

DRAFT ENVIRONMENTAL ASSESSMENT FOR THE SHILOH III WIND PLANT PROJECT HABITAT CONSERVATION PLAN

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February 2011



U.S. Fish and Wildlife Service. 2011. *Draft Environmental Assessment for the Shiloh III Wind Plant Project Habitat Conservation Plan*. February. (ICF 00263.09). Sacramento, CA. With technical assistance from ICF International, Sacramento, CA.

Contents

Chapter 1	Purpose and Need	1-1
1.1	Background	1-1
1.2	Species Covered by the HCP	1-2
1.3	Proposed Action Addressed in this EA	1-2
1.4	Purpose of and Need for the Proposed Action	1-2
Chapter 2	Proposed Action and Alternatives	2-1
2.1	Alternative 1: Proposed Action	2-1
2.2	Alternative 2: No Action	2-9
2.3	Alternatives Eliminated from Further Consideration	2-9
Chapter 3	Affected Environment and Environmental Consequences	3-1
3.1	Aesthetics	3.1-1
3.2	Agricultural Resources	3.2-1
3.3	Air Quality and Climate Change	3.3-1
3.4	Biological Resources	3.4-1
3.5	Cultural Resources	3.5-1
3.6	Geology, Minerals, and Paleontological Resources	3.6-1
3.7	Hazardous Materials	3.7-1
3.8	Hydrology and Water Quality	3.8-1
3.9	Land Use and Planning	3.9-1
3.10	Noise	3.10-1
3.11	Public Health Hazards	3.11-1
3.12	Recreation	3.12-1
3.13	Traffic and Transportation	3.13-1
3.14	Utilities and Public Service Systems	3.14-1
Chapter 4	Other Required Analysis	4-1
4.1	Unavoidable Adverse Effects	4-1
4.2	Irreversible and Irrecoverable Commitments of Resources	4-1
4.3	Short-Term Uses versus Long-Term Productivity	4-1
4.4	Cumulative Effects	4-1
4.5	Environmentally Preferable Alternative	4-6
Chapter 5	List of Preparers	5-1

Tables

3.3-1	Applicable Federal and State Ambient Air Quality Standards.....	3.3-1
3.3-2	Federal de Minimis Threshold Levels for Criteria Pollutants in Nonattainment Areas.....	3.3-3
3.3-3	Federal de Minimis Threshold Levels for Criteria Pollutants in Maintenance Areas	3.3-4
3.3-4	Ambient Air Quality Monitoring Data Measured at the Fairfield-Chadbourne and Vallejo Monitoring Stations.....	3.3-6
3.3-5	Summary of Construction Equipment.....	3.3-10
3.3-6	Summary of Construction Emissions (tons)	3.3-10
3.3-7	Summary of GHG Emissions from Construction Activities (metric tons)	3.3-11
3.4-1	Special-Status Wildlife Species Potentially Occurring in the Montezuma Hills Region	follows 3.4-6
3.4-2	Special-Status Plants Potentially Occurring in the Montezuma Hills Region	follows 3.4-6
3.5-1	Previous Cultural Resource Studies Conducted in the Plan Area and 1-Mile Buffer Area	3.5-6
3.5-2	Previously Recorded Archaeological Resources in the 1-Mile Buffer Area.....	3.5-8
3.10-1	Definition of Acoustical Terms	3.10-1
3.10-2	Typical Noise Levels.....	3.10-2
3.10-3	Construction Noise Levels	3.10-5
3.10-4	Amount of Noise Reduction (dB) Required to Achieve 50 dBA CNEL Criterion	3.10-6

Figures

		Follows Page
1-1	Project Location.....	1-2
1-2	Montezuma Hills Wind Resource Area.....	1-2
2-1	Turbine Options.....	2-2
2-2	Impact Analysis Schematic	2-2
2-3	Shiloh III Wind Plant Project Features.....	2-2
3.1-1	Locations of Visual Simulation Viewpoints.....	3.1-4
3.1-2	Existing and Simulated Views	3.1-4
3.4-1	Biological Resources in the Plan Area	3.4-4
3.10-1	Locations of Long-Term Measurement Sites and Sensitive Receptors	3.10-4
3.10-2	Predicted Noise Levels and Criteria at Area Residences	3.10-6

Acronyms and Abbreviations

AB	Assembly Bill
AFB	Air Force Base
ANSI	American National Standards Institute
APN	Assessor's Parcel Number
area of impact	area of potential effects
BGEPA	Bald and Golden Eagle Protection Act
BMPs	best management practices
CAISO	California Independent System Operator
Cal-OSHA	California Occupational Safety and Health Administration
CDC	California Department of Conservation
CEC	California Energy Commission
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
County	Solano County
CRHR	California Register of Historical Resources
CTS	California tiger salamander
CWA	Clean Water Act
dB	decibel
DFG	California Department of Fish and Game
EA	environmental assessment
EIR	environmental impact report
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FMMP	Farmland Mapping and Monitoring Program
Frac-out	drilling fluid leak
GIS	geographic information system
HCP	Habitat Conservation Plan
HDD	horizontal directional drilling
ITP	incidental take permit
kV	kilovolt

MBTA	Migratory Bird Treaty Act
Mph	miles per hour
MW	megawatt
NAHC	Native American Heritage Commission
NEMA	National Electrical Manufacturers Association
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
NWIC	Northwest Information Center
PCBs	polychlorinated biphenyls
PG&E	Pacific Gas & Electric
Plan Area	4,570-acre Shiloh III property
Quads	quadrangle maps
RCRA	Resource Conservation and Recovery Act
RWQCBs	Regional Water Quality Control Boards
SFRWQCB	San Francisco RWQCB
Shiloh III study	Avian Monitoring Study and Risk Assessment for the Shiloh III Wind Power Project, Solano County, California
SHPO	State Historic Preservation Officer
SMUD	Sacramento Municipal Utility District
SR 12	State Route 12
SWANCC	Solid Waste Agency of Northern Cook County
SWPPP	Storm Water Pollution Prevention Plan
UCMP	University of California, Berkeley Museum of Paleontology
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
VOR	VHF Omni-directional Radio Range
WEGE	Western Geo-Engineers

Chapter 1

Purpose and Need

This environmental assessment (EA) has been prepared by the U.S. Fish and Wildlife Service (USFWS) pursuant to the National Environmental Policy Act (NEPA). It evaluates the effects of issuing an incidental take permit (ITP) under Section 10 (a)(1)(B) of the federal Endangered Species Act (ESA) for activities covered by the Shiloh III Wind Plant Project Habitat Conservation Plan (HCP). Under section 10(a)(2)(A) of the ESA, any application for an ITP must include a “habitat conservation plan” that details the impacts of the incidental take allowed by the ITP on affected species and how the impacts of incidental take will be minimized and mitigated to the maximum extent practicable.

The permit applicant, enXco, proposes to develop a commercially viable wind energy facility that would deliver renewable energy to the Pacific Gas & Electric (PG&E)/California Independent System Operator (CAISO) power grid to meet California’s Renewable Portfolio Standard goals and help reduce greenhouse gas emissions pursuant to AB32 and Solano County’s (County’s) general plan. Up to 59 wind turbines, providing 320–400 million kilowatt hours (kWh) of renewable energy per year, would be built on the approximately 4,600-acre Shiloh III project area (Plan Area) in Solano County (Figure 1-1). The project would be constructed in a location that supports suitable habitat for California tiger salamander (*Ambystoma californiense*) (CTS), a species listed as threatened under the ESA. The HCP has been developed to ensure that impacts on this federally listed species are adequately avoided, minimized, and mitigated in accordance with requirements pursuant to Section 10(a)(2)(B) of the ESA.

The ESA and its implementing regulations prohibits take of any fish or wildlife species that is federally listed as threatened or endangered without prior approval pursuant to either Section 7 or Section 10(a)(1)(B) of the ESA. ESA defines *take* as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” 50 CFR 17.3 further defines the term *harm* in the take definition to mean any act that actually kills or injures a federally listed species, including significant habitat modification or degradation.

Issuance of a Section 10 ITP constitutes a discretionary federal action by USFWS and is thus subject to NEPA, which requires that all federal agencies assess the effects of its action on the human environment.

1.1 Background

The Shiloh III Wind Plant Project would be constructed in the 4,600-acre Plan Area in the Collinsville–Montezuma Hills Wind Resources Area (WRA) adjacent to existing energy producing facilities, most notably wind turbine generators in the Sacramento Municipal Utility District (SMUD) project area, the High Winds LLC project area, the enXco V (formerly US Windpower) project area, the Shiloh I project area, and the Shiloh II project area (Figure 1-2).

The Plan Area is in an actively farmed area of Solano County with adjacent wind farms. The primary land uses in the Plan Area are grazing and dryland farming. Nine rural residences are present in the Plan Area, and 13 are located in the vicinity. Small portions of the Plan Area are also being used for natural gas exploration, drilling, and extraction. These ongoing uses are not under the control of the permittees and would not be covered activities under the HCP. Surrounding communities include Bird’s Landing, approximately 6 miles from the western border of the Plan Area, and Rio Vista, approximately 1 mile east of the Plan Area.

The Plan Area is entirely under private ownership. It comprises 35 privately owned parcels owned by 23 local landowners. enXco does not own any of the land in the Plan Area, but leases it for the proposed wind plant project.

Land within the Plan Area is zoned Exclusive Agriculture (A-160) according to the Code of Solano County, Zoning Regulations. Wind farms are allowed as conditional uses in Exclusive Agricultural zone designations. The project is also within one of the County's designated WRAs identified in the Resources Element of the General Plan.

enXco must obtain a conditional use permit (CUP) from Solano County California to develop the project. As conditions of approval, the project must also comply with requirements, including setbacks, set forth in the Solano County General Plan with respect to wind energy development.

1.2 Species Covered by the HCP

CTS, federally listed as threatened under the ESA, is the single species covered by the HCP. An additional 22 state- and federally listed species potentially occurring in the Montezuma Hills Region were considered for inclusion in the HCP but are not covered for various reasons. These species, and the rationale for not including each in the HCP, are discussed in Appendix A of the HCP.

1.3 Proposed Action Addressed in this EA

The Proposed Action is USFWS's issuance of a Section 10 ITP for activities covered by the proposed HCP. The HCP addresses two sets of activities: (1) implementing the proposed Shiloh III Wind Plant facilities (referred to as covered activities in the HCP), and (2) those activities proposed to protect and conserve CTS in the course of carrying out the covered activities. The Section 10(a)(2)(B) permit holders would be enXco and, for a small portion of the project related to transmission interconnection, PG&E; hereafter, this HCP refers to both as the permittees. The permit duration for the HCP is 36 years, corresponding with a 30-year lease of the project properties, an expected option for a 4-year extension, and up to 2 years to complete decommissioning of the project.

Accordingly, this EA analyzes the direct, indirect, and cumulative impacts of approving the HCP and issuing an ITP, including impacts of the covered activities and conservation measures proposed to avoid, minimize, or mitigate potential effects on CTS.

1.4 Purpose of and Need for the Proposed Action

USFWS needs to ensure compliance with ESA and continue to protect, conserve, and enhance the survival of CTS and its habitat. The CTS population in Solano County is limited in its distribution to the central portion of Solano County, and USFWS has a need to conserve this population for its conservation value.

The purpose of the federal action is to issue an ITP to enXco that enables enXco to develop a commercially viable wind energy facility in the Collinsville–Montezuma Hills WRA that would deliver renewable energy to the PG&E/CAISO power grid to meet California's Renewable Portfolio Standard goals and help reduce greenhouse gas emissions pursuant to Assembly Bill (AB) 32 and Solano County's General Plan.

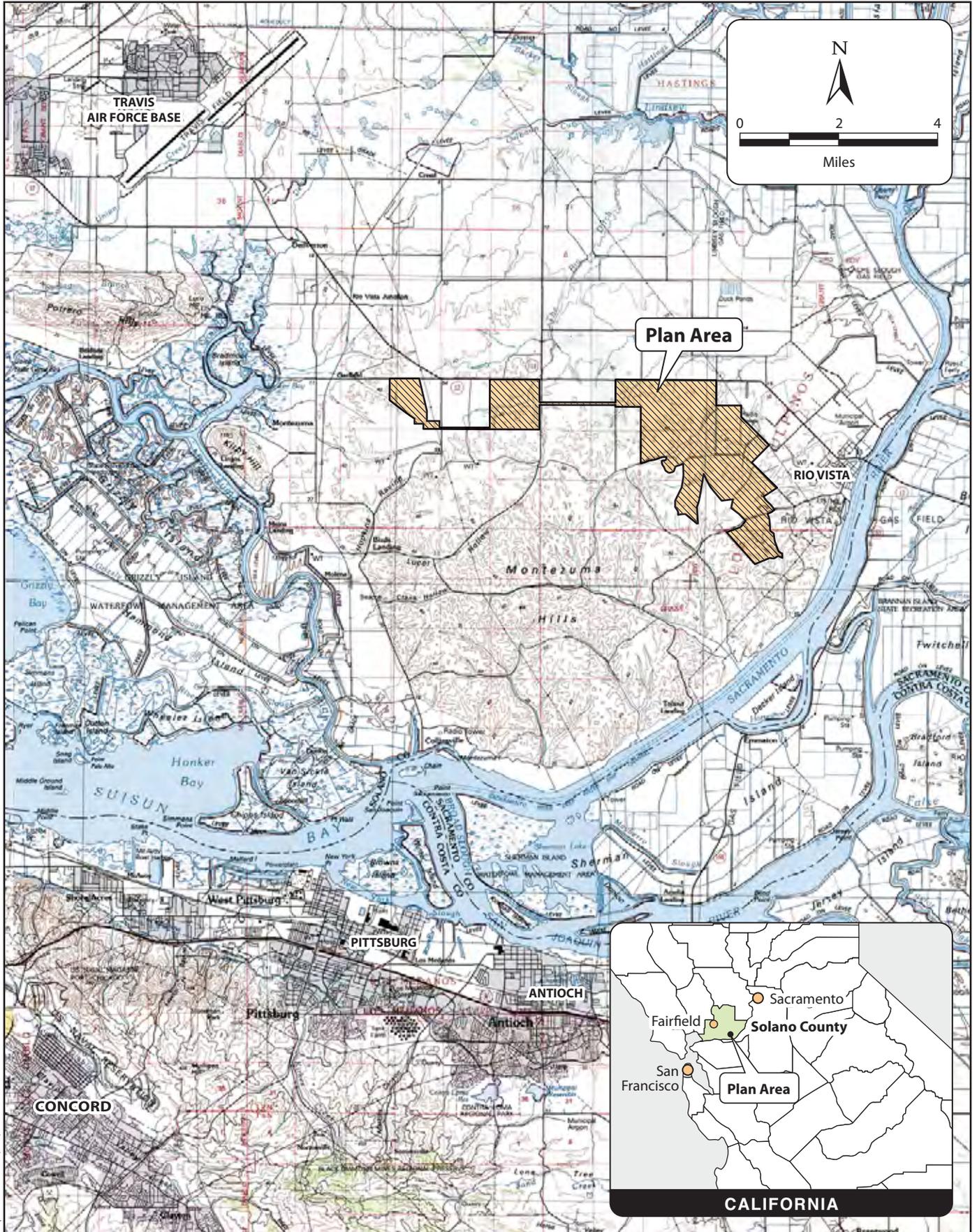
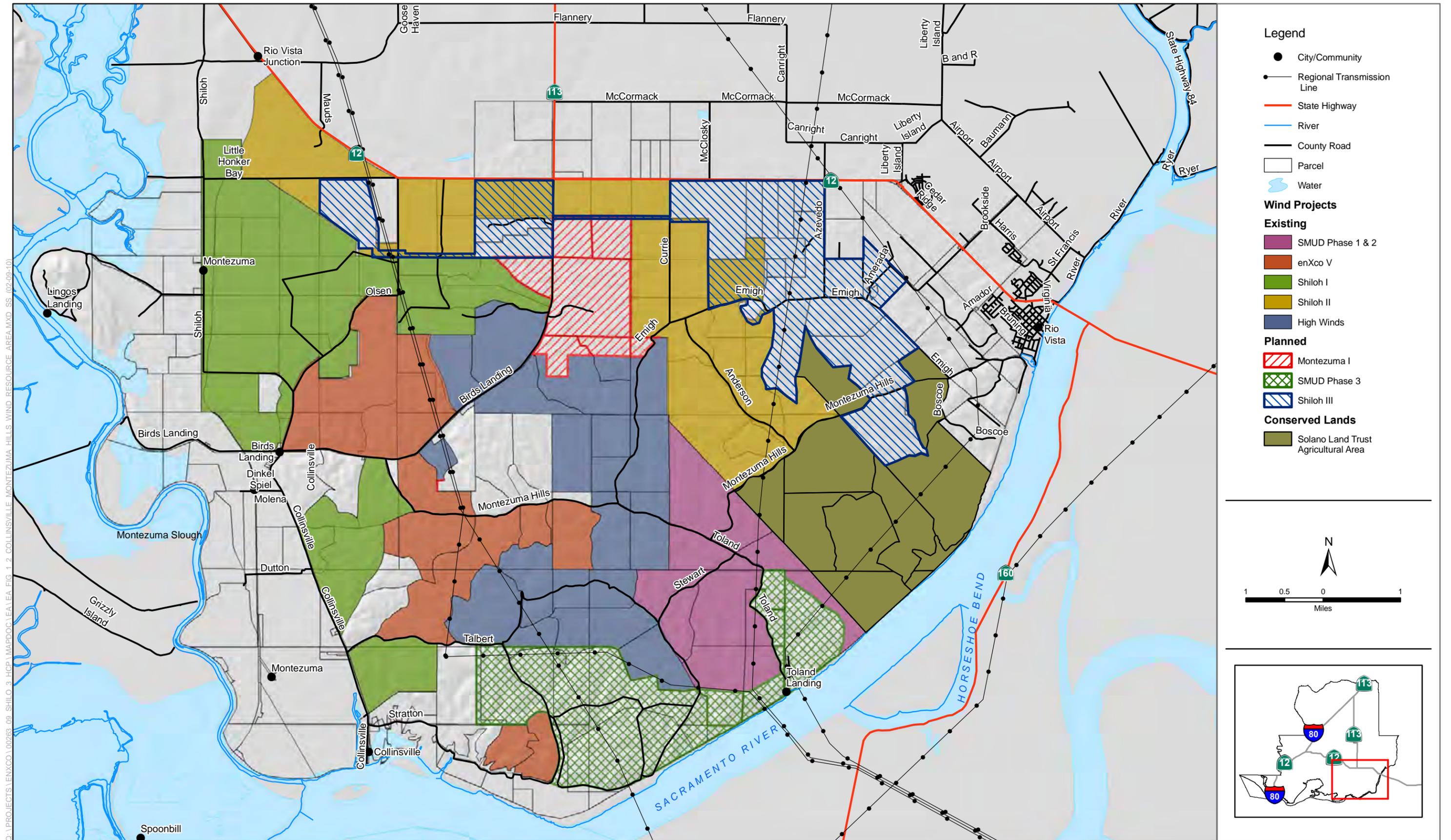


Figure 1-1
Shiloh III Regional Location



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Figure 1-2
Collinsville-Montezuma Hills
Wind Resource Area

This purpose and need establishes the basis for determining whether other viable alternatives to the Proposed Action may meet the project's intended purpose and reduce potential effects. Alternatives considered for this analysis are the No-Action Alternative and the Proposed Action.

Chapter 2

Proposed Action and Alternatives

As referenced in the Council for Environmental Quality's NEPA regulations regarding the contents of an EA (40 CFR 1508.9[b]), NEPA Section 102[2][E] requires federal agencies to develop, study, and briefly describe alternatives to any proposed action with the potential to result in unresolved resource conflicts. This chapter describes the alternatives considered by USFWS during preparation of the HCP: the Proposed Action, the No-Action Alternative, and alternatives considered but rejected from further consideration.

2.1 Alternative 1: Proposed Action

The Proposed Action comprises issuance of the ITP requested by the permittees and implementation of the proposed Shiloh III project HCP, including covered activities and conservation measures to avoid, reduce, or mitigate effects on CTS. A number of environmental commitments have been incorporated into the covered activities to reduce the effects of the project on the human environment.

2.1.1 Covered Activities

Shiloh III is a new project to be developed in the Montezuma Hills area adjacent to the recently permitted and built 150 MW Shiloh II project.

The project would require the construction of access roads, foundations for wind turbine towers and meteorological towers, underground power collection lines, PG&E's 0.25-mile 230 kilovolt (kV) line, and other minor support facilities such as staging and storage areas. Grading would be required for the construction of new access roads, the improvement of existing access roads to deliver project materials, and the construction of pads to support wind turbine foundations. To minimize the amount of earth movement, grading would follow existing elevation contours to the degree possible; moreover, the project has been designed to avoid wetlands, low-lying drainage areas, and residences throughout the Plan Area. Wetlands are being avoided through siting and subsurface horizontal directional drilling (HDD).

Project Components

Construction of the project would involve construction of up to 59 wind turbines, each with a maximum height of 415 feet (126.5 meters). Each wind turbine would require a foundation, access roads, and a power collection system, which includes underground cables and a dedicated substation. Additional information and detail on the project components can be found in the Shiloh III project HCP (ICF 2010).

Turbines

Up to 59 wind turbines would be placed in the Plan Area. Three turbine types (Repower MM92-2.0 MW, Clipper Liberty 2.5 MW, and Vestas V90-2.0 MW) are being considered for the project. All three have the same approximate rotor diameter. Despite their differing energy outputs, the selection would not affect the overall turbine configuration because of their similarities in size. The turbine type ultimately selected for the proposed project would depend primarily on product availability and the manufacturer's ability to support the construction schedule.

Each wind turbine, including the rotor blade (when pointing straight up), would be a maximum of 415 feet (126.5 meters) tall (Figure 2-1). Each tower (measured to the rotor hub) would be a maximum of 262.5 feet (80 meters) tall. The rotor blades would be a maximum of 304 feet (93 meters) in diameter. The turbine towers would be painted a neutral color to reduce their visibility.

Wind turbine towers would be set back from public rights-of-way and existing residences in accordance with Solano County requirements. All turbine towers would be locked, and the substation would be fenced and locked to prevent unauthorized entry.

Foundations and Roads

Each tower foundation would be 24 feet in diameter in the center of a 92-foot-wide graveled building pad. Sixteen-foot-wide graveled access roads would be constructed from existing roadways in the Plan Area to each turbine location. The project would require the construction of approximately 18 linear miles of new roads. Figure 2-2 is a schematic of the proposed foundation and construction pad size as well as roadway dimensions used to evaluate physical impacts of the Proposed Action.

The access roads, would be sited in upland areas to avoid drainages and water features to the extent feasible. Roads that must cross drainages would incorporate standard culvert design to ensure the integrity of the road structure and adequately pass storm flows.

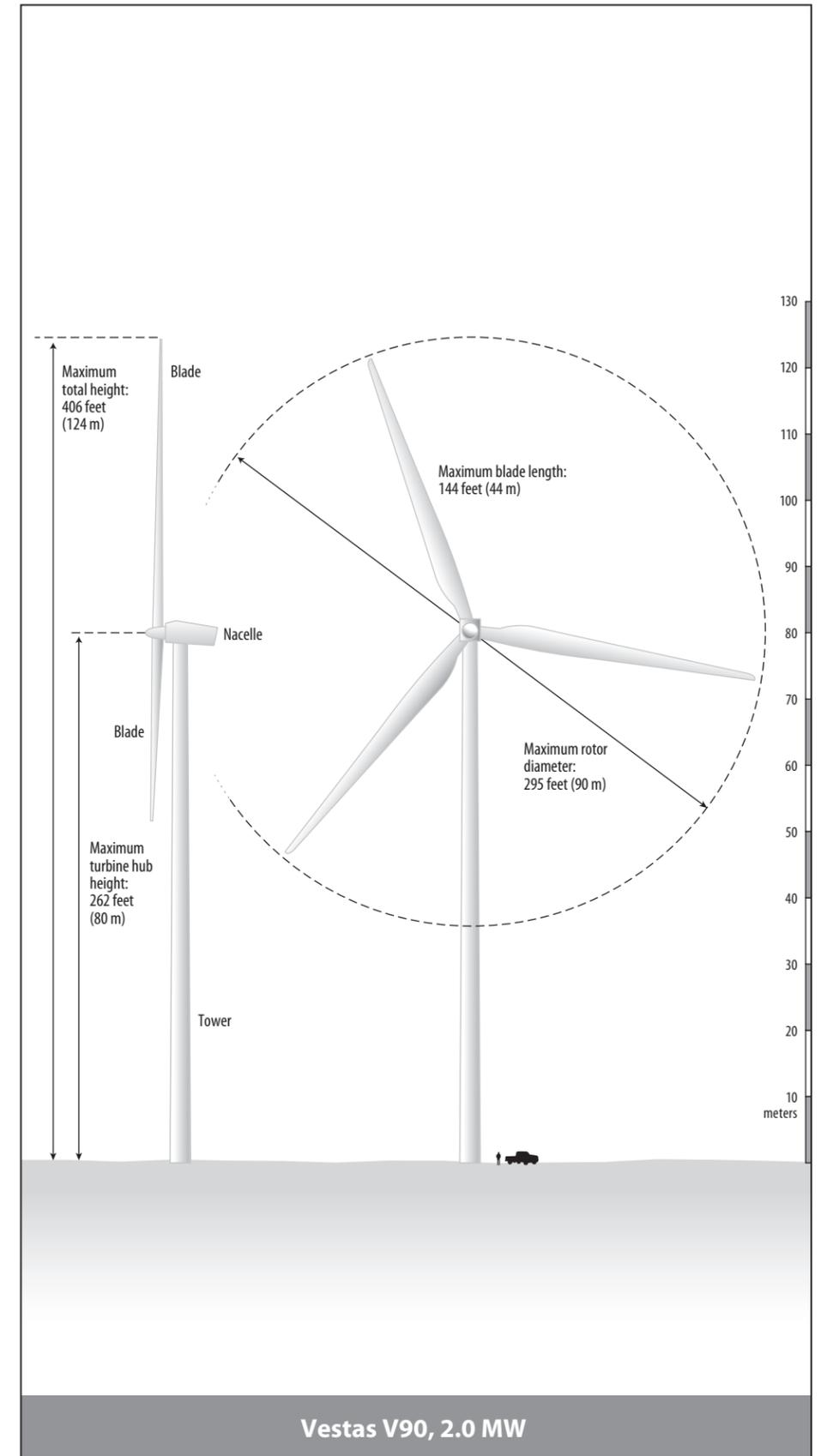
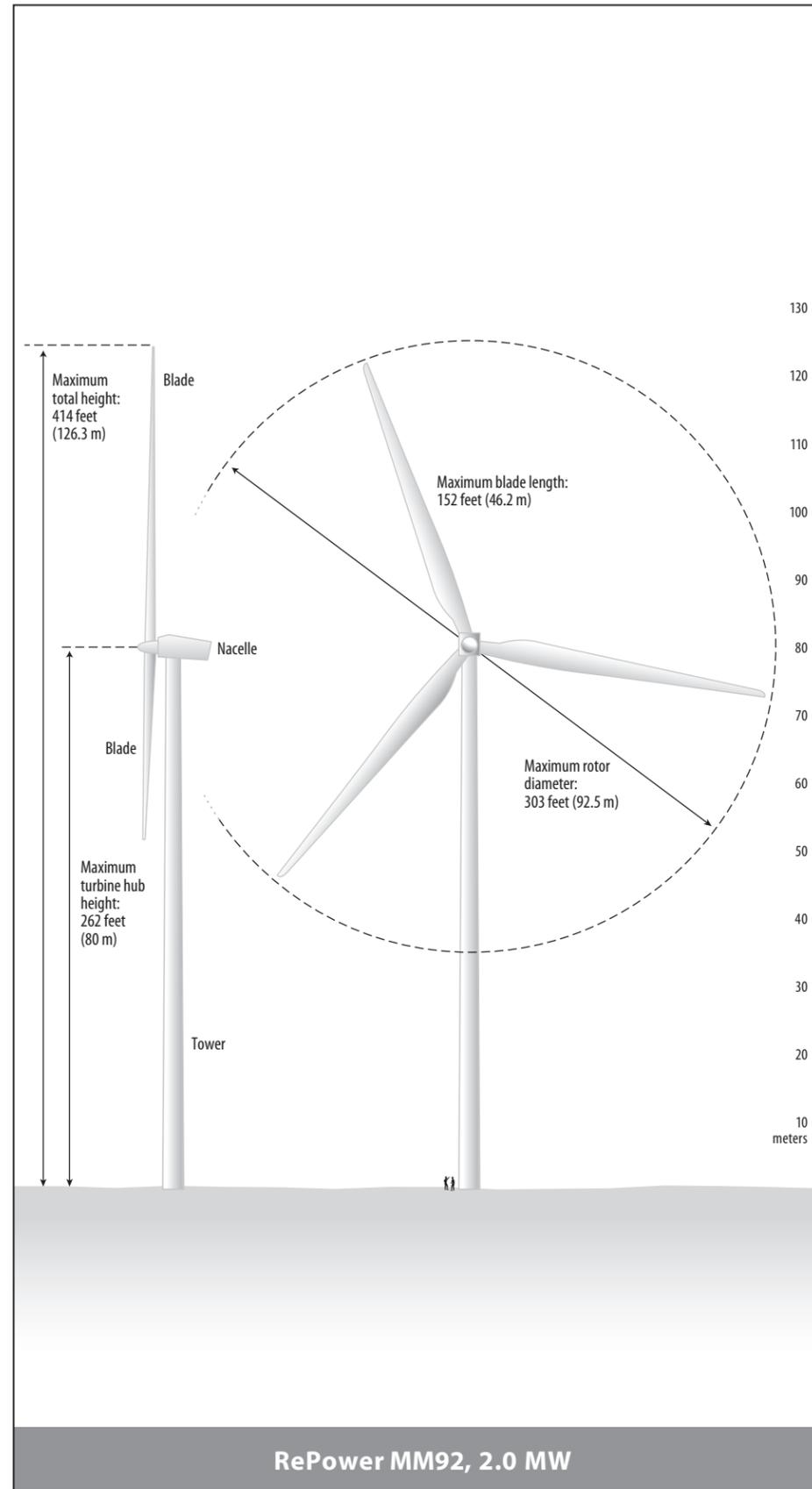
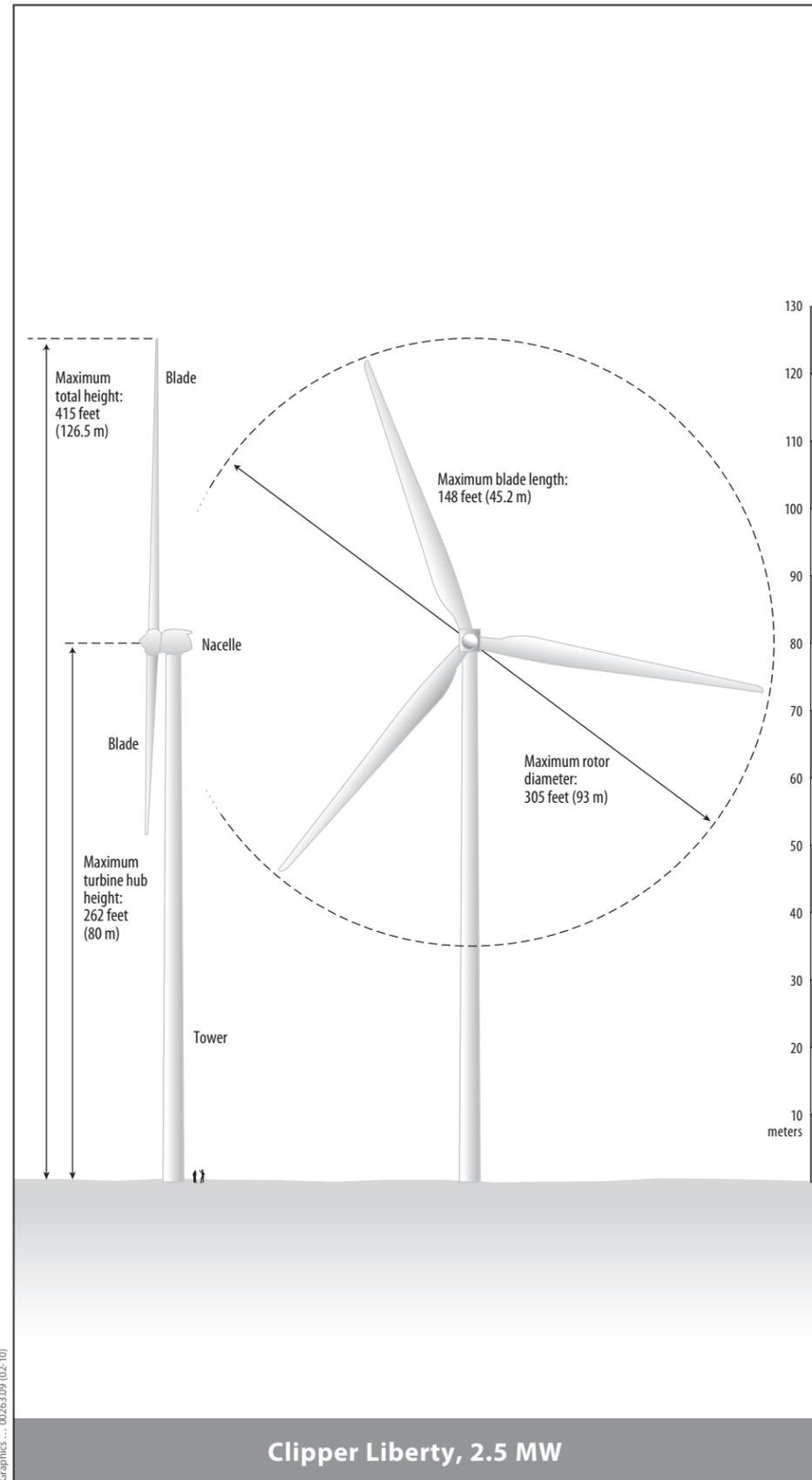
Turbine Locations

Up to 59 turbines would be placed across the Plan Area (Figure 2-3). The preliminary turbine placement plan was developed considering topography and environmental factors including the location of wetlands, vernal pools, alkali meadows, and sensitive plant species. Special consideration was given to siting all turbines at least 0.25 mile from State Route (SR) 12, a designated scenic route, as required by Solano County.

Power Collection System

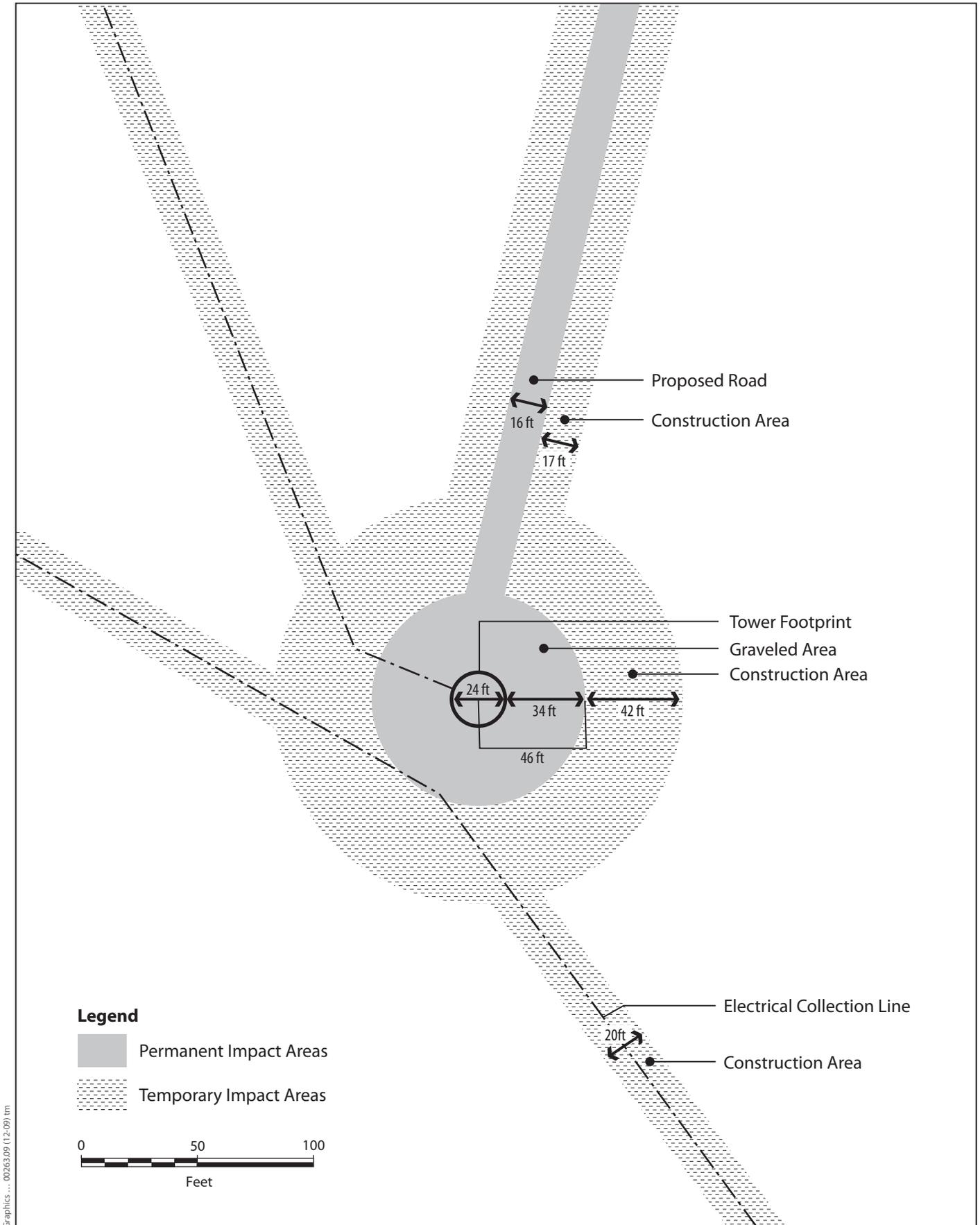
The project's power collection system would collect the power produced by the turbines. Power generated by each turbine is fed into a pad-mounted transformer, which is in turn connected to an array of junction boxes distributed throughout the Plan Area to facilitate power collection. Collection lines for the project would be installed underground from each turbine site to the substation.

Collection lines are constructed by excavating a trench; laying power collection lines; and recovering, recompacting, and reseeded soil above the collection line. Where the collection lines could intersect with seasonal wetlands, enXco will use HDD. HDD is expected to be necessary in approximately 11 locations. HDD bores can be steered: this allows the bore machine to sit at ground level, bore down and along the alignment, and direct the bore back up to the surface at a distant point. The Shiloh III substation, centrally located in the Plan Area, would be constructed at one of two possible locations within the Plan Area and would connect to the underground system carrying electricity from the individual turbines. The Option 1 location would connect with the transmission line by a new 350-foot transmission line. The Option 2 location would connect to existing PG&E facilities by a new 0.25-mile transmission line. Either transmission line would be constructed by PG&E and would entail the installation of approximately five "short poles" under Option 1 and five 80-foot transmission towers and several "short-poles" under Option 2 to connect with the nearby transmission line. The substation access road in Option 1 would require installation of approximately 1 culvert ; Option 2 would require installation of approximately two culverts and a small (4- by 4-foot) catchment basin. Under either option, power would be transmitted via the

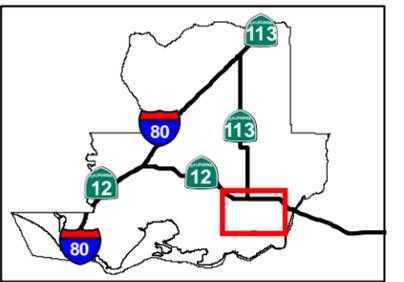
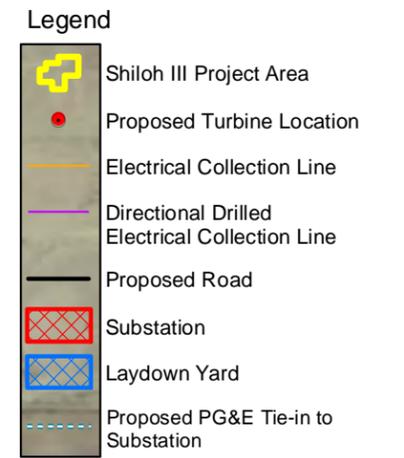
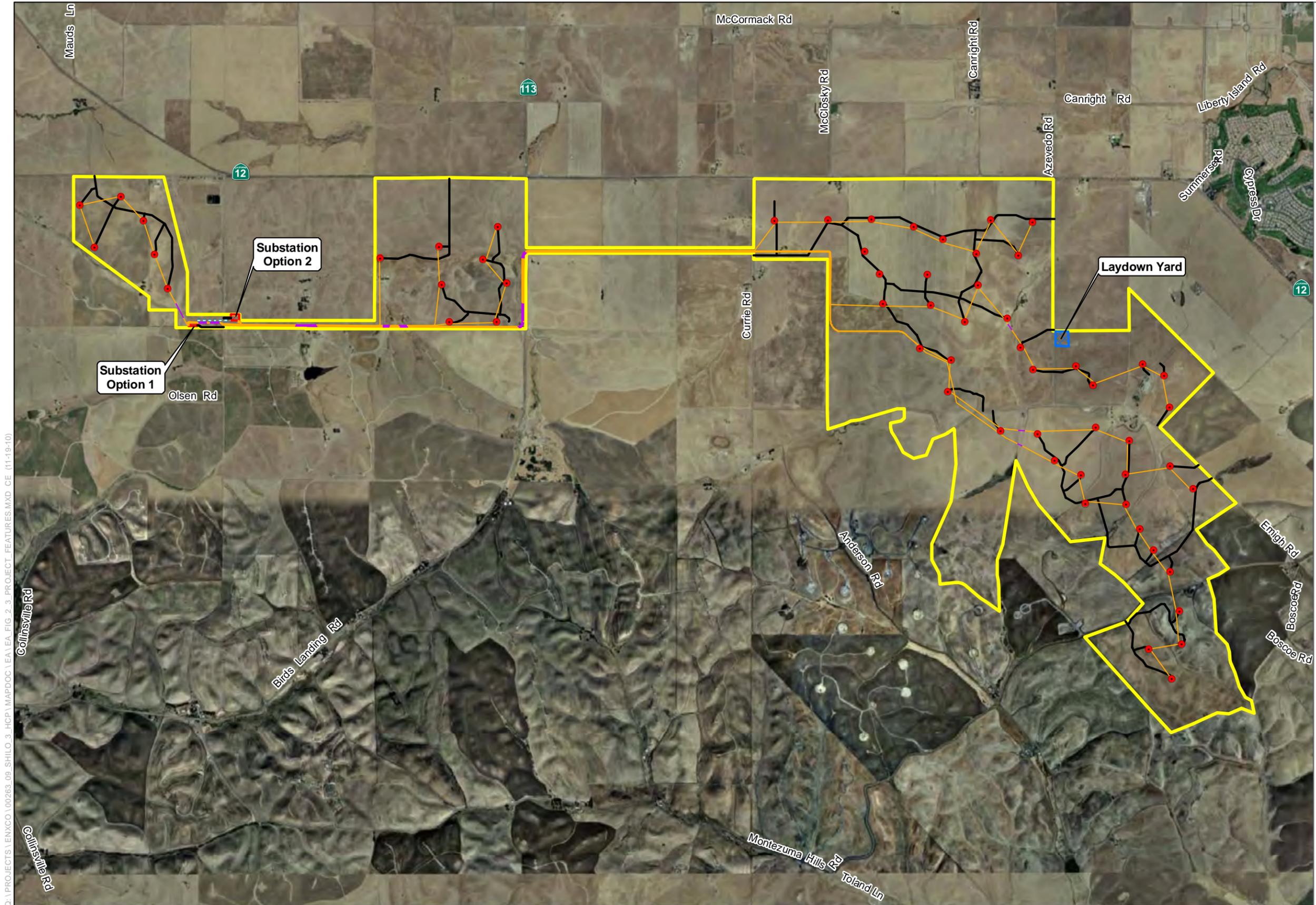


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Figure 2-1
Turbine Options



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Base Map: ESRI Stream Imagery, iCubed 2009

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Figure 2-3
Shiloh III Wind Plant
Project Features

existing PG&E 230 kV transmission line, which would not require expansion to accommodate the Shiloh 3 project.

Maintenance

Maintenance activity in the Plan Area would consist of equipment maintenance and replacement, collection system repair, and gravel application and repair to roads as necessary. Maintenance-related impacts would occur within the footprint of the originally designated disturbance areas. Road gravelling and repairs would be limited to the footprint of the existing and new roads. Turbines may need to be repaired or replaced at a rate of approximately one every 5 years. No new permanent effects are anticipated during maintenance activities, and temporarily affected areas would be restored within 1 year of disturbance.

Decommissioning

enXco is securing a 30-year lease for properties in the Plan Area. If the lease is renewed following that period, enXco could request an extension of the ITP; however, there is no guarantee that the request would be granted. If the lease is not renewed, then the site would be decommissioned within the ITP duration of 36 years. The roads would be removed unless the landowner desires that they be retained (in accordance with County regulations and County permit terms). All hard facilities, including turbine foundations and wires at the substation, would be removed to a depth of 3 feet during the dry season. Large equipment would be necessary to remove the roads and return them to grade. All decommissioning related ground disturbance would be temporary, limited to the original disturbance footprint, and returned to preproject conditions within 1 year of ground disturbance.

2.1.2 Conservation Strategy for California Tiger Salamander

This section describes the conservation strategy that the permittees will implement to minimize and mitigate impacts on CTS as required under Section 10(a)(2)(B) of the ESA. Please refer to the HCP for a detailed description of the proposed conservation strategy for CTS.

Biological Goal

Biological goals are designed to minimize and mitigate impacts on the species as required under Section 10(a)(2)(B) of the ESA. The biological goal for the CTS conservation strategy was developed subsequent to the analysis of potential project-related impacts on CTS as presented in Chapter 4 of the HCP. The biological goal as set forth in the HCP is to provide the continuing protection and existence of CTS in Solano County by purchasing mitigation credits at the Elsie Gridley Multi-Species Conservation Bank or an equivalent conservation bank in Solano County.

Conservation Approach

The conservation approach comprises avoidance and minimization measures and compensatory mitigation.

The permittee will minimize impacts through the use of various minimization measures such as setbacks from CTS aquatic habitat, flagging and avoidance of sensitive areas, and limits on work season. BMPs will also be implemented to ensure that indirect impacts from such causes as erosion, sedimentation, and hazardous spills are avoided to the extent possible. In addition to these avoidance and minimization measures, the permittee will mitigate unavoidable impacts on upland habitat for CTS through the purchase of conservation credits at a USFWS- and DFG- bank or banks, as appropriate for this species.

Additional information on the conservation approach, including monitoring requirements, adaptive management, and reporting requirements, can be found in the Shiloh III project HCP (ICF 2010).

Monitoring

Compliance monitoring involves verifying that the permittees are carrying out the terms of the HCP. A biological monitor will be present during construction activities and any maintenance activities that involve ground disturbance to ensure that construction personnel adhere to the specified impact avoidance and minimization measures. Effects and effectiveness monitoring will include a postconstruction evaluation to assess the actual acreage affected, as well as a series of evaluations to assess habitat restoration success (refer to Appendix C of the HCP).

Adaptive Management

Adaptive management will be applied to the habitat restoration program. As described further in Appendix C of the HCP, temporarily affected areas will be restored and monitored. If monitoring indicates that restoration performance standards are not being met, areas will be re-seeded and/or other remedial measures will be implemented to ensure restoration success.

2.1.3 Environmental Commitments

In addition to the conservation measures set forth in the HCP to avoid, minimize, or mitigate impacts on CTS, the following environmental commitments are incorporated into the covered activities to reduce the effects on the human environment associated with implementing the Shiloh III project. These environmental commitments are similar to the requirements of Solano County, California, the agency with discretionary approval of the project. The requirements will become conditions of approval in the County's Conditional Use Permit (CUP) for the project, and the implementation of the requirements will be ensured by the County. Failure to comply with any of the County's conditions of approval can result in revocation of the CUP.

EC-1: Limit marking and lighting to Federal Aviation Administration requirements

Nighttime lighting will be limited to the minimum required by FAA. In keeping with these requirements, only synchronized red flashing lights will be installed for nighttime visibility. There will be no daytime lighting, and strobe lighting will not be used unless specifically required by FAA.

EC-2: Implement emission controls

The permittees will implement standard emission control measures, such as reduction of idling time, proper maintenance and adjustment of equipment, limiting the hours of operation for heavy equipment, and ensuring that sources of emissions are equipped with appropriate emission control systems. Moreover, any stationary sources of emissions (e.g., generators, compressors) within 100 feet of a residence or other sensitive receptor will be equipped with a control system to reduce normal exhaust emissions.

EC-3: Prepare and implement a Construction Fugitive Dust Control Plan

The permittees will develop, implement, and adhere to the conditions of a Construction Fugitive Dust Control Plan in accordance with industry standards and appropriate Air Quality Management District requirements. This plan will also require stabilization/restoration of all temporarily disturbed areas. The plan will be sufficiently detailed to demonstrate that the best available control measures are being

implemented. It will also establish a process for addressing complaints received from sensitive receptors (either directly or through the County) and procedures for resolving such complaints.

EC-4: Conduct preconstruction surveys for sensitive biological resources

Prior to any ground-disturbing activities, qualified biologists will conduct preconstruction surveys to identify any sensitive biological resources present in the Plan Area. These resources will be accurately depicted on design drawings, and the permittees will ensure that project design avoids these resources to the extent possible, and avoids ground-disturbing activities within 250 feet of aquatic resources. Preconstruction surveys will be conducted to identify the boundaries of occurrences of bearded popcornflower, Carquinez goldenbush, and pappose spikeweed. Surveys for nesting raptors will be conducted in accordance with USFWS and DFG guidelines for nesting raptors and agency and California Burrowing Owl Consortium protocols for western burrowing owl. If burrowing owls are determined to be subject to disturbance from project activities, owls may be passively relocated during the nonbreeding season (September 1–January 31). During the breeding season, avoidance measures will be implemented in accordance with DFG guidelines.

EC-5: Conduct environmental awareness training for all construction and operational personnel

A qualified biologist will provide training for all construction personnel prior to their commencing work in the Plan Area. This training will address the identification of sensitive resources, the need to protect them, the appropriate practices to ensure their protection, the appropriate action in response to accidental infractions, and the possible consequences (e.g., fines, imprisonment) for violation of state or federal environmental law.

EC-6: Avoid and minimize disturbance or removal of sensitive biological resources

Under the direction of a qualified biologist, all sensitive biological resources—special-status plant occurrences; wetlands and other aquatic features; the single elderberry shrub (habitat of valley elderberry longhorn beetle) identified in the Plan Area; observed nests/dens of raptors, migratory birds, or western burrowing owls—will be fenced or flagged as appropriate. Construction activities will be excluded from designated sensitive areas. In addition, construction activities will be confined to necessary work areas, thereby minimizing the extent of ground disturbance and vegetation removal even in common habitats. Staging areas will be sited, when possible, in areas that are already disturbed or of marginal quality as wildlife habitat (e.g., near the existing maintenance building). Appropriate buffer zones around sensitive biological resources will be established in consultation with USFWS and DFG or in accordance with accepted guidance or practice (e.g., 500 feet for raptor nests, 250 feet for other special-status bird nests, 250 feet for sensitive aquatic habitats, 500 feet for groves of mature trees that could support raptor nesting habitat, and at least 100 feet for elderberry shrubs). Where western burrowing owls are present, DFG guidelines will be followed to ensure that disturbance is avoided or, when necessary, owls are properly relocated.

EC-7: Avoid disturbance of wetlands and other aquatic features

In addition to avoidance measures described in EC-4, where underground power lines (either power collection lines or transmission lines) cannot be routed to avoid aquatic features, it may be necessary to use horizontal directional drilling (HDD) to install the line beneath the feature. If such is the case, HDD will be used during the dry season (typically April–October, or when surface water is not present). A qualified environmental monitor will be present during drilling operations to ensure that proper procedure is being followed and that there is no evidence of a drilling fluid leak (frac-out). In the event of a frac-out,

or if the potential for a frac-out is suspected, work will stop and appropriate containment and cleanup procedures will be initiated. Containment materials (e.g., straw bales, sediment fences) will be installed between the bore site and nearby sensitive resources prior to drilling. In addition, response equipment (e.g., vacuum truck) and additional containment materials will be available onsite for rapid response to a frac-out. Finally, the exit and entry pits will be at least 100 feet from the boundaries of the feature that is being crossed.

EC-8: Avoid impacts on California tiger salamander through avoidance, minimization, and compensatory mitigation measures

The conservation strategy for CTS is detailed in the HCP for the Shiloh III Wind Plant project. Implementation of the HCP and issuance of the ITP constitute the federal action that triggers the need for NEPA compliance.

EC-9: Mitigate potential turbine-related mortality of birds and bats

The wind project has been designed to avoid specific high use areas, and it incorporates the latest turbine design, which has been shown in recent studies to reduce levels of mortality. Offsite mitigation will be achieved through conservation at a DFG-approved location (through fee title purchase, conservation easement, or purchase of mitigation bank credits) of an area of habitat suitable to support breeding opportunities for affected raptor species; such mitigation will also minimize effects on avian and bat species. This conservation area will be equal to or greater than the total rotor-swept area of the wind project—up to 97 acres based on the worst case wind turbine scenario (i.e., the largest wind turbine proposed for the project).

EC-10: Restore temporarily disturbed areas to preconstruction conditions

Following ground-disturbing activities, all areas that are not occupied by project facilities will be graded to their original contours and revegetated to restore habitat and prevent erosion and possible water quality effects associated with sediment transport. Revegetated areas will be monitored until ground cover has been established in accordance with the requirements of the HCP (see Appendix C of the HCP).

EC-11: Avoid impacts on unanticipated cultural and paleontological resources

Surveys for cultural resources within the area of potential effect have been completed for the project. If the permittees revise the project footprint outside areas addressed by cultural resource surveys, supplemental surveys will be conducted by a qualified archaeologist to ensure that no cultural resources are present. If cultural resources are identified, appropriate avoidance and mitigation measures will be implemented in accordance with regulatory requirements and standard cultural resource management practice. If unanticipated cultural resources (e.g., chipped or ground stone, historic debris, building foundations, human remains) or paleontological resources are discovered during activities within the previously surveyed area, all work within 100 feet of the discovery site will stop until a qualified archaeologist or paleontologist can assess the significance of the find.

EC-12: Conduct a geotechnical study

The permittees will conduct a geotechnical study to evaluate soil conditions and geologic hazards in the Plan Area. The study will be signed by a California-registered Professional Geologist. The study will evaluate the location of seismic features and the potential for associated hazards such as ground shaking, liquefaction, and landslides; the stability of existing cut-and-fill slopes; the presence and location of

collapsible or expansive soils; the potential for wind erosion, water erosion, sedimentation, and flooding; and the foundation material upon which project components will be constructed.

EC-13: Implement appropriate facility design

In accordance with the findings and recommendations of the geotechnical study, all new facilities and appurtenant features (e.g., roadbeds, cut-and-fill slopes) will be designed to withstand ground shaking and changes in soil density and to avoid landslide- and mudflow-prone areas.

EC-14: Develop and implement a Storm Water Pollution Prevention Plan

To minimize loss of soils through erosion and to reduce impacts (e.g., effects on water quality, sediment transport, impacts on agricultural activities), the permittees will prepare and implement a SWPPP. The SWPPP will include such measures as erosion control practices, watering disturbed areas, and stockpiling and reuse of topsoil for restoration of temporarily disturbed areas, as well as BMPs for management of construction equipment and fluids that could contribute to water quality impacts.

EC-15: Develop a Hazard Materials Business Plan/Spill Prevention, Control, and Countermeasure Plan

In accordance with the California Health and Safety Code and California Code of Regulations, the permittees will prepare a Hazard Materials Business Plan/Spill Prevention, Control, and Countermeasure Plan to avoid spills and minimize impacts in the event a spill occurs. The plan will discuss hazardous materials management, delineation of hazardous material and hazardous waste storage areas, prevention and response procedures, access and egress routes, and notification procedures. All hazardous materials (e.g., paints, solvents) will be stored in accordance with manufacturer's specifications and federal regulations.

EC-16: Develop a plan for encountering hazardous materials

To minimize adverse effects associated with the unexpected encounter of hazardous materials, the permittees will develop a written plan to specify the proper reporting, handling, and disposal of any such materials. The plan will specify that, should any such materials be encountered, construction activities will stop, the permittees will notify the Solano County of Resource Management, and a licensed waste disposal contractor will remove the materials from the site in accordance with federal, state, and local requirements.

EC-17: Comply with Solano County and FAA requirements for turbine siting

The Shiloh III project is designed to comply with requirements established in the Solano County General Plan and Zoning Ordinance. In the event that site-specific considerations warrant setback reductions, the permittees will comply with requirements in the General Plan and zoning title. Determinations of No Hazards will be obtained from FAA prior to commencement of construction.

EC-18: Implement Noise-Reducing Construction Practices

The permittees will implement noise-reducing construction practices such that noise from construction activities does not exceed 50 dBA- L_{eq} at residences during evening and nighttime hours. Measures to be implemented include but are not limited to ensuring that equipment mufflers are in good working condition, restricting work to daytime hours (7:00 a.m. to 7:00 p.m. Monday through Friday, and 8:00 a.m.

to 6:00 p.m. Saturdays and Sundays), limiting the use of pneumatic tools, and implementing a noise complaint plan.

EC-19: Comply with Solano County Noise Standards

enXco will reduce or avoid impacts of operational noise by configuring the proposed Shiloh III project such that the operation of wind turbines will not exceed a community noise equivalent level (CNEL) of 50 dBA (or the equivalent 44 dBA- L_{eq}) at nearby residences (see Table 3.10-2 for a description of noise levels). Compliance will be achieved or waived by implementing one or more of the measures listed below.

- Conduct additional analysis demonstrating that noise from actual turbines to be installed will not exceed the 50 dBA CNEL or 44 dBA- L_{eq} steady noise level criteria at any existing residence.
- Obtain a waiver from affected landowners that waives their right to any noise mitigation by the wind energy operator after the turbine(s) become operational.
- Relocate the turbines near the affected residences such that the exterior noise level standards are no longer exceeded.
- Commit to operational limitations or adjustments (e.g., partial “feathering” of the turbine blades) during nighttime hours or other provisions that would be implemented in response to noise complaints from nearby residents and verified exceedence of the 50 dBA CNEL criterion.

EC-20: Develop a grass fire control plan

The permittees will prepare and implement a grass fire control plan that specifies safety restrictions pertaining to construction activities (e.g., spark arresters on internal combustion engines, smoking restrictions), vegetation management requirements, employee training in fire safety and response, and periodic inspections by the Montezuma Hills Fire District.

EC-21: Conform with turbine design standards, building codes, and siting requirements

To prevent the exposure of the public or project employees to safety hazards, the permittees will ensure that all turbines conform to international standards for wind turbines, that all construction activities (i.e., construction of foundations and mounting of turbines on them) conform to state and local building codes, and that turbine placement is designed in compliance with the Solano County General Plan and the Solano County Zoning Ordinance.

EC-22: Develop a health and safety plan

The permittees will develop a project-specific health and safety plan to reduce the risk of accidents during construction and operation. The plan will include emergency contacts, location of the nearest hospital, and proper emergency protocols.

EC-23: Limit public access to the Plan Area

To reduce the risk of accidents involving members of the public, the permittees will restrict public access by installing locks on wind project facilities (wind turbine towers, maintenance building, substation); installing locked gates on new access roads to exclude unauthorized entry; posting appropriate signage warning of high-voltage facilities, underground cables, and the associated hazards; and training personnel to monitor for unauthorized access and follow proper procedure in the event of trespass.

EC-24: Develop and implement a traffic control plan and a transportation plan

To minimize the potential effects of construction-related traffic on local circulation, the permittees will develop and implement a traffic control plan specifying the location, schedule, and safety procedures for lane and road closures; minimizing the duration of lane closures; signage pertaining to road conditions; scheduling of construction traffic; coordination with local jurisdictions; notification to local residents of alternate routes; ensuring access for emergency vehicles at all times; and other BMPs, as appropriate, to address potential traffic impacts.

EC-25: Minimize road damage and repair road surfaces

To minimize damage to existing County roads, the permittees will obtain an encroachment permit for work within the county right-of-way; obtain hauling permits from the appropriate agencies, enter into a secured agreement with the County ensuring that any damage to County roads be repaired to preconstruction conditions by the appropriate method; and post a security bond to cover the costs of road maintenance during construction.

EC-26: Implement proper plans and notifications

Prior to issuance of building permits for the Shiloh III project, the permittees will notify all television and radio station owners within 2 miles of the Plan Area; all telecommunications facilities in the Plan Area will be identified; and effects on local residents' reception will be resolved through appropriate measures, such as enhancing reception on receiving equipment.

2.2 Alternative 2: No Action

Under the No-Action Alternative, the HCP would not be implemented, the proposed ITP would not be issued, and the covered activities for the proposed Shiloh III project would not occur. There would be no take of CTS as a result of the project. Agricultural uses—dryland farming and grazing—would continue in the Plan Area. This alternative assumes that currently planned wind production facilities in the Collinsville–Montezuma Hills WRA would continue in the vicinity of the Shiloh III Plan Area.

2.3 Alternatives Eliminated from Further Consideration

USFWS considered several alternatives that were not carried forward for analysis in this EA. Reasons for eliminating alternatives from further consideration are listed below.

- The alternative would not adequately meet project objectives.
- The alternative site was found not to be feasible for project construction.
- The alternative was assessed as likely to result in unacceptable adverse environmental and/or economic effects.

2.3.1 Alternative Development Sites

Construction of the Shiloh III project at several alternative locations was considered. A number of other WRAs in California are listed below.

- Altamont Pass (Alameda and Contra Costa Counties).
- Pacheco Pass (Merced County).
- San Geronio (Riverside County).
- Tehachapi Pass (Kern County).

Limitations constrain additional wind power development in all these WRAs, or existing development is planned for the available properties. Developing the Shiloh III project in the Altamont Pass area is restricted by a one-to-one replacement of older wind turbines and could contribute to bird strike issues in this area. Development in the San Geronio, Tehachapi Pass, or Pacheco Pass WRAs could reduce impacts on CTS, migrating birds, and bats but would likely not reduce air quality issues and would displace other planned wind power developments in these areas (Ecology and Environment 2006).

The potential for development in the Cordelia Hills WRA in Solano County was considered, but such a site was found to have additional wind development restrictions, including a greater number of sensitive residential receptors, potential recreation conflicts and fewer agricultural areas that may be compatible with wind turbine development (Ecology and Environment 2006).

Because developing the Shiloh III project on potential alternative sites would be restricted by the availability of developable areas in existing WRAs and by the potential for similar or greater impacts, these alternatives were considered infeasible.

2.3.2 Reduced Take Alternative

The Reduced Take Alternative would involve construction of 17 fewer wind turbines and approximately 5.4 miles less of access road, resulting in reductions of approximately 11.1 acres of permanent impacts and 30.5 acres of temporary impacts. Aquatic habitat would remain unaffected. While dispersal habitat could be degraded, temporarily affected areas are expected to fully recover their dispersal value within 1 year of construction. Areas of permanent effects (i.e., roads, turbine foundations) would not cause migration barriers, would remain suitable for dispersal, and would be mitigated. Overall, the magnitude of the degradation to dispersal habitat is very small compared to total suitable dispersal habitat; these effects are justified by the clear benefit of providing 320–400 million kilowatt hours (kWh) of renewable energy per year. Fewer turbines and roads would result in a nominal reduction in take, but would result in a substantial reduction in generation capacity (approximately 29% of the project's capacity). This alternative would not achieve the project purpose of constructing 130–160 MW of power; moreover, a reduction of this size would mean a decrease of 92–115 million kWh per year, diminishing the project's contribution to California's Renewable Portfolio Standard goal of a 30% reduction of greenhouse gases by 2030 pursuant to AB32.

Chapter 3

Affected Environment and Environmental Consequences

This chapter describes the affected environment (e.g., environmental setting, regulatory setting) and the potential environmental consequences that could result from implementation of the Proposed Action. The analysis considers the resource areas as shown below.

- 3.1 Aesthetics
- 3.2 Agricultural Resources
- 3.3 Air Quality and climate
- 3.4 Biological Resources
- 3.5 Cultural Resources
- 3.6 Geology, Seismicity, Soils, and Paleontological Resources
- 3.7 Hazardous Materials
- 3.8 Hydrology and Water Quality
- 3.9 Land Use and Planning
- 3.10 Mineral Resources
- 3.11 Noise
- 3.12 Public Health Hazards
- 3.13 Recreation
- 3.14 Transportation
- 3.15 Utilities and Service Systems

3.1 Aesthetics

The aesthetic value of an area is a measure of its visual character and quality, combined with the viewer response to the area. The scenic quality component can best be described as the overall impression that an individual viewer retains after driving through, walking through, or flying over an area. Viewer response is a combination of viewer exposure and viewer sensitivity.

3.1.1 Affected Environment

Regulatory Setting

Aesthetics and visual resources are regulated indirectly through a variety of federal, state, and local laws and programs. For example, the federal government does not explicitly regulate visual resources, but recognizes their value and preserves them under the aegis of the National Park, National Wildlife Refuge, National Monument, and National Scenic Byway Systems. Similarly, aesthetic values are preserved at the state level through the establishment of state parks and preserves and through the California Scenic Highway Program. In addition, although local jurisdictions are not required to address visual resources as a separate topic in their general plans, most do consider aesthetic values in developing their planning framework.

The Solano County General Plan (Solano County 2008, p. RS-36) requires the protection of views along scenic highways. In the vicinity of the Plan Area, SR 12 and SR 113 north of its intersection with SR 12 have been designated as scenic roadways.

Specific policies for roads with marshland and grassland foregrounds were developed to preserve the integrity of these views. Policies include retaining the open space around the marshland; preventing modifications to natural water movement; burying utility lines underground; avoiding development on the steeper slopes; maintaining setbacks between the proposed development and the viewshed; using materials and colors subordinate to the surrounding natural environment; minimizing grading and padding; and preventing the spread of noxious weeds.

In addition, the general plan requires a 0.25-mile setback from scenic roadways (i.e., SR 12) to minimize visual impacts (Solano County 2008, pp. RS-56–RS-57).

Environmental Setting

Since Solano County designated the Collinsville–Montezuma Hills WRA in 1987, several hundred utility-grade wind turbines have been installed throughout the hills between SR 12 and the Sacramento River, permanently altering the previous aesthetics of this area of the county (Ecology and Environment 2006). There are currently a total of 825 wind turbines in the WRA to the south and east of the Plan Area, distributed among the wind farms as listed below and shown in Figure 1-2.

- Shiloh II: 75 RePower 2.0 MW turbines.
- Shiloh I: 100 GE 1.5 MW turbines.
- High Winds: 90 V-80 turbines.
- enXcoV: 510 KCVS 56 turbines and 6 GE 1.5 MW turbines.
- SMUD: 23 V-47 turbines and 8 V-90 turbines.

Existing conditions for visual resources were identified using the Federal Highway Administration (FHWA) methodology (Federal Highway Administration 1988), which provides a systematic, standardized approach for evaluating effects on visual resources. This approach identifies a view's aesthetic value based on its inherent visual character, its visual quality, and viewers' response to it.

- **Visual character** refers to the nature of a view—put simply, what does it look like, or what is there to see? Visual character may depend on a combination of natural and artificial (urban or built) elements.
- A view's **visual quality** is described in terms of its vividness, intactness, and unity. *Vividness* describes the power or “memorable-ness” of landscape components as they combine in visual patterns. *Intactness* refers to the visual integrity of the natural or built landscape and its freedom from encroaching elements; this factor can be present in well-kept urban and rural landscapes, as well as in natural settings. *Unity* is the visual coherence and compositional harmony of the landscape considered as a whole. Typically, high-quality views are highly vivid, are relatively intact, and exhibit a high degree of visual unity. Low-quality views lack vividness, are not visually intact, and possess a low degree of visual unity (Jones et al. 1975; Dunne and Leopold 1978; Federal Highway Administration 1983, 1988).
- **Viewer response** to a view—and to potential changes in that view—depends on viewer exposure and viewer sensitivity. This analysis emphasizes the sensitivity of individual viewers rather than overall viewer exposure. *Viewer exposure* reflects the number of viewers, the distance from which they view the resource, and the duration of viewing. *Viewer sensitivity* describes the public's level of concern for particular views. It depends in part on viewer exposure, but is also affected by viewer activity, awareness, and expectations. For example, visual sensitivity is higher for views seen by people who are driving for pleasure; people engaging in recreational activities such as hiking, biking, or camping; and homeowners. Visual sensitivity tends to be lower for views seen by people driving to and from work or as part of their work (Soil Conservation Service 1978; Federal Highway Administration 1983; USDA Forest Service 1995).

Existing Views

The most extensive views of the Plan Area are those from SR 12, which follows the northern perimeter of the Plan Area and of portions of the Shiloh II Wind Project. These views are expansive landscapes of open grazing land, some agricultural fields, and rolling hills, covered at varying distances with wind turbines constructed in the course of several independent projects (Figure 1-2). Because of their expansiveness and the striking presence of the wind turbines, these would be considered highly vivid views. The views would be considered to exhibit moderate to low intactness and unity because of the presence of the turbines. Overall, visual quality would be moderate. Because of the subjective nature of aesthetics, some viewers might find the juxtaposition of wind turbines with a rolling rural landscape to be pleasing, while others might find it unattractive.

Views from Rio Vista, including the Trilogy senior housing development (discussed below), would in most cases be obstructed by intervening structures, with the possible exception of structures at the westernmost perimeter of the community. Those viewpoints with views of the Plan Area would also have views of the eastern portion of the Shiloh II Wind Project.

Viewer Groups

Sensitive viewer groups are the categories of viewers, in the context of a given project, for whom aesthetic impacts must be evaluated. Three categories of viewer groups are considered in this analysis.

Motorists

Motorists are typically considered to have moderate to low visual sensitivity because their views are typically fleeting and they are primarily focused on driving. However, SR 12 and SR 113 have been designated as scenic roadways in the County's general plan. Approximately 15,000 vehicles per day travel on SR 12; approximately 3,700 vehicles per day travel on SR 113 (Ecology and Environment 2006).

Residents

Nine residences are present in the Plan Area. All have agreed to lease their property to enXco under long-term agreements for the installation of the wind turbines and associated facilities. The nearest residential community is a senior housing development called Trilogy, immediately northeast of SR 12 approximately 1 mile from the Plan Area at the nearest point. Trilogy is within the Rio Vista city limits. An 8- to 10-foot cinderblock soundwall along SR 12 separates the single-story residences from SR 12 and views of the Plan Area.

Recreationists

Because the Plan Area and its vicinity are devoted to intensive agricultural uses, recreationists are not likely to view the Plan Area. However, the Western Railway Museum, a private nonprofit facility, is on the south side of SR 12 east of Shiloh Road. The nonprofit Bay Area Electric Railway Association, which owns and operates the museum, operates a tourist train along the Sacramento Northern Railroad, near the western portion of the Shiloh II Wind Project. Additionally, recreational boaters use the Sacramento River east and south of the Plan Area.

3.1.2 Environmental Consequences

Approach and Methods

The assessment of effects on aesthetics was based on the preliminary siting plan for the Shiloh III project, evaluation of existing conditions (i.e., existing wind projects in the vicinity), and preparation of visual simulations (Figure 3.1-1 and Figure 3.1-2a-f).

Effects

Proposed Action

Impact AES-1: Temporary visual impacts caused by construction activities

Construction of the Shiloh III project would entail grading activities and the presence of some heavy equipment associated with new turbine pads and tower construction, access roads, electrical collection lines, a laydown yard, and a substation. While it is possible that construction activities could be visible from various locations, the distance from SR 12 to the nearest construction sites would be approximately 0.5 mile or more and views from local roads and residences would be visible to relatively few people during construction. Visual effects on nearby residences would not be expected to elicit negative viewer responses because proposed construction activities would be consistent with existing wind turbine development immediately adjacent to the Plan Area, views to construction areas would be intermittent across a 4,600-acre area, only 9 local residences would be affected, and most of these have agreed to long-term leases of property for wind turbine use. Because only long-distance views of construction sites from SR 12 would be visible during construction adjacent to existing turbine development and the number of

viewers from local roads and residences would be relatively minor, this impact is not considered to be adverse.

Impact AES-2: Long-term changes in visual character

The Proposed Action would result in the introduction to the Plan Area of approximately 59 wind turbines with a maximum height of 415 feet. The Plan Area is immediately adjacent to, and in some areas overlaps, existing wind farms (Figure 1-2). This potential effect is addressed separately for the four viewer groups.

Motorists

The proposed action in the Plan Area would introduce new turbines to the viewshed on the southern side of SR 12 in an area that already has turbines of the Shiloh II Wind Project. The proposed action would entail placement of additional wind turbines. In some cases these would be nearer to SR 12 than existing turbines, but they would still be at least 0.25 mile from the roadway in accordance with local requirements. The visual character and quality would in the Plan Area would not change substantially because the addition of 59 turbines near the existing Shiloh II Wind Project would be consistent with the current overall visual experience looking south from SR 12. For example, as shown in Figures 3.1-2a, b, and c, the change in visual character from several SR 12 locations would mainly entail an increase in the perceived density of existing turbines in the viewshed across middle and background views south of SR 12. The visual quality, as expressed by viewshed vividness, intactness, and unity, would remain similar to current conditions because the pattern of wind turbine development would be consistent with existing development, the visual integrity of turbines in an agricultural setting would not change, and the visual unity would continue to be moderate to low depending on individual viewer preference. Viewer response to proposed wind plant development from motorists on SR 12 is subjective, but based on the visual simulations presented in Figures 3.1-2a, b, and c, this response is not expected to be substantial because perceived changes for passing motorists would likely be subtle and viewing time would be brief while passing the Plan Area. These minor changes to visual resources in the established WRA are not considered to be adverse because the visual context in the area would be similar to existing conditions and the change in views to a designated wind turbine development would be subtle for most viewers.

Residents

Residents within the Plan Area would be exposed to the introduction of large, nearby wind turbine structures. The visual experience for residents would likely intensify compared to existing conditions because of the scale of towers compared to residential structures. However, because of the dispersed configuration of turbines in the 4,600-acre Plan Area (59 turbines spread across 4,600 acres equates to one turbine per 78 acres), each residence would be able to see only a relatively small number of Plan Area turbines. The change in visual character, quality, and response would be expected to be minor because the project would be constructed within the context of an existing WRA and the intensity of development is consistent with the nearby Shiloh II Wind Project and existing development. Accordingly, the visual impact on residents who have agreed to lease their properties to enXco under long-term agreements is not considered adverse.

Residents in Rio Vista would have limited views of the Plan Area, and the wind turbines would not dominate views that are available both because of intervening structures and because the community is at a lower elevation than the Plan Area. Accordingly, there would be no adverse effect.

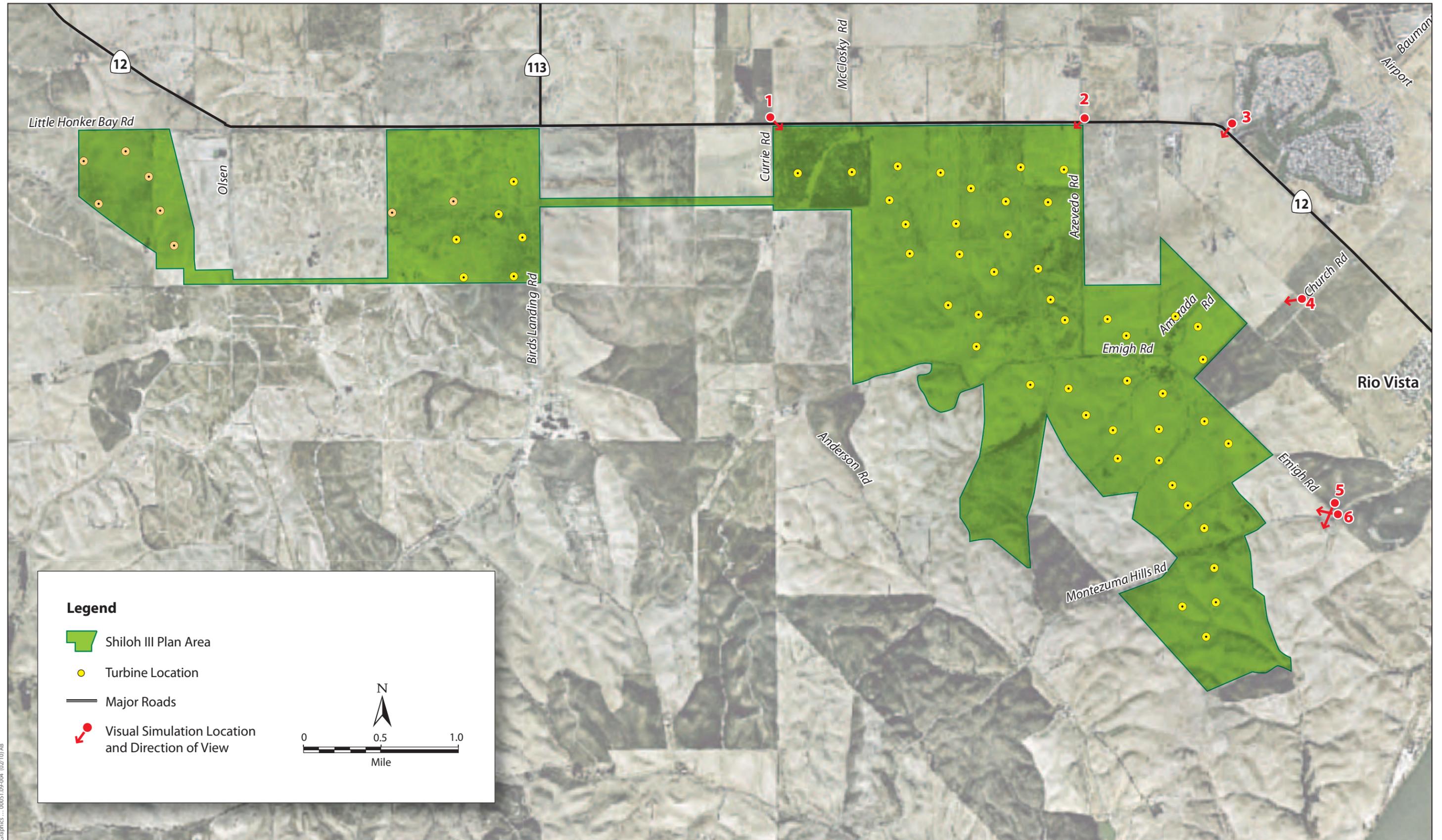


Figure 3.1-1
Location of Visual Simulation Viewpoints

Existing View
(Looking Southeast, 2-4-09)



Simulated View

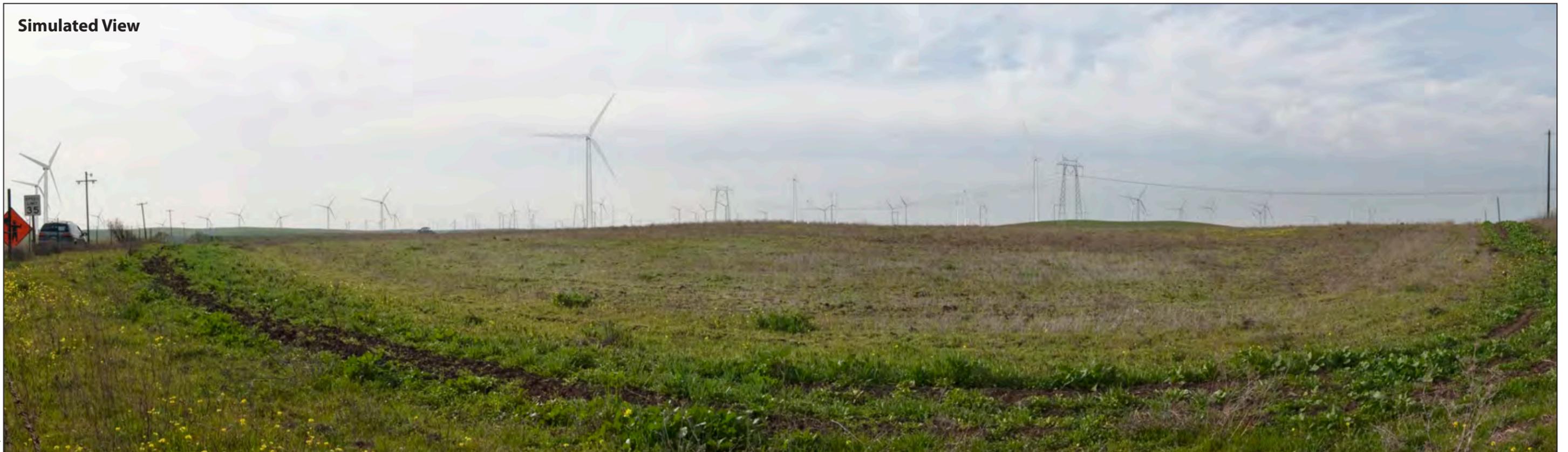


Graphics ... 00051.09-004 (02-10) AB

Existing View
(Looking Southwest, 2-4-09)

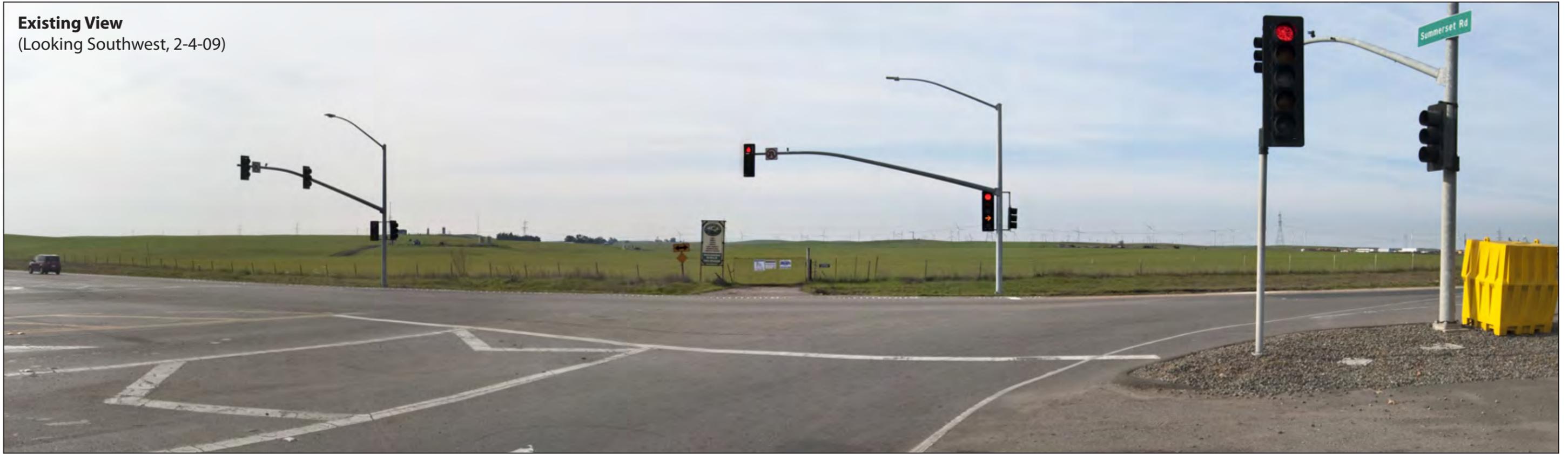


Simulated View

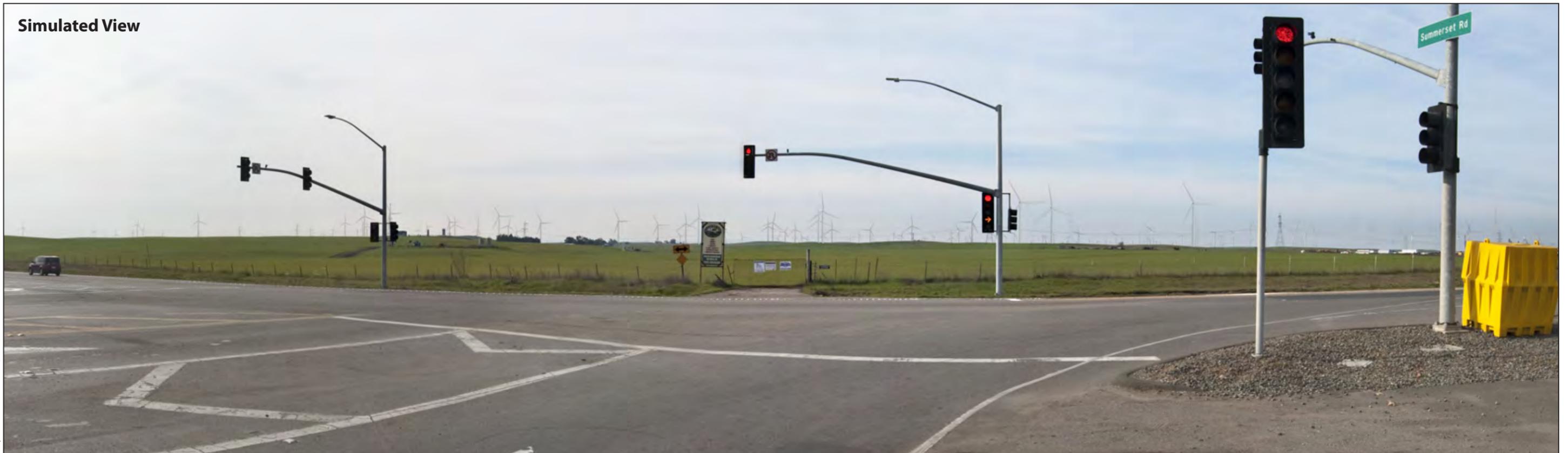


Graphics ... 00051.09-004 (02-10) AB

Existing View
(Looking Southwest, 2-4-09)



Simulated View



Graphics ... 00051.09-004 (02-10) AB

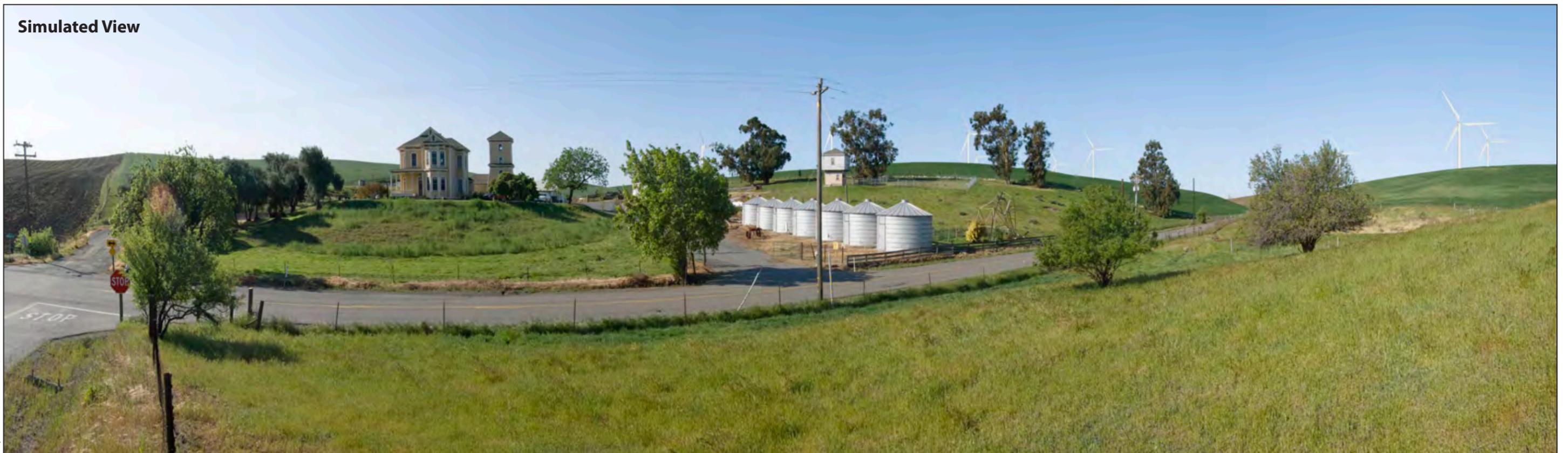
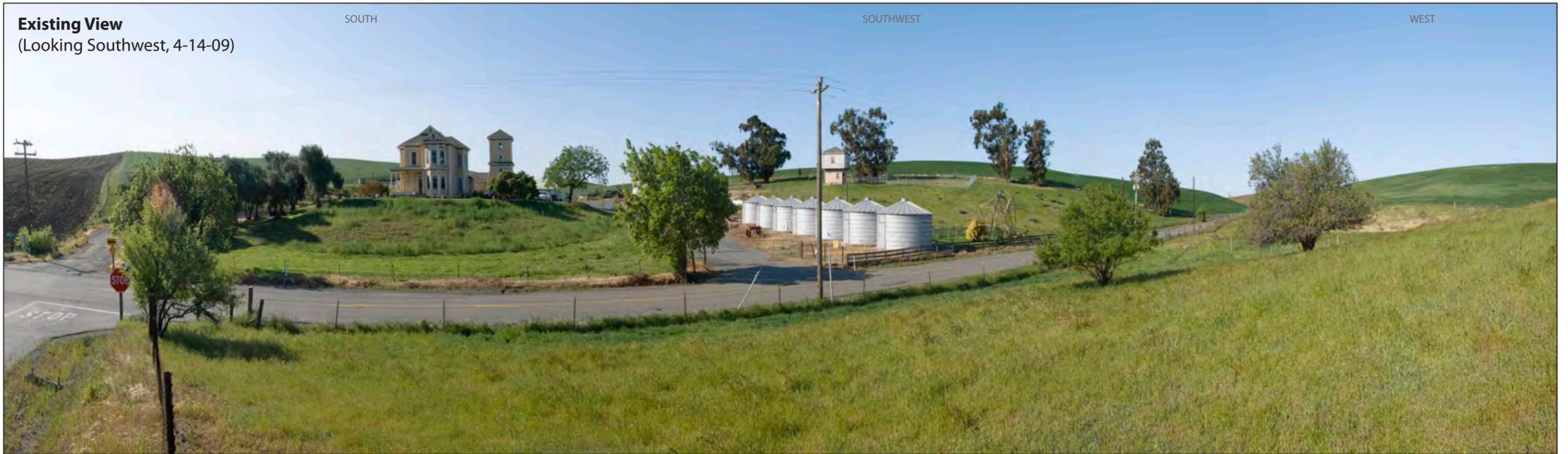
Existing View
(Looking West, 2-4-09)



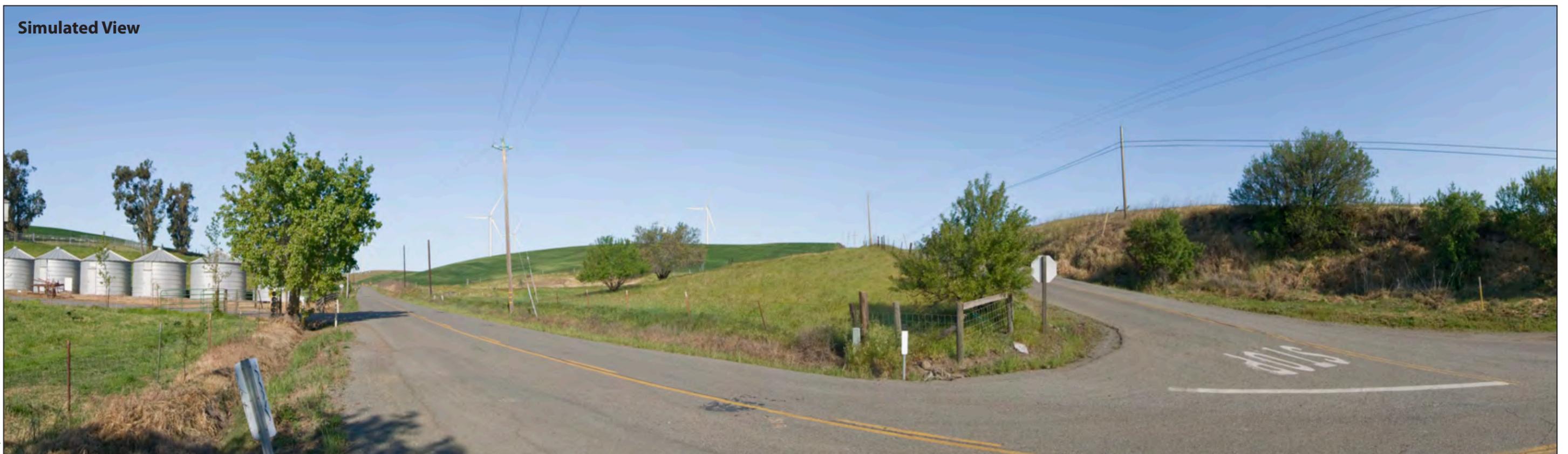
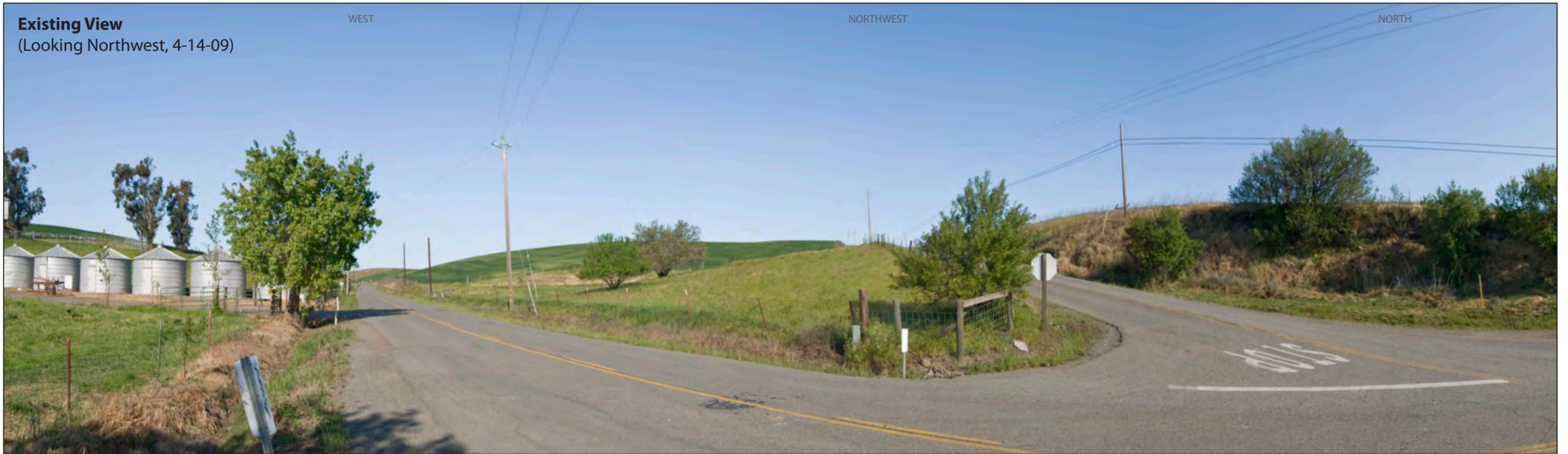
Simulated View



Graphics ... 00051.09-004 (02-10) AB



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Recreationists

Visitors to the Western Railroad Museum would have views of the westernmost portion of the Shiloh III project; however, the westernmost portion of the Shiloh II project is directly between the Shiloh III project and the museum; accordingly, there would be no adverse effect. Recreational boaters on the Sacramento River would not be likely to have views of the Plan Area because of distance and intervening topography and levees. In any case, other wind projects—both existing and planned—lie much nearer the river than the Shiloh III project. Accordingly, because the visual character of the Montezuma Hills has already been defined by the extensive development of wind projects, there would be no adverse visual resource effect on existing recreationists.

Impact AES-3: Potential increase of light and glare

As mentioned in the project description, the turbines would be painted a neutral color to minimize visual intrusion; this would also reduce the potential to create glare. Moreover, required setbacks would ensure that no turbine would be nearer than 0.25 mile to any scenic roadway and that all turbines would be more than 500 feet from the property line.

Safety lighting would be required by FAA; however, EC-1 specifies that nighttime lighting will be limited to the minimum required by FAA. There will be no daytime lighting, and strobe lighting will not be used unless specifically required by FAA. Because turbines will be colored to minimize glare and established lighting as indicated in EC -1 would be used consistent with existing wind plant development, there would be no adverse visual effect.

No-Action Alternative

Under the No-Action Alternative, the Proposed Action would not be implemented and no new turbines would be constructed. The Plan Area would continue under current agricultural uses and no effects on visual resources in the WRA would occur.

3.1.3 References

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- Ecology and Environment. 2006. *Draft Environmental Impact Report Shiloh II Wind Plant Project*. October. Prepared for Solano County Department of Resource Management.
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- U.S. Soil Conservation Service. 1978. *Procedure to Establish Priorities in Landscape Architecture*. (Technical Release No. 65). Washington, DC.

3.2 Agricultural Resources

This section describes the existing conditions pertaining to agricultural resources and the potential environmental consequences that could result from implementation of the Proposed Action.

3.2.1 Affected Environment

Regulatory Setting

Williamson Act (California Land Conservation Act of 1965)

The Williamson Act allows county governments to enter into contracts with private landowners who agree to restrict parcels of land to agricultural uses or uses compatible with agriculture for at least 10 years. In return, landowners receive property tax assessments that are much lower than normal because they are based upon income derived from farming and open space uses as opposed to full market value of the property.

Solano County General Plan

The Solano County General Plan designates the Montezuma Hills as a distinct agricultural region with a minimum lot size of 160 acres with identified uses of agricultural and energy production (Solano County 2008, p. AG-21).

Environmental Setting

Agricultural uses—primarily dryland farming and livestock grazing—are the dominant land uses in the Plan Area. As of October 2009, approximately 70% of the Plan Area was in wheat production or was in preparation for wheat production, with the remainder being utilized as grazing lands. The farmers in the Montezuma Hills typically use a 1- to 3-year crop rotation cycle, where grazing and fallow years follow planting and harvesting.

The California Department of Conservation (CDC) Farmland Mapping and Monitoring Program (FMMP) defines the Montezuma Hills area as land with lower quality soils but that can be used for non-irrigated agricultural production (Ecology and Environment 2006).

The Plan Area does not contain Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance, as defined by the FMMP (Ecology and Environment 2006). The CDC maps the Plan Area as Grazing Land. Soil types in the Plan Area are primarily of the Altamont and Diablo series, which are not associated with important farmland (Ecology and Environment 2006). Wheat, barley, and oats are the main crops in the Montezuma Hills, and sheep are the primary livestock.

3.2.2 Environmental Consequences

Approach and Methods

The assessment of potential effects on agricultural resources entailed a qualitative evaluation of the Proposed Action's potential to conflict with existing agricultural resources or to increase demand for agricultural resources.

Effects

Proposed Action

Impact AG-1: Conversion of lands to non-agricultural use

Implementation of the Proposed Action would result in some permanent conversion of agricultural lands to non-agricultural use. The initial construction phase would result in the permanent loss of 36 acres of agricultural land from construction and placement of wind turbines, substation, switchyard, and permanent roads. In addition, temporary disturbance of 115 acres of agricultural land would result from installation of collection lines, a construction area around each turbine pad, temporary equipment access, and temporary laydown areas.

In addition to temporary impacts on agricultural lands, overall agricultural and grazing operations in the Plan Area could be temporarily disrupted by operation of construction equipment because equipment may need to cross existing agricultural areas at times that may conflict with existing agricultural operations. However, because construction activities would not occur throughout the whole Plan Area at the same time, such disruptions would be limited to varying extents and times throughout the 4- to 8-month construction period. This potential impact is not considered adverse because less than 0.8% of the total Plan Area would be converted to non-agricultural uses during the life of the project, none of the converted land is considered prime farmland, and agricultural and grazing uses would continue on the vast majority of the 4,600-acre plan area.

Impact AG-2: Potential conflict with Williamson Act contracts

Most of the parcels in the Plan Area are under Williamson Act contracts and could be affected by implementation of the Proposed Action. Under the Williamson Act, the County is authorized to approve compatible uses of non-prime land if the use will not significantly alter or degrade the long-term productivity of agricultural lands or adjacent areas, remove a significant amount of land from agricultural or open land uses, or otherwise degrade or impair current and future agricultural activities. As described in Impact AG-1, the Proposed Action would not permanently remove a significant amount of land from agricultural use or affect long-term productivity in the Plan Area. Because of the dispersed character of the wind project and the relatively small footprints of the wind turbine generators, existing agricultural uses would be compatible with wind energy generation; consequently, implementation of the Proposed Action would not be in conflict with existing Williamson Act contracts in the Plan Area. This potential impact is not considered adverse because no loss of Williamson Act contracts would result from implementing the Proposed Action.

Impact AG-3: Soil erosion, soil loss, and decrease in soil productivity

Implementation of the Proposed Action would not substantially increase soil erosion or soil loss, nor would it result in a decrease in soil productivity in or near the Plan Area. Ground-disturbing construction activities could result in minor loss of soils and marginal impacts on soils that could have a slight effect on soil productivity. Ground-disturbing and earthmoving activities could also result in a relatively small amount of mixing fertile topsoil and less fertile subsurface soils, potentially leading to a slight decrease in soil productivity. The use of heavy equipment could result in rutting, which may also cause mixing of topsoil and subsoil, especially under excessively wet conditions. However, implementation of EC-10, EC-12, and EC-14 as part of the Proposed Action would minimize soil erosion, soil loss, and a decrease in soil productivity on approximately 115 acres of agricultural land that are subject to temporary effects during construction by requiring land uses and habitat to be returned to preproject conditions, mitigating

geologic hazards, and implementing requirements of a SWPPP. In addition, a substantial decrease in soil productivity in the Plan Area is not expected from construction and operation because less than 0.7% of the agricultural land in the Plan Area would be permanently affected and soil productivity in dryland farmed areas of the Montezuma Hills is generally considered to be low. These potential soil impacts are not considered to be adverse because the Proposed Action incorporates environmental commitments into the project design that would reduce soil erosion or loss in the Plan Area and soil productivity would not be substantially affected by temporary disruption of agricultural areas.

No Action

Under the No-Action Alternative, there would be no effects on soils beyond current conditions because current uses would continue on the site.

3.2.3 References

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

3.3 Air Quality and Climate Change

This section describes the existing conditions pertaining to air quality and the potential environmental consequences that could result from implementation of the Proposed Action. Where appropriate, mitigation measures are presented to address adverse effects.

3.3.1 Affected Environment

Regulatory Setting

Federal Regulations

The federal Clean Air Act (CAA), promulgated in 1970 and amended twice thereafter (including the 1990 amendment [CAAA]), establishes the framework for modern air pollution control. The act directs the U.S. Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for six pollutants: ozone, carbon monoxide (CO), lead, nitrogen dioxide (NO₂), particulate matter, and sulfur dioxide (SO₂) (Table 3.3-1).

Table 3.3-1. Applicable Federal and State Ambient Air Quality Standards

Pollutant	Symbol	Average Time	Standard (parts per million)		Standard (micrograms per cubic meter)		Violation Criteria		
			California	National	California	National	California	National	
Ozone*	O ₃	1 hour	0.09	NA	180	NA	If exceeded	NA	
		8 hours	0.070	0.075	137	147	If exceeded	If fourth highest 8-hour concentration in a year, averaged over 3 years, is exceeded at each monitor within an area	
Carbon monoxide	CO	8 hours	9.0	9	10,000	10,000	If exceeded	If exceeded on more than 1 day per year	
		1 hour	20	35	23,000	40,000	If exceeded	If exceeded on more than 1 day per year	
(Lake Tahoe only)		8 hours	6	NA	7,000	NA	If equaled or exceeded	NA	
Nitrogen dioxide	NO ₂	Annual arithmetic mean	0.030	0.053	57	100	If exceeded	If exceeded on more than 1 day per year	
		1 hour	0.18	0.100	339	NA	If exceeded	NA	
Sulfur dioxide	SO ₂	Annual arithmetic mean	NA	0.030	NA	80	NA	If exceeded	If exceeded
		24 hours	0.04	0.14	105	365	If exceeded	If exceeded on more than 1 day per year	
		1 hour	0.25	NA	655	NA	If exceeded	NA	
Hydrogen sulfide	H ₂ S	1 hour	0.03	NA	42	NA	If equaled or exceeded	NA	
Vinyl chloride	C ₂ H ₃ Cl	24 hours	0.01	NA	26	NA	If equaled or exceeded	NA	

Pollutant	Symbol	Average Time	Standard (parts per million)		Standard (micrograms per cubic meter)		Violation Criteria	
			California	National	California	National	California	National
Inhalable particulate matter	PM10	Annual arithmetic mean	NA	NA	20	NA	NA	NA
		24 hours	NA	NA	50	150	If exceeded	If exceeded on more than 1 day per year
	PM2.5	Annual arithmetic mean	NA	NA	12	15	NA	If 3-year average from single or multiple community-oriented monitors is exceeded
		24 hours	NA	NA	NA	35	NA	If 3-year average of 98 th percentile at each population-oriented monitor within an area is exceeded
Sulfate particles	SO ₄	24 hours	NA	NA	25	NA	If equaled or exceeded	NA
Lead particles	Pb	Calendar quarter	NA	NA	NA	1.5	NA	If exceeded no more than 1 day per year
		30-day average	NA	NA	1.5	NA	If equaled or exceeded	NA
		Rolling 3-month average	NA	NA	NA	0.15	If equaled or exceeded	Averaged over a rolling 3-month period

Source: California Air Resources Board 2010

Notes: All standards are based on measurements at 25°C and 1 atmosphere pressure. National standards shown are the primary (health effects) standards.

NA = not applicable.

- * The U.S. Environmental Protection Agency recently replaced the 1-hour ozone standard with an 8-hour standard of 0.08 part per million. EPA issued a final rule that revoked the 1-hour standard on June 15, 2005. However, the California 1-hour ozone standard will remain in effect.

The CAAA requires that all federally funded projects come from a plan or program that conforms to the appropriate State Implementation Plan (SIP) so that they do not interfere with strategies employed to attain the NAAQS. The rule applies to federal projects in areas designated as nonattainment areas for any of the six criteria pollutants and in some areas designated as maintenance areas. Project-level conformance with the SIP is demonstrated through a general conformity analysis.

A general conformity determination would be required if a proposed project's total direct and indirect emissions fail to meet the following condition.

- Emissions for each affected pollutant for which the region is classified as a maintenance or nonattainment area for the national standards are below the *de minimis* levels indicated in Table 3.3-2 and Table 3.3-3.

Table 3.3-2. Federal *de Minimis* Threshold Levels for Criteria Pollutants in Nonattainment Areas

Pollutant	Emission Rate (Tons per Year)
Ozone (ROG/VOC or NO _x)	
Serious nonattainment areas	50
Severe nonattainment areas	25
Extreme nonattainment areas	10
Other ozone nonattainment areas outside an ozone transport region¹	100
Other ozone nonattainment areas inside an ozone transport region ¹	
ROG/VOC	50
NO _x	100
CO: All nonattainment areas	100
SO ₂ or NO ₂ : All nonattainment areas	100
PM10	
Moderate nonattainment areas	100
Serious nonattainment areas	70
PM2.5	
Direct emissions	100
SO ₂	100
NO _x (unless determined not to be a significant precursor)	100
ROG/VOC or ammonia (if determined to be significant precursors)	100
Pb: All nonattainment areas	25

Source: 40 CFR 51.853.

Notes: *de minimis* threshold levels for conformity analysis.

Bolded text indicates pollutants for which the region is in nonattainment and a conformity determination must be made with the corresponding emission threshold.

¹ Ozone Transport Region is comprised of the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, the Consolidated Metropolitan Statistical Area that includes the District of Columbia and northern Virginia (Section 184 of the Clean Air Act).

ROG = reactive organic gas	CO = carbon monoxide
VOC = volatile organic carbon	PM2.5 = particulate matter 2.5 microns in diameter or smaller
NO _x = oxides of nitrogen	PM10 = particulate matter 10 microns in diameter or smaller
SO ₂ = sulfur dioxide	Pb = lead

Table 3.3-3 Federal *de Minimis* Threshold Levels for Criteria Pollutants in Maintenance Areas

Pollutant	Emission Rate (Tons per Year)
Ozone (NO _x , SO ₂ or NO ₂)	
All maintenance areas	100
Ozone (ROG/VOC)	
Maintenance areas inside an ozone transport region ¹	50
Maintenance areas outside an ozone transport region ¹	100
CO: All maintenance areas	100
PM10: All maintenance areas	100
PM2.5	
Direct emissions	100
SO ₂	100
NO _x (unless determined not to be a significant precursor)	100
ROG/VOC or ammonia (if determined to be significant precursors)	100
Pb: All maintenance areas	25

Source: 40 CFR 51.853.

Notes: *de minimis* threshold levels for conformity analysis.

Bolded text indicates pollutants for which the region is in nonattainment and a conformity determination must be made with the corresponding emission threshold.

¹ Ozone Transport Region is comprised of the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, the Consolidated Metropolitan Statistical Area that includes the District of Columbia and northern Virginia (Section 184 of the Clean Air Act).

ROG = reactive organic gas	CO = carbon monoxide
VOC = volatile organic carbon	PM2.5 = particulate matter 2.5 microns in diameter or smaller
NO _x = oxides of nitrogen	PM10 = particulate matter 10 microns in diameter or smaller
SO ₂ = sulfur dioxide	Pb = lead

If the above condition is not met, a general conformity determination must be performed to demonstrate that total direct and indirect emissions for each affected pollutant for which the region is classified as a maintenance or nonattainment area for the national standards would conform to the applicable SIP.

If the above condition is met, the requirements for general conformity do not apply, as the proposed project is presumed to conform to the applicable SIP for each affected pollutant, and no further analysis or determination is required.

State and Local Regulations

The California Air Resources Board (ARB) and the local air districts have primary implementation responsibility for the NAAQS (Table 3.3-1). The Proposed Action is in the Solano County portion of the San Francisco Bay Area Basin. The majority of the project is in an area where the Yolo-Solano Air Quality Management District (YSAQMD) has enforcement authority for air quality projects. Only the portion of Shiloh III west of Olsen Road is under the authority of the Bay Area Air Quality Management District (BAAQMD).

In addition to administering air quality regulations adopted at the federal, state, and local levels, the YSAQMD and BAAQMD are also responsible for implementing strategies for air quality improvement and recommending mitigation measures for new growth and development. The YSAQMD, along with other air districts in the Sacramento Valley, adopted a Rate of Progress Plan to attain the national 8-hour ozone standard. The YSAQMD also adopted an Air Quality Attainment Plan in 1992 to address nonattainment with the state ozone standard. The BAAQMD has prepared a 2005 Ozone Strategy and is currently preparing a 2009 Clean Air Plan to reduce ground level ozone and achieve attainment with the 8-hour ozone NAAQS.

Climate Change Regulations

Numerous efforts at legislation at the state and federal levels have resulted in policies with targets for greenhouse gas (GHG) emissions reduction. Climate change research and policy efforts are primarily concerned with the emissions of GHG related to human activity.

The State of California has several existing programs in place that reduce and minimize greenhouse gas emissions.

- Assembly Bill 1493 (AB 1493) requires the ARB to implement regulations to reduce automobile and light truck GHG emissions. On May 18, 2009, President Obama announced the enactment of a 35.5 mile per gallon (mpg) fuel economy standard for automobiles and light duty trucks to take effect in 2012.
- Executive Order S-3-05 is designed to reduce California's GHG emissions to: (1) 2000 levels by 2010, (2) 1990 levels by 2020 and (3) 80% below 1990 levels by 2050.
- Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006, sets the same overall GHG emissions reduction goals as S-3-05 while further mandating that ARB create a plan, which includes market mechanisms, and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases." Executive Order S-20-06 further directs state agencies to begin implementing AB 32, including the recommendations made by the state's Climate Action Team.
- Executive Order S-01-07 sets low carbon fuel standards that will reduce the intensity of California's transportation fuels by at least 10% by 2020.

Climate change and GHG reduction are also a concern at the federal level. On December 7, 2009, the EPA Administrator found that current and projected concentrations of GHGs threaten the public health and welfare. Although this Endangerment Finding in itself does not place requirements on industry, it is an important step in EPA's process to develop regulation of GHGs through the CAA.

The Council on Environmental Quality (CEQ) has also issued a memorandum (Draft Guidance) providing guidance on the consideration of the effects of climate change and GHG emissions under NEPA. The Draft Guidance suggests that the effects of projects directly emitting GHGs in excess of 25,000 tons annually be considered in a qualitative and quantitative manner. Although the Draft Guidance provides 25,000 tons as a reference point, it does not propose it as a threshold for determining significance (Sutley 2010). Consequently, at this time, no legislation or binding regulations have been enacted specifically addressing GHG emissions reduction and climate change.

Environmental Setting

Climate and Meteorology

The climate in the Plan Area is characterized by the transition between the San Francisco Bay Area and the Sacramento Valley—cool air flowing from the Pacific Ocean and San Francisco Bay through the Carquinez Strait, where it mixes with warm air in the Sacramento Valley. This difference in temperature and atmospheric surface pressure circulation results in strong winds, dry summers, and rainy winters. From November to March, average temperatures recorded at Rio Vista range from lows of 37—44°F to highs of 53—65°F. From April to October, average temperatures range from lows of 47—58°F to highs of 71—91°F. When temperatures are highest, precipitation is lowest—averaging 0.3 inch in July and August. In winter, average precipitation ranges from 1.7 inches in November to 2.72 inches in January.

Local Monitoring Data

The existing air quality conditions in the Plan Area can be characterized by monitoring data collected in the region. The nearest air quality monitoring station is the Fairfield-Chadbourne monitoring station, approximately 19 miles northwest of the Plan Area. The Fairfield-Chadbourne station only monitors for 1-hour ozone. The next closest station is the Vallejo monitoring station, approximately 32 miles to the west. The Vallejo station monitors for 8-hour ozone, PM10, PM2.5, and CO. Table 3.3-4 summarizes air quality monitoring data from these stations for the last three years for which complete data are available (2006–2008). As shown in Table 3.3-4, the Fairfield-Chadbourne monitoring station has experienced occasional violations of the state 1-hour ozone standard. The Vallejo monitoring station has experienced violations of the state and federal standards for PM10, PM2.5, and 8-hour ozone, while no violations have occurred for CO.

Table 3.3-4. Ambient Air Quality Monitoring Data Measured at the Fairfield-Chadbourne and Vallejo Monitoring Stations

Pollutant Standards	2006	2007	2008
1-Hour Ozone (Fairfield-Chadbourne)			
Maximum 1-hour concentration (ppm)	0.106	0.089	0.116
1-hour California designation value	0.10	0.10	0.10
1-hour expected peak day concentration	0.104	0.100	0.103
Number of days standard exceeded ^a			
CAAQS 1-hour (>0.09 ppm)	3	0	2
8-Hour Ozone (Vallejo)			
National maximum 8-hour concentration (ppm)	0.069	0.066	0.075
National second-highest 8-hour concentration (ppm)	0.064	0.056	0.072
State maximum 8-hour concentration (ppm)	0.070	0.067	0.075
State second-highest 8-hour concentration (ppm)	0.064	0.056	0.073
8-hour national designation value	0.057	0.054	0.060
8-hour California designation value	0.065	0.061	0.067
8-hour expected peak day concentration	0.066	0.061	0.067
Number of days standard exceeded ^a			
NAAQS 8-hour (>0.075 ppm)	0	0	0
CAAQS 8-hour (>0.070 ppm)	0	0	3

Pollutant Standards	2006	2007	2008
Carbon Monoxide (Vallejo)			
National ^b maximum 8-hour concentration (ppm)	2.94	2.70	2.31
National ^b second-highest 8-hour concentration (ppm)	2.73	2.60	1.96
California ^c maximum 8-hour concentration (ppm)	2.94	2.70	2.31
California ^c second-highest 8-hour concentration (ppm)	2.73	2.60	1.96
Maximum 1-hour concentration (ppm)	3.7	3.3	2.7
Second-highest 1-hour concentration (ppm)	3.5	3.3	2.5
Number of days standard exceeded ^a			
NAAQS 8-hour (≥ 9 ppm)	0	0	0
CAAQS 8-hour (≥ 9.0 ppm)	0	0	0
NAAQS 1-hour (≥ 35 ppm)	0	0	0
CAAQS 1-hour (≥ 20 ppm)	0	0	0
Particulate Matter (PM10)^d (Vallejo)			
National ^b maximum 24-hour concentration ($\mu\text{g}/\text{m}^3$)	46.6	49.1	42.1
National ^b second-highest 24-hour concentration ($\mu\text{g}/\text{m}^3$)	43.9	47.3	31.4
State ^c maximum 24-hour concentration ($\mu\text{g}/\text{m}^3$)	50.1	52.4	43.6
State ^c second-highest 24-hour concentration ($\mu\text{g}/\text{m}^3$)	47.2	51.1	32.4
State annual average concentration ($\mu\text{g}/\text{m}^3$) ^e	19.7	18.9	-
National annual average concentration ($\mu\text{g}/\text{m}^3$)	19.1	18.2	16.0
Number of days standard exceeded ^a			
NAAQS 24-hour ($>150 \mu\text{g}/\text{m}^3$) ^f	0	0	-
CAAQS 24-hour ($>50 \mu\text{g}/\text{m}^3$) ^f	0	2	0
Particulate Matter (PM2.5) (Vallejo)			
National ^b maximum 24-hour concentration ($\mu\text{g}/\text{m}^3$)	42.2	40.8	50.0
National ^b second-highest 24-hour concentration ($\mu\text{g}/\text{m}^3$)	40.5	40.0	47.0
State ^c maximum 24-hour concentration ($\mu\text{g}/\text{m}^3$)	44.0	41.5	51.2
State ^c second-highest 24-hour concentration ($\mu\text{g}/\text{m}^3$)	43.2	41.3	50.0
National annual designation value ($\mu\text{g}/\text{m}^3$)	36	36	36
National annual average concentration ($\mu\text{g}/\text{m}^3$)	9.8	9.7	9.9
State annual designation value ($\mu\text{g}/\text{m}^3$)	13	12	12
State annual average concentration ($\mu\text{g}/\text{m}^3$) ^e	12.4	12.0	-
Number of days standard exceeded ^a			
NAAQS 24-hour ($>35 \mu\text{g}/\text{m}^3$) ^f	6	12	7

Sources: California Air Resources Board 2009a; U.S. Environmental Protection Agency 2009a.

Notes: CAAQS = California ambient air quality standards.
 NAAQS = national ambient air quality standards.
 - = insufficient data available to determine the value.

^a An exceedance is not necessarily a violation.

^b National statistics are based on standard conditions data. In addition, national statistics are based on samplers using federal reference or equivalent methods.

^c State statistics are based on local conditions data, except in the South Coast Air Basin, for which statistics are based on standard conditions data. In addition, State statistics are based on California approved samplers.

^d Measurements usually are collected every 6 days.

^e State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.

^f Mathematical estimate of how many days concentrations would have been measured as higher than the level of the standard had each day been monitored. Values have been rounded.

Attainment Status

Areas are classified as either attainment or nonattainment with respect to state and federal ambient air quality standards. If a pollutant concentration is lower than the state or federal standard, the area is classified as being in *attainment* of the standard for that pollutant. If a pollutant violates the standard, the area is considered a *nonattainment* area. If data are insufficient to determine whether a pollutant is violating the standard, the area is designated *unclassified*. Unclassified designations are typically applied to urbanized areas where levels of the pollutant are not a concern. Areas that were previously designated as nonattainment areas but that have recently met the standard are called *maintenance* areas.

The ARB has classified Solano County as a serious nonattainment area for the state 1-hour ozone standard. For the state CO standard, the ARB has classified Solano County as an attainment area. The ARB has classified Solano County as a nonattainment area for the state PM10 and 8-hour ozone standards. Finally, the ARB has designated the San Francisco Bay Area portion of Solano County as a nonattainment area for the state PM2.5 standard (California Air Resources Board 2009b).

EPA has classified the San Francisco Bay Area portion of Solano County as a marginal nonattainment area for the federal 8-hour ozone standard. For the federal CO standard, EPA has classified the urbanized areas (50 FR 12540, March 29, 1985) in the San Francisco Bay Area portion of the County as a moderate (\leq 12.7 parts per million) maintenance area. Finally, EPA has classified the entire county as an unclassified/attainment area for the federal PM10 standard, and the San Francisco Bay Area portion of the county as a nonattainment area for to the federal PM2.5 standard (U.S. Environmental Protection Agency 2009b).

Based on the attainment status of the San Francisco Bay Area portion of Solano County, a federal conformity analysis will be required to determine if project-level emissions exceed *de minimis* thresholds for ozone, CO, and PM2.5 (Table 3.3-2 and Table 3.3-3).

Sensitive Receptors

A sensitive receptor is generally defined as a facility or land use that houses or attracts members of the population that are particularly sensitive to the effects of air pollutants, such as children, the elderly, and people with illnesses. Examples of sensitive receptors include schools, hospitals, convalescent facilities, and residential areas. The land surrounding the project area is primarily used for grazing and dryland farming. There are a few rural residential dwellings located along SR 12 and within the plan area. Rio Vista is approximately 2 miles from the Plan Area's easternmost boundary.

3.3.2 Environmental Consequences

Approach and Methods

As discussed in Chapter 2, the Proposed Action would require the construction of access roads, foundations for the wind turbines, towers, support facilities, and underground power lines. Emissions associated with these activities were estimated using information supplied by the project applicant (Sarantos pers. comm.), and the URBEMIS2007, Version 9.2.4 model, the currently accepted model for estimating emissions.

Once construction is completed, the wind plant would operate independently. Routine maintenance would consist of equipment replacement, collection system repair, and gravel application to repair roads as necessary. It is anticipated that turbines would need to be repaired or replaced at a rate of approximately one every 5 years. Given the limited nature and extent of maintenance activities, emissions associated

with operation of the Proposed Action were assumed to be minimal. No further quantification or analysis was performed.

The Proposed Action would be considered to have an adverse effect on air quality and climate change if it would result in any of the conditions listed below.

- Exceed federal *de minimis* thresholds for ozone, CO, or PM_{2.5} (Tables 3.3-2 and 3.3-3).
- Generate more than 10% of the area's total emissions inventory for ozone, CO, or PM_{2.5} (Table 3.3-5).
- Generate a significant level of GHGs that exceeds local or federal air quality thresholds.
- Expose sensitive receptors to a substantial amount of diesel particulate matter (DPM).

Effects

Proposed Action

Impact AQ-1: Generation of construction emissions in excess of federal *de minimis* thresholds

Construction activities associated with the Proposed Action would generate short-term emissions of ROG, NO_x, CO, PM₁₀, and PM_{2.5}. Emissions would originate from mobile and stationary construction equipment exhaust, employee vehicle exhaust, and dust from site grading. Construction-related emissions would vary depending on the level of activity, specific construction operations, types of equipment, number of personnel, and climatic conditions.

Construction of the Shiloh III project is scheduled to begin in October 2010 and would require 8 months to complete. For the purposes of this analysis, it was assumed that approximately half of the 8-month construction schedule would entail grading activities and the other half would entail facility installation. Based on information supplied by the project applicant and summarized in the Shiloh III HCP, the following assumptions were made for the emissions modeling (ICF Jones & Stokes 2009; Sarantos pers. comm.).

- A total of 226 acres would be disturbed, of which 51 acres would be permanently disturbed and 175 acres would be temporarily disturbed.
- A daily maximum of 56.5 acres would be disturbed (a default assumption of one-quarter the total acreage; this ensures a conservative analysis of a worst-case scenario).

Table 3.3-5 summarizes the pieces of equipment assumed in the emissions modeling. URBEMIS default values for load factor and horsepower (as listed in Table 3.3-5) were used for equipment.

Table 3.3-5. Summary of Construction Equipment and URBEMIS Default Values

Phase	Equipment	Quantity	Horsepower	Load Factor	Hour/day
Site Grading	Grader	1	174	0.610	8
	Water Truck	1	189	0.500	8
Facility Installation	Bulldozer	1	191	0.590	8
	Roller	1	95	0.560	8
	Backhoe	1	108	0.550	8
	Drill Rig	1	291	0.750	8
	Cranes	2	399	0.430	8
	Rough Terrain Forklifts	2	93	0.600	8
	General Forklift	1	145	0.300	8

Emissions from on-road workforce traffic and off-road diesel-powered delivery trucks were estimated using the total number of trips required to complete construction activities. Based on information provided by enXco, the following vehicle fleet profile and statistics were assumed. Vehicle trips lengths were based on URBEMIS default values for urban areas.

- Gasoline powered workforce trips.
 - Site Grading: 6,081 (assumed to be half of the total workforce trips).
 - Facility Installation: 6,082 (assumed to be half of the total workforce trips).
- Diesel powered materials delivery trips.
 - Site Grading: 1,475.
 - Facility Installation: 8,116.

Emissions were estimated using the URBEMIS model and the assumptions listed above. Table 3.3-6 provides a summary of construction emissions.

Table 3.3-6. Summary of Construction Emissions (tons)

Construction Year	ROG	NO _x	CO	PM10	PM2.5
2010	0.09	0.78	0.85	37.33	7.82
2011	0.46	4.43	2.66	12.10	2.68
<i>de minimis</i> threshold	100	100	100	n/a ¹	100
Significant?	No	No	No	n/a	No

Source: URBEMIS2007.

¹ Area in attainment with the NAAQS. No conformity analysis required.

Based on Table 3.3-6 construction emissions are not expected to exceed the federal *de minimis* thresholds. Furthermore, implementation of EC-2 and EC-3 would further reduce emissions from construction activities by applying standard emission control measures for construction equipment and requiring control of fugitive dust during construction. Therefore, this impact is not considered to be adverse.

Impact AQ-2: Generation of a significant level of greenhouse gas emissions

GHG emissions from construction activities are primarily the result of fuel use by construction equipment, as well as worker and vendor trips. To date, specific thresholds to evaluate adverse effects pertaining to GHG emissions have not been established by local decision-making agencies, the state, or the federal government (see Section 3.3.1). However, this absence of thresholds does not negate NEPA's mandate to evaluate all potentially adverse effects associated with the Proposed Action. Consequently, for this analysis, an adverse effect related to GHG emissions is a net increase in GHG emissions for the project in its entirety (i.e., construction and operations considered together), compared to baseline emissions.

Table 3.3-8 summarizes direct GHG emissions associated with construction activities.¹ CO₂ emissions were estimated using URBEMIS2007 and assumptions described above. URBEMIS does not quantify CH₄ and N₂O emissions from off-road equipment or worker/vendor commutes. Emissions of CH₄ and N₂O from diesel equipment were determined by scaling the construction CO₂ emissions predicted by URBEMIS by the ratio of CH₄/CO₂ and N₂O/CO₂ emissions expected per gallon of diesel fuel according to the Climate Action Registry General Reporting Protocol Version 3.1 (California Climate Action Registry 2009). GHG emissions from worker and vendor commutes were determined by dividing the annual CO₂ emissions from construction worker and vendor commutes by 0.95. This statistic is based on EPA's recommendation that CH₄, N₂O, and HFC emissions account for 5% of on-road GHG emissions, accounting for global warming potential (U.S. Environmental Protection Agency 2009b).

Table 3.3-7. Summary of GHG Emissions from Construction Activities (metric tons)

Year	Off-Road Emissions ¹			On-Road Emissions ²		Total Emissions (metric tons CO ₂ e)
	CO ₂	CH ₄	N ₂ O	CO ₂	Other GHGs (CO ₂ e)	
2010	76.46	0.00	0.00	44.33	2.33	124
2011	523.29	0.03	0.01	70.57	3.71	602

Source: U.S. Environmental Protection Agency 2005; URBEMIS2007; CCAR 2009.

¹ From construction equipment (diesel)

² From construction worker and vendor commutes (mix of fuels). Other GHGs include CH₄, N₂O, and HFCs, which represent 5% of total GHG emissions from on-road sources (Calculated by dividing CO₂ emissions by 0.95 and multiplying the resulting number by 0.05).

As shown in Table 3.3-7, construction of the Shiloh III project would generate 726 metric tons of CO₂e. This is the equivalent of adding approximately 484 typical passenger cars to the road during the construction period (U.S. Environmental Protection Agency 2009b). While these emissions would be negligible relative to total statewide emissions, they would result in a short-term increase in GHGs during construction relative to existing conditions.

The ultimate purpose of the Proposed Action is to deliver renewable energy to the PG&E/CAISO power grid to meet California's Renewable Portfolio Standard goals. The 59 wind turbines proposed as part of the Proposed Action have a generation capacity of 2.0 or 2.5 MW, for an aggregated capacity of 118 or 147.5 MW. Assuming that one MW of wind power can produce an average of 2.7 kilowatt-hours (kWh) of electricity (Layton 2010), operation of the Shiloh III project has the potential to deliver 318–398 million

¹ Per standard air quality impact analysis practices, the construction analysis does not include emissions generated indirectly during the production and manufacturing of the wind turbines. These processes would produce GHG emissions from activities such as energy consumption and equipment transport. All new energy generation facilities have embedded production GHG emissions and these emissions are not factored into air quality analysis because of the variability of the data on processing, materials production, country of origin, and emission controls.

kWh of renewable electricity per year, depending on the type of turbine selected. If emissions associated with traditional energy sources (e.g., fossil fuels) remain constant at 2007 levels, implementation of the Proposed Action could offset production of 93,423–116,779 metric tons of CO₂e per year.² Over the 35-year life of the project, this would equate to approximately 3.3–4.0 million metric tons of CO₂e.

While innovations in energy efficiency and renewable energy standards may reduce future emissions generated by traditional energy sources, the Shiloh III project would nevertheless result in a cumulative reduction in long-term GHG emissions. The 726 metric tons of CO₂e emitted during project construction, as well as any indirect GHGs associated with manufacturing and producing the wind turbines, would thus be offset by the project's contribution to the ongoing production of renewable energy in place of traditional energy. The project helps contribute to the state's Renewable Portfolio Standards and results in long-term reduction of GHG emissions in the amount of approximately 3.3–4.0 million metric tons of CO₂e. Consequently, there would be a beneficial effect.

Impact AQ-3: Expose sensitive receptors to substantial amounts of diesel particulate matter

DPM, which is classified as a carcinogenic toxic air contaminant (TAC) by the ARB, is the primary pollutant of concern with regards to health risks to sensitive receptors. Cancer health risks associated with exposures to diesel exhaust are typically associated with chronic exposure, in which a 70-year exposure period is assumed. Because construction would be of short duration, lasting no more than 8 months, construction of the Shiloh III project is not anticipated to result in an elevated cancer risk to exposed sensitive receptors. In addition, particulate matter emitted during construction would dissipate as a function of distance. Because the majority of sensitive land uses are more than 2 miles from the Plan Area (in Rio Vista), elevated cancer risks are not anticipated. Implementation of EC-2 to apply standard construction vehicle emissions controls would also reduce DPM emissions from heavy-duty equipment. Consequently, this impact would have no adverse effect related to exposure of sensitive receptors to DPM.

No Action

Under the No-Action Alternative, the Proposed Action would not be implemented. Consequently, no construction emissions would be generated. The No-Action Alternative would therefore result in no adverse effect on air quality or climate change.

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² Based on the following emission factors: CO₂ (635.67 pounds/MWh), CH₄ (0.0302 pounds/MWh), N₂O (0.0081 pounds/MWh), and SF₆ (0.00032 pounds/MWh) (Pacific Gas and Electric Company 2007; California Climate Action Registry 2009; California Air Resources Board 2009d; California Energy Commission 2009)

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3.4 Biological Resources

This section describes the existing conditions pertaining to biological resources and the potential environmental consequences that could result from implementation of the Proposed Action. Information in this section is summarized from a separate biological resources report prepared for the Shiloh III project (ICF Jones & Stokes 2009).

3.4.1 Affected Environment

For the purposes of this analysis, the *study area* comprises the Plan Area plus a 250-foot buffer around it (except along SR 12, where the Plan Area boundary is congruent with the study area).

Regulatory Setting

Federal Endangered Species Act

USFWS has jurisdiction over species listed as threatened or endangered under ESA. Because there is no federal nexus for the proposed Shiloh III project, consultation with USFWS, including preparation of an HCP for potential impacts on CTS (federally listed as threatened), has been initiated pursuant to Section 10 of the ESA; as discussed in Chapter 1, this EA has been prepared to evaluate the environmental effects of implementation of the HCP, approval of which—and issuance of the associated ITP—constitute the federal nexus triggering NEPA compliance.

Section 404 of the Clean Water Act

The USACE and EPA regulate the discharge of dredged or fill material into waters of the United States under Section 404 of the federal CWA. Project proponents must obtain a permit from USACE for all discharges of fill material into waters of the United States, including wetlands, before proceeding with a Proposed Action.

Waters of the United States are defined in the CFR as:

(1) all waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (2) all interstate waters including interstate wetlands; (3) all other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce including any such waters...; (4) all impoundments of waters otherwise defined as waters of the United States under the definition; (5) tributaries of waters identified in paragraphs (a)(1)–(4) of this section; (6) the territorial seas; and (7) wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a)(1)–(6) of this section (33 CFR § 328.3).

Wetlands are defined for regulatory purposes in the CFR as areas “inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (33 CFR 328.3, 40 CFR 230.3). To be considered subject to federal jurisdiction, a wetland must normally exhibit positive indicators for three distinct features: hydrophytic vegetation, hydric soil, and wetland hydrology (Environmental Laboratory 1987; U.S. Army Corps of Engineers 2008).

Although a majority, if not all, of the wetlands in the study area would likely be considered jurisdictional by USACE, relatively recent federal rulings (January 9, 2001, *Solid Waste Agency of Northern Cook County [SWANCC] vs. United States Army Corps of Engineers* (121 S.Ct. 675, 2001)) may affect whether some wetlands are considered jurisdictional. However, for the purposes of this report and when determining effects on waters of the United States, it is assumed that all potential waters would be considered jurisdictional by USACE. If the project would affect potential waters, a final determination on the jurisdiction of those waters must be made through consultation with USACE.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 United States Code [USC] 703) protects migratory birds, their occupied nests, and their eggs (16 USC 703, 50 CFR 21, 50 CFR 10). Most actions that result in taking of or the permanent or temporary possession of a protected species constitute violations of the MBTA. USFWS is responsible for overseeing compliance with the MBTA. Most bird species and their occupied nests that occur in the Plan Area would be protected under the MBTA.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) makes it illegal to import, export, take (which includes molest or disturb), sell, purchase, or barter any bald eagle (*Haliaeetus leucocephalus*) or golden eagle (*Aquila chrysaetos*), or parts thereof. USFWS oversees enforcement of this act. The 1978 amendment authorizes the U.S. Secretary of the Interior to permit the taking of golden eagle nests that interfere with resource development or recovery operations.

With the removal in 2007 of bald eagle from the list of threatened and endangered species, USFWS issued new regulations to authorize the limited take of bald eagles and golden eagles under the BGEPA, where the take to be authorized is associated with otherwise lawful activities. USFWS proposed the regulations on June 5, 2007 (72 FR 31141), and provided a 90-day comment period, which closed on September 4, 2007. A draft environmental assessment of the action was released on August 14, 2008 (73 FR 47574) and reopened the public comment period on the proposed rule with some revisions noted in the Federal Register. A final rule was published on September 11, 2009 (74 FR 46836).

The permits will authorize limited, non-purposeful take of bald and golden eagles, authorizing individuals, companies, government agencies (including tribal governments), and other organizations to disturb or otherwise take eagles in the course of conducting lawful activities such as operating utilities and airports. Most permits issued under the new regulations would authorize disturbance. In limited cases, a permit may authorize the physical take of eagles, but only if every precaution is taken to avoid physical take.

Environmental Setting

Biological Communities

Agricultural Lands

Dryland farming and livestock grazing are the dominant land uses in the Plan Area. Approximately 3,116 acres (68%) of the Plan Area is in wheat production or preparation for wheat production. Farmers in the Montezuma Hills typically use a 1- to 3-year crop rotation cycle, where grazing and fallow years follow planting and harvesting.

Depending on the crop pattern and their proximity to native habitats, agricultural lands (particularly fallow croplands) can provide relatively high-value foraging habitat for avian wildlife. Raptor species such as

red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), prairie falcon (*Falco mexicanus*), barn owl (*Tyto alba*), and great horned owl (*Bubo virginianus*) use agricultural lands for foraging because rodents often congregate in these fields. Ground-feeding granivorous passerines such as savannah sparrow (*Passerculus sandwichensis*), western meadowlark (*Sturnella neglecta*), Brewer's blackbird (*Euphagus cyanocephalus*), and red-winged blackbird (*Agelaius phoeniceus*) also forage in the stubble and disked crop fields. While agricultural practices can make the area attractive foraging habitat, the routine disturbance associated with agricultural practices can also make the area unsuitable for nesting by groundnesting species and for terrestrial species such as California ground squirrels (*Spermophilus beecheyi*) and burrowing owls. Such species are often extirpated from cultivated areas or only remain in portions that escape cultivation such as along fences or near wetlands and drainages.

Annual Grassland

After agriculture, annual grassland is the most common vegetation type, covering approximately 1,346 acres (30%) of the Plan Area. The largest area of annual grassland is the central portion of the Plan Area between Olsen Road and Birds Landing Road, adjacent to SR 12. This patch of grassland is currently utilized for grazing and does not appear to have been plowed or disked in the recent past. Annual grassland habitat such as that found in the Plan Area is relatively uncommon in the Montezuma Hills region because most areas in the region are under cultivation.

The annual grassland in the study area is dominated by nonnative annual grasses such as ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), and Italian ryegrass (*Lolium multiflorum*). No native grasses appear to be present. Annual grassland in the study area also supports a diverse forb flora that includes filaree (*Erodium* spp.), fiddleneck (*Amsinckia menziesii* var. *intermedia*), yellow star-thistle (*Centaurea solstitialis*), and scattered native perennial and annual forbs. Annual grasslands can provide valuable nesting and foraging habitat for many wildlife species and foraging and resting habitat for migrating and wintering birds. A western burrowing owl was observed in annual grassland in the Plan Area.

Eucalyptus and Ornamental Trees

Several groves of eucalyptus and other ornamental trees, comprising approximately 8 acres, are present in the Plan Area. These groves are typically found around residences or abandoned homesteads and were planted as windbreaks or for landscaping.

Eucalyptus and other ornamental trees can provide roosting and nesting habitat for a variety of raptor species such as red-tailed hawk, great horned owl, golden eagle (*Aquila chrysaetos*), and barn owl, as well as passerines and other birds.

Wetland and Aquatic Resources

Six types of wetlands and other waters occur in the study area. Each of these types is discussed below; their locations are shown in Figure 3.4-1. All these features could potentially qualify as waters of the United States (including wetlands).

Bulrush-Cattail Wetland

Bulrush-cattail wetlands are common in the study area, occurring in topographically low-lying areas throughout the study area and along some seasonal streams. Generally, they are long, relatively narrow corridors characterized by erect, rooted, herbaceous hydrophytes (i.e., species adapted to very wet conditions). The species composition varies in these wetlands, but many are monotypic stands of cattail

(*Typha latifolia*) or common tule (*Scirpus acutus*). Additionally, these wetlands are typically surrounded by the seasonal wetland type (described below), which constitutes a transition to the upland community. Bulrush-cattail wetlands encompass approximately 13 acres (less than 1%) of the total Plan Area.

Bulrush-cattail wetlands provide valuable nesting and foraging habitat for many bird species, including pied-billed grebe (*Podilymbus podiceps*), mallard (*Anas platyrhynchos*), green-winged teal (*Anas crecca*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), Virginia rail (*Rallus limicola*), marsh wren (*Cistothorus palustris*), song sparrow (*Melospiza melodia*), and red-winged blackbird.

Bulrush-cattail wetlands in the study area meet USACE criteria to be considered wetlands under Section 404 of the CWA and would typically be subject to USACE jurisdiction as waters of the United States.

Seasonal Wetland

As mentioned above, seasonal wetlands typically occur in topographically low-lying areas along the edges of bulrush-cattail wetlands and along seasonal creeks. Seasonal wetlands cover approximately 15 acres (less than 1%) of the total Plan Area. The primary distinction between these two types of wetlands is the length of time each is inundated. Bulrush-cattail wetlands typically retain water for extended periods into the growing season, while seasonal wetlands usually flood or are saturated for only short periods and do not remain inundated into the growing season. Dominant species found in seasonal wetlands in the study area include Italian ryegrass, pale spikerush (*Eleocharis macrostachya*), bird's-foot treefoil (*Lotus corniculatus*), Baltic rush (*Juncus balticus*), and curly dock (*Rumex crispus*).

Several wildlife species use seasonal wetlands. When wetlands are ponded, waterbirds such as mallard, killdeer (*Charadrius vociferus*), black-necked stilt (*Himantopus mexicanus*), American avocet (*Recurvirostra americana*), greater yellowlegs (*Tringa melanoleuca*), and long-billed curlew (*Numenius americanus*) commonly forage on floating and emergent vegetation and invertebrates.

Seasonal wetlands in the study area meet USACE criteria to be considered wetlands under Section 404 of the CWA and would typically be subject to USACE jurisdiction as waters of the United States.

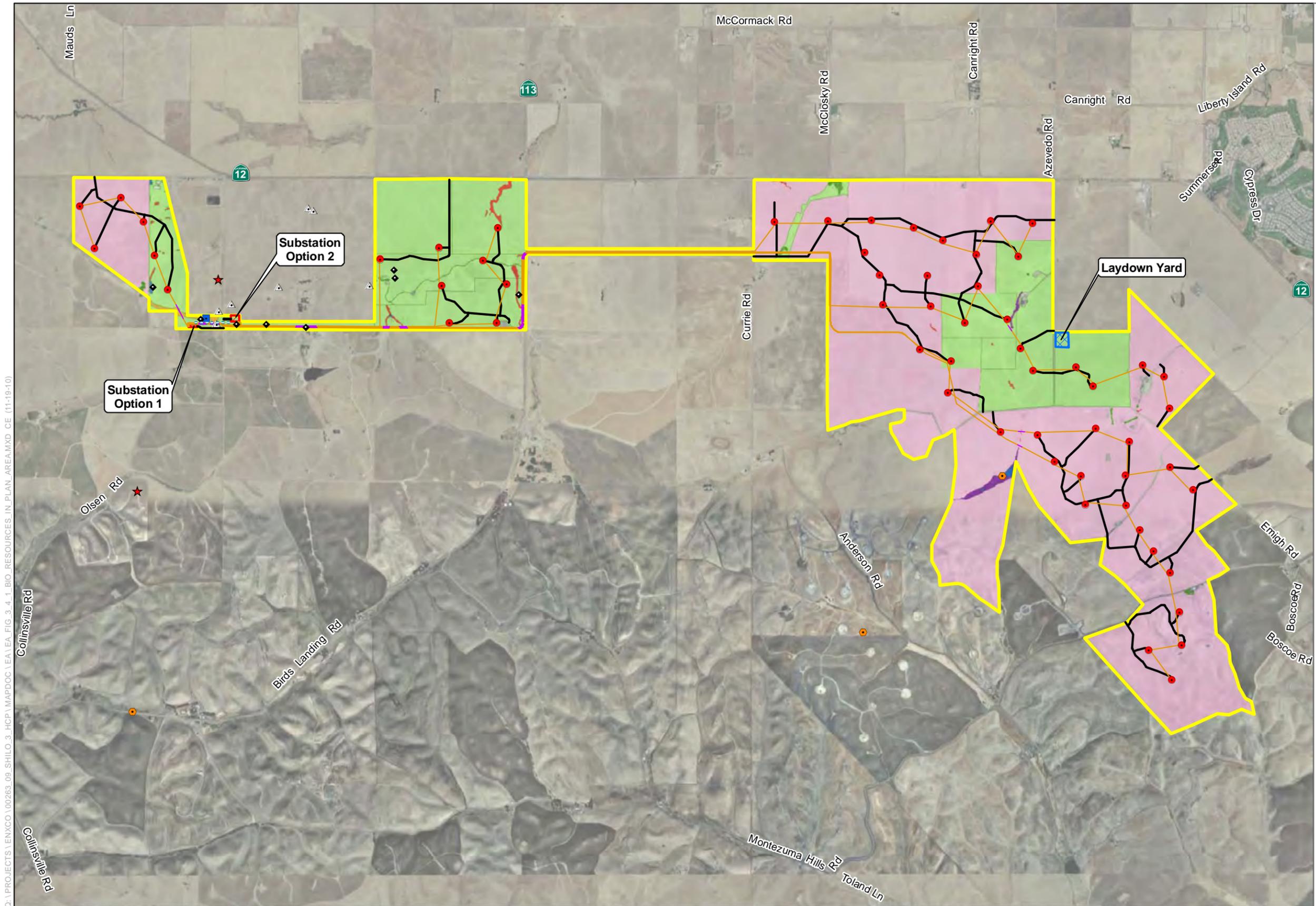
Alkali Meadow

Alkali meadow is uncommon in the Plan Area, occurring in only one location adjacent to Olsen Road and covering approximately 8 acres (less than 1% of the total Plan Area). This community supports halophytic (salt-tolerant) herbaceous plants such as saltgrass (*Distichlis spicata*), alkali heath (*Frankenia salina*), and alkali weed (*Cressa truxillensis*). In addition, this community also supports Carquinez goldenbush (*Isocoma arguta*), pappose spikeweed (*Centromadia parryi* ssp. *parryi*), and bearded popcornflower (*Plagiobothrys hystriculus*) (all of which are considered rare or endangered by the California Native Plant Society [CNPS]). In addition to its status as a sensitive natural community and its importance as habitat for special-status plant species, portions of the habitat would also likely qualify as wetlands and would be subject to jurisdiction under Section 404 of the CWA.

Alkali meadows are frequently used as foraging habitat by wintering waterfowl, shorebirds, and other avian species commonly found in open habitats.

Seasonal Stream

Seasonal streams are relatively common in the study area, occurring in low-lying areas. Numerous other features that are shown as "blue-line" streams on the USGS topographic maps are also present in the study area. In the Montezuma Hills, these blue-line streams typically possess only intermittent stream characteristics (such as a defined bed and bank and/or scour) or no stream characteristics at all and would

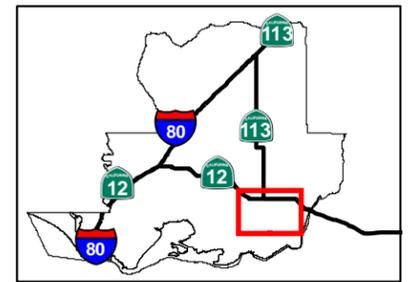
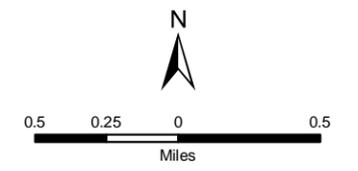


Legend

- Proposed Turbine Location
- Shiloh III Project Area
- Electrical Collection Line
- Directional Drilled Electrical Collection Line
- Proposed Road
- Proposed PG&E Tie-in to Substation
- Agriculture
- Alkali Meadow
- Annual Grassland
- Bulrush-Cattail Wetland
- Eucalyptus
- Pond
- Seasonal Wetland
- Vernal Pool

Biological Occurrences

- ▲ Bearded Popcornflower
- Carquinez Goldenbush
- Elderberry Shrub
- ◆ Pappose Spikeweed
- ★ California Tiger Salamander



Base Map: ESRI Stream Imagery, iCubed 2009

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Figure 3.4-1
Biological Resources
in the Plan Area

not likely be considered waters of the United States under Section 404 of the CWA. Several roadside drainages specifically constructed for the purpose of removing and channeling runoff from roads are also present along several roads in the study area. These features are also not likely to be considered waters of the United States because they are artificially created in uplands solely for the purpose of transporting runoff water from roadbeds. Where such features intercept and transport runoff from seasonal streams, they may be considered waters of the United States.

Seasonal streams in the study area meet USACE criteria to be considered streams under Section 404 of the CWA and would typically be subject to USACE jurisdiction as waters of the United States.

Pond

Five ponds are present in the Plan Area; numerous others are within 1 mile of the Plan Area. The ponds in the Plan Area are variable in size and duration of ponding, and all have been constructed by landowners for agricultural or personal use. All the ponds appear to impound seasonal streams and are entirely supported by runoff from surrounding lands. Vegetation is variable, but most ponds are open water with a narrow ring of emergent wetland vegetation along the edges. Most dry completely or nearly completely by mid- to late summer. A few small willows (*Salix* sp.) are often present around ponds in the Montezuma Hills area, but extensive riparian areas are generally lacking.

Ponds can provide habitat for waterfowl and shorebirds such as mallard, green-winged teal, great blue heron, great egret, greater yellowlegs, and other species commonly found in wetland habitats. In addition, ponds can provide important habitat for several amphibian species that depend on these temporary water bodies for successful reproduction, including CTS.

Because the ponds in the study area appear to impound water from seasonal creeks, they would likely be subject to USACE jurisdiction as waters of the United States.

Vernal Pool

Although not within the Plan Area, two disturbed vernal pools were mapped within 250 feet of the Plan Area between Birds Landing Road and Olson Road (Figure 3.4-1). Vernal pools are depressions in the landscape that pond water intermittently during the rainy season and are completely dry during late spring and summer. These areas pond because they typically contain an impervious soil layer that prevents water from infiltrating into the lower soil layers. Because of their distinct hydrologic regime, vernal pools support a highly specialized flora adapted to prolonged inundation and subsequent dry periods. The primary difference between vernal pools and seasonal wetlands, which have somewhat similar hydrologic regimes, is the depth and duration of ponding (seasonal wetlands typically remain saturated for extended periods, but do not necessarily pond water to the surface like vernal pools do). Additionally, vernal pools typically support a higher number of annual vernal pool endemic plants—species that are adapted to an extended duration of inundation.

Vernal pools were historically widespread throughout the region, but their extent is now limited due to development and agricultural conversion over the last 150 years. Vernal pools are considered sensitive natural communities because they support unique plant associations, provide tremendous diversity in a small area, and provide seasonal habitat for dependent common and special-status wildlife species.

Vernal pools are considered important habitats for several invertebrate and amphibian species that depend on these temporary water bodies for successful reproduction, including the federally listed vernal pool fairy shrimp, vernal pool tadpole shrimp, and CTS. A number of bird species are also known to utilize these habitats when they are inundated.

Vernal pools in the study area likely meet USACE criteria to be considered wetlands under Section 404 of the CWA.

Special-Status Wildlife

Based on a review of the California Natural Diversity Database (CNDDDB) and other environmental documents prepared for projects near the Plan Area, 31 special-status wildlife species were identified as having the potential to occur in the region surrounding the proposed project (Table 3.4-1). Of the species identified as potentially occurring in the region, 15 do not occur in the Plan Area because they have extremely limited ranges that do not overlap with the Plan Area, or they are limited to habitats that are not present in the study area (e.g., salt or brackish marshes). The rationale detailing why each of these species does not occur in the Plan Area is provided in Table 3.4-1.

Of the remaining 16 potentially occurring special-status species, 10 have been documented in or near the Plan Area: Swainson's hawk, golden eagle, northern harrier, short-eared owl, loggerhead shrike, white-tailed kite, American white pelican, western burrowing owl, pallid bat, and western red bat. The other six species—valley elderberry longhorn beetle, vernal pool fairy shrimp, vernal pool tadpole shrimp, CTS, western pond turtle, and tricolored blackbird,—have not been documented in the Plan Area, but may occur there.

Migratory birds and raptors such as red-tailed hawk, red-shouldered hawk, and great horned owl have the potential to nest in the Plan Area and vicinity. The breeding season for migratory birds and raptors generally extends from early February through early August, although nesting periods vary by species. Forested nesting habitat for these species typically includes riparian and woodland areas, although nonnative trees and electrical towers also are used. The main prey species for raptors include California ground squirrels, black-tailed jackrabbits, voles, pocket mice, and harvest mice.

Groves of mature trees, primarily nonnative eucalyptus trees, in the Plan Area provide nesting habitat for migratory birds and raptors (Figure 3.4-1).

Special-Status Plants

Based on a review of the CNDDDB and environmental documents prepared for other projects in the Montezuma Hills, 36 special-status plant species were identified as having the potential to occur in the region (Table 3.4-2). Ten of these species do not occur in the study area because they have extremely limited ranges (e.g., Antioch Dunes evening-primrose) or are limited to habitats that are not present in the Plan Area (i.e., serpentine soils, brackish marsh, tidal salt marsh, or dunes). The rationale detailing why each of these 10 species does not occur in the study area is provided in Table 3.4-2.

Surveys were conducted in October 2009 for late-blooming special-status plants. These surveys resulted in the detection of one special-status plant: pappose spikeweed. Surveys for spring-blooming special-status plants have not been conducted as of the preparation of this report, but ICF will conduct surveys in spring 2010. One occurrence of Carquinez goldenbush is documented in the Plan Area south of Little Honker Road and west of Olsen Road, and one occurrence of bearded popcornflower is located in the Plan Area west of Olsen Road (Figure 3.4-1).

Table 3.4-1. Special-Status Wildlife Species Potentially Occurring in the Montezuma Hills Region

Common Name <i>Scientific Name</i>	Status		Habitat Requirements	Potential Occurrence in Plan Area
	Fed/State	Geographic Distribution		
Insects				
Delta green ground beetle <i>Elaphrus viridus</i>	T/-	Restricted to Olcott Lake and other vernal pools at Jepson Prairie Preserve, Solano County	Sparsely vegetated edges of vernal lakes and pools; occurs up to 250 ft from pools	None; no suitable habitat present; species occurs only at Jepson Prairie
Valley elderberry longhorn beetle <i>Desmocerus californicus dimorphus</i>	T/-	Streamside habitats below 3,000 ft throughout Central Valley	Riparian and oak savanna habitats with elderberry shrubs; elderberry is the host plant	Low; potential habitat is present (single elderberry shrub that will be avoided) but there are no nearby records and shrub is likely on the edge of species' range
Callippe silverspot butterfly <i>Speyeria callippe callippe</i>	E/-	Occurs at only two locations: near Oakland and on San Bruno Mountain	Annual grassland habitats around the northern San Francisco Bay; larvae feed on host plant, <i>Viola pedunculata</i> ; adults feed on floral nectar	None; no suitable habitat present
Crustaceans				
Conservancy fairy shrimp <i>Branchinecta conservatio</i>	E/-	Disjunct occurrences in Solano, Merced, Tehama, Ventura, Butte, and Glenn Counties	Large, deep vernal pools in annual grasslands	None; no suitable habitat present
Vernal pool fairy shrimp <i>Branchinecta lynchi</i>	T/-	Central Valley, central and South Coast Ranges from Tehama to Santa Barbara Counties; isolated populations in Riverside County	Common in vernal pools; also found in sandstone rock outcrop pools	Low; potential habitat present adjacent to Plan Area
Vernal pool tadpole shrimp <i>Lepidurus packardi</i>	E/-	Shasta to Merced Counties	Vernal pools and ephemeral stock ponds	Low; potential habitat adjacent to Plan Area
Reptiles and Amphibians				
California tiger salamander <i>Ambystoma californiense</i>	T/C	Central Valley, including Sierra Nevada foothills to approximately 1,000 ft and coastal region from Butte to northeastern San Luis Obispo Counties	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	High; potential habitat present in Plan Area
Western spadefoot <i>Spea hammondi</i>	-/SSC	Sierra Nevada foothills, Central Valley, Coast Ranges, coastal counties in southern California	Shallow streams with riffles and seasonal wetlands such as vernal pools in annual grasslands and oak woodlands	None; no suitable habitat present; study area is outside current species' range; species not known to occur in Solano County
California red-legged frog <i>Rana draytonii</i>	T/SSC	Along the coast and coastal mountain ranges of California from Marin to San Diego Counties and in the Sierra Nevada from Tehama to Fresno Counties	Permanent and semipermanent aquatic habitats, such as creeks and cold-water ponds, with emergent and submergent vegetation; may aestivate in rodent burrows or cracks during dry periods	None; Plan Area is outside species' range

Table 3.4-1. Continued

Common Name <i>Scientific Name</i>	Status		Geographic Distribution	Habitat Requirements	Potential Occurrence in Plan Area
	Fed/State				
Western pond turtle <i>Actinemys marmorata</i>	-/SSC		From Oregon border of Del Norte and Siskiyou Counties south along the coast to San Francisco Bay, inland through the Sacramento Valley and on western slope of Sierra Nevada	Ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and with watercress, cattails, water lilies, or other aquatic vegetation in woodlands, grasslands, and open forests	Low; potential habitat present in Plan Area, although no known records nearby, and species has not been observed in the Montezuma Hills during multiple years of monitoring
Giant garter snake <i>Thamnophis gigas</i>	T/T		Central Valley from the vicinity of Burrel in Fresno County north to near Chico in Butte County; has been extirpated from areas south of Fresno	Sloughs, canals, low-gradient streams, and freshwater marsh habitats with prey base of small fish and amphibians; irrigation ditches and rice fields; requires grassy banks and emergent vegetation for basking and areas of high ground protected from flooding during winter	None; Plan Area is outside species' range
Birds					
American white pelican <i>Pelecanus erythrorhynchos</i> (nesting colony)	-/SSC		Historically, nested at large lakes throughout California; only breeding colonies in the state occur at lower Klamath National Wildlife Refuge, Siskiyou County, and at Clear Lake, Modoc County; winters along the California coast	Freshwater lakes with islands for breeding; inhabits river sloughs, freshwater marshes, salt ponds, and coastal bays during the rest of the year	High; observed in Plan Area
Bank swallow <i>Riparia riparia</i>	-/T		Much of the state, less common in mountainous areas of the north coast and in coniferous or chaparral habitats	Nests in bluffs or banks, usually adjacent to water, where soil consists of sand or sandy loam	None; no suitable habitat present; species not observed during last 3 years of monitoring in Montezuma Hills
California clapper rail <i>Rallus longirostris obsoletus</i>	E/E,FP		Marshes around San Francisco Bay and east through Sacramento-San Joaquin River Delta to Suisun Marsh	Restricted to salt marshes and tidal sloughs; usually associated with heavy growth of pickleweed; feeds on mollusks in sloughs	None; no suitable habitat present; species not observed during last 3 years of monitoring in Montezuma Hills
California black rail <i>Laterallus jamaicensis coturniculus</i>	-/T,FP		Permanent resident in San Francisco Bay and east through Delta into Sacramento and San Joaquin Counties; small populations in Marin, Santa Cruz, San Luis Obispo, Orange, Riverside, and Imperial Counties	Tidal salt marshes associated with heavy growth of pickleweed; also brackish marshes or freshwater marshes at low elevations	None; no suitable habitat present; species not observed during last 3 years of monitoring in Montezuma Hills
Golden eagle <i>Aquila chrysaetos</i>	-/FP		Foothills and mountains throughout California; uncommon nonbreeding visitor to lowlands (e.g., Central Valley)	Nests on cliffs and escarpments or in tall trees overlooking open country; forages in annual grasslands, chaparral, and oak woodlands with plentiful medium and large-sized mammals	High; observed in Plan Area

Table 3.4-1. Continued

Common Name <i>Scientific Name</i>	Status		Habitat Requirements	Potential Occurrence in Plan Area
	Fed/State	Geographic Distribution		
Loggerhead shrike <i>Lanius ludovicianus</i>	-/SSC	Resident and winter visitor in lowlands and foothills throughout California; rare on coastal slope north of Mendocino County, occurring only in winter	Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches	High; observed in Plan Area
Mountain plover <i>Charadrius montanus</i>	PT/SSC	Does not breed in California; in winter, found in Central Valley south of Yuba County; along coast in parts of San Luis Obispo, Santa Barbara, Ventura, and San Diego Counties; parts of Imperial, Riverside, Kern, and Los Angeles Counties	Open plains or rolling hills with short grasses or very sparse vegetation; nearby bodies of water not needed; may use newly plowed or sprouting grain fields	None; no suitable habitat present; species not observed during at least 3 years of monitoring in Montezuma Hills
Northern harrier <i>Circus cyaneus</i>	-/SSC	Throughout lowland California; has been recorded in fall at high elevations	Grasslands, meadows, marshes, and seasonal and agricultural wetlands	High; observed in Plan Area
Short-eared owl <i>Asio flammeus</i> (nesting)	-/SSC	Permanent resident along coast from Del Norte to Monterey Counties although very rare in summer north of San Francisco Bay, in Sierra Nevada north of Nevada County, in plains east of the Cascades, and in Mono County; small, isolated populations	Freshwater and salt marshes, lowland meadows, and irrigated alfalfa fields; needs dense tules or tall grass for nesting and daytime roosts	Low; observed only twice at High Winds in 2000–2001
Suisun song sparrow <i>Melospiza melodia maxillaris</i>	-/SSC	Restricted to the extreme western edge of the Sacramento–San Joaquin River Delta between Vallejo and Pittsburg near Suisun Bay	Brackish and tidal marshes supporting cattails, tules, various sedges, and pickleweed	None; no suitable habitat present; species not observed during at least 3 years of monitoring in Montezuma Hills
Swainson’s hawk <i>Buteo swainsoni</i>	-/T	Lower Sacramento and San Joaquin Valleys, Klamath Basin, and Butte Valley; highest nesting densities near Davis and Woodland, Yolo County	Nests in oaks or cottonwoods in or near riparian habitats; forages in grasslands, irrigated pastures, and grainfields	High; observed in Plan Area
Tricolored blackbird <i>Agelaius tricolor</i>	-/SSC	Permanent resident in Central Valley from Butte to Kern Counties; breeds at scattered coastal locations from Marin to San Diego Counties and at scattered locations in Lake, Sonoma, and Solano Counties; rare nester in Siskiyou, Modoc, and Lassen Counties	Nests in dense colonies in emergent marsh vegetation, such as tules and cattails, or upland sites with blackberries, nettles, thistles, and grainfields; habitat must be large enough to support 50 pairs; probably requires water at or near the nesting colony	High; observed in Plan Area
Yellow-breasted chat <i>Icteria virens</i>	-/SSC	Nests locally in coastal mountains and Sierra Nevada foothills, east of Cascades in northern California, along Colorado river, and very locally inland in southern California	Nests in dense riparian habitats dominated by willows, alders, Oregon ash, tall weeds, blackberry vines, and grapevines	None; no suitable habitat present; species not observed during at least 3 years of monitoring in Montezuma Hills

Table 3.4-1. Continued

Common Name <i>Scientific Name</i>	Status		Geographic Distribution	Habitat Requirements	Potential Occurrence in Plan Area
	Fed/State				
California yellow warbler <i>Dendroica petechia brewsteri</i>	-/SSC		Nests over all California except Central Valley, Mojave Desert region, and high altitudes in Sierra Nevada; winters along Colorado River and in parts of Imperial and Riverside Counties	Nests in riparian areas dominated by willows, cottonwoods, sycamores, or alders or in mature chaparral; may also use oaks, conifers, and urban areas near stream courses	None; no suitable habitat present; species not observed during at least 3 years of monitoring in Montezuma Hills
Western burrowing owl <i>Athene cunicularia hypugea</i>	-/SSC		Lowlands throughout California, including Central Valley, northeastern plateau, southeastern deserts, and coastal areas; rare along south coast	Level, open, dry, heavily grazed or low-stature grassland or desert vegetation with available burrows	High; observed in Plan Area
White-tailed kite <i>Elanus leucurus</i>	-/FP		Lowland areas west of Sierra Nevada from head of Sacramento Valley south, including coastal valleys and foothills, to western San Diego County at Mexico border	Low foothills or valley areas with valley or live oaks, riparian areas, and marshes near open grasslands for foraging	High; observed in Plan Area
Mammals					
Salt marsh harvest mouse <i>Reithrodontomys raviventris</i>	E/E, FP		San Francisco, San Pablo, and Suisun Bays; Sacramento–San Joaquin River Delta	Salt marsh with a dense plant cover of pickleweed and fat hen; adjacent to an upland site	None; no suitable habitat present or nearby
Pallid bat <i>Antrozous pallidus</i>	-/SSC		Throughout California except high Sierra from Shasta to Kern Counties and northwest coast, primarily at lower and mid-elevations	Variety of habitats from desert to coniferous forest; most closely associated with oak, yellow pine, redwood, and giant sequoia habitats in northern California and oak woodland, grassland, and desert scrub in southern California; relies heavily on trees for roosts	Low; may forage over Plan Area; not observed during operational surveys
Western red bat <i>Lasiurus blossevillii</i>	-/SSC		Occurs throughout California at lower elevations	Found primarily in riparian and wooded habitats; may occur in urban areas.	High; observed during operational surveys
Suisun ornate shrew <i>Sorex ornatus sinuosus</i>	-/SSC		Restricted to San Pablo Bay and Suisun Bay, both in Solano County	Tidal, salt, and brackish marshes containing pickleweed, grindelia, bulrushes, or cattails; requires driftwood or other objects for nesting cover	None; no suitable habitat is present or nearby

Status explanations:

Federal

- E = listed as endangered under the federal Endangered Species Act.
- T = listed as threatened under the federal Endangered Species Act.
- PT = proposed for federal listing as threatened under the federal Endangered Species Act.
- = no listing.

Common Name <i>Scientific Name</i>	Status		Geographic Distribution	Habitat Requirements	Potential Occurrence in Plan Area
	Fed/State				
State					
E	=	listed as endangered under the California Endangered Species Act.			
T	=	listed as threatened under the California Endangered Species Act.			
C	=	candidate for listing under the California Endangered Species Act.			
FP	=	fully protected under the California Fish and Game Code.			
SSC	=	species of special concern in California.			
—	=	no listing.			
Potential Occurrence in the Plan Area:					
High: CNDDDB (or other documents) records the known occurrence of the species within a 10-mile radius of the Plan Area. Suitable habitat is present within the Plan Area.					
Moderate: CNDDDB (or other documents) records the known occurrence of the species within a 10-mile radius of the Plan Area. Poor quality suitable habitat is present within the Plan Area.					
Low: CNDDDB (or other documents) does not record the occurrence of the species within a 10-mile radius of the Plan Area. Suitable habitat is present within the Plan Area.					
None: CNDDDB (or other documents) does not record the occurrence of the species within a 10-mile radius of the Plan Area. Suitable habitat is not present in the Plan Area.					

Table 3.4-2. Special-Status Plants Potentially Occurring in the Montezuma Hills Region

Common Name <i>Scientific Name</i>	Legal Status ^a		Geographic Distribution	Habitat Requirements	Blooming Period	Potential Occurrence in the Plan Area ^b
	Fed/State/CNPS					
Mt. Diablo manzanita <i>Arctostaphylos auriculata</i>	-/-/1B.3		Endemic to Contra Costa County, especially Mt. Diablo area, San Francisco Bay Area	Chaparral in canyons and on slopes on sandstone; 490–1,650 ft	Jan–Mar	None; no habitat is present in the Plan Area
Alkali milk-vetch <i>Astragalus tener</i> var. <i>tener</i>	-/-/1B.2		Alameda, Merced, Napa, Solano, and Yolo Counties	Alkali playa, valley and foothill grassland, vernal pools; below 200 ft	Mar–Jun	Moderate; alkali grassland habitat is present but no nearby records
Heartscale <i>Atriplex cordulata</i>	-/-/1B.2		Western Central Valley and valleys of adjacent foothills	Alkali grassland, alkali meadow, alkali scrub; below 660 ft	May–Oct	None; not located in the Plan Area during surveys
Brittlescale <i>Atriplex depressa</i>	-/-/1B.2		Sacramento Valley and valleys of adjacent foothills on west side of San Joaquin Valley	Alkali grassland, alkali meadow, alkali scrub, chenopod scrub, playas, valley and foothill grasslands on alkaline or clay soils; below 660 ft	May–Oct	None; not located in the Plan Area during surveys
San Joaquin spearscale <i>Atriplex joaquiniana</i>	-/-/1B.2		Western edge of Central Valley from Glenn to Tulare Counties	Alkali grassland, alkali scrub, alkali meadows, saltbush scrub; below 1,000 ft	Apr–Sep	Moderate; alkali grassland habitat is present but no nearby records
Big tarplant <i>Blepharizonia plumosa</i>	-/-/1B.1		Interior Coast Range foothills; Alameda, Contra Costa, San Joaquin, Stanislaus*, and Solano* Counties	Annual grassland on dry hills and plains; 50–1,500 ft	Jul–Oct	Not located in the Plan Area during surveys
Pappose spikeweed <i>Centromadia parryi</i> ssp. <i>parryi</i>	-/-/1B.2		Solano County	Meadows and seeps, marshes and swamps, coastal prairie, grassland; moist, alkaline; below 1,000 ft	May–Nov	High; known to occur in the Plan Area
Pappose spikeweed <i>Centromadia parryi</i> ssp. <i>rudis</i>	-/-/4.2		Solano County	Meadows and seeps, marshes and swamps, coastal prairie, grassland; moist, alkaline; below 1,000 ft	May–Nov	Not located in the Plan Area during surveys
Suisun thistle <i>Cirsium hydrophilum</i> var. <i>hydrophilum</i>	E/-/1B.1		Known only from the Suisun Marsh in Solano County	Salt marshes and swamps; below 3 ft	Jul–Sep	None; no habitat is present in the Plan Area
Hispid bird’s-beak <i>Cordylanthus mollis</i> ssp. <i>hispidus</i>	-/-/1B.1		Central Valley; Alameda, Kern, Merced, Placer, and Solano Counties	Meadow, grassland, playa, on alkaline soils; below 500 ft	Jun–Sep	None; no habitat is present in the Plan Area
Soft bird’s-beak <i>Cordylanthus mollis</i> ssp. <i>mollis</i>	E/R/1B.2		San Francisco Bay region; Suisun Marsh; Contra Costa, Marin*, Napa, Solano, Sacramento*, and Sonoma* Counties	Tidal salt marsh	Jul–Sep	None; no habitat is present in the Plan Area

Table 3.4-2. Continued

Common Name <i>Scientific Name</i>	Legal Status ^a		Geographic Distribution	Habitat Requirements	Blooming Period	Potential Occurrence in the Plan Area ^b
	Fed/State/CNPS					
Hoover's cryptantha <i>Cryptantha hooveri</i>	-/-/1A		Northern and central San Joaquin Valley; Alameda, Contra Costa, Madera, Merced, San Joaquin, and Stanislaus Counties	Coarse sandy soil in grassland	Apr-May	Low; habitat quality is poor and no nearby records
Dwarf downingia <i>Downingia pusilla</i>	-/-/2.2		California Central Valley and South America	Vernal pools and mesic valley and foothill grasslands, 1,500 ft	Mar-May	Low; habitat quality is poor and no nearby records
Round-leaved filaree <i>Erodium macrophyllum</i>	-/-/1B.1		Sacramento Valley, northern San Joaquin Valley, central western California, South Coast Ranges, and northern Channel Islands (Santa Cruz Island)	Open sites, dry grasslands, and shrublands; below 4,000 ft	Mar-May	Low; habitat quality is poor and no nearby records
Contra Costa wallflower <i>Erysimum capitatum</i> ssp. <i>angustatum</i>	E/E/1B.1		Contra Costa County	Inland dunes	Mar-Jul	None; no habitat is present in the Plan Area
Diamond-petaled California poppy <i>Eschscholzia rhombipetala</i>	-/-/1B.1		Interior foothills of South Coast Ranges from Contra Costa to Stanislaus Counties; Carrizo Plain in San Luis Obispo County	Grassland, chenopod scrub, on clay soils, where grass cover is sparse enough to allow growth of low annuals	Mar-Apr	Low; habitat quality is poor and no nearby records
Fragrant fritillary <i>Fritillaria liliacea</i>	-/-/1B.2		Coast Ranges from Marin to San Benito Counties	Adobe soils of interior foothills, coastal prairie, coastal scrub, annual grassland, often on serpentinite; below 1,350 ft	Feb-Apr	Low; habitat quality is poor and no nearby records
Brewer's western flax <i>Hesperolinon breweri</i>	-/-/1B.2		Southern inner North Coast Ranges, northeast San Francisco Bay region, especially Mt. Diablo. Known only from Contra Costa, Napa, and Solano Counties	Serpentine slopes in chaparral and grasslands; 100-2,300 ft	May-Jul	None; no habitat is present in the Plan Area
Carquinez goldenbush <i>Isocoma arguta</i>	-/-/1B.1		Deltaic Sacramento Valley, Suisun Slough, Contra Costa and Solano Counties	Annual grassland on alkaline soils and flats; generally below 70 ft	Aug-Dec	High; known to occur in the Plan Area
Contra Costa goldfields <i>Lasthenia conjugens</i>	E/-/1B.1		Scattered occurrences in Coast Range valleys and southwest edge of Sacramento Valley; Alameda, Contra Costa, Mendocino, Napa, Santa Barbara*, Santa Clara*, and Solano Counties; historically distributed through the north coast, southern Sacramento Valley, San Francisco Bay region, and south coast	Alkaline or saline vernal pools and swales; below 700 ft	Mar-Jun	None; no habitat is present in the Plan Area
Delta tule pea <i>Lathyrus jepsonii</i> var. <i>jepsonii</i>	-/-/1B.2		San Francisco Bay region; Alameda, Contra Costa, Fresno, Marin, Napa, Sacramento, San Benito, Santa Clara*, San Joaquin, and Solano Counties	Coastal and estuarine marshes; below 1,000 ft	May-Sep	None; no habitat is present in the Plan Area

Table 3.4-2. Continued

Common Name <i>Scientific Name</i>	Legal Status ^a		Geographic Distribution	Habitat Requirements	Blooming Period	Potential Occurrence in the Plan Area ^b
	Fed/State/CNPS					
Legenere <i>Legenere limosa</i>	-/-/1B.1		Primarily lower Sacramento Valley; also North Coast Ranges, northern San Joaquin Valley, and Santa Cruz mountains.	Deep, seasonally wet habitats such as vernal pools, ditches, marsh edges, and riverbanks; below 500 ft	May–Jun	Low; habitat quality is poor and no nearby records
Heckard’s pepper-grass <i>Lepidium latipes</i> var. <i>heckardii</i>	-/-/1B.2		Southern Sacramento Valley; Glenn, Solano, and Yolo Counties	Annual grassland on margins of alkali scalds; below 660 ft	Apr–May	Low; habitat quality is poor and no nearby records
Woolly-headed lessingia <i>Lessingia hololeuca</i>	-/-/3.1		Southern North Coast Ranges; southern Sacramento Valley; northern San Francisco Bay region; Alameda, Monterey, Marin, Napa, Santa Clara, San Mateo, Solano, Sonoma, and Yolo Counties	Clay or serpentinite soils of coastal scrub, lower montane coniferous forest, valley and foothill grassland; below 1,000 ft	Jun–Oct	Not located in the Plan Area during surveys
Mason’s lilaepsis <i>Lilaepsis masonii</i>	-/R/1B.1		Southern Sacramento Valley; Sacramento–San Joaquin Delta; northeast San Francisco Bay area; Alameda, Contra Costa, Marin*, Napa, Sacramento, San Joaquin, and Solano Counties	Freshwater and intertidal marshes, streambanks in riparian scrub; generally at sea level	Apr–Nov	None; no habitat is present in the Plan Area
Showy madia <i>Madia radiata</i>	-/-/1B.1		Scattered populations in interior foothills of South Coast Ranges; Contra Costa, Fresno, Kings, Kern, Monterey, Santa Barbara, San Benito, San Joaquin, and San Luis Obispo Counties	Oak woodland, grassland, slopes; below 3,000 ft	Mar–May	Low; habitat quality is poor and no nearby records
Robust monardella <i>Monardella villosa</i> ssp. <i>globosa</i>	-/-/1B.2		North Coast Ranges and eastern San Francisco Bay Area; Alameda, Contra Costa, Humboldt, Lake, Marin, Napa, San Mateo, and Sonoma Counties	Oak woodland and grassy openings in chaparral	Jun–Jul	None; no habitat is present in the Plan Area
Little mouseltail <i>Myosurus minimus</i> ssp. <i>apus</i>	-/-/3.1		Central Valley, San Francisco Bay region, outer South Coast Ranges, south coast. Alameda, Butte, Contra Costa, Colusa, Kern, Riverside, San Bernardino, San Diego, Solano, and Stanislaus Counties	Alkaline vernal pools and marshes; below 5,000 ft	Mar–Jun	Low; habitat quality is poor and no nearby records
Baker’s navarretia <i>Navarretia leucocephala</i> ssp. <i>bakeri</i>	-/-/1B.1		Inner North Coast Ranges, western Sacramento Valley; Colusa, Lake, Mendocino, Marin, Napa, Solano, Sonoma, and Tehama Counties	Vernal pools and swales in woodland, lower montane coniferous forest, mesic meadows, and grassland; generally below 5,600 ft	May–Jul	Low; habitat quality is poor and no nearby records
Colusa grass <i>Neostapfia colusana</i>	T/-/1B.1		Central Valley: Colusa, Glenn, Merced, Solano, Stanislaus, and Yolo Counties	Adobe soils of vernal pools, generally below 650'	May–Sep	None; no habitat is present in the Plan Area
Antioch Dunes evening-primrose <i>Oenothera deltooides</i> ssp. <i>howellii</i>	E/E/1B.1		Northeast San Francisco Bay region, known from three native occurrences; Contra Costa and Sacramento Counties	Inland dunes; generally below 330 ft	Mar–Sep	None; no habitat is present in the Plan Area

Table 3.4-2. Continued

Common Name <i>Scientific Name</i>	Legal Status ^a		Geographic Distribution	Habitat Requirements	Blooming Period	Potential Occurrence in the Plan Area ^b
	Fed/State/CNPS					
Gairdner's yampah <i>Perideridia gairdneri</i> ssp. <i>gairdneri</i>	-/-/4.2		Kern, Los Angeles*, Mendocino, Monterey, Marin, Napa, Orange*, San Benito, Santa Clara, Santa Cruz, San Diego*, San Luis Obispo, San Mateo*, Solano, and Sonoma Counties	Broadleaved upland forest, chaparral, coastal prairie, valley and foothill grassland, vernal pools, in mesic areas	Jun–Oct	Known to occur in the Montezuma Hills but not located in the Plan Area during surveys
Bearded popcornflower <i>Plagiobothrys hystriculus</i>	-/-/1B.1		Endemic to Solano* County, previously presumed extinct	Mesic grassland, vernal pools	Apr–May	High; known to occur in the Plan Area
Blue skullcap <i>Scutellaria lateriflora</i>	-/-/2.2		Northern San Joaquin Valley; east of the Sierra Nevada; Inyo and San Joaquin Counties; New Mexico, Oregon	Mesic meadows, marshes and swamps; generally below 1,640 ft	Jul–Sep	Low; habitat quality is poor and no nearby records
Suisun Marsh aster <i>Symphotrichum lentum</i>	-/-/1B.2		Sacramento–San Joaquin Delta; Suisun Marsh; Suisun Bay; Contra Costa, Napa, Sacramento, San Joaquin, and Solano Counties	Brackish and freshwater marsh; below 500 ft	Aug–Nov	None; no habitat is present in the Plan Area
Solano grass <i>Tuctoria mucronata</i>	E/-/1B.1		Southwestern Sacramento valley: Solano and Yolo Counties	Vernal pools, mesic grassland, below 500'	Apr–Jul	None; no habitat is present in the Plan Area

^a Status explanations:

Federal

- E = listed as endangered under the federal Endangered Species Act.
- = no listing.

State

- R = Listed as Rare under the Native Plant Protection Act
- E = listed as endangered under the California Endangered Species Act
- = no listing.

California Native Plant Society

- 1A = List 1A species: presumed extinct in California.
- 1B = List 1B species: rare, threatened, or endangered in California and elsewhere.
- 2 = List 2 species: rare, threatened, or endangered in California but more common elsewhere.
- 3 = List 3 species: plants about which more information is needed to determine their status.
- 4 = List 4 species: plants of limited distribution.
 - .1 = seriously endangered in California
 - .2 = fairly endangered in California
 - .3 = not very endangered in California
- = no listing.
- * = known populations believed extirpated from county.

^b **Definitions of Levels of Potential Occurrence (prior to field surveys):**

High: California Natural Diversity Database (or other documents) records known occurrence of plant in the project vicinity; or presence of suitable habitat conditions and suitable microhabitat conditions.

Moderate: California Natural Diversity Database (or other documents) records known occurrence of plant in the project vicinity; or presence of suitable habitat conditions but suitable microhabitat conditions are not present.

Low: California Natural Diversity Database (or other documents) records no known occurrence of plant in the project vicinity; or habitat conditions of poor quality.

None: California Natural Diversity Database (or other documents) records no known occurrence of plant in the project vicinity; or suitable habitat not present in any condition.

3.4.2 Environmental Consequences

Approach and Methods

A prefield investigation and field surveys were conducted to identify and describe biological resources in the Plan Area.

Prefield Investigation

Existing information was reviewed to prepare lists of special-status plant and wildlife species known to occur or with potential to occur in the project region. ICF botanists and wildlife biologists reviewed the information listed below to develop lists of special-status species that could occur in the project region.

- A search of the CNDDDB (2009) for the Birds Landing and surrounding 7.5-minute U.S. Geological Survey quadrangle maps (quads).
- CNPS's (2009) 7th Edition *Online Inventory of Rare and Endangered Plants of California*.
- USFWS lists of endangered and threatened species for Solano County (U.S. Fish and Wildlife Service 2009).

A number of wind energy projects have been constructed or permitted or are in the planning phase in the Collinsville–Montezuma Hills WRA. Environmental documentation available for each of these projects addressed potential impacts on biological resources, and each report was reviewed as part of this study. These projects are listed below.

- High Winds LLC (Environmental Science Associates 2001).
- SMUD–Solano Wind (Sacramento Municipal Utility District 2003).
- Shiloh I (Ecology and Environment 2005).
- Shiloh II (Ecology and Environment 2007a).
- Montezuma Wind (Ecology and Environment 2007b).
- SMUD—Phase 3 (Sacramento Municipal Utility District 2010).

Additionally, a recent study of avian issues for Shiloh III, *Avian Monitoring Study and Risk Assessment for the Shiloh III Wind Power Project, Solano County, California* (Curry & Kerlinger 2009) was reviewed. Data on the biological resources present in the Shiloh I and Shiloh II project areas were used extensively because the proposed Shiloh III project area partially overlaps the other two project areas. All the information sources described above were used to develop lists of special-status species that could occur in the Plan Area (Table 3.4-1 and Table 3.4-2).

Field Surveys

ICF conducted field studies to map and describe the biological resources present in the Plan Area. Each of these studies is described below.

General Vegetation

Field surveys to identify and map the general vegetation types (i.e., habitats) present in the study area were conducted between March and September 2009. Habitats were visually inspected in the field, mapped on

aerial photographs at a scale of 1 inch = 400 feet, and digitized into a geographic information system (GIS) format.

Special-Status Wildlife

ICF wildlife biologists conducted surveys in March, April, May, and August 2009 for special-status wildlife species and/or their habitats in the study area. The surveys focused on locating the species or habitat for the species identified as potentially occurring in the Plan Area. With the exception of CTS surveys, protocol-level surveys (i.e., formal surveys conducted to DFG and/or USFWS standards) were not conducted as part of this study and are not necessary to describe the biological resources in the Plan Area.

As the first step in reaching a determination on the presence of CTS in the Plan Area, a site assessment was conducted in accordance with the procedures set forth in *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (interim guidance) (U.S. Fish and Wildlife Service and California Department of Fish and Game 2003). The interim guidance describes two components to the assessment process: an assessment of potential habitat and documented CTS occurrences in and around the project site, and protocol-level field surveys of breeding pools and associated uplands to determine presence or absence.

Based on the results of the site assessment, USFWS recommended surveys for CTS only in the eastern portion of the Plan Area (the area roughly to the east of Birds Landing Road), assuming presence in the western portion of the Plan Area based on nearby records. Surveys for CTS, conducted according to the interim guidance, were initiated in March 2009 by ICF biologists in suitable aquatic habitat in the eastern portion of the Plan Area, and were completed in May 2010 (ICF 2010). No CTS were located in or surrounding suitable aquatic habitat that was surveyed.

Avian and Bat Species

Preconstruction surveys for avian species, conducted consistent with CEC/DFG Guidelines (primarily point counts at scattered and representative locations across the project area) were conducted for the Shiloh III project. Over the last 10 years, several other preconstruction surveys have been conducted at adjacent (and now operating) wind projects (i.e., High Winds, Shiloh I, Shiloh II, and SMUD Solano). Additionally, operational mortality studies have been completed at High Winds (2 years postconstruction), Shiloh I (3 years postconstruction), and Shiloh II (year 1 of 3 is complete but has not yet been reported). In general, the methods used in all studies have been similar and the available data on avian and bat mortality can be used to predict mortality rates at Shiloh III.

Special-Status Plants

ICF botanists conducted floristic surveys in October 2009 for late-blooming special-status plants with potential to occur in the Plan Area. Surveys employed floristic methods recommended by DFG (California Department of Fish and Game 2000) and CNPS guidelines. The guidelines specify that all plants be identified to the level necessary to determine whether they qualify as special-status plants or plant species with unusual or significant range extensions. Floristic surveys are conducted to ensure that special-status plant species are not inadvertently overlooked merely because they were not expected in the region. The general purpose of the floristic surveys was to locate and map occurrences of special-status plants and to further characterize plant communities.

Surveys for spring-blooming special-status plants have been conducted in a portion of the Plan Area that overlaps with the recently constructed Shiloh II project. ICF will conduct surveys in the Shiloh III area for spring-blooming special-status plants during the appropriate time in 2010 (anticipated to be April or early

May, depending on the timing and intensity of rainfall events). A summary of the spring-blooming species known to occur and a habitat assessment for the remaining spring-blooming special-status plants are provided in Table 3.4-2

Waters of the United States

ICF Jones & Stokes botanists and wetland ecologists conducted field surveys between April and August 2009 to identify and map potential waters of the United States in the study area. A formal wetland delineation using the methods outlined in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Arid West Supplement to the Manual* (U.S. Army Corps of Engineers 2008) was not conducted in the study area as part of this study because there are no plans to place fill any of these features. Potential waters of the United States were identified and mapped on the basis of the presence of observable indicators such as wetland vegetation, wetland hydrology, a defined channel, or a defined bed and bank. An effort was made to be as conservative as possible when assessing whether a particular area would be considered a water of the United States and when mapping its boundaries.

Potential waters of the United States were mapped in the field on aerial photographs at a scale of 1 inch = 400 feet and then digitized into a GIS format.

Effects

Proposed Action

Impact Bio-1: Potential impacts on habitat for valley elderberry longhorn beetle

A single elderberry shrub with a stem greater than 1 inch in diameter is present in the Plan Area. The shrub is adjacent to a wetland area, is not within 500 feet of any project components, and will be completely avoided by at least 100 feet in accordance with EC-6. Implementation of EC-5 and EC-6 would ensure that direct and indirect impacts on potential habitat for this species are avoided. Implementing the Proposed Action would therefore not affect VELB or habitat capable of supporting VELB.

Impact Bio-2: Potential impacts on habitat for special-status invertebrate species

Potential habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp is present in vernal pools immediately adjacent to the Plan Area. Although the potential habitat is not within the Plan Area, USFWS normally evaluates effects on habitat for federally listed invertebrate species (vernal pool fairy shrimp and vernal pool tadpole shrimp) when project activities are proposed to occur within 250 feet of potential habitat. Electrical collection lines would be placed in the Plan Area at a distance greater than 250 feet from vernal pools but within the watershed of these pools. Consequently, the potential exists for upland areas around this habitat to be disturbed during construction. However, the likelihood of these activities having an adverse effect is minor, because of the limited extent of disturbance necessary to bury electrical collection lines and because implementation of EC-4, EC-6, and EC-7 would ensure that direct and indirect impacts on vernal pool habitats are avoided. Therefore, implementation of the Proposed Action would not have an adverse effect on special-status invertebrate species.

Impact Bio-3: Potential impacts on habitat for California tiger salamander

Potential breeding, aestivation, and dispersal habitat for CTS is present in and adjacent to the Plan Area in ponds, vernal pools, and surrounding annual grassland habitats. However, the Proposed Action would

avoid all breeding habitat for CTS by siting wind turbines, access roads, and appurtenant facilities away from potential CTS breeding habitat. USFWS recommended that the permittees assume presence in suitable habitat in the western portion of the Plan Area (approximately the area west of Birds Landing Road), and recommended surveys in suitable aquatic habitat in the eastern portion of the Plan Area. Surveys for CTS, consistent with the USFWS/DFG protocol, were conducted in the eastern portion of the Plan Area and concluded in May 2010. No CTS were observed during the surveys.

Although the survey results indicate that CTS are absent or at least uncommon in the Plan Area, vernal pools and stock ponds in and around the Plan Area may still be considered suitable aquatic habitat for CTS by the USFWS. Additionally, annual grassland areas surrounding suitable aquatic habitat would be considered suitable upland habitat. Temporary impacts on 65 acres and permanent impacts on 15 acres of aestivation and dispersal habitat (annual grassland) are anticipated as part of the Proposed Action, but these impacts would be reduced by implementing avoidance and minimization measures set forth in the HCP and by offsetting unavoidable permanent impacts on CTS habitat through conservation of upland habitat at a USFWS-approved conservation bank (EC-8). Therefore, implementation of the Proposed Action would not have an adverse effect on CTS.

Impact Bio-4: Potential impacts on western burrowing owl

Burrowing owls are known to occur in the Plan Area and its vicinity. Potential impacts could result from construction disturbing existing owl burrows or foraging habitat. Potential impacts may also occur as a result of collision with wind turbines. Impacts on burrowing owl would be adverse if the proposed project would substantially reduce the numbers or range of the species. To date, no documented mortalities of burrowing owl have occurred at adjacent wind projects (Curry & Kerlinger 2009). Implementation of EC-4, EC-5, and EC-6 would avoid and minimize impacts and EC-9 would mitigate the impacts through offsite conservation of suitable avian foraging habitat. Therefore, although implementation of the Proposed Action could result in effects on western burrowing owl, overall the Proposed Action would not result in adverse effects on the species.

Impact Bio-5: Habitat removal, displacement, and disturbance impacts on nesting raptors and special-status birds

Implementation of the Proposed Action would result in the permanent removal of 15 acres of grassland and 36 acres of agricultural habitat that are used for foraging and nesting by some avian species. In addition, the presence of new facilities (primarily turbines and access roads) could result in the temporary or permanent displacement of some species from the Plan Area. Finally, disturbance from construction in the Plan Area could result in disturbance of some nesting species, potentially leading to nest abandonment. However, the habitat types being removed are common in the region and the acreage of habitats permanently removed is small. Studies of the potential effect of displacement of birds from wind turbine facilities resulting from the presence of new facilities and operational activities are inconclusive (Curry & Kerlinger 2009); in studies showing an effect, the impacts are minimal, with effects being demonstrated for the most common species only. Implementation of EC-4, EC-5, and EC-6 would minimize any potential effects associated with disturbance from construction of the Shiloh III project. Therefore, although implementation of the Proposed Action could result in minor habitat loss, displacement, and disturbance impacts, the Proposed Action taken as a whole would not adversely affect raptors and special-status birds.

Impact BIO-6: Mortality of raptors, other birds, and bats due to collisions with turbines

Operation of wind plants can cause mortality of raptors, other birds, and bats through collision with turbine blades. Extensive studies have been conducted in the Collinsville–Montezuma Hills WRA; data from those studies were incorporated into the *Avian Monitoring Study and Risk Assessment for the Shiloh III Wind Power Project, Solano County, California* (Shiloh III study) (Curry & Kerlinger 2009). These studies were conducted in accordance with protocols set forth in *Studying Wind Energy/Bird Interactions: A Guidance Document—Metrics and Methods for Determining or Monitoring Potential Impacts on Birds at Existing and Proposed Wind Energy Sites* (Anderson et al. 1999) and *California Guidelines for Reducing Impacts to Birds and Bats from Windplant Development* (California Energy Commission and California Department of Fish and Game 2007).

Bird use studies were conducted at nine observation points in the Plan Area over a period of 1 year. The data from these studies were compared to analogous data from studies at neighboring wind projects under similar conditions. Because bird use at neighboring wind projects could be correlated with empirical mortality data, it was possible to project mortality levels for Shiloh III on the basis of the results of the bird use surveys, during which roughly 42,000 observations of 70 avian species were recorded.

Although these studies reflect a great number of variables, the Shiloh III study (Curry & Kerlinger 2009) suggests that raptors—the category of birds of most concern in the context of wind turbine collision—are relatively less abundant in the Plan Area than in the three neighboring wind farms studied in the Collinsville–Montezuma Hills WRA. Of raptor species, golden eagle is probably the species of greatest concern: in part because it is a California Species of Special Concern and is protected under the Bald and Golden Eagle Protection Act, and because in many parts of its range it is a relatively scarce species.

The National Wind Coordinating Committee, an organization funded by the U.S. Department of Energy's Wind and Water Technologies Program and made up of a collaborative of representatives from utilities, wind developers, environmental organizations, states, federal agencies, and consumer advocacy groups, (among others), published a paper in 2001 that summarized existing mortality studies and compared avian mortality from wind energy with other sources of avian mortality (Erickson et al. 2001). The paper concludes that current levels of mortality caused by windplants do not appear to be causing significant population impacts for avian species, with the possible exception of golden eagle impacts at the Altamont Pass. Recent studies conducted in the Altamont Pass indicate adjusted mortality estimates of approximately 67 golden eagles annually (Smallwood and Thelander 2008:221). The recent Altamont Pass Wind Resource Area Bird Fatality Study (ICF Jones & Stokes 2009), prepared in support of the Alameda County Scientific Review Committee (SRC), indicated mortality rates similar to the results of the Smallwood and Thelander study. Data collected in the Montezuma Hills indicate that mortality in this area is considerably lower (Curry & Kerlinger 2009). In the Montezuma Hills, golden eagles are relatively uncommon, in terms of both nesting and overall observations, compared to nearby areas such as the Altamont Pass. Currently, golden eagle nests in the Montezuma Hills are limited to three or four nest sites/territories. Observations by Curry & Kerlinger indicate that use of the known nests in the Montezuma Hills is somewhat erratic and nesting success has been inconsistent over the years the area has been monitored. In preconstruction use surveys conducted by Curry & Kerlinger, nearly three-quarters of golden eagle observations (23 out of 31 observations) were at heights above or below the rotor-swept area (Curry & Kerlinger 2009 p. 59). Predicted mortality rates for the Shiloh III project indicate one fatality per year (Ecology and Environment 2010 p. 8-83). These observations suggest that golden eagles in the Collinsville–Montezuma Hills WRA may be less susceptible to collision-related mortality than other wind resource areas in California, such as the Altamont Pass Wind Resource Area. Based on a consideration of the national context and regional intensity, and with implementation of EC-9, the relatively low impacts on golden eagle anticipated from the Shiloh III project are not anticipated to constitute an adverse effect.

American kestrels and red-tailed hawks both suffer relatively high mortality rates at wind projects in the Collinsville–Montezuma WRA. Postconstruction monitoring conducted at the High Winds and Shiloh I projects generated estimated mortality rates of 32.5 and 42 fatalities per year for kestrels and 21 and 11 fatalities per year for red-tailed hawks, respectively. However, because both species enjoy abundant populations throughout wide distributions, this level of mortality would not constitute an adverse effect. Similarly, implementation of EC-9 would minimize this effect.

In preconstruction use surveys conducted by Curry & Kerlinger, approximately 2% of all observations were waterfowl species (ducks and geese) (Curry & Kerlinger 2009 p. 18). Approximately 10% of the waterfowl were observed flying within the rotor-swept area, in contrast to approximately 30% for passerines, and 43% for other birds (Curry & Kerlinger 2009 p. 38). During postconstruction monitoring conducted in the Shiloh I project area, there were a total of six waterfowl incidents during the 3-year monitoring period (Curry & Kerlinger 2009 p. 69). This mortality rate, compared to annual waterfowl hunting rates in California (more than 300,000 birds for mallards alone), indicates that the mortality rates are not significant for waterfowl species. Accordingly, this would not be an adverse effect.

Finally, mortality studies at the High Winds and Shiloh I wind projects yielded an estimated mortality rate of two–three bats per MW per year (Ecology and Environment 2010) as calculated from monitoring results and the incorporation of correction factors for scavengers and searcher efficiency. This rate could result in 236–443 bat fatalities per year for the Shiloh III project, depending on the type of turbine selected and the extent to which bats use the Plan Area. Because most of these bats would likely be migrating (based on the time of year most fatalities occur), and consequently would represent large populations (numerically and geographically), this level of mortality would not constitute an adverse effect (Ecology and Environment 2010). Nevertheless, implementation of EC-9 would ameliorate this effect, minimizing effects on bats and their foraging habitat.

The Proposed Action is not expected to result in turbine-related mortality that adversely affects populations of raptors, other bird species, or bats through potential collisions with turbines.

Impact Bio-7: Potential impacts on special-status plants

No state- or federally listed species are present in the Plan Area; however, implementation of the Proposed Action could adversely affect three non-listed special-status plant species known to occur in the Plan Area. Although all wind turbines have been sited to avoid impacts on special-status plants, power collection system components and roads are proposed on or adjacent to several special-status plant occurrences. Implementation of EC-4, EC-5, and EC-6 would reduce impacts on bearded popcornflower, Carquinez goldenbush, and pappose spikeweed.

Bearded popcornflower. The Proposed Action includes an overhead electrical line connecting the proposed substation with the existing PG&E line that crosses the Plan Area. One bearded popcornflower occurrence is located within the proposed corridor for the overhead electrical line.

Carquinez goldenbush. The Proposed Action includes an overhead electrical line connecting the substation with the existing PG&E lines within the Plan Area. The Carquinez goldenbush occurrence is within the proposed corridor for the overhead electrical line.

Pappose spikeweed. Several pappose spikeweed occurrences in the Plan Area may be disturbed during construction of the Proposed Action. Based on review of the site plan and current understanding of the Proposed Action, it appears that most occurrences of pappose spikeweed can be avoided through implementation of avoidance measures presented in EC-6. One small occurrence (0.02 acre) is adjacent to the proposed substation location. The permittees have indicated that avoidance at this location may not be

possible. Based on the avoidance of other nearby occurrences, the size of this particular occurrence, and the relative abundance of this species in the surrounding area, impacts on this species from construction of the substation do not appear to be substantial and would not constitute a substantial adverse effect on the species.

Impact 7: Potential impacts on waters of the United States (including wetlands)

Implementing the Proposed Action could potentially affect waters of the United States, including wetlands, at several locations in the Plan Area. Potential waters of the United States in and adjacent to the Plan Area comprise ponds, marshes, alkali meadow, vernal pools, and seasonal streams. Although the Proposed Action would avoid siting wind turbines near waters of the United States, several associated project components—some roads and collection lines—are currently proposed in locations where they cross or are immediately adjacent to waters of the United States.

Power collection lines are typically installed by digging a trench, installing the line, and backfilling the trench (i.e., the open-cut trenching method). This method could result in the discharge of fill material into a jurisdictional wetland and would require a CWA Section 404 permit. However, the Proposed Action would avoid all waters of the United States and associated permitting requirements along the power collection system routes by using HDD to cross under wetlands and streams. This method of avoidance has been used successfully on similar projects in the Montezuma Hills, such as the High Winds Project and the Shiloh I Project.

While the use of HDD is considered less intrusive than other construction methods (e.g., open-cut trenching), the “frac-out,” or inadvertent release of drilling lubricant, is a potential concern when using HDD. Implementation of EC-7 would address these potential effects.

No Action

Under the No-Action Alternative, the proposed HCP, including covered activities, would not be implemented and none of the biological communities, special-status species, or waters of the United States would be affected by wind plant development in the Plan Area. Land uses would remain in grazing and agricultural uses. Under this alternative, the potential exists that future development in the Plan Area could occur that is compatible with agricultural and wind plant development.

3.4.3 References

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3.5 Cultural Resources

This section describes the existing conditions pertaining to cultural resources and the potential environmental consequences that could result from implementation of the Proposed Action. Information presented in this section has been summarized from the *Cultural Resources Inventory Report for the Proposed Shiloh III Project, Solano County, California* (ICF Jones & Stokes 2009). Please refer to this report for additional detail related to the context of cultural resources in the Plan Area and detailed descriptions of the methods used for this analysis.

3.5.1 Affected Environment

Regulatory Setting

The cultural resources study was conducted in compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966 and its implementing regulations (36 CFR 800, as amended in 1999). Section 106 requires that federal agencies and entities that they fund or license consider the effects of their actions on properties that are listed in the NRHP, or that may be eligible for such listing. To determine whether an undertaking could affect NRHP-eligible properties, cultural resources (including archaeological, historical, and architectural properties) must be inventoried and evaluated. Although compliance with Section 106 is the responsibility of the lead federal agency, others can conduct the work necessary to comply.

The Section 106 review process consists of four steps.

1. Initiate the Section 106 process by establishing the undertaking, developing a plan for public involvement, and identifying other consulting parties.
2. Identify *historic properties* (resources that are eligible for inclusion in the NRHP) by determining the scope of efforts, identifying cultural resources within the area potentially affected by the project, and evaluating resources' eligibility for the NRHP inclusion.
3. Assess adverse effects by applying the Section 106 criteria of adverse effect to identified historic properties.
4. Resolve adverse effects by consulting with the State Historic Preservation Officer (SHPO) and other consulting agencies to develop an agreement that addresses the treatment of historic properties.

Cultural Setting

Prehistoric Context

The prehistoric context for the Plan Area provides an overview of the human occupation in the Plan Area region. The proposed Plan Area is within the boundaries of the Delta subregion of the Central Valley archaeological region, as defined by Moratto (1984). Little is known of human occupation of this region before 4500 before present (BP). As a result of rapid alluvial and colluvial deposition in the valley over the past 10,000 years, ancient cultural deposits have been deeply buried in many areas.

The earliest evidence of widespread occupation of the lower Delta region appears at archaeological deposits assigned to the Windmill Pattern (Early Horizon), dated between 4500 and 2500 BP. The Windmill Pattern has been associated by some archaeologists with the arrival of Utian peoples from

outside of California (see the section titled *Ethnographic Context*) who had adapted to riparian and wetland environments (Moratto 1984).

Windmill group subsistence-settlement patterns are poorly understood because few known archaeological sites are ascribed to this archaeological pattern. Available data indicate that Windmill group sites are typically located on low rises or knolls in the floodplains of creeks or rivers. Such locations would have provided protection from seasonal floods while retaining proximity to riparian, marsh, and grassland biotic communities.

Most known Windmill Pattern sites contain cemeteries, implying some degree of sedentism. Windmill groups typically buried the deceased in a ventrally extended position with abundant grave goods and oriented the head to the west.

Subsistence needs were met through hunting and fishing, as evidenced by large projectile points (spear or dart tips); baked clay net sinkers; bone fish hooks and spears; and remnants of faunal remains at Windmill Pattern sites. The presence of Windmill Pattern ground stone tools, such as mortars and milling slabs, indicate that Windmill groups collected plant foods (seeds, nuts, and perhaps roots).

Other artifacts characteristic of the Windmill Pattern include charmstones, quartz crystals, bone awls, and needles; and beads and ornaments manufactured from abalone shell (*Haliotis* sp.) and olive snails (*Olivella* sp.) (Beardsley 1948; Heizer 1949; Heizer and Fenenga 1939; Lillard et al. 1939; Ragir 1972; Schulz 1970).

The succeeding Berkeley Pattern (Middle Horizon) dates from 2500 to 1500 BP, overlapping in time at least some Windmill Pattern manifestations. Archaeologists have identified more Berkeley Pattern sites than Windmill Pattern sites, and sites representing the former pattern are also more widespread. Deep midden deposits, suggesting larger residential group size, greater frequency of site reuse, and/or a greater degree of sedentism, characterize Berkeley Pattern sites. Berkeley group subsistence, in contrast to Windmill groups, placed greater emphasis on acorns (*Quercus* sp.) and other vegetal food sources.

Ethnographic Setting

The ethnographic setting for the Plan Area provides an overview of Native American use in the region. The Plan Area is in a portion of the Delta that was most likely used by several Native American groups in recent prehistory and the historic period. Anthropologists have drawn conflicting pictures of Native American use of the Montezuma Hills: The region has been variously ascribed to the Southeastern Patwin (Bennyhoff 1977:164; Johnson 1978: Figure 1; Kroeber 1925: Plate 1), the Plains Miwok (Levy 1978: Figure 1; Theodoratus et al. 1980: Map 2), and the Bay Miwok (Bennyhoff 1977:164; Levy 1978: Figure 1; Theodoratus et al. 1980: Map 2).

Given that the Bay Miwok village *Ompin* was located in the vicinity of the present project area (Levy 1978), it is likely that Bay Miwok used the Montezuma Hills most intensively up to the historic period, although Plains Miwok, Southern Patwin, and possibly Northern Yokuts and Ohlone/Costanoan groups made periodic visits to the Montezuma Hills as well (Theodoratus et al. 1980). Please refer to *Cultural Resources Inventory Report for the Proposed Shiloh III Project, Solano County, California* for a summary description of Bay Miwok culture.

Historical Context

Early History

Solano County is one of California's original 27 counties and retains its original boundaries to the present day. Mexican, American, and European settlers began to arrive and set down roots within the boundaries of Solano County in the 1840s and 1850s. Euroamerican encroachment into the Montezuma Hills began in 1844, when settler John Bidwell (1819–1900) petitioned the Mexican government for a land grant in southeastern Solano County (Kyle 1990:464). Governor Manuel Micheltoarena gave the grant to Bidwell that same year for the 17,726-acre *Rancho Los Ulpinos*. The grant was located on the west bank of the Sacramento River and extended west into the eastern portion of the proposed Plan Area (Beck and Haase 1974:29; Kyle 1990:464; cf. Gregory 1912:64; Hunt 1926:78, 228).

The town of Rio Vista was created on land purchased in 1855 by Colonel N. H. Davis from Bidwell. During the late nineteenth and early twentieth centuries, Rio Vista functioned largely as an agricultural community. Aside from its downtown, much of its land remained undeveloped. An increasing population due to renewal and development during the early 1900s resulted in a rise in residential and infrastructure development including educational, religious, and community facilities. During the 1920s, Rio Vista and the surrounding region had approximately 1,900 residents. By the late 1940s and following World War II, Rio Vista had an established downtown area and the regional population reached more than 3,500 residents. Today, the Rio Vista region is approximately 25 percent developed and has more than 8,000 residents (City of Rio Vista 2005; Gunn and Hunt 1926:227; Pezzaglia 2005:101, 105).

Montezuma Hills was one of the original townships created in 1854 and is located in the southeastern region of the county (Munro-Fraser 1879:30, 311). During the nineteenth century, the Montezuma Hills area maintained a small local population, with fewer than 500 residents as late as 1890. Over the next three decades the Montezuma Hills population varied but generally remained at under 500 residents. By the mid-twentieth century the regional population had declined to approximately 300 residents (United States Census 1895:74; 1913:150; 1924:16; 1942:126). Settlement in Montezuma Hills continued to be sparse into the latter half of the twentieth century and remains so, particularly in the Plan Area (United States Census 1913:150; 1921:16; and 1942:126).

Agriculture

Unlike other areas of Solano County, agricultural development in Montezuma Hills was limited to grain, hay, and wheat, which thrived. This was largely due to a combination of adobe soil and high winds, making fruit and vegetable crops, which were grown in other regions of the county, a more challenging endeavor in Montezuma Hills (Munro-Fraser 1879:24; Gregory 1912:71). By 1878, an estimated 23 ranches operated in the area (Delaplane 1995). Several residents who established farmsteads in the Plan Area during the nineteenth century maintained their grazing and hay ranches throughout the twentieth century. The Emigh family continued to operate their farm through at least the late 1990s; the Azevedo family, who operated a dairy and general store during the early twentieth century, held their property through at least the late 1970s; and the Mayhood family, who established their farmstead during the late nineteenth century, maintain their property today. Presently, agricultural land, including agriculture-related buildings and some residences, continues to dominate the local landscape for the region surrounding the Plan Area (Delaplane 1999; Eager 1890 and 1915; Munro-Fraser 1879:471; Gregory 1912:189–190; Hunt 1926:211–215, 232)

Natural Gas Production

In addition to agricultural pursuits, ranchers and farmers in the eastern section of Montezuma Hills, in an area known as the Rio Vista Gas Fields, leased the rights to the natural gas beneath their land. In 1921, PG&E drilled the first well, 7 miles west of the Rio Vista city limits, with little result. It was not until 1936 that oil drilling resumed under the direction of geologists for the Amerada Petroleum Company (Amerada). Amerada acquired leases on lands in the Montezuma Hills area, including Arthur Emigh's property on Emigh Road just west of Azevedo Road. While drilling for oil at well Emigh No. 1, Amerada discovered natural gas and quickly switched efforts from oil drilling to drilling for natural gas. A natural gas drilling boom ensued and a second well was drilled southwest of Emigh's property on land owned by Perry Anderson (Gbedema 2006:59–61; Eager 1915). By 1942, there were 55 wells in the area (Gbedema 2006:68). Farmers leased the rights to the gas beneath their land for a royalty on the proceeds from the sale of the gas coming from their land (Wiley 1974:F1). These gas fields became the country's second largest natural gas operation and had pumped more than 3.3 trillion cubic feet of gas as of 2004. Oil drilling continues today in Rio Vista (Paul Graham Drilling and Service Company 2009; Peña 2004).

Wind Energy Production

Windmill use in California began in 1854 when farmers and landholders in San Francisco, Sacramento, and Stockton began using windmills produced by local manufacturers to pump well water for livestock, crop irrigation, and other tasks. These windmills were constructed of wood. However, by the 1860s windmills were largely constructed of steel and sheet metal. During the mid-1870s, windmills constructed in the Midwest began arriving in California, although locally produced windmills continued.

During the late nineteenth century, oil and gasoline availability in combination with the advent of electricity led to a decline in windmill use in developed areas. Rural areas continued using windmills largely because of the lack of electrical development in these areas and because new windmills produced around the turn of the century featured all-metal construction. By the 1910s, windmills were almost entirely replaced by other forms of pumping power (Manning 1975:33–37).

During the 1930s, the Great Depression and the resulting prohibitive costs for oil and gasoline brought renewed popularity for energy production. Residences in rural areas maintained wind turbines as energy sources throughout the twentieth century. Since the 1980s, local utility company and private energy corporations have been installing wind farms in the Montezuma Hills region. These wind turbines stand 300–400 feet tall, feature modern design, and provide energy to power more than 700,000 homes (Baker 2006:B-2; Manning 1975:33–37; Massad 2009:1–2).

Transportation

Nineteenth century transportation to and from the Montezuma Hills was limited to river ferries along the Sacramento River and a small network of roads (Hunt 1926:38). Through the 1870s, road development was limited in this area, comprising a few tracks and unimproved roads (General Land Office 1877). The current system of roads from the Montezuma Hills to Fairfield, Rio Vista, and Dixon was established between 1872 and 1890 (Henning 1872; Eager 1890). Several roads, including SR 12 (formerly Road 211) and Olsen Road (formerly Road 290), border and pass through the Plan Area. Montezuma Hills Road was originally named Road 345, maintaining that name through at least 1915 (Eager 1915). Many of the roads in the eastern and southern section of the Plan Area were established as truck routes to the natural gas fields (Gbedema 2006:92). By 1945 more roads were created, including Azevedo and Emigh Roads (named after local families). The roads were either oiled or gravel (Freese 1945). Today Olsen, Azevedo, and Emigh Roads continue to be unimproved gravel roads.

Methods

The effort to identify cultural resources in the Plan Area included a records search of previous cultural resource investigations and recorded sites; background research and a review of literature relevant to the prehistory, ethnography, and history of the project vicinity; consultation with Native American representatives of Bay Miwok and Patwin descent, historical societies, and other interested parties; and a site visit and pedestrian survey of the Plan Area.

Area of Potential Effects

The Plan Area for the proposed Shiloh III project encompasses approximately 4,600 acres of treeless rolling hills. For the purposes of this analysis, the area of potential effects (*area of impact*) is defined as the maximum possible area of direct impact resulting from the Proposed Action, including all areas of ground-disturbing activities. The area of impact is much smaller than the Plan Area and is generally confined to corridors within which the project components are planned: the proposed wind turbine locations, access roads, substation, electrical lines, and underground cables (Figure 2-3). The area of impact for the built environment includes all standing buildings and structures situated on parcels on which the project would be constructed.

Research and Consultation

A records search was conducted on February 12, 2009, by an ICF archaeologist at the Northwest Information Center (NWIC) of the California Historical Resources Inventory System in Rohnert Park, California. Records of previously conducted cultural resource investigations and previously recorded cultural resources were consulted for the Plan Area and a 1-mile radius around it. The records search included a review of the NRHP and the Directory of Properties in the Historic Property Data File for Solano County. Historic topographic maps and survey plats were also consulted (Henning 1872; General Land Office 1877; U.S. Geological Survey 1908).

ICF requested from the Native American Heritage Commission (NAHC) a search of its sacred lands file and a list of Native Americans with knowledge of and interest in local cultural resources. The NAHC informed ICF that no sacred lands have been reported in the project vicinity. Additionally, the NAHC provided a list of Native American contacts for Solano County, and correspondence was sent to gather input from these contacts.

ICF contacted the Solano County Historical Association, the Solano County Genealogical Society, and the Rio Vista Museum by letter on August 3, 2009, to inquire if they had information pertinent to the project or concerns regarding the Proposed Actions.

Cultural Resource Fieldwork

ICF archaeologists, qualified in identifying and documenting prehistoric and historic cultural resources, conducted pedestrian surveys of the Plan Area over the course of four partial-week field sessions between April and October, 2009. The entire project footprint was surveyed: turbine locations, access roads, service roads, electrical alignments, staging areas, and the substation. Survey transects were spaced 66 feet apart in sensitive areas adjacent to ponds and wetlands and 98 feet apart in low-sensitivity areas on ridges and hillsides.

On July 2, 2009, and August 10, 2009, ICF architectural historians conducted a field survey of the current proposed Plan Area. As part of the field process, buildings, structures, and linear features 50 years old or older were inspected, photographed, and documented.

Results

The records search results shows that four studies were previously conducted within the Plan Area; 25 studies have been conducted within the 1-mile radius outside the project area. Table 3.5-1 lists these studies; report numbers followed by *IN* indicate studies conducted within the Plan Area; numbers followed by *OUT* indicate studies conducted in the 1-mile buffer area.

Table 3.5-1 Previous Cultural Resource Studies Conducted in the Plan Area and 1-Mile Buffer Area

Report #	Report Name	Date	Author	Company/Agency
S-005096 OUT	An Archaeological Survey Report for a Proposed Bridge Replacement on 10-Sol-12 P.M. 14.3/15.1	1977	Caltrans	Caltrans
S-005141 OUT	A Cultural Resource Survey of the Proposed Drouin Park Unit Number Seven, Solano County, California	1980	M. F. Rondeau	
S-005207 OUT	A Survey of Archeological Resources along Pacific Gas and Electric Company's Canadian Gas Line in California	1984	B. Arnold	Pacific Gas
S-008845 OUT	Cultural Resource Survey, Brannan Island and Franks Tract State Recreation Areas	1986	G. Waugh	University of California, Dept. of Environmental Design
S-011115 OUT	An archaeological survey of the proposed Del Rio Hills golf course and residential development adjacent o the City of Rio Vista	1989	P. D. Bouey	Far Western FWARG
S-011246 OUT	Cultural Resource Investigation of the Proposed Mc Cormack Annexation to the City of Rio Vista (320 acres), Solano County, California	1989	L. K. Nepton	
S-011766 OUT	Archaeological Literature Review and Field Inspection of Areas 1 through 9, Montezuma Hills, Solano County	1989	M. P. Holman	Holman & Associates
S-011826 OUT	Montezuma I and II Cultural Resources	1980	Theodoratus et al.	Theodoratus Cultural Research
S-012300 OUT	Final Cultural Resources Assessment Report, PGT-PG&E Pipeline Expansion Project, Idaho, Washington, Oregon, and California, Phase 1: Survey, Inventory and Preliminary Evaluation of Cultural Resources	1990	Moratto et al.	INFOTEC Research, Inc. Biosystems Analysis, Inc.
S-012747 OUT	Appendix to an Archaeological Survey Report for a Proposed Bridge Replacement on 10-Sol-12 P.M. 14.3/15.1 (Highway 12, Solano County), (Alternate 1-A)	1978	Caltrans	Caltrans
S-012348 OUT	Historic Property Survey Report, State Highway 12, Solano County, Post Miles 13.6 to 15.4, Lambie Road to 0.7 East of Denverton Overhead Bridge No. 23-20, New Bridge on New Alignment	1979	Caltrans	Caltrans
S-013263 IN	An Archaeological Inspection of the Proposed Collinsville Wind Turbine Generation Site and Transmission Line	1991	K. J. Tremaine	Biosystems Analysis, Inc.
S-013672 OUT	Archaeological Survey Report, Application 29809, McCoster Property, Solano County	1991	W. E. Soule	California Division of Water Rights

Report #	Report Name	Date	Author	Company/Agency
S-015793 OUT	Archaeological Archival Research and Field Inspection of the Proposed Rio Vista Marina Study Area, Rio Vista, Solano County, California	1992	M. P. Holman	
S-016744 IN	Archaeological Survey Report, proposed work on Highway 12, 10-Sol-12 P.M. 20.6/22.7 10-110-45950K	1993	Caltrans	Caltrans
S-016745 OUT	Archaeological Survey Report, proposed removal of maintenance station buildings and construction of a new facility. 10-Sol-12 P.M. 26.10 110-267301	1990	Caltrans	Caltrans
S-017236 OUT	Cultural Resources Survey Report for Mega Sand – Sacramento River Dredging/Decker Island Sand Mining Facility ADEIR: Solano and Sacramento	1994	Cultural Resources Unlimited	Cultural Resources Unlimited
S-018525 OUT	Archaeological Survey Report for Three Passing Lane Extensions in a Rural Area of Solano County, California, 04-SOL-12, KP 25.6/27.2, 28.5/29.9, 30.9/33.4, EA 0T0300	1996	Caltrans	Caltrans
S-019026 OUT	Archaeological Survey Report, proposed widening of the intersection of Route 12 and Route 113, 04-SOL-12 30.84/31.26 244200, 04-SOL-113 0.0/1 EA 244200	1997	Caltrans	Caltrans
S-019563 OUT	Historic Property Survey Report, 04-SOL-12, KP 25.6/27.2, 28.5/27.2, 28.5/29.9, 30.9/33.4, CU 4383, EA 0T0300, Proposed Lengthening of Four Existing Passing Lanes	1997	Caltrans	Caltrans
S-022464 IN	Cultural Resource Inventory Report for the Williams Communications, Inc. Fiber Optic Cable System Installation Project, Pittsburg to Sacramento, California	1999	J&S	Jones & Stokes Associates, Inc.
S-023674 OUT	Archaeological Investigations, PGT-PG&E Pipeline Expansion Project, Idaho, Washington, Oregon, and California (Volume I, II, III, IV, V)	1995	Moratto et al.	INFOTEC Research, Inc. FWARG
S-025670 OUT	Historical and Cultural Resource Assessment, Proposed Telecommunications Facility, Western Railway Museum, Site No. SF-369-03, 5848 State Route 12, Solano County, California	2002	E. H. Derr	Cultural Resources Unlimited
S-027048 OUT	Archaeological Survey and Literature Review for the Calpine Natural Gas Company City of Rio Vista Gas Gathering System, Solano County, California	2003	D. Sterling J. Holson	Pacific Legacy
S-027856 OUT	Archaeological Resources Inventory & Evaluation, Riverwalk, Rio Vista, Solano County, California	2003	R. Windmiller	
S-029351 OUT	Evaluation of National Register Eligibility, Rio Vista Army Reserve Center, Rio Vista, Solano County, California	1997	R. F. Herbert	JRP Historical Consulting Services
S-031570 OUT	A Cultural Resource Study of the Brann Ranch, Rio Vista, Solano County, California	2005	M. P. Holman	Holman & Associates
S-033132 OUT	Archaeology Survey Report for the Solano 12 Road Rehabilitation Project, 04-SOL-12, PM 7.9/20.6, EA 0T0900/0T1010	2006	Caltrans	Caltrans (D-4)

Report #	Report Name	Date	Author	Company/Agency
S-033878 IN	Cultural Resources Inventory of the Del Rio Hills Project Area, Solano County, California, Project 2005-124	2007	ECORP Consulting, Inc	ECORP Consulting, Inc

No archaeological resources have been previously recorded in the Plan Area. Thirteen resources, including two isolates, have been recorded within the 1-mile radius surrounding the Plan Area. The built resources comprise an electric power alignment, a ranch complex, a school, three burnt structures, one house, an old road, and survey and bench markers. The isolates consist of a horseshoe and an obsidian core. Table 3.5-2 lists these resources.

Table 3.5-2 Previously Recorded Archaeological Resources in the 1-Mile Buffer Area

Primary # (P-48-)	Trinomial (CA-SAC-)	Temp Name	Site Type	Recorded By	Company/Agency
000210	396H	SOL-12	Ranch Complex	K. Dowdall	Caltrans (D-4)
000444	H		Round Hill School	Thompson; Dowdall	Caltrans (D-4)
000795	461H	RV-101	Burnt House/Foundations	Ahmet; Bholat	ECORP
000796	H	RV-102	Old Road	Ahmet; Bholat	ECORP
000797	H	RV-103	Power line	Ahmet; Bholat	ECORP
000798	H	RV-104	Burnt Barn	Ahmet; Bholat	ECORP
000799	H	RV-105	Barn/Granary	Ahmet; Bholat	ECORP
000800	H	RV-106	Survey Marker–1931	Ahmet; Bholat	ECORP
000801	H	RV-107	Benchmark–1939	Ahmet; Bholat	ECORP
000802	H	RV-108	Survey Marker–1931	Ahmet; Bholat	ECORP
000803	H	RV-109	House–1951	Ahmet; Bholat	ECORP
000804	ISO(H)	RV-1001-I	Horseshoe	Ahmet; Bholat	ECORP
000805	ISO(P)	RV-1002-I	OBS Core	Ahmet; Bholat	ECORP

Correspondence with Native American groups resulted in one response. On April 21, 2009 ICF received a letter response from Mr. McKay, chairman of the Rumsey Indian Rancheria, stating that he had no information regarding Native American sites or sacred lands within the Plan Area. Mr. McKay also requested to be informed if cultural resources were discovered during project implementation, particularly if human remains were observed. In the week of April 20, 2009, follow-up phone calls were made to Cynthia Clarke, Leland Kinter, Kesner Flores, Karen Flores, Elaine Patterson, and the Wintun Environmental Protection Agency. To date no responses have been received.

As of November 2009 no response has been received from the Solano County Historical Association, the Solano County Genealogical Society, or the Rio Vista Museum to requests for historical information or concerns regarding the Proposed Action.

Results of the archaeological inventory concluded that no prehistoric or historic period archaeological resources were observed during the archaeological surveys. Based on ethnographic and environmental data, the Plan Area is divisible according to sensitivity (high and low) for the presence of prehistoric cultural resources. High-sensitivity areas were defined as seasonal and year-round watercourses, wetlands, flat areas surrounding streams and wetlands, and ridges that afforded easy access to sources of water. Low-sensitivity areas were defined as the majority of ridges and steep slopes in the Plan Area.

As part of the architectural survey, six parcels (0048-100-530, 0048-120-030, 0048-120-400, 0048-120-410, 0048-130-200, 0049-320-010) containing a total of 25 buildings/structures 50 years old or older were identified in the Plan Area. The resources were documented and evaluated for their eligibility for listing in the NRHP and the California Register of Historical Resources (CRHR). None of the resources appear to meet the criteria for listing in the NRHP or the CRHR individually or as part of a district. Refer to *Cultural Resources Inventory Report for the Proposed Shiloh III Project, Solano County, California* for additional information regarding the specific properties evaluated in this analysis.

One parcel, 0048-050-290, contains buildings, but access to this parcel was restricted. In addition, the parcel was not visible from the public right-of-way. Therefore, the buildings on this parcel could not be thoroughly documented or formally evaluated eligibility for inclusion in the NRHP or the CRHR.

3.5.2 Environmental Consequences

This analysis documents that potential impacts pertaining to cultural resources are not considered adverse, because they would not result in any of the following conditions.

- Cause an adverse change in the significance of an archaeological resource.
- Cause an adverse change in the significance of a historical resource.

Effects

Proposed Action

Impact CUL-1: Change in significance of known archaeological sites

Implementing the Proposed Action would not result in any effects on known archaeological sites because no sites were identified during the record search, Native American consultation, or archaeological inventory. Refer to *Cultural Resources Inventory Report for the Proposed Shiloh III Project, Solano County, California* (ICF Jones & Stokes 2009) for additional information.

Impact CUL-2: Change in significance of potential buried archaeological sites

Although no known archaeological sites have been identified in the Plan Area, the potential exists for discovery of buried archaeological resources in the Plan Area during construction of the Proposed Action, based on the general sensitivity for archaeological resources in the area. This potential impact is not considered adverse because EC-11, which is incorporated into the Proposed Action, would require additional cultural resource surveys if the location of project features change and would require work to stop if unanticipated cultural resources are discovered during construction.

Impact CUL-3: Change in significance of a historical resource

Implementing the Proposed Action would not result in adverse effects on any known historical resource in the Plan Area because no significant historical resources are present that could be adversely affected by Proposed Action construction or operations. Refer to *Cultural Resources Inventory Report for the Proposed Shiloh III Project, Solano County, California* (ICF Jones & Stokes 2009) for additional information.

No Action

Under the No-Action Alternative, the Proposed Action would not be implemented and the Plan Area would remain in agricultural uses. No adverse effects on archaeological or historic resources would occur in the Plan Area because none exist and no new activities that could affect unknown resources are proposed.

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3.6 Geology, Minerals, and Paleontological Resources

This section describes the existing conditions pertaining to geology, minerals, and paleontological resources and the potential environmental consequences that could result from implementation of the Proposed Action.

3.6.1 Affected Environment

Regulatory Setting

To address potential impacts pertaining to geologic hazards, the Solano County General Plan requires that geotechnical study be conducted and a geotechnical report prepared for wind project permit applications (Solano County 2008, p. RS-62). The study would identify geologic hazards and specify design requirements to withstand potential hazards. The report presenting the study's results would be signed by a California-registered geologist and approved by the County.

Environmental Setting

Geology

Solano County is located in the Great Valley geomorphic province, an approximately 50-mile-wide by 400-mile-long alluvial plain between the Sierra Nevada to the east and the terminus of the Coast Ranges to the west (Ecology and Environment 2006). The Great Valley is composed of alluvial deposits underlain by the east-sloping Cretaceous and Cenozoic strata of the Coast Ranges and the west-sloping bedrock of the Sierra Nevada. Solano County is in the southwestern portion of the Sacramento Valley, bordered by Putah Creek on the north, Suisun and San Pablo Bays on the south, and the Sacramento River on the east (Ecology and Environment 2006).

The Plan Area is in the low-rolling Montezuma Hills in the southeastern portion of Solano County. 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 (Ecology and Environment 2006). Hills in the area have a relatively constant crest elevation between 100 and 272 feet above mean sea level. Valleys in the Plan Area transition to slightly sloped hillsides with relatively flat ridgelines.

Seismicity

The San Francisco Bay Area is considered very seismically active. Geologists focus their studies on Quaternary-active faults (faults with evidence of displacement during approximately the last 2 million years) and Holocene-active faults (faults with evidence of movement during approximately the last 11,500 years) (Ecology and Environment 2006).

Soils

Approximately 35% of the county, including most of the Montezuma Hills, is made up of gently sloping to very steep, well-drained, and somewhat excessively drained soils on dissected terraces and mountainous uplands. There are 17 soil associations in Solano County, classified into four groups based on slope and drainage characteristics. Of these 17 soil associations, two are present in the Montezuma Hills: the

Altamont-Diablo and the San Ysidro-Antioch associations (Ecology and Environment 2006). The Altamont-Diablo association covers almost the entire Plan Area; the San Ysidro-Antioch association covers a small portion in the northwestern corner of the Plan Area where Little Honker Road and the railroad intersect on the eastern boundary of Montezuma Slough. The Altamont-Diablo association is composed of gently sloping to steep, well-drained clays formed by weakly consolidated sediments on dissected terraces. San Ysidro-Antioch is made up of nearly level to moderately sloping, moderately well-drained sandy loams and loams on terraces.

Mineral Resources

According to the Solano County Land Use and Circulation Element, many significant mineral resources occur in Solano County, including natural gas, sand, gravel, rock and other fill material, and sandstone (Ecology and Environment 2006). Clay and gas are extracted from the Suisun Marsh and eastern county areas, while salines are taken from the Napa Marsh area. Sand, crushed gravel, and stone are mined in the Vallejo–Benicia Hills, Potrero Hills, and Wolfskill and Putah Creek areas. There are also mercury deposits in the Vallejo–Benicia Hills area and a large gas field in Rio Vista.

Paleontological Resources

The Plan Area is entirely underlain by the Montezuma Hills Formation. This formation has not historically been a source of fossils. A fossil locality search was conducted through the University of California, Berkeley Museum of Paleontology (UCMP) website database.

An investigation conducted for the Shiloh II Wind Project, some of which overlaps the Plan Area, included a search for vertebrates, invertebrates, plants, and microfossils. No fossil localities were identified (Ecology and Environment 2006); however, one locality (Locality ID V 5704) was found approximately 1 mile north of Little Honker Bay Road. Several other fossil localities occur in the Plan Area vicinity, but are all more than 1 mile outside its boundary.

3.6.2 Environmental Consequences

Approach and Methods

Assessment of environmental consequences of alternatives on geological resources entailed a qualitative evaluation of the Proposed Action's potential to result in any of the conditions listed below.

- Exposure of people or structures to increased risk related to strong seismic ground shaking.
- Exposure of people or structures to increased risk of landslides or other slope failure.
- Substantial soil erosion or the loss of topsoil.
- Location on expansive soil, as defined in Table 18-1-B of the Unified Building Code (International Code Council 1997), creating substantial risks to life or property.
- Potential loss of availability of a mineral resource.
- Substantial damage to or destruction of significant paleontological resources, as defined in Regulatory Setting.

Effects

Proposed Action

Impact GEO-1: Increased exposure to risk from ground shaking and landslides

In the event of a ground shaking event, Plan Area facilities could be affected. Wind turbines, electrical transmission towers, power lines, and other facilities could be damaged or may collapse. Structural damage to the Shiloh III Wind Project facilities could injure workers or other humans in the vicinity. In light of the historical seismic activity in the vicinity, an earthquake could cause damage to improperly designed structures. EC- 12 specifies preparation of a geotechnical study; EC-13 requires that design of structures follow recommendations provided in the geotechnical study to avoid structural failure due to ground shaking and landslides. Because standard building measures are incorporated into the Proposed Action to address potential landslide and ground shaking risks, this potential impact is not considered adverse.

Impact GEO-2: Location of facilities on expansive soils

Without proper engineering, buildings and structures associated with the Proposed Action could be susceptible to damage from shrinking and swelling soils. Because of the clay content in the Plan Area's soils, use of heavy equipment during construction could result in soil compaction, and soil settlement could occur subsequent to project construction. EC- 12 specifies preparation of a geotechnical study; EC-13 requires that design of structures follow recommendations provided in the geotechnical study to avoid failure resulting from placement of facilities on expansive soils. Because standard building measures are incorporated into the Proposed Action to address the potential for expansive soils, this potential impact is not considered adverse.

Impact GEO-3: Potential loss of availability of mineral resources

Because the Proposed Action would not affect any known mineral resources in the Plan Area and would not preclude future development of as yet unknown mineral resources that may occur in the Plan Area, there would be no adverse effect.

Impact GEO-4: Potential damage or destruction of significant paleontological resources

Although no paleontological resources have been documented in the Plan Area, it is possible that unanticipated discovery of such resources could result from construction-related activities. Implementation of EC-11, which requires work to stop if unknown paleontological resources are discovered, would ensure that this is not an adverse effect.

No Action

Under the No-Action Alternative, the Proposed Action would not be implemented and the Plan Area would remain in agricultural uses. No adverse effects on geological or soil resources beyond those associated with current conditions would result.

3.6.3 References

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

International Code Council. 1997. Uniform Building Code. Albany, NY: Delmar Publishers.

3.7 Hazardous Materials

This section describes the existing conditions pertaining to hazardous materials and the potential environmental consequences that could result from implementation of the Proposed Action. The information in this section is derived from the *Phase I Environmental Site Assessment: Shiloh III Wind Farm Project* prepared by Western Geo-Engineers (WEGE) (2009).

3.7.1 Affected Environment

Regulatory Setting

EPA is the principal federal regulatory agency responsible for the safe use and handling of hazardous materials. Two key federal regulations pertaining to hazardous wastes are described below. Other applicable federal regulations are contained primarily in CFR Titles 29, 40, and 49.

Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) enables EPA to administer a regulatory program that extends from the manufacture of hazardous materials to their disposal, thereby regulating the generation, transport, treatment, storage, and disposal of hazardous waste at all facilities and sites in the nation.

Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act, also known as Superfund, was passed to facilitate the cleanup of the nation's toxic waste sites. In 1986, Superfund was amended by Title III of the Superfund Amendment and Reauthorization Act (community right-to-know laws), also called the Emergency Planning and Community Right-to-Know Act, which states that past and present owners of land contaminated with hazardous substances can be held liable for the entire cost of the cleanup even if the material was dumped illegally when the property was under different ownership. These regulations also establish reporting requirements that provide the public with important information on hazardous chemicals in their communities to enhance community awareness of chemical hazards and facilitate development of state and local emergency response plans.

Environmental Setting

During excavation and earth-moving activities associated with construction of the Shiloh III project, there is the potential for encountering hazardous contaminants. To evaluate this potential, enXco retained WEGE to conduct a Phase I environmental site assessment for the Shiloh III Project. The objective of the assessment was to determine whether the properties comprising the Plan Area were subject to the presence or likely presence of hazardous materials or wastes, including petroleum products, or were under conditions that indicate an existing release, a past release, or any material threat of a release of those materials or wastes into the ground, groundwater, or surface water of the properties.

The current and historical uses of the project area and vicinity were determined through an examination of historical aerial photographs and topographic maps, a review of the records of the California Department of Oil and Gas, and onsite inspections by a WEGE geologist.

The presence of the natural gas production well heads and their associated equipment and waste storage tanks introduces the possibility of the release of petroleum condensate or hydrocarbon contaminated salt water through the leakage of the storage tanks or piping or as the result of an accident involving the transportation of the waste. An examination of the well sites showed no problems at this time. WEGE indicated that the presence of the gas well heads and metering stations should be constraining factors in determining the location of wind turbines and appurtenant facilities. The report also indicated that the location of underground utilities on the project, especially natural gas pipelines, must be addressed in project design and construction.

Dryland Farming

Dryland crop production has included wheat, oats, barley, rye grass, canola, and safflower. Anhydrous ammonia is a commonly used fertilizer applied directly in the field. Biosolids, a class B waste, have been applied to a number of the properties as fertilizer since 1987.

Herbicides are either applied in the field or, less commonly, are broadcast by aerial spraying. Herbicide use includes 2-4-D products for eradicating broadleaf plants, Avenge[®] for controlling wild oats, and Hoelon[®] for controlling rye and canary grasses. Transline[®] has been used to a limited extent to control the growth of star thistle.

Permanent or Temporary Structures

WEGE's site inspections identified only a limited number of locations in the unconstrained portions of the Plan Area that contained aboveground permanent or temporary structures other than wood and wire fences and small dirt and gravel roads. All these structures were related to the production of natural gas (discussed below). Site inspections determined that currently there are no other permanent or temporary residences, outbuildings, or other sheltered storage facilities in the unconstrained portions of the Plan Area. Moreover, WEGE did not find remnants of such structures or any other evidence to suggest that such structures ever existed in the unconstrained portions of the Plan Area.

Temporary Storage or Dumping Areas

WEGE examined aerial photographs for evidence of changes in landforms and road alignments, and for the historical presence of storage areas or dumpsites, permanent or temporary residences, outbuildings, pits, ponds, gas well sites, or any other artificial structures. A refuse pile on the Mayhood parcel (Assessor's Parcel Number [APN] 0048-130-070) was identified during the historical aerial survey review. The refuse site is adjacent to an active natural gas production well, RVGU 141. It contains scrap lumber, wire fencing, and other metal parts from discarded farming equipment. It also contains discarded household items, small unidentified empty metal drums, and a large yellow steel tank. There was no evidence of the recent addition of any liquid containers or staining of the ground surface or stressed vegetation that would indicate the release of liquid wastes.

The dumpsite that was identified in the aerial photographic surveys and site inspection currently contains no obvious hazardous materials or wastes. The areal extent of the dumpsite has not increased significantly over the years of use.

Oil and Gas Wells

Four major pipelines carrying pressurized natural gas have been installed through the Plan Area. These gas transmission lines are buried approximately 3–5 feet below ground surface. An 8-inch pipeline runs east/west, passing through the Mahoney 2005 Family Trust parcel (APN 0048-120-400) and the Kathleen

Threlfall & Eleanor Garrissere parcel (APN 0048-120-030). A 16-inch pipeline runs north-northwest, crossing the Vierra parcel (APN 0048-120-430). Another 16-inch pipeline runs southwest through the southern end of the E. Dexter Mayhood, III parcel (APN 0049-320-010). A 42-inch PG&E pipeline runs south-southwest through section 24 T4N, R1E. The presence of productive gas wells in the Plan Area indicates the existence of underground gathering lines connecting individual wells to the transmission pipelines. In addition, one waste disposal well, A. R. Emigh 11, is on the Emigh parcel (APN 0048-130-210). There are a number of storage tanks on the parcel inside a concrete enclosure, and a pumping system to pump the wastewater and incidental petroleum condensate down the well for disposal.

WEGE geologists located a PG&E Serpa Junction/Compressor station at EDR sites Shiloh east 5 C6-10. This is a large natural gas compression station on the Esperson parcel (APN 0048-120-160) adjacent to the Mahoney 2005 Family Trust parcel. This Serpa compression station, encompassing approximately 3 acres, is approximately 1.5 miles northwest of Rio Vista and houses equipment and materials for processing and compressing natural gas into PG&E's gas transmission system. The station has operated since 1959, and was upgraded in 1989 to provide secondary containment for the storage tanks onsite.

3.7.2 Environmental Consequences

Approach and Methods

This assessment, based on WEGE's Phase I study, involved a qualitative evaluation of the potential to expose people or properties to hazardous materials as a result of implementation of the Proposed Action.

Effects

Proposed Action

Impact HAZ-1: Potential Hazardous Materials Spills

Implementation of the Proposed Action would not introduce substantial amounts of hazardous materials to the Plan Area. Construction and operation of the Shiloh III project would not require treatment, disposal, or transport of significant quantities of hazardous materials. However, transformer oil would be stored onsite for the duration of operations and would be used and handled for the turbine maintenance. In addition, fuel and carburetor fluid would be used for equipment and motor vehicles during installation, and oil would be held in the substation transformers. Implementation of EC-14 and EC-15, which require implementing a SWPPP and a hazardous materials business plan/spill prevention, control, and countermeasure plan as part of the Proposed action, would substantially contribute to avoidance and minimization of the potential for hazardous materials spills during project construction. Accordingly, no substantial hazardous materials spill associated with Proposed Action would be expected during construction or operation.

Impact HAZ-2: Encountering Hazardous Materials during Construction

Implementation of the Proposed Action would not be likely to result in encounters with hazardous materials during construction activities because limited hazardous materials sources are known to occur in the Plan Area. During grading, trenching, and other ground-disturbing activities, however, construction crews could encounter unknown subsurface hazardous materials that were not identified during the Phase I study. Implementation of EC-16, which specifies implementation of procedures should hazardous materials be encountered, would minimize the potential for an adverse impact to result from implementation of the Proposed Action.

No Action

Under the No-Action Alternative, potential hazardous materials would not be introduced into the Plan Area, and there would be no risk of encountering unknown hazardous materials through construction activities associated with the Proposed Action.

3.7.3 References

Western Geo-Engineers. 2009. *Phase I Environmental Site Assessment: Shiloh III Wind Farm Project*. July. Prepared for enXco, San Ramon, CA.

3.8 Hydrology and Water Quality

This section describes the existing conditions pertaining to hydrology and water quality and the potential environmental consequences that could result from implementation of the Proposed Action.

3.8.1 Affected Environment

Regulatory Setting

Federal Clean Water Act

The Clean Water Act (CWA) is intended to restore and maintain the chemical, physical, and biological integrity of the nation's waters (33 CFR 1251). The regulations implementing the CWA protect waters of the United States, including wetlands (33 CFR 328.3). The CWA ensures that water quality in aquatic ecosystems is maintained at a level of integrity that enables biological resources to exist and function properly. Under Section 404, the discharge of dredged and fill material into waters of the United States are regulated by USACE.

Section 303(d) of the CWA lists streams and other waters of the United States that have "Water Quality Limited Segments" or portions that do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution-control technology.

National Pollutant Discharge Elimination System

Created under the CWA, the National Pollutant Discharge Elimination System (NPDES) permit program applies to stormwater and point source discharges. The EPA has delegated regulatory authority for the NPDES program to the Regional Water Quality Control Boards (RWQCBs). The Shiloh III project would require an NPDES general construction permit from the San Francisco RWQCB (SFRWQCB) to control stormwater runoff during construction; some streams in the Plan Area flow into the Suisun Marsh watershed, which is regulated by the SFRWQCB. Other unnamed drainages flow into the Sacramento River. A provision of an NPDES permit requires that a SWPPP be developed in advance of construction activity in accordance with the general permit and implemented concurrently with the beginning of construction activities.

Environmental Setting

Topography

The Montezuma Hills in the Plan Area are characterized by rolling hills with a relatively constant crest elevation between 100 and 272 feet above mean sea level. Valleys in this area transition to sloped hillsides with relatively flat ridgelines. The Sacramento and San Joaquin Rivers lie to the south. The predominant landform is a relatively uniform pattern of treeless hills separated by narrow valleys and drainages.

Hydrology

From the vicinity of SR 12, Currie Road, Azevedo Road, and Emigh Road at the northern and eastern portions of the Plan Area, the site generally drains into several small unnamed streams that ultimately flow

through numerous adjacent parcels toward the southeast, ultimately reaching the Sacramento River approximately 2 miles south of Rio Vista. Topography in the western portion—in the vicinity of Little Honker Bay Road—is similar to that in the eastern portion, except that surface flows drain into one small unnamed stream that flows to the northwest. Flows continue through several small unnamed streams, ultimately reaching Denverton Slough and Little Honker Bay, tributaries of the Suisun Marsh.

Wetlands and Aquatic Features

The Plan Area supports several aquatic and wetland features, including bulrush-cattail wetlands, seasonal wetlands vernal pools, alkali meadows, seasonal streams, and ponds in low-lying areas. (Figure 3.4-1).

Under the National Flood Insurance Program, the Federal Emergency Management Agency (FEMA) designates 100-year flood zones nationwide. In the Collinsville–Montezuma Hills WRA, lower-lying areas are within the 100-year flood zone (Ecology and Environment 2006). Generally, the area experiences heavy rainfall during the storm season (November through May), and runoff is often very rapid as a result of low infiltration. Montezuma Slough is subject to such overflows as a result of runoff from Montezuma Hills as well as from other areas.

Surface Water Quality

Grazing, agricultural activities, and runoff from roads and rural residences can contribute to degradation of surface water quality in the Plan Area. Grading for construction activity removes vegetation and exposes soil to wind and water erosion, which can result in sedimentation that ultimately flows into surface waters. Metals and petroleum hydrocarbons washed from roadways and parking lots, as well as fertilizers, pesticides, and herbicides from agricultural areas, may degrade water quality and wildlife habitat in receiving water bodies.

The SFRWQCB maintains a list of impaired water bodies. An impaired or threatened water body is any water body that is listed according to the criteria noted in Section 303(d) of the CWA. A water body is considered impaired if it does not attain water quality standards as specified in the 1986 Basin Plan adopted by the SFRWQCB and the State Water Resources Control Board. Suisun Bay is listed for high levels of polychlorinated biphenyls (PCBs) and mercury, and Suisun Slough is listed for urban runoff and storm sewer drainage. Some of the Suisun wetlands are also listed as impaired (Ecology and Environment 2006). No streams in the Plan Area are listed as water quality impaired or threatened.

As is evident in the reported water quality of Suisun Bay and associated wetlands, nonpoint source pollution has degraded regional water quality. The largest sources of nonpoint source pollution are agricultural and urban runoff, which contribute sediments, nutrients, disease-carrying bacteria, and pollutants. Pollutants in agricultural runoff include diazinon, selenium, metals, phosphorus, nitrogen, and pesticides and fertilizers. Metals can bioaccumulate in the food web of Suisun Marsh, resulting in mortality of aquatic life. Nutrients can cause algal blooms, or eutrophication, which can harm native aquatic plants.

Soil erosion potential is highest in silty soils on steep, unvegetated areas. Clearing and grading activities remove vegetation and topsoil, cut into existing slopes, and destabilize the area, all of which can lead to soil erosion. Road construction can also increase water runoff rates, resulting in accelerated soil erosion. Rocks, soil, sediment, and other eroded material can drain into nearby streams, wetlands, and other water bodies, increasing the existing sediment loads. Excessive sedimentation may clog streams and storm drains, reducing their capacity to carry water, potentially leading to flooding. The input of sediments into water bodies can also degrade the water quality of receiving streams and wetlands by increasing sediment loads. Sediment runoff into streams can increase the turbidity (concentration of suspended particles) in a

stream, thereby reducing light penetration and inhibiting photosynthesis. Eroded soils can also carry fertilizers and other nutrients, which can lead to eutrophication.

Groundwater Quality

The Plan Area is located primarily within the Suisun/Fairfield Valley groundwater basin, which encompasses approximately 133,600 acres. The Suisun/Fairfield Valley groundwater basin is underlain by a thick sequence of low-permeability marine sedimentary rocks. Marine sedimentary units in the Fairfield-Suisun area are classified as non-water-bearing. Groundwater resources in this basin are extremely limited and are characterized by low well yields and poor water quality. However, many of the residences near the Plan Area rely on wells for their drinking water supply.

3.8.2 Environmental Consequences

Approach and Methods

Potential environmental effects were evaluated through consideration of existing conditions, project design features, and environmental commitments incorporated into the project description.

This analysis adapted criteria set forth in the State CEQA Guidelines to determine if adverse effects would result from implementation of the Proposed Action, including activities covered under the HCP. An effect would be considered adverse if the Proposed Action could lead to any of the conditions listed below.

- Substantial depletion of groundwater supplies or interference with groundwater recharge.
- Substantial alteration of the existing drainage pattern of the site or area in a manner that would result in substantial on- or offsite erosion or siltation.
- Substantial increase of the rate or amount of surface runoff in a manner that would result in on- or offsite flooding.
- Other substantial degradation of water quality.
- Placement of structures within a 100-year flood hazard area that would impede or redirect flood flows.

Effects

Proposed Action

Impact HYD-1: Potential to substantially deplete groundwater supplies

Implementation of the Proposed Action would not substantially deplete groundwater resources because the it entails no construction or operational activities that could affect groundwater resources. There would be no adverse effect.

Impact HYD-2: Potential to substantially increase erosion or siltation associated with alternation of existing drainage patterns

Implementation of the Proposed Action would not substantially increase erosion or siltation in existing drainages or water features in or near the Plan Area because wind turbine construction pads, access roads, collection lines, and construction staging areas would largely avoid all surface drainages and wetlands in the Plan Area. One collection line would be required to cross a seasonal wetland/pond area in the western portion of the Plan Area (Figure 3.4-1). In addition, construction in upland areas around seasonal streams

and wetlands could result in soil erosion and siltation effects. However, these potential impacts are not considered adverse because implementation of EC-7, EC 10, and EC-14 would ensure avoidance of aquatic features, restoration of site conditions, and implementation of measures to reduce water quality effects of construction. EC-7 specifies the use of horizontal directional drilling to install electrical collection lines under wetlands and other aquatic features. EC-10 requires that all temporarily disturbed construction areas be restored to the original contours and revegetated to restore habitat and prevent soil erosion or siltation of aquatic features. EC-14 requires implementation of SWPPP measures to minimize soil erosion and reduce construction impacts associated with turbine access roads and pads.

Impact HYD-3: Potential to substantially increase the rate or amount of surface runoff

Implementation of the Proposed Action would entail construction of approximately 1.23 acres of impervious surface in the form of turbine foundations. These impervious areas would no longer slow stormwater through percolation, potentially accelerating erosion and sedimentation rates. However, these impervious areas constitute a very small percentage of the total Plan Area; moreover, they would be located along ridgelines and away from low-lying areas such as streams and wetlands. Consequently, substantial changes to existing stormwater runoff rates are not anticipated.

Impact HYD-4: Potential to substantially degrade water quality

Construction activities associated with the proposed action could produce a short-term increase in erosion. Clearing and grading could cause accelerated erosion on steep slopes, in erosion-susceptible soils, or before vegetation is reestablished, leading to potential sedimentation of nearby creeks and drainages, thereby degrading water quality and increasing the risk of flooding. Implementation of EC-7, EC-10, and EC-14 would address this effect through the mechanisms discussed for Impact HYD-2. No adverse water quality effects are anticipated to result from construction or operation because environmental commitments have been incorporated into the Proposed Action to minimize water quality effects, no major streams are located in the vicinity of planned construction areas, and the majority of turbine facilities would be sited substantial distances from sensitive aquatic sites (Figure 3.4-1).

Impact HYD-5: Potential to create substantial flood hazards

Implementation of the Proposed Action would not result in placement of structures in an existing 100-year flood hazard zone or impeding flood flows because construction activities in the Plan Area would occur primarily on hilltops and wind turbines, roads, and appurtenant facilities would be designed so as not to affect or be affected by temporary seasonal flooding in the area.

No Action

Under the No-Action Alternative, the Proposed Action would not be implemented and the Plan Area would remain in grazing and agricultural use. No effects on seasonal drainages, wetland features, or waters of the United States would occur and there would be no effects on groundwater resources, water quality, or flood risk.

3.8.3 References

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

3.9 Land Use and Planning

3.9.1 Affected Environment

Regulatory Setting

Solano County General Plan

The County's general plan reiterates the intention to maintain the rural, agricultural identity of unincorporated areas of the county, including the Plan Area, by limiting non-agriculture-related residential development. The general plan designates the Montezuma Hills as a distinct agricultural region, with a minimum lot size of 160 acres and agricultural and energy production identified as primary uses (Solano County 2008, p. AG-21). The general plan seeks to preserve the character of the area by curtailing non-agricultural land use, particularly non-agriculture-related residential development.

Moreover, the general plan requires turbines to be sufficiently removed from certain receptors to protect human health and safety, as well as to ensure land use compatibility. According to the general plan, turbines must be at least three times the turbine height from any zoning district that does not allow wind turbines, or from any property line, public roadway, transmission facility, or railroad. These requirements may be waived with permission from the County and the landowner if the adjoining property is a wind facility. The general plan also requires a 0.25-mile setback from scenic roadways (e.g., SR 12) to minimize visual impacts (Solano County 2008, pp. RS-56–57).

Solano County Zoning Ordinance

Solano County Zoning Code Section 28.50 (b)(4) contains regulations for commercial and noncommercial wind turbine generators. The provisions summarized below pertain to the Proposed Action in the context of land use.

- Wind turbines shall be permitted in lands in zones designated A, A-L, R-R, P, C-H, C-N, C-G, C-S, C-O, M-L, M-G, I-WD, W or MP districts, among others, provided a use permit is first secured.
- Wind turbines shall be set back a minimum of 1.25 times the maximum height of the turbine to the property line. Setbacks determined by height may be waived when appropriate easements are secured from adjacent property owners or other acceptable mitigation is approved by the County.
- The wind turbines shall be filtered and/or shielded to prevent the emission of radio frequency energy, which would cause interference with radio and/or television broadcasting or reception. Alternate mitigation for such interference may be approved for commercial wind turbines.
- Noise emitted from any wind turbines shall not exceed 50 dBA CNEL at any property line abutting a residential zone or 60 dBA CNEL at any other property lines.
- Brand names or advertising associated with a wind turbine installation shall not be visible from any public access.

Environmental Setting

The entire Plan Area is zoned for agricultural use; moreover, the Montezuma Hills have been designated by Solano County as land suitable for wind energy development (Solano County 2008). The Collinsville–

Montezuma Hills WRA was established on the basis of wind energy monitoring and assessment studies conducted by the California Energy Commission (CEC), PG&E, and the Bureau of Reclamation in the late 1970s and 1980s.

The Plan Area would be entirely on private land leased under long-term agreements with landowners, most of whom currently use their property for wheat farming or sheep grazing. No public lands are in the Plan Area, but County access roads do cross it.

Existing Wind Plants

Several commercial wind energy-producing facilities are adjacent and near the Plan Area in the Collinsville–Montezuma Hills WRA (Figure 1-2). The Shiloh I Wind Project consists of 100 turbines on approximately 6,800 acres of leased land. The High Winds Project consists of 90 turbines on more than 6,000 acres of leased land. SMUD currently operates approximately 31 turbines, and is planning 21 more previously approved turbines on approximately 2,000 acres. SMUD is also in the planning stages to install up to 76 additional turbines on recently acquired additional acreage. The enXco V project currently operates 516 turbines and is planning to replace 510 of these turbines with about 34 new turbines that would generate an equivalent energy output. FPL Montezuma Energy LLC is currently proposing to construct the Montezuma I Wind Project.

Travis Air Force Base

Travis Air Force Base (AFB) is approximately 6.5 miles northwest of the Plan Area. Travis AFB serves as the strategic airlift and aerial refueling base on the West Coast. Other tenant organizations at the base include the Air Force Reserve Command and the Navy's VQ3 Detachment (Ecology and Environment 2006). Potential design constraints associated with Travis AFB are discussed in Section 3.13, *Traffic and Transportation*.

Suisun Marsh

The Suisun Marsh is southwest of the Plan Area. Given that the Suisun Marsh is the largest contiguous brackish water marsh remaining on the west coast of North America, it is a critical part of the San Francisco Bay and Delta ecosystem. The marsh encompasses 116,000 acres, comprising 52,000 acres of managed wetlands, 27,700 acres of upland grasslands, 6,300 acres of tidal wetlands, and 30,000 acres of bays and sloughs (Ecology and Environment 2006).

3.9.2 Environmental Consequences

Approach and Methods

This assessment entailed a qualitative evaluation of the Proposed Action's potential to conflict with existing or future land use.

Environmental Consequences and Mitigation Measures

Proposed Action

Impact LU-1: Potential to conflict with land use plans and policies

Implementation of the Proposed Action could cause conflicts with land use plans and policies. The proposed Shiloh III project would be sited in accordance with the requirements of the Solano County

General Plan. In the event, however, that setback reductions are required, implementation of EC-17 would address this potential effect by complying with specific County setback requirements and obtaining determinations of no hazards from FAA.

Impact LU-2: Inhibit future land use of the Plan Area

The Shiloh III project's useful life is anticipated to be 30 years. Once the Shiloh III project surpasses its useful lifespan, if the affected area were not decommissioned and properly restored, the County may be burdened with an area for which it could not properly initiate local or regional planning efforts. Proper decommissioning of the Shiloh III project would require removal of the wind turbine nacelles, blades, towers, foundations, cables, and other components incorporated into the wind project to a depth of 3 feet below grade, and restoration of those lands disturbed by the decommissioned wind project. However, because decommissioning activities are specified as part of the project description and as described in the HCP, there would be no adverse effect.

No Action

Under the no-Action Alternative, the Proposed Action would not be implemented and the Plan Area would remain in current land uses. No adverse effects on land use would occur.

3.9.3 References

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

3.10 Noise

This section describes the existing conditions pertaining to noise and the potential environmental consequences that could result from implementation of the Proposed Action. This discussion is based primarily on information in the *Shiloh III Wind Project Solano County, California Noise Technical Report* (Illingworth & Rodkin 2009). Because of the specialized technical character of noise-related analyses, this section opens with a brief discussion of relevant terminology.

3.10.1 Terminology

Noise may be defined as unwanted sound. A *decibel (dB)* is a unit of measurement which indicates the relative amplitude of a sound. The zero on the dB scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in dB are calculated on a logarithmic basis. An increase of 10 dB represents a ten-fold increase in acoustic energy, while 20 dB is 100 times more intense, 30 dB is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 dB increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Table 3.10-1 provides definitions of terms commonly used in noise analysis. Table 3.10-2 summarizes typical sound levels measured in the environment.

Table 3.10-1. Definition of Acoustical Terms

Term	Definition
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micro-newtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise.
C-Weighted Sound Level, dBC	The sound pressure level in decibels as measured using the C-weighting filter network. The C-weighting is very close to an unweighted or "flat" response. C-weighting is only used in special cases when low frequency noise is of particular importance.
L_{01} , L_{10} , L_{50} , L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels measured in the night between 10:00 pm and 7:00 am.
Day/Night Noise Level, L_{dn}	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.

Term	Definition
L_{\max} , L_{\min}	The maximum and minimum A-weighted noise level during the measurement period.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Table 3.10-2. Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	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 mph	— 80 —	Food blender at 3 feet Garbage disposal at 3 feet
Noisy urban area, daytime	— 70 —	Vacuum cleaner at 10 feet Normal speech at 3 feet
Gas lawn mower, 100 feet Commercial area	— 60 —	
Heavy traffic at 300 feet	— 50 —	Large business office Dishwasher next room
Quiet urban daytime	— 40 —	Theater, large conference room (background)
Quiet urban nighttime	— 30 —	Library
Quiet suburban nighttime	— 20 —	Bedroom at night, concert hall (background)
Quiet rural nighttime	— 10 —	Broadcast/recording studio
Lowest threshold of human hearing	— 0 —	Lowest threshold of human hearing

Source: California Department of Transportation Noise Protocol Technical Noise Supplement

For a *point source*, such as a wind turbine, sound level attenuates at a rate of 6 dB per doubling of distance from the source. This attenuation rate is based on distance only. Other factors can result in additional attenuation; these factors are often lumped together into a term called *excess attenuation*. Some examples of these include attenuation by sound absorption in air; attenuation by barriers; attenuation by rain, sleet, snow, or fog; attenuation by grass, shrubbery, and trees; and attenuation from shadow zones created by wind and temperature gradients. When more than one point source contributes to the sound pressure level at a receiver point, the overall sound level is determined by combining contribution of the sources. This is done by adding the individual sound pressures together. For two sources that are independent and equal,

the combined level results in a 3 dB increase over the level of each alone. This is due to the logarithmic nature of sound level. In assessing environmental noise, a 3 dB increase in level is typically considered as just perceivable, while an increase of 1 dB is difficult to detect.

3.10.2 Affected Environment

Regulatory Setting

There are no state or federal noise regulations directly applicable to the Proposed Action. In California, noise from wind turbine generator operations is typically regulated at the county level. For Solano County, the documents listed below are applicable.

- The *Solano County General Plan* (Solano County 2008).
- Zoning regulations of the Solano County Code.

The County's general plan defines noise standards for non-transportation sources. For outdoor residential areas, an L_{eq} limit of 55 dBA is defined for daytime hours (7:00 a.m. to 10:00 p.m.) and 50 dBA for nighttime hours (10:00 p.m. to 7:00 a.m.) For interior locations, an L_{eq} limit of 35 dBA is defined for any time of the day. The Zoning Regulations for Solano County state that noise emitted by any wind turbine generator shall not exceed 50 dBA CNEL at any property line abutting a residential zone or 60 dBA CNEL at any other property line.

Low-frequency noise from wind turbines can also be a concern. Although Solano County does not have specific standards for low-frequency noise, a noise criterion specified in the Alameda County Standard Conditions of Permit Approval for Windfarms (Alameda County 1998) is reasonable to consider in this context. This document uses 70 dBC L_{dn} as the threshold for "reasonable complaints."

Environmental Setting

The Plan Area contains a few rural residences surrounded by agricultural land. The noise environment is defined primarily by ground transportation noise from traffic on SR 12 and local traffic on the secondary roads throughout the vicinity. In most areas neighboring the Plan Area, wind turbine generators are already in operation. In addition to these artificial noise sources, the windy conditions of the area can also create a somewhat elevated ambient noise condition in which the background noise increases with wind speed.

To objectively characterize the noise environment in the Plan Area, sound levels were measured. Long-term unattended noise level measurements were made at three locations in the vicinity of the project area at locations indicated as LT1, LT2, and LT3 in Figure 3.10-1.

At all sites, measurements were made from about noon on November 13 to about 2:00 pm on November 17, 2009. This timeframe included weekdays and weekends. Refer to Illingworth & Rodkin (2009) for details on the measurement methodology.

At LT1, measured CNEL values were in the range of 48–49 dBA. At LT2, measured CNEL values were in the range of 58–63 dBA. The higher noise level at this location is attributed to the close proximity of the measurement position to traffic on the adjacent road. Estimated CNEL values at a typical setback distance where the influence of traffic noise is substantially less are estimated to be in the range of 46–51 dBA. At LT3, measured CNEL values were in the range of 66–68 dBA. At this location, potential sources of noise include traffic on SR 12, construction activity on SR 12, existing nearby wind turbines, and wind-induced background noise.

3.10.3 Environmental Consequences

This section discusses the evaluation of noise impacts associated with implementation of the Proposed Action.

Approach and Methods

Construction noise has been evaluated using standard reference noise levels from various types of construction equipment and activity (U.S. Environmental Protection Agency 1971). The following three wind turbines are currently being considered for this project:

- Vestas V90 2.0 MW
- Repower MM92 2.0 MW
- Liberty 2.5 MW

Wind turbine noise has been evaluated using source noise levels provided by these three turbine manufacturers. Predicted construction and wind turbine noise levels at various receiver locations have been estimated using the sound attenuation concepts described above. Refer to Illingworth & Rodkin (2009) for details on the noise prediction methodology.

Construction is considered to result in an adverse noise impact if construction noise is predicted to exceed 50 dB- L_{eq} during evening and nighttime hours at adjacent residences. Evening and nighttime hours are defined as 7:00 p.m.–7:00 a.m. Monday through Friday and 6:00 p.m.–8:00 a.m. Saturdays and Sundays.

Operation of the wind turbines is considered to result in an adverse noise impact if wind turbine noise is predicted to exceed the following noise levels at residences.

- 50 CNEL (dBA)
- 44 dBA- L_{eq}
- 70 CNEL (dBC)
- 64 dBC- L_{eq}

The 44 dBA- L_{eq} and 64 dBC- L_{eq} values have derived from the CNEL criteria based on the fact that wind turbines do not operate continuously every day as a result of varying wind conditions. Refer to Illingworth & Rodkin (2009) for details on the derivation of these L_{eq} values.

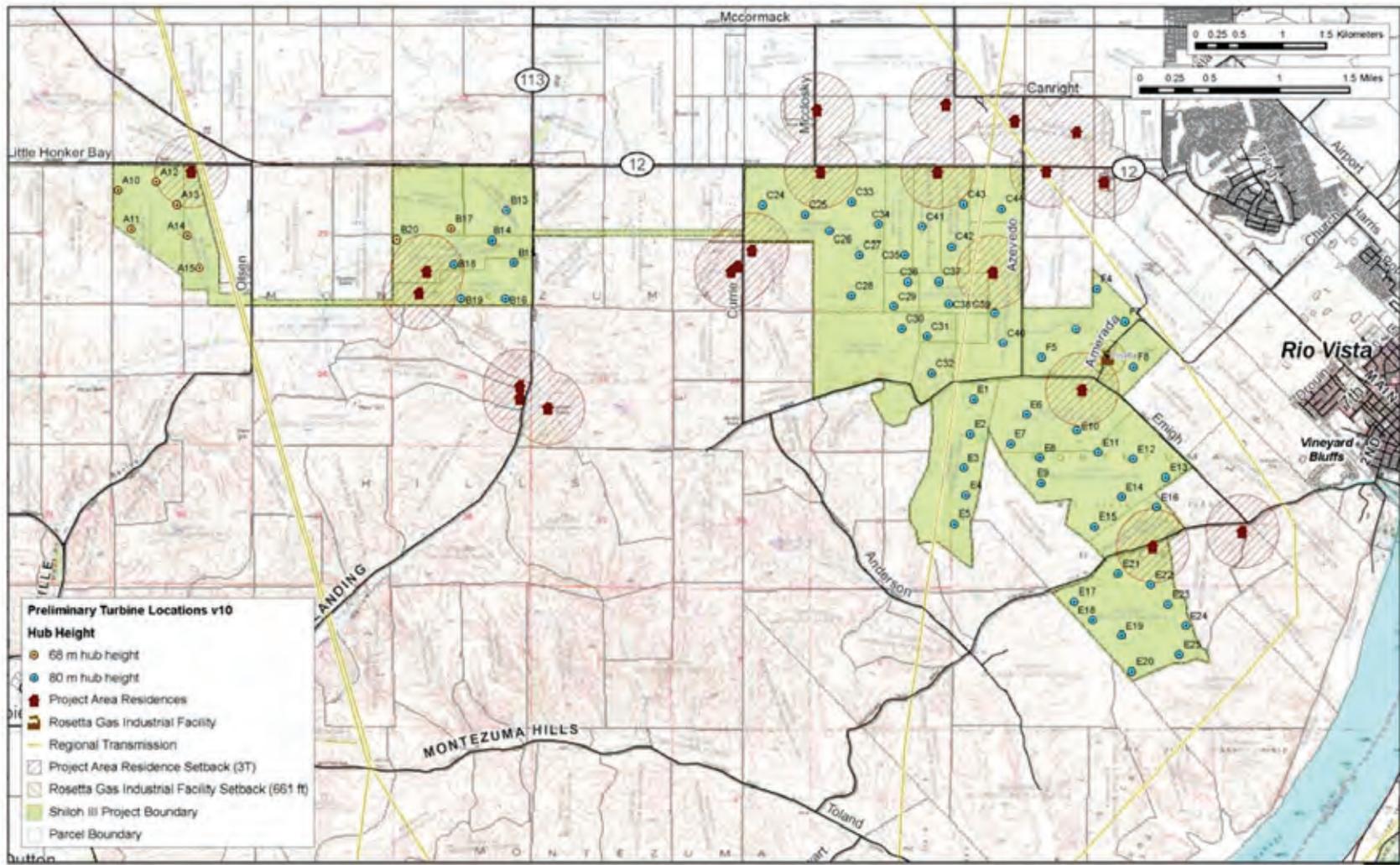
Effects

Proposed Action

Impact NOI-1: Exposure of residences to short-term noise from construction activity

Site preparation and construction activities would temporarily increase noise levels at residences in and around the Plan Area. The noise would occur mainly from heavy-duty construction equipment (e.g., graders, bulldozers, backhoes, drill rigs). A study conducted for EPA (U.S. Environmental Protection Agency 1971) estimated noise levels of multiple pieces of construction equipment associated with various stages of construction of a typical non-residential project.

For the Shiloh III project, noise would be greatest during scraping, grading, crane pad development, and excavation for the turbine foundation. Road construction would also entail use of heavy equipment, and



Source: EnXco Shiloh III Wind Partners LLC

Figure 3.10-1
Locations of Long-Term Measurement Sites and Sensitive Receptors

the noise levels would be similar to those of excavation and grading. Once the pads are constructed and the foundations excavated, the loudest source of noise would be the cranes lifting the turbines into place.

Using the point source attenuation assumption described above, calculations were performed to determine the distances at which noise levels associated with construction are reduced to 60 dBA, 55 dBA, and 50 dBA. The calculations are summarized in Table 3.10-3.

Table 3.10-3. Construction Noise Levels

Construction Phase	Noise Level at 50 Feet	Distance (feet) to Reduce Noise to Given L_{eq}		
		60 dBA	55 dBA	50 dBA
Ground clearing (grading)	89	1,410	2,510	4,460
Excavation	91	1,770	3,150	5,610
Foundations	87	1,120	1,990	3,540
Erection (installation)	88	1,260	2,230	3,970
Finishing (clean-up)	87	1,120	1,190	3,540

Source: U.S. Environmental Protection Agency 1971.

Residences are located as close as about 1,000 feet from turbine sites. The results in Table 3.10-3 indicate that construction noise could exceed the County's 50 dBA- L_{eq} standard at residences. This would be an adverse effect if this exceedance were to occur during evening and nighttime hours.

Implementation of EC-18 will avoid adverse noise impacts from construction activity by requiring construction equipment mufflers to be in good working condition, avoiding construction during nighttime hours, limiting the use of pneumatic tools, and implementing a noise complaint plan that is consistent with plans employed for recent WRA developments. There would be no adverse effect because construction noise levels would be adequately reduced, the number of residents potentially affected would be small, and construction activities would be temporary.

Impact NOI-2: Exposure of residences to long-term noise from operation of wind turbines

As described above noise from wind turbine operation has been evaluated using source levels provided by each of the three manufacturers currently being considered. The analysis focuses on those receiver locations where there is potential for the applicable noise standards to be exceeded. Figure 3.10-2 compares the predicted A-weighted L_{eq} noise levels at these receivers with the 44 dBA- L_{eq} criterion; the predicted CNEL values with the 50 CNEL criterion, and the predicted C-weighted L_{eq} noise levels with the 64 dBC- L_{eq} criterion.

As would be expected, receivers where the 45 dBA- L_{eq} and 50 CNEL criteria are exceeded—Receivers 1, 2, 3, 9, 11, 13, 18, 19, and 20—are generally the same. However, the predicted C-weighted sound levels are well below the 64 dBC criterion. Accordingly, evaluation of predicted noise levels against the C-weighted CNEL criterion is not necessary.

The results illustrated in Figure 3.10-2 indicate that there is potential for noise from wind turbine operation to exceed both the 44 dBA and 50 CNEL criteria and to result in an adverse effect.

Table 3.10-4 shows the amount of noise reduction needed at affected residences to reduce noise to 50 CNEL. This reduction would also achieve the 44 dBA criterion at all residences with the exception of residence 9, which would require an additional reduction of roughly 1 dB to attain the criterion.

Table 3.10-4 Amount of Noise Reduction (dB) Required to Achieve 50 dBA CNEL Criterion

Turbine Model	1	2	3	11	13	18	19	20
Vestas V90 2.0 MW	0.8	2.9			0.4	2.5	2.6	3.2
Repower MM92 2.0 MW	1.6	4.0	0.8	0.6	1.2	3.3	3.4	4.0
Liberty 2.5 MW	2.6	4.7	1.8	1.6	2.2	4.3	4.4	5.0

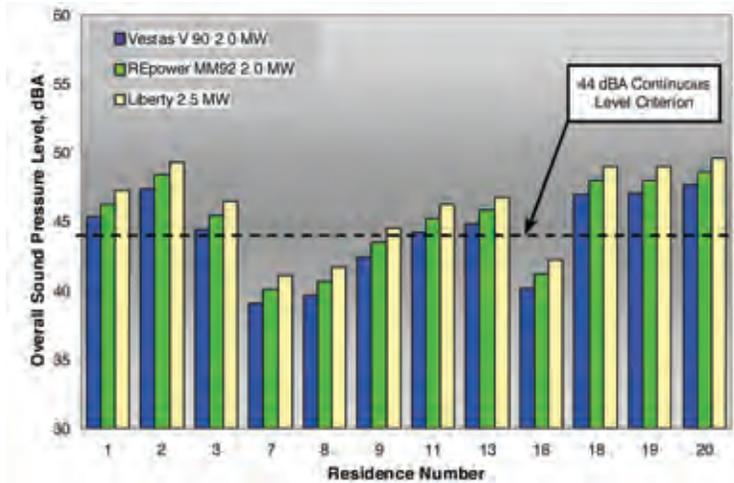
Implementation of EC-19 will avoid adverse noise impacts from operation of wind turbines by requiring modifications to the Proposed Action or by receiving waivers from affected residence to ensure compliance with County noise standards. In addition, because only nine rural residences could potentially be affected by turbine noise and because residences are located in the WRA where existing wind turbine noise occurs, this potential effect is not considered to be adverse.

No Action

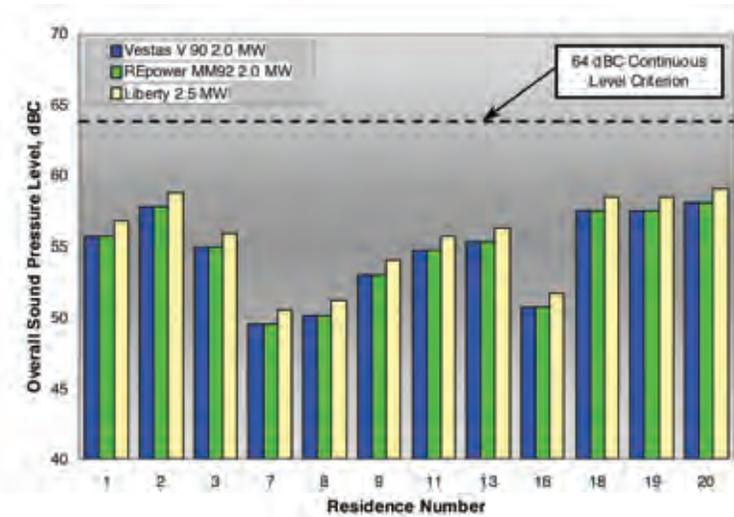
Under the No-Action Alternative, no wind turbines would be installed and there would be no adverse noise effects on existing rural residences.

3.10.4 References

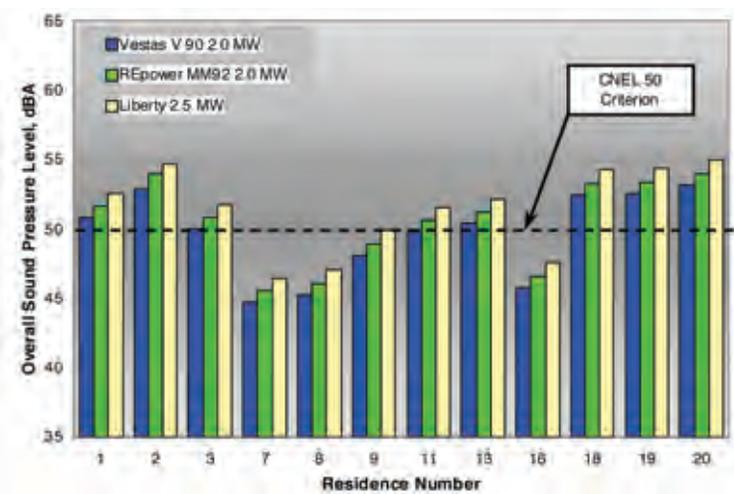
- Alameda County. 1998. Standard Conditions of Approval for Wind Farm Permits, Item 16. May.
- U.S. Environmental Protection Agency. 1971. Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances. Washington, DC.
- Illingworth & Rodkin. 2009. Shiloh II Wind Project Solano County, California – Noise Technical Report. December 11. Petaluma, CA.
- Solano County. 2008. Solano County General Plan. December. Solano County, CA.



Calculated steady overall A-weighted noise levels for all residences approaching or exceeding the 44 dBA criteria



Calculated steady overall C-weighted noise levels for all residences approaching or exceeding the 64 dBC criteria



CNEL values calculated using annual average wind speed data and WTG sound power level as a function of wind speed

Source: EnXco Shiloh III Wind Partners LLC

3.11 Public Health Hazards

This section describes the existing conditions pertaining to public health hazards and the potential environmental consequences that could result from implementation of the Proposed Action. Such hazards include wildfire, accidents involving wind turbine generators or appurtenant facilities, and exposure to electric shock.

3.11.1 Affected Environment

Regulatory Setting

According to the 1987 *Solano County Wind Turbine Siting Plan*, theoretically, the tip of a rotor blade could be thrown up to a distance of 1,300 feet, although in most reported cases blades were thrown 500–750 feet.

The Solano County General Plan establishes safety policies for wind plant development in the Collinville–Montezuma Hills WRA, including the following siting requirements to protect the public in the event of turbine rotor or tower failure.

- A minimum setback of 1,000 feet or three times total turbine height (e.g., 1,242.3 feet for the 80-meter and 1,114.6 feet for the 67-meter RePower 2.0 MW turbine), whichever is greater, from a dwelling unit, residential building site, or land zoned for residential uses.
- A minimum setback of three times total turbine height from any zoning district (other than residential) that does not allow wind turbines.
- A minimum setback of three times total turbine height from any property line, public roadway, transmission facility, or railroad. This minimum setback may be waived in the case of wind farms located on adjacent parcels, provided an agreement has been reached between the neighboring property owners.

In addition, Section 28.50(b)(4) of the Solano County Zoning Ordinance provides the following regulations pertaining to safety.

- There will be a minimum of 10 feet between any part of a turbine and any other non-occupied structure on the property.
- The project applicant (i.e., enXco) shall provide the manufacturer's specifications certifying that the turbine is equipped with a braking system, blade pitch control, and/or other mechanism for rotor control, and that the turbine is equipped with both manual and automatic over-speed controls.

Environmental Setting

Wildland Fire

The Montezuma Hills area is classified as a high grassfire risk area due to the ignition potential of dry grassland environment and periodic strong winds. However, the risk is not as severe as in the mountainous areas northwest of Fairfield. No areas with extreme or high wildfire risk are located in or near the Plan Area or Montezuma Hills (Ecology and Environment 2006).

Wind Turbine Rotor Failure and Tower Integrity

Public safety issues related to wind plants are usually associated with rotor failure or tower integrity. If a wind turbine experiences excess speed, material fatigue, excessive stresses, or vibration from seismic ground shaking, there is the potential for a rotor blade to crack or dislocate from the turbine tower. If a blade dislocates from the tower, the thrown blade could travel several hundred feet. Blade failures may occur due to extremely high winds and excess rotor speed. However, most turbines that are currently commercially available have been equipped with safety and engineering features to prevent excess rotor speed (Ecology and Environment 2006).

Utility Interface

Shiloh III and PG&E personnel are at risk of electrical shock while working on energized facilities. There is also the potential for direct impacts on the public resulting from contact with energized equipment (Ecology and Environment 2006).

3.11.2 Environmental Consequences

Approach and Methods

This analysis adapted criteria set forth in the State CEQA Guidelines to determine if adverse effects would result from implementation of the Proposed Action, including activities covered under the HCP. An effect would be considered adverse if the Proposed Action could lead to any of the conditions listed below.

- Exposure of people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.
- Exposure of people to a significant risk of loss, injury, or death associated with project infrastructure or operations.

Effects

Proposed Action

Impact PH-1: Increased risk of wildfire

Implementation of the Proposed Action could result in the increased risk of wildfires during construction activities in vegetated areas. During construction, heavy equipment and passenger vehicles driving on vegetated areas prior to clearing and grading could increase the danger of fire. During operation, lightning strikes on wind turbines and electrical towers could create power surges that could result in a fire (Ecology and Environment 2006). Corona discharges could also increase fire risk. However, because the moving parts of the wind turbine generator are housed in the nacelle, potential sparks from moving parts would be contained within this housing. Implementation of EC-20, requiring a grass fire control plan, would minimize increased risk of wildfire by incorporating safety restrictions such as spark arresters, smoking restrictions, and vegetation management requirements during construction. No adverse effects related to wildfire would result.

Impact PH-2: Turbine or meteorological tower failure

Implementation of the Proposed Action could result in turbine or meteorological tower failure through such conditions as excess rotor speed, electrical system failure, or turbine fire. Turbine or tower failure could cause hazard or injury to project personnel or the general public. Implementation of EC-20, which requires a grass fire control plan, and EC-21, which requires specific design standards and safety measures for wind turbines, would adequately address this potential effect. No adverse effects related to turbine failure would result.

Impact PH-3: Electrical shock and accidents

Personnel working on the Shiloh III project are at risk of electrical shock from energized facilities and injury from work-related accidents that may occur during construction and operation. Implementation of EC-21 and EC-22 would address this effect by imposing specific safety requirements and turbine design specifications to avoid this potential effect. No adverse effects related to electrical shock would result.

Impact PH-4: Accidents involving the general public (other than turbine failure)

Incidental or intentional entry onto the Shiloh III project site could create risks to human safety. Implementation of EC-23 would address this effect by restricting access to the Plan Area during construction and operation. No adverse effects associated with public safety would result.

No Action

Under the No-Action Alternative, there would be no increase in public health and safety issues beyond current conditions because the Plan Area would remain in current agricultural operations.

3.11.3 References

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

3.12 Recreation

This section describes the existing conditions pertaining to recreational activities and resources and the potential environmental consequences that could result from implementation of the Proposed Action.

3.12.1 Affected Environment

Regulatory Setting

There are no federal regulations relevant to potential impacts on recreational resources. However, local jurisdictions exercise authority over recreational facilities, designations, and uses.

The Park and Recreation Element of the General Plan, as adopted in 2003, includes the following policies and implementation goals relevant to the Proposed Action.

- Areas surrounding regional parks should be maintained in open space or other compatible uses to protect the natural setting and environment of the park site.
- Land use development proposals adjacent to regional parks shall be reviewed for compatibility with natural and recreational features and uses of the park.

Environmental Setting

No recreation or park facilities are present in or near the Plan Area. The Western Railway Museum, a private nonprofit facility, is on the south side of SR 12 east of Shiloh Road. The nonprofit Bay Area Electric Railway Association, which owns and operates the museum, operates a tourist train along the Sacramento Northern Railroad, near the western portion of the Shiloh II Wind Project.

The Suisun Marsh is the largest natural recreation area in Solano County. Fishing, duck hunting; water sports, upland game hunting, and wildlife observation are popular recreational activities in the marsh. Duck hunting is the most prevalent activity occurring from late October until January (Ecology and Environment 2006).

Water oriented recreation activities—fishing, boating, water skiing, and swimming—occur in the Sacramento River corridor at the southern boundary of the Collinsville–Montezuma Hills WRA.

The Solano County General Plan Park and Recreation Element identifies development of a regional County park near the Western Railway Museum. The park is intended to attract visitors on its own and to increase visitation to the museum. The specific location is not specified but it is envisioned to be within the vicinity of the museum, south of SR 12 and east of Shiloh Road. According to the Park and Recreation Element, a regional park is typically 50 acres or larger. The proposed facility would have only minimal improvements, such as a group picnic area and playfields.

3.12.2 Environmental Consequences

Approach and Methods

Assessment of environmental consequences of alternatives on recreation resources involved a qualitative evaluation of the potential to conflict with existing and planned park and recreation facilities or to increase demand for recreation facilities.

Environmental Consequences and Mitigation Measures

Proposed Action

Impact REC-1: Potential to affect operation of the Western Railway Museum

Implementation of the Proposed Action would require construction activities over a 6–8 month period that could potentially affect the recreational experience at the museum. However, this potential effect is not considered substantial or adverse because the Plan Area is more than 2 miles from the museum and is buffered by the existing Shiloh I and II wind projects.

Impact REC-2: Potential conflict with planned regional park

Solano County has identified the potential for a regional park adjacent to the Western Railway Museum. The Proposed Action would have no effect on this park because of the distance of the Plan Area from potential park sites and because the Shiloh I and II wind projects currently buffer the Plan Area from these sites.

Impact REC-3: Potential effect on Suisun Marsh recreation areas

Implementation of the Proposed Action would have no effect on recreation activities in the Suisun Marsh, including duck hunting, because the Plan Area is approximately 2 miles from the eastern edge of the marsh and would be buffered by existing wind farm development to the west.

No Action

Under the No-Action Alternative, there would be no effects on existing or planned park sites because current agricultural and grazing operations would continue and are generally compatible with regional parks.

3.12.3 References

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

3.13 Traffic and Transportation

This section describes the existing conditions pertaining to traffic and transportation and the potential environmental consequences that could result from implementation of the Proposed Action.

3.13.1 Affected Environment

Regulatory Setting

Local traffic is subject to the policies and regulations of the Solano County Public Works Agency. Solano County transportation policies and standards for roadways are discussed in the Transportation and Circulation chapter of the Solano County General Plan. The general plan has established a policy that proposals for new development be evaluated for their compatibility with and potential effects on transportation systems (Solano County 2008, p. TC-6). The Solano County Road Improvement Standards and Land Development and Subdivision Requirements have set specific guidelines for the construction of public road improvements and private roads, including design standards addressing slopes, widths, connection to County roads, and others (Ecology and Environment 2006).

Environmental Setting

Circulation System

Regional Roadways

The regional circulation system near the Plan Area consists of Interstate 80 (I-80) and I-680, which connect the nearby city of Fairfield to other cities in the San Francisco Bay Area and northern California. From I-80, SR 12 provides access to the Plan Area. SR 12 continues east of the Plan 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. The Solano County Board of Supervisors has designated portions of I-80, SR 12, and SR 113 as Scenic Roadways (Ecology and Environment 2006).

Local Roadways

The local circulation system—public surface streets—provides access to properties and movement of people and goods.

Construction personnel and delivery vehicles would travel to the site via the regional circulation system described above, as well as local roadways. Specifically, I-80 would provide access to the Plan Area from San Francisco and Sacramento, while access from Contra Costa County would be 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 (Ecology and Environment 2006). SR 12 would provide primary access to the Plan Area from this freeway network. Local access to the Plan Area will be available from SR 12, Currie Road, Emigh Road, Anderson Road, Shiloh Road, Little Honker Bay Road, Birds Landing Road, and Olsen Road (Figure 2-3).

Air Traffic

Several airports are located in the region. Large metropolitan airports are in San Francisco, Oakland, and Sacramento; regional airports are in Franklin, Byron, Concord, Vacaville, and Napa (Ecology and

Environment 2006). Small private airfields are in Dixon, Lodi, Elk Grove, Brentwood, and Vacaville. The closest public airport is in Rio Vista, approximately 1.75 miles east of the Plan Area's nearest boundary.

The Travis AFB military airport is approximately 6.5 miles northwest of the Plan Area's nearest boundary. The western portion of the Plan Area is located within Travis AFB *outer horizontal surface*, which restricts the height of structures to 562 feet above mean sea level (Ecology and Environment 2006). To ensure compatibility with aircraft activities at the Base, the Solano County Airport Land Use Commission developed the Travis Air Force Base Land Use Compatibility Plan in June 2002. The commission also reviews proposed projects with structures taller than 200 feet regardless of where they occur in the County (Ecology and Environment 2006).

Rail Traffic

Rail traffic is present (but infrequent) in the vicinity for scenic and historical purposes. The Western Railway Museum, a private, nonprofit facility on the south side of SR 12, east of Shiloh Road offers short local train rides to museum visitors.

3.13.2 Environmental Consequences

Approach and Methods

This analysis adapted criteria set forth in the State CEQA Guidelines to determine if adverse effects would result from implementation of the Proposed Action. An effect would be considered adverse if the Proposed Action could lead to any of the conditions listed below.

- An increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections).
- Exceedance, either individually or cumulatively, of level of service (LOS) standards established by the County for designated roads or highways.
- Substantial safety hazards for motorists, bicyclists, pedestrians, or rail operations.
- Restriction of one or more lanes of a primary or secondary arterial during peak-hour traffic, thereby reducing its capacity and creating congestion; or the closure of an arterial or collector roadway for more than 48 consecutive hours.
- Significant disruption of access to or from adjacent land uses for more than 14 days.
- Inadequate parking capacity.
- Inadequate emergency access.
- A change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risk.
- Noticeable and substantial deterioration of roadway surfaces by restoration of road surface in a manner inconsistent with local requirements.
- Conflicts with planned transportation projects or adopted public transportation policies.
- Substantial increase in hazards due to a design feature (e.g., sharp curves, dangerous intersections) or incompatible uses.

Effects

Proposed Action

Impact TRA-1: Temporary increase in traffic during construction

Implementation of the Proposed Action could result in temporary and short-term increases in local traffic due to construction-related workforce traffic (employee travel to and from the site), heavy equipment delivery (e.g., cranes and bulldozers), and material deliveries (e.g., gravel and concrete). Construction activities would be similar to other wind plant projects in the WRA, with peak traffic temporarily affecting SR 12, SR 113, and local access roads. Construction traffic would, however, be dispersed among several roads, minimizing traffic impacts on any one road. Increased traffic would not disrupt access to or from adjacent land uses because existing or alternate access will be maintained at all times. Although construction-related traffic would not exceed the capacity of local roadways, traffic during peak construction would more than double existing daily traffic on some local roads. Implementation of EC-24 would address these effects.

Impact TRA-2: Temporary disruptions of traffic flow during construction

The Proposed Action could result in temporary disruptions of traffic flow if it is necessary to widen or improve existing roads to accommodate equipment during construction. Temporary lane closures could directly affect traffic flow by causing congestion on the roads, or could indirectly affect traffic flow if drivers avoid roads with lane closures and use alternate roads, potentially shifting traffic patterns and affecting existing traffic loads on the alternate roads. EC-24 requires development and implementation of a construction traffic control and transportation plan that addresses potential lane/road closures, alternative routes, signage requirements, construction traffic scheduling, local jurisdiction coordination, and other BMPs needed to alleviate temporary traffic issues. No adverse effect would result.

Impact TRA-3: Damage to existing roads as a result of construction

Existing roads used to access the Plan Area could be damaged by increased use and heavy equipment. There is also the potential for tracking dust, soils, and other materials from graded construction sites onto public roads. EC-25 requires any damaged roads to be repaired to preconstruction conditions. No adverse effect would result.

Impact TRA-4: Operations-related traffic impacts

Traffic from operation of the Proposed Action is expected to be minimal because wind turbine operation and maintenance would require infrequent visits by up to 10 workers. No effect on local roads or highways is expected.

Impact TRA-5: Potential to affect aviation patterns

The westernmost portion of the Plan Area is within Travis AFB's outer horizontal surface. Because the turbines and meteorological towers would be more than 200 feet tall, enXco will require a Determination of No Hazard to Air Navigation from the FAA. As currently sited, none of the proposed turbines would exceed the 562-foot height restriction imposed by location in the outer horizontal surface. However, if enXco modifies the location or height of proposed turbines, this height restriction could be exceeded; such an exceedance would be considered an airfield obstruction. EC-17 requires enXco to comply with Solano County and FAA siting requirements. No adverse effects would result.

No Action

Under the No-Action Alternative, there would be no effect on transportation systems or traffic patterns because existing agricultural uses would continue and no new development would occur.

3.13.3 References

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

3.14 Utilities and Public Service Systems

This section describes the existing conditions pertaining to utilities and public service systems and the potential environmental consequences that could result from implementation of the Proposed Action.

3.14.1 Affected Environment

Regulatory Setting

The Housing Element of the County's general plan guides housing and development in the county. According to the general plan, the County "recognizes that the provision of essential public facilities and services is an important and necessary prerequisite to the maintenance of a satisfying living environment" (Ecology and Environment 2006). In the Solano County Housing Element Update, the County sets the following objectives and policies (Solano County 2008).

G.2 Domestic water for rural development shall be provided principally through on-site individual wells. When individual well systems in an area of the unincorporated County become marginal or inadequate for serving domestic uses, public water service may be permitted in conformance with the General Plan. In such cases, public water service shall be provided and managed through a public agency. If lands proposed for water service are not within the boundaries of an existing public water agency, the Board of Supervisors shall, as a condition of development, designate a public agency to provide and manage the water service. Water facilities shall be designed to provide water service only to the developed areas and those designated for potential development. Such facilities shall be designed to prevent any growth inducing impacts on adjoining designated agricultural and open space lands.

G.3 The County shall continue to work with the local school districts in implementing mechanisms and procedures for mitigating impacts on school facilities resulting from future County development.

Utilities

Electricity and Natural Gas

PG&E is the primary supplier of electricity to Solano County, including the Plan Area. Power lines and towers cross the Plan Area and connect with the Bay Area grid. Four pipelines carrying pressurized natural gas have been installed through the Plan Area.

Telecommunications

Frequency-based communication signals traverse the Plan Area; these include microwave, radio/television, and aircraft navigation signals. Because of the height of the wind turbines and disturbance caused by the turbines, the blades may affect signal transmission and reception (Ecology and Environment 2006).

Water Supply

The Plan Area is suitable for dryland farming and grazing activities, which do not require irrigation or other large-scale water use. Water use in the Plan Area is mostly limited to domestic purposes in the maintenance building. According to the Solano County General Plan, unincorporated areas of the County are required to provide most of their own water, largely from onsite wells (Ecology and Environment 2006).

Wastewater

Residences and establishments in unincorporated areas of the county, including those in the Plan Area, largely maintain their own sewer systems (i.e., septic tanks) under the authority of the County Health Department (Ecology and Environment 2006).

Solid Waste Disposal

The Rio Vista landfill is the closest waste disposal site to the Plan Area. Landfills are also present in Sacramento, Vacaville, and the East Bay (Ecology and Environment 2006).

Public Service Systems

Fire Protection

The Montezuma Hills Fire District provides fire and rescue services to the Shiloh III Plan Area. There are four fire stations equipped for grass fires operated by this district: one at Birds Landing Road, one on Collinsville Road near Collinsville, one on Shiloh Road, and one in Rio Vista (Ecology and Environment 2006). The department is dispatched by the Solano County Sheriff's Department and receives as-needed support from the County and State Office of Emergency Services.

Police Protection

The Solano County Sheriff's Office, located in Fairfield, provides protection for unincorporated sections of Solano County, including the Plan Area. The Solano County Sheriff's Office Dispatch Center provides law enforcement and fire services for the Solano County Sheriff's Office, Isleton Police and Fire, Dixon Police and Fire, Cordelia Fire Protection District, California Medical Facility, Suisun Fire Protection District, Rio Vista/Delta Fire Districts, Montezuma Fire Protection District, Ryer Island Fire Protection District, Vacaville Fire Protection District, and Solano Community College Police on a 24-hour basis (Ecology and Environment 2006). The nearest city police department is in Rio Vista.

Schools

Solano County is composed of seven kindergarten through grade 12 school districts: Benicia, Dixon, Fairfield-Suisun, River Delta (Rio Vista), Travis, Vacaville, and Vallejo City (Ecology and Environment 2006). Collectively, the schools serve approximately 71,000 students. The River Delta district provides school bus service to the III Plan Area, as does the special education program of the County, although only for qualifying students (Ecology and Environment 2006).

3.14.2 Environmental Consequences

Approach and Methods

Evaluation of the potential utilities and public services effects of the Proposed Action is based on a qualitative evaluation of the context and intensity of potential effects.

For the purposes of this analysis, any consequence of the Proposed Action that would result in any of the conditions listed below would be considered an adverse effect.

- Significant adverse physical impacts on police, fire, medical, recreational, or educational services.
- Exceedance of wastewater treatment requirements of the applicable RWQCB.

- Need for expansion or construction of a utilities system, such as a wastewater treatment plant or landfill, where the construction would cause substantial environmental effects.
- The need for new or expanded entitlements for water supplies.
- Interference with existing microwave communication.
- Degradation in existing television or radio reception.
- Interference with existing civilian or military navigation systems.
- Failure to comply with local, state, or federal statutes and regulations related to public utilities and services.

Environmental Consequences and Mitigation Measures

Proposed Action

Impact PSU-1: Increased demand for public services and utilities

Implementing the Proposed Action would not substantially increase the demand for water, sewage, solid waste disposal, or gas and electrical services during construction activities because construction activities would be temporary and limited to the Plan Area; similarly, there would be no such need caused by operation of the Proposed Action because operations would not require substantial public services.

Impact PSU-2: Potential to interfere with existing utility service or infrastructure

Public utilities in the Plan Area would not be affected by construction or operation of the Proposed Action because compliance with relevant County requirements and building codes would ensure that construction activities or excavation do not affect electrical or natural gas utility lines.

Impact PSU-3: Interference with television or radio reception

Wind turbine towers could interfere with existing television or radio signals that traverse the Plan Area. Although the potential exists for the Proposed Action to affect television or radio reception, implementation of EC-26 would avoid interference with land mobile services and over-the-air television signals by requiring enhancement of receiving equipment reception as necessary.

Impact PSU-4: Potential to cause navigational system interference

Operating the proposed wind turbines under the Proposed Action could potentially interfere with airport navigation systems. As stated in the *Solano County Wind Turbine Siting Plan*, a 100-foot (30.5-meter) wind turbine tower would have to be within 1 mile of a VHF omnidirectional range (VOR) station to cause potential interference. The nearest VOR station is approximately 5 miles from the Plan Area, at Travis AFB, and no interference is expected. Accordingly, there would be no adverse effects associated with implementation of the Proposed Action.

No Action

Under the No-Action Alternative, there would be no effects pertaining to utilities and public service systems because the lands within the proposed Plan Area would continue under current agricultural uses.

3.14.3 References

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

This chapter addresses required NEPA analyses beyond those addressed in Chapter 3: identification of unavoidable adverse effects, a discussion of potential irreversible and irretrievable commitments of resources, short-term uses versus long-term productivity, and cumulative effects. A summary of the environmental consequences conclusions is also provided.

4.1 Unavoidable Adverse Effects

Implementation of the Proposed Action would not result in any unavoidable adverse impacts on the human environment.

4.2 Irreversible and Irretrievable Commitments of Resources

Implementation of the Proposed Action would result in an irretrievable commitment of construction materials used to construct the wind turbines, substation, electrical collection system and interconnections, and access roads. Energy resources would also be expended during construction; however, because the Proposed Action involves creation of a renewable energy source, this expenditure would be offset by operation of the wind turbines. Approximately 51 acres of grassland and agricultural land would be unavailable during the 35-year lease period for the Shiloh III project, but this acreage would be restored to current uses if the project is decommissioned.

4.3 Short-Term Uses versus Long-Term Productivity

Implementation of the Proposed Action would result in use of the Plan Area as a renewable energy source. Development would require 51 acres of the 4,600-acre Plan Area to be removed from agricultural and grazing uses during the 35-year lease period. This short-term loss of dryland farming and grazing productivity would constitute about 1% of the Plan Area.

4.4 Cumulative Effects

The CEQ's NEPA regulations (40 CFR 1580.25) require a reasonable analysis of the significant cumulative impacts of a proposed action. *Cumulative impacts* refers to "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts."

There are two approaches to identifying cumulative projects and the associated impacts. The *list* approach identifies individual projects in order to identify potential cumulative impacts. The *projection* approach uses a summary of projections in an adopted general plan or related planning document to identify

potential cumulative impacts. This EA uses the list approach as presented in a number of environmental impact reports for wind development projects in the Plan Area vicinity.

4.4.1 Cumulative Development

Cumulative development in the general vicinity of the Plan Area consists mainly of existing and proposed wind development projects in the Collinsville–Montezuma Hills WRA. Existing projects, comprising 825 turbines, are SMUD Phase 1 and 2, enXco V, Shiloh I, Shiloh II, and High Winds (although the enXco V project is planned for repowering, replacing 510 turbines with 34 newer turbines with an equivalent capacity). Currently proposed projects are Montezuma 1 (16–23 turbines), SMUD Phase 3 (36–75 turbines), and Shiloh III (approximately 59 turbines) (Figure 1-2). Assuming the remaining WRA outside the 3,700-acre Solano Land Trust conservation easement is developed, it is possible that a total of up to approximately 650 turbines on 42,972 acres could ultimately be expected within the WRA in the reasonably foreseeable future (Ecology and Environment 2006). This is the cumulative development scenario for the WRA considered for the purposes of this analysis.

Other planned projects in Solano County that could potentially contribute to cumulative impacts include the Jepson Parkway project, a four-lane parkway planned for an area northwest of Travis AFB connecting Interstate-80/Leisure Town Road in Vacaville with SR 12 in Suisun City; the SR 12 widening project near the WRA; and the Potrero Hills Landfill expansion on 245 acres of land currently occupied by CTS (U.S. Fish and Wildlife Service 2008).

4.4.2 Effects Analysis

Aesthetics

Implementation of the Proposed Action combined with other developments in and around the Collinsville–Montezuma Hills WRA would result in changes to visual resources in the WRA. The addition of 59 additional wind turbines in the Plan Area would be visible from SR 12 and surrounding rural roads (Figures 3.1-1 through 3.1-7). As shown in the visual simulations, the cumulative view from various locations would be of wind turbines in the middleground and background, with the most pronounced changes in views from SR 12 at Curry Road. At other locations, views would be of middleground or distant turbines that are similar in design and scale to those that comprise the Shiloh II, Montezuma, and SMUD projects.

Previous EIRs for wind projects in the WRA have concluded that the addition of wind turbines in the WRA is significant and unavoidable under CEQA. For this analysis, NEPA requires that the context and intensity of the impact be considered in determining whether an adverse effect would result from the Proposed Action combined with other cumulative projects.

The context of this cumulative visual impact is an established WRA. There are currently 825 wind turbines in the WRA, although the cumulative projection is that at buildout the area will support a total of approximately 650 turbines because of changes in turbine types in the enXco V project area. The current established visual context is of large (400-foot-tall) wind turbine structures surrounded by open grazing and agricultural lands. A number of rural residences in and near the WRA have current views of a large number of wind turbine structures. The addition of 59 wind turbines to the currently projected number of structures would constitute approximately 10% of the total structures projected in the area. Therefore, from an aggregate perspective, additional structures in this established WRA would have a minor effect on the environmental context of the viewshed.

In evaluating the intensity of the cumulative impact and the contribution of the Shiloh III project, the number of viewers and views from aesthetically sensitive areas were considered. The most dominant views of the WRA are from SR 12 and SR 113 (County-designated scenic roadways). From this location large wind turbines occupy the foreground, middleground, and background views. Approximately 15,000 vehicles per day travel on SR 12; approximately 3,700 vehicles per day travel on SR 113 (Ecology and Environment 2006). Other potentially sensitive viewing areas include rural roads in the WRA and rural residences. Daily vehicle trips on rural roads in the WRA generally average between 200 and 400 (Solano County 2007). There are 21 rural residences in and near the WRA with views of wind turbine development.

A considerable number of individuals view the area on a daily basis from somewhat sensitive locations. Views of the WRA are of an altered landscape dominated by large wind turbine structures. However, these views have been extant for a number of years; most views from SR 12 and rural residences have been characterized by the presence of large wind turbines for the past 2–5 years, depending on the precise locale. While individual viewers may have differing subjective opinions regarding the visual quality of the WRA, the overall visual experience in this area has changed very little over the past year. The Proposed Action's contribution to the current visual resources would be subtle; from some viewpoints, wind turbines would be in the middleground rather than the background. These changes would modify the extent of turbine presence but not the fundamental visual character of the Plan Area vicinity.

Implementation of conservation measures set forth in the HCP would have no cumulative effect on visual resources because avoidance, minimization, and mitigation measures for impacts on special-status species would not substantially alter the visual resources in the area. Cumulative visual effects are not considered to be adverse.

Agricultural Resources

Implementation of the Proposed Action together with other projects would not result in cumulative adverse effects on land use or agricultural resources because wind plant development in the CMHWRA takes place in an area designated for wind plant development and because associated uses are compatible with continued agricultural uses in the WRA. Wind plants in the WRA are also developed in accordance with the County's general plan, which requires setbacks from property lines, roadways, railroads, residences, transmission lines, and sensitive habitats. EIRs for other wind development projects in the WRA (i.e., Shiloh I, Shiloh II, SMUD, and Montezuma I) have indicated either that no land use impacts would result from wind plant development or that they could be successfully mitigated. Similarly, the Proposed Action would not contribute to cumulative land use or agricultural impacts.

Air Quality and Climate Change

Many of the wind plant projects considered for the cumulative analysis are already constructed or would not be constructed concurrently with the Shiloh III project. For this reason, and because air quality effects associated with wind plant development are relatively minor and temporary, cumulative effects associated with construction of wind projects in the WRA are not expected to result in adverse effects on regional air quality or climate change. Moreover, no substantial cumulative effects on air quality associated with operations have been identified in any of the numerous environmental documents prepared for wind plant projects in the WRA.

Biological Resources

The analysis of cumulative impacts on biological resources in the Collinsville–Montezuma Hills WRA is based on an evaluation of several EIRs prepared for existing and proposed wind plant projects in the WRA. The potential for cumulative impacts on avian species was assessed using data and conclusions presented in *Avian Monitoring Study and Risk Assessment for the Shiloh III Wind Power Project, Solano County California* (Curry & Kerlinger 2009).

Cumulative effects on vegetation and wetlands and waters of the United States would not be adverse because permanent vegetation loss from cumulative wind plant development in the WRA is expected to amount to less than 1% of the 42,972-acre WRA (Ecology and Environment 2006). The Proposed Action's 51-acre contribution to this potential cumulative effect would be minimal compared to the overall area of the WRA. Cumulative effects on special-status plants in the WRA are expected to be minor because individual projects, including the Proposed Action, have incorporated environmental commitments or mitigation measures designed to avoid or minimize effects on plant populations. Potential effects on special aquatic sites in the WRA would not be adverse because all the existing and proposed wind plant projects, including the Proposed Action, provide for avoidance of water features by siting wind turbines on hilltops, providing buffers from aquatic sites, and using HDD for crossing water features.

Cumulative effects related to temporary displacement of wildlife could result from concurrent construction of proposed wind plant projects: specifically, the Proposed Action, Montezuma 1, and SMUD Phase 3. These potential impacts are not likely to occur because the proposed projects are not likely to occur simultaneously. However, even if these three projects were constructed simultaneously, the disturbance effects would be widely dispersed over a large area and would occur at only one or a few turbine sites at any one time. Cumulative impacts on CTS are addressed in the HCP. Potential cumulative effects on CTS include continuing and future loss of suitable breeding, foraging, sheltering, and dispersal habitat resulting from conversion to urban and other development. The Proposed Action's contribution to CTS impacts is not expected to preclude survival or recovery of CTS when considered with other cumulative projects because the HCP conservation measures would adequately minimize and compensate for Plan Area impacts. In addition, the installation of turbines in the area effectively precludes other types of adverse effects that are potentially more detrimental to CTS—namely urban development.

Birds in the immediate vicinity and birds migrating through and wintering in the WRA could be subject to the cumulative effects of multiple wind projects. Some quantification of these potential cumulative effects has been attempted in a synthesis of information from two postconstruction monitoring reports for adjacent projects in the Collinsville–Montezuma Hills WRA and a bird use and behavior study completed for the Shiloh III project (Curry & Kerlinger 2009). The estimated mortality rates in the WRA for the two most common raptor species—red-tailed hawk and American kestrel—are notably higher than those for other avian species and bats, a phenomenon that has been noted in most studies of avian fatalities at wind farms. However, the local nesting populations of these two species appear to occur at densities commensurate with California Central Valley habitats and in line with available suitable nesting substrates, and they show no signs of decline. Regional populations of these two species also appear to be stable. The majority of fatalities of the two species occur primarily during the winter period. The geographic origin of these individuals is not known, making an assessment of cumulative effects difficult. However, estimated total avian fatalities for the WRA are substantially fewer than estimated fatalities from other types of collisions (e.g. power lines, buildings, automobiles); accordingly, avian fatalities from the Collinsville–Montezuma WRA are not likely to be significant at a regional or higher scale (Curry & Kerlinger 2009). Moreover, these species are abundant locally, regionally, and nationally, and their populations are not expected to be substantially affected by wind plant operation. Therefore, these

cumulative impacts are not considered adverse. No federally listed avian species have been identified in or adjacent to the Plan Area. Based on the best available information and conclusions of the *Shiloh III Avian Monitoring Study and Risk Assessment*, no adverse cumulative impacts on avian species, including raptors, are expected in the Collinsville–Montezuma Hills WRA.

Cultural Resources

Implementation of the Proposed Action together with other projects would not result in adverse cumulative effects on cultural resources because standard avoidance and mitigation measures have been incorporated into all the wind plant development projects in the WRA; additionally, the Proposed Action is not anticipated to result in adverse effects on cultural resources.

Geology, Seismicity, and Soils

Implementation of the Proposed Action together with other projects would not result in adverse cumulative impacts related to geology, seismicity, or soils because all the potential hazards associated with wind plant development would be reduced by standard design measures incorporated into the Proposed Action and other cumulative projects.

Hazardous Materials

Implementation of the Proposed Action together with other projects would not result in adverse cumulative impacts associated with accidental hazardous materials spills or discovery of hazardous materials sites because cumulative wind plant development in the WRA requires standard spill prevention and hazardous materials discovery mitigation measures that reduce these potential effects as do the environmental commitments for the Proposed Action.

Hydrology and Water Quality

Implementation of the Proposed Action would place proposed wind turbines in upland areas with established setbacks from wetlands, streams, vernal pools, and ponds. In areas where components of the electrical collection system would need to cross a seasonal stream or pond, HDD would be used to route the component under the feature. Consequently, with implementation of the environmental commitments that are part of the project description, no direct or indirect impacts on drainage or aquatic features in the Plan Area are anticipated. The Proposed Action would result in minimal hydrological changes in the WRA. Cumulative hydrological effects in the WRA would also be minor because Solano County imposes conditions on wind development projects in the WRA similar to the environmental commitments incorporated into the Proposed Action.

Any potentially adverse effects on water quality during construction of the Shiloh III project would be mitigated through implementation of a SWPPP required under EC-14. The Shiloh III project would increase impervious surfaces in the Plan Area by less than 1% of the plan area acreage. Cumulative impacts on water quality would similarly be minor because of mitigation measures required to reduce water quality effects in the WRA (Ecology and Environment 2006).

Land Use and Planning

Refer to *Agricultural Resources* above.

Noise

Implementing the Proposed Action with other projects in the WRA would not result in adverse cumulative noise effects on sensitive receptors, because noise levels would not exceed most Solano County noise criteria and in cases where the potential exists for noise levels to exceed criteria impacts have been or would be reduced by implementing EC-18 and EC-19 that would require implementing noise reducing construction practices and complying with Solano County noise standards.

Public Health Hazards

Implementation of the Proposed Action together with other projects in the WRA would not result in adverse cumulative impacts on public health and safety because all wind development projects in the WRA have been required to incorporate mitigation measures to reduce risk of wildfire, address the potential for turbine and meteorological tower failure, minimize the potential for electrical shock, and address access-related safety issues. These measures are similar to the environmental commitments incorporated into the Proposed Action.

Transportation

Implementation of the Proposed Action together with other projects in the WRA would not result in adverse cumulative effects on transportation or traffic because the potential effects of project construction on local traffic conditions would be temporary, are staggered as the projects are developed sequentially, and would be reduced by implementing standard Traffic Control Plans required by Solano County. The Proposed Action's contribution to this potential cumulative effect would be minor and would be reduced by implementing transportation-related environmental commitments. Operations of the various wind energy projects would not create a cumulative effect on traffic conditions on area highways and roads because operation and maintenance of facilities requires very few workers generating daily trips on local roadways.

Population and Socioeconomic Conditions

Because none of the existing and proposed projects in the vicinity of the WRA, including the Proposed Action would result in population increases, and because the only potential socioeconomic effect would result from temporary construction employment for development of proposed wind projects, no cumulative impacts on population or socioeconomic conditions would result from the Proposed Action together with other projects.

4.5 Environmentally Preferable Alternative

NEPA requires identification of an environmentally preferable alternative (40 CFR 1505.2[b]). The environmentally preferable alternative is the alternative that would result in the least damage to the environment. Although the No-Action Alternative would result in current Plan Area conditions continuing with no effects associated with the Proposed Action, it would not meet the purpose of the project to construct a commercially viable wind plant, or the need to increase sources of renewable energy. Other alternatives that were considered but rejected, including offsite alternatives, would likely have similar or greater effects than the Proposed Action. Based on these considerations, the environmentally preferable alternative is the Proposed Action.

Chapter 5

List of Preparers

The individuals listed below participated in the preparation of this EA.

Management Team

- Brad Norton—project director.
- Brad Schafer—project manager.
- Steve Centerwall—environmental assessment lead.
- Julia Hooten—project coordinator.

Technical Team

- Patricia Ambacher—cultural resources.
- Dave Buehler—noise.
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- Larry Goral—aesthetics, technical editing.
- Laura Smith—air quality.
- Shannon Hatcher—air quality peer review.
- Julia Hooten—agricultural resources, geological resources, hazardous materials, land use and planning, public health hazards, recreation, traffic and transportation.
- Brad Schafer—biological resources (botany) and technical peer review.
- Will Kohn—biological resources (wildlife).
- Doug Leslie—biological resources peer review.
- Tim Messick—graphic artist.
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- Ryan Patterson—publications specialist.

