicle maintenance activities and storage of hazardous materials, if any, will be permitted.

Mitigation Measure 3.7-1d: Prepare and implement a spill prevention, control, and countermeasures (SPCC) plan.

If more than 1,320 gallons of petroleum products will be stored on-site (excluding vehicles), SMUD's construction contractor shall prepare and implement a SPCC plan in accordance with state and federal requirements, including 40 CFR 112. The SPCC plan shall identify engineering and containment measures for preventing releases of oil into waterways. The SPCC plan shall be submitted to SMUD for review and approval before the start of operations, or during construction.

If less than 1,320 gallons of petroleum products will be stored on-site (excluding vehicles), this mitigation measure is not required.

Mitigation Measure 3.7-1e: Prepare and implement a hazardous materials business plan.

If the project will use or store hazardous materials equal to or greater than 55 gallons of liquids, 500 pounds of solids, and/or 200 cubic feet (at standard temperature and pressure) of compressed gases, SMUD's construction contractor shall prepare a hazardous materials business plan that will conform with Solano County Environmental Health requirements. The contractor shall file the plan with SMUD annually. The hazardous materials business plan shall identify site activities; list the contact information for the business owner/operator; provide an inventory of hazardous materials used on-site; provide a facilities map; and identify an emergency response plan/contingency plan.

During the construction phase, if threshold quantities of any hazardous materials are stored on-site for more than 90 consecutive days, then the hazardous materials business plan shall be filed and maintained for as long as any of those thresholds are met or exceeded. During the operations phase, if the threshold for any hazardous materials is met or exceeded for more than 30 consecutive days, then the hazardous materials business plan shall be submitted by the contractor to SMUD and shall be maintained as long as the thresholds are met or exceeded. The regulations require annual submittal of the hazardous materials business plan as long as the project meets the conditions for the continued applicability of the regulations.

If less than 55 gallons of liquids, 500 pounds of solids, and/or 200 cubic feet (at standard temperature and pressure) of compressed gases will be used or stored on-site, this mitigation measure is not required.

<u>Significance after Mitigation</u>

Mitigation Measures 3.7-1a through 3.7-1e require preparation and implementation of various plans to address environmental training; hazardous substance control and emergency response; spill prevention, control, and countermeasures; and hazardous materials. Implementing these mitigation measures would reduce potential impacts on workers and the environment associated with routine transport or accidental release of hazardous materials to a **less-than-significant** level.

Impact 3.7-2: Exposure of people and the environment to subsurface hazardous materials disturbed during construction.

Construction could result in a short-term hazard to the public and/or the environment if subsurface hazardous materials were to be disturbed during construction activities. Therefore, this impact would be **potentially significant**.

During grading, trenching, and other ground-disturbing activities, project construction crews could encounter subsurface hazardous materials related to farming and natural gas extraction. Such an accidental disturbance could produce a release to the environment, causing a hazard to the public. Historic agricultural uses of the property indicate the presence (or likely presence) of hazardous materials or wastes, including fuels, motor oil, lubricants, and agricultural chemicals. However, the likelihood of encountering any related hazardous materials during construction would be considered low. Further, as established in Section 3.7.2, "Environmental Setting," no impact on known gas wells is likely. However, the locations of the gas wells relative to the proposed WTGs have not been established.

Historical uses of hazardous materials related to farming and natural gas exploration, including petroleum products, are present in the project area. Therefore, the potential exists for an accidental release of hazardous materials to occur during construction. This impact would be **potentially significant**.

Mitigation Measure 3.7-2a: Implement Mitigation Measures 3.7-1a through 3.7-1e.

SMUD or its construction contractor shall implement Mitigation Measures 3.7-1a through 3.7-1e, listed above. These measures establish and require implementation of various plans to minimize the risk of accidental release of hazardous materials.

Mitigation Measure 3.7-2b: Delineate any construction areas where the presence of hazardous materials is known or suspected.

Before the start of construction, SMUD or its contractor shall delineate construction areas where the presence of hazardous materials is known or suspected. Such areas shall be avoided during construction to the extent feasible. These areas include but are not limited to abandoned gas wells and underground gas pipelines. Underground utilities, such as gas pipelines and high-voltage lines, shall be identified and marked clearly. If necessary, appropriate encroachment permits shall be obtained before work begins.

A Spill Discovery and Response Plan shall be developed before construction begins. The plan shall be implemented in the event that hazardous materials are unexpectedly encountered during construction. The plan shall include instructions for work crews to stop work immediately, notify the appropriate emergency response agency, and in the case of natural gas pipelines, notify the pipeline operator.

Mitigation Measure 3.7-2c: Maintain access to gas wells.

Should a gas well location be verified, SMUD and its construction contractor shall implement the following measures:

- Maintain physical access to any gas well encountered.
- Ensure that the abandonment of gas wells is to current standards.
- If one or more unknown wells is discovered during project development, immediately notify the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources so that the newly discovered well(s) can be incorporated into the records and investigated. Any wells found during implementation of the project, and any pertinent information obtained, shall be communicated to the Solano County Recorder for inclusion in the title information of the subject real property. This is to ensure that present and future property owners are aware of (1) the wells located on the property, and (2) potentially significant issues associated with any improvements near oil or gas wells.
- Avoid performing work on any oil or gas well without written approval from the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources in the form of an appropriate permit. This includes but is not limited to mitigating leaking fluids or gas from abandoned wells, modifications to well casings, and/or any other re-abandonment work.

Significance after Mitigation

Mitigation Measures 3.7-2a through 3.7-2c require preparation and implementation of various plans to reduce potential impacts on workers and the environment associated with the release of subsurface hazardous materials. Therefore, implementing these mitigation measures would reduce the impact to a **less-than-significant** level.

Impact 3.7-3: Safety hazard to air traffic.

The project site lies within the planning boundary of the Travis AFB LUCP, which contains policies designed to promote land use compatibility with airport operations. Placement of WTGs have the potential to intrude into navigable airspace, thereby increasing the risk of aircraft collision, or causing interference with radar signals used by air traffic control. Therefore, this impact would be **potentially significant**.

The project area is located approximately 10 miles southeast of Travis AFB and 5 miles southwest of the Rio Vista Municipal Airport. The entire project area is located within the Travis AFB Airport Influence Area (Zone D). The proposed WTGs would exceed the turbine height threshold of 200 feet set forth in the Travis AFB LUCP for Zone D. As per the Travis AFB LUCP, generally such structures trigger a requirement for a consistency evaluation against policies of the LUCP.

As discussed above, the LUCP provisions do not apply to SMUD. Further, even if SMUD was required to obtain a determination from ALUC, SMUD, as a local agency, can overrule the ALUC determination by holding a hearing, making findings that the action is consistent with the purposes of the SAA, and obtaining a two-thirds vote of its governing body. (See Pub. Util. Code, § 21674.7(b) ["This subdivision does not limit the authority of local agencies to overrule [the ALUC] actions or recommendations pursuant to Sections 21676, 21676.5, or 21677."].)

FAA and its regulations concerning air safety and aviation navigation preempt the ALUC's land use regulations regarding radar system interference. The FAA has conducted an independent evaluation of the Solano 4 Wind Project and determined there would be no significant hazard to air traffic control operations. A No Hazard Determination was issued on February 1, 2019 (see Appendix G for the FAA Notice). The FAA notice determined that the Solano 4 project:

- Is not a hazard for air navigation based on the results of an aeronautical study.
- WTG operations may be detected by radar sensors, and displayed as interference. However, this would not cause an unacceptable adverse impact on ATC operations at this time.
- Proposed WTGs are beyond normal traffic pattern airspace. Therefore, the proposal would not have an adverse effect on Visual Flight Rules[1] (VFR) traffic pattern operations at 591 feet AGL, the structures would extend upwards into altitudes commonly used for en route VFR flight; however, no information was received to indicate they would be located along a regularly used VFR route, or that they would pose a problem for pilots operating en route.
- The proposed structures would have no other effect on any existing or proposed arrival, departure, or en route instrument flight rules operation or procedure. Further, the cumulative impact of the proposed structures, when combined with other proposed and existing structures, would not be considered significant.

During the FAR Part 77 review, the FAA contacted responsible agencies within DoD, which raised no concerns about Travis AFB. FAA also considered communications from the Solano County ALUC, which are described and dismissed by the FAA in the Determination of No Hazard to Air Navigation. Therefore, SMUD can make the requisite

[1] Visual Flight Rules re a set of regulations under which a pilot operates an aircraft in weather conditions generally clear enough to allow the pilot to see where the aircraft is going. Specifically, the weather must be better than basic VFR weather minima, i.e. in visual meteorological conditions (VMC), as specified in the rules of the relevant aviation authority.

findings pursuant to Public Utilities Codes section 21674.7(b) that the project would not result in any adverse impacts on public health, safety, and welfare.

As a condition of the FAA's Determination of No Hazard to Air Navigation safety lighting would be incorporated into the design of the WTGs using an aircraft detection and lighting system. The risk of unlit WTG structures erected during erection was identified as a potential risk by the FAA, and the aeronautical study provides conditions during construction activity to minimize impacts to air traffic.

Mitigation Measure 3.7-3: Mark and light wind turbine generators during construction.

SMUD will e-file FAA Form 7460-2, Part 1, Notice of Actual Construction or Alteration, at least 60 days before the start of construction, so that appropriate action can be taken to amend the affected procedure(s) and/or altitude(s), if necessary.

To ensure proper conspicuity of turbines at night during construction, all WTGs shall be lit with temporary lighting once they reach a height of 200 feet or greater until the permanent lighting configuration is turned on. As the height of the structure continues to increase, the temporary lighting shall be relocated to the uppermost part of the structure. The temporary lighting may be turned off for periods when they would interfere with construction personnel. If practical, permanent obstruction lights shall be installed and operated at each level as construction progresses.

An FAA Type L-810 steady red light fixture shall be used to light the structure during the construction phase. If power is not available, WTGs shall be lit with self-contained, solar-powered light-emitting diode (LED) steady red light fixtures that meet the photometric requirements of an FAA Type L-810 lighting system. The lights shall be positioned to ensure that a pilot has an unobstructed view of at least one light at each level. The use of a Notice to Airmen (NOTAM) (D) to avoid lighting WTGs within the project site until completion of the entire project is prohibited.

This measure includes temporary construction equipment such as cranes and derricks, which may be used during actual construction of the structures. However, this equipment shall not exceed a height of 200 feet. Separate notice shall be provided to the FAA for any equipment taller than 200 feet.

<u>Significance after Mitigation</u>

Mitigation Measure 3.7-3 requires that the WTGs be marked and lit according to FAA regulations and made visible to any air traffic for avoidance. Therefore, implementing this mitigation measure would reduce the impact of hazards to aviation during construction to a **less-than-significant** level.

Impact 3.7-4: Exposure of employees and the public to hazards from accidental rotor failure.

If a blade on a project WTG were to fail, the blade could become a projectile, exposing employees and the public to a hazard. As part of final design and siting, SMUD requires that the contractor prepare a blade throw analysis to inform the final site layout, and ensure sufficient setback is provided to minimize the risk of exposure to such a hazard. This impact would **be less than significant**.

WTG rotor failure includes throwing or cracking a blade and could result from over-speed, material fatigue, excessive stresses, and vibration. Available documentation shows the probability of blade failure to be in the range of 1 in 1,000 to 1 in 1,000,000 per turbine per year (Simms 2018).

WTG manufacturers have designed methods to prevent over-speed and minimize the occurrence of rotor failure. The SCADA system monitors conditions systemwide and can provide information to alert operators of an impending problem so the rotor blade can be inspected for safety. Further, the project layout is designed to avoid placing WTG near to occupied structures. SMUD policy requires that the construction contractor prepare a blade throw study illustrating that operation of the WTG system as proposed would not pose a safety risk. Impacts are **less than significant**.

Mitigation Measure 3.7-4: Conduct Safety Evaluation of WTGs

The Contractor shall provide a safety evaluation of the proposed siting plan, and ensure that the design and layout of the Project considers the safety evaluation. The Contractor's safety evaluation shall include an analysis of the following types of failure that could occur:

a. Blade Throw Risk Analysis: Probability of Loss of an entire blade by failure at the hub attachment.
b. Tower Failure. Complete failure of the tower, particularly at the base.
c. Rotor Delamination. Failure of the fiberglass rotor skin, resulting in flying fragments.
d. Blade-Throw Strike. Impact of a failed rotor blade on the tubular tower

<u>Significance after Mitigation</u>

Mitigation Measures 3.7-4 requires voluntary preparation and implementation of a safety plan to ensure the WTGs are sited and designed to meet adequate factors of safety, and lower the probability of a safety hazard to a moderate risk level. Impacts of project construction are **less-than-significant**.

Impact 3.7-5: Exposure of people or structures to a significant risk of loss, injury, or death involving wildfires.

The project site is not located in an area classified as a High Fire Hazard Severity Zone. Although the project would adhere to applicable fire regulations, the use of construction equipment in grass-covered areas could expose people or structures to a significant fire risk. Therefore, this impact would be **potentially significant**.

The project site is not located in a State Responsibility Area designated as a High or Very High Fire Hazard Severity Zone (CAL FIRE 2007; Solano County 2008). However, during the hot summer months, the project area is highly susceptible to grass fires. The grass is dry and flammable, the wind blows regularly, and there are few roads in the area to allow access for fire control. Vehicles, generators, construction equipment, and smoking by construction workers would increase the possible sources of ignition that could increase the risk of wildfire in the area. The existing access roads and existing and proposed internal roads would provide emergency vehicle access and serve as fire breaks. During construction, the transport of WTG components would adversely affect emergency access. An emergency access plan would be required by Mitigation Measure 3.11-2 to maintain emergency access during WTG transport and throughout the construction period (see Section 3.11, “Transportation and Traffic”). Because the project could increase the potential for wildfire, this impact would be **potentially significant**.

Mitigation Measure 3.7-5a: Prepare and implement a grass fire control plan.

SMUD or its construction contractor will develop a grass fire control plan. The plan shall be implemented for use during construction and operation of the project to reduce potential impacts on public services relative to fire protection services in the project area. The plan shall include notification procedures and emergency fire precautions, as discussed in Section 4.8, “Hazards and Hazardous Materials.” This shall include the training of construction workers in the use of firefighting equipment available on-site (e.g., fire extinguishers) and communicating with the Montezuma Fire Protection District. Additionally, the nearby Montezuma Fire Protection District stations are equipped for grass fires, and the proposed access roads for WTG maintenance shall be used to improve access by fire trucks during emergency situations and serve as a fire break. The operations and maintenance building shall be designed to SMUD’s safety standards and shall include a fire alarm. In addition, construction and maintenance crews shall be trained in fire prevention, carry fire extinguishers in all vehicles, and have access to one or more water trucks.

Mitigation Measure 3.7-5b: Implement Mitigation Measure 3.11-1b, “Create and implement an emergency access plan and notify emergency services providers of anticipated roadway obstructions.”

SMUD will implement Mitigation Measure 3.11-2 listed in Section 3.11, “Transportation and Traffic.” This measure requires the development and implementation of a plan to maintain emergency access during WTG transport and throughout the construction period.

Significance after Mitigation

Mitigation Measures 3.7-5a and 3.7-5b require preparation and implementation of a grass fire control plan and emergency access plan. Implementing these mitigation measures and adhering to all applicable regulations would reduce potential impacts of project construction related to wildland fires to a **less-than-significant** level.

3.8. Hydrology and Water Quality

This section describes the existing hydrological setting for the project site, including runoff, storm drainage, flood control, and water quality. Regulations and policies affecting local hydrology and water quality are discussed, and potential impacts of implementing the project are identified. Mitigation measures are recommended to reduce potential impacts, where appropriate. Impacts associated with the potential contamination of groundwater are addressed in Section 3.7, “Hazards and Hazardous Materials.”

3.8.1. Regulatory Setting

Numerous federal, state, and local laws, regulations, and policies define the framework for regulating water quality, drainage, and flooding in the project area. Water quality is regulated through the federal Clean Water Act (CWA), which is managed by the U.S. Environmental Protection Agency (EPA). In California, implementation of the CWA has been delegated to the State Water Resources Control Board (SWRCB) and nine regional water quality control boards (RWQCBs).

Water quality at the project site is regulated primarily by the Central Valley RWQCB, although a portion of the Solano 4 West project subarea is within the jurisdictional boundary of the San Francisco Bay RWQCB. The water quality requirements applicable to the project are described below. Flood protection guidance is provided primarily by the Federal Emergency Management Agency (FEMA) and is implemented at the state and local levels through legislation and local flood protection ordinances.

Federal

Clean Water Act

The CWA, the primary federal statute governing the protection of water quality, was established to provide a comprehensive program to protect the nation’s surface waters. EPA is the federal agency with primary authority for implementing regulations adopted pursuant to the CWA.

The basis of the CWA is the federal Water Pollution Prevention and Control Act (Water Pollution Act), which was enacted in 1948. The Water Pollution Act was substantially reorganized and expanded in subsequent amendments enacted in 1972 and 1977, when “Clean Water Act” became the common name of the law.

The Water Pollution Act required EPA to establish nationwide effluent standards on an industry-by-industry basis. The 1972 amendment established the National Pollutant Discharge Elimination System (NPDES) program. With the reauthorization of the CWA in 1987, Sections 402(p) through 405 were added, creating a framework for regulating discharges under the NPDES permit program (discussed later in this section).

Under federal law, EPA has published water quality regulations under Volume 40 of the Code of Federal Regulations. Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the United States. As defined by the CWA, water quality standards consist of two elements: designated beneficial uses of the water body in question, and criteria that protect the designated uses.

CWA Section 304(a) requires EPA to publish advisory water quality criteria reflecting the latest scientific knowledge on the kinds and extent of effects on health and welfare expected from the presence of pollutants in water. Where multiple uses exist, water quality standards must protect the most sensitive use. EPA has authorized the SWRCB and its nine RWQCBs to identify beneficial uses and adopt applicable water quality objectives. EPA has delegated to the State of California the authority to implement and oversee most programs authorized or adopted for CWA compliance through the Porter-Cologne Water Quality Control Act of 1969 (Porter-Cologne Act), described below.

CWA Section 401 states that before issuance of any federal permit or license, or implementation of any activity that may result in discharges into waters of the United States, the action must be certified by the state (in California, specifically by the RWQCB). This certification ensures that the proposed activity would not violate federal and/or state water quality standards.

CWA Section 404 establishes programs to regulate the discharge of dredged and fill material in waters of the United States, including wetlands. For purposes of Section 404, the limits of nontidal waters extend to the ordinary high-water line. The ordinary high-water line is the line on the shore established by the fluctuation of water and indicated by physical characteristics such as a natural line impressed on the bank, changes in the character of the soil, and the presence of debris. When applying for a Section 404 permit, the applicant must show that it has:

- taken steps to avoid impacts on wetlands or waters of the United States where practicable,
- minimized unavoidable impacts on waters of the United States and wetlands, and
- provided mitigation for unavoidable impacts.

Section 404 requires a permit for construction activities that would involve placing any kind of fill material into waters of the United States or wetlands. A water quality certification pursuant to CWA Section 401 is required for Section 404 permit actions.

Federal Emergency Management Agency

In 1968, Congress created the National Flood Insurance Program in response to the rising cost of taxpayer-funded disaster relief for flood victims and the increasing amount of damage caused by floods. FEMA administers the program to provide subsidized flood insurance to communities that comply with FEMA regulations that limit development in floodplains. FEMA also issues flood insurance rate maps that identify areas subject to flooding. These maps provide flooding information and identify flood hazard zones. FEMA has established the minimum level of flood protection for new development as the 1-in-100 annual exceedance probability (known as the “100-year flood”). Participants in the National Flood Insurance Program must satisfy certain mandated floodplain management criteria.

Construction in Special Flood Hazard Areas, as identified by FEMA, requires compliance with the local floodplain management ordinance.

State

Porter-Cologne Water Quality Control Act of 1969

The Porter-Cologne Act is California’s statutory authority for the protection of water quality. The law requires the state to adopt water quality policies, plans, and objectives that protect the state’s waters for the use and enjoyment of the people. The Porter-Cologne Act sets forth the obligations of the SWRCB and nine RWQCBs to adopt and periodically update basin plans. Basin plans are the regional water quality control plans required by both the CWA and Porter-Cologne Act in which beneficial uses, water quality objectives, and implementation programs are established for each of the nine regions in California.

The Porter-Cologne Act also requires waste dischargers to notify the RWQCBs of their activities by filing reports of waste discharge. The SWRCB and RWQCBs are authorized to issue and enforce waste discharge requirements, NPDES permits, Section 401 water quality certifications, or other approvals. The RWQCBs also have the authority to issue waivers to waste discharge requirements for broad categories of “low threat” discharge activities that have minimal potential for adverse water quality effects, when implemented according to prescribed terms and conditions.

NPDES Permit System and Waste Discharge Requirements for Construction

The 1972 amendment to the CWA established the NPDES permit program. The program contains effluent limitation guidelines, water quality requirements, and permit program requirements for discharges to waters of the United States.

The 1987 amendment to the CWA established a framework for regulating discharges under the NPDES. In 1990, EPA issued regulations for permitting stormwater discharges from industrial sites, including construction sites that disturb 5 acres or more, and from municipal separate storm sewer systems (MS4s) serving a population of 100,000 people or more. The November 16, 1990 regulations, known as the Phase I regulations (*Federal Register* [FR] Title 55, page 47990 [55 FR 47990]), rely on NPDES permit coverage to address stormwater runoff from operators of medium and large MS4s, construction activity disturbing 5 acres of land or greater, and 10 categories of industrial activity.

On December 8, 1999, EPA promulgated regulations known as Phase II. The regulations in the Storm Water Phase II Final Rule (64 FR 68722) require permit coverage for discharges from small municipalities, including nontraditional small MS4s (government facilities such as military bases, public campuses, and prisons and hospitals), and from sites where construction would disturb at least 1 acre of land. Phase II is intended to further reduce adverse impacts on water quality in receiving waters and aquatic habitats by controlling the unregulated sources of stormwater discharges that are most likely to continue degrading the environment. The goal of the NPDES nonpoint-source regulations is to improve the quality of stormwater discharged to receiving waters to the “maximum extent practicable” through the use of best management practices (BMPs).

Under the Phase II regulations in California, small MS4s are covered under SWRCB Water Quality Order No. 2003-0005–Division of Water Quality (DWQ), NPDES General Permit No. CAS000004 (known as the “Small MS4 Permit”).

Construction projects disturbing at least 1 acre of land are covered under the Construction General Permit, SWRCB Water Quality Order No. 2009-0009-DWQ, NPDES General Permit No. CAS000002. To comply with the NPDES General Construction Permit, the applicant must submit a notice of intent to the SWRCB and prepare a storm water pollution prevention plan (SWPPP). The SWPPP identifies BMPs that must be implemented to reduce the effects of construction on receiving water quality. The BMPs identified are measures to control sediment, erosion, and potential chemical contaminants. The permit also requires dischargers to consider using postconstruction BMPs that will remain in service permanently to protect water quality throughout the life of the project. All NPDES permits also have inspection, monitoring, and reporting requirements.

Delta Protection Commission

The Delta Protection Commission (DPC) was created by the Delta Protection Act of 1992 (Public Resources Code Section 29700 et seq., and most recently amended by SBX7-1 in November 2009. The Delta Protection Act declared that the Sacramento–San Joaquin Delta (Delta) is a natural resource of statewide, national, and international significance, containing irreplaceable resources, and that it is the policy of the state to recognize, preserve, and protect Delta resources for the use and enjoyment of current and future generations, in a manner that protects and enhances the unique values of the Delta as an evolving place (Public Resources Code Sections 29701–29702). (DPC 2019)

Public Resources Code Section 29760 requires the DPC to prepare and adopt a long-term resource management plan for land uses in the Primary Zone of the Delta. The Land Use and Resource Management Plan guides local land use decisions on projects in the areas of agriculture, flood protection, Delta communities, natural resources, recreation, and utilities and infrastructure. General plans and projects in the five Delta counties must be consistent with the plan and are subject to review by the DPC. The DPC also comments on projects in the Secondary Zone that have the potential to affect the Primary

Zone (DPC 2010). Portions of the Solano 4 West project subarea are located in the Secondary Zone.

Groundwater Management

The Sustainable Groundwater Management Act (SGMA), which went into effect on January 1, 2015, established a robust framework for the sustainable management of groundwater resources for the first time in California's history. Groundwater is a critical component of the state's water supply portfolio. If managed effectively, this resource will help protect communities, farms, and the environment against the impacts of prolonged dry periods and climate change. The SGMA recognizes that management is most effective at the local level, by local agencies with adequate information, tools, resources, and authorities.

The SGMA requires that the state's medium- and high-priority groundwater basins be managed by local agencies that formed a groundwater sustainability agency by June 30, 2017. Each groundwater sustainability agency must develop and implement a groundwater sustainability plan by January 31, 2022, to guide the sustainable management of its groundwater basin. The groundwater sustainability agency has 20 years after this date to achieve its sustainability goals.

The project site is located within two groundwater basins: the Solano Subbasin and the Suisun–Fairfield Valley Basin (Exhibit 3.8-1). The state has designated the Solano Subbasin as a medium-priority groundwater basin, and thus subject to SGMA. The Solano Subbasin is contained mostly within Solano County, but portions are also within Sacramento and Yolo counties. The subbasin underlies the cities of Dixon, Fairfield, Rio Vista, and Vacaville, and is pumped regularly for local agricultural and municipal uses. A consortium of agencies and other interests is currently preparing a groundwater management plan.

Local

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 (Section 53091 of the Government Code (Subdivisions d and e). The following policies are provided for the purpose of disclosure, and to allow informed decision-making.

Solano County General Plan

The following policies from the Resources, Public Health & Safety, and Public Facilities & Services Elements of the *Solano County General Plan* (Solano County 2008a) pertain to hydrology and water quality.

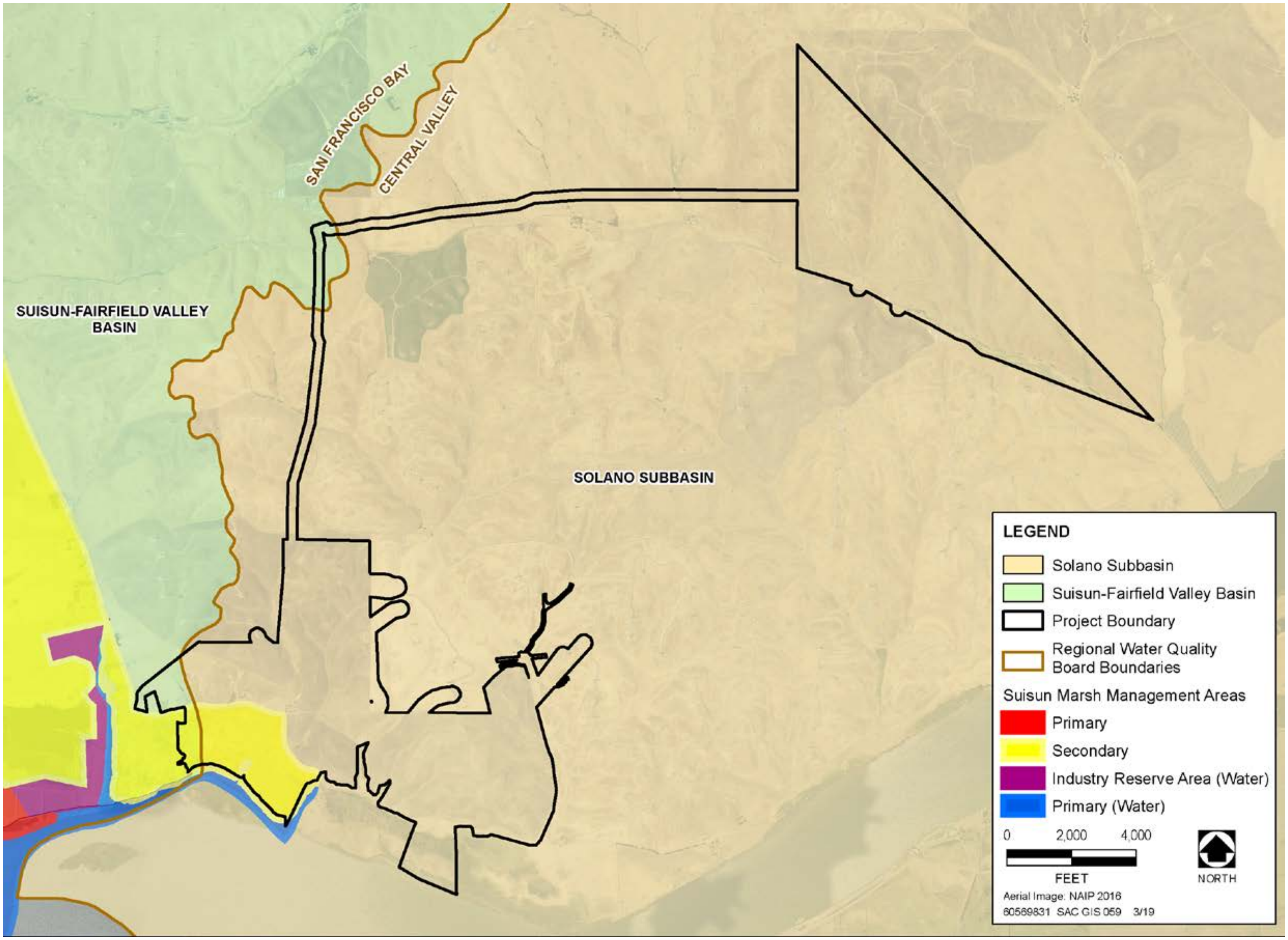

Exhibit 3.8-1 Groundwater Basins and Regulatory Boundaries

Resources Element

- **Policy RS.P-65:** Require the protection of natural water courses.
- **Policy RS.P-67:** Encourage new groundwater recharge opportunities.
- **Policy RS.P-68:** Protect existing open spaces, natural habitat, floodplains, and wetland areas that serve as groundwater recharge areas.
- **Policy RS.P-69:** Preserve and maintain watershed areas characterized by slope instability, undevelopable steep slopes, high soil erosion potential, and extreme fire hazards in agricultural use. Watershed areas lacking water and public services should also be kept in agricultural use.
- **Policy RS.P-70:** Protect land surrounding valuable water sources, evaluate watersheds, and preserve open space lands to protect and improve groundwater quality, reduce polluted surface runoff, and minimize erosion.
- **Policy RS.P-71:** Ensure that land use activities and development occur in a manner that minimizes the impact of earth disturbance, erosion, and surface runoff pollutants on water quality.
- **Policy RS.P-72:** Preserve riparian vegetation along county waterways to maintain water quality.
- **Policy RS.P-73:** Use watershed planning approaches to resolve water quality problems. Use a comprehensive stormwater management program to limit the quantity and increase the water quality of runoff flowing to the county's streams and rivers.

Public Health & Safety Element

- **Policy HS.P-2:** Restore and maintain the natural functions of riparian corridors and water channels throughout the county to reduce flooding, convey stormwater flows, and improve water quality.
- **Policy HS.P-3:** Require new developments to incorporate devices capable of detaining the stormwater runoff caused by a 100-year storm event or to contribute to regional solutions to improve flood control, drainage, and water recharge.
- **Policy HS.P-4:** Encourage the use of stormwater detention that may also be used for groundwater recharge.
- **Policy HS.P-9:** Preserve open space and agricultural areas that are subject to natural flooding and are not designated for future urban growth; prohibit permanent

structures in a designated floodway where such structures could increase risks to human life or restrict the carrying capacity of the floodway.

Public Facilities & Services Element

- **Policy PF.P-33:** Require development projects to minimize pollution of stormwater, water bodies receiving runoff, and groundwater, and to maximize groundwater recharge potential by:
    - o implementing planning and engineering design standards that use low-impact development techniques and approaches to maintain and mimic the natural hydrologic regime;
    - o using “infiltration” style low-impact development technologies; and
    - o following stormwater best management practices during and after construction, in accordance with relevant state-required stormwater permits.
- **Policy PF.P-34:** Control the rate and dispersal of runoff from developments through use of detention and retention basins, appropriate landscaping, minimal use of impervious surfaces, and other stormwater facilities.
- **Policy PF.I-32:** As a condition of project approval, require new development to provide adequate on-site and off-site stormwater and drainage facilities to control both direct and indirect erosion and discharges of pollutants and/or sediments so that “no net increase in runoff” occurs as a result of the proposed project. To determine the needs for facilities and best management practices, the County will require, when necessary, that a licensed and County-approved civil engineer perform a hydrological/drainage analysis. The project applicant would be responsible for the cost of this analysis.

Solano County General Plan/Solano County Component of the Suisun Marsh Local Protection Program

Solano County (County) has integrated the 2018 Solano County Component of the Suisun Marsh Local Protection Program into the *Solano County General Plan* as Chapter 12. The requirement to manage and protect Suisun Marsh was established in the Suisun Preservation Act of 1977. The act divides Suisun Marsh into the Primary and Secondary management areas. The Suisun Marsh Preservation Act requires that all public and private development activities in the Primary and Secondary management areas of Suisun Marsh be consistent with the policies and provisions of the certified Suisun Marsh Local Protection Program (Solano County 2018).

A portion of the Solano 4 West subarea is located within the Secondary Management Area. According to the Suisun Marsh Local Protection Program, the upland grasslands and cultivated lands of the Secondary Management Area provide habitat for marsh-related wildlife. More importantly, through their location and existing uses, they buffer the wetlands and lowland grasslands from the adverse impacts of both urban development and other upland land uses and practices incompatible with preservation of the marsh. The Suisun Marsh Preservation Act also identifies protected channels within the Suisun Marsh watershed and the watershed's overall boundaries. Although the Solano 4 West project subarea, the majority of the transmission corridors, and a portion of the Solano 4 East subarea are within the Solano Marsh watershed, no protected channels intersect with any planned project components (Solano County 2018).

- **Policy SM.P-25:** In the Suisun Marsh, improvements to public utility and transportation facilities should follow these planning guidelines:

    a. New electric power transmission utility corridors should be located at least one-half mile from the edge of the Marsh. New transmission lines, whether adjacent to the Marsh or within existing utility corridors, should be constructed so that all wires are at least six feet apart.

- **Policy SM.P-34:** Wind energy is an important renewable, natural resource which is limited in its statewide distribution. Areas which are endowed with the resource should be considered for prudent development of wind energy. Certain areas within the Suisun Marsh have been identified as having significant potential for wind energy resource development. Specifically identified are areas west of I-680 and in the Potrero Hills; however, numerous other areas may have potential for development of private or commercial wind energy machines. Installation of wind turbines in the Suisun Marsh could have a significant impact upon maintenance of the area in its present natural state, on Marsh wildlife, and on the visual characteristics of the Marsh. Therefore, careful consideration will need to be given projects on a case by case basis to ensure that significant adverse ecological or aesthetic impacts on the Marsh will be avoided. The County's objective is to balance the prudent use of wind resources of the Marsh with the need to protect and maintain its essential environmental qualities. The following should be followed in siting wind energy projects: (1) Commercial wind turbine generators should be permitted in the Secondary Management Area only. (2) Projects should not be allowed to proliferate in the Marsh, but should be allowed only where monitoring has shown productivity to be feasible. (3) The location and density of machines should not substantially alter the principal (agricultural or wetland) allowed uses in the Marsh. (4) Roads and utility transmission lines to serve machines and transmit power from machines must be installed in conformance with provisions of the Suisun Marsh Preservation Act. (5) In order to protect the biological resources of the Marsh, the design, density, height, noise level, illumination, and location of wind turbine generators and ancillary facilities should minimize or avoid the following adverse effects: collision hazards for birds, interference with migratory flight patterns, or disturbance of wildlife habitat. Design considerations of importance should include non-synchronous machines, low-noise design, subdued security lighting, and minimal tower lighting. (6) All construction must be carried out so as to minimize erosion and prevent sedimentation in the Marsh. (7) The installation and operation of wind turbine facilities must protect the visual characteristics of the Marsh. In order to minimize the impact upon the aesthetics of the Marsh as a natural open space area, wind turbine generators and ancillary facilities should be designed and sited to complement the natural landscape whenever feasible, consistent with the following guidelines: colors should blend with the landscape; lighting should be subdued and be provided for safety and security reasons only; and facilities should be located off the ridgeline unless to do so would result in higher tower height, significant grading, or cut and fill. sustainability plan consistent with SGMA requirements for the Solano Subbasin. The other groundwater basin in the project vicinity, the Suisun–Fairfield Valley Basin, is not designated as a priority basin, so it is not subject to the SGMA (SCWA 2019).

City of Rio Vista Urban Water Management Plan

Pursuant to state requirements, the City of Rio Vista prepared and adopted a 2015 urban water management plan in 2016. According to this plan, the City of Rio Vista provides a retail supply of potable water within its service area. The system is entirely dependent on groundwater. Rio Vista has seven operational supply wells that provide water for the entire system. In 2015, the City of Rio Vista supplied 1,793 acre-feet (af) of treated water to 4,450 customers. City water deliveries are expected to reach 2,713 acre-feet per year (af/yr) by 2035. During the period from 2011 to 2015, Rio Vista's average groundwater pumping rate was 2,263 af/yr and its maximum annual rate was 2,658 af/yr. In the year 2020, Rio Vista expects to have a reasonably available groundwater supply of 3,241 af and a total demand of 2,175 af, for a difference between supply and demand of 1,131 af.

Rio Vista draws its water supply from the Solano Subbasin at the southeastern limit of the Sacramento Valley Groundwater Basin. This groundwater basin is currently not adjudicated.

The Solano Subbasin is bounded by the Sacramento River to the east, Putah Creek on the north, and the North Mokelumne and San Joaquin rivers on the south and southeast. The western edge of the basin is defined by the hydrologic divide between the Sacramento River and the San Francisco Bay drainages. The Solano Subbasin also contains at least two distinct freshwater-bearing zones: an upper alluvial layer ranging from 60 to 130 feet thick; and the thicker Tehama Formation, which provides most of the groundwater used in the area. Additional saline water-bearing formations underlie the Tehama Formation. Primary waterways in and bordering the basin include the Sacramento, Mokelumne, and San Joaquin rivers; the Sacramento River Deep Water Ship Channel; and Putah Creek.

As cited in the City's urban water management plan, Solano County Water Agency's Integrated Regional Water Management Plan estimates the groundwater basin's supply to be 23,300 af/yr. There is no trend of groundwater overdraft with current levels of groundwater use.

A recent report for the City of Rio Vista reevaluated the groundwater basin in and around the city limits to help determine the basin's future capability to provide water for existing and planned developments. The report concludes that the groundwater basin will likely meet the future groundwater demands established by projected population growth for the next 20 years. Since February 2005, the City of Rio Vista has contracted with ENGEO to collect and analyze well monitoring data. More than 60 months of well data have been collected and synthesized. This monitoring indicates that groundwater levels at various wells may fluctuate during particular months or seasonally, according to the City's operational use of its array of wells, but that overall well levels and trends remain stable. In addition, an updated groundwater report was developed in 2016 that concluded that groundwater levels are stable and not declining, consistent with previous investigations (City of Rio Vista 2016).

3.8.2. Environmental Setting

Hydrology

The project area is located in the Montezuma Hills, gently rolling hills that crest at elevations of 150–250 feet above mean sea level, with intermittent streams in the low-lying areas. Several seasonal streams flow through the site, generally in a westerly or southerly direction. Wetlands and other aquatic features are discussed in Section 3.3, "Biological Resources," of this EIR.

Solano County is located within two major drainage provinces: the Sacramento River/Delta Drainage Province and the San Francisco Bay Drainage Province. As a result, the project site falls within the jurisdiction of two RWQCBs, the San Francisco Bay RWQCB and the Central Valley RWQCB (Exhibit 3.8-1).

Five subwatersheds are contained within, or partially located in, the project area. Montezuma Slough is located west of the northwestern portion of the project site and has the largest drainage area. (Wetlands and marsh areas are found in low-lying areas near Montezuma Slough and the Sacramento River. Project activities would not be conducted in these low-lying areas.) All drainages ultimately flow to the Sacramento River. The project site is immediately north of the Sacramento River, east of the confluence with the San Joaquin River. West of the project area, the Sacramento River flows through Suisun Bay and eventually discharges to San Francisco Bay. The southern portion of the site lies within the Secondary Zone of the legal Delta (Solano County 2008b).

Groundwater

The project area is located within two groundwater basins: the Solano Subbasin and the Suisun–Fairfield Valley Basin (Exhibit 3.8-1). The Suisun–Fairfield Valley Basin occupies approximately 133,600 acres. This groundwater basin is underlain by a thick sequence of low-permeability marine sedimentary rock that is classified as non-water-bearing. Groundwater resources in the Suisun–Fairfield Valley Basin are limited, with low well yields and poor water quality. Groundwater resources in the project area are used for agricultural and domestic uses.

The Solano Subbasin occupies 425,000 acres. The subbasin's western border is defined by the hydrologic divide that separates lands draining to San Francisco Bay from those draining to the Delta. That divide is roughly delineated by the English Hills and the Montezuma Hills. Freshwater-bearing units within the subbasin include younger alluvium, older alluvium, and the Tehama Formation. The Tehama Formation is the thickest water-bearing unit underlying the Solano Subbasin, ranging in thickness from 1,500 to 2,500 feet. Surface exposures of the Tehama Formation are limited mainly to the English Hills along the western margin of the basin. Wells completed in the Tehama Formation can yield up to several thousand gallons per minute (DWR 2004, 2014).

Water Quality

Because of the limited amount of surface water in the project area, no characterizations of surface water quality have been completed. However, because of the lack of urban activities and other potential sources of pollution at the project site and vicinity, surface water quality could be considered good.

The usable groundwater in the Suisun–Fairfield Valley Basin is slightly alkaline. Water, though scarce, in the area south of Fairfield near the tidal marsh could be threatened by intrusion of brackish water if subjected to heavy groundwater draft. Groundwater in the Solano Subbasin is considered to be of generally good quality, and usable for both domestic and agricultural purposes (DWR 2004, 2014).

Flooding

The project site and vicinity have not historically been prone to flooding. Small portions of the site, typically within ephemeral drainages or adjacent to the Sacramento River, are located in a FEMA-designated 100-year flood zone (Exhibit 3.8-2) (FEMA 2019). The site's topography and soil types promote runoff away from existing and proposed facilities.

Tsunami and Seiche

The California Emergency Management Agency and California Geological Survey have developed tsunami inundation maps for susceptible areas along the Pacific coast of California. In the project vicinity, maps have been prepared for San Francisco Bay as far east as the city of Benicia, approximately 15 miles west of the project site (CalEMA and CGS 2009). According to maps prepared by the agencies, tsunami inundation in the Benicia/Martinez area would be less than several feet above mean sea level. The potential for tsunami inundation adjacent to the project site would be less than that present at Benicia, so preparation of tsunami hazard maps would be unnecessary to protect public health and safety.

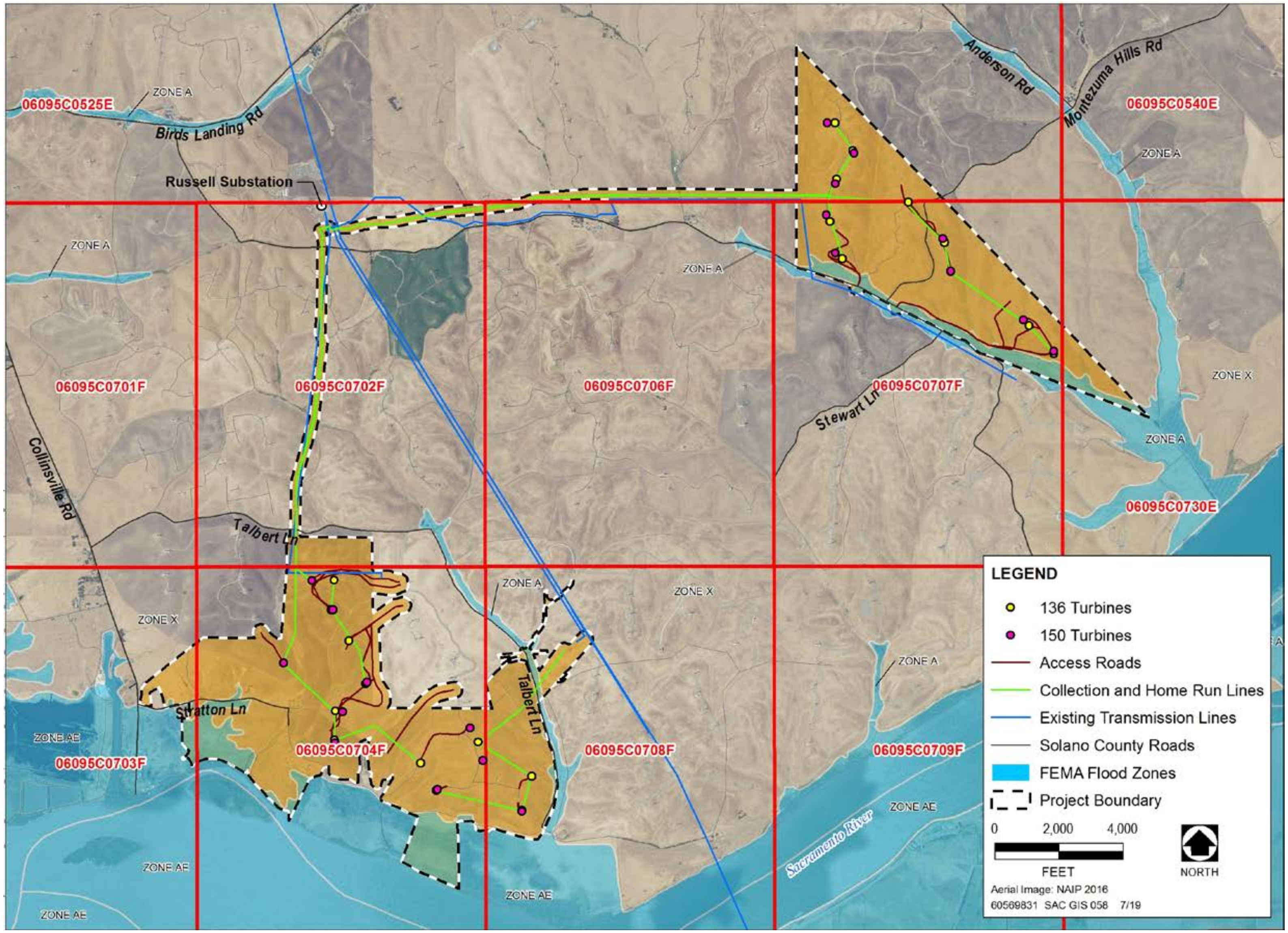

Exhibit 3.8-2 FEMA Flood Zones in the Project Vicinity

3.8.3. Environmental Impacts and Mitigation Measures

Methods and Assumptions

The evaluation of potential impacts of the project on hydrology and water quality was based on a review of existing information from previously completed documents that address water resources in the project vicinity, including:

- *Solano County General Plan* (Solano County 2008a, 2018)
- *Solano County General Plan EIR* (Solano County 2008b)
- FEMA floodplain maps
- the Solano Wind Project Phase 3 EIR and Recirculated EIR (SMUD 2007, 2009)
- *Geotechnical Study and Geologic Hazards Evaluation for the Collinsville Wind Turbine Project* (Fugro 2010)

The information obtained from these sources was reviewed and summarized to establish existing conditions and identify potential environmental effects, based on the standards of significance presented in this section.

In determining the level of significance, the analysis assumes that the proposed project would comply with relevant federal, state, and local ordinances and regulations (see Section 3.8.1, "Regulatory Setting").

Water quality impacts of temporary construction activities were assessed in a qualitative manner. The potential short-term, construction-related effects of grading and land disturbance were assessed based on the probability of seasonal exposure to rainfall and runoff; routes of exposure for contaminants to enter surface water; and the magnitude and duration of construction relative to the potential water quality parameters expected to be affected by the activity.

Thresholds of Significance

Based on Appendix G of the State CEQA Guidelines, the project would result in a potentially significant impact related to hydrology and water quality if it would:

- violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality;
- substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin;

- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in substantial erosion or siltation on- or off-site;

- substantially alter the existing drainage pattern of a site or area or through the addition of impervious surfaces, in a manner which would substantially increase the rate or amount of surface runoff which would result in flooding on- or off-site;

- substantially alter the existing drainage pattern of a site or area or through the addition of impervious surfaces, in a manner which would create runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;

- substantially alter the existing drainage pattern of a site or area or through the addition of impervious surfaces, in a manner which would impede or redirect flood flows;

- in a flood hazard, tsunami, or seiche zone, risk release of pollutants due to project inundation; or

- conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

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. Therefore, the following issues will not be discussed further in the impact analysis.

Flood Hazard, Tsunami, or Seiche

Only a small portion of the project site is within a federally designated 100-year flood hazard area (Exhibit 3.8-2), and the risk and potential wave height of tsunamis in the project vicinity are low. The lowest pad elevations of the proposed project facilities (wind turbine generators [WTGs] and meteorological towers) would be 40 feet (Solano 4 East) and 100 feet (Solano 4 West) above mean sea level. Because the project does not propose construction of structures that would house hazardous materials, and no developed structures other than access roads or power lines would be constructed in flood hazard areas, the risk of inundation by flooding or tsunami is low. Therefore, the project would not result in inundation that could release pollutants, and this issue will not be analyzed further.

Impact Analysis

Impact 3.8-1: Short-term degradation of water quality.

Decommissioning of existing wind power facilities, project construction, and future project decommissioning or repowering activities would require the grading and movement of soil. Such activities could result in erosion, sedimentation, and discharge of other nonpoint-source pollutants to stormwater, which could then drain off-site and degrade local water quality. This impact would be **potentially significant**.

Detailed construction plans and specifications have not yet been developed for the project. However, decommissioning existing facilities and foundations from the Solano Wind Phase 1, and constructing the proposed project would require ground disturbance on 189.2 acres of the approximately 2,622-acre site.[1] Ground-disturbing activities would include grading and removing vegetation during construction; constructing new and improving existing on-site access roads; excavating trenches for installation of the collection and home run lines; and installing foundations for the WTGs and meteorological towers.

Constructing new roads would require crossing five natural drainage channels. Channel crossings would be designed and constructed to pass projected stormwater flows and minimize the potential for erosion and scour at the crossings during both construction and operation of the project. For information regarding wetland resources affected by the proposed project, see Section 3.3, “Biological Resources.”

Construction is proposed to begin in 2020 and would be completed in approximately 17 months. Because of the increased ground exposure and the earth-moving activities, the potential for erosion and sedimentation runoff would be higher during the rainy season.

Removal of foundations and decommissioning of existing facilities, construction, and eventual decommissioning or repowering activities would create the potential for soil erosion and sedimentation, both within and downstream of the project site. In addition, pollutants such as oil and gas, chemical substances, waste concrete, and wash water could be accidentally released to surface waters during construction. Construction waste could degrade water quality by altering the water’s dissolved-oxygen content, temperature, pH, levels of suspended sediment and turbidity, or nutrient content, or by causing toxic effects on the aquatic environment. If not conducted properly, the proposed construction activities could violate water quality standards or directly harm aquatic organisms.

Intense rainfall and associated stormwater runoff could cause brief sheet erosion in areas where soils are exposed or stockpiled. If uncontrolled, this erosion could cause sedimentation that would block drainage channels. Compaction of soils by heavy equipment may reduce the soils’ infiltration capacity and increase the potential for runoff

[1] The site area includes the Solano 4 West and Solano 4 East project subareas, the off-site Solano 4 West staging area, and the home run easements.

and erosion. Stormwater runoff could also wash construction materials into receiving waterbodies, reducing water quality. Accidental spills of hazardous substances such as fuels, oils, concrete, paints, solvents, cleaners, or other construction materials could result in nonstormwater discharges of pollutants to receiving waters.

Because project construction would disturb more than 1 acre of land, the project must obtain coverage under the Construction General Permit, SWRCB Order No. 2009-0009-DWQ as modified by Order No. 2010-0014-DWQ and 2012-0006-DWQ. Because the proposed project has the potential to violate water quality standards or waste discharge requirements, this impact would be **potentially significant**.

Mitigation Measures

Mitigation Measure 3.8-1a: Implement Mitigation Measure 3.5-1, "Prepare and implement a SWPPP and associated BMPs."

SMUD shall prepare and the construction contractor will implement Mitigation Measure 3.5-1 listed in Section 3.5, "Geology, Soils, and Mineral Resources." This measure requires the construction contractor to implement a SWPPP, including all necessary BMPs.

Mitigation Measure 3.8-1b: Implement Mitigation Measure 3.7-1b, "Establish and implement an environmental training program."

The construction contractor shall implement Mitigation Measure 3.7-1b listed in Section 3.7, "Hazards and Hazardous Materials." This measure requires SMUD to establish and require implementation of an environmental training program for all field personnel that communicates spill prevention, emergency response measures, and proper implementation of BMPs.

Mitigation Measure 3.8-1c: Implement Mitigation Measure 3.7-1c, "Prepare and implement a hazardous substance control and emergency response plan."

The construction contractor shall implement Mitigation Measure 3.7-1c listed in Section 3.7, "Hazards and Hazardous Materials." This measure requires SMUD to prepare and implement a construction-specific hazardous substance control and emergency response plan for quick, safe cleanup of accidental spills.

Mitigation Measure 3.8-1d: Implement Mitigation Measure 3.7-1d, "Prepare and implement a spill prevention, control, and countermeasures plan."

The construction contractor shall implement Mitigation Measure 3.7-1d listed in Section 3.7, "Hazards and Hazardous Materials." This measure requires SMUD to prepare and the construction contractor to implement a spill prevention control and closures plan to prevent the discharge of petroleum products into waterways.

Significance after Mitigation

Mitigation Measures 3.8-1a through 3.8-1d would substantially reduce the potential for a violation of water quality standards and waste discharge requirements. Therefore, implementing these mitigation measures would reduce potential construction-related impacts on water quality to a **less-than-significant** level.

Impact 3.8-2: Alteration of the site's existing drainage pattern.

The project would include limited grading of the project site, with only a small portion of the site to be developed with compacted materials and concrete pads. Therefore, installation of project facilities would not alter existing on-site drainage patterns and flow paths sufficiently to alter the way in which stormwater flows onto and off the site during major events. This impact would be **less than significant.**

Constructing new roads for the project would require crossing five natural drainage channels. The channel crossings would be designed and constructed to pass projected stormwater flows without interfering with the five channels' drainage patterns.

Grading would occur on a limited portion (approximately 3.5 percent) of the project site during construction and improvement of the new and existing on-site access roads; excavation of trenches for the collection and home run lines; and installation of foundations for the WTGs and meteorological towers. The project would not require construction of substantial additional impermeable surfaces; therefore, surface water would not be blocked from percolating into the ground or flowing into existing drainage features.

The impacts on existing drainage patterns from the various project stages—decommissioning of existing facilities and construction, project operation, and project decommissioning and/or repowering—are discussed separately below.

Decommissioning of Existing Facilities and Construction

As discussed in Impact 3.8-1, project-related ground disturbance on 189.2 acres of the approximately 2,622-acre site would expose soil and could increase erosion and siltation on- or off-site. Project construction would also require using approximately 90 acre-feet of water to control dust. Any water that does not evaporate and is not absorbed into exposed soil would increase runoff on the site. The remaining water would be captured via existing ephemeral drainages, which flow to off-site ditches and wetland areas. Because the proposed project would not alter the drainage pattern of the project site to a sufficient degree to cause increased erosion or siltation, this impact would be **less than significant**. Further, the construction contractor would be required to prepare and implement a SWPPP and associated BMPs, which would further reduce the potential for on- or off-site erosion (see Mitigation Measure 3.8-1a).

Operation

Operation and maintenance of the proposed facility would use up to 4.5 acre-feet of water per year for routine cleaning, a relatively small amount of water for an approximately 2,622-acre site. Most of this water would rapidly evaporate; the rest would percolate into the ground or flow into existing on-site drainage swales. Because of the relatively small amount of water that be used for project operation, the project is not anticipated to alter the existing drainage pattern such that on- or off-site erosion would occur. This impact would be **less than significant**.

Decommissioning and/or Repowering

Decommissioning and/or repowering of the proposed project would involve removing then-existing facilities and potentially installing new WTGs and ancillary facilities. Upon completion of decommissioning and/or repowering, all disturbed areas of the site would be stabilized. Some new grading may also be required, but decommissioning and/or repowering would otherwise not substantially alter the existing drainage patterns of the project site. No net additional impervious surfaces would be added as part of project decommissioning and/or repowering. This impact would be **less than significant**.

Mitigation Measures

No mitigation is required.

Impact 3.8-3: Long-term degradation of water quality.

The project would alter the types, quantities, and timing of contaminant discharges in stormwater runoff. Overall, if the system is not designed properly, the project could cause or contribute to a long-term increase in discharges of urban contaminants (e.g., oil and grease, trace metals and organics, trash) into the stormwater drainage system compared with existing conditions. SMUD would comply with federal and state stormwater management regulations and would incorporate appropriate BMPs into project design to prevent long-term degradation of water quality. Therefore, this impact would be **less than significant**.

Project operation would modify land uses at the project site from existing conditions, which could increase the level of urban contaminants discharged into the stormwater drainage system. Some of the currently undeveloped land on the project site would be developed with permanent uses: new and existing on-site access roads, collection line and home run facilities, and foundations for the WTGs and meteorological towers. These proposed land uses have the potential to increase the load of pollutants in stormwater discharges if the system is not designed properly. Expected project-related pollutants include trash, debris, and hydrocarbons from parking areas; sediment from pervious areas that would not be landscaped; herbicides from vegetation management activities; and organic compounds from uncovered parking areas and access roads.

Federal, state, and County stormwater management regulations require new construction and significant redevelopment to maintain pre-project hydrology and incorporate proper pollutant source controls. Projects must also minimize pollutant exposure outdoors and treat stormwater runoff using proper BMPs when source control or exposure protection is insufficient to reduce pollutant loads in runoff. In accordance with Central Valley and San Francisco Bay RWQCB requirements and County compliance guidelines, SMUD would incorporate appropriate BMPs into project design to prevent long-term degradation of water quality.

Development at the project site could cause or contribute to a long-term increase in discharges of urban contaminants into the stormwater drainage system relative to existing conditions. However, SMUD would be required to comply with federal, state, and local stormwater management regulations. These regulations require that appropriate BMPs be incorporated into the design of the development to prevent long-term degradation of water quality. Therefore, this impact would be **less than significant**.

Mitigation Measures

No mitigation is required.

Impact 3.8-4: Substantial decrease in groundwater supplies.

The project is expected to use up to several million gallons of water during construction for dust control and other activities. Water use would vary over time depending on the construction phasing. SMUD or its contractor plans to obtain construction water from the City of Rio Vista. Because Rio Vista has forecast that it would have excess water capacity during project construction, this impact would be **less than significant**.

During the construction period, the project is expected to use up to 18 million gallons (55.3 af) of water for dust control and other activities. The project's water use would vary over time depending on construction phasing, but would average 3 af per month. Project operation would require up to .4 af/yr.

SMUD anticipates that it would obtain water for construction activity from the City of Rio Vista or other commercially available source, and truck the water to the project site. Water for project operation would be provided by an existing well located at the O&M building.

The City of Rio Vista provides a retail supply of potable water within its service area. The system is entirely dependent on groundwater. Rio Vista has seven operational supply wells that provide water for the entire system. In 2015, the City of Rio Vista supplied 1,793 af of treated water to 4,450 customers. City water deliveries are expected to reach 2,713 af/yr by 2035. During the period from 2011 to 2015, Rio Vista's average groundwater pumping rate was 2,263 af/yr and its maximum annual rate was 2,658 af/yr. In 2020, Rio Vista expects to have a reasonably available groundwater supply of 3,241 af and a total demand of 2,175 af, for a difference between supply and demand of 1,131 af.

Solano County Water Agency's Integrated Regional Water Management Plan estimates the groundwater basin supply to be 23,300 af/yr (SCWA 2005:3-6). There is no trend of groundwater overdraft with current levels of groundwater use. Studies conducted in Rio Vista have concluded that City of Rio Vista well levels and groundwater elevation trends remain stable.

The bulk of project-related water usage would occur during construction of the proposed project. This usage rate would be temporary and would be scaled back dramatically during project operation. Because groundwater conditions in the City of Rio Vista's well system are stable, and because Rio Vista will have an excess of groundwater during the project's construction period, the project would not substantially deplete groundwater supplies. As noted in Impact 3.8-2, a small area of the site would be developed with impervious surfaces. Thus, implementing the project would not interfere substantially with groundwater recharge such that the project may impede the sustainable groundwater management of the basin. This impact would be **less than significant**.

Mitigation Measures

No mitigation is required.

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3.9. Land Use

This section describes the land use characteristics of the project area that may affect or be affected by the project.

3.9.1. Regulatory Setting

Federal

The Travis Air Force Base (AFB) Air Installation Compatible Zone Study (AICUZ) program promotes compatible land development in areas subject to aircraft noise and accident potential. U.S. Air Force AICUZ guidelines reflect land use recommendations for the Clear Zone, Accident Potential Zones I and II, and the four noise zones exposed to noise levels at or above 65 decibels day-night average A-weighted sound level. These guidelines were established based on studies prepared and sponsored by the U.S. Department of Housing and Urban Development, U.S. Environmental Protection Agency, and U.S. Air Force, as well as state and local agencies. The guidelines recommend land uses that are compatible with airfield operations while allowing maximum beneficial use of adjacent properties. According to the AICUZ, project boundaries are outside of either the Clear Zone or accident potential zone of Travis AFB.

State

The California State Aeronautics Act (California Public Utilities Code Sections 21670 through 21679.5) requires the creation of airport land use commissions (ALUCs) to coordinate planning for areas surrounding public use airports. The purpose of the law is to protect public health, safety, and welfare by ensuring orderly expansion of airports and adoption of land use measures that minimize the public's exposure to excessive noise and safety hazards in areas around public use airports. The ALUC is also concerned with airport activities that may adversely affect adjacent areas and nearby land uses that may interfere with airport operations.

The California Department of Transportation, Division of Aeronautics, administers much of this statute and publishes the *California Airport Land Use Planning Handbook* to provide guidance for conducting airport land use compatibility planning. Airport land use compatibility is determined to reconcile how land development and airports function together. The concept of compatibility has been defined as follows (Caltrans 2011):

> [T]hose uses that can coexist with a nearby airport without either constraining the safe and efficient operation of the airport or exposing people living or working nearby to unacceptable levels of noise or (safety) hazards. Compatibility concerns include any airport impact that adversely affects the livability of surrounding communities, as well as any community characteristic that can adversely affect the viability of an airport.

Local

As discussed in Section 1.2 of this EIR, 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]). Therefore, SMUD's wind turbine facilities are exempt from County land use plans because SMUD, as a municipal utility district, is a local agency and the project is an electrical generation facility.

However, the EIR recognizes that plans, policies, and regulations reflect the local community's policy decisions regarding appropriate uses of land in the area. For purposes of disclosure, Solano County policies that relate to the project area are identified below.

Solano County General Plan

The *Solano County General Plan* (General Plan) (Solano County 2008) identifies goals, policies, and implementation measures to guide the development and conservation of natural resources in the county on a long-term basis. The General Plan designates the project area as Agriculture. Commercial wind turbine development is a permitted use in the following districts: Exclusive Agricultural (A), Limited Agricultural (A-L), Water-Dependent Industrial (rWD), Limited Manufacturing (M-L), General Manufacturing (M-G), and Watershed and Conservation (W).

The Agriculture designation is intended to provide areas for practicing agriculture as the primary use, including areas that contribute substantially to the local agricultural economy, and allows for secondary uses that support the economic viability of agriculture. Agricultural land use designations protect these areas from intrusion by nonagricultural uses and other uses that do not directly support the economic viability of agriculture.

Solano County (County) has identified the Collinsville–Montezuma Hills south of State Route (SR) 12 as the primary wind resource area in the county. Wind energy development has been deemed inappropriate in certain areas of the county, to protect public health and safety and natural resources. These areas are urban areas, the Suisun Marsh Primary Management Area, the Stebbins Cold Canyon Natural Area, San Pablo Bay National Wildlife Refuge, and the Jepson Prairie Preserve owned by the Solano Land Trust.

Chapter 4, Resources, of the General Plan covers the project area. This element contains procedures for review and siting of wind turbines in a manner that do not conflict with air operations at Travis Air Force Base and avoids impacting natural resources or creating an increased risk to public safety. Studies required for siting wind turbines include archeological, geotechnical, biological resources, and public safety. The County also requires detailed plans for structures, foundations, and electrical systems to be submitted by a licensed professional engineer.

Solano County Airport Land Use Commission

The Solano County ALUC has adopted the Travis Air Force Base Land Use Compatibility Plan (ESA 2015), which includes regulations to ensure land use compatibility in the vicinity of Travis AFB. The project site is identified as Zone D, which is an area where the ALUC calls for structures taller than 200 feet to provide radar line of site studies and ALUC consistency determination. However, as discussed in Section 3.7, Hazards and Hazardous Materials, of this EIR, the LUCP provisions do not apply to SMUD WTG facilities under section 53091 of the Government Code (Subdivisions d and e). And even if SMUD was required to obtain a determination from ALUC, SMUD, as a local agency, can overrule the ALUC determination consistent with the State Aeronautics Act provisions.

3.9.2. Environmental Setting

Regional Setting

Solano County is a suburban and rural area between the San Francisco and Sacramento metropolitan areas. The county covers approximately 907 square miles, including 683 square miles of rural lands, 146 square miles of urban areas, and 79 square miles of water. Solano County is situated between the Sierra Nevada to the east and the Coast Ranges to the west. It is also bordered by the Sacramento River to the south. The project site is in southeastern Solano County

Agriculture constitutes the land use in two-thirds of Solano County. Agricultural activities include irrigated agriculture, dryland farming, and grazing. The major agricultural commodities are nursery stock, cattle, alfalfa hay, wheat, feeder lambs, grapes, milk, and walnuts. However, agricultural production has declined in recent years as the county has continued to urbanize.

Travis Air Force Base

Travis AFB, located approximately 15 miles northwest of the project area, is home to the 60th Air Mobility Wing, which is considered the largest air mobility organization in the U.S. Air Force. Travis AFB serves as the strategic airlift and aerial refueling base for the West Coast. The base is on approximately 6,260 acres of land (see Exhibit 2-1, “Regional Location Map,” in Chapter 2, “Project Description”). Access to Travis AFB is available via Air Base Parkway from the west and Peabody Road from the north. Travis AFB has two main runways and a future landing zone, which will be shorter and will parallel the main runways.

Aircraft types operating at Travis AFB consist primarily of military aircraft and contract commercial aircraft. In addition to the aircraft based at Travis AFB, numerous types of transient military and contract commercial aircraft conduct operations at the base. Travis AFB conducts approximately 42,000 aircraft operations annually. An aircraft operation is defined as one takeoff/departure, one approach/landing, or half a closed pattern (USAF 2009).[1]

Local Setting

The project area is designated for agricultural use and leased for dryland farming and grazing. Visible developments include electric transmission towers, and WTGs on the surrounding hilltops.

With the exception of the home run lines running between the two main WTG project subareas and the Russell Substation, all project facilities would be constructed on land that is owned in fee title by SMUD.

As described in Chapter 2, “Project Description,” several existing and planned wind farms also surround the project area. These include Phases 1, 2A and 2B, and 3 of the Solano Wind Project, previously developed by SMUD.

3.9.3. Environmental Impacts and Mitigation Measures

Methods and Assumptions

The evaluation of potential impacts of the proposed project on land use was based on a review of the following planning documents pertaining to the proposed project and surrounding area:

- *FAA Notice of No Hazard Determination*
- *Solano County General Plan* (Solano County 2008)
- *Travis Air Force Base Land Use Compatibility Plan* (ESA 2015)

Thresholds of Significance

Based on Appendix G of the State CEQA Guidelines, the project would result in a potentially significant impact related to land use if it would:

- physically divide an established community; or
- cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.

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[1] A closed pattern consists of two portions: a takeoff/departure and an approach/landing, i.e., two operations.

Impact Analysis

Impact 3.9-1: Division of an established community.

The project site is not located within an existing community and the project does not have any features that would divide a community. This impact would be **less than significant.**

The project would be located on rural land. The nearest established community (Collinsville) is about one-half mile east of the project area. Collinsville is a 27-acre residential area at the end of Collinsville Road. The nearest city, Rio Vista, is about 5 miles northeast of the project area on the western bank of the Sacramento River. No established communities lie within the project area. The project is not a linear project that would divide a community or block travel. Therefore, the project would not divide an established community. This impact would be **less than significant**.

Mitigation Measures

No mitigation is required.

Impact 3.9-2: Conflict with a plan, policy, or regulation adopted to avoid or mitigate an environmental effect.

The proposed project could be found consistent with local plans, policies, and regulations. This impact would be **less than significant.**

As stated above, SMUD is not subject to County zoning ordinances, nor does project construction and operation require Solano County to issue a permit under the County's zoning ordinances. Nevertheless, this EIR considers local land use plans, policies, and regulations consistent with the intent of the CEQA to provide full disclosure, along with SMUD's desire to promote informed decisionmaking.

The Solano County General Plan designates the project area as Agriculture. Commercial wind energy operations are permitted on lands designated for agricultural use. Therefore, the project would not conflict with the General Plan's land use designations for the site.

Solano County sets policies to ensure development occurring in the established compatibility zones of Travis AFB, do not interfere with airport operations or present a hazard to the public through exposure to high noise levels or creation of risk to public safety. The Solano 4 Wind Project has been designed with the intent to avoid impacting operations at Travis AFB. Project construction and operation would not be a hazard to public safety or to flight operations. SMUD criteria used in siting WTGs included efficient wind power collection; presence of resources, surrounding land uses, topographic features, construction and operating costs; product availability, equipment lifespan; neutral or reduced probability of detection by radar, and ability to meet SMUD's design criteria, project schedule, and cost of power delivery goals.

But the Travis AFB divides the land around Travis AFB into zones which correspond to airport flight patterns and the greatest risk for accident (takeoff or landing). The project site is located in Zone 4 of the Travis AFP LUCP and a line-of-sight analysis would be required for projects taller than 100 feet. As discussed in Section 3.7, Hazards and Hazardous Materials, of this EIR, the project would likely be within the line-of-sight of the Travis AFB radar based on Appendix H of LUCP. Therefore, the project as proposed is unlikely to be determined consistent with this policy of LUCP. But the FAA has issued a Determination of No Hazard Finding for the Solano 4 Wind Project, and FAA and its regulations concerning air safety and aviation navigation preempt the ALUC's land use regulations regarding radar system interference. Due to the FAA Determination, the project could be found consistent with the intent of ALUC policies to avoid obstruction of airport operations. See Section 3.7, Hazards and Hazardous Materials and Appendix G for the FAA Notice for more details regarding the FAA findings.

Further, as also discussed in Section 3.7, Hazards and Hazardous Materials, of this EIR, the LUCP provisions do not apply to SMUD WTG facilities under section 53091 of the Government Code (Subdivisions d and e). And even if SMUD was required to obtain a determination from ALUC, SMUD, as a local agency, can overrule the ALUC determination consistent with the State Aeronautics Act provisions.

WTGs proposed as part of the project are generally consistent with regulations establishing setbacks from the property line to promote safety on adjacent property, requirements to shield the equipment preventing radio frequency emissions from disrupting operations at Travis Air Force Base, and site WTGs avoiding the potential hazard of blade throw (see Section 3.7 Hazards and Hazardous Materials). Due to the FAA Determination, the project could be found consistent with the intent of ALUC policies to avoid obstruction of airport operations. See Section 3.7, Hazards and Hazardous Materials and Appendix G for the FAA Notice for more details regarding the FAA findings.

The project uses existing roadways and transmission infrastructure to minimize land disturbance, and WTGs are sited in a manner that avoids direct impact on wetlands and sensitive biological resources (see Section 3.3 Biological Resources).

The project also proposes the construction of up to two meteorological towers, each up to 105 meters high. SMUD will site the two meteorological towers a minimum of 132 feet, or 1.25 times the total tower height, from public roads, dwelling units, and other structures, consistent with requirements established by the County Department of Resource Management for previous wind projects. The purpose of this setback is to prevent a safety hazard to the public in the event that a tower falls toward a county road.

Additionally, the tower would be lighted and marked for safety in the same manner as required by the FAA. The FAA determined that the structures would not be a hazard to air navigation, provided that the WTGs are marked with white paint and lighted using synchronized red lights in accordance with Chapters 4, 12, and 13 of FAA Advisory Circular 70/7460-1L with Change 2, *Obstruction Marking and Lighting* (FAA 2018)

This impact would be **less than significant**.

Mitigation Measures

No mitigation measures are required.

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3.10. Noise

This section describes ambient-noise conditions and provides an analysis of potential short-term construction and decommissioning, as well as long-term operational-source noise impacts associated with the proposed project. Applicable regulations related to noise and vibration provide the regulatory background that guides the assessment of potential environmental effects. Mitigation measures are recommended as necessary to reduce significant noise impacts. Additional data are provided in Appendix H.

3.10.1. Acoustics Terminology and Background

Background information about sound, noise, vibration, and common noise descriptors is included below to provide context and to explain the technical terms referenced throughout this section.

Sound, Noise, and Acoustics

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a human ear. Noise is defined as loud, unexpected, annoying, or unwanted sound.

The field of acoustics deals primarily with the propagation and control of sound. The fundamental acoustical model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the source and obstructions or atmospheric factors affecting the propagation path to the receiver determines the level and characteristics of the sound perceived by the receiver.

Frequency

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz, or thousands of hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

Sound Pressure Levels and Decibels

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (mPa). One mPa is approximately one hundred billionth (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to 100,000,000 mPa. Because of this large range of values, sound is rarely expressed in terms of mPa. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of decibels (dB).

Addition of Decibels

Because decibels are logarithmic units, SPLs cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources are each producing sound of the same loudness at the same time, the resulting sound level at a given distance would be 3 dB higher than if only one of the sound sources was producing sound under the same conditions. For example, if one idling truck generates an SPL of 70 dB, two trucks idling simultaneously would not produce 140 dB; rather, they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together produce a sound level approximately 5 dB louder than one source.

A-Weighted Decibels

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

Human hearing is limited in the range of audible frequencies as well as in the way it perceives the SPL in that range. In general, people are most sensitive to the frequency range of 1,000–8,000 Hz and perceive sounds within this range better than sounds of the same amplitude with frequencies outside of this range. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies. Then, an “A-weighted” sound level (expressed in units of A-weighted decibels) can be computed based on this information.

The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgment correlates well with the A-scale sound levels of those sounds. Thus, noise levels are typically reported in terms of A-weighted decibels. All sound levels discussed in this section are A-weighted decibels. Table 3.10-1 describes typical A-weighted noise levels for various noise sources.

Human Response to Changes in Noise Levels

As discussed above, the doubling of sound energy results in a 3-dB increase in the sound level. However, given a sound level change measured with precise instrumentation, the subjective human perception of a doubling of loudness will usually be different from what is measured.

Table 3.10-1 Typical A-Weighted Noise Levels

Common Outdoor Activities	Noise Level (dB)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 1,000 feet	— 100 —	
Gas lawn mower at 3 feet	— 90 —	
Diesel truck at 50 feet at 50 miles per hour	— 80 —	Food blender at 3 feet, Garbage disposal at 3 feet
Noisy urban area, daytime, Gas lawn mower at 100 feet	— 70 —	Vacuum cleaner at 10 feet, Normal speech at 3 feet
Commercial area, Heavy traffic at 300 feet	— 60 —	
Quiet urban daytime	— 50 —	Large business office, Dishwasher next room
Quiet urban nighttime	— 40 —	Theater, large conference room (background)
Quiet suburban nighttime	— 30 —	Library, Bedroom at night
Quiet rural nighttime	— 20 —	
	— 10 —	Broadcast/recording studio
Lowest threshold of human hearing	— 0 —	Lowest threshold of human hearing
Source: Caltrans 2013a: Table 2-5		

Under controlled conditions in an acoustical laboratory, the trained, healthy human ear is able to discern 1-dB changes in sound levels when exposed to steady, single-frequency ("pure-tone") signals in the mid-frequency (1,000–8,000 Hz) range. In general, the healthy human ear is most sensitive to sounds between 1,000 and 5,000 Hz and perceives both higher and lower frequency sounds of the same magnitude with less intensity (Caltrans 2013a:2-18). In typical noisy environments, changes in noise of 1–2 dB are generally not perceptible. However, it is widely accepted that people are able to begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5-dB increase is generally perceived as a distinctly noticeable increase, and a 10-dB increase is generally perceived as a doubling of loudness (Caltrans 2013a:2-10). Therefore, a doubling of sound energy (e.g., doubling the volume of traffic on a highway) that would result in a 3-dB increase in sound would generally be perceived as barely detectable.

Vibration

Vibration is the periodic oscillation of a medium or object with respect to a given reference point. Sources of vibration include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) and those introduced by human activity (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous (e.g., operating factory machinery) or transient (e.g., explosions). Vibration levels can be depicted in terms of amplitude and frequency, relative to displacement, velocity, or acceleration.

Vibration amplitudes are commonly expressed in peak particle velocity (PPV) or root-mean-square (RMS) vibration velocity. PPV and RMS vibration velocity are normally described in inches per second (in/sec) or in millimeters per second. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is typically used in the monitoring of transient and impact vibration and has been found to correlate well to the stresses experienced by buildings (FTA 2018:7-3, Caltrans 2013a:6).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. It takes some time for the human body to respond to vibration signals. In a sense, the human body responds to average vibration amplitude. The RMS of a signal is the average of the squared amplitude of the signal, typically calculated over a 1-second period. As with airborne sound, the RMS velocity is often expressed in decibel notation as vibration decibels (VdB), which serves to compress the range of numbers required to describe vibration (FTA 2018:7-4; Caltrans 2013b:7). This is based on a reference value of 1 microinch per second.

The typical background vibration-velocity level in residential areas is approximately 50 VdB. Ground vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels (FTA 2018:7-8; Caltrans 2013b:27).

Typical outdoor sources of perceptible ground vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur to fragile buildings. Construction activities can generate sufficient ground vibrations to pose a risk to nearby structures. Constant or transient vibrations can weaken structures, crack facades, and disturb occupants (FTA 2018:7-5).

Vibrations generated by construction activity can be transient, random, or continuous. Transient construction vibrations are generated by blasting, impact pile driving, and wrecking balls. Continuous vibrations are generated by vibratory pile drivers, large pumps, and compressors. Random vibration can result from jackhammers, pavement breakers, and heavy construction equipment.

Table 3.10-2 summarizes the general human response to different ground vibration-velocity levels.

Table 3.10-2 Human Response to Different Levels of Ground Noise and Vibration	
Vibration-Velocity Level	**Human Reaction**
65 VdB	Approximate threshold of perception.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable.
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.

Notes: VdB = vibration decibels referenced to 1 microinch/second and based on the root mean square velocity amplitude.
Source: FTA 2018:7-8

Common Noise Descriptors

Noise in our daily environment fluctuates over time. Various noise descriptors have been developed to describe time-varying noise levels. The following noise descriptors are used throughout this section.

- **Equivalent Continuous Sound Level (L_{eq}):** L_{eq} represents an average of the sound energy occurring over a specified period. In effect, L_{eq} is the steady-state sound level containing the same acoustical energy as the time-varying sound level that actually occurs during the same period (Caltrans 2013a:2-48). For instance, the 1-hour equivalent sound level, also referred to as the hourly L_{eq}, is the energy average of sound levels occurring during a 1-hour period and is the basis for noise abatement criteria used by the California Department of Transportation (Caltrans) and the Federal Highway Administration (FHWA) (Caltrans 2013a:2-47; FTA 2018:2-19).

- **Percentile-Exceeded Sound Level (L_X)**: L_X represents the sound level exceeded for a given percentage of a specified period (e.g., L_{10} is the sound level exceeded 10 percent of the time, and L_{90} is the sound level exceeded 90 percent of the time) (Caltrans 2013a:2-16).

- **Maximum Sound Level (L_{max})**: L_{max} is the highest instantaneous sound level measured during a specified period (Caltrans 2013a:2-48; FTA 2018:2-16).

- **Day-Night Level (L_{dn})**: L_{dn} is the energy average of A-weighted sound levels occurring over a 24-hour period, with a 10-dB "penalty" applied to sound levels occurring during nighttime hours between 10 p.m. and 7 a.m. (Caltrans 2013a:2-48; FTA 2018:2-22).

- **Community Noise Equivalent Level (CNEL)**: Similar to L_{dn}, CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10-dBA penalty applied to A-weighted sound levels occurring during the nighttime hours between 10 p.m. and 7 a.m. and a 5-dBA penalty applied to the A-weighted sound levels occurring during evening hours between 7 p.m. and 10 p.m.

Sound Propagation

When sound propagates over a distance, it changes in level and frequency content. The manner in which a noise level decreases with distance depends on the factors described below.

Geometric Spreading

Sound from a localized source (i.e., a point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Roads and highways consist of several localized noise sources on a defined path and hence can be treated as a line source, which approximates the effect of several point sources. Thus, the sound from a line source propagates at a slower rate than the sound from a point source. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source.

Ground Absorption

The propagation path of noise from a source to a receiver is usually very close to the ground. Noise attenuation from ground absorption and reflective-wave canceling provides additional attenuation associated with geometric spreading. Traditionally, this additional attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 feet. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receiver, such as soft dirt, grass, or scattered bushes and trees), additional ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the attenuation rate associated with cylindrical spreading, the additional ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance. This would hold true for point sources, resulting in an overall drop-off rate of up to 7.5 dB per doubling of distance.

Atmospheric Effects

Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels, as wind can carry sound. Sound levels can be increased over large distances (e.g., more than 500 feet) from the source because of atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also affect sound attenuation.

Shielding by Natural or Human-Made Features

A large object or barrier in the path between a noise source and a receiver attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. A barrier that breaks the line of sight between a source and a receiver will typically result in at least 5 dB of noise reduction (Caltrans 2013a:2-41; FTA 2018:5-6, 6-25). Barriers higher than the line of sight provide increased noise reduction (FTA 2018:2-12). Vegetation between the source and receiver is rarely effective in reducing noise because it does not create a solid barrier unless there are multiple rows of vegetation (FTA 2018:2-11).

3.10.2. Regulatory Setting

Federal

U.S. Environmental Protection Agency Office of Noise Abatement and Control

The U.S. Environmental Protection Agency (EPA) Office of Noise Abatement and Control was originally established to coordinate Federal noise control activities. In 1981, EPA administrators determined that subjective issues such as noise would be better addressed at more local levels of government. Consequently, in 1982 responsibilities for regulating noise control policies were transferred to state and local governments. However, documents and research completed by the EPA Office of Noise Abatement and Control continue to provide value in the analysis of noise effects.

Federal Transit Administration

To address the human response to ground vibration, the Federal Transit Administration (FTA) has set forth guidelines for maximum-acceptable vibration criteria for different types of land uses. These guidelines are listed in Table 3.10-3.

State

California General Plan Guidelines

Though not adopted by law, the *State of California General Plan Guidelines 2003*, published by the Governor’s Office of Planning and Research (OPR 2003), provide guidance for the compatibility of projects within areas of specific noise exposure. Acceptable and unacceptable community noise exposure limits for various land use categories have been determined to help guide new land use decisions in California communities. In many local jurisdictions, these guidelines are used to derive local noise standards and guidance. Citing EPA materials and the State Sound Transmissions Control Standards, the state’s general plan guidelines recommend interior and exterior noise standards of 45 and 60 dB CNEL for residential units, respectively (OPR 2003: 253–254).

Table 3.10-3 Groundborne Vibration Impact Criteria for General Assessment			
Land Use Category	Groundborne Vibration Impact Levels (VdB re 1 microinch/second)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where vibration would interfere with interior operations.	65 [4]	65 [4]	65 [4]
Category 2: Residences and buildings where people normally sleep.	72	75	80
Category 3: Institutional land uses with primarily daytime uses.	75	78	83

Notes:
VdB = vibration decibels referenced to 1 microinch/second and based on the root mean square velocity amplitude.
1 "Frequent Events" is defined as more than 70 vibration events of the same source per day.
2 "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day.
3 "Infrequent Events" is defined as fewer than 30 vibration events of the same source per day.
4 This criterion is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research would require detailed evaluation to define acceptable vibration levels.
Source: FTA 2018

California Department of Transportation

The Transportation and Construction Vibration Manual (Caltrans 2013a) provides general guidance on vibration issues associated with construction and operation of projects in relation to human perception and structural damage. Table 3.10-4 presents recommendations for levels of vibration that could result in damage to structures exposed to continuous vibration.

Table 3.10-4 Caltrans Recommendations Regarding Levels of Vibration Exposure	
PPV (in/sec)	**Effect on Buildings**
0.4–0.6	Architectural damage and possible minor structural damage
0.2	Risk of architectural damage to normal dwelling houses
0.1	Virtually no risk of architectural damage to normal buildings
0.08	Recommended upper limit of vibration to which ruins and ancient monuments should be subjected
0.006–0.019	Vibration unlikely to cause damage of any type

Notes: in/sec = inches per second; PPV = peak particle velocity
Source: Caltrans 2013

Local

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]). The following discussion is provided to promote informed decisionmaking.

Solano County General Plan

The noise goal in the *Solano County General Plan* (General Plan) Health and Safety Element, HS.G-3, is to protect people living, working, and visiting Solano County from the harmful impacts of excessive noise. The Public Health and Safety Element (Solano County 2015) contains noise level standards.

Table HS-3 in the General Plan, presented here as Table 3.10-5, shows the acceptable noise levels for various land use categories.

Table 3.10-5 Land Use Noise Compatibility Guidelines

Land Use Category	Community Noise Exposure (L_{dn} or CNEL, dBA)			
	Normally Acceptable[1]	Conditionally Acceptable[2]	Normally Unacceptable[3]	Clearly Unacceptable[4]
Residential—Low Density Single Family, Duplex, Mobile Home	<65	55–70	70–75	75+
Residential— Multifamily	<65	60–70	70–75	75+
Transient Lodging—Motel, Hotel		60–70	70–80	80+
Schools, Libraries, Churches, Hospitals, Nursing Homes	<70	60–70	70–80	80+
Auditoriums, Concert Halls, Amphitheaters		<70	65+	
Sports Arena, Outdoor Spectator Sports		<75	70+	
Playgrounds, Neighborhood Parks	<70		67.5–75	72.5+
Golf Courses, Riding Stables, Water Recreation, Cemeteries	<70		70–80	80+
Office Building, Business Commercial, and Professional	<70	67.5–77.5	75+	
Industrial, Manufacturing, Utilities, Agriculture	<75	70–80	75+	

Notes:
CNEL = community noise equivalent level; dBA = A-weighted decibel; L_{dn} = day-night average noise level
[1] Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
[2] New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.
[3] New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. Outdoor areas must be shielded.
[4] New construction or development should generally not be undertaken.
[5] These standards are not applicable for development within the airport compatibility review area. Development in the airport compatibility review areas are subject to standards in the applicable airport land use plan.
Sources: OPR 2003; Solano County 2015.

Table HS-4 in the General Plan, presented here as Table 3.10-6, defines acceptable outdoor and interior noise levels for land uses affected by traffic and railroad noise.

Table 3.10-6 Noise Standards for New Uses Affected by Traffic and Railroad Noise			
New Land Use	**Sensitive Outdoor Area (dBA L_{dn})**	**Sensitive Interior[1] Area (dBA L_{dn})**	**Notes**
All Residential	65	45	2
Transient Lodging	65	45	2, 3
Hospitals and Nursing Homes	65	45	2, 3, 4
Theaters and Auditoriums	–	35	3
Churches, Meeting Halls, Schools, Libraries, etc.	65	40	3
Office Buildings	65	45	3
Commercial Buildings	–	50	3
Playgrounds, Parks, etc.	70	–	
Industry	65	50	3

Notes:
dBA = A-weighted decibels; L_{dn} = day-night average noise level
[1] Interior-noise-level standards are applied within noise -sensitive areas of the various land uses, with windows and doors in the closed positions.
[2] If these uses are affected by nighttime railroad passages, the potential for sleep disturbance shall be addressed
[3] Where there are no sensitive exterior spaces proposed for these uses, only the interior-noise- level standard shall apply.
[4] Hospitals are often noise-generating uses. The exterior-noise-level standards for hospitals are applicable only at clearly identified areas designated for outdoor relaxation by either hospital staff or patients.
Source: Solano County 2015.

Table HS-5 in the General Plan, presented here as Table 3.10-7, defines noise performance standards for nontransportation noise.

Table 3.10-7 Nontransportation Noise Standards—Average (dBA L_{eq})/Maximum (dBA L_{max})[1]				
	Outdoor Area		**Interior[2]**	
Receiving Land Use	**Daytime**	**Nighttime**	**Day and Night**	**Notes**
All Residential	55/70	55/65	35/55	
Transient Lodging	55/75	–	35/55	3
Hospitals and Nursing Homes	55/75	–	35/55	4,5
Theaters and Auditoriums	–	–	30/50	5
Churches, Meeting Halls, Schools, Libraries, etc.	55/75	–	35/60	5
Office Buildings	55/75	–	45/65	5
Commercial Buildings	55/75	–	45/65	5
Playgrounds, Parks, etc.	55/75	–	–	5
Industry	55/80	–	50/70	5

Notes:
L_{eq} = equivalent or energy-averaged sound level; L_{max} = highest root-mean-square sound level measured over a given period of time
[1] The standards shall be reduced by 5 dBA for sounds consisting primarily of speech or music, and for recurring impulsive sounds. If the existing ambient noise level exceeds the standards, then the noise level standards shall be increased at 5-dBA increments to encompass the ambient.
[2] Interior-noise-level standards are applied within noise-sensitive areas of the various land uses, with windows and doors in the closed positions.
[3] Outdoor activity areas of transient lodging facilities are not commonly used during nighttime hours.
[4] Hospitals are often noise-generating uses. The exterior-noise-level standards for hospitals are applicable only at clearly identified areas designated for outdoor relaxation by either hospital staff or patients.
[5] The outdoor activity areas of these uses (if any), are not typically utilized during nighttime hours.
Source: Solano County 2015.

Solano County Code

Article III, "Land use Regulations," Section 28.70.10, "General Development Standards Applicable to All Uses in Every Zoning District," of the Solano County Code requires all uses of land and structures be conducted in a manner, and provide adequate controls and operational management, to prevent noise levels exceeding 65 dBA L_{dn} at any property line. Section 28.80, "Commercial Wind Energy Facilities," states that noise emitted from any wind turbine generator (WTG) shall not exceed 50 dBA CNEL at any property line abutting a residential zone or 60 dBA CNEL at any other property line (Solano County 2018).

Solano County Wind Turbine Siting Plan and Environmental Impact Report

The WTG operation levels studied for the adjacent High Winds Power Project indicated 80 percent, 86 percent, and 88 percent operation for daytime, evening, and nighttime periods, respectively. These percentages would be used to help calculate hourly equivalent sound level (L_{eq}), from which day-night average sound level (L_{dn}) and community noise equivalent level (CNEL) can be derived and assumed to apply under conditions when WTGs are operating.

In addition to the A-weighted sound levels, the *Solano County Wind Turbine Siting Plan and Environmental Impact Report* (Siting Plan) (Solano County 1987) and the National Wind Coordinating Committee (NWCC) *Permitting of Wind Energy Facilities Handbook* (NWCC 2002) address low-frequency noise. Both suggest increasing WTG setback distance from dwelling units, residential building sites, or residentially zoned land to a mile if low-frequency (20–100 Hz) noise is prominent. However, because the WTGs associated with this project feature upwind rotor arrangement, the likelihood of low-frequency noise is remote. "Upwind" refers to the rotor disc positioned upstream from the WTG support tower. In this configuration, rotor blades do not interact with tower-induced wakes that can cause low frequency blade passage tones.

Draft Final Solano County Noise Ordinance County Code, Chapter 28.1

Section 28.1-30, "Interior Noise Standards," includes the interior noise standards for residential dwelling units within residential zones or areas for noise generated by sources outside the dwelling unit. These standards are presented in Table 3.10-8.

Table 3.10-8 Interior Noise Standards

Land Use	Time Interval	Allowable Interior Noise Level (dBA)
Residential	7 p.m.–7 a.m.	45
	7 a.m.–7 p.m.	55

Note: dBA = A-weighted decibels
Source: Solano County 2018:Table 28.1.30

Noise from any source on a property within a residential zone or area shall not cause the noise level measured inside a dwelling unit on a neighboring property to exceed the noise standard specified in Table 3.10-8 for a cumulative period of more than 5 minutes in any hour.

Section 28.1-40, “Exterior Noise Standards,” limits the maximum permissible sound levels by receiving land use. The exterior noise standards for residential and agricultural zones or areas are presented in Table 3.10-9 and summarized further below.

Table 3.10-9 Noise Levels Permissible by Receiving Land Uses

Zone	Noise Level (dBA)	
	7 a.m.–7 p.m.	**7 p.m.–7 a.m.**
Agricultural	55	50
Residential	55	50

Source: Solano County 2018:Table 28.1.40

1. If the measured ambient noise level at the time of a complaint investigation exceeds the identified permissible noise level for that zone, the allowable noise standard shall be the ambient noise level.

2. Except as provided in subsection (b) of Section 28.1-30, noise from any source shall not cause the noise level measured on a property in an agricultural or residential zone or area to exceed the exterior noise levels specified in Table 28.1-40 or in subsection (2), whichever is greater, for a period of more than 5 minutes in any hour.

In addition to the standards established in Sections 28.1-30 and 28.1-40, noise created by specific activities shall be subject to the following additional regulations in Section 28.1-50, “Specific Noise Regulations”:

(a) Construction or Demolition

1) Construction and demolition activities within a residential district or within a radius of 500 feet are allowed only during the times specified in Table 28.1-50 (*Note: Table 3.10-10 of this EIR*).

2) Except as set forth in subsection (5) of this section, the noise created by construction activity shall not cause:

a. The noise level to exceed the noise standards specified in Table 28.1–40 of this chapter (*Note: Table 3.10-9 of this EIR*), for the land use where the measurement is taken, plus 20 dBA, for a period of more than 2 minutes; or

b. A maximum noise at the receiving property line of more than 90 dBA at any time.

3) Any construction that exceeds noise levels established in Sections 28.1-30 or 28.1-40 shall occur between the hours of 9 a.m. and 4 p.m., Monday through Friday.

4) Construction or demolition activity during the times otherwise prohibited by this section may be allowed as described in this subsection if it is found to be in the public interest.

a. A request for such allowance shall be in writing and shall set forth in detail facts showing that the public interest will be served by the grant of such allowance.

b. If the allowance is being requested in connection with construction or demolition activities to be undertaken in connection with a land division, use permit, or other discretionary entitlement, the request shall be submitted as part of the application for such entitlement and shall be acted upon by the official or decision-making body taking action on such application, after considering the recommendation of the noise control officer.

c. If the allowance is being requested in connection with a building permit, demolition permit, or grading permit and is not in connection with a discretionary entitlement, the request shall be considered and acted on by the noise control officer before the construction or demolition permit has been issued.

Table 3.10-10 Time Limits for Noise Associated with Commercial Construction Activities

Day of Week	Time Frame
Monday–Friday	7 a.m.–6 p.m.
Saturday	8 a.m.–5 p.m.
Sunday	Not allowed
Federal Holidays	Not allowed
Source: Solano County 2018:Table 28.1-50	

3.10.3. Environmental Setting

Existing Noise- and Vibration-Sensitive Land Uses

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels, and because of the potential for nighttime noise to result in sleep disruption. Additional land uses such as schools, transient lodging, historic sites, cemeteries, parks, recreational areas, and places of worship are also generally considered sensitive to increases in noise levels. These land use types are also considered vibration-sensitive land uses, as are commercial and industrial buildings, where vibration would interfere with operations within the building, including levels that may be well below those associated with human annoyance.

The nearest noise-sensitive receptors are single-family rural residences located along Montezuma Hills Road (Solano 4 East project subarea) and Talbert Lane (Solano 4 West project subarea) adjacent to the project site, approximately 3,100 feet and 1,400 feet from the project site boundary, respectively. The historically significant Hastings Adobe structure is located within the project boundary, but approximately 1,100 feet from the nearest proposed project construction area of the Solano 4 West subarea. Exhibit 3.10-1 shows the layout of the nearest surrounding receptors relative to the project site.

Existing Noise Sources and Ambient Levels

To characterize the existing ambient noise environment at the project site, long-term ambient noise level measurements were conducted at three locations at the project site between March 13, 2019, and March 19, 2019. The locations of the noise monitoring sites are shown in Exhibit 3.10-1. To characterize existing WTG noise in the project area, multiple short-term noise measurements were conducted around existing WTGs and at two distances to assess attenuation factors. The locations of the WTG reference noise monitoring sites are shown in Exhibit 3.10-2. Larson Davis Laboratories precision integrating sound level meters Models 820 and 831 were used for the ambient noise level measurement surveys. The meters were calibrated before use with Larson Davis Laboratories Model CAL200 acoustical calibrators to ensure measurement accuracy. The measurement equipment meets all pertinent specifications of the American National Standards Institute. The results of the long-term ambient noise measurement survey are summarized in Table 3.10-11 and results of the short-term WTG reference noise measurements are summarized in Table 3.10-12.

Table 3.10-11 Summary of Existing Ambient Noise Measurements

					A-Weighted Sound Level (dB)							
					Daytime				Nighttime			
Location[1]	Date	Start Time	Duration	L_{dn}	L_{eq}	L_{max}	L_{50}	L_{90}	L_{eq}	L_{max}	L_{50}	L_{90}
LT-1	13-Mar-2019	17:10	24 Hours	61.3	62.4	77.8	45.3	43.0	48.4	60.4	45.1	44.0
LT-2	18-Mar-2019	17:40	24 Hours	62.2	57.6	73.9	51.1	46.2	55.4	64.1	50.5	47.8
LT-3	18-Mar-2019	18:25	24 Hours	49.8	49.0	62.6	38.7	35.1	40.8	49.5	39.2	37.8
ST-1[2]	14-Mar-2019	13:40	0:05	–	53.6	73.8	53.6	53.0	–	–	–	–
ST-2[3]	14-Mar-2019	13:47	0:05	–	54.3	82.9	54.2	53.6	–	–	–	–
ST-3[2]	14-Mar-2019	13:54	0:05	–	50.4	81.4	50.0	49.1	–	–	–	–
ST-4[3]	14-Mar-2019	14:00	0:05	–	48.9	85.6	48.7	47.6	–	–	–	–
ST-5[2]	14-Mar-2019	14:08	0:05	–	52.6	78.2	52.6	52.0	–	–	–	–
ST-6[3]	14-Mar-2019	14:14	0:06	–	51.9	84.4	51.3	50.3	–	–	–	–
ST-7[2]	14-Mar-2019	14:22	0:10	–	52.3	83.9	52.5	49.4	–	–	–	–
ST-8[3]	14-Mar-2019	14:33	0:12	–	50.6	82.9	50.7	48.5	–	–	–	–
ST-9[4]	14-Mar-2019	14:48	0:10	–	50.1	85.8	49.8	48.7	–	–	–	–

Notes: dB = decibels; L_{dn} = day-night noise level

[1] See Exhibit 3.10-1 for locations of long-term ambient noise level measurements; see Exhibit 3.10-2 for locations of short-term ambient WTG noise level measurements; LT = long-term measurement; ST = short-term measurement.

[2] Measurement located 50 feet from base of tower either downwind and upwind wing side of turbine.

[3] Measurement located 100 feet from base of tower either downwind and upwind wing side of turbine.

[4] Measurement located between two existing turbines in operation at 345 feet from each turbine.

Source: Data collected by AECOM in 2019

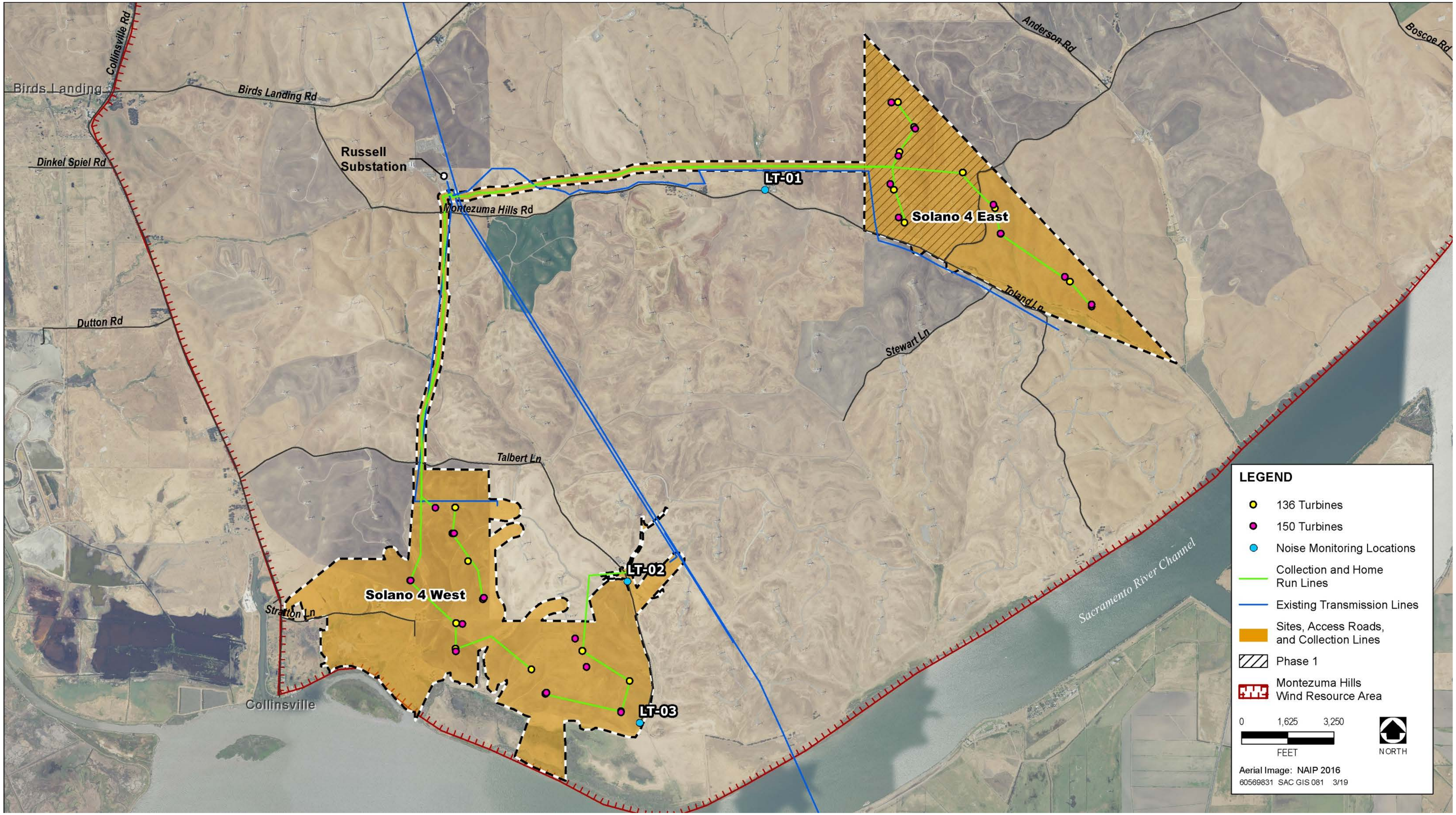

Exhibit 3.10-1 Locations of Long-Term Noise Measurements

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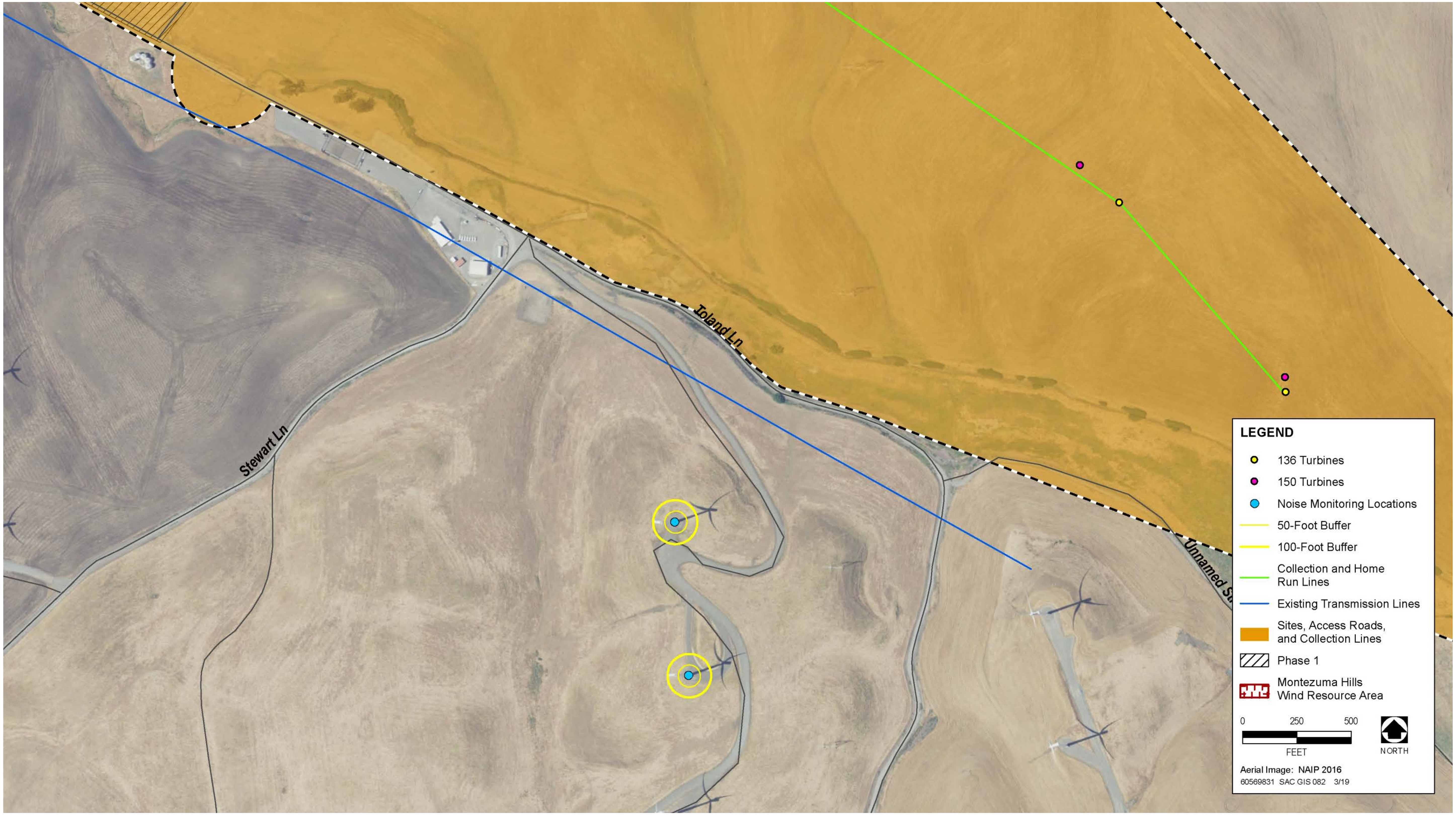

Exhibit 3.10-2 Locations of Short-Term Wind Turbine Generator Reference Noise Measurements

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The predominant noise source in the area of LT-1 is vehicle traffic on Montezuma Hills Road. The predominant noise sources in the area of LT-2 are wind-generated noise and other natural sources (e.g., wind, birds, animals) and farm and ranch activities at the nearby house. At LT-3, the predominant noise sources are existing wind-generated noise and other natural sources (e.g., wind, birds, animals). As shown in Table 3.10-11, the ambient operational noise levels for single WTG operation at 50 feet and 100 feet ranged between 50 dBA and 54 dBA and the ambient operational noise levels for two WTGs measured 50 dBA at 345 feet, the midpoint between the two turbines.

3.10.4. Environmental Impacts and Mitigation Measures

Methods and Assumptions

To assess potential short-term (construction- and decommissioning-related) noise and vibration impacts, sensitive receptors and their relative exposure were identified. Project-generated construction source noise and vibration levels were determined based on methodologies, reference emission levels, and usage factors from FTA's *Transit Noise and Vibration Impact Assessment* methodology (FTA 2018) and FHWA's *Roadway Construction Noise Model User's Guide* (FHWA 2006). Reference levels are noise and vibration emissions for specific equipment or activity types that are well documented and the usage thereof is common practice in the field of acoustics.

To evaluate relative significance, noise and vibration impacts were determined based on comparisons to applicable regulations and guidance provided by federal and state agencies.

Based on current decommissioning practices, as a reasonable worst case, it is assumed that construction source noise and vibration levels during future decommissioning of the project would be similar to those generated during project construction. Thus, the impact analysis and mitigation that follows apply to project construction as well as decommissioning of the project.

Thresholds of Significance

Based on Appendix G of the State CEQA Guidelines, the project would result in a potentially significant impact on noise if it would cause:

- generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies,
- generation of excessive groundborne vibration or groundborne noise levels, exceeding either of the following:
    - Caltrans's recommended level of 0.08 in/sec PPV with respect to the prevention of structural damage for historical buildings; or

- o FTA's maximum acceptable level of 80 VdB with respect to human response for residential uses (i.e., annoyance) at nearby existing vibration-sensitive land uses; or

- for a project within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public-use airport, exposure of people residing or working in the project area to excessive noise levels.

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. Therefore, the following issues will not be discussed further in the impact analysis.

As explained in Chapter 2, "Project Description," project operation is expected to generate approximately six vehicular trips per day (one round trip per day) attributed to on-site employee and infrequent monitoring and maintenance trips. This would not result in a substantial increase in noise during operation of the project, because the increase in traffic would be a small fraction of existing and future traffic volumes.

Pickup trucks and flatbeds, forklifts, and loaders may be used for maintenance and repair throughout the lifetime of the project as they are for existing needs. The project is not expected to result in any discernable noise because the daily operation of the project and the associated stationary equipment is not likely to generate a substantial amount of noise. Project maintenance and repair would be similar to existing conditions. Therefore, project operations would not increase the ambient noise level. This issue will not be discussed further.

The closest airport to the project site is Rio Vista Municipal Airport, which is located approximately 5 miles to the northeast. Therefore, the project would not expose residents or workers to excessive noise levels from airport noise. This issue will not be discussed further.

Impact Analysis

Impact 3.10-1: Generation of a Substantial Temporary Increase in Ambient Noise Levels in the Vicinity of the Project in Excess of Standards Established in the Local General Plan or Noise Ordinance, or Applicable Standards of Other Agencies due to Short-term construction noise impacts.

Proposed construction areas are located mostly far from existing noise-sensitive receptors, the only closest receptor (LT-2) being approximately 275 feet from where construction activities (underground cabling) would occur. Most noise-generating construction activity would be performed during daytime hours, when people are less sensitive to noise. This impact would be **less than significant**.

Construction Activity

Construction of project components would result in temporary, short-term construction activities and haul truck trips to haul wind turbine parts and needed construction materials, equipment, and waste materials to and from the project area. Short-term construction noise levels near the project site would fluctuate depending on the type, number, and duration of usage for the varying equipment. The effects of construction noise largely depend on the type of construction activities being performed, noise levels generated by those activities, distances to noise-sensitive receptors, the relative locations of noise attenuating features such as vegetation and existing structures, and existing ambient noise levels.

As discussed in Section 2.5.10, "Construction Methods and Schedule," construction of the project is estimated to begin in spring 2020, with completion targeted for winter of 2022. Construction activities at the project site would include initial site preparation work, grading and improving on-site and public access roads, turbine foundation, erection, trenching, and underground cable installation. Construction equipment may include, but would not be limited to scrapers, dozers, dump trucks, watering trucks, graders, compactors, loaders, excavators, forklifts, and cranes. Noise levels for individual equipment range from 55 to 89 dBA at 50 feet, as indicated in Table 3.10-12.

Table 3.10-12 Noise Emission Levels from Construction Equipment

Equipment Type	Typical Noise Level (L_{max}) @ 50 feet
Dump Truck	76
Concrete Mixer	85
Concrete Saw	82
Crane	85
Dozer	85
Grader	85
Excavator	85
Front End Loader	80
Lift	75
Paver	89
Roller	85
Scraper	89
Pickup Trucks	55

Notes:
L_{max} = maximum noise level
Assumes all equipment is fitted with a properly maintained and operational noise control device, per manufacturer specifications. Noise levels listed are manufacturer-specified noise levels for each piece of heavy construction equipment.
Source: FTA 2018

The most noise intensive phase of construction would likely be during road construction and installation of underground cable because of the proximity of these activities to two receptors (LT-1 and LT-2). Daytime construction-noise evaluation assumed that four of the highest noise-generating pieces of equipment could operate simultaneously in close proximity to each other and nearest location to receptors of the project construction activity. Based on the reference noise levels listed in Table 3.10-12 and accounting for typical usage factors of individual pieces of equipment, on-site construction-related activities could generate a combined hourly average noise level of approximately 86 dBA L_{eq} and a maximum noise level as high as 91 L_{max} at 50 feet from project areas.

Noise-sensitive receptors that could be adversely affected by construction noise are shown in Table 3.10-13. See Exhibit 3.10-1 for locations of all nearby sensitive land uses. The distance to and daytime noise exposure levels at each receptor location were estimated for the closest possible construction activities and are summarized in Table 3.10-13.

Table 3.10-13 Levels of Noise Exposure at Noise-Sensitive Receptors during Typical Daytime Construction Activity

Sensitive Receptor[1]	Daytime Construction Noise Exposure Level at Sensitive Receptor L_{eq} (dBA)[2]				
	Highest L_{eq} (Exterior/Interior [dBA])[3]	Road Work	Turbine Foundation	Tower Erection	Underground Cabling
LT-1	30	55	35	35	32
LT-2	41	66	38	38	63
LT-3	22	47	47	47	44
Hastings Abode	26	51	50	50	47

Notes:
dBA = A-weighted decibels; L_{eq} = equivalent or energy-averaged sound level; LT = long-term noise measurement
1 See Exhibit 3.10-1 for locations of sensitive land uses relative to the project site.
2 Assumes all equipment is fitted with a properly maintained and operational noise control device, per manufacturer specifications. Noise levels listed are manufacture-specified noise levels for each piece of heavy construction equipment.
3 Assumes windows closed with an exterior to interior noise reduction of 25 dBA.
Source: Data modeled by AECOM in 2019.

As shown in Table 3.10-13, daytime construction-generated exterior noise levels could exceed 66 dBA and 63 dBA L_{eq} at the nearest sensitive receptor (LT-2) during road construction and underground cabling, respectively. All other receptors would not be exposed to project construction noise levels greater than 55 dBA L_{eq}. Table 3.10-13 also shows that interior noise levels due to project construction would not exceed 45 dBA at noise sensitive receptors.

There would be some nighttime construction related noise generated by the project. These nighttime activities do not involve intensive sustained noise levels due to project construction equipment. Nighttime activities would include the relocation of project cranes to WTG sites and transport of oversized project components. These would be very short-term events and noise sources would include, but not be limited to, engine noise, track interaction with road surfaces, and support vehicle noise. This project activity would not result in an impact due to the large distances from receptors to relative access roads that would be used for crane mobilization.

Construction Traffic

Over the entire construction period, approximately 8,025 heavy truck trips would be needed for delivery of the turbine parts and related material to the project site. Dump trucks, concrete trucks, water trucks, cranes, and other construction and trade vehicles would also travel to the site. Construction worker trips would generate a total of 7,500 trips over the construction period. In total, the project would generate 15,525 trips over the course of construction with a peak construction traffic volume of approximately 250 trips per day. This would result in 25 to 30 trips per hour.

Although the large trucks carrying turbine parts would be required to travel via specific routes (as described above), other construction traffic would travel to the project site via the most efficient paths. In general, construction traffic would travel to the generation area using State Route (SR) 12 and SR 113. Local access to the project site would be via Shiloh Road, Collinsville Road, Birds Landing Road, and Montezuma Hills Road.

Generally, a doubling of a noise source (such as twice as much traffic) is required to result in an increase of 3 dB, which is perceived as barely noticeable by people (Caltrans 2013a). Existing traffic volumes along the routes used by project-related construction traffic are more than 25–30 trips per hour (peak project-related trips). Therefore, project-related construction traffic would not double the existing traffic along the affected roadways and would not result in significant traffic noise increase. This impact would be less than significant.

Turbine Activity

Operation of wind turbines generates aerodynamic and mechanical noise. Aerodynamic noise is generated by the moving blades passing through the air, which may produce a buzzing, whooshing, pulsing, or sizzling sound, depending on the type of wind turbine and operating speed. Most of the noise generated during operation radiates perpendicular to the rotation of the blades; however, because the turbines rotate to face the wind, the noise may be radiated in various directions. Two or more operating turbines may combine to create an oscillating or thumping effect. Mechanical noise may be generated by the turbine's gears, which can produce noticeable and irritating noise, depending on the degree of turbine insulation (Alberts 2006).

The effects of wind turbine noise on nearby receptors can be related to wind speed; high wind speeds generate noise that can mask turbine noise. Public perception of the acoustic impact of wind turbines is, in part, a subjective determination. Typically, the effects of noise from turbines on nearby receptors include subjective effects, including annoyance, nuisance, and dissatisfaction, along with interference with speech, sleep, and learning. (UMass 2006)

The proposed project would replace existing turbines with new and technologically improved WTGs and introduce up to 22 new WTGs between the Solano East and Solano West project subareas. Wind turbine noise levels are based on the reference noise level measurements conducted in the field, as shown in Table 3.10-11. Measured noise levels from existing wind turbine operation ranged from 49 dBA to 54 dBA, depending on the orientation of the noise meter and the noise producing rotor hub. Conservatively assuming the highest measured WTG noise level in the field (54 dBA L_{eq}) and an attenuation rate of -3 dBA per doubling of distance, Table 3.10-14 shows the resulting combined noise level at each receptor accounting for the various distances to the nearest cluster of wind turbines.

Table 3.10-14 Combined Wind Turbine Noise at Sensitive Receptors

LT-1		LT-2		LT-3		Adobe House	
Distance	**L_{eq}**	**Distance**	**L_{eq}**	**Distance**	**L_{eq}**	**Distance**	**L_{eq}**
3,900	38.1	1,300	42.9	1,400	42.5	1,000	44.0
4,100	37.9	1,500	42.2	2,000	41.0	3,400	38.7
4,200	37.8	1,700	41.7	4,000	38.0	1,850	41.3
4,700	37.3	2,100	40.8	3,300	38.8	3,300	38.8
Combined Noise Level	**41**	**Combined Noise Level**	**45**	**Combined Noise Level**	**45**	**Combined Noise Level**	**45**

Notes: L_{eq} = equivalent or energy-averaged sound level; LT = long-term measurement
Source: Data compiled by AECOM in 2019

As shown in Table 3.10-14, combined noise levels of new and upgraded WTGs at the relative nearest receptor would result in cumulative noise levels of up to 45 dBA L_{eq}. Interior noise levels at sensitive receptor locations would be less than 30 dBA due to the operation of proposed new and upgraded turbines. The combined noise levels represent the most conservative approach to determining project operational noise impacts at sensitive receptors in the project area. The resulting combined noise levels indicate project operation would not expose people to a substantial increase in noise levels. This impact would be **less than significant**.

Overall Conclusion

Construction of project roads and underground cabling would take place over a relatively short time (4 months and 3 months, respectively), for a total of 7 months; and construction would move in a linear motion from one section of the road or underground cabling to another as installations are completed, further minimizing the timeframe during which substantial noise would be generated near any one sensitive receptor. Moreover, noise generated by construction activity would be limited to daytime hours between 7 a.m. and 6 p.m., Monday through Friday, and between 8 a.m. and 5 p.m. on Saturday. As described in Section 2.5.10, "Construction Methods and Schedule," construction would primarily take place during the day, with only crane mobilization and transportation of heavy components occurring during the nighttime hours. Operation of the project wind turbines would not exposed to receptors to noise levels above 45 dBA at exterior or interior uses. This impact would be **less than significant**.

Mitigation Measures

No mitigation is required.

Impact 3.10-2: Temporary and Short-Term Exposure of Sensitive Receptors to, or Temporary and Short-Term Generation of, Excessive Groundborne Vibration.

Construction activities, including but not limited to the use of large dozers, would not expose existing nearby sensitive residential or historical receptors and structures to levels of ground vibration that could result in structural damage and/or disturbance to people occupying nearby buildings because of the project's distance from the closest sensitive receptor (275 feet). This impact would be **less than significant**.

As shown in Table 3.10-15, below, construction activities generate varying degrees of ground vibration, depending on the specific construction equipment used and activities involved. Ground vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance. Construction-related ground vibration is normally associated with impact equipment such as pile drivers, jackhammers, and the operation of some heavy-duty construction equipment, such as dozers and trucks. Blasting activities also generate relatively high levels of ground vibration and vibration noise. The effects of ground vibration may be imperceptible at the lowest levels, result in low rumbling sounds and detectable vibrations at moderate levels, and high levels of vibration can cause sleep disturbance in places where people normally sleep or annoyance to people in buildings that are primarily used for daytime functions.

Table 3.10-15 Representative Ground Vibration and Noise Levels for Construction Equipment

Equipment	PPV at 25 feet (in/sec)[1]	Approximate L_V (VdB) at 25 feet[2]
Large Bulldozer	0.089	87
Caisson Drilling	0.089	87
Loaded Trucks	0.076	86
Rock Breaker	0.059	83
Jackhammer	0.035	79
Small Bulldozer	0.003	58

Notes: in/sec = inches per second; L_V = the root mean square velocity expressed in vibration decibels (VdB), assuming a crest factor of 4; PPV = peak particle velocity.
[1] Typical PPV and VdB shown.
Source: FTA 2018

As shown in Table 3.10-15, the operation of large bulldozers are the typical construction activities that generate the greatest ground vibration. As described in Section 2.5.10, "Construction Methods and Schedule," construction activity associated with decommissioning of outdated WTGs and new construction of access roads, underground cable lines, and WTGs would be conducted at both of the project subarea sites as part of installation of the WTGs.

According to FTA, large bulldozers typically generate vibration levels of 0.089 in/sec PPV and 87 VdB at 25 feet (FTA 2018). Construction activities would be located approximately 275 feet from the nearest existing sensitive residential receptor (LT-1) and 1,100 feet from the nearest existing sensitive historical structure (Hastings Abode). Based on FTA's recommended procedure for applying a propagation adjustment to these reference levels, vibration levels from project construction was modeled at the nearest existing sensitive receptors. It was assumed that construction activity could take place nearest to vibration-sensitive receptors. Table 3.10-16 summarizes the levels of ground vibration that could occur at the surrounding sensitive receptors because of pile driving on the project site.

Table 3.10-16 Summary of Modeled Vibration Levels at Sensitive Receptors

Sensitive Receptor	Distance (feet) to Sensitive Receptor	PPV (in/sec) at Sensitive Receptor[1,2]	Approximate L_V (VdB) at Sensitive Receptor[3]
LT-1	775	0.001	42
LT-2	275	0.002	56
LT-3	1,400	0.0002	35
Hastings Abode	1,100	0.0003	38

Notes:
in/sec = inches per second; LT = long-term measurement; PPV = peak particle velocity; VdB = vibration decibels
See Appendix H for detailed noise modeling input data and output results.
[1] Caltrans's recommended level of 0.2 in/sec PPV with respect to the structural damage used as the threshold for residential receptors.
[2] Caltrans's recommended level of 0.1 in/sec PPV with respect to the structural damage used as the threshold for nonresidential receptors.
[3] FTA's maximum acceptable level of 80 VdB with respect to human response used as the threshold.
Source: Data modeled by AECOM in 2017

As shown in Table 3.10-16, for all nearby residential and historical (Hastings Abode) sensitive receptors, modeled vibration levels would not exceed Caltrans's recommended standard of 0.08 in/sec PPV nor 0.2 in/sec PPV with respect to the prevention of structural damage for historical structures and residential dwellings or exceed FTA's maximum acceptable level of 80 VdB with respect to human response.

Thus, the use of vibration inducing construction equipment during project construction activities at the project site would not result in the exposure of existing nearby sensitive receptors to excessive ground vibration and vibration noise levels. This impact would be **less than significant**.

Mitigation Measures

No mitigation is required.

3.11. Transportation and Traffic

This section describes applicable federal, state, and local regulations and policies related to transportation and circulation, and discusses the existing roadway network and transportation facilities in Solano County and adjacent areas that could be affected by implementation of the project. This section also describes existing conditions along transportation routes that would be affected by transport of equipment, tools, materials, and personnel to decommission existing facilities, and to construct, operate, and decommission the project. Finally, this section presents an evaluation of the potential impacts of project construction and operation.

3.11.1. Regulatory Setting

The California Department of Transportation (Caltrans) and Solano County (County) have regulatory authority over the transportation network in the project area. Caltrans has jurisdiction over the state highway system and the County establishes regulations for unincorporated areas of the county. An overview of the transportation and circulation standards applicable to the project is provided below.

Federal

The following federal plans, policies, regulations, and laws may be applicable to the proposed project.

- Sections 171–173 and 177 of Title 49 of the Code of Federal Regulations include general information, regulations, and definitions pertaining to the transportation of hazardous materials, types of materials defined as hazardous, shipping requirements, marking of transportation vehicles, training requirements, and carriage by public highway.
- Sections 350–399 and Appendices A–G in Title 49 of the Code of Federal Regulations address safety issues for transport of goods, materials, and substances over public highways.
- The Hazardous Materials Act of 1974, which is enforced by the U.S. Department of Transportation, governs the transportation of hazardous materials in the nation. The act's main objective is to improve regulations and enforcement for transportation of hazardous materials in commerce.

State

Caltrans is responsible for planning, designing, constructing, operating, and maintaining all state-owned roadways in Solano County and throughout the state. Federal highway standards are implemented in California by Caltrans. Any improvements or modifications to the state highway system in Solano County need to be approved by Caltrans. In areas that could be affected by the project, State Routes (SRs) 221, 29, 12 west and east) and 113, and Interstate 80 (I-80) are under Caltrans's jurisdiction.

The following State of California plans, policies, regulations, and laws may be applicable to the proposed project.

- Sections 660, 670, 1450, 1460 et seq., 1470, and 1480 of the California Streets and Highways Code regulate right-of-way encroachment and granting of permits for encroachments on state and county roads.
- Sections 117 and 660–672 of the California Street and Highways Code and Sections 35780 et seq. of the California Vehicle Code (CVC) require permits for transportation of oversized loads on county roads.
- CVC Sections 13369, 15275, and 15278 address the licensing of drivers and classifications of licenses required for operating particular types of vehicles. These sections also address certificates that permit operation of vehicles transporting hazardous materials.
- CVC Section 353 defines hazardous materials, and Sections 2500–2505 authorize the Commissioner of the California Highway Patrol (CHP) to issue licenses for transportation of hazardous materials, including explosives.
- Under CVC Section 2812.5, CHP staff may prohibit commercial vehicles from using highways under limited-visibility conditions, and CVC Section 21662 includes regulations governing driving in mountainous terrain.
- CVC Division 13 regulates towing and loading equipment and vehicles.
- CVC Division 14.8 includes safety regulations for operation of commercial vehicles and certain large vehicles.
- CVC Division 15 (Size, Weight, and Load), Chapter 5, Article 6 defines oversized loads. Caltrans approval is required for transportation of oversized or excessive loads over state highways; this includes limitations for various types, depending on axles and wheelbase length.
- The *California Manual on Uniform Traffic Control Devices*, including Chapter 6, "Temporary Traffic Control," specifies standards for construction work in the public rights-of-way (Caltrans 2014).
- Caltrans is responsible for the planning, design, construction, operation, and maintenance of all state-owned roadways. SRs 221, 29, 12, and 113, and I-80 could be affected by the project, and are within Caltrans's jurisdiction.

Senate Bill 743

Senate Bill 743 (Chapter 386, Statutes of 2013) requires the Governor's Office of Planning and Research to develop new CEQA guidelines addressing the traffic metrics to be used in CEQA analyses. As stated in the legislation, upon adoption of the new guidelines, "automobile delay, as described solely by level of service or similar measures of vehicular capacity or traffic congestion shall not be considered a significant impact on the environment pursuant to this division, except in locations specifically identified in the guidelines, if any." On December 28, 2018, the California Natural Resources Agency adopted revisions to the State CEQA Guidelines to implement Senate Bill 743. In compliance with the revised guidelines, this EIR does not assess changes in vehicle delay, including levels of service, on roadways that could be affected by project implementation.

Regional

Solano County Comprehensive Transportation Plan, Arterials, Highways and Freeways Element

The Solano Transportation Authority is responsible for preparing and updating the *Solano County Comprehensive Transportation Plan* Arterials, Highways and Freeways Element. The Arterials, Highways and Freeways Element identifies priorities for Solano County that will be recommended for inclusion in the regional transportation plan/sustainable communities strategy prepared by the Metropolitan Transportation Commission (STA 2018).

The roadways included in the *Solano County Comprehensive Transportation Plan* Arterials, Highways and Freeways Element are identified as:

- roadways providing access to and from transit facilities of regional significance,
- roadways providing access to and from major employment centers,
- roads providing intercity and freeway/highway connections, and
- other roads critical to providing countywide emergency response.

As defined by the Solano Transportation Authority, the following facilities that serve the Solano 4 Wind Project area or that could be used in the transport of major project components are included in the *Solano County Comprehensive Transportation Plan* Arterials, Highways and Freeways Element roadway network:

- **Interstate 80:** Six- to 10-lane divided interstate freeway. Solano County's main freeway corridor. Average annual daily traffic is 116,000 (Solano/Contra Costa County line) to 132,000 (Solano/Yolo County line). Trucks average 5.8 percent of average annual daily traffic. Designated freight corridor.

- **SR 12 (west):** Four-lane divided state highway connecting Solano and Napa counties. Newly improved.

- **SR 12 (east):** Two- and four-lane state highway connecting Fairfield, Suisun City, and Rio Vista. Significant truck traffic related to wine, agriculture, and Travis Air Force Base.

- **SR 113:** Two- and four-lane state highway through central Solano County, and two-lane arterial through Dixon.

Solano Transportation Authority Bicycle Master Plan and Pedestrian and Trails Master Plan

In 2011 and 2012, the Solano Transportation Authority prepared and adopted a regional bicycle master plan and pedestrian and trails master plan (STA 2011, 2012). The plans promote the continued development of regional pedestrian and bikeway systems and nonmotorized transportation route planning, in conjunction with planning for streets, roads, highways, and public transit.

Local

Solano County General Plan

The Circulation Element of the *Solano County General Plan* (Solano County 2008) provides goals, policies, and implementation measures to provide greater mobility through a balanced transportation system. The following policies apply to the project:

- **Policy TC.P-4**: Evaluate proposals for new development for their compatibility with and potential effects on transportation systems.

- **Policy TC.P-5**: Fairly attribute to each development the cost of on- and off-site improvements needed for state and county roads and other transportation systems to accommodate that development, including the potential use of development impact fees to generate revenue.

- **Policy TC.P-11**: Maintain and improve the current roadways and highway system to meet recommended design standards set forth by the County, including streets that also carry transit and nonmotorized traffic.

3.11.2. Environmental Setting

Circulation System

The regional circulation system near the project area consists of I-80 and Interstate 680 (I-680), which connect Fairfield to other cities in the San Francisco Bay Area. These are multi-lane freeways. From I-80, SR 12 provides access to the project area. SR 12 continues east of the project area and connects to SR 113, which provides access to

Davis and Woodland to the north and turns into Birds Landing Road to the south. Other state highways in the area include SR 4 and SR 160.

The local circulation system near the project site generally consists of Birds Landing Road, Montezuma Hills Road, and Toland Lane, as well as Shiloh Road, Collinsville Road, and Talbert Lane, all of which could serve as access roads. Exhibit 3.11-1 shows and Table 3.11-1 describes the roadways that serve the project site or that could be used to transport wind turbine generator (WTG) components.

The construction workforce and delivery vehicles would travel to the site via the regional and local circulation system as described. Specifically, I-80 would provide freeway access to the project area from San Francisco and Sacramento, while access from Contra Costa County to the project area would be provided via I-680 to I-80 or via SR 12 and SR 113 from the east and SR 4 and SR 160 from the south. SR 12 would provide primary access to the project area from this highway network.

Existing and Proposed Transit Services, and Bicycle and Pedestrian Facilities

No developed pedestrian facilities are existing or planned in the project area (STA 2012; Solano County 2008).

There are no existing bicycle facilities in or adjacent to the project area. The *Solano Countywide Bicycle Transportation Plan* (STA 2011) proposes a 20-mile Class II bicycle lane or Class III bicycle route on SR 12 from Rio Vista to Walters Road. Class III facilities are planned for SR 113 from Dixon to the SR 12 intersection near the project site. Class III facilities are planned for Montezuma Hills Road, Birds Landing Road, Collinsville Road, and Shiloh Road within the Montezuma Hills in the project vicinity.

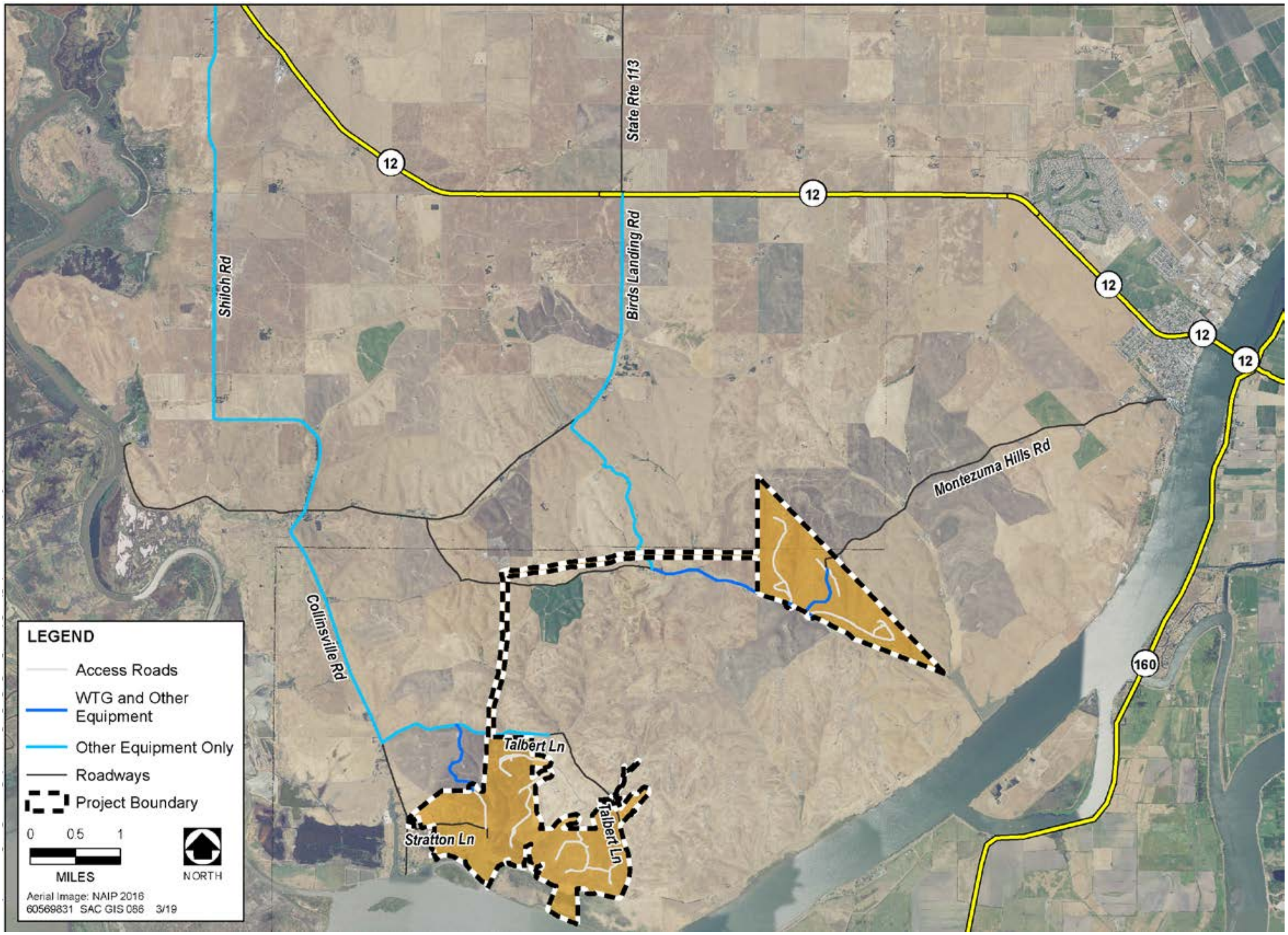
Bikeways are classified into one of three different classes of bicycle travel routes, identified as Class I, Class II, and Class III, based on the following descriptions:

- **Off-Street Bike Paths (Class I Bikeways)**: These facilities are off-street bike paths in a right-of-way designated for exclusive use by cyclists and pedestrians.

- **On-Street Bike Lanes (Class II Bikeways)**: These facilities are street lanes identified with lane markings and signage for preferential use by cyclists.

- **On-Street Bike Routes (Class III Bikeways)**: These facilities are on-street bike routes designated by signs or permanent markings and are shared by motorists. Generally, these routes are through streets that provide connectivity for the bicycle network where Class I or Class II bikeways are not present.

The City of Rio Vista operates a weekday deviated, fixed-route bus service from Rio Vista to Suisun City/Fairfield using SR 12. Deviations within 1 mile of the fixed bus route are available by reservation (City of Rio Vista 2019). No other transit services are available or planned in the project vicinity.



Source: SMUD 2019

Exhibit 3.11-1 Roadways in the Project Vicinity

Table 3.11-1 Public Roadways Potentially Serving the Project Area

Facility Name	Jurisdiction	Functional Classification	Description	Source(s) (see Notes below)
Napa Pipe Railroad Terminal to the Vicinity of the Solano 4 Wind Project				
Kaiser Road	City of Napa	Collector	Collectors serve as connectors between local and arterial streets and provide direct access to parcels. Collector street standards are normally used for access streets in industrial and office parks.	1
SR 221	Caltrans	Rural Minor Arterial	Rural minor arterials link cities and larger towns and form an integrated network providing interstate and intercounty service.	5, 6, 7
	Napa County	*Rural Throughway*	*Rural throughways are roadways with two to six through lanes that are designed primarily for longer distance travel between major centers of activity and built to accommodate this type of travel.*	
SR 29	Caltrans	Other Principal Arterial—Freeway and Expressway	Other principal arterials provide mobility through rural areas. Forms of access for other principal arterial roadways include driveways to specific parcels and at-grade intersections with other roadways.	4, 6, 7
	Napa County	*Rural Throughway*	*Rural throughways are roadways with two to six through lanes that are designed primarily for longer distance travel between major centers of activity and built to accommodate this type of travel.*	
SR 12 (west)	Caltrans	Other Principal Arterial—Freeway and Expressway	Other principal arterials provide mobility through rural areas. Forms of access for other principal arterial roadways include driveways to specific parcels and at-grade intersections with other roadways.	3, 6, 7, 8
		Rural Throughway (Napa County)	*Rural throughways are roadways with two to six through lanes that are designed primarily for longer distance travel between major centers of activity and built to accommodate this type of travel.*	
		Major Arterial (Solano County)	*Major arterial roads, often with multiple lanes, provide the highest level of connectivity with local land uses. These facilities are usually controlled by signal operations with multiple phases.*	
I-80	Caltrans	Interstate Freeway	Interstates are the highest classification of arterials and were designed and constructed with mobility and long-distance travel in mind.	2, 6, 8
		Freeway (Solano County)	*Freeways provide interregional connectivity and are designed for limited-access operation without any signalized controls. All roadway access is limited to ramps.*	
SR 12 (east)	Caltrans	Other Principal Arterial—Freeway and Expressway	Other principal arterials provide mobility through rural areas. Forms of access for other principal arterial roadways include driveways to specific parcels and at-grade intersections with other roadways.	3, 6, 8

Table 3.11-1 Public Roadways Potentially Serving the Project Area				
Facility Name	**Jurisdiction**	**Functional Classification**	**Description**	**Source(s) (see Notes below)**
		Major Arterial (Solano County)	Major arterial roads, often with multiple lanes, provide the highest level of connectivity with local land uses. These facilities are usually controlled by signal operations with multiple phases.	
Wind Turbine Generator Delivery to the Solano 4 West Project Subarea				
Shiloh Road	Solano County	*Collector*	Collector roads link local and collector roads with arterials, freeways, and other collector roads. They usually have moderate but not congested volume.	8
Collinsville Road	Solano County	*Collector*	See collector road description presented for Shiloh Road, above.	8
Talbert Lane	Solano County	*Local Road*	Local roads are used primarily for access to residences, businesses, or other abutting properties. Ideally, these are paved roads with enough width to allow vehicles to operate in both directions.	8
Stratton Road	Solano County	*Local Road*	See local road description presented for Talbert Lane, above.	8
Wind Turbine Generator Delivery to the Solano 4 East Project Subarea				
Birds Landing Road (SR 12 to Private Road)	Solano County	*Collector*	Collector roads link local and collector roads with arterials, freeways, and other collector roads. They usually have moderate but not congested volume.	8
Montezuma Hills Road (Private Road to Solano 4 East)	Solano County	*Collector*	See collector road description presented for Birds Landing Road, above.	8

Notes: Caltrans = California Department of Transportation; Solano 4 Wind Project = Solano Wind Energy Project, Phase 4; SR = State Route

Sources:

1. City of Napa 2012: Table 3-2
2. Caltrans 2017a
3. Caltrans 2017b
4. Caltrans 1985a
5. Caltrans 1985b
6. FHWA 2019
7. Napa County 2008:Policy CR-11
8. Solano County 2008:Roadway Classifications

3.11.3. Environmental Impacts and Mitigation Measures

Proposed Project

Transporting WTG components, other construction elements, and construction personnel, would require several modes of transportation and multiple routes, including rail and roadways. No construction transportation plan has been prepared; however, based on past SMUD practice, wind turbine towers, blades, nacelles, and rotors likely would be transported via rail to the former site of Napa Pipe in unincorporated Napa County. Rail transport would be via the Union Pacific Railroad to Suisun City, and then via the California Northern Railroad to the Napa Pipe yard. (See Exhibit 3.11-2.) At this location, WTG tower components and blades would be offloaded for marshalling and transport by truck to the project site.

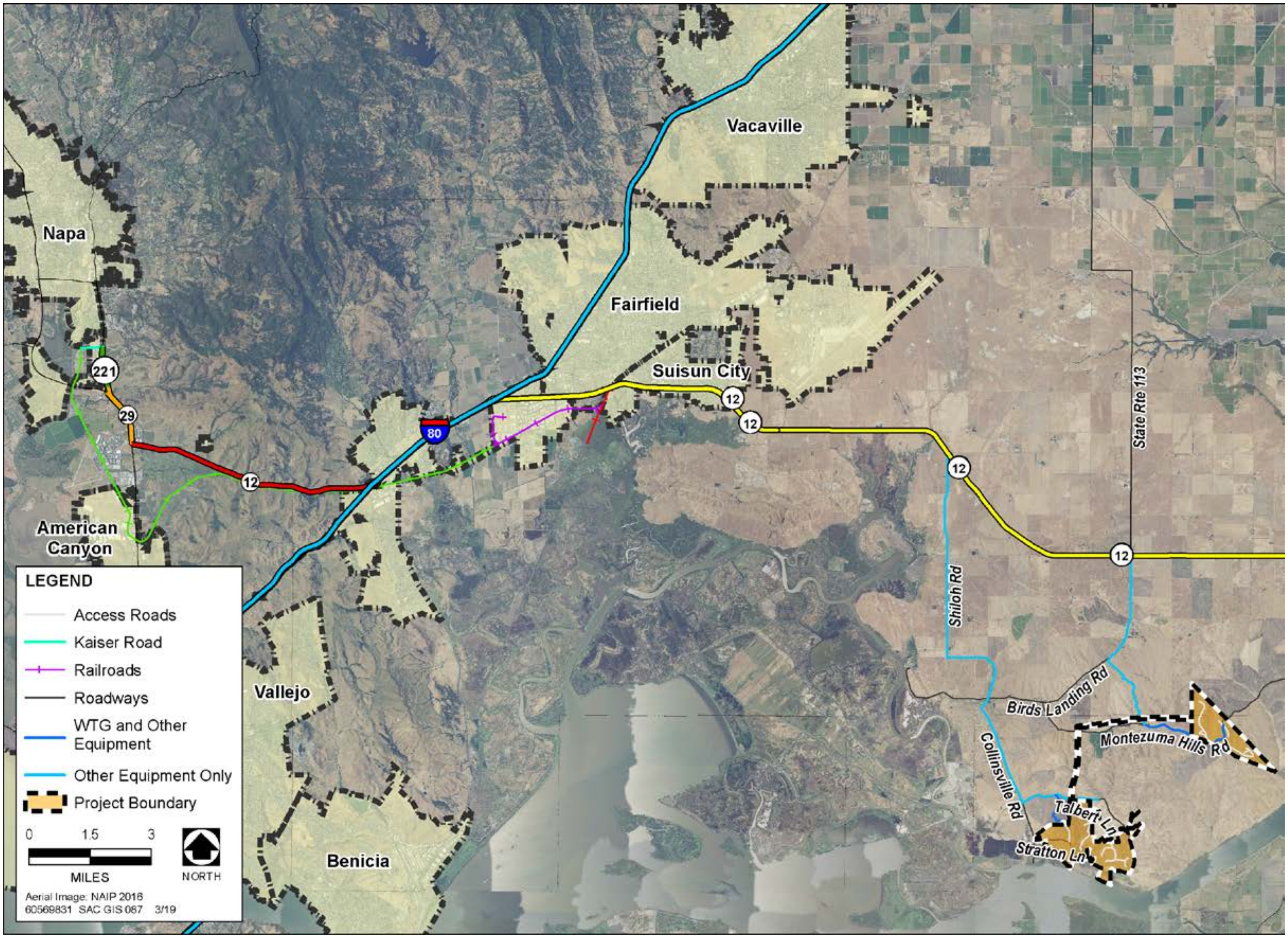
From the Napa Pipe staging area, larger components would be transported overland to the project site on heavy trucks, which would use a series of city streets, state routes, and rural roadways (Table 3.11-2). Truck trailers may be larger than average to carry oversized loads. If required, pilot vehicles would accompany the trucks. Equipment would be hauled directly to the worksite and assembled or installed. Transport of heavy components may require temporary relocation of obstacles such as fences and overhead power lines, and/or placement of temporary mats and fill material to support the loaded vehicle weights.

Source: Photograph taken by Vestas Americas in 2017

Exhibit 3.11-3 Clearance for Blade Tip Swing-out

For each turbine, up to 18 separate loads of equipment and materials would be delivered to the pad. Nine to 12 of these loads would be oversized permitted loads (Exhibit 3.11-3). Towers generally would be delivered and constructed in three, four, or five sections, depending on the turbine selected. Each turbine blade, nacelle, and rotor and set of down-tower components (e.g., controllers, ladders and platforms, and turbine switchgear) would be delivered separately.

All transportation activities would be timed to minimize traffic disruptions consistent with applicable permits administered by the City of Napa, Caltrans, and Solano County. Delivery of project components would be coordinated through the encroachment permit processes implemented by the City, Caltrans, and County. These processes would be used to determine the final trailer configuration, clearance requirements, emergency service access, lane closures (if required), CHP escort (as required), and transportation times.



Source: SMUD 2019

Exhibit 3.11-2 Proposed Transportation Routes

Table 3.11-2 Public Roadways that May Be Used to Transport Project Components

Facility Name	Jurisdiction	Segment Description	Length (miles)	Truck Route or Roadway Designation
Napa Pipe Railroad Terminal to the Vicinity of the Solano 4 Wind Project				
Kaiser Road	City of Napa	Nominal two lanes/38- to 80-foot paved section	0.5	Collector
SR 221	Caltrans	Two-lane highway/two 12-foot through lanes/42-foot paved section in each direction	1.1	Terminal Access (STAA)
SR 29	Caltrans	Four-lane highway/two 12-foot through lanes/42-foot paved section in each direction	1.5	Terminal Access (STAA)
SR 12 (west)	Caltrans	Four-lane highway/two 12-foot through lanes/42-foot paved section in each direction, transitioning to a single lane (eastbound) near Red Top Road/median concrete barricade	6.3	Terminal Access (STAA)
I-80	Caltrans	Multi-lane controlled-access freeway/six 12-foot through lanes/80-foot paved section eastbound/median concrete barricade	2.5	National Network Route (STAA)
SR 12 (east) I-80 to Walters Road	Caltrans	Four-lane highway/two 12-foot through lanes/38-foot paved section in each direction	6.7	Terminal Access (STAA)
SR 12 (east) Walters Road to Shiloh Road	Caltrans	Two-lane highway/one 10-foot through lane each direction/38-foot paved section/median concrete barricade	6.0	Terminal Access (STAA)
SR 12 (east) Shiloh Road to Birds Landing Road	Caltrans	Two-lane highway/one 10-foot through lane each direction/38-foot paved section	5.6	Terminal Access (STAA)
Wind Turbine Generator Delivery to the Solano 4 West Project Subarea				
Shiloh Road	Solano County	Two-lane roadway/two 10-foot lanes/ 20-foot paved width	6.3	Collector
Collinsville Road	Solano County	Two-lane roadway/two ~10-foot lanes/ 18- to 20-foot paved width	4.5	Collector
Talbert Lane	Solano County	Paved roadway transitioning to gravel/ 15–17 feet in width	1.9	Local Road
Stratton Road	Solano County	Gravel roadway/17 feet in width	1.0	Local Road
Wind Turbine Generator Delivery to the Solano 4 East Project Subarea				
Birds Landing Road (SR 12 to Private Road)	Solano County	Two-lane roadway/two 12-foot lanes/ 24-foot paved width	2.6	Collector
Montezuma Hills Road (Private Road to Solano 4 East)	Solano County	Two-lane roadway/two 10-foot lanes/ 20-foot paved width	2.5	Collector

Notes: I-80 = Interstate 80; Solano 4 Wind Project = Solano Wind Energy Project, Phase 4; SR = State Route; STAA = Surface Transportation Assistance Act of 1982

Sources: Napa County 2008:Figure CIR-1; Solano County 2008:Figure TC-1; Caltrans 2018a, 2018b

Internal Project Site Access Roads

Access to project components would rely on existing roads when feasible. The first step in construction of new access roads or improvement of existing roads would be vegetation clearing as required, rough grading, and leveling. Base rock would be trucked in, spread, and compacted to create a road base 16 to 30 feet wide. Capping rock would then be spread over the road base and roll-compacted to finished grade. The grading equipment would make a final pass on permanent maintenance roads to level the road surfaces, and more capping rock would be spread and compacted where needed.

Some segments of currently paved roads (e.g., Talbert Lane or Stratton Road) may require realignment or widening. Realigned or widened segments would be improved with gravel during construction. Paved portions would be repaved upon completion of construction activities. Within the site boundaries, new and rehabilitated roads would be reduced in width from 30 feet to 16 feet at the end of the construction period.

Construction Traffic

Over the entire construction period, approximately 8,025 heavy truck trips would be needed for delivery of the turbine parts and related material to the project site. Of these, 360 trips would involve oversize loads. These trucks could weigh up to 110 tons and could be up to 280 feet long. Because of the large size and low maneuverability of the vehicles, brief temporary road closures may be required while larger parts are being transported.

Dump trucks, concrete trucks, water trucks, cranes, and other construction and trade vehicles would also travel to the site. Construction worker trips would generate a total of 7,500 trips over the construction period. In total, the project would generate 15,525 trips over the course of construction, with a peak construction traffic volume of approximately 250 trips per day. After construction has been completed, operation and maintenance activities for the project would require approximately six round trips per day, using pickups or other light-duty trucks.

Although the large trucks carrying turbine parts would be required to travel via specific routes (as described above), other construction traffic would travel to the project site via the most efficient paths. In general, construction traffic would travel to the generation area using SRs 12 and 113. Local access to the project site would be via Shiloh Road, Collinsville Road, Birds Landing Road, and Montezuma Hills Road.

Methods and Assumptions

Decommissioning of Existing Facilities and New Construction Traffic

Trip generation during project construction was estimated based on the average number of construction workers and material delivery and haul trips that would access the project site during construction. Except for oversize loads that would use the projected route described in Table 3.11-2 and Exhibit 3.11-2, it was assumed that the construction workforce and delivery vehicles would travel to the site via the regional and local circulation system as described above. Specifically, I-80 would provide freeway access to the project area from San Francisco and Sacramento, while access from Contra Costa County to the project area would be provided via I-680 to I-80 or via SR 12 and SR 113 from the east and SR 4 and SR 160 from the south. SR 12 would provide primary access to the project area from this highway network.

The construction workforce is expected to arrive at the project site between about 6 a.m. and 7 a.m. and to leave the site between about 4 p.m. and 5 p.m., Monday through Friday. Some nighttime and weekend work may also be required to maintain the project construction schedule, complete critical activities, and accommodate deliveries. Deliveries would generally occur outside of the peak morning and afternoon traffic hours, with materials delivered to the designated receiving area and then distributed within the site as needed.

Project Decommissioning

Based on current decommissioning practices, as a reasonable worst-case scenario, it is assumed that trip generation, distribution, and assignment during future decommissioning activities would be similar to those during project construction. However, the project would be decommissioned at the end of the project's useful life (anticipated to be 30–35 years or more).

Thresholds of Significance

Based on Appendix G of the State CEQA Guidelines, the project would result in a potentially significant effect related to transportation and traffic if it would:

- conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities;
- conflict with or be inconsistent with State CEQA Guidelines Section 15064.3(b) regarding vehicle miles traveled;
- substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment); or
- result in inadequate emergency access.

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. Therefore, the following issues will not be discussed further in the impact analysis.

Consistency with policies affecting the circulation system

No pedestrian or bicycle routes currently exist in or adjacent to the project area, and no pedestrian facilities are planned for the area. No transit facilities exist or are planned for the project area. Future Class III bikeways are planned by the Solano Transportation Authority and the County for Shiloh Road, portions of Collinsville Road, Birds Landing Road, and Montezuma Road in the project vicinity. No aspect of the proposed project would interfere with the establishment of future bikeways along these roadways. Thus, during operation, the proposed project would not conflict with an applicable plan, ordinance, or policy addressing the circulation system.

Short-term (i.e., construction-related) increases to traffic volumes along SR 12 and local roadways during construction would not affect existing or planned transit, bicycle, or pedestrian facilities by altering or placing incompatible uses within the public right-of-way.

During both construction and operation, the project would be consistent with policies affecting the circulation system. Therefore, this issue will not be discussed further.

Vehicle Miles Traveled

The project is expected to generate only a limited number of operational trips per day (three two-way trips on average). Because of this small number of trips during project operations, the project would not result in a significant increase in vehicle miles traveled. Therefore, this issue will not be discussed further.

Traffic Hazards/Emergency Access

Except for minor improvements to Talbert Lane and Stratton Road, and their intersections with collector roadways to allow passage of construction traffic, no public roadways would be modified, nor would any new safety hazards would be created. Existing emergency access would be maintained during project operation. During operation, the project would not result in the redesign or alteration of any public roadways, nor would emergency access be hindered. Therefore, this issue will not be discussed further.

Impact Analysis

Impact 3.11-1: Short-term construction transport-related traffic hazards and incompatible uses.

Construction-related transport of WTG components could result in hazardous conditions on state routes and local roadways because of the transport vehicle’s weight, length, width, height, and speed. This impact would be **potentially significant**.

Transporter Impacts on Public Roadway Hazards

A wind turbine consists of several components: the tower base, mid-section, and top section; three turbine blades; and the turbine nacelle. The size of these components would require the use of special transport vehicles that would exceed allowable limits when loaded and traveling on California roadways. Specifically, a transporter under load would exceed the maximum allowable width, height, length, and/or weight for California highways, as defined in CVC Division 15, Size, Weight, and Load. Division 15 includes provisions for obtaining a discretionary permit to transport such loads (also known as a transportation permit) from Caltrans and/or local agencies, for the use of roadways under their respective jurisdictions. The application for such a transportation permit must describe the vehicle, the load, the route to be traversed, whether the permit is for a single trip or continuous operation, the transport date(s), and various other details.

Weight Limits

Vehicle weight limits are specified in the California Vehicle Code, and a summary of these complex regulations is outside the scope of this analysis. A transportation permit must be obtained for any vehicle that weighs more than regulatory limits. The permit must specify the number of tires per truck axle, distance between axles, and axle widths. This information is used to determine the maximum allowable weight per axle for the vehicle. The maximum allowable weight per axle is used for comparison to bridge weight restrictions and for determining “equivalent axle loads” used in road structure evaluations.

Caltrans inspects both state and county bridges and overcrossings and identifies the weight-bearing capacity of each. The County Road Design Standards include information on the design of county roads relative to traffic loads, although no specific standards are identified relative to single traffic trips.

The maximum allowable weight per axle for a heavy vehicle is assigned to either an orange, green, or purple load category. These categories correspond to similar bridge and overcrossing ratings. Bridges are designed to carry a certain maximum allowable weight, and bridge ratings may change over time. Heavier loads have fewer route options because some bridges are not designed to accommodate extremely heavy loads. The transporter would be required to obtain a transportation permit from state and local agencies, so that, among other safety concerns, the proposed load would not exceed any bridge or overcrossing weight limits along the intended route.

The maximum axle load weight for a loaded turbine transporter is estimated to be 18,000 pounds. This is greater than the legal standard of 10,000 pounds. If the turbine transporter were to cross any bridges between the Napa Pipe laydown yard and the project area, traffic safety could be affected if the vehicle were to exceed load limits and cause a bridge or overcrossing to fail. This impact would be **potentially significant**.

Width Limits

The maximum allowable width of a vehicle in California is 8.5 feet (with some exceptions noted in the California Vehicle Code), although most vehicles are closer to 6 feet wide. A transportation permit must be obtained from state and local agencies for most vehicles that exceed the maximum width and all vehicles greater than 10 feet wide, so that, among other safety concerns, proposed loads would not obstruct the flow of opposing traffic, travel outside their lane widths, or encroach into areas outside the travel ways.

For extra-wide loads, the vehicle width must be noted on the transportation permit, along with the specified transport route. Using this information, local agents can determine which roads are adequate. It is common to permit extra-wide loads to use the majority of the roadway, even if oncoming travel is obstructed. Such travel can be accomplished safely by requiring a variety of temporary traffic control measures, such as being escorted by pilot cars or the CHP; providing advance notice to the traveling public that the travel route may be subject to delay during the transport passage; or delineating a detour route.

The maximum width of a loaded turbine transporter is estimated to be 13 feet. This is greater than the legal standard of 10 feet. A vehicle that is 13 feet wide will extend beyond the limits of a standard 12-foot travel lane and all narrower travel lanes. Therefore, transporters would occupy both travel lanes in one direction along four-lane roadways, which would affect traffic that is traveling in the same direction but not in the opposing direction. Kaiser Road, portions of SR 12 west and east, and local county roadways are two-lane facilities, and the transporters would affect traffic flows in both travel directions simultaneously. Travelers may attempt to pass the large transporter on the two-lane roadways, risking the possibility of encountering an oncoming vehicle. Traffic safety could be jeopardized. This impact would be **potentially significant.**

Length Limits

California has two types of truck networks based on truck length, the STAA Network and the California Legal Truck Network. A transportation permit must be obtained for vehicles that exceed regulation length limits. The permit must specify semi-tractor and semi-trailer lengths, axle length, and total length, to name several dimensions.

Vehicular length limits have been established mainly because of a vehicle characteristic called off-tracking. Off-tracking is the tendency of rear tires to follow a shorter path than front tires when turning. Off-tracking is a concern primarily with longer vehicles because rear tires may clip street signs, drive onto unpaved shoulders, walkways, or bike lanes, or cross the centerline on a curve, creating a safety hazard for adjacent and oncoming traffic.

To be conservative and consistent with the assumed design vehicle dimensions, the maximum length of a loaded turbine transporter is estimated to be 280 feet. This is greater than the legal standard of 65 feet. To reduce the turning radius of such long vehicles, the transporters would include rear steering dollies, although off-tracking is expected to occur at most intersections and on many curvilinear road segments. Off-tracking could result in a collision with a fixed object (such as a signpost or a curb) or the transporter would travel outside the roadway, or both. This could pose a safety risk to the transporter driver and to any person or property in the vicinity of the off-tracking vehicle. Because of the safety hazards and potential property damage associated with the turbine transporter's turning maneuvers along the potential route, this impact would be **potentially significant**.

Height Limits

Vehicle heights are restricted to a maximum of 14 feet (with exceptions noted in the California Vehicle Code), although the CVC stipulates that a vehicle height of 13.5 feet shall be exceeded (by 6 inches) only where deemed safe by the vehicle owner and the operator. These limits have been established for various reasons; a lower vehicle center of gravity contributes to the stability of a moving vehicle, and overcrossing roads, utilities, and tree branches are suspended above many roadways and may obstruct the safe passage of vehicles. Roads that cross state facilities are posted with a clearance height facing the undercrossing travel lanes, if the undercrossing clearance is less than 16 feet.

The maximum allowable vehicle height is 14 feet, and the tallest turbine load could reach nearly 15 feet. The transporter would have a higher center of gravity, which could create unstable movements. In addition, overcrossing roads, utilities, and tree branches are suspended above many roadways. These resources could be damaged if they hang lower than the top of any of the transporters. This impact would be **potentially significant**.

Transporter Impacts on Traffic Flows

The size of the various turbine components may require the transporters to move at a rate or in such a manner that normal traffic flow is impeded, including traffic traveling in the same and opposing directions as the transporters.

<u>City of Napa roadway segment</u>. The segment of Kaiser Road that could be used by the project ranges in width from 38 feet to 80 feet. Traffic volumes on this roadway are expected to be low. Because of the width of the roadway and the lack of traffic, transporter traffic on this roadway would not adversely affect traffic flow or emergency access. This impact would be **less than significant**.

<u>SR 221/SR 29/SR 12 west/I-80/SR 12 east traffic volumes</u>. The transporters would travel at 40–50 miles per hour (mph) when loaded, and at 55–60 mph when empty. The speed limits on the majority of these state routes are 65 mph for all vehicles except trucks with trailers, which are limited to 55 mph. For four-lane or greater facilities (SR 221/SR 12/the majority of SR 12 west/I-80/a portion of SR 12 east), the transporters would be expected to travel in the rightmost slow lane plus the shoulder, enabling most vehicles to pass in the remaining fast lanes. Because other vehicles would be able to pass the transporters safely, the impact on the freeway traffic flow would be minor. However, should the transporters not be permitted to use the shoulder and occupy both travel lanes, this impact on state route traffic flows would be **potentially significant**.

<u>SR 12 west single lane, eastbound segment/SR 12 east segment from Walters Road to Birds Landing Road.</u> The transporters are expected to travel much slower on SR 12 west in the single-lane segment from west of Red Top Road to I-80. In this section, the width of the single lane is 18 feet, including the shoulder, and westbound traffic is separated from eastbound traffic by a concrete median barrier. Eastbound traffic could be delayed when the transporter travels through this section. SR 12 east is a two-lane facility from

Walters Road to Birds Landing Road in the project area. Travel lanes in this section are 10 feet in width plus a shoulder. The opposing traffic lanes in this section are separated by a concrete median barrier. Because of the likelihood that eastbound traffic could be delayed and emergency access impeded on these state routes, this impact would be **potentially significant**.

Solano County Roads. The transporters are expected to travel much slower on local roads, with an estimated travel speed of 10 mph when loaded. These roads include Shiloh Road, Collinsville Road, Talbert Lane, Stratton Road, Birds Landing Road, and Montezuma Hills Road. With the exceptions of Talbert Lane and Stratton Road, these facilities are two-lane roadways. Lane widths for these roads are generally 10 feet. Talbert Lane and Stratton Road are nominally single-lane roadways with widths from 15 to 17 feet. Although these roadways have generally low levels of traffic, transporters would use both lanes or the entire roadway in some cases, thereby substantially interfering with travel and emergency access. This impact would be **potentially significant**.

Overall Impact Conclusion

The transport of WTG components would result in adverse effects on travel and emergency access, because of the transport vehicles' weight, length, width, height, and speed on state routes and local roadways. This impact would be **potentially significant**.

Mitigation Measure 3.11-1a: Create and implement a traffic control plan and notify the public of anticipated roadway obstructions.

SMUD or its construction contractor will work with Caltrans, Solano County, and the City of Napa to determine the lowest hourly traffic flows on affected facilities and develop a traffic control plan. The traffic control plan shall specify travel times and days and provide for public notification of anticipated roadway obstructions before transporter travel days. Traffic control plan measures shall include the use of pilot cars for oversize loads; traffic safety measures, such as warning signs; coordination with local jurisdictions; and safety personnel to direct traffic as needed. To minimize impacts on roadway traffic flows, transporters shall travel under loaded conditions during off-peak hours and possibly during evenings or at night. The final plan shall be submitted to all affected agencies for review and approval. After agency approvals have been received, the traffic control plan shall be implemented during transport of the WTG components.

Mitigation Measure 3.11-1b: Create and implement an emergency access plan and notify emergency services providers of anticipated roadway obstructions.

SMUD or its construction contractor will work with affected emergency services providers to develop and implement a plan to maintain emergency access during transport of WTG components and throughout the construction period. The plan shall identify alternative emergency access routes; the need to station emergency equipment in areas where access will be reduced; and notification protocols between SMUD, its contractors, and affected providers. The final plan shall be submitted to all affected agencies for review and approval. After agency approvals have been received, the emergency access plan shall be implemented during transport of WTG components and throughout the construction period as necessary.

Mitigation Measure 3.11-1c: Obtain an agency transportation permit for each load exceeding weight, length, width, and height standards.

SMUD or its construction contractor will submit an application to Caltrans, Solano County, and the City of Napa for a transportation permit for each load that exceeds weight, length, width, or height standards. The applications shall identify the specific transporter to be used and provide details about the turbine components' load specifications, the requested route, and the time and date of transport. All permit conditions shall be implemented during transport of WTG components.

Mitigation Measure 3.11-1d: Improve roadways to enable safe use or use shorter transporters, and obtain agency transportation permits for transport of extra-legal length vehicles.

SMUD or its construction contractor will make improvements to public roads to enable delivery of WTG components and provide access for construction equipment. These improvements shall accommodate all turning movements of the maximum-size transporter. A detailed topographic survey shall be conducted to determine the exact limits, and to identify additional areas that may be affected. All roadway improvements shall be designed and implemented in close cooperation with Solano County (and other jurisdictions, if applicable).

An alternative mitigation measure is to use shorter transporters to reduce the impact, although this measure is also expected to require a reduction in the size of the WTG components, which likely will increase the number of trips if the overall turbine dimensions remain the same.

Significance after Mitigation

Mitigation Measures 3.11-1a through 3.11-1d require working with Caltrans, the County, and the City of Napa to determine the lowest hourly traffic flows and develop a traffic control plan specifying transporter travel times and days. The measures require a plan for notifying the public regarding affected roadways before the transporters' travel days, and for modifying local roadways to enable transporter access. The measures would also maintain emergency access during transport of WTG components and throughout the construction period. Therefore, implementing Mitigation Measures 3.11-1a through 3.11-1d would reduce this impact to a **less-than-significant** level.

Impact 3.11-2: Short-term increase in construction traffic on physically deficient roadway segments.

Construction activities would result in a short-term increase in heavy vehicle traffic on state routes and local roads. The project could result in the degradation of pavement conditions along these roadways. This impact would be **potentially significant**.

For purposes of this analysis, an impact on roadway pavement conditions would be significant if project construction traffic would cause a deficiency in pavement conditions. Access to the project site would be provided primarily via SR 12 east and Shiloh Road, Collinsville Road, Talbert Lane, Stratton Road, Birds Landing Road, and Montezuma Hills Road. Other roadways would also be used during construction; however, because of their distance from the site and because they would not provide as direct a route for materials delivery, those roadways would not likely receive sufficient project traffic during construction to cause substantial degradation. However, SR 12 east and the cited local roads would experience the highest degree of daily heavy truck traffic during construction, and the pavement conditions on these roads could degrade to the point they become deficient (e.g., ruts, cracked pavement). Therefore, this impact would be **potentially significant**.

Mitigation Measure 3.11-2: Monitor the physical condition of roadway segments along primary access routes to the project site and restore the physical condition of affected roadways to the extent damaged by the project.

SMUD or its construction contractor will conduct a preconstruction survey and assessment of existing pavement conditions along SR 12 east, Shiloh Road, Collinsville Road, Talbert Lane, Stratton Road, Birds Landing Road, and Montezuma Hills Road. If the preconstruction pavement conditions are deficient, the preconstruction pavement analysis shall establish the baseline for required improvements. If the preconstruction pavement conditions are acceptable, improvements shall be required only if the postconstruction pavement condition is deficient, and only to the extent that the project demonstrably contributed to such deficiencies. If deficient following construction, any segments of SR 12 east and Shiloh Road, Collinsville Road, Talbert Lane, Stratton Road, Birds Landing Road, and Montezuma Hills Road that are affected by the project shall be returned to preconstruction conditions after construction. Implementing this measure will ensure that construction activities will not worsen pavement conditions, relative to existing conditions.

Before construction, SMUD will make a good-faith effort to enter into mitigation agreements with Caltrans (for SR 12 east) and Solano County (for Shiloh Road, Collinsville Road, Talbert Lane, Stratton Road, Birds Landing Road, and Montezuma Hills Road) to verify the location, extent, timing, and fair-share cost to be paid by SMUD for any necessary pre- and postconstruction physical improvements. The fair-share amount will be either the cost to return the affected roadway segment to its preconstruction condition or a contribution to programmed planned improvements. Repairs may include overlays or other surface treatments.

Significance after Mitigation

Mitigation Measure 3.11-2 requires monitoring and improvement of physically deficient roadways affected by project construction. Implementing this mitigation measure would reduce the project's impacts on physically deficient roadway systems to a **less-than-significant** level.

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4 Cumulative Impacts

4.1 CEQA Requirements

Section 15130(a) of the State CEQA Guidelines requires a discussion of the cumulative impacts of a project when the project's incremental effect is cumulatively considerable. Cumulatively considerable, as defined in CEQA Guidelines Section 15065(a)(3), means that the "incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." The State CEQA Guidelines Section 15355 defines a cumulative impact as two or more individual effects that, when considered together, are considerable or that compound or increase other environmental impacts. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.

4.2 Cumulative Impact Approach

CEQA Guidelines Section 15130 identifies two basic methods for establishing the cumulative environment in which a project is considered: the use of a list of past, present, and probable future projects or the use of adopted projections from a general plan, other regional planning document, or a certified EIR for such a planning document. This cumulative analysis uses a combination of the "list" approach and the "projections" approach to identify the cumulative setting. The effects of past and present projects on the environment are reflected by the existing conditions in the project area.

In the case of the proposed Solano 4 Wind Project, the project site and surrounding area have been modified from its natural conditions by human activity including ranching beginning in the 1840s. Starting in late 1980s, the Solano County Wind Resource Area (WRA) was established and multiple wind farms were constructed in the WRA to exploit the strong winds on the area's hilltops and ridges. Currently the older wind projects are undergoing repowering with fewer, more efficient turbines.

A list of probable future projects is provided below. Probable future projects are those in the project vicinity that have the possibility of interacting with the project to generate a cumulative impact and either:

1. are partially occupied or under construction;
2. have received final discretionary approvals;
3. have applications accepted as complete by local agencies and are currently undergoing environmental review, or
4. have been discussed publicly by an applicant or otherwise have become known to the lead agency, provided sufficient information is available about the project to allow at

least a general analysis of environmental impacts and an evaluation of the likelihood of implementation.

The analysis also considers planning efforts that address regional environmental issues, such as water quality improvement programs, and potential effects associated with climate change. These plans, programs, and effects are discussed in relevant resource discussions below.

4.3 Cumulative Setting

4.3.1 Geographic Scope

The geographic scope of the cumulative analysis was defined with consideration to the resource being examined, the location of the project, and the type of project. For example, air pollutant emissions generated by construction activity would generate criteria pollutants that would affect the air quality of the entire air basin. Ambient air quality is regulated at the regional level by the Bay Area Air Quality Management District and the Yolo-Solano County Air Quality Management District, which must prepare attainment plans for criteria pollutants that exceed national and state ambient air quality standards. Consequently, the plans and policies approach to cumulative analysis is best suited for characterizing the cumulative condition related to air quality.

On the other hand, intervening topography and distance between operating WTGs to the nearest receptor are site specific factors that attenuate noise levels. In this circumstance, the list approach is best suited for identifying projects with potential cumulative impacts. Given the variability in the nature of cumulative effects, a combination of the two methods has been used to identify related projects and evaluate cumulative impacts. Table 4-1 lists the cumulative impact analysis methodology applied to each impact category.

When the effects of the project are considered in combination with those other past, present, and probable future projects to identify cumulative impacts, the other projects that are considered may also vary depending on the type of environmental effects being assessed. Table 4-1 presents the general geographic areas associated with the different resources addressed in this analysis.

4.3.2 Project List

Table 4-2 provides a list of past as well as ongoing and probable future projects that would affect the local area and that meet the requirements stated above. The listed projects are in the project vicinity and have the possibility of interacting with the proposed Solano 4 Wind Project, to generate related impacts. This list of projects was utilized in the development and analysis of the cumulative settings and impacts for each resource topic. Past and current projects in the project vicinity were also considered as part of the cumulative setting as they contribute to the existing conditions upon which the proposed Solano 4 Wind Project, and each probable future project’s environmental effects also is described; these projects are included in Table 4-2.

Table 4-1 Geographic Scope of Cumulative Impacts

Resource Topic	Geographic Area
Aesthetics	Local (project site and surrounding public viewpoints)
Air Quality	Regional (pollutant emissions that affect the air basins) and immediate project vicinity (pollutant emissions that are highly localized)
Biological Resources	Regional and local
Archaeological, Historical, and Tribal Cultural Resources	Local (limited to project site), with regional implications
Geology and Soils	Local
Greenhouse Gas Emissions and Energy	Global (for greenhouse gas emissions) and regional (for energy)
Hazards and Hazardous Materials	Local (immediate project vicinity)
Hydrology and Water Quality	Regional and local
Land Use	Regional
Noise	Local
Transportation and Traffic	Regional and local

Source: Compiled by AECOM in 2019

Table 4-2 Cumulative Project List

Project Name	Description	Project Status
Caltrans SR 12 Corridor Improvement Project	The long-range vision includes recommendations to add a lane in each direction on SR-12 in the area of Fairfield and Suisun City, construct a four-lane divided highway from SR-113 to SR-160 and replace movable bridges at the Rio Vista and Mokelumne River crossings. For the balance of the corridor, an enhanced two-lane highway is recommended that includes median barriers, inside shoulders, full 12' lanes, outside shoulders and strategically located acceleration lanes that provide passing opportunities.	Planned
Battery Storage	PG&E's Vaca-Dixon sodium sulfur battery energy storage system at the PG&E Vaca-Dixon substation serves to supply a variety of power grid functions. 2MW/14MWh Vaca-Dixon sodium sulfur battery storage system The objective is to analyze various energy storage use scenarios and gain knowledge on how future systems can be implemented within the power grid came online in 2014 providing energy services to PG&E and ancillary services to the California ISO markets. In the event of the power disturbance or outage, both energy storage systems can provide up to seven hours of backup power to the facility and the grid. Moreover, the Vaca-Dixon system was intended to test applications of energy storage such as power quality, frequency regulation, and other ancillary services.	
Wind Resource Area	The Wind Resource Area contains eight separate wind energy facilities with a combined 607 WTGs.	

Source: Compiled by AECOM in 2019 based on information provided by SMUD

4.4 Cumulative Impact Analysis

For purposes of this EIR, the proposed Solano 4 Wind Project, would result in a significant cumulative effect if:

- the cumulative effects of related projects (past, current, and probable future projects) are not significant, and the incremental impact of implementing the proposed Solano 4 Wind Project, is substantial enough, when added to the cumulative effects of related projects, to result in a new cumulatively significant impact; or
- the cumulative effects of related projects (past, current, and probable future projects) are already significant, and implementation of the proposed Solano 4 Wind Project, makes a considerable contribution to the effect. The standards used herein to determine a considerable contribution are that either the impact must be substantial or must exceed an established threshold of significance.

Significance criteria, unless otherwise specified, are the same for cumulative impacts and project impacts for each environmental topic area. This cumulative analysis assumes that all mitigation measures identified in Sections 3.1 through 3.11 to mitigate project impacts are adopted. The analysis herein analyzes whether, after adoption of project-specific mitigation, the residual impacts of the project would cause a cumulatively significant impact or would contribute considerably to existing/anticipated (without the project) cumulatively significant effects.

4.4.1 Aesthetics

Since 1987, when Solano County first designated the Montezuma Hills region as a wind resource area. Large-scale transmission towers and WTGs have become established landscape elements within the Montezuma Hills viewshed. The wind energy facilities occupy approximately 88 percent of the WRA's acreage, and 607 WTGs operate within the area (see Table 3.1-1 in Section 3.1, "Aesthetics"). Wind energy development has substantially altered the rural, agricultural character of the region. The turbines dominate formerly open views of rolling grassland and draw the attention of sensitive viewer groups. Sensitive viewer groups that have been affected by the existing projects include residents in the vicinity of the wind resource area, motorists driving along local roads, motorists driving along scenic roadways SR 12 and SR 113, and visitors to the wind resource area, including visitors to the Sacramento River, Delta islands, Suisun Marsh, and Suisun Bay.

Visual changes during operation of the project, including the presence of taller WTGs would not be noticeable to residents, recreationists, and motorists in the area. The proposed WTGs would be slightly taller than the existing WTGs in the area but the number of WTGs would be reduced from current conditions. The mean height for the existing WTGs is 396 feet; the mean height for the largest of the WTGs proposed for the Solano 4 Wind Project is 591 feet. All transmission infrastructure associated with the project would be placed underground. Implementation of Mitigation Measures 3.1-1a and 3.1-1b would reduce potential visual effects. Therefore, the impact of the proposed project on scenic vistas and the visual character of the site and adjacent scenic roadways would be less than significant.

Although there may be cumulative changes in views, the project's contribution toward this visual change is not cumulatively considerable. Project construction and operation would not substantially degrade the overall visual character or quality of the area as a whole. As stated above, large-scale transmission towers and WTGs have become established landscape elements within the Montezuma Hills viewshed. The proposed project would result in a minor change to the visual setting, and the change would be in character with the existing visual environment. The addition of 22 WTGs, 10 WTGs in Solano 4 East and 12 WTGs in Solano 4 West, would not represent a substantial increase in WTGs compared to the existing 607 WTGs in the project area. Therefore, the proposed project would **not result in a cumulatively considerable contribution** to a significant cumulative impact related to visual character.

Project operation would introduce permanent sources of light, mainly to comply with FAA safety lighting requirements. Implementation of Mitigation Measure 3.3-2, which requires use of an Aircraft Detection Lighting Systems (ADLS) as defined in AC 70/7460-1L CHG 1 Chapter 14, would greatly reduce the night sky impacts of lighting. The FAA has issued a Determination of No Hazard for the project and approved use of the ADLS which would minimize the potential for light and glare impacts.

Due to FAA safety requirements, wind energy facilities, including existing and planned facilities, in the wind resource area are required to install synchronized red lights on some of the turbines. However, the project would not contribute to this impact because the use of ADLS would avoid lighting project WTGs except during times when an aircraft is detected entering the zone. Therefore, the proposed project would **not result in a cumulatively considerable contribution** to a significant cumulative visual impact related to new permanent sources of light.

4.4.2 Air Quality

Air quality is inherently a cumulative impact, as current emission levels and attainment status are a result of past and present projects. The cumulative setting for air quality is the Sacramento Valley Air Basin (SVAB) and San Francisco Bay Area Air Basin (SFBAAB). The SVAB and SFBAAB is designated as nonattainment for federal and State ozone standards and PM_{10}, and $PM_{2.5}$ standards. Each additional project within the SJVAB and SFBAAB has the potential to cause a net increase in emissions that would contribute to this cumulative air quality impact. Construction activities throughout the region would emit criteria air pollutants from earthmoving activities and construction equipment. The operation of past, present, and future projects would contribute criteria air pollutant and precursor emissions to the region that when added to the other emissions occurring within the region. Pollutant emissions, collectively could cause an exceedance of California ambient air quality standards (CAAQS) and national ambient air quality standards (NAAQS).

Yolo-Solano Air Quality Management District (YSAQMD) attains and maintains air quality conditions in northeastern Solano County and Bay Area Air Quality Management District (BAAQMD) regulates air pollutant emissions in the southwestern portion of the county. Regional and local criteria air pollutant emissions and associated impacts were assessed in accordance with YSAQMD- and BAAQMD- recommended methodologies. YSAQMD and BAAQMD considers projects that would generate air quality emissions that exceed applicable thresholds of significance to be cumulatively considerable.

Project construction activities would emit NO_X and PM_{10} at levels that could exceed YSAQMD and BAAQMD daily emissions thresholds for these pollutants. Construction would occur over a 14-month period, with several construction phases occurring simultaneously at several points. In addition, given the size and characteristics of the project, which would involve substantial grading activity, fugitive dust emissions would contribute to an exceedance of these thresholds and could violate applicable air quality standards. Implementation of Mitigation Measure 3.2-1 would reduce NO_X, PM_{10}, and $PM_{2.5}$ emissions associated with project construction. However, even with these mitigation measures, the project's construction emissions of NO_X would exceed applicable thresholds during certain months of construction. Thus, the proposed project's contribution to this significant cumulative impact would be cumulatively considerable and the cumulative impact associated with short-term construction activities would be **significant and unavoidable**.

Operation of the proposed project and the other wind energy facilities in Solano County would reduce the County's dependence on fossil fuels, reduce regional and statewide emissions of ozone precursors and other criteria pollutants, and would have a beneficial cumulative effect on long-term regional air quality.

4.4.3 Biological Resources

The cumulative setting for biological resources is the Solano County WRA, an area that encompasses more than 40,000 acres along the western edge of the Sacramento–San Joaquin River Delta. The WRA formerly supported a native California prairie plant community, but due to a long history of livestock grazing and cultivation, nonnative annual grassland has replaced the original plant community of perennial bunchgrasses. In part because of the transformation from native landscape to the current altered landscape, wildlife abundance and diversity are somewhat limited in the WRA. The landscape generally is monotypic (i.e., annual grassland or dryland farming), is mostly treeless, and supports limited wetlands or other distinctive biological communities. The few trees in the WRA are mostly nonnative (primarily *Eucalyptus* sp.) and are associated with rural farmsteads. Other habitats, such as wetlands, are uncommon; most of these are seasonal and highly disturbed by agricultural practices and grazing. Overall, currently very little native vegetation exists in the WRA, and therefore the avifauna and other wildlife in the WRA also generally lacks the abundance and diversity of surrounding areas.

The net permanent impact of project construction on vegetation communities would be 43.82 acres for the 136m WTG option or 39.56 acres 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. Areas disturbed by temporary construction would be restored to former conditions with implementation of a revegetation and restoration plan. Because the project-related loss of wildlife habitat would be small, and because these habitats are abundant throughout the project area, this impact would be less than significant. Therefore, the project would **not result in a cumulatively significant impact** on the WRA's plant communities and wildlife.

The total impact of project construction on waters of the United States differs between the 136m WTG option and the 150m WTG option. 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 project impact on waters would be up to 0.12 acre (approximately 0.09 acre of temporary impacts and 0.03 acre of permanent impacts). Regardless of WTG size (i.e., 136m or 150m), the project would result in permanent fill of up to 0.03 acre of swales. 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. Compensatory mitigation would be provided to offset impacts on wetlands and other waters of the United States. Because these impacts are small, and because Best Management Practices and compensatory mitigation would avoid, minimize, and mitigate for these impacts, the project's construction impacts on wetlands and other waters of the United States would be less than significant. Therefore, the project would **not result in a cumulatively significant impact** on wetlands and waters of the United States.

Operation of the project would result in an impact on birds and bats through mortality from direct collision with WTG rotor blades. Golden eagles are present in the WRA and although they have not been recorded nesting in the WRA since 2012, they occur with some regularity and could be injured or killed by project WTGs. 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. Bat species such as hoary bats are also vulnerable to mortality and injury due to operation of the project. Average predicted annual mortality rates for special-status raptor species are low overall, and generally much less than one individual per year.

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). To offset potential project impacts on eagles, SMUD will retrofit electrical utility poles that present a high risk of electrocution to eagles, consistent with requirements described in the USFWS eagle take permit that SMUD will secure. SMUD will monitor bird and bat fatalities during the first year of operation and will undertake adaptive management measures avoid, minimize, and mitigation operational impacts on special-status birds or bats. With implementation of the adaptive management and compensatory mitigation measures, impacts on special-status raptors and other special-status birds and bats would 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. Thus, the proposed project's contribution to cumulative impacts on resident and migratory birds and bats, including special-status species, **would be less than cumulatively considerable with mitigation**

4.4.4 Archaeological, Historical, and Tribal Cultural Resources

The project area is located in the Sacramento–San Joaquin Delta (Delta), a region where rapid alluvial and colluvial deposition has occurred over the last 10,000 years, resulting in the presence of deeply buried archaeological deposits throughout much of the region. In addition, the project area is located primarily within the ethnographic boundaries of the Patwin; however, the Plains Miwok occupied both banks of the Sacramento River from Rio Vista to Freeport. During the 19th and 20th centuries, urbanization and intensive agricultural use in the region has caused the destruction or disturbance of numerous archaeological sites and tribal cultural resources. From the latter half of the 20th century to the present, regulations protecting cultural resources have substantially reduced the rate and intensity of these impacts. However, even with these regulations, cultural resources, including archaeological and tribal cultural resources, are still degraded or destroyed as cumulative development in the region proceeds. This is a **significant cumulative** impact.

The proposed project, in combination with other development in the region, could contribute to the loss of significant cultural resources. Because all significant cultural resources are unique and non-renewable members of finite classes, all adverse effects or negative impacts erode a dwindling resource base. The loss of any one archaeological site affects all others in a region since these resources are best understood in the context of the entirety of the cultural system of which they are a part. The boundaries of an archaeologically important site extend beyond the project site. As a result, a meaningful approach to preserving and managing cultural resources must focus on the likely distribution of cultural resources, rather than on project or parcel boundaries. The cultural system is represented archaeologically by the total inventory of all sites and other cultural remains in the region. Proper planning and appropriate mitigation can help to capture and preserve knowledge of such resources and can provide opportunities for increasing understanding of the past environmental conditions and cultures by recording data about sites discovered and preserving artifacts found. Federal, State, and local laws can protect these resources, in most instances.

The proposed project will include earthmoving activities and grading during site construction. There are no known unique archaeological resources identified with the project site as a result of previous cultural resource investigations and no impacts to historic resources would occur. No tribal cultural resources have been definitively identified within the project site boundaries. However, the lack of previously recorded archaeological resources and the lack of surface indications do not preclude the possibility that significant subsurface archaeological resources or human remains could be inadvertently encountered and damaged during construction. In addition, AB 52 consultation has not yet been completed; therefore, tribal cultural resources may exist at the project site and could be affected by the project. Because archaeological resources tribal cultural resources are non-renewable, any significant impacts to these resources have a cumulative effect on archaeological and tribal cultural resources in the region. Implementing mitigation measures described in Section 3.4, "Archaeological, Historical, and Tribal Cultural Resources," would ensure that any archaeological features and tribal cultural resources, or human remains encountered during construction would be treated in an appropriate manner under CEQA and other applicable laws and regulations. Thus, the proposed project's contribution to cumulative impacts on archaeological and tribal cultural resources **would be less than cumulatively considerable with mitigation**.

4.4.5 Geology, Soils, Paleontological Resources, and Mineral Resources

Geology and Soils

Each cumulative project site has its own unique geologic considerations. Adherence to all relevant plans, codes, and regulations with respect to construction would avoid cumulative impacts related to exposure to geologic hazards. Therefore, no additive effect would result from construction of the proposed project, and the project would not contribute to any cumulative impact related to geology or soil instability.

The geographic scope of cumulative impacts related to geology and soils includes only projects immediately adjacent to the project site. Construction of related projects would likely include vegetation removal, grading, staging, trenching, excavation, and other activities that would result in the temporary and short-term disturbance of soil and would expose disturbed areas to storm events. Related projects would comply with the State Water Resources Control Board's, the Central Valley Regional Water Quality Control Board's, and San Francisco Bay Regional Water Quality Control Board's National Pollutant Discharge Elimination System permits for construction activity, adhere to all applicable codes and regulations, and implement recommendations contained in project-specific geotechnical reports. It is anticipated, therefore, that any potential impacts associated with geologic and soil conditions would be mitigated within the respective sites of these projects. As such, the future cumulative condition for geology and soils within the affected environment would not be adverse, relative to existing conditions. Therefore, a **cumulatively significant impact would not occur**.

The project has the potential to result in erosion or loss of topsoil during decommissioning, rehabilitation, and construction activities; however, implementation of Mitigation Measure

3.5-1 would reduce potential impacts by requiring preparation of a stormwater pollution prevention plan (SWPPP) and implementation of best management practices (BMPs) to minimize potential topsoil loss and soil erosion. In addition, because the project could be located on unstable or expansive soils, implementation of Mitigation Measures 3.5-2 and 3.5-3 would reduce hazards associated with unstable or expansive soils by requiring preparation of a site-specific geotechnical report and implementation of measures to stabilize on-site soils. Therefore, The proposed project's impact associated with geology and soils is **less than cumulatively considerable with mitigation**.

Paleontological Resources

Fossil discoveries resulting from excavation and earthmoving activities associated with development are occurring with increasing frequency throughout California. The value or importance of different fossil groups varies depending on the age and depositional environment of the rock unit that contains the fossils, their rarity, the extent to which they have already been identified and documented, and the ability to recover similar materials under more controlled conditions, such as part of a research project. Unique, scientifically important fossil discoveries are relatively rare, and the likelihood of encountering them is specific to a site and based on the type of specific geologic rock formations found underground.

The Montezuma Formation, which makes up the majority of the Montezuma Hills between Collinsville and the city of Rio Vista, is a quaternary deposit. The Montezuma Formation is highly fossiliferous. Sixteen vertebrate fossil localities in the county have been recorded from this formation. Fossils typical of this formation represent Rancholabrean-age terrestrial faunas, and range from microvertebrate tooth and limb fossils of rodents, birds, amphibians and reptiles, to larger fossils from animals such as horse, deer, bison, and mammoths. This formation has a high paleontological sensitivity. Therefore, there is a potential for uncovering additional similar fossil remains during construction-related earthmoving activities of the related projects. This is considered a **potentially significant cumulative** impact.

The project has the potential to result in result in the degradation or destruction of paleontological resources during decommissioning, rehabilitation, and construction activities Mitigation Measure 3.5-4 would reduce the proposed project's impact associated with potential damage to or destruction of unique paleontological resources to a less-than-significant level by requiring an analysis of potential on-site paleontological resources, and implementing measures to identify, treat, and avoid adverse effects on such resources as needed before construction. The proposed project's impact associated with potential damage to unique paleontological resources during earthmoving activities is **less than cumulatively considerable with mitigation**.

4.4.6 Greenhouse Gas Emissions and Energy

Greenhouse gas (GHG) emissions from past, present, and future projects create a significant cumulative impact. Significance thresholds can be developed by federal or

State regulatory agencies or by air districts, but these thresholds and their related goals are ultimately designed to effect change at a global level. Although the analysis provided in Section 3.6, “Greenhouse Gas Emissions and Energy,” focuses on the proposed project and is project specific, it also is considered cumulative because it is only as a contribution to a cumulative effect that the project specific emissions have environmental consequences. As discussed in Impact 3.6-1 and 6.6-2 of Section 3.6, impacts of the proposed project related to GHG emissions are **less than cumulatively considerable**, and the proposed project would **not result in a cumulatively significant incremental contribution** to impacts related to related to GHG emissions.

The increased demand for electrical supplies is a byproduct of development in the SMUD service area. Energy is consumed for heating, cooling, and electricity in homes and businesses; for public infrastructure and service operations; and for agriculture, industry, and commercial uses.

Solano County and cities within the region implement general plans and other policy documents that include goals and policies to reduce energy demands through the use design features, building materials, and building practices and encourage the use of renewable energy sources. Therefore, individual projects would not result in a significant cumulative impact related to energy resources. As described in Impact 3.6-3, the proposed project would not result in inefficient, wasteful, and unnecessary consumption of energy resources during construction. Once completed, the project will serve as one of SMUD’s power generating facilities and would increase SMUD’s overall power generation capacity. There is **no significant cumulative** impact, and the project **would not result in a cumulatively significant** incremental contribution to a significant cumulative impact related to the wasteful, inefficient, excessive, and unnecessary consumption of energy.

4.4.7 Hazards and Hazardous Materials

Impacts related to the transport, use, or disposal of hazardous materials and hazards to the public or environment because of upset and accident conditions are primarily site-specific. The impacts of the proposed project would not combine with impacts from related projects such that a cumulatively significant impact associated with hazards or hazardous materials could occur.

The proposed project would involve the storage, use, disposal, and transport of hazardous materials (such as asphalt, fuel, lubricants, and solvents) to varying degrees during construction. The storage, use, disposal, and transport of hazardous materials are extensively regulated by various federal, State, and local agencies. Mitigation Measures in Section 3.7, “Hazards and Hazardous Materials,” require preparation and implementation of various plans to address environmental training; hazardous substance control and emergency response; spill prevention, control, and countermeasures; and hazardous materials. Related projects would be subject to the same regulations implemented by federal, State, and local agencies, which are specifically designed to protect the public health. In general, wind energy facilities do not require the use and storage of significant quantities of hazardous materials. Therefore, there is **no cumulative impact**.

During grading, trenching, and other ground-disturbing activities, project construction crews could encounter subsurface hazardous materials related to farming and natural gas extraction. Such an accidental disturbance could produce a release to the environment, causing a hazard to the public. Implementation of mitigation measures included in Section 3.9 would reduce impacts to a less-than-significant level by requiring preparation and implementation of various plans to reduce potential impacts on workers and the environment associated with the release of subsurface hazardous materials. Thus, the proposed project **would not contribute to any significant cumulative impacts**.

Regarding impacts on air traffic, the FAA concluded that the cumulative impact of the proposed WTGs, when combined with other proposed and existing structures, is not considered to be significant. The study did not disclose any significant adverse effect on existing or proposed public-use or military airports or navigational facilities, nor would the proposed WTGs affect the capacity of any known existing or planned public-use or military airport. (FAA 2019).

In addition, The project site is not located in a State Responsibility Area designated as a High or Very High Fire Hazard Severity Zone. However, during the hot summer months, the project area is highly susceptible to grass fires. Mitigation measures in Section 3.9 require preparation and implementation of a grass fire control plan and emergency access plan. Implementing these mitigation measures and adhering to all applicable regulations would reduce potential impacts of project construction related to wildland fires to a **less-than-significant** level. Thus, the proposed project **would not contribute to any significant cumulative impacts**.

4.4.8 Hydrology and Water Quality

Local hydrology, drainage, and water quality conditions are often affected by regional activities, in addition to local activities and related projects. Past and present projects from Sacramento and San Joaquin Counties (e.g., urban, roadway, and infrastructure development) to the Sacramento–San Joaquin Delta (water supply diversions, agricultural diversions, flood control projects, urban development, river channelization) affect hydrology and water quality conditions in Solano County.

Five subwatersheds are contained within, or partially located in, the project area. Montezuma Slough is located west of the northwestern portion of the project site and has the largest drainage area. All drainages ultimately flow to the Sacramento River. The project site is immediately north of the Sacramento River, east of the confluence with the San Joaquin River. West of the project area, the Sacramento River flows through Suisun Bay and eventually discharges to San Francisco Bay.

Decommissioning of existing wind energy facilities, project construction, and future project decommissioning or repowering activities would require the grading and movement of soil. Such activities could result in erosion, sedimentation, and discharge of other nonpoint-source pollutants to stormwater, which could then drain off-site and degrade local water quality. Implementation of mitigation measures contained in Section 3.9, “Hydrology and Water Quality,” would reduce this impact to a less-than-significant level by requiring preparation and implementation a SWPPP and associated BMPs, an environmental training program, a hazardous substance control and emergency response plan, and a spill prevention control and closures plan. Just as with the proposed project, related projects would be required to adhere to applicable requirements designed to prevent significant water quality impacts. Therefore, implementation of related projects **would not result in a cumulative impact**, and the project would result in a **less-than-cumulatively-considerable** incremental contribution to temporary, short-term construction-related water quality impacts.

4.4.9 Land Use

Cumulative development within the region would result in a significant change in land use, and individual projects would need to be considered in context of their compliance with adopted land use plans. The County is unaware of any broadscale and sustained future inconsistencies with the General Plan or other regional plans that would generate significant cumulative impacts. The proposed project is generally consistent with the Solano County General Plan. Land use inconsistencies are not physical effects in and of themselves and combinations of policy inconsistencies would not rise to the level of a physical effect. Cumulative effects of the physical changes related to the project are discussed in the other topics in this section. **No cumulatively considerable** impacts would occur.

4.4.10 Noise

Noise impacts are normally localized and attenuated rapidly with distance. Proposed construction areas are located mostly far from existing noise-sensitive receptors, the only closest receptor being approximately 275 feet from where construction activities (underground cabling) would occur. Most noise-generating construction activity would be performed during daytime hours, when construction noise is exempt from noise standards by the Solano County Draft Noise Ordinance. Short-term construction noise impacts are less than significant.

No related projects are proposed in the vicinity of the project site. Therefore, no construction projects would occur simultaneously in a way that would create cumulative construction noise impacts and **no cumulative** impact would occur.

4.4.11 Transportation and Traffic

The vehicular traffic generated by the proposed project would be present primarily during the construction period. This traffic would consist of worker trips to and from the project area, the transport of construction material, and equipment deliveries. In total, the project would generate 15,525 trips over the course of construction, with a peak construction traffic volume of approximately 250 trips per day. After construction has been completed, operation and maintenance activities for the project would require approximately six round trips per day, using pickups or other light-duty trucks. Construction and operational traffic would be routed primarily along Interstate 80; Interstate 680; SR 160; SR 12; SR 113; Kaiser Road in the City of Napa; and local roadways in the vicinity of the project site, including Shiloh Road, Collinsville Road, Talbert Lane, Stratton Road, Birds Landing Road, and Montezuma Hills Road.

With some exceptions, heavy trucks that would transport project components would exceed standards for the height, width, length, and weight of regular vehicles as outlined in the California Vehicle Code. Obstruction of traffic flows and impairment of emergency access are also potential impacts associated with the hauling of heavy project components. Mitigation Measures in Section 3.11, “Transportation and Traffic,” require working with Caltrans, the County, and the City of Napa to determine the lowest hourly traffic flows and develop a traffic control plan specifying transporter travel times and days. These measures require a plan for notifying the public regarding affected roadways before the transporters’ travel days, and for modifying local roadways to enable transporter access. The measures would also maintain emergency access during transport of WTG components and throughout the construction period. Therefore, implementing mitigation measures in Section 3.11 would reduce construction-related traffic impacts to a **less-than-significant** level.

A review of the cumulative project list found that most related projects would not create vehicular trips that would overlap with those of the proposed project to create a cumulatively significant traffic impact, because those projects either do not generate substantial traffic volumes or would not use the same road segments for construction trips. In addition, the Caltrans SR 12 Corridor Improvement Project is currently a planned project, and no timeframe has been identified for implementation of this project. For these reasons, implementing the related cumulative projects would not be expected to result in a cumulatively significant impact, and the project would result in a **less-than-cumulatively-considerable** incremental contribution to temporary, short-term construction-related traffic impacts.

5 Other CEQA Sections

In accordance with Section 15126 of the State CEQA Guidelines, all aspects of a project should be considered when evaluating its impacts on the environment, including planning, acquisition, development, and operation. As part of the analyses, this chapter of the draft EIR identifies the following components that are referred to collectively as other CEQA requirements:

- Effects Found Not to Be Significant (Section 5.1);
- Significant and Unavoidable Impacts (Section 5.2);
- Significant Irreversible Environmental Changes (Section 5.3); and
- Growth-Inducing Impacts (Section 5.4).

5.1. Effects Found Not to Be Significant

Agriculture and Forestry Resources

The majority of the project site (approximately 1, 875 acres) is leased for grazing by cattle, goats, and sheep. Active dryland farming of wheat, barley, and oats occurs on the major portion of the site. Agricultural practices generally follow a 1- to 3-year crop rotation cycle, with grazing and fallow years following planting.

The proposed project would not conflict with the agricultural zoning of the project site. The site is zoned as A-160 (Exclusive Agriculture District). Allowable uses in this zoning district include agriculture and renewable wind energy development and production.

The *Solano County General Plan* identifies 10 broad geographic areas that have similar agricultural characteristics. The project site is located in the Montezuma Hills agricultural region, an area of 58,035 acres generally composed of grazing land and cropland with a minimum lot size of 160 acres (Solano County 2008).

The Solano County Important Farmland Map, published by the California Department of Conservation's Division of Land Resource Protection, designates the project site as Grazing Land, defined as land where the existing vegetation is suited to the grazing of livestock (DOC 2016a). Appendix G of the State CEQA Guidelines states that conversion of Prime Farmland, Farmland of Statewide Importance, or Unique Farmland to nonagricultural use is a significant environmental effect related to the conversion of agricultural land. Grazing Land is not considered Important Farmland under CEQA (California Public Resources Code [PRC], Sections 21060.1 and 21095; State CEQA Guidelines, Appendix G).

The proposed project would allow for continued agricultural uses. The excess roads and staging and laydown areas would be returned to preproject conditions. Grazing or dryland farming would continue in the area below the towers, consistent with current practice within the project area for Phases 1–3 of the Solano Wind Project.

The project site is not under a Williamson Act contract (DOC 2016b). Therefore, the proposed project would not convert Important Farmland to nonagricultural uses, conflict with zoning for agricultural uses, or conflict with existing Williamson Act contracts. The project would accommodate the long-term viability of agricultural use in the Montezuma Hills. **No impact** on agricultural resources would occur and this issue is not evaluated further in this EIR.

The project site is not zoned as forestland, timberland, or a Timberland Production Zone. Appendix G of the State CEQA Guidelines further defines forestland as land that can support 10 percent native tree cover and woodland vegetation of any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resource (timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation) and other public benefits (PRC Section 12220[g]). The project site does not contain native tree cover or woodland vegetation that is considered forestland as defined by PRC Section 12220(g) (see Section 3.4, “Biological Resources,” for further discussion). **No impact** on forestry resources would occur; therefore, this issue is not evaluated further in this EIR.

Mineral Resources

Mineral resources in Solano County include natural gas, sand, gravel, rock, and sandstone materials. The nearest mineral resources are mapped at Collinsville, approximately 6 miles west of the project (Solano County, 2008). Nevertheless, the project area does coincide with the northern portion of the Sherman Island Gas Field, which contains active and abandoned gas wells. No active wells or mineral deposits exist on the project site. Therefore, this issue is not evaluated further in this EIR.

Population and Housing

No residences are located on the project site; thus, the proposed project would not result in displacement or relocation of any residents. The project would not displace substantial numbers of people or existing housing that would necessitate the construction of replacement housing elsewhere. The project also would not involve constructing new homes or businesses that would directly generate new population growth.

The construction workforce is expected to be approximately 70 workers on a peak construction day. The source of the labor force is unknown at this time, but workers likely would come from the local labor pool. The most current labor data available from the U.S. Census Bureau’s 2017 American Community Survey indicate that 19,204 residents in Solano County were employed in the construction industry in 2017 (U.S. Census Bureau 2017). Based on the pool of existing residents employed in the construction industry, construction of the proposed project would not likely cause substantial population growth or a substantial increase in housing demand in the region. Even if the project were to employ construction workers from outside of the region, the temporary nature of the work suggests that the nonlocal workers would be unlikely to relocate permanently.

At the completion of project construction, the proposed project would employ approximately five full-time staff members for periodic maintenance and monitoring of the project area. This increase in employment would be minimal compared to the available employee labor pool.

In addition, the project would not induce substantial population growth indirectly (through the extension of roads or other infrastructure). Approximately 5.5 miles of new access roads would be constructed within the project boundaries. Therefore, the project would not extend roads to new areas that would induce growth in new locations.

Population, housing, and employment growth, in and of itself, is not an environmental impact. However, increases in population, employment, and housing can result in indirect impacts. Examples include increased travel demand that requires additional roadways and other transportation infrastructure, with associated air pollutant emissions and traffic noise; and impacts related to expansion of public facilities and utilities as needed to serve new growth. Specific impacts on other resources and issue areas are addressed in each technical section of this EIR as appropriate. These technical sections provide a detailed analysis of other relevant physical environmental effects that could result from the proposed project. Therefore, **no impact** would occur; this issue is not evaluated further in this EIR. The potential for growth-inducing effects is considered, as required by CEQA, in Section 5.4, "Growth-Inducing Impacts."

Public Services

The proposed project would not provide any new housing that would generate new residences. As discussed above in "Population and Housing," the employees required to construct and operate the proposed project would likely come from the local labor pool, and Solano County's available labor force is sufficient to meet the demand for full-time positions for project construction and operation without requiring employee in-migration from outside the region. Therefore, the project would not increase the demand for new schools, parks, or other public facilities (i.e., libraries). **No impact** would occur; therefore, these issues are not evaluated further in this EIR.

Fire Protection Services

The Montezuma Fire Protection District would provide fire protection services to the project site. The district operates four fire stations equipped for grass fires. Three of these stations are near the project area, on Birds Landing Road, Collinsville Road, and Shiloh Road; the fourth station is in Rio Vista. The Montezuma Fire Protection District has three full-time firefighters and 28 volunteers (Montezuma Fire Protection District 2019). The district covers an area of approximately 230 square miles of mostly agricultural land.

Project construction and operation could increase demands on the Montezuma Fire Protection District. As discussed below under "Wildfire," the dry, grassy environment of the Montezuma Hills area presents a high risk for grass fires, and construction activities could increase the fire danger. Therefore, construction of the proposed project has the potential to affect the capacity of fire personnel to maintain acceptable service ratios, response times, or other performance objectives.

Impacts related to fire protection services would be **less than significant with implementation of Mitigation Measure 3.7-5a** listed in Section 3.7, "Hazards and Hazardous Materials." This measure requires SMUD or its construction contractor to prepare and implement a grass fire control plan. The grass fire control plan would include notification procedures, describe emergency fire precautions, require training of construction workers in the use of firefighting equipment available on-site (e.g., fire extinguishers), and require communication with the Montezuma Fire Protection District. Mitigation Measure 3.7-5a would reduce dependence on the district's equipment and personnel by reducing fire hazards.

Police Protection Services

The Solano County Sheriff's Department (SCSD) would provide police protection services to the project site. The department's main office is located at 530 Union Avenue in Fairfield, approximately 17 miles northwest of the project site. As of 2017, SCSD employed 124 sworn full-time officers (California Department of Justice 2019).

Construction of the proposed project could increase demand for police protection services. Typical crime and safety issues during project construction and operation could include trespassing, theft of materials, and vandalism. However, the contractor would discourage criminal activities during construction by installing chain-link fencing along the perimeter of the laydown area and installing a locking gate to provide secure access to each laydown yard.

The proposed project would not add residents to SCSD's service area; therefore, the project would not require additional SCSD staffing to maintain service ratios. The project would not create any obstacles to providing law enforcement services to surrounding land uses. Furthermore, the project site is located within SCSD's existing service area. Overall, the proposed project would not decrease response times, nor would the project increase demand for SCSD services such that the construction of new or expansion of existing sheriff's service facilities would be required. **No impact** on police protection services would occur; therefore, this issue is not evaluated further in the EIR.

Recreation

As discussed previously, the proposed project would not generate new residents in Solano County. Therefore, the project would not increase the use of existing or require construction of new neighborhood and regional parks or other recreational facilities. For these reasons, **no impact** on recreation would occur; this issue is not evaluated further in this EIR.

Utilities and Service Systems

Water Supply and Demand

During its 18-month construction period, the proposed project is expected to use up to 18 million gallons (55.3 acre-feet [af]) of water for dust control and other construction-related activities. The project's water use would vary over time depending on construction phasing, but would average approximately 3 af per month. Operation and maintenance of the proposed facilities are expected to use up to 4.5 acre-feet per year (af/yr) of water for routine cleaning.

SMUD anticipates that it would obtain water for construction and operation from the City of Rio Vista and truck the water to the project site. The City of Rio Vista provides a retail supply of potable water within its service area. Rio Vista has seven operational supply wells that provide water for the entire system. In 2015, the City of Rio Vista supplied 1,793 af of treated water to 4,450 customers. City water deliveries are expected to reach 2,713 af/yr by 2035. During the period from 2011 to 2015, Rio Vista's average groundwater pumping rate was 2,263 af/yr and its maximum annual rate was 2,658 af/yr. In 2020, Rio Vista expects to have a reasonably available groundwater supply of 3,241 af/yr and a total demand of 2,175 af/yr, for a difference between supply and demand of 1,131 af/yr.

For the reasons described above, the water supply would be sufficient to meet project-related demands. This impact would be **less than significant**; therefore, this issue is not evaluated further in this EIR.

Wastewater Treatment

The proposed project would not include any new development that would require wastewater treatment by a municipal service provider. Thus, the project would not exceed a wastewater treatment provider's capacity and would not require relocation or construction of new or expanded municipal wastewater treatment facilities. **No impact** on wastewater treatment facilities would occur; therefore, this issue is not evaluated further in this EIR.

Stormwater Drainage Facilities

The proposed project would not include construction of new stormwater drainage facilities (see Section 3.8, "Hydrology and Water Quality," for further discussion). **No impact** on stormwater drainage facilities would occur; therefore, this issue is not evaluated further in this EIR.

Solid Waste

Solid waste generated by construction of the proposed project would be disposed of at the Potrero Hills Landfill in Suisun City or the Hay Road Landfill in Vacaville. According to the California Department of Resources Recycling and Recovery (CalRecycle), the Potrero Hills Landfill has a maximum permitted throughput of 4,330 tons per day; a total maximum permitted capacity of 83.1 million cubic yards; a remaining capacity of approximately 13.9

million cubic yards; and an anticipated closure date of February 14, 2048 (CalRecycle 2019a). The Hay Road Landfill has a maximum permitted throughput of 2,400 tons per day; a total maximum permitted capacity of 37.0 million cubic yards; a remaining capacity of approximately 30.4 million cubic yards; and an anticipated closure date of January 1, 2077 (CalRecycle 2019b).

Construction activities would generate various types of solid waste: scrap lumber, scrap finishing materials, scrap metals, and other recyclable and nonrecyclable solid waste. The 2016 California Green Building Standards Code (CALGreen Code) (California Code of Regulations Title 24, Part 11) requires all construction contractors to reduce construction waste and demolition debris by 65 percent. The 2016 CALGreen Code requires contractors to:

- prepare a construction waste management plan that identifies materials to be diverted from disposal by efficient usage, recycling, reuse on the project, or salvage for future use or sale;
- determine whether materials will be sorted on-site or mixed; and
- identify diversion facilities where the materials collected will be taken.

The CALGreen Code also specifies that the amount of materials diverted should be calculated by weight or volume, but not by both (California Building Standards Commission 2016). In addition, the code requires that 100 percent of trees, stumps, rocks, and associated vegetation and soils resulting primarily from land clearing be reused or recycled.

After construction of the wind turbine generators (WTGs), SMUD or its contractor would remove all construction waste and dispose of it properly in accordance with applicable federal, state, and local laws regarding disposal of solid and hazardous waste. Construction waste would be transported to either the Potrero Hills Landfill in Suisun City or the Hay Road Landfill in Vacaville, which have capacity to accept solid waste until February 14, 2048, and January 1, 2077, respectively. All remaining stockpiled native materials would be spread on-site.

The proposed project does not include any components that would violate any applicable federal, state, or local solid waste regulations. Project construction and operation would comply with all statutes and regulations regarding solid waste, including the CALGreen Code. Given the available permitted daily capacity and remaining life spans of the landfills that would serve the proposed project, sufficient landfill capacity is available to accommodate the project's solid waste disposal needs during both construction and operation. This impact would be **less than significant**; therefore, this issue is not evaluated further in this EIR.

Wildfire

The project site is not located in a State Responsibility Area designated as a High or Very High Fire Hazard Severity Zone. However, during the hot summer months, the project area is highly susceptible to grass fires. The grass is dry and flammable, and the wind blows regularly.

Project construction would involve ground-disturbing activities, including grading and vegetation clearing to enable the construction of necessary work areas, structural foundations, and access/spur roads. The on-site use of construction equipment and diesel fuel could pose a wildfire risk, because internal combustion engines, gasoline-powered tools, and other equipment could produce a spark, fire, or flame. SMUD and its construction contractor would comply with all laws, plans, policies, and regulations related to fire safety and wildfire suppression, including the following requirements identified in the California Public Resources Code:

- PRC Section 4427, which identifies appropriate fire suppression equipment and stipulates removal of flammable materials to a distance of 10 feet from any equipment that could produce a spark, fire, or flame on days when burning permits are required;
- PRC Section 4428, which identifies additional firefighting equipment requirements during the period of highest fire danger (April 1–December 1); and
- PRC Section 4431, which prohibits the use of portable tools powered by gasoline-fueled internal combustion engines within 25 feet of flammable materials when burning permits are required.

The project would strictly adhere to these requirements during construction. The contractor would be responsible for monitoring and compliance with safety measures, thus minimizing the risk of a wildfire.

Up to 22 new WTGs would be maintained on-site during project operation. This would increase the potential for a wildland fire to accidentally ignite as a result of a malfunction or mechanical failure, such as turbine overload or overheating of moving parts. Sparks could be fueled by oils, lubricants, and other combustible materials, resulting in a fire.

Impacts related to the potential for wildfires would be **less than significant with implementation of Mitigation Measure 3.7-5a** listed in Section 3.7, “Hazards and Hazardous Materials.” This measure requires SMUD or its construction contractor to prepare and impalement a grass fire control plan. The grass fire control plan would include notification procedures, describe emergency fire precautions, require training of construction workers in the use of firefighting equipment available on-site (e.g., fire extinguishers), and require communication with the Montezuma Fire Protection District. In addition, existing access roads and existing and proposed internal roads would provide emergency vehicle access and serve as fire breaks.

Impacts related to impairment of emergency response and evacuation are addressed in Section 3.7, “Hazards and Hazardous Materials,” and Section 3.11, “Transportation and Traffic.” Section 3.7 also addresses the potential for exposure of people or structures to wildfire risks.

5.2. Significant and Unavoidable Impacts

Section 21100(b)(2)(A) of the State CEQA Guidelines provides that an EIR shall include a detailed statement setting forth "in a separate section any significant effect on the environment that cannot be avoided if the project is implemented." Accordingly, this section summarizes the significant environmental impacts of the project that cannot be mitigated to a less-than-significant level.

Sections 3.1 through 3.11 of this draft EIR describe the potential environmental impacts of the project and recommend various mitigation measures to reduce impacts, to the extent feasible. Chapter 4, "Cumulative Impacts," determines whether the incremental effects of this project would be significant when viewed in connection with the effects of past projects, other current projects, and probable future projects. After implementation of the recommended mitigation measures, project implementation would result in the following significant unavoidable impact:

Air Quality

- Construction emissions of criteria air pollutants and ozone precursors (significant unavoidable)

5.3. Significant Irreversible Environmental Changes

The State CEQA Guidelines (Section 15126) require a discussion of the significant irreversible environmental changes that would be involved in a project should it be implemented. The irreversible and irretrievable commitment of resources is the permanent loss of resources for future or alternative purposes. Irreversible and irretrievable resources are those that cannot be recovered or recycled or those that are consumed or reduced to unrecoverable forms.

The project would result in the irreversible and irretrievable commitment of energy and material resources during construction and operation, including the following:

- construction materials, including such resources as soil, rocks, wood, concrete, glass, and steel;

- land area committed to new project facilities (for the project's useful life, anticipated to be 30–35 years or more);

- water supply for project construction (for controlling dust and maintaining soil compaction) and operation (for periodic operation and maintenance activities); and

- energy expended in the form of electricity, gasoline, diesel fuel, and oil for equipment and transportation vehicles that would be needed for project construction and operation.

The use of these nonrenewable resources is expected to account for a minimal portion of the region's resources and would not affect the availability of these resources for other needs in the region. Construction activities would not result in the inefficient use of energy or natural resources. The construction contractor selected would use best available engineering techniques, construction and design practices, and equipment operating procedures. Long-term project operation would not result in substantial long-term consumption of energy and natural resources because the project would be designed using energy efficient technologies.

5.4. Growth-Inducing Impacts

5.4.1 CEQA Requirements

CEQA specifies that the growth-inducing impacts of a project must be addressed in an EIR (California Code of Regulations Section 21100[b][5]). Specifically, Section 15126.2(d) of the State CEQA Guidelines states that the EIR shall:

> Discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth (a major expansion of a wastewater treatment plant might, for example, allow for more construction in service areas). Increases in the population may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects. Also, discuss the characteristics of some projects which may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.

Direct growth inducement would result if a project would involve construction of new housing, which would facilitate new population to an area. Indirect growth inducement would result, for instance, if implementing a project would result in any of the following:

- substantial new permanent employment opportunities (e.g., commercial, industrial, or governmental enterprises);
- substantial short-term employment opportunities (e.g., construction employment) that indirectly stimulates the need for additional housing and services to support the new temporary employment demand; and/or
- removal of an obstacle to additional growth and development, such as removing a constraint on a required public utility or service (e.g., construction of a major sewer line with excess capacity through an undeveloped area).

The State CEQA Guidelines do not distinguish between planned and unplanned growth for purposes of considering whether a project would foster additional growth. Therefore, to conclude that the proposed project would be growth-inducing as defined by CEQA, this EIR must find that the project would foster (promote, encourage, or allow) additional growth in economic activity, population, or housing, regardless of whether the growth is already approved by and consistent with local plans. The conclusion does not determine that induced growth is beneficial or detrimental, consistent with Section 15126.2(d) of the State CEQA Guidelines.

If the analysis conducted for the EIR results in a determination that the project would be growth-inducing, the next question is whether that growth may cause adverse effects on the environment. Environmental effects of induced growth (i.e., growth-induced effects) fit the CEQA definition of “indirect” effects in Section 15358(a)(2) of the State CEQA Guidelines. These indirect or secondary effects of growth may result in significant environmental impacts. CEQA does not require that the EIR speculate unduly about the precise location and site-specific characteristics of significant indirect effects caused by induced growth, but the EIR must show a good-faith effort to disclose whatever is feasible to assess. The potential secondary effects of growth could include consequences resulting from growth fostered by the project. Examples of such consequences include conversion of open space to developed uses; increased demand on community and public services and infrastructure; increased traffic and noise; degradation of air and water quality; or degradation or loss of plant and wildlife habitat.

5.4.2 Growth-Inducing Impacts of the Project

Development of the project would contribute to a diversified statewide energy portfolio that would assist the state in meeting renewable energy requirements. The project would install up to 22 utility-scale wind turbine generators with a nameplate generating capacity (theoretical maximum energy generation) of 92 megawatts. The project applicant is proposing to develop and operate the project in response to projections of growth in energy demand on a statewide basis. Rather than removing an obstacle to growth, it is a response to market demand driven in part by state policy, which calls for an expanded statewide portfolio of renewable energy sources that must account for 50 percent of California’s electrical load by 2030 and 100 percent of retail sales of electricity by 2045. Renewable energy generated by project operation would be accepted into the state’s energy transmission system and sold in the bulk power market to meet existing and future demands. Therefore, the renewable energy generated by the project would not result in any growth-inducing impacts.

6 Alternatives

6.1 Introduction to Alternatives

The California Code of Regulations (CCR) Section 15126.6(a) (State CEQA Guidelines) requires EIRs to describe "… a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives. An EIR need not consider every conceivable alternative to a project. Rather, it must consider a range of potentially feasible alternatives that will avoid or substantially lessen the significant adverse impacts of a project, and foster informed decision making and public participation. An EIR is not required to consider alternatives that are infeasible. The lead agency is responsible for selecting a range of project alternatives for examination and must publicly disclose its reasoning for selecting those alternatives. There is no ironclad rule governing the nature or scope of the alternatives to be discussed other than the "rule of reason." This section of the State CEQA Guidelines also provides guidance regarding what the alternatives analysis should consider. Subsection (b) further states the purpose of the alternatives analysis is as follows:

> Because an EIR must identify ways to mitigate or avoid the significant effects that a project may have on the environment (Public Resources Code [PRC] Section 21002.1), the discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly.

The State CEQA Guidelines require that the EIR include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the project. If an alternative would cause one or more significant effects in addition to those that would be caused by the project as proposed, the significant effects of the alternative must be discussed, but in less detail than the significant effects of the project as proposed (CCR Section 15126.6[d]).

The State CEQA Guidelines further require that the "no project" alternative be considered (CCR Section 15126.6[e]). The purpose of describing and analyzing a no project alternative is to allow decision makers to compare the impacts of approving a project with the impacts of not approving the project. If the no project alternative is the environmentally superior alternative, CEQA requires that the EIR "…shall also identify an environmentally superior alternative among the other alternatives." (CCR Section 15126[e][2]).

In defining "feasibility" (e.g., "… feasibly attain most of the basic objectives of the project …"), CCR Section 15126.6(f) (1) states, in part:

> Among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure,

general plan consistency, other plans or regulatory limitations, jurisdictional boundaries (projects with a regionally significant impact should consider the regional context), and whether the proponent can reasonably acquire, control or otherwise have access to the alternative site (or the site is already owned by the proponent). No one of these factors establishes a fixed limit on the scope of reasonable alternatives.

In determining what alternatives should be considered in the EIR, it is important to consider the objectives of the project, the project's significant effects, and unique project considerations. These factors are crucial to the development of alternatives that meet the criteria specified in Section 15126.6(a). Although, as noted above, EIRs must contain a discussion of "potentially feasible" alternatives, the ultimate determination as to whether an alternative is feasible or infeasible is made by the lead agency's decision-making body, here the SMUD Board of Directors (Board). (See PRC Sections 21081.5, 21081[a] [3].)

6.2 Considerations for Selection of Alternatives

6.2.1 Attainment of Project Objectives

As described above, one factor that must be considered in selection of alternatives is the ability of a specific alternative to attain most of the basic objectives of the project (CCR Section 15126.6[a]). Chapter 2, "Project Description," articulated SMUD's project objectives for the proposed Solano 4 Wind Project, which is repeated below:

- Contribute to a diversified energy portfolio that will aid in the continued improvement of air quality in the Sacramento Valley Air Basin by decreasing reliance on fossil fuel combustion for the generation of electricity, and reduce SMUD's exposure to price volatility associated with electricity and natural gas.

- Assist SMUD in achieving the Board of Directors' directive of using dependable renewable resources to meet SMUD's RPS obligations. This goal is consistent with Senate Bill 100, which was signed into law in 2018.

- Develop an economically feasible wind project that will deliver a reliable supply of up to 91 MW of electrical capacity at the point of interconnection.

- Accommodate the long-term viability of agricultural use within the Montezuma Hills.

6.2.2 Summary of Project Impacts

Sections 3.1 through 3.11 of this Draft EIR address the project-specific environmental impacts of the project. Potentially feasible alternatives were developed with consideration of avoiding or lessening the significant adverse impacts of the project. Many of the significant impacts can be mitigated through application of existing regulations or inclusion of mitigation measures. Despite compliance with existing regulations governing protection of environmental resources and application of all feasible mitigation, project construction and operation would result significant unavoidable impacts in the following category:

Air Quality

- Construction emissions of criteria air pollutants and ozone precursors (significant unavoidable)

6.2.3 Alternatives Considered but Not Evaluated Further

State CEQA Guidelines Section 15126.6(c) provides the following guidance in selecting a range of reasonable alternatives for the project. The range of potential alternatives for the project shall include those that could feasibly accomplish most of the basic objectives of the project, and could avoid or substantially lessen one or more of the significant effects. The EIR should also identify any alternatives that were considered by the lead agency, but were rejected during the planning or scoping process.

The following describes alternatives considered by SMUD but not evaluated further in this Draft EIR, and a brief description of the reasons for SMUD's determination.

Offsite Alternatives

Offsite alternatives are generally considered in EIRs when one of the means to avoid or eliminate the significant impacts of a project is to develop it in a different available location. Such alternatives are especially appropriate where a proposed project would put a site to uses different than those contemplated in the governing general plan, which presumably reflects land use policies reached after much deliberation and public involvement, and also in instances where there is an ample supply of similarly situated land that could be developed for a project.

The *Solano County General Plan* designates the site for Agriculture. Commercial wind farms are a permitted use in the agricultural designation. The project site is also located in a "wind resource area," as identified on the California Wind Project and Wind Resource Areas map produced by the California Energy Commission 2018. Conditions suitable for the sustained winds necessary to operate are found in limited locations in the state.

The Wind Resource Area contains eight separate commercial wind energy projects operating 607 WTGs. Siting the project at the current location would maximize use of existing infrastructure including electrical transmission systems with adequate capacity to accommodate additional load and land that is accessible by existing roadways. The project site represents the only available major land area that is reasonably capable of attaining the project objectives. Therefore, alternative locations for the project are not considered feasible and, thus, these alternatives are not evaluated further in this Draft EIR.

Alternative Technologies

Various technologies are available to produce renewable energy resources, including solar, wind, and nuclear energy. The primary project objective is to support California's renewable energy and greenhouse gas emission reduction laws and goals and SMUD Board directives by constructing and operating a wind energy facility. Most of the other project objectives are similarly focused on developing wind energy facility while minimizing environmental effects and minimizing land use conflicts.

Nuclear energy is a non-fossil fuel (non GHG-producing) energy resource, and unlike solar or wind energy, production of nuclear energy does not depend on the availability of sun or wind. Nuclear energy was produced at the decommissioned Rancho Seco Nuclear Generating Station from 1975 until 1989, when it was closed by public vote. Developing a nuclear energy facility at the project site would be infeasible because use of nuclear power was already voted down once; it is a controversial technology due to public perception around safety and uncertainties over the disposition of spent fuel; it is relatively expensive to build and operate (compared to most if not all technologies); and there is overall doubt that it would ever be approved even if considered due to these factors. Diablo Canyon, the last nuclear power plant built in California, was completed in 1986, over 30 years ago, and is the last operating commercial nuclear power plant in the state; PG&E, its owner and operator, plans to close it. In short, nuclear power plants do not appear to have an immediate future in California. Finally, due to their footprint, number of employees, and operating characteristics including safety risks, they would likely result in greater impacts compared to the proposed project.

6.3 Alternatives Selected for Detailed Analysis

6.3.1 No Project Alternative

State CEQA Guidelines Section 15126.6(e) (1) requires that the no project alternative be described and analyzed "to allow decision makers to compare the impacts of approving the project with the impacts of not approving the project." The no project analysis is required to discuss "the existing conditions at the time the notice of preparation is published…as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services" (Section 15126.6[e][2]).

Under this alternative, the project would not be constructed on the project site, and as a result, none of the permits or approvals that would be required by SMUD and various permitting agencies for the project would occur. The existing WTGs on Solano Phase 1 would continue to generate approximately 15MW although increased maintenance needs would result in higher costs to operate over time. This alternative would not go as far toward meeting the objectives identified in Section 6.2.1, "Attainment of Project Objectives."

Environmental Analysis

Aesthetics

Under the No Project Alternative, the project site would continue to support operation of existing WTGs associated with Solano Phase 1. This alternative would not result in any change related to the visual character or quality of the site or lighting or glare. Overall aesthetic impacts of this alternative would be less than the project. *(Less)*

Air Quality

Under the No Project Alternative, the proposed project would not be constructed and the existing WTGs would continue to operate on the site. Construction emissions of criteria air pollutants, ozone precursors, and toxic air contaminants (TACs) would not increase above existing levels. This alternative would avoid the project's short term significant air quality impact. *(Less)*

Biological Resources

Under the No Project Alternative, the proposed project would not be constructed and the existing WTGs would continue to operate on the site. This alternative would not result in new impacts to biological resources. Overall, impacts to terrestrial biological resources would be less compared to the project. *(Less)*

Archaeological, Historical, and Tribal Cultural Resources

Under the No Project Alternative, the proposed project would not be constructed and the existing WTGs would continue to operate on the site. Because no earth-disturbing activities would occur, there would be no potential for disturbance to known or unknown resources. Impacts to archeological, historical and tribal cultural resources would be less than the project. *(Less)*

Geology and Soils

Under the No Project Alternative, the proposed project would not be constructed and the existing WTGs would continue to operate on the site. Therefore, the No Project Alternative would have no impact associated with geological hazards or soil erosion. All of the existing site conditions described in Section 3.5.2, "Environmental Setting," would remain. The No Project Alternative would not create any conditions to increase those existing hazards or reduce the risks to people, structures, or the environment. Overall, the No Project Alternative would result in less geology and soils impacts compared to the project. *(Less)*

Greenhouse Gas Emissions and Energy

Under the No Project Alternative, the proposed project would not be constructed and the existing WTGs would continue to operate on the site. Construction emissions of GHGs would not be generated by the project and GHG emissions would remain at existing levels. The No Project Alternative would have no impact associated with energy demand. The fundamental purpose of the project is to reduce GHG emissions produced in, or to support beneficial uses in, the Sacramento region. Under the No Project Alternative, GHG emissions associated with power generation would not be reduced to the degree identified by SMUD Integrated Resources Plan and policy directives to rely on renewable resources to meet 50 percent of SMUD's load by 2030.[1] Thus, the No Project Alternative would generate greater GHG emissions compared to the project. *(Greater)*

Hazards and Hazardous Materials

Under the No Project Alternative, the proposed project would not be constructed and the existing WTGs would continue to operate on the site. The use of hazardous materials onsite would continue as existing WTGs are maintained. Under either development scenario, SMUD would continue to follow all existing hazardous material and emergency response plans currently in place. The No Project Alternative would result in continued operation of WTGs. Under the proposed project, fewer WTGs would operate on the site compared to existing conditions, so the No Project Alternative would result in greater hazards or hazardous materials impacts compared to the project. *(Greater)*

Hydrology and Water Quality

Under the No Project Alternative, the proposed project would not be constructed and the property would existing WTGs would continue to operate on the site. Therefore, the No Project Alternative would not degrade water quality or alter the project site's existing drainage pattern. Overall, the No Project Alternative would result in less hydrology and water quality impacts compared to the project. *(Less)*

Land Use

Under the No Project Alternative, the proposed project would not be constructed and existing WTGs would continue to operate on the site. The No Project Alternative would be compatible with existing uses and no conflicts with regulatory plans or policies adopted for the protection of environmental resources would occur. Impacts under the No Project Alternative would be similar to those of the project *(*Similar*)*

Noise

Under the No Project Alternative, no new facilities would be constructed and existing onsite operations would not change. Therefore, no construction activities would take place and there would be no increases in short-term construction related noise at nearby

[1] SMUD has committed to achieving a 90% reduction in the electricity portfolio for GHG emissions by 2050, relative to 1990 levels. In addition, SMUD is also committed to help the Sacramento region more broadly reduce GHG emissions outside of the electricity sector.

sensitive receptors. Overall, the No Project Alternative would result in less noise impacts compared to the project. *(Less)*

Transportation and Traffic

Under the No Project Alternative, the proposed project would not be constructed and the existing WTGs would continue to operate on the site. The No Project Alternative would not require heavy truck trips to haul project components and does not generate construction related vehicle traffic. However, vehicle trips would still be required as the WTGs age and increasingly more maintenance activity occurs to keep them running. Traffic would not increase above existing levels and, therefore, pavement conditions along area roadways would not be degraded. Overall, the No Project Alternative would result in less transportation and traffic impacts compared to the project. *(Less)*

6.3.2 Reduced Turbine Height Alternative

SMUD contracted with Black & Veatch to conduct an assessment of options for repowering and expansion of the Solano Wind project (Black and Veatch 2018). This effort included preparation of preliminary layouts, energy production assessments, conceptual civil and electrical plans, capital and operational cost estimates, and studying vertical wind profiles on site.

Using property boundary information and the wind resource data obtained for the site, Black & Veatch developed project layouts at Solano 4 East and West, for the GE, Vestas, and Siemens turbine options. Layouts were developed with the aid of the Openwind® optimizer to maximize energy production based on changes in wind resource and wake loss across the site and adherence to required setbacks dependent upon turbine height. Turbine spacing was chosen in view of the rotor diameter of the turbine model and wind resource with focus on maximizing use of existing roads and infrastructure to reduce construction costs.

WTGs considered during the first phase of the study included use of GE Energy model GE2.3-116 (turbine height of 138 meters) which is rated at a capacity of 2.3 MW. Under the Reduced Turbine Height Alternative, a total of 27 WTGs would be placed on the property (13 at Solano 4 east and 14 at Solano 4 west) in a configuration similar to that of the proposed project. Total capacity for the Reduced Turbine Alternative would be 62 MW compared to the 91 MW for the proposed project.

The Reduced Turbine Height Alternative would attain most of the objectives identified in Section 6.2.1, “Attainment of Project Objectives,” because it would involve construction and operation of a wind energy facility. However, as noted above, even the larger proposed project does not yield the full current unfulfilled need for solar energy in SMUD’s service area, so a reduction in scale would need to be offset by an additional project or projects. Moreover, the project objectives related to supporting California’s renewable energy and greenhouse gas emission reduction laws and goals and SMUD Board

Strategic Directive 9, would be achieved at a lesser degree under this alternative due the reduced amount of renewable energy that would be generated compared to the project.

Environmental Analysis

Aesthetics

Under this alternative, the visible elements of the WTG facility would be reduced in height (138 meters tall with hub height of 80 meters) compared to the proposed project which could install 150 meter WTGs with a hub height of 105 meters. Smaller structures are less visible at distance and are compatible with the surrounding wind energy projects that utilize older, smaller WTGs. Under either development scenario, impacts to nighttime views would be minimized through incorporation of ADLS technology that activates aircraft warning lights only when an aircraft is detected. Therefore, overall visual impacts under this alternative would be less than those of the project. *(Less)*

Air Quality

Selection of the Reduced Turbine Height Alternative would introduce 27 WTG compared to the 22 WTG for the project. As such, all construction activities and resulting criteria air pollutants would be similar to, but slightly greater than, those of the project.

Under either development scenario, construction activity would emit NO_X and PM_{10} at levels that could exceed YSAQMD and BAAQMD daily emissions thresholds for these pollutants. Similar to the project, implementation of Mitigation Measure 3.2-1 would reduce construction-related exhaust and dust emissions but not below the threshold and this impact would remain at significant levels. On an operational basis, neither the Proposed Project nor Reduced Turbine Height Alternative would conflict with an adopted plan or policy adopted for the purpose of environmental protection. Thus, assuming the implementation of Mitigation Measure 3.2-1, short-term construction air quality impacts would be similar to, but slightly greater than, the project. *(Similar, but slightly greater)*

Biological Resources

The Reduced Height Alternative would result in construction of 27 smaller, WTGs than the 22 WTGs proposed by the project. Therefore, the Reduced Turbine Height Alternative would result in more ground disturbance than would the project. Placement of a greater number of tall structures in the area may increase the chances for protected birds to hit obstacles while flying. Direct and indirect effects to waters and jurisdictional resources could result from grading, trenching, pile driving, and creation of impervious surface adjacent to wetlands and non-wetland waters under either development scenario. Potential indirect effects include potential changes in hydrology through modification of surface flows or perched groundwater flows, penetration of the hardpan, shading of wetlands, and reduced water quality caused by erosion and siltation or herbicide use (chemical runoff or drift). Implementation of the mitigation measures identified in Section 3.3, “Biological Resources,” would apply to this alternative, but like the project, would not reduce impacts on biological resources to less-than-significant levels. Overall, impacts to biological resources would be greater compared to the project. *(Greater)*

Archaeological, Historical, and Tribal Cultural Resources

Under this alternative, a greater number of WTGs would be constructed on the project site. This alternative may result in greater disturbance to unknown archaeological sites because additional roadways would be required to access the additional WTGs and more foundations would be created compared to the project. Because earthwork and ground-disturbing activities would occur under this alternative, implementation of Mitigation Measures 3.4-1, 3.4-2, and 3.4-3 would apply, and would reduce impacts to less-than-significant levels. Overall, impacts under this alternative would be greater than those of the project since more land disturbance would likely occur. *(Greater)*

Geology and Soils

Implementation of this alternative would involve grading and other ground-disturbing activities similar to the project, but over a slightly larger footprint. Therefore, this alternative would have similar impacts associated with geological hazards and soil erosion compared to the project. Implementation of Mitigation Measures 3.5-1 through 3.5-3 would apply to this alternative, and would reduce these impacts to less-than-significant levels. Overall, this alternative would result in more geology and soils impacts compared to the project. *(Greater, but no significant difference)*

Greenhouse Gas Emissions and Energy

Under this alternative, a greater number of WTGs would be constructed on the project site compared to the project. As such, all construction activities and resulting GHG emissions would be similar to, but slightly greater than, the project. A reduction in the annual generation capacity of the facility would also result in a reduction in avoided GHG emissions. Thus, while this alternative would result in a slight reduction of construction-related GHG emissions, the reduction would be smaller than the amount of GHG avoided emissions lost through the reduction of wind energy capacity compared to the proposed project. Potential impacts of climate change on this alternative would be the same as the project because the site would be unchanged in location and the same County policies are in place to respond to the effects of climate change. Thus, GHG impacts under this alternative would be less than significant. *(Greater)*

Hazards and Hazardous Materials

Implementation of this alternative would involve the storage, transport, and handling of hazardous materials; exposure of or disturbance to contaminated soils or asbestos containing materials; and exposure of people or structures to a significant fire risk, similar to the project. Implementation of Mitigation Measures 3.7-1a through -1d, -2a through -2d, and -3a through -3c would apply to this alternative, and would reduce these impacts to less-than-significant levels.

The Reduced Turbine Height Alternative would introduce structures that exceed the 200 foot threshold. Both development scenarios would be subject to review by the FAA under Part 77 and must implement lighting and other physical measures applied during this process to avoid posing an obstacle to aviation by intruding into flight patterns or interfering with operation of radar equipment. The FAA found the proposed project was not a hazard to aviation, and while WTGs may be detected by radar sensors, this would not cause an unacceptable adverse impact on ATC operations. The placement of more WTGs on the project site may increase radar interference compared to the proposed project as the density of WTGs is greater than for the project. Overall, the Reduced Turbine Height Alternative may result in greater hazards or hazardous materials impacts compared to the project. *(Greater)*

Hydrology and Water Quality

Implementation of this alternative would involve grading and movement of soil, which could result in erosion and sedimentation, and discharge of other nonpoint source pollutants in stormwater runoff that could degrade local water quality. Installation of the WTGs under either development scenario would not alter existing onsite drainage patterns. Implementation of Mitigation identified for the proposed project would reduce these impacts to less-than-significant levels. Overall, this alternative would result in similar hydrology and water quality impacts compared to the project. *(Similar)*

Land Use

The Reduced Turbine Height Alternative would be sited on land designated for agricultural use. WTGs are permitted in the agricultural designation and would be compatible with the existing grazing and farming occurring on neighboring parcels and no conflicts with regulatory plans or policies adopted for the protection of environmental resources would occur. Impacts under this alternative would be similar to those of the project. (Similar)

Noise

The Reduced Turbine Height Alternative would require slightly more heavy truck trips to deliver components to the site as more turbines would be placed on the site compared to the project. As such, all construction activities would be slightly greater to the proposed project and, therefore, construction noise impacts would be slightly greater. Under either development scenario, noise impacts are less than significant, so the slight increase in construction noise impacts is not substantially greater than those for the project. Therefore, overall impacts under this alternative would be similar to those of the project. *(Similar)*

Transportation and Traffic

The Reduced Turbine Height Alternative would require slightly more heavy truck trips needed to haul more WTGs than those for the project. Operational trips would be similar since the O&M activity would not change. As such, all construction activities would be similar but slightly greater to the proposed project and, therefore, construction-related increases to vehicle traffic on the surrounding roadway network and resulting degradation of pavement conditions would be similar. Implementation of Mitigation Measures 3.10-2a and -2b would apply to this alternative, and would reduce these impacts to less-than-significant levels. Overall, this alternative would result in similar transportation and traffic impacts compared to the project. (*Similar*)

6.4 Comparison of Alternatives

Table 6-1 summarizes the environmental analyses provided above for the project alternatives.

Table 6-1 Comparison of the Environmental Impacts of the Alternatives in Relation to the Project

Resource Area	Project	No Project Alternative	Reduced Turbine Height Alternative
Aesthetics	Less than significant (with mitigation)	Less	Less
Air Quality	Significant and unavoidable	Less	Similar
Biological Resources	Less than significant (with mitigation)	Less	Greater
Archaeological, Historical, and Tribal Cultural Resources	Less than significant (with mitigation)	Less	Greater
Geology and Soils	Less than significant (with mitigation)	Less	Greater
Greenhouse Gas Emissions and Energy	Less than significant	Greater	Greater
Hazards and Hazardous Materials	Less than significant (with mitigation)	Greater	Greater
Hydrology and Water Quality	Less than significant (with mitigation)	Less	Similar
Land Use	Less than significant	Similar	Similar
Noise	Less than significant (with mitigation)	Less	Similar
Transportation and Traffic	Less than significant (with mitigation)	Less	Similar
Source: Compiled by AECOM in 2019			

6.5 Environmentally Superior Alternative

CCR Section 15126.6 suggests that an EIR should identify the “environmentally superior” alternative. “If the environmentally superior alternative is the ‘no project’ alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives.”

The No Project Alternative is the environmentally superior alternative, as all of the significant impacts of the project would be avoided. However, the No Project Alternative would not meet any of the project objectives because a wind energy facility would not be constructed on the project site.

The Reduced Turbine Height Alternative would result in the introduction of WTGs on the property that could result in significant impacts to biological resources, including special-status species and their habitat. Because this alternative would involve construction of a greater number of WTGs compared to the project, all construction activities and resulting impacts associated with air quality, GHG emissions, and transportation and traffic be similar to, or slightly greater than, the project. The GHG emissions that would be reduced from lesser construction would not be sufficient to offset the avoided GHG emissions associated with less capacity (assuming this capacity is otherwise provided by a non-renewable resource). Further, because this alternative would be constructed on the project site, impacts associated with aesthetics; archaeological, historical, and tribal cultural resources; geology and soils; hazards and hazardous materials; and hydrology and water quality would be similar to, or slightly greater than, the project.

This alternative would meet most of the project objectives. However, reducing the height of the WTGs would result in a project that produces a smaller amount of energy (62 MW compared to the 92 MW for the proposed project) at a higher price. This would result in reduced ability to comply with California’s renewable energy and greenhouse gas emission reduction laws and goals and SMUD Board Strategic Directive 9. For these reasons, the proposed project is the environmentally superior alternative.

7 List of Preparers

7.1 SMUD

Amanda Beck, Senior Project Manager

Ammon Rice, Environmental Specialist 2

Buck Cutting, Manager Renewable Energy Assets

7.2 AECOM

Petra Unger – Project Director

Ken Koch – Project Manager

Susan Sanders, Ph.D. – Senior Biologist

Michael Kuehn, Ph.D. – Senior Avian Specialist

Kate Dadey, Ph.D. – Senior Regulatory Specialist

Jim Estep Biologist

Jasmine Greer – Biologist

Vanessa Tucker – Biologist

Julie Roth – Biologist

Allison Kochan – Environmental Planner

Issa Mahmodi – Noise Specialist

Chris Shields – Senior Noise Specialist

Richard Deis – Senior Archaeologist

Diana Ewing – Archaeologist

Chandra Miller – Architectural Historian

Bryn Montgomery – GIS Specialist

Lisa Clement – Senior GIS Specialist

Vivian Gaddie – Graphic Artist

Julie Nichols –Technical Editor

Beth Duffey – Technical Editor

Deborah Jew – Document Production

7.3 Craig Stevens

Robert Klousner

Mary Wilson

Craig Stevens

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No references are cited in this chapter.

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