APPENDIX C
Biological Resources Reports

C-1: The Biological Resources Technical Report (BRTR) for the Tylerhorse Wind Energy Project

C-2: Addendum to the Biological Resources Technical Report for the Tylerhorse Wind Energy Project

C-3: Addendum No. 2 to the Biological Resources Technical Report for the Tylerhorse Wind Energy Project

C-4: Draft Bird and Bat Conservation Strategy

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APPENDIX C-1
The Biological Resources Technical Report (BRTR) for the Tylerhorse Wind Energy Project

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TYLERHORSE WIND ENERGY PROJECT
BIOLOGICAL RESOURCES TECHNICAL REPORT

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EXECUTIVE SUMMARY

The proposed Tylerhorse Wind Energy Project (project) property covers three parcels of approximately 1,100 acres of public lands administered by the Bureau of Land Management. Characterization of biological resources at the project property determined that a total of 49 special-status plant species and 66 special-status wildlife species could potentially occur within five habitats (Joshua Tree Woodland, Mojave Desert Wash Scrub, Mojave Mixed Woody Scrub, Mojavean Juniper Woodland and Scrub, and Non-native Grassland). Literature reviews; agency coordination; reviews of applicable federal, state, and local statues and guidelines; database searches; and field surveys indicate that the Swainson's hawk (*Buteo swainsanii*), listed as threatened pursuant to the California Endangered Species Act, was observed foraging within the project property. There were no other federally or state-listed rare, threatened, or endangered species observed within the project area. There were 20 federally or state-designated sensitive wildlife species (1 reptile, 15 birds, 1 bat, 2 small mammals, and 1 large mammal) documented within or immediately adjacent to the project area, including the state fully protected golden eagle (*Aquila chrysaetos*). The other 19 sensitive wildlife species are designated as State Species of Special Concern or BLM sensitive species.

The U.S. Geological Survey 7.5-minute series Tylerhorse quadrangle depicts Tylerhorse Canyon, an ephemeral drainage, crossing through section 26, Gamble Spring Canyon and Burham Canyon crossing through Section 24, and six additional unnamed ephemeral drainages crossing through the project area. There will be no turbines located within drainages, and the roadway system has been designed to follow existing dirt roads wherever possible to eliminate the crossing of any ephemeral drainages within the project area.

A review of the Natural Wetlands Inventory found that there are no wetlands mapped within the project area. All of the drainages within the project property are nonnavigable and isolated drainages that do not connect to any navigable waterway subject to the jurisdiction of the U.S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act.

Several thousand hours of field observations for the project and surrounding wind energy projects has resulted in the determination that the project area is not a significant migratory corridor for wildlife.

The project area is located within lands administered by the U.S. Department of Interior, Bureau of Land Management pursuant to the West Mojave Plan, an amendment to the California Desert Conservation Area Plan. Mohave ground squirrel (*Xerospermophilus mohavensis*) and desert tortoise (*Gopherus agassizii*) have been determined to be absent; therefore, the project would not conflict with long-term conservation strategies for Mohave ground squirrel and desert tortoise established by the West Mojave Plan. The project area is not located within any other area adopted, or proposed to be adopted, as a Habitat Conservation Plan; Natural Community Conservation Plan; or other approved local, regional, state, or federal habitat conservation plan.

SECTION 1.0
INTRODUCTION

This Biological Resources Technical Report was prepared to fully characterize the proposed Tylerhorse Wind Energy Project (project) with respect to biological resources and related planning and regulatory statutes and guidelines. The characteristics of resources and analysis of impacts presented in this report are based on information obtained from literature reviews; agency coordination; consideration of applicable federal, state, and local statues and guidelines; database searches; field surveys; and geospatial analysis that were conducted on a property covering approximately 1,100 acres of public lands administered by the Bureau of Land Management (BLM) and similar analysis conducted for two adjacent projects: the 6,970-acre Manzana (formerly PdV) Wind Energy Project (Manzana Project) and the 9,576-acre Pacific Wind Energy Project.

The project would require land modifications to accommodate construction, operation, and maintenance of up to 40 wind turbine generators (WTGs) with an anticipated total generating capacity of up to 60 megawatts (MW) in the unincorporated area of Kern County that has the required physical and wind dynamics capable of supporting the development of wind energy.

Related and supporting components would include an underground, 34.5-kilovolt (kV) underground electrical collection system to collect energy from the turbines and an interconnecting road network. The estimated area of permanent disturbance for the wind turbine pads is 0.51 acre per turbine. With 40 WTGs proposed, the total estimated area of disturbance for all turbines within the proposed action area is 20.4 acres. The construction of access roads is expected to result in an additional 12.6 acres of permanent disturbance. Therefore, the actual impacted area would cover approximately 33 acres.

To exploit economies of scale and reduce environmental impacts, the project would use the ancillary facilities of the adjacent, approved Manzana Project, a separate wind farm approved by the Kern County Board of Supervisors on July 29, 2008, which is controlled by Iberdrola Renewables, Inc. on approximately 6,970 acres of private land. Such facilities include the Manzana Project's previously approved operations and maintenance (O&M) facility, staging and refueling areas, and concrete batch plant.

Throughout this report, the term "project property" is used to represent the total area for which the applicant has requested a right-of-way permit (area of disturbance).

1.1 INTENDED AUDIENCE

This report summarizes the results of more than 800 hours of field investigations for consideration by the project applicant in the planning and development of the project and by the BLM, trustee and responsible agencies in their respective decision-making positions, and the public for the purpose of intrinsic and full disclosure consistent with the spirit of the National Environmental Policy Act. The information contained in the report has been an integral part of the project planning process effort to avoid and minimize impacts to biological resources to the maximum extent practicable while attaining most of the basic objectives of the project. This report documents the coordination that has been undertaken with the U.S. Fish and Wildlife Service, the California Department of Fish and Game, BLM, Kern County, and the U.S. Army Corp of Engineers.

SECTION 2.0
PROJECT DESCRIPTION

2.1 LOCATION

The proposed Tylerhorse Wind Energy Project (project) property consists of three separate parcels that total approximately 1,100 acres (slightly less than 2 square miles) of Bureau of Land Management (BLM)–administered land located in the southern portion of the unincorporated area of Kern County (Figure 2.1-1, *Regional Vicinity Map*). The project is located approximately 15 miles west of California State Highway 14 (Antelope Valley Freeway), 12.5 miles south of California State Highway 58 (Blue State Memorial Highway), and 8 miles north of State Route 138 (West Avenue D) in southern Kern County, California. The project property is bordered by the Tehachapi Mountains to the northwest and is approximately 11 miles southeast of the City of Tehachapi, Kern County and approximately 8 miles northwest of the unincorporated community of Rosamond, California (Figure 2.1-2, *Project Vicinity Map*). Edwards Air Force Base is located approximately 29 miles east of the project.

The project property is within the U.S. Geological Survey (USGS) 7.5-minute series, Tylerhorse Canyon, topographic quadrangle (Figure 2.1-3, *Topographic Map with USGS 7.5-minute Quadrangle Index*).[1] The project includes all of Township 10N, Range 15W, Section 24; the northern half of Township 10N, Range 15W, Section 26; and the southeast eighth of Township 10N, Range 15W, Section 28. The project property ranges in elevation from 3,480 feet above mean sea level (MSL) at the southeastern parcel to 3,960 feet MSL at the northwestern parcel of the project property boundaries.

The project is generally accessed from the corner of Rosamond Boulevard and north along 170th Street West, then along access roads constructed for the Manzana (formerly PdV) Wind Energy Project (Manzana Project) approved by the Kern County Board of Supervisors on July 29, 2008, which is controlled by Iberdrola Renewables, Inc. on 6,970 acres of private lands.

2.2 PROJECT ELEMENTS

The project would consist of up to 40 wind turbine generators (WTGs) of 1.5- to 3.0-megawatt (MW) generating capacity per turbine, with an anticipated total generating capacity of up to 60 MW (Figure 2.2-1, *Conceptual Site Plan*). As stated above, the project would use the ancillary facilities of the adjacent Manzana Project, a separate wind farm. Such facilities include the Manzana Project's previously approved operations and maintenance (O&M) facility, staging and refueling areas, and concrete batch plant.

Electrical power from the project would connect to a substation located on the Manzana Project, which would in turn be interconnected to Southern California Edison's (SCE's) Whirlwind Substation (Tehachapi Renewable Transmission Project [TRTP] Substation 5) by means of a 220-kilovolt (kV) overhead transmission line constructed as part of the Manzana Project. The principal components of the project include:

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[1] U.S. Geological Survey. 1965. *7.5-minute Series, Tylerhorse Canyon, California, Topographic Quadrangle*. Scale 1:24,000. Reston, VA.

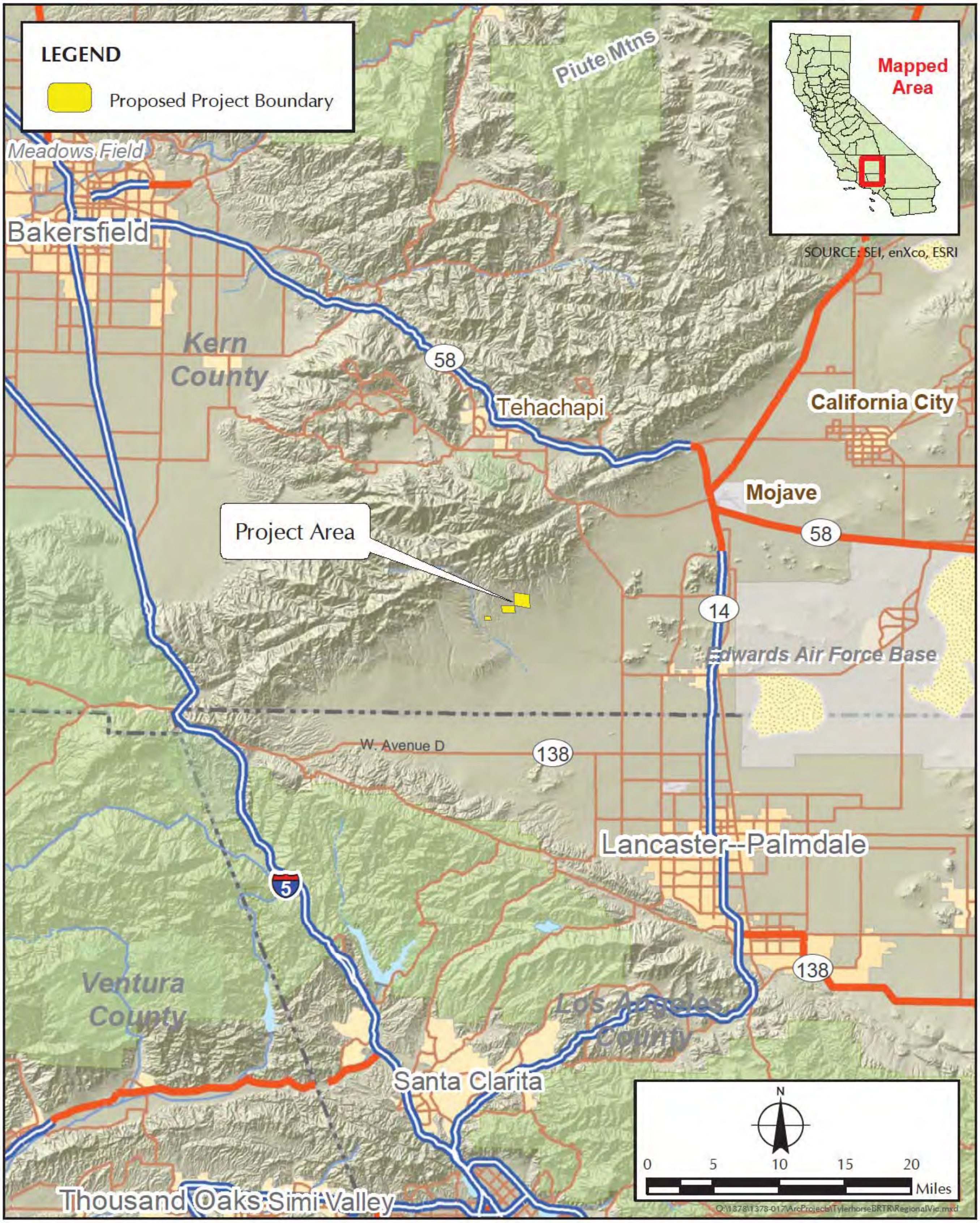
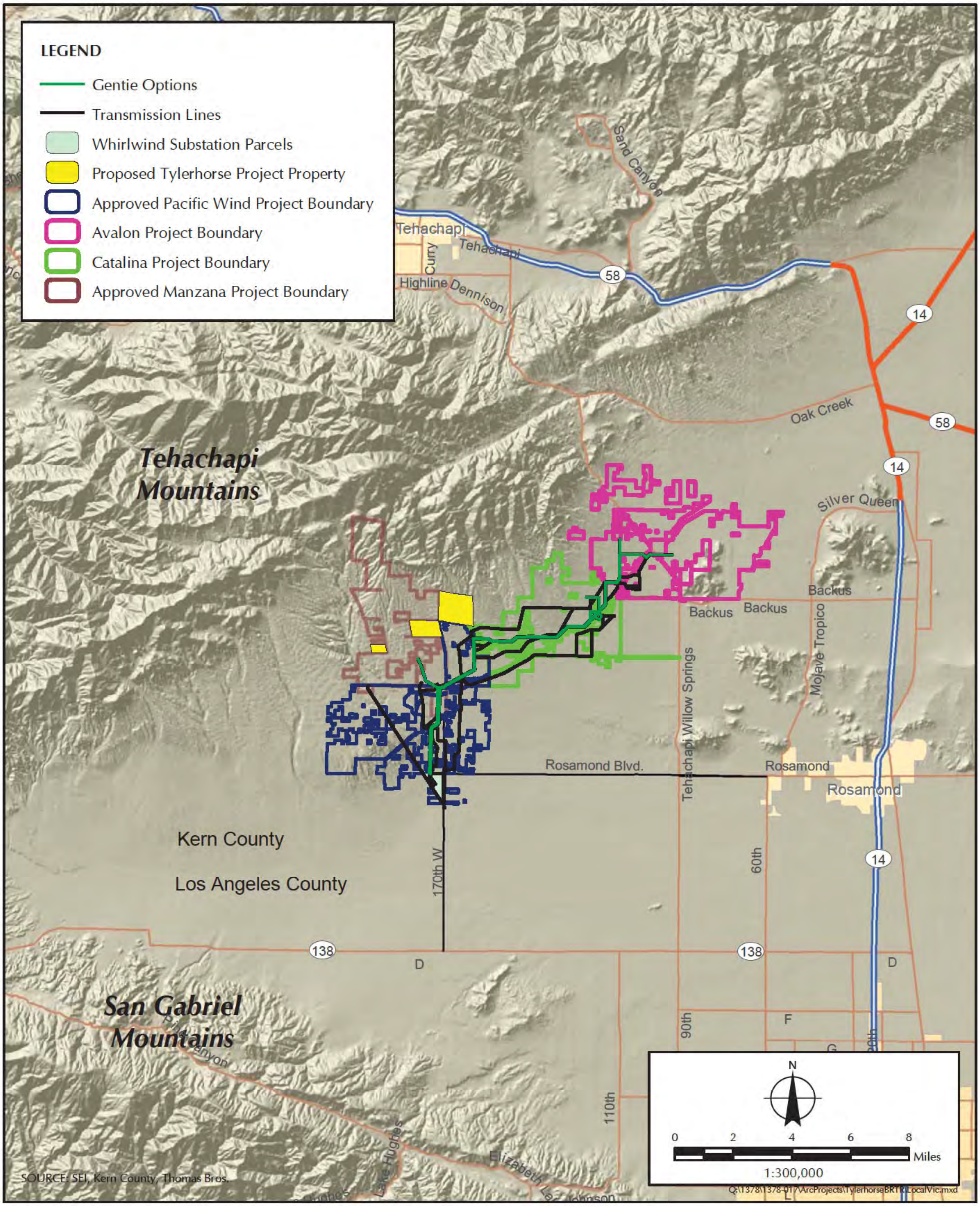


Figure 2.1-1
Regional Vicinity Map



enXco An EDF EN Company

FIGURE 2.1-2
Project Vicinity Map

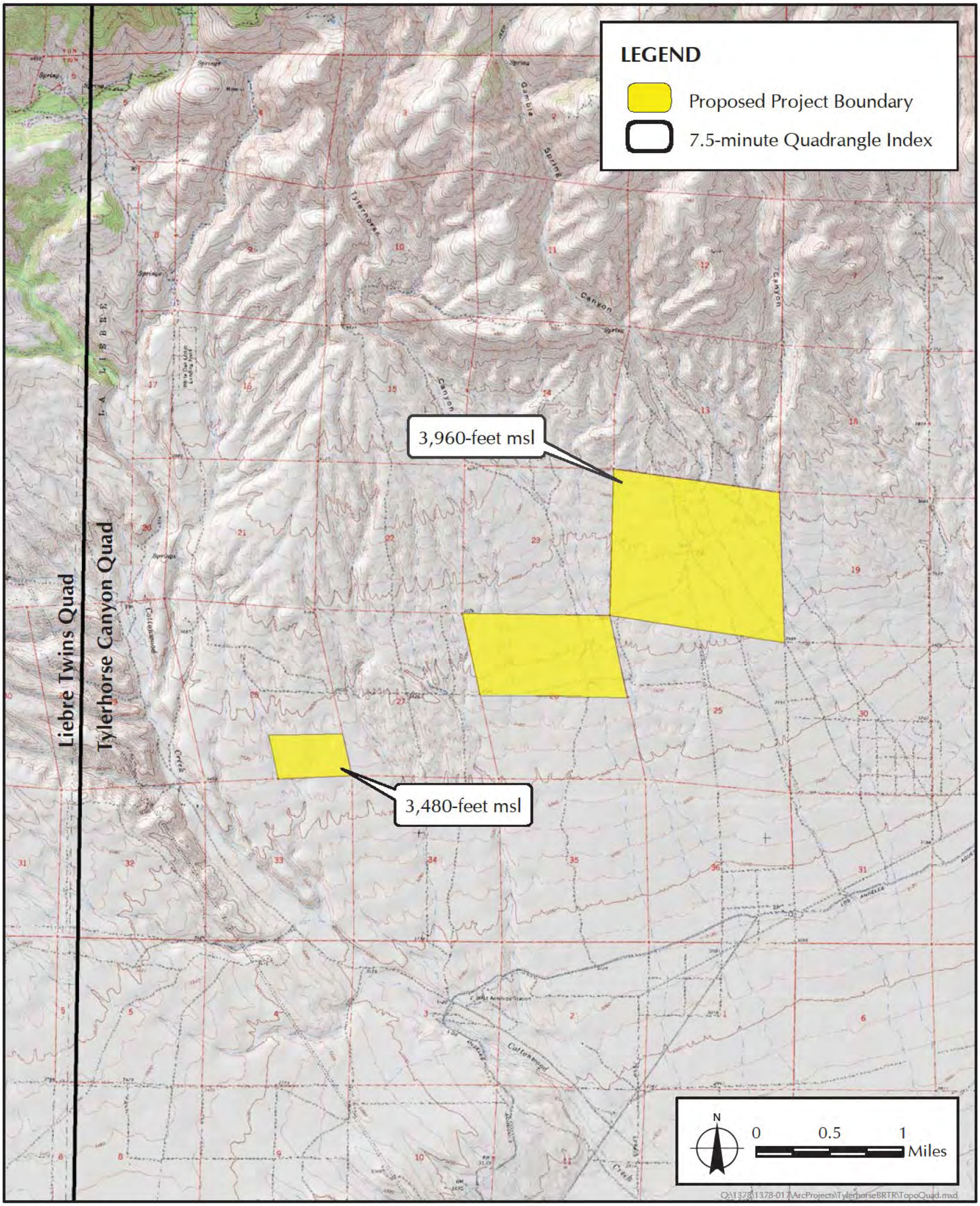


FIGURE 2.1-3
Topographic Map with USGS 7.5-minute Quadrangle Index

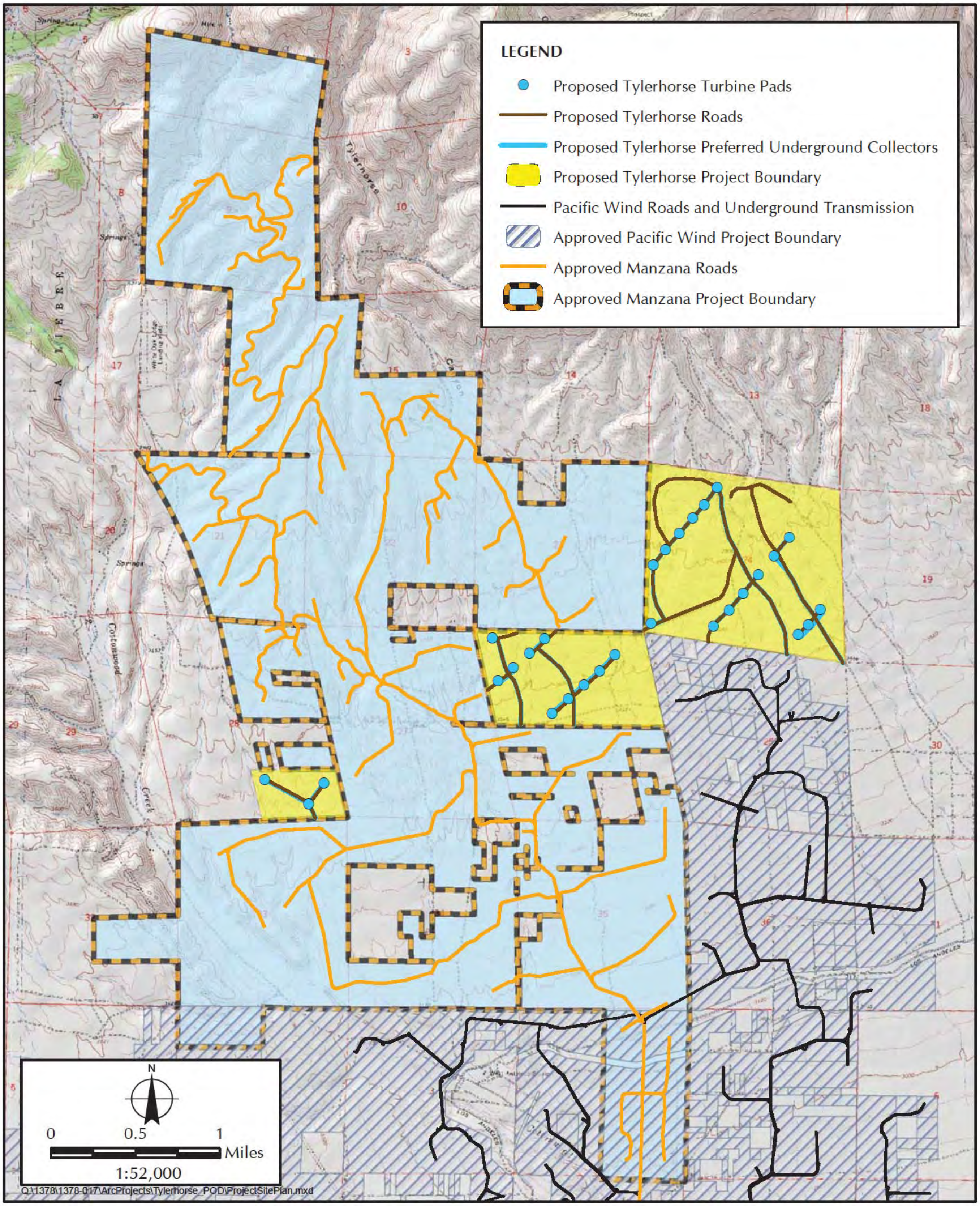


FIGURE 2.2-1
Conceptual Site Plan

- Up to 40 WTGs;
- A 34.5-kV underground electrical collection system linking each turbine to an off-site substation previously permitted by Kern County;
- An access road system;
- Supervisory control and data acquisition (SCADA) system and fiber optic communications; and
- Fencing of portions of the exterior boundary of the proposed project or each wind turbine cluster or row

2.2.1 Wind Turbine Generators

Depending on the final number of each type of wind turbine selected, fewer turbines may be installed. The WTGs would be arranged in parallel arrays (turbine strings) running north-northeast to south-southwest. Spacing of the wind turbines along the arrays would be based on the final turbine selection. In general, the turbines will be spaced 2.5 to 3 rotor diameters apart, side-to-side, and 6 to 8 rotor diameters between downwind turbines. The project would use three-bladed WTGs, each ranging from 1.5 MW to 3.0 MW (generator nameplate capacity). The project applicant, enXco Development Corporation (enXco), is considering using wind turbines manufactured by Vestas, Siemens, Re-Power, Gamesa, Suzlon, and/or GE Energy. The turbine specifications of the Vestas and GE Energy wind turbine models are summarized in Table 2.2.1-1, *Wind Turbine Specifications*.

TABLE 2.2.1-1
WIND TURBINE SPECIFICATIONS

Manufacturer	Model	Capacity (MW)	Rotor Diameter (feet)	Hub Height (feet)	Maximum Height from Tower Base to Blade Tip (feet)
Vestas	90–3.0 MW	3	295	262 / 295 / 344	407 / 440 / 489
GE	SLE	1.5	253	262	389

Depending on equipment availability, different combinations of these turbine types could be installed at the project. Each combination would result in a total project energy capacity of up to 60 MW. Wind turbines consist of three primary components: a tubular steel tower, rotor blades, and a nacelle. Basic components of the wind turbine generators are described as follows. The wind turbine towers would be up to approximately 350 feet high at hub height, and wind turbine rotors would be up to approximately 300 feet in diameter, for a maximum total height from tower base to blade tip of up to approximately 500 feet. The 15- to 18-foot-diameter wind turbine towers would be mounted on concrete foundations approximately 50 feet in diameter and would each occupy an approximately 75-foot-diameter graveled pad. The maximum amount of land that would be permanently occupied by up to 40 wind turbine pads would be approximately 20 acres. The project's wind turbines would be sited according to BLM wind turbine setback requirements.

2.2.2 Electrical Collection System

A transformer at each wind turbine tower (depending on turbine manufacturer, the transformer could be housed in the nacelle or the tower base; typically the transformer is outside the tower at the base of the turbine) would transform the power generated at approximately 690 volts to 34.5 kV for delivery to the off-site substation. The steel transformer box housing the transformer circuitry, if outside the tower or nacelle, would be mounted on a fiberglass or concrete pad or vault located at the base of each turbine tower. The transformer box would be approximately 7 feet by 8 feet, with the concrete pad or foundation approximately 6 to 10 inches thick. The transformers would be connected to underground power cables (collector lines), which would be installed between turbines to collect power generated by the individual wind turbines. The electrical collection system would consist primarily of medium-voltage, high-density, insulated underground cables that would connect to the off-site substation. The project will transmit electrical power to the electrical grid by interconnecting the project to already constructed private collector stations located within the adjacent approved Manzana or Pacific Wind Energy Projects, which are in turn connected to the SCE Whirlwind Substation. Interconnection will not require additional rights-of-way outside the current application. In an effort to avoid any streambed alterations, the electrical system will utilize overhead transmission lines and/or bore underneath the drainages. The use of overhead transmission lines and/or boring underneath the drainages will be determined upon final engineering design.

2.2.3 Supervisory Control and Data Acquisition (SCADA) System and Fiber Optic Communications

A SCADA system would be installed at the project site to collect operating and performance data from each wind turbine to provide for remote operation of the project from the off-site O&M facility, located within the adjacent Manzana Project. The wind turbines would be linked to a central computer in the off-site O&M building by a fiber optic network. The fiber optic cables used for SCADA communication would be placed in the same trenches used for the project's 34-kV electrical collection system.

2.2.4 Access Roads

Access to the project site would be from the corner of Rosamond Boulevard and 170th Street, located 15 miles west of the unincorporated community of Rosamond, then along access roads constructed for the previously approved Manzana Project. While existing roads would be used when possible, new unpaved turbine connector roads would be constructed to serve as access roads across the project site to turbines located within the project site. These turbine connector roads would be tangential to the permanent wind tower pads and would have a permanent travel width of 16 feet and a road base or gravel surface. The permanent road width would be 36 feet, with 10 feet on either side to be reseeded but retained for future use, as needed. All roads within the project site would be designed to avoid any streambed crossings, thus eliminating the need for any streambed alterations. Final service road alignments would depend on the final placement of wind turbines and on the results of the environmental report documenting the results of field investigations, including topography and any other site-specific details to be incorporated into the final design.

2.2.5 Security

Warning signs will be posted along the access roads informing the public of construction activities and recommending that the public not enter the site. For areas where public safety risks could exist and site personnel would not be available to control public access (such as excavated foundation holes and electrical collection system trenches), warning signs and temporary fences will be erected. Other areas determined to be hazardous or where issues of security or theft are of concern may also be fenced in coordination with the BLM. Temporary fencing around unfinished turbine bases, excavations, and other hazards will typically be a high-visibility plastic mesh. Security guards, cameras, and/or additional fencing may also be used if necessary to protect public health and safety and project facilities.

The project boundary would be fenced. Primary security measures for the wind turbines include the following:

- Posting warning and/or no trespassing signage on fences, electrical equipment, and system entrances as necessary;
- Keeping all tower access doors and ports locked at all times; and
- Making outside ladders or other climbing apparatus inaccessible within 15 feet of the ground

The gearboxes located within each tower's nacelle require no additional security. The step-up transformers at the individual wind turbine sites will have padlocked and wrench-locked cabinets to prevent access to the level gauges and valves. Outside lighting of the wind turbines (beyond Federal Aviation Administration requirements) is impractical due to their remote location.

SECTION 3.0
REGULATORY FRAMEWORK

This regulatory framework identifies the federal ordinances or policies that govern the conservation and protection of biological resources that must be considered by the Bureau of Land Management (BLM) during the decision-making process for projects that have the potential to affect biological resources.

3.1 FEDERAL ENDANGERED SPECIES ACT

The Endangered Species Act of 1973 (ESA) (16 USC 1531–1544) provides a framework for the protection of endangered and threatened plant and animal species. Federal agencies may not jeopardize the existence of listed species, which includes ensuring that actions they authorize, fund, or carry out do not adversely affect the species or adversely modify designated critical habitats. Under the ESA, all federal departments and agencies also must utilize their authorities, as appropriate, to promote the recovery of listed species. In addition, the ESA prohibits all persons, including federal agencies, from harming or killing ("taking") individuals of a listed species without authorization. While federal agencies must consult with the U.S. Fish and Wildlife Service (USFWS) or National Marine Fisheries Service when their activities may affect listed species, projects cannot be stopped unilaterally by the services; however, for any anticipated take to be authorized, applicable measures to minimize the take that are developed in the consultation must be followed.

Critical habitat is defined as the geographic area containing physical or biological features essential to the conservation of a listed species or an area that may require special management considerations or protection.

As defined in the federal ESA, individuals, organizations, states, local governments, and other nonfederal entities are affected by the designation of critical habitat only if their actions occur on federal lands; require a federal permit, license, or other authorization; or involve federal funding.[1]

Due to the potential presence of federally listed species in the vicinity of the proposed Tylerhorse Wind Energy Project (project) property, project compliance with the federal ESA was considered in this evaluation.

3.2 MIGRATORY BIRD TREATY ACT

The Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703–712), as amended, provides for federal protection of all migratory bird species and their active nests and eggs. Permits are required to remove these birds from their roosting and nesting areas. The federal government is exempt from the MBTA permit requirements based on the court decision in *Newton County Wildlife Assn. v. U.S. Forest Service 113 F. 3d 110* (8th Cir 1997), but must minimize "take" caused by their activities. Nesting birds and the contents of the nest within the project property are afforded protection during the nesting season pursuant to the MBTA. Nonfederal contractors are required to obtain a depredation permit from the USFWS prior to removal or disturbance of nesting birds. Project compliance with the MBTA was considered in this evaluation.

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[1] U.S. Fish and Wildlife Service. Accessed July 2009. *Federal Endangered Species Act*. Available at: http://www.fws.gov/Endangered/pdfs/esaall.pdf

3.3 BALD AND GOLDEN EAGLE PROTECTION ACT

The federal Bald and Golden Eagle Protection Act (BGEPA) (16 USC 668–668d, 54 Stat. 250), as amended, is administered by the USFWS to protect bald (*Haliaeetus leucocephalus*) and golden (*Aquila chrysaetos*) eagles, their nests, eggs, and parts. The BGEPA states that no person shall take, possess, sell, purchase, barter, offer for sale, purchase or barter, transport, export, or import any bald or golden eagle alive or dead, or any part, nest, or egg without a valid permit to do so.[2] The BGEPA also prohibits the "take" of bald and golden eagles unless pursuant to regulations. *Take* is defined by the BGEPA as an action "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." *Disturb* is defined in the BGEPA as

> to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available; (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.[3]

In addition to immediate impacts, this definition also covers impacts that result from human-caused alterations initiated around a previously used nest site during a time when eagles were not present. Permits are issued to Native Americans to possess eagle feathers for religious purposes, and salvaged eagle carcasses can be sent to the National Eagle Repository in Colorado where they are redistributed to Native Americans. This effort is coordinated by a local USFWS office. Although the bald eagle was removed from the Endangered Species List in June 2007, it is still federally protected under the BGEPA. In addition, the *National Bald Eagle Management Guidelines* were published in conjunction with delisting by the USFWS in May 2007 to provide provisions to continue to protect bald eagles from harmful actions and impacts.[4]

Under the BGEPA, a final rule was published in May 2008 in the *Federal Register* that proposed authorization for take of bald eagles for those with existing authorization under the federal ESA where the bald eagle is covered in a Habitat Conservation Plan (HCP) or the golden eagle is covered as a nonlisted species.[5] The final rule also established a new permit category to provide expedited permits to entities authorized to take bald eagles through Section 7 incidental take permits. A proposed rule will later address authorization of take of (1) disturbance-type take of bald and golden eagles due to otherwise lawful activities and (2) eagle nests in rare cases where their location poses a risk to human safety or the eagles themselves.

The BGEPA was taken into consideration in the evaluation of the project due to the potential presence of the golden eagle within the project property.

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[2] U.S. Fish and Wildlife Service. n.d. *Bald Eagle Management Guidelines and Conservation Measures: Bald and Golden Eagle Protection Act*. Available at: http://www.fws.gov/midwest/Eagle/guidelines/bgepa.html

[3] U.S. Fish and Wildlife Service. n.d. *Bald Eagle Management Guidelines and Conservation Measures: Bald and Golden Eagle Protection Act*. Available at: http://www.fws.gov/midwest/Eagle/guidelines/bgepa.html

[4] U.S. Fish and Wildlife Service. May 2007. *National Bald Eagle Management Guidelines*. Available at: http://www.fws.gov/pacific/eagle/NationalBaldEagleManagementGuidelines.pdf

[5] *Federal Register*. 20 May 2008. "Notices." *73* (98): 29075–29084.

3.4 SECTION 404 OF THE FEDERAL CLEAN WATER ACT

Section 404 of the federal Clean Water Act, which is administered by the U.S. Army Corps of Engineers (USACOE), regulates the discharge of dredged and fill material into waters of the United States. USACOE has established a series of nationwide permits that authorize certain activities in waters of the United States, provided that a proposed activity can demonstrate compliance with standard conditions. Generally, USACOE requires an individual permit for an activity that will affect an area equal to or in excess of 0.3 acre of waters of the United States. Projects that result in impacts to less than 0.3 acre of waters of the United States can normally be conducted pursuant to one of the nationwide permits, if consistent with the standard permit conditions. USACOE also has discretionary authority to require an Environmental Impact Statement (EIS) for projects that result in impacts to an area between 0.1 and 0.3 acre. Use of any nationwide permit is contingent on the activities that have no impacts to endangered species.

There are ephemeral streams located within and adjacent to the project property; however, there are no National Wetland Inventory (NWI) wetlands located within the project property. Although it is anticipated that many of these intermittent streams and crossings within the project property do not feed into navigable waters of the United States, the federal Clean Water Act was taken into consideration in the evaluation of the project due to the potential for the project to impact intermittent streams or crossings within the project property during construction.

3.5 BUREAU OF LAND MANAGEMENT CALIFORNIA DESERT CONSERVATION AREA PLAN

Administered by the BLM, the California Desert Conservation Area (CDCA) Plan requires that proposed development projects are compatible with policies that provide for the protection, enhancement, and sustainability of fish and wildlife species, wildlife corridors, riparian and wetland habitats, and native vegetation resources. The project is located on lands administered by the BLM that are designated in the CDCA Plan as Unclassified. According to the CDCA "Energy Production and Utility Corridors" section, "Sites associated with power generation or transmission not identified in the Plan will be considered through the Plan Amendment Process."[6] Therefore, a Plan Amendment will be required for this project in accordance with the CDCA.

3.6 WEST MOJAVE PLAN

The BLM produced the West Mojave Plan as an amendment to the CDCA Plan (Figure 3.6-1, *Project in Relation to the West Mojave Plan*). The West Mojave Plan is a federal land use plan amendment that (1) presents a comprehensive strategy to conserve and protect the desert tortoise (*Gopherus agassizii*), the Mohave ground squirrel (*Xerospermophilus mohavensis*), and nearly 100 other plants and animals and the natural communities of which they are part and (2) provides a streamlined program for complying with the requirements of the California and federal ESAs.[7,8]

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[6] U.S. Department of the Interior, Bureau of Land management. 1980. *California Desert Conservation Area Plan*. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/cdd/cdcaplan.Par.15259.File.dat/CA_Desert_.pdf

[7] U.S. Department of the Interior, Bureau of Land Management. 1980. *Final Environmental Impact Report and Statement for the West Mojave Plan*. Moreno Valley, CA: California Desert District. Available at: http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-1-Chapter1_Bookmarks.pdf

[8] U.S. Department of the Interior, Bureau of Land Management. January 2005. *West Mojave Plan—A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment Final Environmental Impact Report and Statement*. Moreno Valley, CA. Available at: http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-1-Chapter1_Bookmarks.pdf

FIGURE 3.6-1
Project in Relation to the West Mojave Plan

3.7 FEDERAL NOXIOUS WEED ACT

The Federal Noxious Weed Act of 1974 (FNWA) (7 USC 2801 *et seq.*), under the authority of the Secretary of Agriculture, establishes a federal program to control the spread of noxious weeds.

3.8 EXECUTIVE ORDER 13186

Executive Order 13186, issued by President Clinton on January 10, 2001, directs each federal agency taking actions that are likely to have a measurable effect on migratory bird populations to develop and implement a Memorandum of Understanding (MOU) with the USFWS that will promote the conservation of migratory bird populations.[9]

3.9 EXECUTIVE ORDER 13112

Executive Order 13112, issued by President Clinton on February 3, 1999, promotes the prevention and introduction of invasive species and provides for their control and minimizes the economic, ecological, and human health impacts that invasive species cause through the creation of the Invasive Species Council and Invasive Species Management Plan.[10]

3.10 EXECUTIVE ORDER 11990

Executive Order 11990, signed by President Carter in 1977, directs federal agencies to avoid development in wetlands whenever there is a practicable alternative and to avoid, to the extent possible, adverse impacts associated with the occupancy or modification of wetlands.[11]

3.11 USFWS WIND TURBINE GUIDELINES ADVISORY COMMITTEE RECOMMENDATIONS TO AVOID AND MINIMIZE WILDLIFE IMPACTS FROM WIND TURBINES

On March 4, 2010, the USFWS Wind Turbine Guidelines Advisory Committee issued *Recommended Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines* in a report submitted to the Secretary of the Interior.[12] The guidelines outline effective measures to avoid or minimize impacts to wildlife and their habitats from wind energy facilities. The guidelines encourage reviewing agencies and other professionals to (1) complete a proper evaluation of potential wind energy development site, (2) ensure the proper location and design of turbines, and (3) complete preconstruction and postconstruction research and monitoring to identify and assess impacts to wildlife to ensure that the actions that they authorize, implement, or fund will not jeopardize the continued existence of any federally endangered or threatened species.

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[9] Executive Order 13212. 18 May 2001. *Actions to Expedite Energy-Related Projects*. Available at: http://www.nepa.gov/nepa/regs/eos/eo13186.html

[10] Executive Order 13112. 18 May 2001. *Actions to Expedite Energy-Related Projects*. Available at: http://www.nepa.gov/nepa/regs/eos/eo13112.html

[11] Executive Order 11990. 18 May 2001. *Actions to Expedite Energy-Related Projects*. Available at: http://water.epa.gov/lawsregs/guidance/wetlands/eo11990.cfm

[12] U.S. Fish and Wildlife Service, Wind Turbine Guidelines Advisory Committee. 4 March 2010. *Recommendations to Avoid or Minimize Impacts to Wildlife and Habitat from Wind Energy Development*. Washington, DC.

3.12 CALIFORNIA ENDANGERED SPECIES ACT

The California ESA (California Fish and Game Code § 2050 *et seq.*) prohibits the take of listed species except as otherwise provided in state law. Unlike the federal ESA, the California ESA applies the take prohibitions to species petitioned for listing (state candidates). State lead agencies are required to consult with the California Department of Fish and Game (CDFG) to ensure that any actions undertaken by that lead agency are not likely to jeopardize the continued existence of any state-listed species or result in destruction or degradation of required habitat. CDFG is authorized to enter into MOUs with individuals, public agencies, universities, zoological gardens, and scientific or educational institutions to import, export, take, or possess listed species for scientific, educational, or management purposes.

Section 2080 of the California ESA states:

> no person shall import into this state [California], export out of this state, or take, possess, purchase, or sell within this state, any species, or any part or product thereof, that the commission [State Fish and Game Commission] determines to be an endangered species or threatened species, or attempt any of those acts, except as otherwise provided in this chapter, or the Native Plant Protection Act, or the California Desert Native Plants Act.

Pursuant to Section 2081 of the California ESA, CDFG may authorize individuals or public agencies to import, export, take, or possess any state-listed endangered, threatened, or candidate species. These otherwise prohibited acts may be authorized through permits or MOUs if (1) the take is incidental to an otherwise lawful activity, (2) impacts of the authorized take are minimized and fully mitigated, (3) the permit is consistent with any regulations adopted pursuant to any recovery plan for the species, and (4) the applicant ensures adequate funding to implement the measures required by CDFG. CDFG shall make this determination based on available scientific information and shall include consideration of the ability of the species to survive and reproduce.

3.13 CALIFORNIA FISH AND GAME CODES

3.13.1 California Fish and Game Code Section 3511

This state law describes bird species, primarily raptors, that are "fully protected." Fully protected birds may not be taken or possessed, except under specific permit requirements.

3.13.2 California Fish and Game Code Section 3500

Under this state law it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by the Code or any associated regulation.

3.13.3 California Fish and Game Code Section 3503.5

This state law makes it unlawful to take, possess, or destroy birds of prey. It also prohibits the take, possession, or destruction of nests or eggs of any bird of prey.

3.13.4 California Fish and Game Code Sections 4700, 5050, and 5515

These state laws list mammal, amphibian, and reptile species that are classified as "fully protected" in California.

3.13.5 Native Plant Protection Act (NPPA) (Fish and Game Code Sections 1900 et seq.)

The NPPA includes measures to preserve, protect, and enhance rare and endangered native plant species. Definitions for "rare and endangered" are different from those contained in the California ESA, although California ESA-listed rare and endangered species are included in the list of species protected under the NPPA.

3.13.6 Title 14, California Code of Regulations, Sections 670.2 and 670.5

These state regulations list plant and animal species designated as threatened and endangered under the California ESA. California Species of Special Concern (CSC) are those species that are indicators of regional habitat changes or are considered potential future protected species. CSCs do not have any special legal status but are intended by CDFG for use as a management tool to take these species into special consideration when decisions are made concerning the future of any land parcel.

3.13.7 California Fish and Game Code Sections 1600–1607

Pursuant to these sections, CDFG regulates all changes to the natural flow, bed or bank, of any river, stream, or lake that supports fish or wildlife resources. A stream is defined broadly as a body of water that flows at least periodically, or intermittently, through a channel that has banks and that supports fish or other aquatic biota. Such areas are referred to as state jurisdictional waters. Impacts to vegetation and wildlife from sediment, diversions, and other disturbances are included in the review.

SECTION 4.0
METHODS

This section of the Biological Resources Technical Report describes the methods employed in the characterization and evaluation of biological resources at the proposed Tylerhorse Wind Energy Project (project) study area. This assessment includes the most recent results of survey efforts, consultation with technical experts, and detailed review of pertinent biological and management literature. The study methods were designed to provide the substantial evidence required in the decision-making processes by the Bureau of Land Management (BLM) pursuant to the National Environmental Policy Act (NEPA), and further articulated in the NEPA Handbook (H-1790-1) and the Land Use Planning Handbook (H-1601-1).[1,2]

All Sapphos Environmental, Inc. survey personnel were either experienced or supervised by persons experienced in the undertaking of field surveys for special-status species, as well as knowledgeable of the identification and ecology of all species. All survey personnel were familiar with both federal and state statutes related to listed and sensitive species and their collection, in addition to being experienced with analyzing the impacts of development on special-status species, their habitats, and communities. Surveyors had in-depth knowledge and familiarity with the species of the area, including rare, threatened, and endangered species. In addition, field teams were knowledgeable of the habitat requirements for each of the target species, locations of various habitats within the project study area, and characteristics and vegetative habitat of each target species.

4.1 LITERATURE REVIEW

Prior to conducting field surveys within the project property, a query of the California Natural Diversity Database (CNDDB)[3,4] was undertaken to identify special-status species, including listed, sensitive, and locally important species with the potential to occur within, and adjacent to, the project property. The query was conducted for the U.S. Geological Survey (USGS) 7.5-minute series, Tylerhorse Canyon, topographic quadrangle, in which the project property is located, as well as the eight surrounding 7.5-minute series topographic quadrangles (Cummings Mountain, Tehachapi South, Monolith, Willow Springs, Little Buttes, Fairmont Butte, Neenach School, and Liebre Twins). The species list was revised based on a review of published and unpublished literature, including the West Mojave Plan, comparing each species' habitat and range to the characteristics present within the project property.

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[1] Bureau of Land Management. 2008. *National Environmental Policy Act Program*. Handbook H-1790-1. Washington, DC. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.24487.File.dat/h1790-1-2008-1.pdf

[2] Bureau of Land Management. 2005. *Land Use Planning*. Handbook H-1601-1. Washington, DC. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/ak/aktest/planning/planning_general.Par.65225.File.dat/blm_lup_handbook.pdf

[3] California Department of Fish and Game. 2004. *Rarefind 2: A Database Application for the Use of the California Department of Fish and Game Natural Diversity Database*. Sacramento, CA.

[4] California Department of Fish and Game. 2005. *Rarefind 3: A Database Application for the Use of the California Department of Fish and Game Natural Diversity Database*. Sacramento, CA.

In addition, Sapphos Environmental, Inc. conducted a review of existing and potential Habitat Conservation Plans[5] and Natural Community Conservation Plans[6] and determined that the project study area is within the West Mojave Plan boundary (see Figure 3.5-1). Due to the location of the project study area within the boundaries of the West Mojave Plan, plant and animal species addressed in the West Mojave Plan were evaluated for their potential to be present within the vicinity of the project study area.

4.2 AGENCY COORDINATION

Informal coordination was undertaken with the U.S. Fish and Wildlife Service (USFWS) to review the scope of federally listed, candidate, and other sensitive species that have the potential to occur in the project area and field methods to be used in assessing the presence or absence of these species:

Agencies contacted included the USFWS and BLM. Coordination was initiated in April 2004 and continued throughout 2005 and 2006 as well as in 2010 and 2011. Correspondences to the various agencies are provided in reverse chronological order.

- Acting Regional Director, Pacific Southwest Region, Sacramento, CA. 20 May 2011. Letter to Acting State Director, BLM, California State Office, Sacramento, CA. Subject: Informal Consultation for Four Wind Energy Projects, Alta East (CACA-0052537), Rising Tree (CACA-052362), Tylerhorse (CACA-051561), and North Sky River (CACA-047847) regarding Golden Eagles and California Condors (1510 (P) CA930).

- Acting State Director, California State Office, BLM. 15 April 2011. Letter to Regional Director, USFWS, Region 8. Subject: Consultation for Four Wind Projects Regarding Golden Eagles and California Condors.

- 6 December 2010. Interagency Meeting to review Biological Resources Work Plans with USFWS (A. Blackford and A. Torres), California Department of Fish and Game (J. Sloan), and BLM California Desert Office (L. LaPre via teleconference), BLM Ridgecrest Field Office (S. Ellis could not attend), enXco (R. Miller), Cox Castle Nicholson (C. Morrison), and Sapphos Environmental, Inc. (M. Campbell and D. McNair).

- 12 October 2010. Site Visit Meeting with BLM (C. Perry, P. Rodriguez, and S. Ellis), enXco (R. Miller), Eight-Bar Brand (J. Lantz), Cox Castle Network (A. Mudge), Kern Wind Energy Association (L. Parker), and Sapphos Environmental, Inc. (M. Campbell and B. Norling).

- 15 July 2010. Meeting with BLM, California Desert District (J. Childers and C. Perry), BLM, Ridgecrest Field Office (H. A. Villalobos and P. Rodriguez), enXco (R. Miller), Eight-Bar Brand, Wind Energy Consultant (J. Lantz), Cox, Castle &

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[5] U.S. Fish and Wildlife Service. May 2009. *Habitat Conservation Plans*. Region 8. Available at: http://ecos.fws.gov/conserv_plans/servlet/gov.doi.hcp.servlets.PlanReport?region=8&type=HCP&rtype=2&hcpUser=&view=report

[6] California Department of Fish and Game. Accessed April 2010. *Natural Community Conservation Planning (NCCP)*. Available at: http://www.dfg.ca.gov/habcon/nccp/status.html

Nicholson LLP (A. Mudge), Kern Wind Energy Association (L. Parker), County of Kern Planning and Community Development Department (P. Johnson and C. Mynk), Sapphos Environmental, Inc. (M. Campbell, E. Charlton, and L. Watson) at the BLM California Desert District, 22835 Calle San Juan de Los Lagos, Moreno Valley, CA 92553.

- 8 April 2010. Sapphos Environmental, Inc. (M. Campbell and E. Charlton) met with L. Oviatt of Kern County Planning and H. Villalobos of the BLM at the Kern County Planning Department, Bakersfield, California.

- 25 February 2010. Sapphos Environmental, Inc. (M. Campbell and E. Charlton) attended a meeting at the BLM Ridgecrest Field Office (H. Villalobos, P. Rodriguez, and S. Ellis) with enXco (R. Miller), Eight-Bar Brand, Wind Energy Consultant (J. Lantz), Cox, Castle & Nicholson LLP (L. Hutnak), and the Kern Wind Energy Association (L. Parker).

- Parker, Robert, BLM, Ridgecrest, CA. 18 October 2005. E-mail correspondence with Dr. Irena Mendez, Sapphos Environmental, Inc., Pasadena, CA.

- Hohman, Judy, USFWS, Ventura, CA. 10 June 2005. Letter to Mr. Jim Clark, Sapphos Environmental, Inc., Pasadena, CA.

- Harris, Glenn, BLM, Ridgecrest, CA. 23 May 2005. E-mail correspondence with Mr. Jim Clark, Sapphos Environmental, Inc., Pasadena, CA.

- Clark, Jim, Sapphos Environmental, Inc., Pasadena, CA. 9 May 2005. E-mail correspondence with Mr. Glenn Harris, BLM, Ridgecrest, CA.

- Clark, Jim, Sapphos Environmental, Inc., Pasadena, CA. 14 April 2005. Letter to Ms. Judy Hohman, USFWS, Ventura, CA.

- Solares, Melissa, Sapphos Environmental, Inc., Pasadena, CA. 26 January 2005. E-mail correspondence with Mr. Glenn Harris, BLM, Ridgecrest, CA.

- Parker, Robert, BLM, Ridgecrest, CA. 14 January 2005. E-mail correspondence with Ms. Melissa Solares, Sapphos Environmental, Inc., Pasadena, CA.

- Warner, Amy, Sapphos Environmental, Inc., Pasadena, CA. 26 April 2004. Telephone correspondence with Mr. Bill Asserson, BLM, Bakersfield, CA.

- Warner, Amy, Sapphos Environmental, Inc., Pasadena, CA. 20 April 2004. Telephone correspondence with Mr. Robert Parker, BLM, Ridgecrest, CA.

Coordination was undertaken with the U.S. Army Corps of Engineers (USACOE) regarding the jurisdictional determination of the project with relation to Section 404 of the Clean Water Act.

- Kaufman, Laura, Sapphos Environmental, Inc., Pasadena, CA. 7 November 2011. Letter to Mr. Daniel Swenson, USACOE, Ventura, CA.

Informal coordination was undertaken with the California Native Plant Society (CNPS), a private organization dedicated to the conservation of native plants, knowledgeable of the special-status species and areas that support potentially suitable habitat at the project property:

- Golden, Clyde, CNPS, Kern County, CA. 17 April 2010. In-person correspondence with Saudamini Sindhar, Sapphos Environmental, Inc., Pasadena, CA.

- Swanson, Amber, Rare Plant Treasure Hunt Coordinator, CNPS. 17 April 2010. In-person correspondence with Saudamini Sindhar, Sapphos Environmental, Inc., Pasadena, CA.

In addition, coordination was undertaken with other private and public institutions with experience related to rare and sensitive plants with the potential to occur in the vicinity of the project.

4.3 PLANT COMMUNITY MAPPING

The purpose of the plant community mapping was to characterize the plant communities within the project property. The plant community map provided the basis for determining the presence or absence of state-designated sensitive plant communities, including wetland, aquatic, and riparian habitats. The plant community mapping also served as one source of information for making a determination regarding the ability of the project property to provide suitable habitat for sensitive plant and wildlife species.

Project data and aerial photographs were reviewed, and site visits were conducted on April 14 and 15, 2005, to map and characterize the vegetation communities within the project property. The site was revisited on November 23, 2011 to further refine the boundaries of the plant communities present on-site. The description of plant communities follows the classification system provided in *Preliminary Descriptions of the Terrestrial Natural Communities of California*[7] and cross-referenced to vegetation series described in *A Manual of California Vegetation*.[8] Scientific names and common names are according to *The Jepson Manual*.[9] Common names not available from *The Jepson Manual* are taken from *A Flora of Southern California*.[10]

4.4 RIPARIAN AND OTHER STATE-DESIGNATED HABITATS

The purpose of this component of the work effort was to determine the presence or absence (within the project property) of areas potentially requiring negotiation of a Streambed Alteration Agreement with the California Department of Fish and Game (CDFG) pursuant to Section 1600 of the State Fish and Game Code.

Information gathered from a literature review was analyzed to determine the presence of hydric soils, drainage features, and the potential presence of drainages / isolated dry washes and intermittently flooded features. In addition, groundwater and flood data were analyzed to determine the impacts of the project and/or constraints to the project. A geographic information

[7] Holland, Robert F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Sacramento, CA: California Department of Fish and Game.

[8] Sawyer, J.O., and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. Sacramento, CA: California Native Plant Society.

[9] Hickman, J.C., ed. 1993. *The Jepson Manual: Higher Plants of California*. Berkeley, CA: University of California Press.

[10] Munz, P. 1974. *A Flora of Southern California*. Berkeley, CA: University of California Press.

system (GIS) was used to identify the locations of drainage feature crossings (i.e., road crossings and underground power lines) to determine the potential presence of features subject to CDFG jurisdiction pursuant to Section 1600 of the State Fish and Game Code. All drainage features were mapped as illustrated on the Tylerhorse Canyon[11] topographic quadrangle. The road system was designed such that no drainages would be impacted by the project (Figure 4.4-1, *Project Access Roads in Relation to Ephemeral Drainages*).

4.5 EVALUATION OF FEDERAL WETLANDS

The determination of presence or absence of federally protected wetlands, as defined in Section 404 of the Clean Water Act, conforms to the protocols specified in the *Corps of Engineers Wetlands Delineation Manual*,[12] as modified by the U.S. Supreme Court case, *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers*, No. 99-1178 (January 9, 2001).[13] The determination regarding the potential presence or absence of federally protected wetlands included review of topographic maps and National Wetlands Inventory (NWI) maps, interpretation of aerial photographs, spatial analysis using GIS, plant community mapping, field analysis, and coordination with the U.S. Army Corps of Engineers (USACOE). The scope of the impact analysis considers the potential for the project to result in direct, indirect, or cumulative impacts through direct removal, filling, hydrological interruption, or other means.

The project property is located in an isolated inland basin; therefore, the legal ruling in the Supreme Court decision of the *Solid Waste Agency* was taken into consideration. The Solid Waste Agency of Northern Cook County (SWANCC) decision limited USACOE jurisdiction of nonnavigable, isolated, and intrastate waters. In this decision, the Supreme Court struck down the Migratory Bird Rule, ruling that the USACOE did not have authority under Section 404 over the isolated wetlands on SWANCC's property based on their use as habitat by migratory birds. However, the Supreme Court did not strike down any of the regulations implementing Section 404 or alter the definition of "waters of the United States." Rather, the Supreme Court concluded that the USACOE could regulate isolated wetlands only if the wetlands had some connection to interstate commerce other than their use by migratory birds.

The assessment was to determine if there were drainages, streams, lakes, wetlands, or navigable water bodies present within the property. A map review was conducted and included the 1:24,000,[14] 1:100,000,[15] and 1:250,000[16] series USGS topographic maps. The project boundary was geo-referenced using ArcGIS and superimposed on 24,000-, 100,000-, and 250,000-scale USGS topographic quadrangles. All drainages on the topographic quadrangles within the project boundary were mapped (Figure 4.5-1, *Isolated Drainage System*).

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[11] U.S. Geological Survey. [1965] Revised 1995. *7.5-minute Series, Tylerhorse Canyon, California, Topographic Quadrangle*. Reston, VA.

[12] U.S. Army Corps of Engineers. January 1987. *Corp of Engineers Wetlands Delineation Manual*. Final Technical Report Y-87-1. Vicksburg, MS. Prepared by: Environmental Laboratory, U.S. Army Engineer Research and Development Center, Waterways Experiment Station, Vicksburg, MS.

[13] U.S. Supreme Court. 9 January 2001. Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers. No. 99-1178, 531 U.S. 159.

[14] U.S. Geological Survey. [1965] Revised 1995. *7.5-minute Series Tylerhorse Canyon, California, Topographic Quadrangle*. Reston, VA.

[15] U.S. Geological Survey. 1979. *30×60-minute Series Lancaster, CA, Topographic Quadrangle*. Reston, VA.

[16] U.S. Geological Survey. 1977. *60-minute Series Los Angeles, CA, County Map*. Reston, VA.

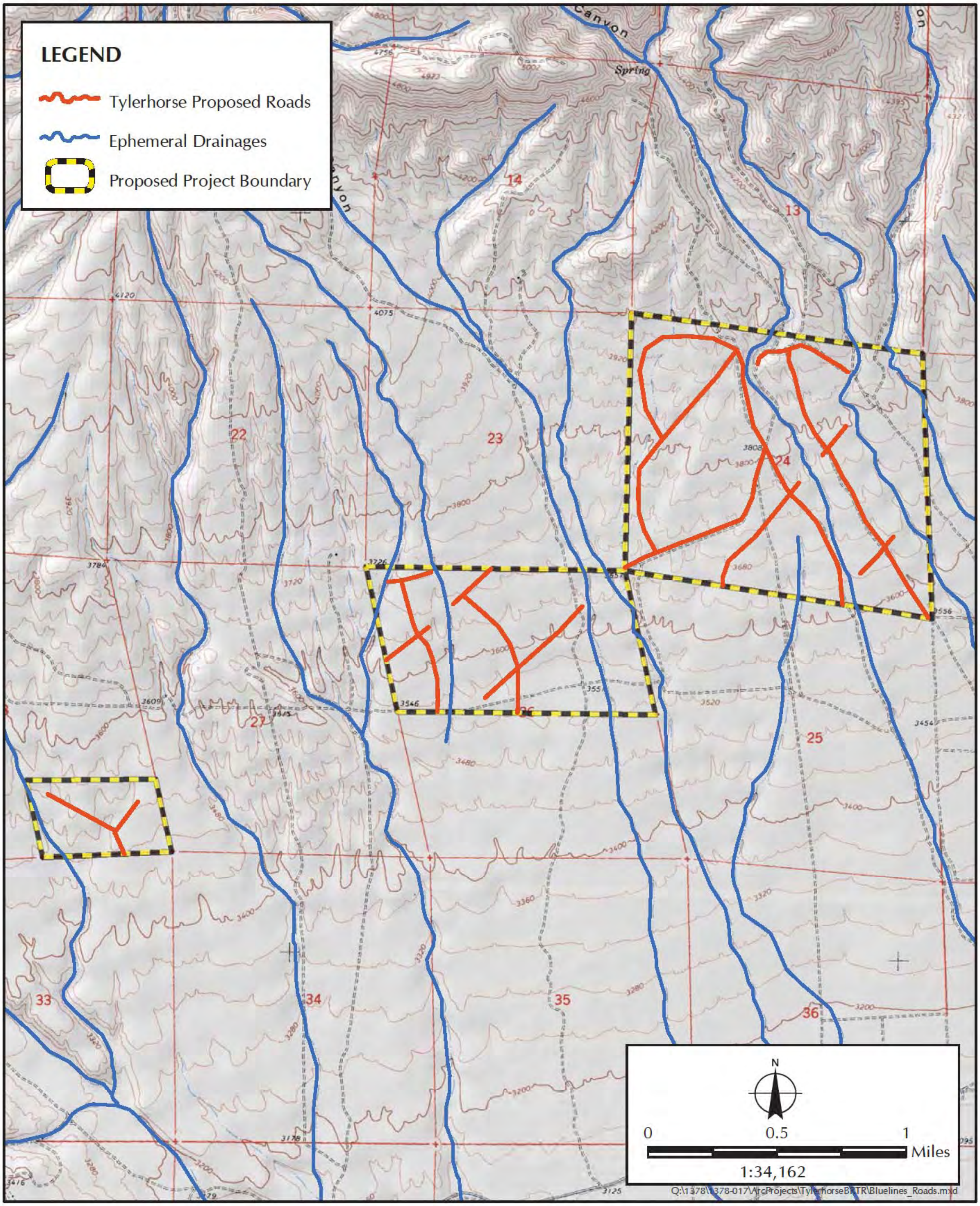

FIGURE 4.4-1

Project Access Roads in Relation to Ephemeral Drainages

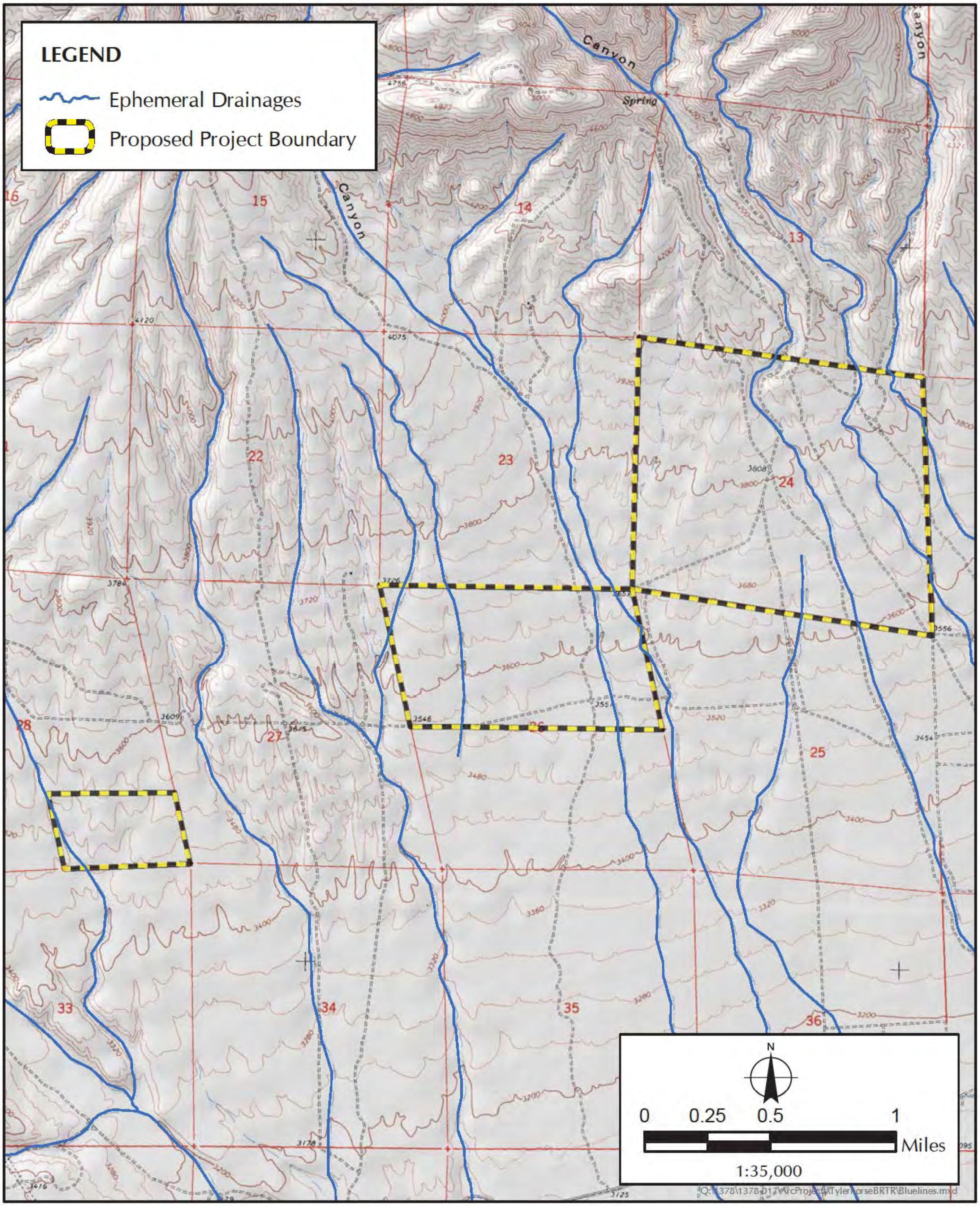

FIGURE 4.5-1
Isolated Drainage System

The evolution and terminus of each drainage was examined in addition to the potential for interstate commerce, including recreation and industry. The potential connection to a federally protected wetland was determined by mapping the terminus of drainages that crossed the property. The National Wetlands Inventory (NWI) map for the Tylerhorse Canyon 7.5 minute series topographic quadrangle was reviewed to determine if there were any potential wetlands mapped within the project property.[17]

Field surveys were conducted on June 7 and 8, 2006, to determine the presence or absence of potential waters of the United States not evident on the NWI or USGS maps. A team of two certified wetland delineators conducted the field investigations. The results of the determination of presence or absence of federally protected wetlands were documented in a letter and transmitted to the USACOE.[18]

4.6 HABITAT ASSESSMENT

The results of the plant community mapping, literature review, and consultation with responsible and trustee agencies were used to complete a preliminary habitat assessment for the project property. The habitat assessment served as the tool for identification of areas within the project property with the potential to support special-status species.

4.7 FIELD SURVEYS

In addition to the review of pertinent literature and habitat assessment, numerous field surveys were conducted to determine the location and extent of plant communities, sensitive habitats, and the potential for occurrences of sensitive plant and animal species. The preliminary habitat assessment for special-status species was ground-truthed in the field by Sapphos Environmental, Inc. on June 24, July 1, July 8, July 22, and July 29, 2004. Additional surveys were undertaken on January 28, July 12, and July 13, 2005. Field surveys for special-status species during this period were undertaken by six to eight Sapphos Environmental, Inc. biologists under the direction of Mr. Gregg Miller and Dr. Irena Mendez. Over 800 staff hours were dedicated to the undertaking of the habitat assessment and presence/absence surveys for special-status rare plant, fish, amphibian, reptile, avian, and mammal species. The project property was resurveyed on July 6, 7, and 8, 2009 to verify that no substantial changes had occurred with respect to the circumstances under which the project would be undertaken that would necessitate major revision of the conclusions of the 2004 and 2005 surveys. Surveys were conducted in suitable habitat for federally listed species, BLM sensitive plant species, BLM sensitive wildlife species, and species listed under the West Mojave Plan. All species observed during surveys were recorded and listed as an appendix to this report (Appendix A, *Floral and Faunal Compendium*).

4.7.1 Rare Plants

Special-status plant species include those listed as threatened or endangered under the federal and California Endangered Species Acts (ESAs), species proposed for listing, species of special concern, and other species identified either by the USFWS, U.S. Forest Service (USFS), BLM, CDFG, CNPS,

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[17] U.S. Fish and Wildlife Service. 21 March 2006. *National Wetlands Inventory*. Portland, OR. Available at: http://www.fws.gov/nwi/

[18] Mendez, Irena, Sapphos Environmental, Inc., Pasadena, CA. 22 June 2006. Letter to Mr. Aaron Allen, U.S. Army Corps of Engineers, Ventura, CA. Subject: Determination of Non-Jurisdiction for Proposed PdV Wind Energy Project in Southern Kern County.

or the California NPPA Section 1901 as unique or rare, and that have the potential to occur within the project area. This includes species that would meet the criteria for listing but have not yet been formally listed, such as plants included in Lists 1A, 1B, and 2 of the CNPS's Inventory.[19] Plant species on CNPS Lists 3 and 4 generally do not qualify for protection under the California ESA and NPPA.

The project is located in an area that provides potentially suitable habitat for special-status plant species. On May 4, 5, and 7, 2010, and on October 6, 8, and 25, 2010, Sapphos Environmental, Inc. biologists (Ms. Saudamini Sindhar, Ms. Debra De La Torre, and Mr. Douglas McNair) conducted focused plant surveys on 319 acres of the project property. On October 28 and 31, 2011, Sapphos Envrionmental, Inc. biologists (Mr. Ryan Villanueva, Ms. Amy Rowland, Mr. Brian Bielfelt, Ms. Mary Davis, Mrs. Meg Schapp, Ms. Debra De La Torre, Ms. Marlise Fratinardo, Dr. Elizabeth Kempton, and Ms. Charlene Wu) conducted plant surveys on 100 percent of the project property concurrently with desert tortoise surveys. Field surveys were conducted by walking parallel transects spaced 10 to 30 meters apart in 100 percent of suitable habitat within the project study area. The protocol for the sensitive plant surveys on the project study area followed CDFG's *Guidelines for Assessing the Effects of Proposed Development on Rare, Threatened, and Endangered Plants and Plant Communities*, which involves using systematic field techniques in all habitats on the study area to ensure thorough coverage of potential impact areas. These surveys were also compatible with requirements for special-status plants surveys in accordance with BLM (constituting a complete survey),[20] USFWS,[21] CDFG,[22] and CNPS guidelines. All habitats present on the study area were surveyed thoroughly in order to properly inventory and document any potential occurrences of sensitive plant species present. Special attention was given to those areas supporting habitat with high potential to support sensitive plant species such as riparian areas and areas with calcareous soils. Surveys were floristic in nature, and all plants encountered during the surveys were identified to the highest taxonomic level necessary for a rare plant determination. Nomenclature used follows *The Jepson Manual: Higher Plants of California*.[23] The team was equipped with standardized field notebooks and checklists for field annotations when applicable, in addition to an aerial photograph of the project study area at a scale of 1 inch to every 400 feet. Amphibian and reptile surveys conducted concurrently with plant surveys included visually inspecting the ground litter as well as searching under vegetation and turning over rocks, wood, and other debris.

Sapphos Environmental, Inc. will conduct additional special-status plant surveys on the project property in spring 2012 for spring- or summer-blooming species that have the potential to occur on the project property. These surveys will be conducted in compliance with BLM guidelines,[24] and survey results will be included as an addendum to the Environmental Impact Statement (EIS).

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[19] Pavlik, B., and M. Skinner. 1994. "Ecological Characteristics of California's Rare Plants." In *Inventory of Rare and Endangered Vascular Plants of California*, 5th Edition, ed. M. Skinner and B. Pavlik. Sacramento, CA: California Native Plant Society, pp. 4–6.

[20] Bureau of Land Management. 2009. *Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species*. Available at: http://www.blm.gov/ca/dir/pdfs/2009/im/CAIM2009-026ATT1.pdf

[21] U.S. Fish and Wildlife Service. 1996. *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed, and Candidate Plants*. Sacramento, CA.

[22] California Natural Resources Agency. 2009. *Protocols for Surveying and Evaluating Impacts to Special-status Native Plant Populations and Natural Communities*. Sacramento CA: California Department of Fish and Game. Available at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/Protocols_for_Surveying_and_Evaluating_Impacts.pdf

[23] Hickman, J.C., ed. 1993. *The Jepson Manual: Higher Plants of California*. Berkeley, CA: University of California Press.

[24] Bureau of Land Management. 2009. *Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species*. Available at: http://www.blm.gov/ca/dir/pdfs/2009/im/CAIM2009-026ATT1.pdf

4.7.2 Fish

Special-status fish species include those listed as threatened or endangered under the federal and California ESAs, species proposed for listing, species of special concern, and other species identified either by the USFWS, USFS, BLM, or CDFG as unique or rare, and that have the potential to occur within the project area. The project is located in an area that provides potentially suitable habitat for special-status fish species, including the Mohave tui chub (*Gila bicolor mohavensis*). However no suitable habitat for fish species occurs within the project property, and therefore the Mohave tui chub will not be discussed further.

4.7.3 Amphibians

Special-status amphibian species include those listed as threatened or endangered under the federal and California ESAs, species proposed for listing, species of special concern, and other species identified either by the USFWS, USFS, BLM, or CDFG as unique or rare, and that have the potential to occur within the project area. The project is located in an area that provides potentially suitable habitat for three special-status amphibian species: Inyo Mountains slender salamander (*Batrachoseps campi*), Tehachapi slender salamander (*Batrachoseps stebbinsi*), and yellow-blotched salamander (*Ensatina eschscholtzii croceator*).

4.7.4 Reptiles

Special-status reptile species include those listed as threatened or endangered under the federal and California ESAs, species proposed for listing, species of special concern, and other species identified either by the USFWS, USFS, BLM, or CDFG as unique or rare, and that have the potential to occur within the project area. The project is located in an area that provides potentially suitable habitat for five special-status reptile species, including desert tortoise (*Gopherus agassizii*), Panamint alligator lizard (*Elgaria panamintina*), coast (San Diego) horned lizard (*Phrynosoma coronatum blainvillii*), northern sagebrush lizard (*Sceloporus graciosus*), and Mojave fringe-toed lizard (*Uma scoparia*).

Detailed surveys for potentially occurring sensitive reptile species were conducted during the summers of 2005 and 2006 and the spring of 2010. Reptile surveys were also conducted in conjunction with the transect surveys completed for the plant community mapping and habitat assessment during summer 2004 and desert tortoise surveys during fall 2011. Wildlife biologists familiar with the habitat requirements, range, and life history of potentially occurring sensitive reptile species searched for direct visual observation and other signs of the species, including areas with high numbers of prey items, such as harvester ants and other insects or arthropods, and areas providing basking habitats.

Desert Tortoise

As a result of the plant community mapping and habitat assessment conducted for the project, it was determined that 1,100 acres of potentially suitable habitat for desert tortoise are present at the project site. A habitat assessment, conforming to the specifications of the USFWS, was undertaken by Sapphos Environmental, Inc. during the summer of 2004 and updated in the fall of 2011. The habitat assessment evaluated extant plant communities suitable to support desert tortoise. In addition to vegetation type, criteria used to evaluate habitat suitability included elevation and topography as desert tortoise are known to utilize topographical features such as flats, valleys, bajadas, and rolling hills from 2,000 to 3,300 feet above mean sea level (MSL) in elevation and have been found above 4,000 feet above MSL. Suitable desert tortoise habitat was composed of Joshua Tree Woodland, Mojave Desert Wash Scrub, Mixed Mojave Woody Scrub, and Mojavean Juniper Woodland and Scrub. Soils within the potentially suitable habitat consisted of predominately silty sand, areas of gravel and cobble, and deeply incised washes. Due to the level of grazing, presence of ravens and coyotes, off-road vehicle use, unauthorized trash disposal, residential land use, and hunting, the habitat was classified as poor to moderate.

As a result of the determination that habitat suitable to support the desert tortoise was present within the project area, protocol surveys for desert tortoise in accordance with the 2010 USFWS protocol were undertaken on 1,100 acres during the fall of 2011.[25] In accordance with protocols recommended by the USFWS, 100 percent coverage surveys were conducted with 100 percent visual coverage of suitable habitat within the project study area. Protocol-level surveys were led by Sapphos Environmental, Inc. biologists with several years of desert tortoise training and experience (Mr. Ryan Villanueva [CDFG scientific collecting permit No. 009578] and Ms. Debra De La Torre [CDFG scientific collecting permit No. 006661]). Transect spacing was 10 meters (approx. 30 feet) from the centerline of the adjacent transects, consistent with the standard for desert tortoise surveys. Tortoise sign (e.g., track, scat, active or inactive burrows, scutes, courtship rings, pallets, drinking depressions, live tortoise, and tortoise carcasses or parts thereof), if found within the project area subject to protocol surveys, were photographed and location information taken with a global positioning system (GPS) in UTM NAD 83 Zone 11 and then submitted to the USFWS Ventura office and CDFG.

4.7.5 Birds

Special-status avian species include those listed as threatened or endangered under the federal and California ESAs, species proposed for listing, species of special concern, and other species identified either by the USFWS, USFS, BLM, or CDFG as unique or rare, and that have the potential to occur within the project area. The project is located in an area that provides potentially suitable habitat for 37 special-status avian species (including several former special-status species that, since avian surveys finished in 2006, have been reclassified and dropped as species of special concern; also including several raptor species that have been dropped as species of special concern), including American white pelican (*Pelecanus erythrorhynchos*), double-crested cormorant (*Phalacrocorax auritus*), California condor (*Gymnogyps californianus*), northern harrier (*Circus cyaneus*), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*Accipiter cooperii*), Swainson's hawk (*Buteo swainsoni*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), prairie falcon (*Falco mexicanus*), Yuma clapper rail (*Rallus longirostris yumanensis*), snowy plover (*Charadrius alexandrinus*), mountain plover (*Charadrius montanus*), long-billed curlew (*Numenius americanus*), California gull (*Larus californicus*), western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), burrowing owl (*Athene cunicularia*), long-eared owl (*Asio otus*), short-eared owl (*Asio flammeus*), Vaux's swift (*Chaetura vauxi*), southwestern willow flycatcher (*Empidonax traillii extimus*), vermillion flycatcher (*Pyrocephalus rubinus*), brown-crested flycatcher (*Myiarchus tyrannulus*), loggerhead shrike (*Lanius ludovicianus*), Least Bell's vireo (*Vireo bellii pusillus*), gray vireo (*Vireo vicinior*), purple martin (*Progne subis*), bank swallow (*Riparia riparia*), Bendire's thrasher (*Toxostoma bendirei*), Le Conte's thrasher (*Toxostoma lecontei*), Virginia's warbler (*Vermivora virginiae*), yellow warbler (Dendroica petechia), yellow-breasted chat

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[25] U.S. Fish and Wildlife Service. 2010. *Preparing for Any Action That May Occur within the Range of the Mojave Desert Tortoise (*Gopherus agassizii*)*. Ventura, CA. Available at: http://www.deserttortoise.org/documents/2010DTPre-projectSurveyProtocol.pdf

(*Icteria virens*), hepatic tanager (*Piranga flava*), summer tanager (*Piranga rubra*), and tricolored blackbird (*Agelaius tricolor*). Of the 37 avian and 10 bat species, many had specific habitat requirements—riparian corridors, for example, that do not exist on the project property—and so these species are not likely to be found within the project property.

Avian field surveys for the project, including raptor surveys, were originally undertaken in conjunction with the avian surveys for the adjacent approved Manzana (formerly PdV) Wind Energy Project (Manzana Project). Three avian count stations were used for raptor migration surveys, passerine point-count surveys, and mist-netting surveys to determine baseline avian use of the area. These count stations were located on the adjacent Manzana Project, but at least two of the points' viewsheds extended over the Tylerhorse parcels and captured species using the Tylerhorse parcels (Figure 4.7.5-1, *Avian Surveys*). To update the results of these surveys, Sapphos Environmental, Inc. will conduct an additional year of bird use count surveys on the project from winter 2011 to fall 2012. These surveys will comply with the California Energy Commission's (CEC's) *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*.[26] The results of these surveys will be included as an appendix to the EIS.

Passerine Surveys

Passerine studies at the Manzana Project were conducted between August 15 and November 12, 2005 by Sapphos Environmental, Inc. and Bloom Biological, Inc., using standard point-count and mist-netting methodologies. The three point-count stations and one mist-netting station were placed along an east-west trajectory across the project study area, allowing for observations of passerines moving through different plant communities on-site. All-day unlimited distance point-count surveys for songbirds were conducted simultaneously with raptor migration surveys at the three stations. All songbirds were counted regardless of their direction of movement. During mist-netting net checks, birds were removed from the nests, identified to species, and banded.

Raptor Surveys

Raptor surveys consisted of migration counts, nest searches, and aerial aircraft surveys. Raptor migration surveys were conducted in fall 2004, during 26 days from October 3 to November 16; in spring 2005, during 30 days from February 16 to April 20; and in fall 2005, during 52 days from August 15 to November 12. Raptor presence/absence surveys were also conducted during winter 2004–2005. Counts of wintering raptors were conducted by one biologist for 6 to 8 hours per day for 30 days during six periods: November 30 to December 7, December 9 to 14, December 16 to January 2, January 6 to 14, January 16 to 31, and February 8 to 9. Raptor nest surveys were conducted during July 2 to 30, 2005, and August 7, 2005, by vehicle and on foot; on August 13, 2005, by plane. Plane surveys were conducted by a qualified raptor biologist (Mr. Peter Bloom). The search effort for raptor nests placed in natural sites (trees, Joshua trees, shrubs, or on rocky ledges of cliffs) and anthropogenic sites (steel transmission line towers or buildings) also included searches of common raven (*Corvus corax*) nests (a pest species in the western Mojave Desert without special status) because some raptors will use raven nests for their own nests.

Additional aerial surveys, focusing on golden eagles, were conducted by helicopter on May 20 to 31, 2010, February 28 to March 10, 2011, and May 25 to June 1, 2011, to determine the presence

[26] California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game. Sacramento, CA.

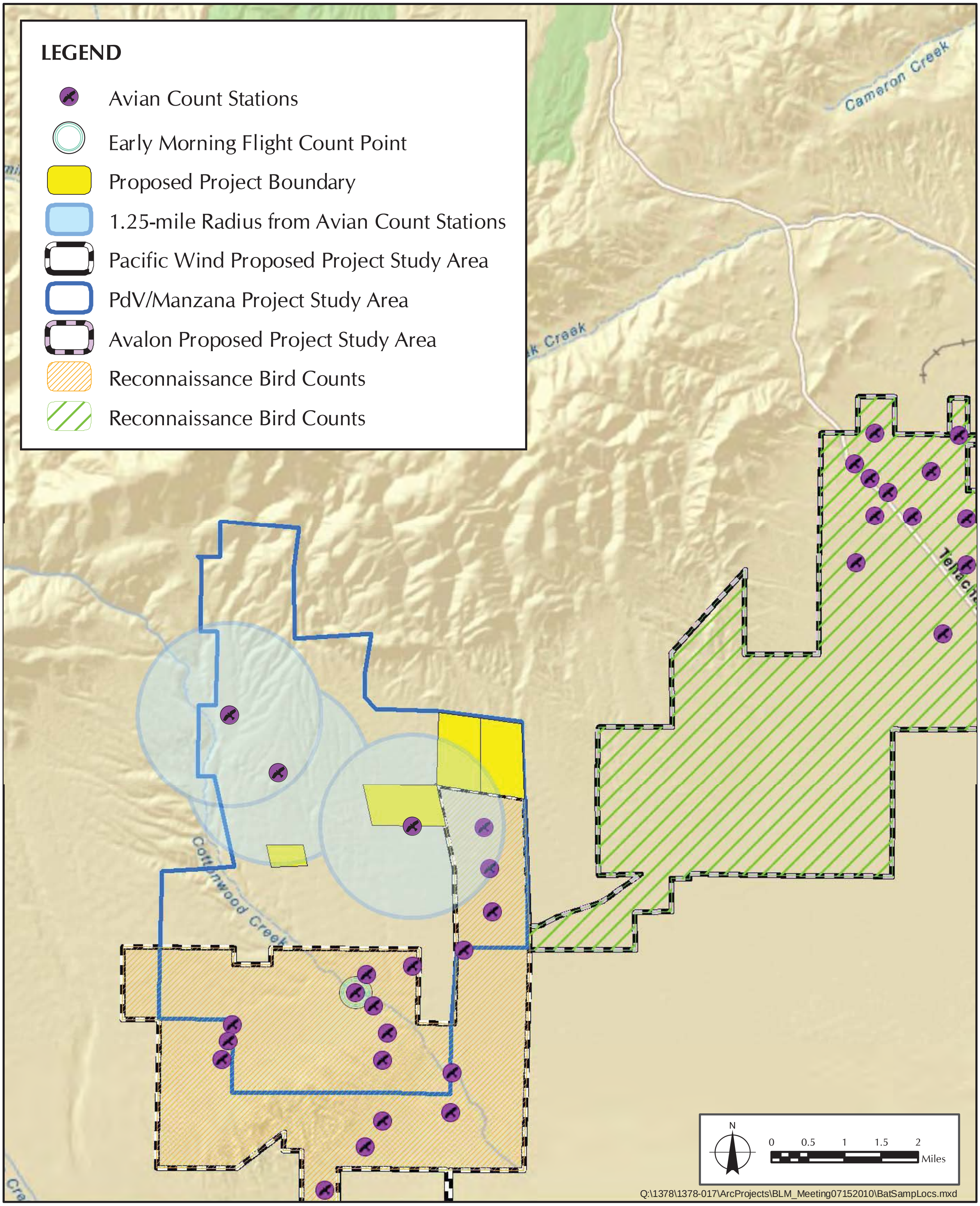

FIGURE 4.7.5-1
Avian Surveys

or absence of raptor nests. These surveys are described in more detail below in the golden eagle section.

Nocturnal Migration Surveys

Nocturnal avian migration surveys were conducted by DeTect, Inc. at the Manzana Project, whose results would apply to the Tylerhorse Wind Energy Project. These surveys used current and archived radar remote sensing data from the project vicinity as well as 10 additional regional samples to determine current and historic levels of bird activity, distribution, and seasonal variation in the vicinity of the project. Data sources include current and historic data from the National Weather Service's NEXRAD WSR-88D, a national weather radar operations system with a center at Edwards Air Force Base, and regional National Weather Service Surface Area Observations (SAO) visibility databases. Archived NEXRAD data covered the period of January 2003 through December 2005. Data from March 15 to May 15 summarized spring migration, and data from August 15 to November 1 summarized fall migration. Only data between the hours of 5:00 p.m. to 6:00 a.m. Pacific Standard Time were used for analysis.

California Condor

Surveys on the project and the surrounding adjacent renewable energy projects, including point counts, diurnal raptor surveys, and raptor nest searches (both on foot and by helicopter), were suitable for documenting California condor presence. California condors are extremely large, striking birds that are easily identifiable. Directed surveys for this species were not necessary to ascertain their presence or absence. Extensive condor telemetry data has also supported Sapphos Environmental, Inc.'s assessment.

In addition to field surveys, Sapphos Environmental, Inc. developed a model that qualitatively and quantitatively assesses the relative probability of use by California condors in areas within and adjacent to the project to ascertain the risk associated with the nearby presence of the historic California condor range.[27] All acreage within the project property constitutes potentially suitable foraging habitat for California condor, but California condors have not been observed in the vicinity of the project for many decades.[28,29]

Golden Eagle

Three replicates of aerial, helicopter surveys of all potentially suitable golden eagle habitat were conducted in 2010 and 2011 and followed the methods outlined by the USFWS *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance*.[30] The surveys were conducted in the area encompassed by the project study area and associated 10-mile (16-kilometer) buffer around

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[27] Sapphos Environmental, Inc. 2 April 2010. *Screen Check California Condor Position Paper*. Prepared for: enXco Development Corporation. Pasadena, CA.

[28] Walters, J.R., S.R. Derrickson, D.M. Fry, S.M. Haig, J.M. Marzluff, and J.M. Wunderle Jr. August 2008. *Status of the California Condor and Efforts to Achieve Its Recovery*. Prepared by: AOU Committee on Conservation, California Condor Blue Ribbon Panel, a Joint Initiative of the American Ornithologists' Union and Audubon California. Sacramento, CA.

[29] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

[30] Pagel, J.E., D.M. Whittington, and G.T Allen. 2010. *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance*. Carlsbad, CA: U.S. Fish and Wildlife Service.

the site, and other areas suitable for development of renewable energy projects (hereafter referred to as the survey area). Sapphos Environmental, Inc. (qualified raptor biologist Mr. Douglas McNair) conducted aerial surveys by helicopter from May 20 to 31, 2010, during the latter part of the breeding season in this region of California. Mr. Brad Kygar of Helinet Aviation (Van Nuys, California), an astute observer of raptors, was the pilot and second observer on these surveys. The second and third aerial survey replicates were conducted by Sapphos Environmental, Inc. biologists (qualified raptor biologists Dr. Pauline Roberts and Mr. John Ivanov) from February 28 to March 10, 2011; and from May 25 to June 1, 2011. Aircraft navigation within the survey area and maintenance of appropriate aircraft position in relation to the survey area were facilitated using a pilot-operated and monitored GPS unit and real-time GPS tracking on an onboard computer.

Complete coverage of the survey area was obtained by systematically traversing the landscape and visually scanning all areas of potential nesting and foraging habitat for golden eagles, as well as other raptor species nesting in the region. Aerial surveys were conducted using a Bell Jet-Ranger 206 helicopter, flying over relatively even terrain mainly in the Antelope Valley at approximately 200 feet above ground level (AGL) and over uneven mountainous terrain at AGL heights varying from 200 to 400 feet AGL. Each of the 10 helicopter flights lasted on average 2 hours (range: 110–140 minutes). Helicopter flights lifted off during low to moderate wind conditions of less than 22 miles per hour (mph) and were flown under generally clear skies. Each flight flew a distance of approximately 162 miles, with average speeds of approximately 80 mph, and included transmit time to each target area. However, flight speed sharply decreased to 20 to 30 mph once the target area of each flight was reached, when searching for golden eagles and their nests on cliffs, rocky outcrops, and in tall trees. When a possible nest site was located, a second flyover was made to confirm nest type and condition and to obtain accurate GPS location coordinates using the pilot's GPS unit. Multiple passes at several elevation bands were sometimes necessary to provide complete coverage when surveying potential nesting habitat on large cliff complexes, escarpments, or headwalls. The observers were alert to noting and recording the locations of perched golden eagles in trees as well as golden eagles observed in flight. The 10 helicopter flights covered an area that extended from the City of Mojave west and north to include all areas located within 10 miles of areas under consideration for potential development of renewable energy projects. Some additional montane areas beyond this 10-mile buffer were also searched, from the foothills of the Tehachapi Mountains and southern Sierras, to include foothills on both the Central Valley side and Mojave Desert side.

Individual golden eagles were identified based on plumage characteristics. Age class was estimated with the assumption that young eagles progressed through standard molt patterns divided into three age classes (Juvenile by 0–1 years of age; Subadult 1 and 2 by 2.5 years of age; Near-adult and Adult by 4.5 years of age).[31,32,33] Perched and flying golden eagle sightings were verified by flying closer to obtain a closer view of eagles. GPS locations were recorded based on where the bird was first observed by flying over identified landmarks on the ground.

[31] Clark, W.S. 2001. "Ageing Eagles at Hawk Watches: What Is Possible and What Is Not." In *Hawkwatching in the Americas*, ed. K.L. Bildstein and D. Klem Jr. North Wales, PA: Hawk Migration Association of America, pp. 143–148.

[32] Clark, W.S., and B. Wheeler. 2001. *Peterson Field Guides: Hawks of North America*. 2nd ed. New York, NY: Houghton Mifflin.

[33] Bloom, P.H., and W.S. Clark. 2001. "Molt and Sequence of Plumages of Golden Eagles, and a Technique for In-hand Ageing." *North American Bird Bander*, *26*: 97–116.

Swainson's Hawk

The directed surveys for Swainson's hawk were designed to conform to the CEC Guideline recommendations.[34] Sapphos Environmental, Inc. used three directed survey types recommended by the CEC Guidelines that are pertinent to detecting Swainson's hawk on the project study area: point counts, raptor migration counts, and raptor nest searches. These methods are described in the raptor survey section. The completion of an additional year of bird use counts on the property, beginning in December of 2011, will further clarify the Swainson's hawk use of the project property.

Burrowing Owl

Sapphos Environmental, Inc. conducted Phase I and Phase II burrowing owl surveys on the project property to assess the site for burrowing owl habitat. Habitat assessments for burrowing owl followed *California Burrowing Owl Survey Protocol and Mitigation Guidelines*.[35] Habitat assessments correspond to Phase 1 (of three) of the *Guidelines*. A site visit was conducted in 2010 by Sapphos Environmental, Inc. to identify and map the extent of various plant communities at the project property. One hundred percent of the 1,100-acre project property was considered potential burrowing owl habitat.

To make a presence or absence determination, protocol-level surveys for burrowing owl were conducted by Sapphos Environmental, Inc. in conjunction with desert tortoise protocol-level surveys, within all suitable habitat areas (approximately 1,100 acres) of the project property on October 28 and 31, 2011. Surveys were in accordance with the USFWS 100 percent coverage recommendations for desert tortoise, using 10-meter belt transects in habitats determined suitable for desert tortoise. In burrowing owl habitat that was not suitable for desert tortoise, parallel transects were spaced 30 meters apart, in accordance with Phase 2 of the *California Burrowing Owl Survey Protocol and Mitigation Guidelines*. A systematic survey of all potential burrowing owl habitat was conducted on-site to locate any burrows in suitable habitat and within 150 meters of project impact areas. Phase III burrowing owl burrow checks will be conducted in winter 2012 and summer 2012 to further clarify burrowing owl use of the property.

4.7.6 Mammals

Special-status mammal species include those listed as threatened or endangered under the federal and California ESAs, species proposed for listing, species of special concern, and other species identified either by the USFWS, USFS, BLM, or CDFG as unique or rare, and that have the potential to occur within the project area. The project is located in an area that provides potentially suitable habitat for 20 special-status mammal species. This includes 10 species of bats: pallid bat (*Antorzous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), spotted bat (*Euderma maculatum*), western red bat (*Lasiurus blossevillii*), western small-footed myotis (*Myotis ciliolabrum*), long-eared myotis (*Myotis evotis*), fringed myotis (*Myotis thysanodes*), long-legged myotis (*Myotis volans*), Yuma myotis (*Myotis yumanensis*), and western mastiff bat (*Eumops*

[34] California Energy Commission and California Department of Fish and Game. 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Commission Final Report. CEC-700-2007-008-CMF. Sacramento, CA: California Energy Commission, Renewables Committee, and Energy Facilities Siting Division, and California Department of Fish and Game, Resources Management and Policy Division. Available at: www.energy.ca.gov/renewables/06-0II-1/documents

[35] The California Burrowing Owl Consortium. April 1993. *California Burrowing Owl Survey Protocol and Mitigation Guidelines*. Available at: http://www.dfg.ca.gov/wildlife/nongame/docs/boconsortium.pdf

perotis). Ten other special-status mammals include Argus Mountains kangaroo rat (*Dipodomys panamintinus argusensis*), Mojave River vole (*Microtus californicus mohavensis*), Tulare grasshopper mouse (*Onychomys torridus tularensis*), southern grasshopper mouse (*Onychomys torridus*), Tehachapi white-eared pocket mouse (*Perognathus alticola inexpectatus*), yellow-eared pocket mouse (*Perognathus xanthonotus*), white-eared pocket mouse (*Perognathus alticola alticola*), San Joaquin pocket mouse (*Perognathus inornatus*), American badger (*Taxidea taxus*), and Nelson bighorn sheep (*Ovis canadensis nelsoni*).

Terrestrial Mammals

The mapping of potentially suitable habitat for small nocturnal mammals was determined based upon their specific habitat requirements, including the Tehachapi white-eared pocket mouse, yellow-eared pocket mouse, San Joaquin pocket mouse, and southern grasshopper mouse. On August 26, 2006, the extent of potentially suitable habitat for the Tehachapi white-eared pocket mouse was verified via a reconnaissance-level survey of the project vicinity. Criteria used for the delineation of the Tehachapi white-eared pocket mouse survey area included open areas with friable soils associated with sparse vegetative cover generally between 3,900 and 4,300 feet above MSL with the presence of small mammal sign, specifically scat, tracks, and burrows. In May 2010, the extent of potentially suitable habitat for the southern grasshopper mouse, Tehachapi white-eared pocket mouse, yellow-eared pocket mouse, and San Joaquin pocket mouse included the project property. Sapphos Environmental, Inc. (Ms. Debra De La Torre [California Scientific Collecting Permit #006661], and Mr. Douglas McNair) conducted special-status mammal species surveys in suitable habitat (Mojavean Juniper Woodland and Scrub, Joshua tree woodland, and nonnative grassland) at the project study area from May 3 to 7, 2010 for the Tulare grasshopper mouse, southern grasshopper mouse, Tehachapi white-eared pocket mouse, yellow-eared pocket mouse, white-eared pocket mouse, and San Joaquin pocket mouse. Special-status small mammal species surveys were conducted in accordance with standard survey practices and in compliance with the guidelines established by the American Society of Mammalogists, which state that "methods of live capture should not injure or cause excessive stress to the animal. Adequate measures should be taken to ensure that the animal is protected from predation and temperature extremes and has food and water available, as needed, until it is released."[36]

Two small mammal trapping locations were selected within the 1,100-acre project property. Habitat types sampled included Non-native Grassland, Joshua Tree Woodland, and Juniper Desert Scrub. Site 1 included 88 traps set in Non-native Grassland and 12 traps set in Joshua Tree Woodland. Site 2 included 100 traps set in Mojavean Juniper Woodland and Scrub. Trapping sites were located approximately 0.78 mile apart within the project study area.

Special-status small mammal surveys were conducted over a period of four consecutive nights from May 3 to 7, 2010, for a total of 800 trapping nights (total number of operational traps multiplied by the number of nights). Sampling transects consisted of 100 Sherman live traps placed 32.8 feet (10 meters) on center. Individual traps were baited with commercial bird seed, with traps opened at sunset and checked at sunrise. Data on age, sex, and species were recorded for all captured small mammals and entered into a database for further analysis.

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[36] Gannon, W.L., R.S. Sikes, and the Animal Care and Use Committee of the American Society of Mammalogists. 2007. "Guidelines of the American Society of Mammalogists for the Use of Wild Mammals in Research." *Journal of Mammalogy*, *88*: 809–823.

The habitat assessment identified marginally suitable habitat for Mojave ground squirrel (MGS) in the project property in 2005; therefore, surveys were not conducted for this species. However, detailed field surveys were conducted for this species in accordance with CDFG protocols within the adjacent Manzana and Pacific Wind Energy Projects. Visual surveys were conducted for MGS in spring 2005 and spring 2010 on the Manzana Project. A total of 12 trapping grids (3 grids in spring 2008 and 9 grids in spring 2010) to detect MGS were completed in spring 2008 and 2010 on the Pacific Wind Energy Project.

Sapphos Environmental, Inc. is currently in discussion with enXco to conduct MGS surveys in spring 2012 within appropriate habitats on the project property pursuant to CDFG guidelines.

Bats

Detailed field surveys targeting bat species were conducted in 2005 using thermal imaging cameras and Anabat acoustic bat detectors to estimate the relative abundance of bats in the broader project vicinity that was inclusive of the project property. Thermal imaging cameras were used to assess the general bat activity level at two sites with high-quality foraging habitat. Anabat acoustic bat detectors were deployed to identify bat species at four locations that had both roosting and high-quality foraging habitat. Anabat acoustic bat detectors are capable of detecting bat activity at least 30 meters away during ideal weather conditions, although the range of detection will vary depending on the frequency of the bat echolocation call. High-quality foraging habitat can be determined by the presence or close proximity to water, moderate to high insect activity, and low-density vegetation. Bats can navigate more readily in open areas and prefer habitats with water sources for drinking and also for attracting insects. Both thermal imaging and acoustic detection surveys were conducted on the evening of October 7, 2005. All sites with the potential to support bat roosts were inspected during the daytime on October 7, 2005. Additional potential bat roosting sites were assessed by surveying a pit mine, approximately 1.8 miles directly northwest of the project property.

Bat activity was resurveyed on June 8, 9, 21, and 22, 2010 using Anabat acoustic bat detectors to monitor for bat activity at several locations that had both roosting and high-quality foraging habitat. Surveys consisted of driving and walking throughout and around the project study area to identify suitable crevice-, cave-, and tree-roosting habitats. Potential sites were identified visually during the day and subsequently surveyed acoustically from dusk to evening. Both types of surveys using active sampling were conducted on the evenings of June 8, 9, 21, and 22, 2010.

In July 2010, Sapphos Environmental, Inc. analyzed bat survey data provided by the USFS from October 11, 2009 to November 19, 2010. The USFS installed four Anabat detectors on two meteorological towers within the project site to continuously record passive data. Anabat detectors were placed at 1.5 meters AGL and 45 meters AGL for each meteorological tower. Bat call files were analyzed using AnalookW, bat detection software.

5.1 EXISTING CONDITIONS

The Tylerhorse Wind Energy Project (project) property and surrounding region have a variety of physical features that offer a diversity of habitat types, represented by a characteristic assemblage of plant species. The size of the area, together with its geology, soils, climate, and anthropogenic influences, have combined to produce a mosaic of floristic components and associated wildlife species. The climate of the project area and surrounding region is characterized by dry air masses, high summer temperatures, infrequent precipitation, and an extremely high rate of evaporation. Precipitation averages approximately 5 inches annually and occurs primarily during the winter months. For most of the region, the availability of water or soil moisture is the critical factor that determines the broad distribution of vegetation types and associated wildlife species.

5.1.1 Vegetation

The project area is located within the western Mojave Desert region of the Desert Floristic Province.[1] This region mixes an array of geographic substrates, topographic features, climatic regimes, soil types, and other physical factors, which have combined to produce a mosaic of floristic components and associated natural habitats. Mojave Desert vegetation is dominated by low, widely spaced shrubs. The species composition of the Mojave Desert has common elements with the Great Basin to the north and many succulent species common to the Sonoran Desert to the south and east. The most widely distributed plant is the creosote bush (*Larrea tridentata*), which covers extensive areas in nearly pure stands, often in close association with bursage (*Ambrosia dumosa*).

The vegetation communities that occur in a given region are largely determined by prevailing environmental variation and disturbance history. Individual plant communities can generally be separated along environmental gradients.[2] Gradients in soil moisture, soil fertility, temperature, slope, and other physical parameters affect the distribution of individual species, and this in turn affects the type of plant community that develops at a given location. Since plant species generally respond individually to environmental gradients,[3] it is often difficult to differentiate recurrent and ecologically meaningful combinations of species as plant communities. Plant community classification, despite these limitations, nonetheless serves an important function in organizing vegetation data into relatively distinct units, which occur with some consistency in the landscape and are amenable to study and management.

Five plant communities are present within the project area: Mojavean Juniper Woodland and Scrub at approximately 515 acres (47 percent), Non-native Grassland at about 184 acres (36 percent), Joshua Tree Woodland at 89 acres (8 percent), Mojave Desert Wash Scrub at 36 acres (3 percent), and Mojave Mixed Woody Scrub at 252 acres (23 percent) (Table 5.1.1-1, *Plant Communities within the Project Area*; and Figure 5.1.1-1, *Plant Communities within the Project*). An additional 24 acres (2 percent) have been mapped as "Disturbed" to account for areas that have been

[1] Hickman, J.C., ed. 1993. *The Jepson Manual: Higher Plants of California*. Berkeley, CA: University of California Press.

[2] Whittaker, R.H. 1967. "Gradient Analysis of Vegetation." *Biological Reviews*, *42*: 207–264.

[3] Sawyer, J.O., and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. Sacramento, CA: California Native Plant Society.

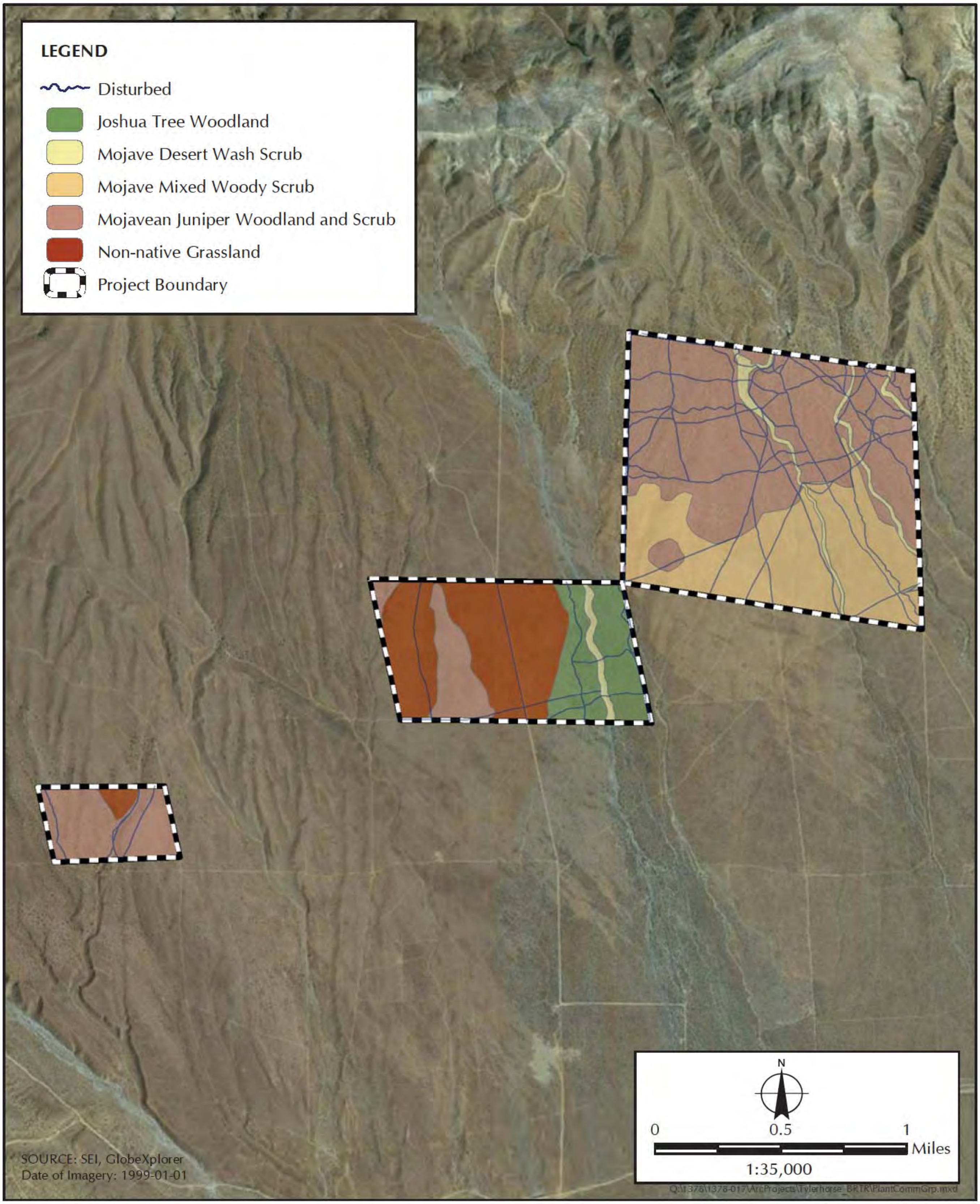

FIGURE 5.1.1-1
Plant Communities within the Project

previously impacted such that native vegetation is no longer present. The description of plant communities follows the classification system provided in *Preliminary Descriptions of the Terrestrial Natural Communities of California*[4] and cross-referenced to vegetation series described in *A Manual of California Vegetation* (2nd Edition).[5] Scientific names and common names are according to *The Jepson Manual*.[6] Common names not available from *The Jepson Manual* are taken from *A Flora of Southern California*.[7]

TABLE 5.1.1-1
PLANT COMMUNITIES WITHIN THE PROJECT AREA

Plant Community	Element Code / Type	Current Status	Total Project (acres)
Mojavean Juniper Woodland and Scrub	CTT72220CA (CNDDB) / 72220 (Holland)	G4, S4	515
Non-native Grassland	CTT42200CA (CNDDB) / 42200 (Holland)	G4, S4	184
Joshua Tree Woodland	CTT75400CA (CNDDB) / 73000 (Holland)	G3, S1.2*	89
Mojave Desert Wash Scrub	CTT63700CA (CNDDB) / 63700 (Holland)	G3, S3.2*	36
Mojave Mixed Woody Scrub	CTT34210CA (CNDDB) / 34210 (Holland)	G3, S3.2*	252
Disturbed	N/A	N/A	24
Total			**1,100**

KEY:
CNDDB = California Natural Diversity Database
Gx = Global ranks (CNDDB)
G1: Fewer than 6 viable occurrences worldwide and/or 2,000 acres
G2: 6 to 20 viable occurrences worldwide and/or 2,000–10,000 acres
G3: 21 to 100 viable occurrences worldwide and/or 10,000–50,000 acres
G4: Greater than 100 viable occurrences worldwide and/or greater than 50,000 acres
G5: Community demonstrably secure due to worldwide abundance
Sx = State ranks (CNDDB; the state rank is assigned much the same way as the global rank, except state ranks in California often also contain a threat designation. Threat designation does not constitute legal protected status.)
S1: Fewer than 6 viable occurrences statewide and/or fewer than 2,000 acres
S2: 6 to 20 viable occurrences statewide and/or 2,000–10,000 acres
S3: 21 to 100 viable occurrences statewide and/or 10,000–50,000 acres
S4: Greater than 100 viable occurrences statewide and/or greater than 50,000 acres
S5: Community demonstrably secure statewide
Threat ranks (CNDDB): x.1 = very threatened; x.2 = threatened; x.3 = no current threats known
* = Special-status plant communities following California Department of Fish and Game (CDFG) guidelines.
SOURCES:
1. California Department of Fish and Game. 2009. *Rarefind3: California Natural Diversity Database*. Sacramento, CA.
2. Holland, Robert F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Sacramento, CA: California Department of Fish and Game.

[4] Holland, Robert F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Sacramento, CA: California Department of Fish and Game.

[5] Sawyer, J.O., T. Keeler-Wolf, and J.M. Evens. 2009. *A Manual of California Vegetation*. 2nd Edition. Sacramento, CA: California Native Plant Society.

[6] Hickman, J.C., ed. 1993. *The Jepson Manual: Higher Plants of California*. Berkeley, CA: University of California Press.

[7] Munz, P. 1974. *A Flora of Southern California*. Berkeley, CA: University of California Press.

Mojavean Juniper Woodland and Scrub (Holland Element 72220)

Mojavean Juniper Woodland and Scrub is typically characterized by open woodland dominated by California juniper with an understory of diverse Mojave mixed scrub and steppe species.[8] This vegetation type typically occurs at 4,000 to 6,000 feet above mean sea level (MSL) in elevation in Southern California, where it is known from the southern Sierra Nevada and Tehachapi Mountains and the Mojave Desert. Mojavean Juniper Woodland and Scrub occupies approximately 515 acres of the project property (Table 5.1.1-1 and Figure 5.1.1-1), from approximately 3,600 to 3,960 feet above MSL. Within the project property, this plant community was generally characterized by sparse to dense California juniper stands and occasional Joshua trees. Species in the understory included typical Mojave mixed scrub and steppe species such as rubber rabbitbrush (*Chrysothamnus nauseosus*), cheesebush, desert needle grass, narrowleaf goldenbush (*Ericameria linearifolia*), ephedra, Bigelow's tickseed (*Coreopsis bigelovii*), and California buckwheat. Non-native annual grasses, including foxtail brome and cheatgrass (*Bromus tectorum*), were common throughout this vegetation type within the project property. Mojavean Juniper Woodland and Scrub corresponds in part to the California juniper series described in *A Manual of California Vegetation*.[9]

Non-native Grassland (Red Brome Alliance) (Holland Element 42200)

Non-native Grassland is characterized by sparse to dense cover of annual grasses, often on clay soils. It generally occurs below 3,000 feet above MSL in elevation but reaches 4,000 feet above MSL in elevation in the Tehachapi Mountains.[10] Non-native Grassland occupies approximately 184 acres of the project property (Table 5.1.1-1 and Figure 5.1.1-1). This vegetation type was characterized by dense to sparse cover of foxtail brome and cheatgrass, with occasional melic (*Melica* spp.), widely scattered shrubs such as rubber rabbitbrush and cheesebush, and annuals such as red-stemmed filaree (*Erodium cicutarium*) and California goldfields (*Lasthenia californica*) throughout. Non-native Grassland corresponds to the California annual grassland series described in *A Manual of California Vegetation*.[11]

Noxious Weeds

The Federal Noxious Weed Act of 1974 (7 USC 28909) established a nationwide definition of noxious weeds. The State of California designates weeds or invasive species as noxious under the California Resources Agency and Department of Food and Agriculture. Weeds that are not indigenous to the state and likely to be detrimental, destructive, and difficult to control or eradicate may be listed as noxious weeds by the state. Noxious weeds can outcompete native vegetation in areas of disturbance and can spread quickly in a short time span.

Nine species of noxious and/or invasive non-native plant species were observed during surveys conducted for the adjacent, approved Manzana (formerly PdV) Wind Energy Project (Manzana

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[8] Holland, Robert F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Sacramento, CA: California Department of Fish and Game.

[9] Sawyer, J.O., Keeler-Wolf, T.,and J.M. Evens. 2009. *A Manual of California Vegetation, Second Edition*. Sacramento, CA: California Native Plant Society.

[10] Holland, Robert F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Sacramento, CA: California Department of Fish and Game.

[11] Sawyer, J.O., Keeler-Wolf, T.,and J.M. Evens. 2009. *A Manual of California Vegetation, Second Edition*. Sacramento, CA: California Native Plant Society.

Project) area in May and June 2006. Noxious and/or invasive plants included tumble mustard (*Sisymbrium altissimum*), slender-keel fruit (*Tropidocarpum gracile*), lamb's quarters (*Chenopodium album*), red-stemmed filaree (*Erodium cicutarium*), horehound (*Marrubium vulgare*), ripgut brome (*Bromus diandrus*), foxtail brome *(Bromus madritensis*), chea tgrass *(Bromus tectorum*), and Chilean chess (*Bromus trinii*). Among these species, only tumble mustard is designated as noxious under California statutes.

Joshua Tree Woodland (Holland Element 73000)

The Joshua Tree Woodland plant community typically contains Joshua trees as the only arborescent species, with a diverse shrub layer. It occurs on sandy, loamy, or gravelly alluvial slopes.[12] Joshua Tree Woodland generally occurs at an elevation between 2,500 and 5,000 feet (762 to 1,524 meters) above MSL and is recorded from the Mojave Desert and the desert slopes of the Tehachapi, Sierra Nevada, and Transverse mountain ranges of California.[13] The Joshua Tree Woodland plant community is a state-designated sensitive plant community.

Joshua Tree Woodland occupies approximately 89 acres of the project property (Table 5.1.1-1 and Figure 5.1.1-1). Within the project property, Joshua Tree Woodland occurs within alluvial terraces and bajadas and is characterized by regular to dense stands of Joshua trees reaching between 10 and 25 feet in height. Understory species in this plant community include nonnative annual species, creosote bush, California buckwheat, boxthorn, desert needle grass, cholla (*Opuntia* sp.), California ephedra, and Nevada ephedra. Joshua Tree Woodland corresponds to the Joshua Tree Woodland series described in *A Manual of California Vegetation*.[14]

Within the project study area, Joshua Tree Woodland intergrades with Mojave Desert Wash Scrub, Mojavean Juniper Woodland and Scrub, and Non-native Grassland communities.

Mojave Desert Wash Scrub (Holland Element 63700)

Mojave Desert Wash Scrub is characterized by a diversity of desert shrub species in sandy arroyos and washes throughout the Mojave Desert, with typical species that include catclaw acacia (*Acacia greggii*), desert willow (*Chilopsis linearia*), and ephedra (*Ephedra californica*) among others.[15] Mojave Desert Wash Scrub occupies approximately 36 acres of the project property (Table 5.1.1-1 and Figure 5.1.1-1). Within the project property, Mojave Desert Wash Scrub occurred in dry washes and was characterized by stands of scalebroom (*Lepidospartum squarrosum*), mulefat (*Baccharis salicifolia*), rabbitbrush (*Chrysothamnus* spp.), and several species of ephedra. Mojave Desert Wash Scrub within the project area corresponds in part to the scalebroom series and mulefat series described in *A Manual of California Vegetation*.[16]

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[12] Holland, Robert F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Sacramento, CA: California Department of Fish and Game.

[13] Davis, F.W., D.M. Stoms, A.D. Hollander, K.A. Thomas, P.A. Stine, D. Odion, M.I. Borchert, J.H. Thorne, M.V. Gray, R.E. Walker, K. Warner, and J. Graae. 1998. *The California Gap Analysis Project–Final Report*. Santa Barbara, CA: University of California, Santa Barbara. Available at: http://www.biogeog.ucsb.edu/projects/gap/gap_rep.html

[14] Sawyer, J.O., Keeler-Wolf, T.,and J.M. Evens. 2009. *A Manual of California Vegetation, Second Edition*. Sacramento, CA: California Native Plant Society.

[15] Holland, Robert F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Sacramento, CA: California Department of Fish and Game.

[16] Sawyer, J.O., Keeler-Wolf, T.,and J.M. Evens. 2009. *A Manual of California Vegetation, Second Edition*. Sacramento, CA: California Native Plant Society.

Mojave Mixed Woody Scrub (Holland Element 34210)

The Mojave Mixed Woody Scrub is a diverse, open scrub community typically characterized by California buckwheat and Joshua tree on shallow soils with low water-holding capacity.[17] This type of vegetation typically occurs at an elevation between 2,000 and 5,000 feet (610 to 1,524 meters) above MSL and is known from the eastern base of the Sierra Nevada Mountains and the Tehachapi, San Gabriel, San Bernardino, and San Jacinto Mountain ranges.[18]

Mojave Mixed Woody Scrub occupies approximately 252 acres of the project property (see Table 5.1.2-1 and Figure 5.1.1-1). Within the project property, this vegetation type is characterized by a shrub layer containing narrowleaf goldenbush (*Ericameria linearifolia*), California buckwheat, yellow rabbitbrush (*Chrysothamnus viscidiflorus*), cheesebush, Cooper's boxthorn, winterfat (*Krascheninnikovia lanata*), Nevada ephedra, California ephedra, and several species of annual buckwheat (*Eriogonum* spp.). Openings among the shrubs are dominated by non-native species that include cheatgrass and filaree along with native forbs including fiddleneck, California goldfields (*Lasthenia californica*), and *Phacelia* spp. with occasional clumps of desert needlegrass. Widely scattered Joshua trees with a 5 to 15 percent cover are present throughout this plant community. Mojave Mixed Woody Scrub corresponds in part to the Bladderpod–California Ephedra–Narrowleaf Goldenbush Scrub series described in *A Manual of California Vegetation*.[19]

Within the project property, this vegetation type intergrades with Mojavean Juniper Woodland and Scrub, Joshua Tree Woodland, and Mojave Desert Wash Scrub.

Disturbed

Disturbed is a mapping unit utilized in this analysis to account for areas of that are marked with previous disturbance or development and no longer support native vegetation. Disturbed areas comprise approximately 24 acres of the project area. Disturbed areas within the site consisted of roads, trails, or other areas that have experienced disturbance (e.g., developed areas, campsites, unauthorized dumping areas). Most vegetation present consists of non-native grasses or ruderal plants. The areas marked as disturbed are largely devoid of native vegetation, or may not support native vegetation without restoration.

5.1.2 Areas Subject to Section 1600 of the State Fish and Game Code

The project was designed to avoid all drainages and will not impact any areas potentially subject to the jurisdiction of the California Department of Fish and Game (CDFG) and therefore would not require a Streambed Alteration Agreement pursuant to Section 1600 of the State Fish and Game Code prior to implementation of the project.

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[17] Holland, Robert F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Sacramento, CA: California Department of Fish and Game.

[18] Davis, F. W., D. M. Stoms, A. D. Hollander, K. A. Thomas, P. A. Stine, D. Odion, M. I. Borchert, J. H. Thorne, M. V. Gray, R. E. Walker, K. Warner, and J. Graae. 1998. *The California Gap Analysis Project–Final Report*. University of California, Santa Barbara, CA. Available at: http://www.biogeog.ucsb.edu/projects/gap/gap_rep.html

[19] Sawyer, J.O., and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. Sacramento, CA: California Native Plant Society.

5.2 FEDERAL WATERS OF THE UNITED STATES

The U.S. Army Corps of Engineers (USACOE) concurs with the project applicant's determination that development of the project would not affect any area protected pursuant to Section 404 of the Clean Water Act.[20] As a result of the analysis of topographic maps, National Wetlands Inventory (NWI) map, aerial photographs, and field investigation of on-site and upstream and downstream resources, 4.6 miles of drainages mapped by the USGS were determined to be nonnavigable, isolated, and intrastate drainages (see Figure 4.5-1, *Isolated Drainage System*). Three named drainages that cross the project property, Gamble Springs Canyon, Burham Canyon, and Tylerhorse Canyon, were identified, as well as six additional unnamed drainages that cross the project property. All of the drainages that cross the project property are nonnavigable and isolated drainages that do not connect to any navigable waterway subject to the jurisdiction of USACOE pursuant to Section 404 of the Clean Water Act. As a result of field investigations, it was determined that no other activity that may be considered interstate commerce, including recreational use, industrial use, or fishing or harvest of shellfish for sale, occurs within the project boundary or on any of the drainages or dry washes upstream or downstream of the project. The determination of nonjurisdiction is consistent with the January 9, 2001 *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers*, No. 99-1178 decision by the U.S. Supreme Court. Further investigation is unnecessary.

There were no NWI wetlands identified within the project property. The nearest wetland identified from the NWI is located approximately 1.3 miles to the northwest of the project property. The project was designed to avoid all mapped NWI wetlands.

5.3 WILDLIFE

Wildlife Habitats

Most wildlife species within the region are adapted to extreme drought conditions, including sparse vegetative cover and limited sources of permanent water. However, seeps and springs provide perennial sources of water and a high concentration of vegetation and cover that contribute to increased wildlife diversity in these areas. Large mammals, such as pronghorn antelope (*Antilocapra americana*), coyote (*Canis latrans*), and desert kit fox (*Vulpes macrotis*), use these water sources and return to them regularly. Bats typically forage over these areas because of increased abundance of invertebrate prey. More common bird species may nest and forage in these areas year-round, while migratory bird species may forage and rest in these areas during their migration. No seeps, springs, or other permanent sources of water are present on the project property.

A number of unnamed ephemeral washes and drainages occur throughout the project area. These areas generally contain a diversity of desert shrub species, have more structured and complex vegetative assemblages, and possess higher wildlife diversity than the surrounding nonnative grassland areas. Washes function as movement corridors for mammals and serve as congregation and feeding areas for a variety of bird species.

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[20] U.S. Army Corps of Engineers. 10 July 2006. Letter from Antal Szijj, Acting Chief of the North Coast Section, Regulatory Branch, U.S. Army Corps of Engineers, to Dr. Irena Mendez, Sapphos Environmental, Inc. Subject: Letter No. 2006-01345-AOA dated June 22, 2006, regarding permit to construct a wind energy project.

As the project property is located at the transition between the Tehachapi Mountains and the western Mojave Desert, a broad diversity of wildlife is expected to occur on-site. The following sections present a sampling of some of the common wildlife species observed during surveys.

Wildlife Species

Amphibians

A number of amphibians occur in the western Mojave. For the most part, these are restricted to areas around ephemeral or permanent water sources. The only amphibians identified as potentially occurring in the project area include the California toad (*Bufo boreas halophilus*), Pacific chorus frog (*hyla regilla*), and bullfrog (*Rana catesbiana*). No amphibians were observed in the project area, as there are no permanent sources of water to provide suitable habitat.

Reptiles

Reptiles are especially adapted to drought conditions and extreme temperatures and are therefore well represented in the project area and surrounding region. Some of the more common species observed in the project area include the side-blotched lizard (*Uta stansburiana*), western whiptail (*Cnemidophorus tigris*), western sagebrush lizard (*Sceloporus graciosus gracilis*), desert iguana (*Dipsosaurus dorsalis*), long-nosed leopard lizard (*Gambelia wislizenii*), desert spiny lizard (*Sceloporus magister*), and western skink (*Eumeces skiltonianus*).

Species of snakes that may be encountered in the area include the coachwhip (*Masticophis flagellum*), California whipsnake (*M. lateralis*), western long-nosed snake (*Rhinocheilus lecontei*), gopher snake (*Pituophis melanoleucus*), glossy snake (*Arizona elegans*), king snake (*Lampropeltis getulus*), night snake (*Hypsiglena torquata*), lyre snake (*Trimorphodon biscutatus*), sidewinder (*Crotalus cerastes*), Mojave rattlesnake (*C. scutulatus*), and western rattlesnake (*C. viridis*).

Avian Species

Survey protocols used to determine bird presence and use of the area were similar to those used at other wind energy development projects in the region. A total of 59 species have been observed in the adjacent Manzana Project area either as residents or as migrants/transients. The lack of available water or areas of dense brush or trees within the project area precludes many of the bird species that otherwise occur in this region, from breeding and nesting in this area. Most bird species that occur in the project area and surrounding region are associated with the Mojavean Juniper Woodland and Scrub vegetation community. Some of the common resident species identified include common raven (*Corvus corax*), horned lark (*Eremophila alpestris*), western meadowlark (*Sturnella neglecta*), barn swallow (*Hirundo rustica*), house finch (*Carpodacus mexicanus*), dark-eyed junco (*Junco hyemalis*), California quail (*Callipepla californica*), and loggerhead shrike (*Lanius ludovicianus*).

Other bird species occur as spring and fall migrants or winter residents. Some common species include the mountain bluebird (*Sialis currucoides*), yellow-rumped warbler (*Dendroica coronata*), and white-crowned sparrow (*Zonotrichia leucophrys*).

Raptors are not plentiful in the region, yet suitable foraging habitat for raptor species occurs throughout the project property. Common raptor species that were observed during surveys include red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), and turkey vulture (*Aura cathartes*).

Migration Routes

The project area and surrounding region can broadly be defined as occurring within the Pacific Flyway, a major bird migration route. From north to south, this flyway comprises the western Arctic, including Alaska and the Aleutian Islands; the Rocky Mountain and Pacific Coast regions of Canada, the United States, and Mexico; and finally south in Central and South America, where it becomes blended with other flyways. This broad flyway covers coastline, mountains, and rivers that provide food supplies and a visual "map" for the birds to follow. Birds migrating from the Alaskan Peninsula follow the coastline to near the mouth of the Columbia River, then travel inland to continue southward through interior California. Birds migrating south from central Canada pass through portions of Montana and Idaho and then migrate either eastward to enter the Central Flyway or turn southwest along the Snake and Columbia River valleys and then continue south across central Oregon and the interior valleys of California. The central Canada to California route is not as heavily used as some of the other migratory routes in North America.

Although the project property is located east of the main migration corridor, a number of migratory bird species pass through the project area during the spring or fall migration, or during other seasonal movements. Based on the species and species density data collected during field surveys, the area does not appear to be within a major migratory pathway. There are no distinct topographic or landscape features that would funnel or concentrate migrating birds through the project area. Furthermore, the project area does not appear to provide important stopover habitat for migrating birds, especially those dependent on open water and forested environments as stopover habitat. The studies do show there is an increase in seasonal use by passerines and other typical migrants as would be expected for this area, but overall use appears to be low in relation to major migratory corridors within the Pacific Flyway.

General Bird Use

Of the 59 avian species observed during point-count surveys at three stations, 25 species and 13,980 individuals (56.8 percent of total) were residents, 22 species and 5,368 individuals (21.8 percent of total) were temperate migrants, and 12 species and 5,283 individuals (21.4 percent of total) were neotropical migrants. The most abundant 14 species (having 100 observations or more) represented 91 percent of all observations, whereas the 5 most abundant species (with 1,000 observations or more) represented 78 percent of all observations. The five most abundant species included three residents (common raven [*Corvus corax*], horned lark [*Eremophila alpestris*], and western meadowlark [*Sturnella neglecta*]), one temperate migrant (mountain bluebird [*Sialis currucoides*]), and one neotropical migrant (barn swallow [*Hirundo rustica*]).

Raptors

Raptors observed in the adjacent Manzana Project area include northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsoni*), American kestrel (*Falco sparverius*), burrowing owl (*Speotyto cunicularia*), barn owl (*Tyto alba*), great horned owl (*Bubo virginianus*), prairie falcon (*Falco mexicanus*), peregrine falcon *(Falco peregrinus*), and golden eagle (*Aquila chrysaetos*). The most common raptors were the red-tailed hawk and American kestrel. Only a single peregrine falcon was observed during surveys, but several golden eagles were noted foraging within the project property, where they can be characterized as having regular though infrequent occurrences. The peregrine falcon is generally uncommon given the relatively low number of observations over several years of directed surveys undertaken for the project.

Many migrating raptors follow distinct routes during fall and spring migrations. These routes, which vary among species, are largely defined by topography and water barriers, and are also influenced by ecological and meteorological factors.[21] Because the project area lacks the topographical and water barriers described above, it is not expected to support high concentrations of migrating raptors. Data collected in the project area appears to support this conclusion.

Mammals

Most desert mammals are nocturnal, but occasionally a few may be seen during the day. Several carnivores occupy various habitats that occur in or near the project area. Those that may be observed within the project area and surrounding region include the bobcat (*Lynx rufus*), coyote (*Canis latrans*), kit fox (*Vulpes macrotis*), and American badger (*Taxidea taxus*).

Typical small mammal species that occur within the region include the black-tailed jackrabbit (*Lepus californicus*), desert cottontail rabbit (*Sylvilagus audobonii*), desert wood rat (*Neotoma lepida*), white-tailed antelope squirrel (*Ammospermophilus leucurus*), round-tailed ground squirrel (*Citellus tereticaudus*), pocket gopher (*Thomomys bottae*), kangaroo rat (*Dipodomys* sp.), various cricetid mice (*Onychomys* sp., *Reithrodontomys megalotis*, *Peromyscus* sp.), and pocket mice (*Pergonathus* sp.).

Two ungulate species, mule deer (*Odocoileus hemionus*) and pronghorn antelope (*Antelocapra americana*), that are managed as game species by the CDFG occupy the region adjacent to the project area. Since 1982, the CDFG has translocated pronghorns captured in northeastern California to Kern, San Luis Obispo, and San Benito Counties, where small populations have become established. Pronghorns in the Antelope Valley are apparently found in small groups in grassland, riparian, and alkali desert scrub habitats.

Bats

As a result of the habitat assessment performed for the broader project vicinity, it was determined that habitats potentially suitable to support resident and migratory special-status bat species were present within the project property. In reference to the Memorandum for Record 22, six bat species were identified to be present in the vicinity of the study area based on bat surveys conducted by the U.S. Forest Service (USFS) from October 11, 2009 to October 21, 2010. These six species include three resident species, the western mastiff bat (*Eumops perotis*), pallid bat (*Antrozous pallidus*), and western pipistrelle (*Parastrellus hesperus*); and three migratory species including the hoary bat (*Lasiurus cinereus*), Mexican free-tailed bat (*Tadarida brasiliensis*), and big brown bat (*Eptesicus fuscus*). Six additional species were identified to be potentially present in the vicinity of the study area. Four of these bat species are resident species, including the Yuma myotis (*Myotis yumanensis*), California myotis (*Myotis californicus*), western small-footed myotis (*Myotis ciliolabrum*), and silver-haired bat (*Lasionycteris noctivagans*). The remaining two species are migratory bats and include the little brown bat (*Myotis lucifugus*) and long-legged myotis (*Myotis volans*).

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[21] Goodrich, L.J., and J.P. Smith. 2008. "Raptor Migration in North America." In *State of North America's Birds of Prey*, ed. K.L. Bildstein, J.P. Smith, E. Ruelas Inzunza, and R.R. Veit. Cambridge, MA: Nuttall Ornithological Club; and Washington, DC: The American Ornithologists' Union, pp. 37–150.

[22] Sapphos Environmental. July 2011. Memorandum for the Record 22: 2010 Annual Bat Survey Results from Meteorological Tower No. 30 for the Proposed Tylerhorse Wind Energy Project, Kern County, California. Prepared for: enXco Development Corporation. Pasadena, CA.

A search of the California Natural Diversity Database (CNDDB) conducted in July 2011 revealed no records for any of the 6 present bat species or the 6 potentially present bat species in the project property or surrounding quadrangles. However, 9 out of the 12 bat species were found to occur in Kern County. No roosts for any of these bat species were identified in the project property, though it was determined that trees and rock crevices within the project property may provide suitable roosting habitat for resident and migratory sensitive bat species. Additionally, it was determined that habitat potentially suitable to support foraging for migratory bats during the spring and fall migration is also present.

5.4 SPECIAL-STATUS PLANT SPECIES

Special-status species include those species listed as threatened or endangered under the federal ESA of 1973, as amended; species proposed for listing; species of concern; and other species identified either by the U.S. Fish and Wildlife Service (USFWS), Bureau of Land Management (BLM), or CDFG as unique or rare, and that have the potential to occur within the project area.

The federal Endangered Species Act (ESA) requires that all federal agencies undertake programs for the conservation of endangered and threatened species and prohibits federal agencies from authorizing, funding, or carrying out any action that would jeopardize a listed species or destroy or modify its critical habitat. A species may be classified as "endangered" when it is in danger of extinction within the foreseeable future throughout all or a significant portion of its range. A "threatened" designation is provided to those animals and plants likely to become endangered within the foreseeable future throughout all or a significant portion of their ranges. Federally designated critical habitat is defined as the geographic area containing the physical or biological features essential to the conservation of a listed species or as an area that may require special management considerations or protection.

BLM sensitive species are those species that are not already included as BLM special-status species under (1) federally listed, proposed, or candidate species; or (2) State of California protected species. The BLM sensitive species designation is normally used for species that occur on BLM-administered lands, where BLM is able to significantly affect the conservation status of the species through management.

The State of California provides protection to a number of sensitive species under state statutes and regulations, which are administered by the CDFG. The California ESA prohibits the take of listed species except as otherwise provided in state law. Unlike the federal ESA, the California ESA applies the take prohibitions to species petitioned for listing (state candidates).

As a result of a literature review and database search, it was determined that 13 plant species were warranted for consideration to be present at the project property (Table 5.4-1, *Special-status Plant Species with the Potential to Occur within the Vicinity of the Project Property*). No special-status plant species were found within the project area.

TABLE 5.4-1
SPECIAL-STATUS PLANT SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE VICINITY OF THE PROJECT AREA

Species	Status: Federal/State/ BLM/ CNPS/ WeMo	Habitat and Phenology	Potential to Occur within the Study Area	Directed Surveys
Darwin rock-cress (*Arabis pulchra* var. *munciensis*)	—/—/ BLM/ CNPS 1B.1/ –	Chenopod and Mojavean scrub, in carbonate soil; at elevations of 1,100–2,075 meters above MSL; perennial herb in the Brassicaceae that blooms in April	Low: Habitat not present.	No. Targeted for spring 2012.
	—/—/ BLM/ CNPS 1B.1/ —	Alkali regions at lake beds margins, meadows and seeps, and playas; at elevations 60–850 meters above MSL; annual herb in the Fabaceae family that blooms from May to October.	Low: Habitat not present.	Yes.
	—/—/ BLM/ CNPS 1B.1/ —	Cismontane woodland, valley and foothill grassland; at elevations 15–1,200 above MSL; annual herb in the Geraniaceae family that blooms from March to May	Low: Habitat not present.	No. Targeted for spring 2012.
	—/—/ —/ CNPS 1B.2/ —	Chaparral, lower montane coniferous forest, meadows and seeps; in mesic areas; at elevations 1,000–2,390 meters above MSL; bulbiferous herb in the Liliaceae family that blooms from April to July	Low: Habitat not present.	No. Targeted for spring 2012.
Clokey's cryptantha (*Cryptantha clokeyi*)	—/—/ BLM, CNPS 1B.2/ —	Mojavean desert scrub; at elevations 2,620–4,200 feet (800–1,280 m) above MSL; annual herb in the Boraginaceae family that blooms in April.	High: Habitat (Mojavean Desert Scrub) present.	No. Targeted for spring 2012.
	—/SR/ BLM/ CNPS 1B.2/ —	Chaparral and cismontane woodlands; at elevations of 315–1,125 meters above MSL; annual herb in the Polemoniaceae family that blooms from June to July	Low: Habitat not present.	No. Targeted for summer 2012.

TABLE 5.4-1
SPECIAL-STATUS PLANT SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE VICINITY OF THE PROJECT AREA, *Continued*

Species	Status: Federal/State/ BLM/ CNPS/ WeMo	Habitat and Phenology	Potential to Occur within the Study Area	Directed Surveys
	—/—/ BLM/ CNPS 1B.1/ —	Coastal salt marshes and swamps, playas, and vernal pools; at elevations 1–120 meters above MSL; annual herb in the Asteraceae family that blooms from February to June	Low: Habitat not present.	No. Targeted for spring 2012.
	—/—/ BLM/ CNPS 1B.1/ —	Cismontane woodland, coastal scrub, pinyon and juniper woodland, valley and foothill grasslands; in alkaline or clay or clay substrates; at elevations 300–1,705 meters above MSL; annual herb in the Asteraceae family that blooms from March to June	Low: Habitat not present.	No. Targeted for spring 2012.
	—/—/ —/ CNPS 1B.2/ —	Cismontane woodland, lower montane coniferous forest; at elevations 300–1,300 meters above MSL; annual herb in the Polemoniaceae family that blooms from April to May	Low: Habitat not present.	No. Targeted for spring 2012.
	—/—/ BLM/ CNPS 1B.2/ —	Broadleafed upland forest, cismontane woodland, on granitic and disturbed substrates; at elevations 100–1,300 meters above MSL; annual herb in the Phymaceae family that blooms from March to May	Low: Habitat not present.	No. Targeted for spring 2012.
	—/—/ BLM/ CNPS 1B.3/ —	Lower montane coniferous forest, pinyon and juniper woodland, upper montane coniferous forest; at elevations from 900–2,470 meters above MSL; rhizomatous herb in the Lamiaceae family that blooms from June through August	Low: Habitat not present.	No. Targeted for summer 2012.
	—/—/ —/ CNPS 1B.2/ —	Openings within chaparral, lower montane coniferous forest, meadows and seeps, mesic areas within pinyon and juniper woodland; at elevations 1,500–2,300 meters above MSL; annual herb in the Polemoniaceae family that blooms from June to August	Low: Habitat not present.	No. Targeted for summer 2012.

TABLE 5.4-1
SPECIAL-STATUS PLANT SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE VICINITY OF THE PROJECT AREA, *Continued*

Species	Status: Federal/State/ BLM/ CNPS/ WeMo	Habitat and Phenology	Potential to Occur within the Study Area	Directed Surveys
	FE/SE/ BLM/ CNPS 1B.1/ --	Chenopod scrub, cismontane woodland,or valley and foothill grassland on sandy or gravelly substrates; at elevations 120–1,140 meters above MSL; perennial stem succulent that blooms April through May.	Low: Habitat not present.	Yes.

KEY:
BLM = sensitive species under BLM
SE = state endangered
SR = state rare
ST = state threatened
WeMo = West Mojave Plan
CNPS = California Native Plant Society
List 1B: Rare, threatened, or endangered in California and elsewhere
0.1: Seriously endangered in California
0.2: Fairly endangered in California
0.3: Not very endangered in California
List 2: Rare, threatened, or endangered in California, but more common elsewhere
0.2: Fairly endangered in California
List 3: Review list, more information required
List 4: Limited distribution (Watch List)
0.1: Seriously endangered in California
0.2: Fairly endangered in California
0.3: Not very endangered in California
MSL = mean sea level

5.5 SPECIAL-STATUS WILDLIFE

As a result of literature review and field surveys conducted for the adjacent Manzana Project study area and current project area, a total of 29 special-status wildlife species were identified as having the potential to occur within the project property, including 4 species of herpetofauna, 17 avian species, 4 terrestrial mammal species, and 4 bat species. No fish species were observed in the project property during the habitat assessment. Of these 29 special-status species, 5 are state- and/or federally listed. As discussed below, protocol-level surveys for the desert tortoise on the project property and protocol-level surveys for Mohave ground squirrel on the adjacent Manzana Project study area have led to the determination that they are absent from the current project property. Table 5.5-1, *Special-status Wildlife with the Potential to Occur at the Project Property*, provides a comprehensive list of special-status species potentially occurring in the project property, their habitat requirements, and the likelihood of their occurrence in the project property based on habitat and field surveys. The following sections provide a general discussion of these species.

TABLE 5.5-1
SPECIAL-STATUS WILDLIFE WITH THE POTENTIAL TO OCCUR AT THE PROJECT PROPERTY

Species	Status Federal/ State/BLM/ WeMo	Habitat	Potential Occurrence on the Project Property
Amphibians			
Tehachapi slender salamander (*Batrachoseps stebbinsi*)		Uncommon in suitable habitat in a small number of isolated localities in the Piute and Tehachapi Mountains of Kern County and perhaps in Los Angeles and Ventura Counties. Elevation 2,500 to 5,000 feet above mean sea level (MSL). Preferred habitats include valley foothill hardwood-conifer and valley foothill riparian.	Low potential. No known occurrences of this species within the USGS 7.5-minute Tylerhorse Canyon topographic quadrangle where the project is located. The nearest known CNDDB occurrence of this species is approximately 7.5 miles to the northwest. The site lacks suitable habitat.
Yellow-blotched salamander (*Ensatina eschscholtzii croceator*)		Occurs in forests and well-shaded canyons, as well as oak woodlands and chaparral. Needs surface objects, such as logs, boards, rocks, old rodent burrows, or other underground retreat.	Low potential. No known occurrences of this species within the USGS 7.5-minute Tylerhorse Canyon topographic quadrangle where the project is located. The nearest known CNDDB occurrence is approximately 8.5 miles north. Not identified during detailed surveys at 32 sites within the adjacent Manzana Wind Energy Project property and downstream locations. Not present. Potentially suitable habitat where moist soils are found near NWI-mapped wetlands and other drainages.
Reptiles			
Desert tortoise (*Gopherus agassizii*)		Main habitats include desert scrub, desert wash, desert alluvial fans, and Joshua tree, but the desert tortoise is also found in other desert habitats.	Moderate potential. Nearest known CNDDB occurrence of the desert tortoise approximately 7 miles to the east. An inactive burrow was located 6 miles east and live tortoise observations were made approximately 5 miles east. No desert tortoise identified during protocol surveys on the project. Suitable desert scrub and desert wash habitat present.

TABLE 5.5-1
SPECIAL-STATUS WILDLIFE WITH THE POTENTIAL TO OCCUR AT THE PROJECT PROPERTY, *Continued*

Species	Status Federal/ State/BLM/ WeMo	Habitat	Potential Occurrence on the Project Property
Coast horned lizard (*Phrynosoma coronatum blainvillii*)		Found in a variety of vegetation types, including coastal scrub, coastal bluff scrub, valley and foothill grassland, chaparral, cismontane woodland, pinon and juniper woodlands, riparian scrub, riparian woodland and desert wash. In inland areas, this species is restricted to areas with pockets of open microhabitat, created by disturbance.	Moderate potential. Present in the northwest corner of the Manzana Wind Energy Project property. Nearest CNDDB occurrence is approximately 10 miles north. Suitable desert wash, juniper woodland and grassland habitat present.
Birds			
American white pelican (*Pelecanus erythrorhynchos*)	--/CSC/--/ WeMo	Sandy coastal beaches and lagoons, waterfronts and pilings, and rocky cliffs.	Present. Observed migrating through the project property in large numbers.
California condor (*Gymnogyps californianus*)	FE/SE,CFP/ --/--	Lives in rocky scrubland, coniferous forests, and oak savannas. They are often found near cliffs or large trees, which they use as nesting sites. Individual birds have a large home range and have been known to travel up to 150 miles in search of carrion.	Low potential. No known occurrences of this species within the project property or the immediate surrounding region. Project property lies outside of historic range. Nearest known occurrence of this species is approximately 3.9 miles to the west.
White-tailed kite (*Elanus leucurus*)	--/CFP/--/--	Low foothills or valley areas with valley or live oaks, riparian areas, and marshes near open grasslands for foraging.	Present. One individual was observed flying through the project property. No nesting available, but may be present during migration.
Northern harrier (*Circus cyaneus*)	--/CSC/--/ WeMo	Grasslands, meadows, marshes, and seasonal and agricultural wetlands.	Present. No known nesting, but common during winter and during migration.
Sharp-shinned hawk (*Accipiter striatus*)	--/WL/--/ WeMo	Nests in riparian growths of deciduous trees and live oaks. Preys mostly on small passerine birds.	Present. Not known to breed in Southern California. Common migrant. No nests observed during surveys.
Cooper's hawk (*Accipiter cooperii*)	--/WL/--/ WeMo	Nests in a wide variety of habitat types, from riparian woodlands and digger pine-oak woodlands through mixed conifer forests.	Present. Potential breeding species, but not currently known to nest on-site. Common local resident and migrant in the Antelope Valley.

TABLE 5.5-1
SPECIAL-STATUS WILDLIFE WITH THE POTENTIAL TO OCCUR AT THE PROJECT PROPERTY, *Continued*

Species	Status Federal/ State/BLM/ WeMo	Habitat	Potential Occurrence on the Project Property
Northern goshawk (*Accipiter gentilis*)	--/CSC/S/--	Found in coniferous and deciduous forests; during the cold winter months migrates to warmer areas, usually at lower elevations.	Present, but extremely rare. A single adult was observed flying north on spring migration. Very uncommon south of the southern Sierra Nevada Mountains.
Swainson's hawk (*Buteo swainsoni*)	--/ST/--/ WeMo	Nests in oaks or cottonwoods, often in or near riparian habitats. Forages for small mammals, birds, and reptiles in grasslands, irrigated pastures, and grain fields.	Present. No nesting population, but were observed using the project property during migration.
Ferruginous hawk (*Buteo regalis*)	--/WL/--/ WeMo	Breeds outside of Southern California. Forages in open grasslands.	Present. Not known to nest in project property, but common as a winter resident.
Golden eagle (*Aquila chrysaetos*)	--/CFP/--/--	Nests in canyons and large trees in open habitats. Forages chiefly for mammalian prey in grasslands and over open areas.	Present. No nesting population, but were observed using the project property during migration. Nearest known nest is 14–15 miles west of the project property.
Merlin (*Falco columbarius*)	--/WL/--/--	Breeds outside California; inhabits coastlines, open grasslands, savannahs, and woodlands.	Present. Not known to nest, but expected in low numbers during migration.
American peregrine falcon (*Falco peregrinus anatum*)	--/CFP/--/--	An aerial forager that preys almost chiefly on birds; prefers open areas, habitats along rivers, sea cliffs, and islands.	Present. No nesting population, but one individual was observed nearby during migration. Summer residents are known nearby.
Prairie falcon (*Falco mexicanus*)	--/WL/--/--	Primarily inhabits perennial grasslands, savannahs, and rangeland. Nests on cliffs, canyons, and rock outcrops.	Present. No known nests on-site, but ranges from an infrequent or common year-round resident and migrant.
Burrowing owl (*Athene cunicularia*)		Level, open, dry, heavily grazed, or low-stature grassland or desert vegetation with burrows excavated by badgers, prairie dogs, or ground squirrels. Preys on small mammals and insects.	Present. Burrowing owls and burrows observed during October 2011 Phase II protocol surveys on project property.

TABLE 5.5-1
SPECIAL-STATUS WILDLIFE WITH THE POTENTIAL TO OCCUR AT THE PROJECT PROPERTY, *Continued*

Species	Status Federal/ State/BLM/ WeMo	Habitat	Potential Occurrence on the Project Property
Vaux's swift (*Chaetura vauxi*)	--/CSC/--/ WeMo	Feeds aerially on small insects; breeds in forest habitats.project	Present. Observed during directed songbird surveys. Project is not within breeding range. Expected to be seen only during migration.
Loggerhead shrike (*Lanius ludovicianus*)	--/CSC/--/ WeMo	Nests in shrublands and forages in open grasslands. Often found associated with agriculture and urbanized areas. All plant community types in the project property provide suitable habitat.	Present as a year-round resident at the project property. Approximately 10–15 breeding pairs were observed.
Le Conte's thrasher (*Toxostoma lecontei*)	--/CSC/--/ WeMo	Resides in desert scrub habitats, primarily open desert wash, alkali desert scrub, and desert succulent scrub. Occupies deserts with sparse vegetation consisting of cholla and creosote bush. Suitable habitat in the project property includes Mojave Desert Wash Scrub, Mojave Creosote Bush Scrub, Mojavean Juniper Woodland and Scrub, Joshua Tree Woodland, and Mojave Mixed Woody Scrub plant communities.	Present as a year-round resident at the project property.
Mammals			
Mohave ground squirrel (*Xerospermophi-lus mohavensis*)	-- /ST/BLM/We Mo	Inhabits open desert scrub, alkali desert scrub, and Joshua Tree Woodland. Restricted to Mohave Desert.	Not observed during detailed surveys of the adjacent Manzana Project area. Not present.
American badger (*Taxidea taxus*)		Lives in open, generally flat grasslands, shrublands, and forblands, often in association with ground squirrel colonies, and preys mainly on mammals. Generally occurs in fairly low density, and often excavate new burrows for short-duration stays. All of the plant communities in the project property provide potentially suitable habitat.	Identified during surveys within Creosote Bush Scrub plant community in the southern portion of the Manzana Project property. One observed during surveys.
San Joaquin pocket mouse (*Perognathus inornatus*)	--	Consumes grass and forbs seeds as well as soft-bodied insects including cutworms and grasshoppers. Lives in arid habitats but requires no open water sources. The species forages under and within shrubs and crosses open areas. Desert Native Grassland and Mojave Mixed Woody Scrub provide potentially suitable habitat in the project property.	Occurs in approximately 10-acre area of the project property, in Desert Native Grassland and Mojave Mixed Wood Scrub plant communities.

TABLE 5.5-1
SPECIAL-STATUS WILDLIFE WITH THE POTENTIAL TO OCCUR AT THE PROJECT PROPERTY, *Continued*

Species	Status Federal/ State/BLM/ WeMo	Habitat	Potential Occurrence on the Project Property
Southern grasshopper mouse (*Onychomys torridus*)		Consumes soft-bodied insects including cutworms and grasshoppers. Lives in arid habitats but requires no open water sources. The species forages under and within shrubs and crosses open areas. Desert Native Grassland and Mojave Mixed Woody Scrub provide potentially suitable habitat in the project property.	Occurs in approximately 10-acre area of the project property, in Desert Native Grassland and Mojave Mixed Wood Scrub plant communities.
Pallid bat (*Antrozous pallidus*)	--	Occurs throughout the American West. Roosts in rock crevices, caves, mineshafts, under bridges, in buildings, and within hollow trees. Consumes crickets, scorpions, beetles, grasshoppers, and other invertebrates. Roosts in small colonies of 10 to 100 and emerges late at night to forage on the ground. Forms nursery colonies, and gives birth usually in June.	Acoustic detection. No roosts found, but may migrate through and forage on suitable habitat in the project property.
Western Small-footed myotis (*Myotis ciliolabrum*)		Found in deserts and desert mountains in the western U.S. Occupies daytime roosts in cracks in canyon walls, caves, mines, in tree bark, or in abandoned houses. It hibernates in caves or mine tunnels within the summer range, and is active during winter. Food habits are not known. It may feed over water and close to the ground over desert scrub or chaparral. Reproduction is not known. Formerly regarded as a subspecies of *Myotis leibii*. Recent work has shown that *M. ciliolabrum* should be elevated to specific status. Trees and rock crevices in the project property could provide suitable roosting habitat.	No records in the USGS 7.5-minute Tylerhorse Canyon topographic quadrangle or the eight surrounding quadrangles for this species. No roosts found, but may migrate through and forage on suitable habitat in the project property.
Western mastiff bat (*Eumops perotis*)		In the Southwest U.S., generally away from human developments. Takes diurnal refuge in vertical rock crevices on cliffs. Roost entrances are large and horizontally oriented, and face downward as they are entered from below, where there is an unobstructed drop of several meters. Colonies from two to several dozen bats. Leaves day roosts late in the evening to forage on moths, crickets, and grasshoppers. Not believed to use night roosts. Normally one young, probably in June to early July, within nursery colonies.	Acoustic detection. No roosts found, but may migrate through and forage on suitable habitat in the project property.

TABLE 5.5-1
SPECIAL-STATUS WILDLIFE WITH THE POTENTIAL TO OCCUR AT THE PROJECT PROPERTY, *Continued*

Species	Status Federal/ State/BLM/ WeMo	Habitat	Potential Occurrence on the Project Property
Yuma myotis (*Myotis yumanensis*)	--/--/BLM/--	Common in western U.S., generally prefers open forests and woodlands with sources of water. Feeds on small flying insects and forages over water sources. Roosts in buildings, mines, caves, crevices, and separate night roosts may be used. Roost location and foraging proximity is closely tied to bodies of water.	No records in the USGS 7.5-minute Tylerhorse Canyon topographic quadrangle or the eight surrounding quadrangles for this species. No roosts found, but may migrate through and forage on suitable habitat in the project property.

KEY:
MSL = mean sea level
CNDDB = California Natural Diversity Database
BCC = U.S. Fish and Wildlife Service (USFWS) bird of conservation concern
BLM = Sensitive species under Bureau of Land Management.
CSC = California Department of Fish and Game (CDFG) species of special concern
CFP = CDFG fully protected species
FC = Listed as a candidate as endangered under the federal Endangered Species Act (ESA)
FE = Listed as endangered under the federal ESA
FT = Listed as threatened under the federal ESA
Mojave = Listed under the Mojave Plan
SE = Listed as endangered by the State of California
ST = Listed as threatened by the State of California.
USGS = United States Geological Survey
WeMo = Species considered in the West Mojave Plan

5.5.1 Amphibians

Two special-status amphibian species were identified as potentially occurring in the project property. These special-status species are the Tehachapi slender salamander (a state-threatened species and a BLM sensitive species) and the yellow-blotched salamander (a state species of special concern and a BLM sensitive species). Detailed surveys were conducted for these two species in suitable habitat within the adjacent Manzana Project study area, and neither species was observed during the detailed surveys. Therefore, based on the results of detailed surveys, as well as literature review, agency coordination, and consultation with experts, it has been determined these two special-status amphibian species are unlikely to occur on the project property, and the project, therefore, has a low potential to impact these species.

5.5.2 Reptiles

Two special-status reptile species were identified as potentially occurring in the project property. These special-status species are the desert tortoise (a federally and state-listed threatened species) and the coast horned lizard (a state species of special concern and a BLM sensitive species).

Desert Tortoise

A habitat assessment identified suitable habitat for desert tortoise in the project property, and the project property lies within the known range of desert tortoise; therefore, surveys were conducted for this species. No desert tortoise or diagnostic signs indicative of desert tortoise presence (e.g., track, scat, active or inactive burrows, scutes, courtship rings, pallets, drinking depressions, live tortoises, and tortoise carcasses or parts thereof) were observed during protocol-level surveys in October 2011.

A number of adjacent projects have also been the subject of protocol-level surveys for desert tortoise. These surveys included approximately 555 and 1,934 acres of potentially suitable habitat in the adjacent, approved Manzana Project in 2005 and 2010, respectively; 10,090 acres and 9,387 acres of potentially suitable habitat in the adjacent, approved Pacific Wind Energy Project in 2008 and 2010, respectively; and 6,183 acres, 342 acres (Zone-of-Influence), and 5,180 acres of potentially suitable habitat in the adjacent, approved Catalina Renewable Energy Project in 2009, 2010, and 2011, respectively. Results of the survey effort indicated that there were no desert tortoise or their sign (i.e., burrows and excrement) observed in either the Manzana or Pacific Wind Energy Projects. However, desert tortoise sign was located while conducting desert tortoise and other biological surveys on the Catalina Renewable Energy Project east of the current project study area. One inactive desert tortoise burrow is located approximately 4 miles to the east, and two separate live tortoise sightings are located approximately 5 miles to the east (Figure 5.5.2-1, *Results of Desert Tortoise Surveys at Adjacent Renewable Energy Projects*). Therefore, while no desert tortoises were identified on the current study area or in the adjacent, approved Manzana or Pacific Wind study areas, there is a low potential for tortoises to move into the area. The current project is located near the western boundary of the desert tortoise range, and it is likely that if desert tortoises are present, they are present at low densities.

Coast Horned Lizard

Suitable habitat for the coast horned lizard exists in the Mojavean Juniper Woodland and Scrub and Non-native Grassland vegetation communities within the project study area. The species has been determined to be present in the adjacent approved Manzana Project study area as a result of literature review, agency coordination, consultation with experts, and detailed field surveys. Field surveys of the adjacent approved Manzana Project study area revealed that the species is present in an approximately 1,000-acre area in the northwest corner of the Manzana Project study area, at an elevation greater than 4,400 feet above MSL. Therefore, this sensitive species has the potential to be present in the project property.

5.5.3 Avian Species

Seventeen special-status avian species, consisting of eight resident sensitive avian species and nine migratory sensitive avian species, were identified as potentially occurring in the adjacent Manzana Project study area, which is considered representative of the project property. Surveys for avian species included directed presence/absence surveys and counts of winter raptors, spring and fall migration surveys, raptor nest surveys, and songbird surveys.[23]

[23] Sapphos Environmental, Inc. 2006. *PdV Wind Energy Project Biological Resources Technical Report*. Pasadena, CA.

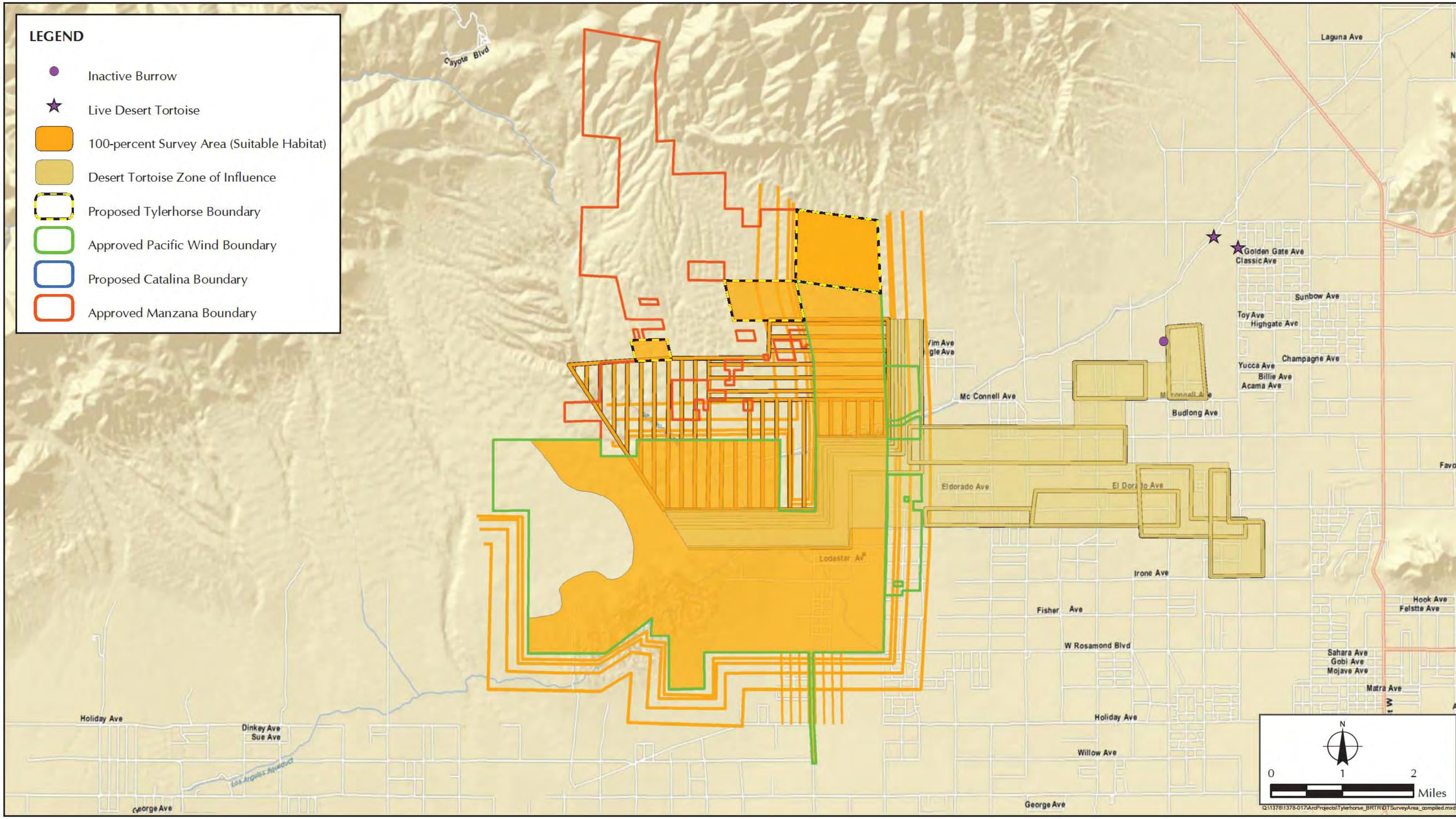

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FIGURE 5.5.2-1

Results of Desert Tortoise Surveys at Adjacent Renewable Energy Projects

Resident Sensitive Birds

Golden Eagle

The golden eagle is a federal bird of conservation concern, state fully protected species, and BLM sensitive species. The habitat assessment conducted for the project property determined that all of the plant communities in the project property provide suitable resting and foraging habitat. During detailed field surveys conducted for the adjacent Manzana Project study area, no nests were identified within the project property. However, resident golden eagles from nearby areas were observed foraging in the project property throughout the year and were observed in the project area during spring and fall migration. Migrants in fall were generally observed flying above 1,000 feet, whereas the more numerous resident birds frequently foraged lower over Joshua Tree Woodland and other habitats in the project property. Additionally, data records from the CNDDB and West Mojave Plan indicate that golden eagles were observed approximately 20.5 miles southwest and 16.5 miles northeast of the project property, respectively. It is expected that golden eagles will be present within the project property where they are anticipated to be an uncommon year-round, nonbreeding visitor or nonbreeding resident.

A nesting golden eagle pair was observed by Bloom Biological, Inc. during directed surveys for raptor nests for the adjacent Manzana Project study area in July and August 2004, approximately 4.3 miles west of the northwestern corner of the project property.[24] However, the exact location of this nest was not disclosed, and thus the validity of this information could not be confirmed. Subsequent aerial surveys conducted for nesting golden eagles in May 2010 by Sapphos Environmental, Inc. within a large geographic area that included the entire area surveyed by Bloom Biological, Inc. failed to detect the presence of the golden eagle nest that was reportedly observed by Bloom Biological, Inc.

Three replicates of aerial surveys were conducted in 2010 and 2011 to identify and map nesting sites for golden eagles and other raptors within 10 miles (16 kilometers) of the project. No golden eagle nests were documented within 10 miles of the project; the closest active golden eagle nest was 15 miles west of the project boundary (Figure 5.5.3-1, *Golden Eagle Observations and Nest Sites in Relation to Project*).

California Condor

The California condor is a federal and state endangered species and a state fully protected species. Currently, California condors (*Gymnogyps californianus*) have not been known to occur within the project property. However, the historic range of the California condor is located approximately 2.2 miles to the northwest of the project property. In Kern County, California, condors forage extensively in the foothills adjacent to the northern boundary of the Los Padres National Forest, to Reyes Station in the west, to the Pleito Hills west of Interstate 5, and eastward throughout much of the region from the Tehachapi Mountains (including Tejon Ranch) north to the slopes of Cummings Mountain; this region is fairly close to traditional nesting sites.[25] Another important foraging area in Kern County was the foothill rangelands around Glennville, where condors foraged daily in the Cedar Creek and upper Pozo Creek drainages as far west as Blue Mountain and the old Granite

[24] Sapphos Environmental, Inc. 23 January 2006. Memorandum for the Record No. 7. Subject: Results of 2004 Raptor Nest Surveys for Proposed PdV Wind Energy Project Site, Kern County, California. Pasadena, CA.

[25] Studer, C.D. 1983. Effects of Kern County Cattle Ranching on California Condor Habitat. Master's thesis, Michigan State University, East Lansing, MI.

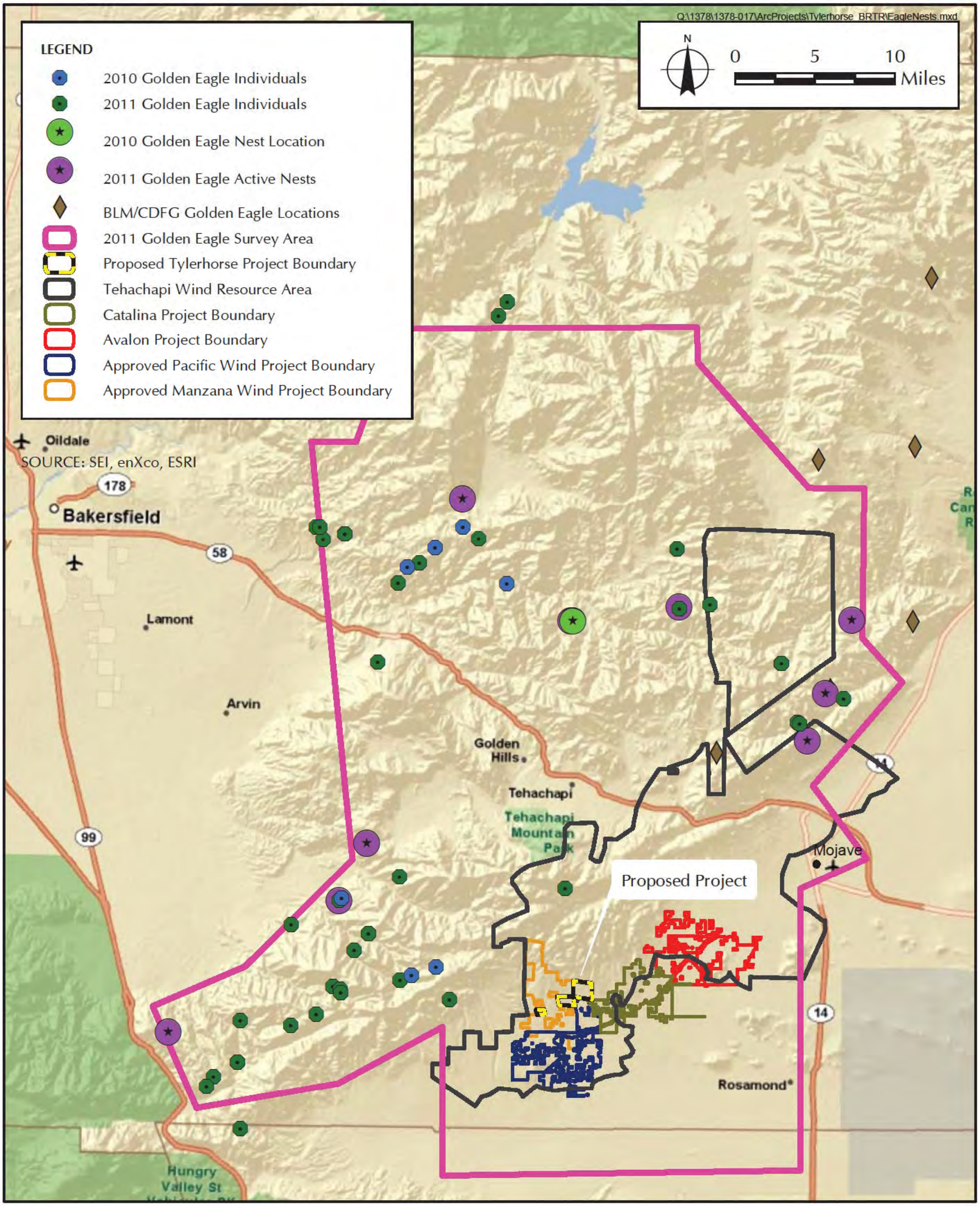

FIGURE 5.5.3-1

Golden Eagle Observations and Nest Sites in Relation to Project

Station crossroads south of Woody. Condors roosted primarily on Sequoia National Forest lands in the Greenhorn Mountains.[26]

There are no known nesting sites within the study area or the Tejon Ranch Critical Habitat Unit (CHU). All recent California condor nest sites in Southern California are located on public lands within the Los Padres, Angeles, and Sequoia National Forests. No cliffs or large trees of the size required by California condors occur in the project area or within the Tejon Ranch CHU.

Daily foraging flights of California condors may occur over vast areas encompassing hundreds of miles of travel.[27] Condors are highly gregarious at feeding sites and somewhat social during foraging flights. Daily foraging flights of California condors typically range from 31 to 44 miles from an active nest or roost site; the longest recorded flight has been 141 miles.[28] However, compared with critical habitat functions and values associated with nesting and roosting, foraging, particularly with today's captive released population, is much more subject to management through the provision of clean food sources (carcasses) in suitable locations. Condors have repeatedly demonstrated that they will locate and utilize carcasses provided throughout their historical range, including the Tejon Ranch critical habitat area. In fact, based on the analysis conducted on condors fitted with global positioning system (GPS) transmitters from 2008 to 2010, condors generally only used those areas within the Tejon Ranch critical habitat boundary that historically contained, and currently contain, animal carcasses, and supplemental feeding areas.

The currently defined range in California includes some areas of Southern and central California, where they are primarily restricted to chaparral, coniferous forest, and savanna habitats.[29] The preponderance of sighting and tracking data in the Tehachapi Mountains and southern Sierras of Kern County since 1992 are concentrated west and north of the Garlock Fault. Newly released birds venturing into the Tejon Ranch region and the Tehachapi Mountains are concentrated within their historical range, particularly into areas west and north of the Garlock Fault. Released condors in Southern California have largely confined their movements within 30 to 37 miles from the Sespe Condor Sanctuary in Ventura County.[30]

However, a small proportion (estimated at less than 3 percent) of sighting and tracking data occurs east and south of the Garlock Fault, but within the physiographic province of cismontane California in the Tehachapi Mountains, which coincides with the historical range of the California condor. None of the captive released birds have established populations in the Blue Ridge condor area, Kern County rangelands, and Tulare County rangelands.[31] In addition, few observations of California condors have occurred east and south of the Garlock Fault at the eastern end of the Tehachapi Mountains, within the Wind Resource Area (WRA), the Town of Tehachapi, or the Tehachapi Pass, which is also confirmed by the absence of sightings by annual bird counts from

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[26] U.S. Fish and Wildlife Service. 1996. *California Condor Recovery Plan*. 3rd Revision. Portland, OR.

[27] Meretsky, V.J., and N.F.R. Snyder. 1992. "Range Use and Movements of California Condors." *Condor*, *94*: 313–335.

[28] U.S. Fish and Wildlife Service. 1996. *California Condor Recovery Plan*. 3rd Revision. Portland, OR.

[29] U.S. Fish and Wildlife Service. 1996. *California Condor Recovery Plan*. 3rd Revision. Portland, OR.

[30] Grantham, J. 2007. "Reintroduction of California Condors into their Historical Range: The Recovery Program in California." In *California Condors in the 21st Century*, ed. A. Mee and L.S. Hall. Cambridge, MA: Nuttall Ornithological Club; and Washington, DC: The American Ornithologists' Union.

[31] Walters, J.R., S.R. Derrickson, D.M. Fry, S.M. Haig, J.M. Marzluff, and J.M. Wunderle Jr. August 2008. *Status of the California Condor and Efforts to Achieve Its Recovery*. Prepared by: AOU Committee on Conservation, California Condor Blue Ribbon Panel, a Joint Initiative of the American Ornithologists' Union and Audubon California.

this region.[32] No condor sightings have occurred southeast of this area within or adjacent to the project area. The nearest recorded observation of a California condor is that of a GPS-transmittered bird in summer 2010 located approximately 3.9 miles to the west of the project property (Figure 5.5.3-2, *USFWS California Condor Southern Flock Data*).

Cooper's Hawk

The Cooper's hawk is a State Watch List species and is also considered in the West Mojave Plan. This species normally nests in forested habitats and may occur as a resident or migrant in the vicinity of the Antelope Valley. During field surveys, Cooper's hawk was observed overwintering within shrub habitats within the adjacent Manzana Project, but no nests were identified. This species was observed in surveys for resident raptors during the winter and in migratory spring and fall surveys. Many individuals were reported to have moved in a southerly direction at low altitudes (i.e., less than 400 feet) through canyon bottoms, dry washes, and Joshua tree habitat. The peak of migration during surveys conducted in fall 2005 was late September, when as many as four to six birds were observed moving through the area. Although seen consistently during spring, winter, and fall raptor surveys, overall use of the area by Cooper's hawks was low. Though they were observed flying within the rotor-swept range of the wind turbines (150–500 feet), the majority of observations were below 60 feet above ground level (AGL).

Prairie Falcon

The prairie falcon is a State Watch List species. Prairie falcons are a desert and grassland species that nest in cliffs and prey mainly on birds and squirrels. This species is commonly observed foraging in the Antelope Valley throughout the year and is present during spring and fall migration throughout the Antelope Valley. No nests were identified during field surveys conducted for the adjacent Manzana or Pacific Wind Energy Projects. The prairie falcon was observed foraging within most habitats during both the winter raptor surveys and the spring and fall migratory surveys at the Manzana Project. It was estimated that at least four individuals, floaters and migrants, reside on or near the Manzana Project; most observations were of individuals perched on cliffs. In contrast, only one prairie falcon was observed in the Pacific Wind Energy Project during a year of avian surveys. The individual was observed in summer 2008 flying approximately 150 feet AGL.

Burrowing Owl

The burrowing owl is a California species of special concern, a BLM sensitive species, and is considered in the West Mojave Plan. The burrowing owl is a grassland- and desert-inhabiting species that nests underground, usually in ground squirrel burrows. This species nests in small numbers in the Antelope Valley.

Burrowing owls were observed overwintering within grassland and open shrub habitats in the adjacent Manzana Project, but no nests were found. An abandoned burrowing owl (with whitewash, but no owl) was observed during desert tortoise protocol surveys in spring 2005.

Four burrowing owls and three of their burrows were observed while conducting fall 2011 burrowing owl and desert tortoise surveys on the project property (Figure 5.5.3-3, *Burrowing Owl Observations and Burrows in Relation to Project*). All three of the burrows were actively used by burrowing owls and contained either owls or their sign (scat, pellets, molting, etc.). Additional

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[32] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

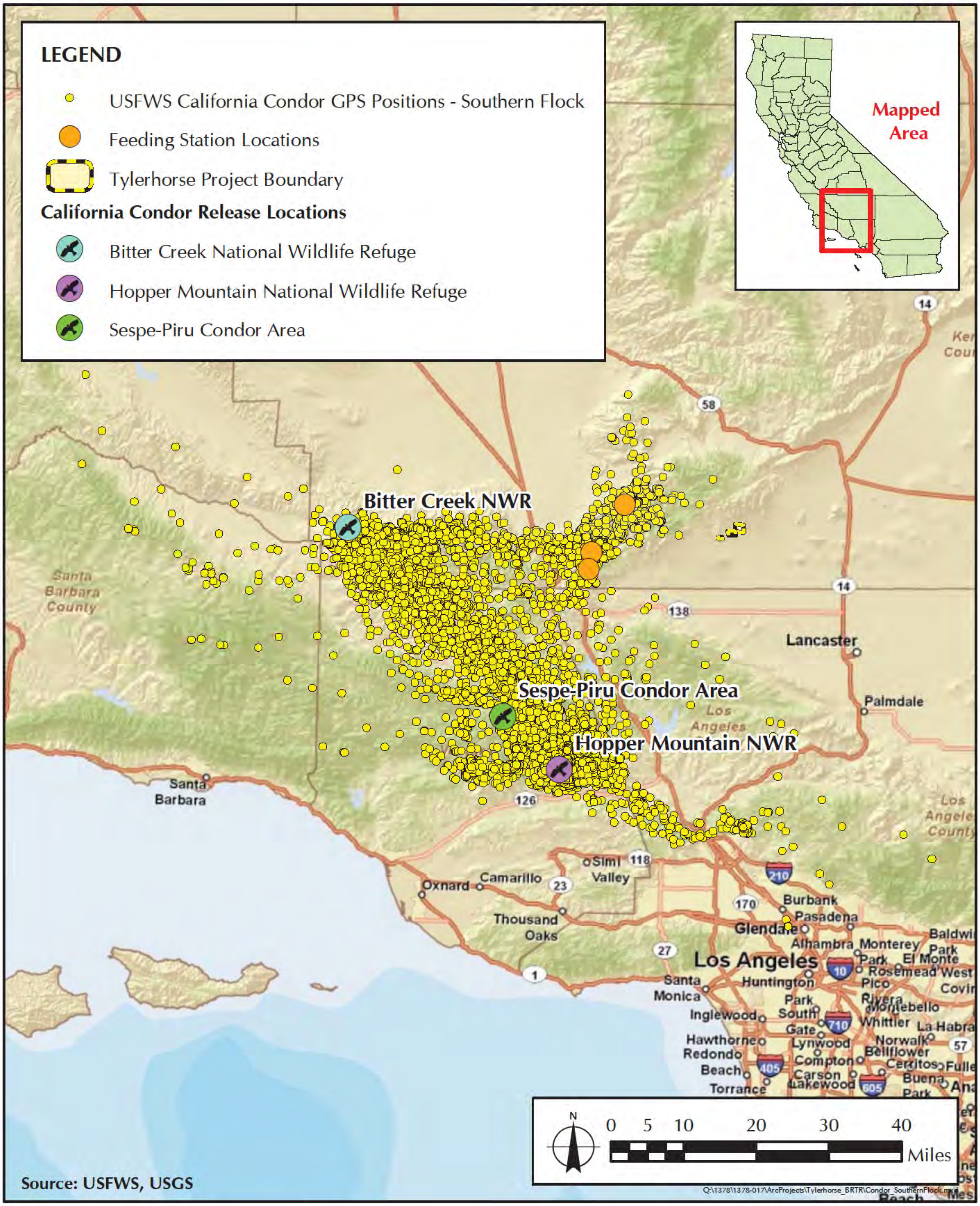

FIGURE 5.5.3-2

USFWS California Condor Southern Flock Data

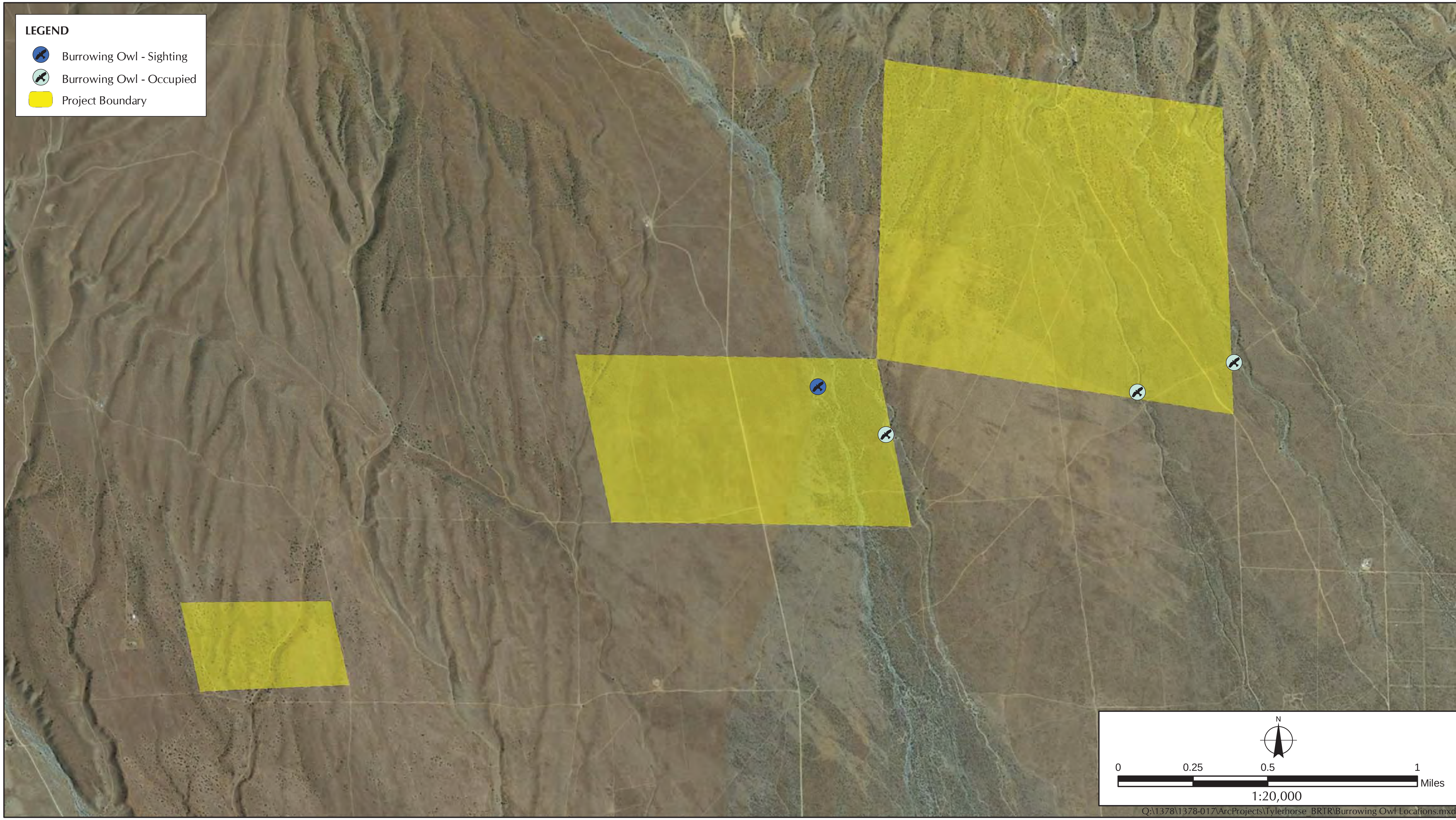

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FIGURE 5.5.3-3

Burrowing Owl Observations and Burrows in Relation to Project surveys are necessary to determine burrow activity during the winter and spring/summer seasons according to Phase 3 of the California Burrowing Owl Consortium's *California Burrowing Owl Survey Protocol and Mitigation Guidelines*.[33]

Loggerhead Shrike

The loggerhead shrike is a California species of special concern and is considered in the West Mojave Plan. All of the shrub plant communities in the project property provide suitable nesting habitat for this species. The loggerhead shrike was observed during numerous surveys in the adjacent Manzana Project study area, and approximately 10 to 15 individuals were determined to be breeding within the project property. As a result of detailed surveys, loggerhead shrike has been determined to be a year-round resident within the adjacent Manzana Project study area and the current project area.

Le Conte's Thrasher

Le Conte's thrasher is a California species of special concern and is considered in the West Mojave Plan. Suitable habitat for the species exists within the Mojave Desert Wash Scrub, Mojavean Juniper Woodland and Scrub, and Joshua Tree Woodland plant communities within the project area. Based on detailed field surveys in the adjacent Manzana Project study area, it has been determined that Le Conte's thrasher is a year-round resident at the project property. Therefore, the species is likely present in the project area.

Migratory Sensitive Birds

Swainson's Hawk

Swainson's hawk is listed as threatened pursuant to the California ESA and is also considered in the West Mojave Plan. The Swainson's hawk is a migratory raptor that travels in flocks with as many as several hundred birds. The project property occurs within an Antelope Valley migration pathway, and the scrub and grassland habitats within the project property provide suitable foraging habitat during migration. The migratory surveys conducted in the adjacent Manzana Project verified that Swainson's hawk migrates through the project property and surrounding area during the fall and spring migration over a short window of time. During the 2005 fall migration surveys, 48 birds were observed, and at least 35 individuals were reported flying below 330 feet AGL. Although known to nest at other locations in the Antelope Valley, the detailed on-site surveys did not identify any nests in the project property, and it was therefore determined that the Swainson's hawk is not a resident bird within the adjacent Manzana Project study area and surrounding region.

Northern Goshawk

The northern goshawk is listed as a California species of special concern and a BLM sensitive species. This species is an inhabitant of coniferous forests on its breeding grounds in northern California and is considered a very uncommon to very rare winter visitor in lowland areas.[34]

[33] The California Burrowing Owl Consortium. April 1993. *California Burrowing Owl Survey Protocol and Mitigation Guidelines*. Available at: http://www.dfg.ca.gov/wildlife/nongame/docs/boconsortium.pdf

[34] Shuford, W.D., and T. Gardali, eds. 2008. *California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California*. Studies of Western Birds 1. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

Northern goshawks are considered very rare in Southern California.[35] A single northern goshawk was observed flying north in the spring of 2005 during a migration count on the adjacent Manzana Project.

Ferruginous Hawk

The ferruginous hawk is a State Watch List species and is also considered in the West Mojave Plan. Although this species does not breed in Southern California, it is commonly observed wintering in the Antelope Valley. Moderate numbers of ferruginous hawks, a total of 23 observations in the fall of 2005 alone, were observed during surveys conducted within the adjacent Manzana Project during winter presence surveys and spring and fall raptor migration surveys. Although use of the project area was moderate for migration in the fall, only approximately five individual hawks hunted over the project vicinity over winter.

American Peregrine Falcon

The American peregrine falcon was de-listed as an endangered species under the California ESA in 2008, but it remains a fully protected state species. The American peregrine falcon does not breed in Kern County,[36] but the entire project property provides suitable foraging habitat. American peregrine falcons are migratory and may pass through the project property during their autumn migration from the northern hemisphere to the southern hemisphere, and then return during their spring migration. A single peregrine falcon was observed during fall 2005 raptor migration surveys in the adjacent Manzana Project. The bird was recorded flying east at approximately 500 feet AGL. There are no records for nesting American peregrine falcon in the Tehachapi Mountains.

American White Pelican

The American white pelican is listed as a species of special concern by the CDFG, but only in its nesting colonies. This species is migratory within the Antelope Valley and has a high potential to migrate over the project property in spring or fall. Large migrating flocks of American white pelicans were observed soaring over the adjacent Manzana Project during fall and spring raptor migration counts in both 2004 and 2005. Flocks of 50 to as many as 2,270 individuals were observed. There are no breeding or foraging grounds within the project property.

White-tailed Kite

The white-tailed kite is a state fully protected species. A single white-tailed kite was observed in November 2005 within the adjacent Manzana Project flying over grassland at an elevation of 100 feet. While this species may have once been predominantly distributed in marshes or grasslands, white-tailed kites are now found in a larger variety of habitats within the coastal plains and low foothills, including riparian woodlands and groves of oak and/or sycamore, bordering open fields or grasslands, cultivated lowlands or orchards, and even some suburban habitats. As such, the species is likely to occur (although infrequently) within the project area.

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[35] Small, A. 1994. *California Birds: Their Status and Distribution*. Vista, CA: Ibis, p. 74.

[36] Comrack, L., and R. Logsdon. 2008. *Status Review of the American Peregrine Falcon in California*. California Department of Fish and Game, Wildlife Branch, Nongame Wildlife Program Report 2008-06. Sacramento, CA: California Department of Fish and Game.

Northern Harrier

The northern harrier (*Circus cyaneus*) is a California species of special concern and is considered in the West Mojave Plan. In eastern Kern County, the northern harrier is a fairly common winter visitor, and a rare breeder, but it does not breed within or near the project.[37] Northern harriers were observed on the adjacent Manzana Project during fall, spring, and winter surveys in 2004 and 2005, though typically only one to two individuals were observed at a time. Most northern harriers observed were flying below 30 feet, which would be a typical foraging height, but the species flies higher during migration, primarily over 1,000 feet AGL.[38]

Sharp-shinned Hawk

The sharp-shinned hawk is a State Watch List species and is also considered in the West Mojave Plan. The species is not known to breed in Southern California but is present during fall and spring migration through the Antelope Valley. Several sharp-shinned hawks were observed during the various studies in the Manzana Project study area. However, due to a lack of suitable overwintering habitat, these individuals were likely migrants, and their use of the property is expected to be low. This species is likely to be present in the project area, albeit in very low densities.

Vaux's Swift

Vaux's swift (*Chaetura vauxi*) is a California species of special concern and is considered in the West Mojave Plan. Vaux's swift is a sporadically fairly common migrant in eastern Kern County,[39] which, while foraging, can range from ground level to over 1,000 feet AGL, and thus potential foraging heights within the project property can occur within the rotor-swept range of proposed wind turbines (150–500 feet). The Antelope Valley is outside of this species' published breeding range, and as expected, no breeding was documented.

Several hundred individuals were observed during various field surveys in the adjacent Manzana Project between 2004 and 2005. Vaux's swifts were only observed during the spring or fall migration period, and almost all were recorded during midday (10:00 a.m. to 2:00 p.m.). No nests were identified. Thus, the Vaux's swift is expected to be a sporadically uncommon to common migrant at the project property.

5.5.4 Mammals

Three special-status mammal species were identified as potentially occurring in the project property. These special-status species are the Mohave ground squirrel, American badger, and San Joaquin pocket mouse.

Mohave Ground Squirrel

The Mohave ground squirrel is listed as a state threatened species and a BLM sensitive species. The habitat assessment identified marginally suitable habitat for the Mohave ground squirrel in the project property; therefore, surveys were not conducted for this species. Detailed field surveys

[37] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

[38] Kerlinger, P. 1989. *Flight Strategies of Migrating Hawks*. Chicago, IL: University of Chicago Press.

[39] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

were conducted for this species in accordance with CDFG protocols within the adjacent Manzana Project study area, and no Mohave ground squirrels were observed. Based on the results of literature review, agency coordination, consultation with experts, and detailed field surveys within the adjacent Manzana Project study area, it has been determined that this species is likely absent from the project property. Therefore, the project would not likely have the potential to impact this species.

American Badger

The American badger is a state species of special concern. All of the plant communities within the project property provide potential habitat for this species. Detailed surveys of the adjacent Manzana Project study area resulted in the identification of one American badger. Therefore, the species has the potential to occur within the project area, and the project has the potential to impact this species.

San Joaquin Pocket Mouse and Southern Grasshopper Mice

As a result of the special-status small mammal surveys conducted in May 2010, Sapphos Environmental, Inc. found one federal sensitive species (BLM) and one California species of special concern (CDFG) within the project property: southern grasshopper mouse and San Joaquin pocket mouse. The 10 southern grasshopper mice captures occurred in Juniper Desert Scrub (5 captures), Joshua Tree Woodland (3 captures), and Non-native Grassland (2 captures) plant communities (Figure 5.5.4-1, *Location of Southern Grasshopper Mouse and San Joaquin Pocket Mouse Captures*). The 3 San Joaquin pocket mice captures occurred at trap number 62 in Joshua Tree Woodland (Figure 5.5.4-1). These three captures probably represented the same individual.

Sapphos Environmental, Inc. captured 152 individuals of seven species during the surveys conducted in May 2010 for special-status small mammal species (Table 5.5.4-1, *Total Number of Captures for Each Small Mammal Species at the Project Study Area*). Because individual animals were not marked, the total number of captured individuals likely included repeat captures of some of the same individuals on multiple occasions.

Allowing for likely repeat captures, ranked by relative abundance among species, the Panamint kangaroo rat (*Dipodomys panamintus)* was the most abundant species among all seven small mammal species captured at both trapping locations and habitats combined (38 percent), followed by chisel-toothed kangaroo rat (*Dipodomys microps*) (31 percent) and deer mouse (*Peromyscus maniculatus*) (21 percent). The southern grasshopper mouse (*Onychomys torridus*) (7 percent; Figure 5.5.4-2, *Site and Species Photographs*) and San Joaquin pocket mouse (*Perognathus inornatus*) (2 percent; Figure 5.5.4-2) comprised the remainder of captures except for Botta's pocket gopher (*Thomomys bottae*) (one capture) and one fortuitous capture of a diurnal small mammal, the white-tailed antelope ground squirrel (*Ammospermophilus leucurus*).

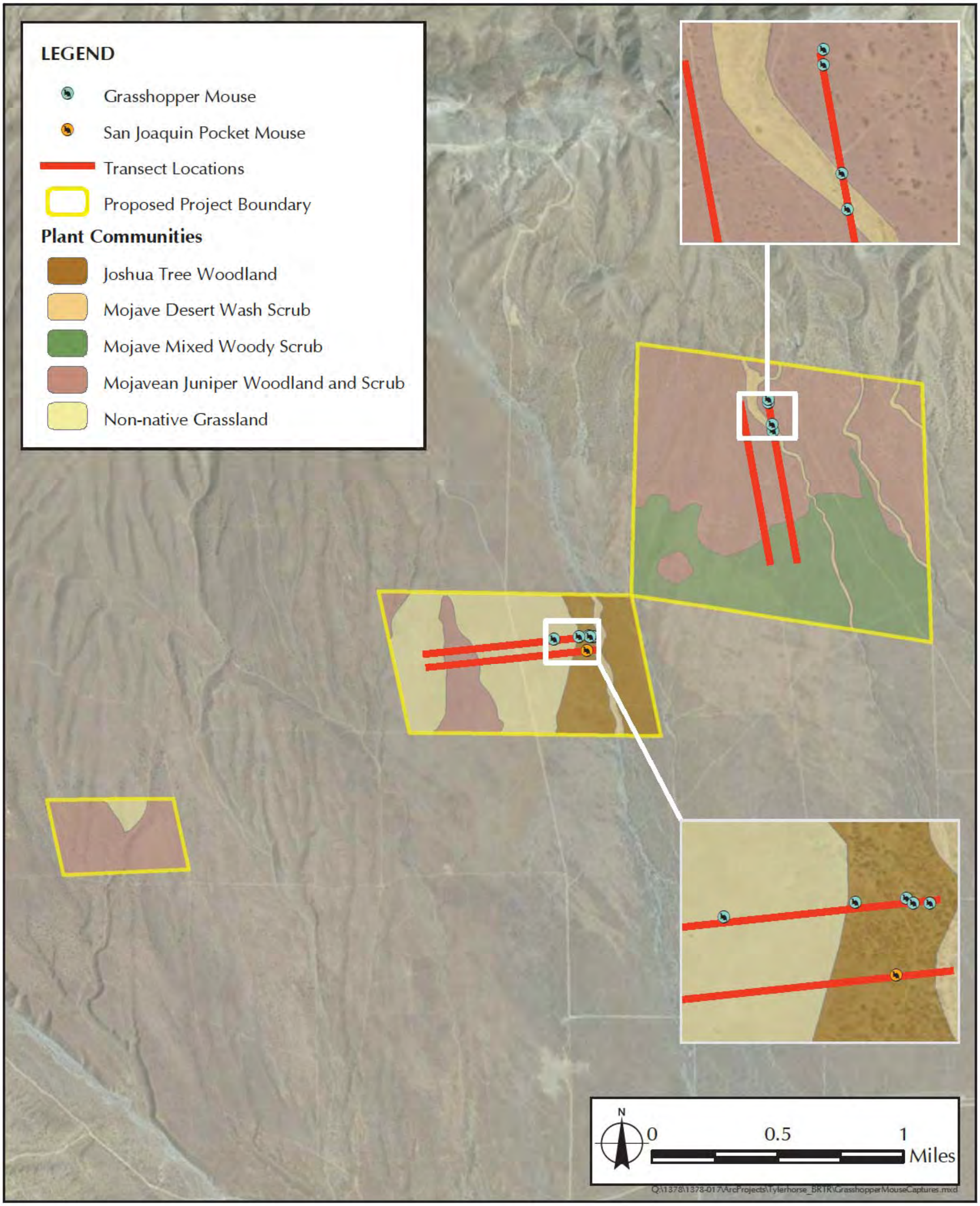

FIGURE 5.5.4-1
Location of Southern Grasshopper Mouse
and San Joaquin Pocket Mouse Captures

PHOTO 1
Non-native Grassland and Joshua Tree Woodland (in background)
Small Mammal Trapping Transect

PHOTO 2
Juniper Desert Scrub Small Mammal Trapping Transect

FIGURE 5.5.4-2
Site and Species Photographs

PHOTO 3
Non-native Grassland Small Mammal Trapping Transect

PHOTO 4
San Joaquin Pocket Mouse

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An EDF EN Company

FIGURE 5.5.4-2
Site and Species Photographs

PHOTO 5
Southern Grasshopper Mouse

FIGURE 5.5.4-2
Site and Species Photographs

TABLE 5.5.4-1
TOTAL NUMBER OF CAPTURES FOR EACH SMALL MAMMAL SPECIES AT THE PROJECT STUDY AREA

Family	Species	Status	Total Number of Captures
Heteromyidae (kangaroo rats and pocket mice)	Chisel-toothed kangaroo rat (*Dipodomys microps*)	N/A	47
	Panamint kangaroo rat (*Dipodomys panamintinus*)	N/A	57
	San Joaquin pocket mouse (*Perognathus inornatus*)	BLM	3
Muridae (other mice and rats)	Deermouse (*Peromyscus maniculatus*)	N/A	32
	Southern grasshopper mouse (*Onychomys torridus*)	CSC	10
Geomyidae (gophers)	Botta's pocket gopher (*Thomomys bottae*)	N/A	1
Sciuridae (squirrels)	White-tailed antelope ground squirrel (*Ammospermophilus leucurus*)	N/A	1

KEY:
N/A = not applicable (no federal or state status)
BLM = BLM sensitive species
CSC = California species of concern

The capture rate for the survey effort averaged 19.0 percent (152 captures / 800 trap nights). Nightly capture rates increased over the four consecutive nights, ranging from a low of 10 percent (19/200) on May 3, 2010 to a high of 27.0 percent (54/200) on May 7, 2010 (Table 5.5.4-2, *Number of Captures/Percentage for Each Small Mammal Species by Date for All Plant Communities*). In particular, capture rates for the chisel-toothed kangaroo rat sharply increased over time.

TABLE 5.5.4-2
NUMBER OF CAPTURES/PERCENTAGE FOR EACH SMALL MAMMAL SPECIES BY DATE FOR ALL PLANT COMMUNITIES

Date	Total Number, All Species in All Habitats	Grasshopper Mouse	San Joaquin Pocket Mouse	Deer Mouse	Chisel-toothed Kangaroo Rat	Panamint Kangaroo Rat	Pocket Gopher	White-tailed Antelope Ground Squirrel	Unknown
May 4	19 (10%)	1 (0.5%)	0	8 (4%)	6	4 (2%)	0	0	0
May 5	32 (16%)	0	1 (0.5%)	7 (3.5%)	5 (2.5%)	18 (9%)	0	0	1 (0.5%)
May 6	47 (24%)	5 (2.5%)	1 (0.5%)	8 (4%)	16 (8%)	16 (8%)	1 (0.5%)	0	0
May 7	54 (27%)	4 (2%)	1 (0.5%)	9 (4.5%)	20 (10%)	19 (9.5%)	0	1 (0.5%)	0
Total	152	10	3	32	47	57	1	1	1

The overall capture rate for small mammals in Joshua Tree Woodland was 37 percent (18 captures / 48 trap nights) (Table 5.5.5-3, *Number of Captures/Percentage for Each Small Mammal Species by Date for Joshua Tree Woodland*; and Figure 5.5.4-2), compared to Juniper Desert Scrub, where the capture rate was 27 percent (108 captures / 400 trap nights) (Table 5.5.4-4, *Number of Captures/Percentage for Each Small Mammal Species by Date for Juniper Desert Scrub*; and Figure 5.5.4-2), and Non-native Grassland, where the capture rate was 7 percent (26 captures / 352 trap nights) (Table 5.5.4-5, *Number of Captures/Percentage for Each Small Mammal Species by Date for Non-native Grassland*; and Figure 5.5.4-2).

TABLE 5.5.4-3
NUMBER OF CAPTURES/PERCENTAGE FOR EACH SMALL MAMMAL SPECIES BY DATE FOR JOSHUA TREE WOODLAND

Date	Total Number, All Species in Joshua Tree Woodland	Grasshopper Mouse	San Joaquin Pocket Mouse	Deer Mouse	Chisel-toothed Kangaroo Rat	Panamint Kangaroo Rat	Pocket Gopher	White-tailed Antelope Ground Squirrel	Unknown
May 4	2	0	0	0	1 (8%)	1 (8%)	0	0	0
May 5	3	0	1 (8%)	0	1 (8%)	1 (8%)	0	0	0
May 6	7	1 (8%)	1 (8%)	0	0	5 (42%)	0	0	0
May 7	6	2 (18%)	1 (8%)	1 (8%)	1 (8%)	1 (8%)	0	0	0
Total	18	3	3	1	3	8	0	0	0

TABLE 5.5.4-4
NUMBER OF CAPTURES/PERCENTAGE FOR EACH SMALL MAMMAL SPECIES BY DATE FOR JUNIPER DESERT SCRUB

Date	Total Number, All Species in Juniper Desert Scrub	Grasshopper Mouse	San Joaquin Pocket Mouse	Deer Mouse	Chisel-toothed Kangaroo Rat	Panamint Kangaroo Rat	Pocket Gopher	White-tailed Antelope Ground Squirrel	Unknown
May 4	13	1 (1%)	0	5 (5%)	5 (5%)	2 (2%)	0	0	0
May 5	23	0	0	6 (6%)	3 (3%)	14 (14%)	0	0	0
May 6	31	2 (2%)	0	5 (5%)	15 (15%)	8 (8%)	1 (1%)	0	0
May 7	41	2 (2%)	0	6 (6%)	18 (18%)	15 (15%)	0	0	0
Total	108	5	0	22	41	39	1	0	0

TABLE 5.5.4-5
NUMBER OF CAPTURES/PERCENTAGE FOR EACH SMALL MAMMAL SPECIES BY DATE FOR NON-NATIVE GRASSLAND

Date	Total Number, All Species in Non-native Grassland	Grasshopper Mouse	San Joaquin Pocket Mouse	Deer Mouse	Chisel-toothed Kangaroo Rat	Panamint Kangaroo Rat	Pocket Gopher	White-tailed Antelope Ground Squirrel	Unknown
May 4	4	0	0	3 (3.4%)	0	1 (1%)	0	0	0
May 5	6	0	0	1 (1%)	1 (1%)	3 (3.4%)	0	0	1 (1%)
May 6	9	2 (2%)	0	3 (3.4%)	1 (1%)	3 (3.4%)	0	0	0
May 7	7	0	0	2 (2%)	1 (1%)	3 (3.4%)	0	1 (1%)	0
Total	26	2	0	9	3	10	0	1	1

Two species of special concern were captured during this effort, the San Joaquin pocket mouse (BLM) and the southern grasshopper mouse (CDFG). The San Joaquin pocket mouse was trapped at the adjacent approved Manzana Project site from August 28–31, 2006;[40] four individuals were captured in Mojave Mixed Woody Scrub, whereas two individuals were captured in Native Valley Needlegrass Grassland. At the original Avalon I Renewable Energy Project site, from April 12 to June 15, 2009, two San Joaquin pocket mice were trapped in Joshua Tree Woodland and Mojave Creosote Bush Scrub habitats. Three of these four habitats (Mojave Mixed Woody Scrub, Mojave Creosote Bush Scrub, and Native Valley Needlegrass Grassland) are different from Joshua Tree Woodland where this species was captured during May 2010 at the project property. Thus, Sapphos Environmental, Inc. has captured San Joaquin pocket mice in four plant community types at three wind energy development project sites located in the Antelope Valley and lower slopes of the adjacent Tehachapi Mountains.

The southern grasshopper mouse was trapped at the adjacent Pacific Wind Energy Project site during six trapping sessions from April 21–24 through June 1–4, 2008;[41] five individuals were captured in Joshua Tree Woodland and Mojavean Juniper Woodland and Scrub. At the original Avalon I Renewable Energy Project site, from April 12 to June 15, 2009, 14 southern grasshopper mice were trapped in Mojave Creosote Bush Scrub, Mojave Mixed Woody Scrub, Mojavean Juniper Woodland and Scrub, and Desert Saltbush Scrub habitats. Two of these five habitats (Joshua Tree Woodland and Mojavean Juniper Woodland and Scrub) are the same as two of the three habitats where southern grasshopper mice were captured during May 2010 at the project site. Thus, Sapphos Environmental, Inc. has captured the southern grasshopper mouse in six plant community types at three wind energy development project sites located in the Antelope Valley and lower slopes of the adjacent Tehachapi Mountains. Therefore, both the San Joaquin pocket mouse and the southern grasshopper mouse are rather widely distributed though generally scarce in a variety of habitat types in the Antelope Valley and lower slopes of the adjacent Tehachapi Mountains. This wide distribution will probably reduce the potential of project-related impacts that site development may have on either species.

[40] Sapphos Environmental, Inc. 23 January 2006. Memorandum for the Record No. 6. Subject: Trapping Surveys for White-eared Pocket Mouse in Support of the PdV Wind Energy Project. Pasadena, CA.

[41] Sapphos Environmental, Inc. 21 July 2008. Memorandum for the Record No. 3. Subject: Results of Small Mammal Surveys at the Pacific Wind Energy Project, Kern County, California. Pasadena, CA.

Ten known subspecies of the southern grasshopper mouse currently are recognized by the American Society of Mammalogists.[42] Presently, identification of individuals to the subspecies designation can be conducted only through genetic analysis. Southern grasshopper mice subspecies, including the Tulare grasshopper mouse (*O. t. tularensis*) are indistinguishable in the field and would require genetic analysis to determine subspecific status. An in-depth description of the southern grasshopper mouse is available through the American Society of Mammalogists Mammalian Species Accounts.[43]

Bats

Four special-status bat species were identified as potentially occurring in the project property based on analysis of passive survey data provided by the USFS from 2009 to 2010. All four of the special-status species are resident bats: the Western mastiff bat and pallid bat, which are both state species of concern and BLM sensitive species; and the Yuma myotis and western small-footed myotis, which are BLM sensitive species. The presence of the Western mastiff bat and the pallid bat were confirmed via acoustic detection, while the Yuma myotis and western small-footed myotis are thought to be potentially present based on acoustic analysis.

A search of the CNDDB revealed no records for any of the four sensitive resident bat species in the U.S. Geological Survey (USGS) Tylerhorse Canyon 7.5-minute series topographic quadrangle, where the project property is located, or the surrounding quadrangles. During the habitat assessment field surveys, no roosts for any of these bat species were identified in the project property. However, it was determined that trees and rock crevices within the project property and surrounding region may provide suitable roosting habitat for resident and migratory sensitive bat species. Additionally, it was determined that habitat potentially suitable to support foraging for migratory bats during the spring and fall migration is also present. Bats were also observed via a thermal imager, although it was not possible to determine the specific species of bats using a thermal imager. Regardless, the majority of the bats were flying in a southeast direction during the period of recordings. Therefore, the project has the potential to impact special-status bat species.

5.6 DISCUSSION

This section presents a discussion of the potential impacts associated with the proposed action and no action alternative. In most instances, impacts are categorized and described in general terms without reference to facility type or any site-specific resources. An adverse impact to biological resources would be considered to occur if construction and/or operation of the proposed facilities would cause substantial changes to the existing abundance, diversity, distribution, or habitat value of existing plant or animal populations.

5.6.1 Direct and Indirect Impacts of the Proposed Action

Vegetation

Construction and operation of the proposed action would result in direct and indirect impacts to natural vegetation communities within the project area. Direct effects to vegetation would occur from disturbance or removal of vegetation at the wind turbine generator (WTG) pad sites, along access roads, and in association with the 34.5-kV underground electrical collection system.

[42] McCarty, R. 1975. "*Onychomys Torridus*." *Mammalian Species*, *59*: 1–5.

[43] McCarty, R. 1975. "*Onychomys Torridus*." *Mammalian Species*, *59*: 1–5.

Vegetation would be removed as a result of surface-disturbing activities associated with blading, grading, vehicular traffic, and trenching. Areas adjacent to the proposed WTG pad sites, access roads, and underground electrical collection system would experience temporary disturbance associated with equipment access, materials, stockpile locations, and workspace requirements. Indirect impacts would include the increased potential for the establishment and spread of noxious weeds, exposure of soils to accelerated wind and water erosion, shifts in vegetation community composition, increase in the potential for fires, and loss of biodiversity.

Implementation of the proposed action would result in the direct disturbance of approximately 48.98 acres of vegetation, or approximately 4.5 percent of the total project property. This includes approximately 0.79 acre of Joshua Tree Woodland, 23.8 acres of Mojavean Juniper Woodland and Scrub, 11.36 acres of Non-native Grassland, 0.11 acre of Mojave Desert Wash Scrub, and 12.92 acres of Mojave Mixed Woody Scrub (Table 5.6.1-1, *Vegetation Communities Affected by the Proposed Action*). Following construction, portions of the WTG pad sites, unused portions of roads and the electrical collection system right-of-way (ROW), and extra workspace areas would be reclaimed. Thus, under the proposed action, total permanent vegetation disturbance would be reduced from approximately 48.98 acres to 29.62 acres, or approximately 2.7 percent of the project property.

The duration of impacts to vegetation would depend, in part, on the success of mitigation and revegetation efforts and the time needed for natural succession to return revegetated areas to predisturbance conditions. Since recovery in arid environments is extremely slow, this is likely to be on the order of 10 to 20 years for Joshua Tree Woodland, Mojave Desert Wash Scrub, and Mojavean Juniper Woodland and Scrub.

Effective reclamation of project-related disturbances would begin after the completion of site cleanup and would be accomplished following the measures identified in the reclamation plan for the project. The reclamation recommendations presented in the plan will be developed based on the physical and biological characteristics of the project area as well as on observations of successful reclamation efforts on similar energy development projects. Therefore, assuming these measures are effectively applied, significant impacts that relate to reclamation success are not likely to occur.

TABLE 5.6.1-1
VEGETATION COMMUNITIES AFFECTED BY THE PROPOSED ACTION

	Turbine Pads	Access Roads*		
Vegetation Community Type	**Permanent Disturbance (acres)**	**Permanent Disturbance (acres)**	**Temporary Disturbance (acres)**	**Permanent plus Temporary Disturbance (acres)**
Joshua Tree Woodland	0.52	0.12	0.15	0.79
Mojavean Juniper Woodland and Scrub	6.69	7.36	9.75	23.8
Non-native Grassland	4.12	3.12	4.12	11.36
Mojave Desert Wash Scrub	0.00	0.05	0.06	0.11
Mojave Mixed Woody Scrub	3.66	3.98	5.28	12.92
Total	**14.99**	**14.63**	**19.36**	**48.98**

NOTE: *The disturbance for the electrical collection system is included in the disturbance for access road rights-of-way.

Implementation of the proposed action also would increase the potential for the occurrence of indirect effects. Disturbances from construction would increase the potential for the establishment and spread of invasive and noxious weed species. Noxious weeds tend to be aggressive colonizers of disturbed areas where the native vegetation has been removed. Therefore, disturbances associated with construction of the proposed WTG pad sites, access roads, and electrical collection system would provide opportunities for invasive and noxious weeds to become established. Once established, weeds would increase fuel levels and the potential for increased intensity and numbers of wildfires. Wildfire within the project area, where vegetation is generally intolerant of fire, could potentially lead to mortality of native plant species and transform the vegetation community from native vegetation to non-native grasslands. To minimize the potential for adverse effects from invasive and noxious weed establishment, monitoring for invasive and noxious weeds would be necessary. If invasive and noxious weeds are found, control and eradication measures would be implemented as outlined in an integrated pest management (IPM) plan.

Additional indirect construction-related impacts could include soil compaction, disruption of microphytic crusts, and an increased potential for wind and water erosion of disturbed surfaces prior to reclamation. However, indirect disturbance effects from construction would be reduced to nonsignificant levels with the implementation of recommended and required mitigation measures.

Federal Waters of the United States

All of the drainages that cross the project property are non-navigable and isolated drainages that do not connect to any navigable waterway subject to the jurisdiction of the USACOE pursuant to Section 404 of the Clean Water Act.[44] There were no NWI wetlands identified within the project property. The nearest wetland identified from the NWI is located approximately 1.3 miles to the northwest of the project property.[45] The project was designed to avoid all mapped NWI wetlands; therefore, there would be no impacts to wetlands as a result of the implementation of the project.

Wildlife

Construction and operation of the proposed wind energy project would result in direct and indirect impacts to wildlife and wildlife habitats. The principal impacts to terrestrial wildlife likely to be associated with the proposed action include (1) the loss of certain wildlife habitats due to construction activities such as earth-moving at the turbine pad sites and associated access roads; (2) habitat fragmentation; (3) direct mortality or injury due to collisions with turbines, meteorological towers, and/or transmission lines; (4) vehicle-related mortality, (5) displacement of some wildlife species; and (6) an increase in the potential for illegal kill and harassment of wildlife. The magnitude of impacts to wildlife and wildlife habitats would depend on a number of factors including the type and duration of disturbance, the species of wildlife present, time of year, and implementation of recommended and required mitigation measures.

[44] U.S. Army Corps of Engineers. 10 July 2006. Letter from Antal Szijj, Acting Chief of the North Coast Section, Regulatory Branch, U.S. Army Corps of Engineers, to Dr. Irena Mendez, Sapphos Environmental, Inc. Subject: Letter No. 2006-01345-AOA dated June 22, 2006, regarding permit to construct a wind energy project.

[45] U.S. Fish and Wildlife Service. [August 1986] 1995. *National Wetlands Inventory Map, Tylerhorse Canyon, California*. Washington, DC.

Construction-related Impacts

Implementation of the proposed action would result in the direct disturbance of 48.98 acres of wildlife habitat. This includes a total of 14.99 acres associated with the turbine pad sites and 33.99 acres for access roads and the electrical collection system. Direct disturbance to wildlife habitat includes activities such as ground surface grading and excavation, tree and shrub removal, and/or scraping of road surfaces that disturbs surface and subsurface soils. Each of these activities could effectively remove and/or degrade existing habitat, thereby reducing its availability to local wildlife populations.

Following construction, portions of the WTG pad sites, unused portions of roads, the electrical collection system ROW, and extra workspace areas (a total of 19.36 acres) would be reclaimed. These areas would be revegetated with seed mixes approved by the BLM, some of which are specifically oriented to enhance wildlife use. The duration of impacts to vegetation would depend, in part, on the success of mitigation and reclamation efforts and the time needed for natural succession to return revegetated areas to predisturbance conditions. Grasses and forbs are expected to become established within the first several years following reclamation; however, an estimated 10 to 20 years would be required for shrub establishment and production of useable forage.[46,47,48,49] Thus, under the proposed action, total vegetation disturbance would be reduced from approximately 48.98 to 29.62 acres.

Permanent and temporary loss of habitat as a result of construction activities could affect some small mammal, reptile, and/or amphibian species with very limited home ranges and mobility. Although there is no way to accurately quantify these effects, the impact is likely to be moderate in the short term and to be reduced over time as reclaimed areas produce suitable habitats. Most of these wildlife species would be common and widely distributed throughout the project area, and the loss of some individuals as a result of habitat removal would have a negligible impact on populations of these species throughout the region.

Indirect effects due to displacement of wildlife also would occur as a result of construction activities associated with the project. In response to the increase in human activity (e.g., equipment operation, vehicular traffic, and noise), wildlife may avoid or move away from the sources of disturbance to other habitats. This avoidance or displacement could result in underutilization of the physically unaltered habitats adjoining the disturbances. The net result would be that the value of habitats near the disturbances would be decreased and previous distributional patterns would be altered. The habitats would not support the same level of use by wildlife as before the onset of the disturbance. Additionally, some wildlife would be displaced to other habitats leading to some degree of overuse and degradation to those habitats.

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[46] Plummer, A.P., D.R. Christensen, and S.B. Monsen. 1968. *Restoring Big-game Range in Utah*. Utah Division of Fish and Game Publication No. 68-3. Salt Lake City, UT.

[47] Environmental Studies Board. 1974. *Rehabilitation Potential of Western Coal Lands*. Study Committee on the Potential for Rehabilitating Lands Surface Mined for Coal in the Western United States, National Academy of Sciences, National Academy of Engineering. Cambridge, MA: Ballinger.

[48] Fisser, H.G. 1981. "Shrub Establishment, Dominance, and Ecology on the Juniper and Sagebrush-Grass Types in Wyoming." In *Shrub Establishment on Disturbed arid and Semi-arid Lands: Proceedings of the Symposium Held at Laramie, Wyoming, December 2-3, 1980*, L.H. Stelter, E.J. DePuit, and S.A. Mikol, Technical Coordinators. Cheyenne, WY: Wyoming Game and Fish Department, pp. 23–28.

[49] Wasser, C.H., and J. Shoemaker. 1982. *Ecology and Culture of Selected Species Useful in Revegetating Disturbed Lands in the West*. FWS/OBS-82/56. Washington, DC: Biological Services Program, U.S. Fish and Wildlife Service.

Public vehicle use of roads built to access turbines can have a similar, additive, or possibly a synergistic influence on reducing wildlife use of adjacent habitats, as well as causing additional impacts. Public access to new and upgraded roads in the project area would increase the potential for mortality and general harassment of wildlife. Closure of some new and existing roads to public use following construction would be one of the most effective measures that could be implemented to offset this impact.

Operational Impacts

The impacts from operation and maintenance of the project on general terrestrial wildlife (other than birds and bats) are expected to be minimal and insignificant.

Avian Species

Collision risk may be introduced to avian species that migrate, breed, or winter within the project area, and at least some degree of avian mortality from collisions with turbines would be an unavoidable consequence of the operation of the project. Collisions may occur with resident birds foraging and flying within the project area or with migrant birds seasonally moving through the area. However, because overall avian use of the project area is lower compared to many areas in Southern California where avian species concentrate at wetlands, oases, or along ridgelines where avian species are known to migrate in moderate to high numbers, risk to migrating, breeding, or wintering passerine birds is expected to be low at the project area.

Based on the results of fatality monitoring at other wind plants throughout the west, including the Tehachapi Pass Wind Resource Area in California, the degree of collision risk to birds at wind plants appears to be species-specific except along important migration corridors. The project area is not located along an important migration corridor. For example, fatalities of common ravens, turkey vultures, and ferruginous hawks are generally low, whereas fatalities of American kestrels, red-tailed hawks, golden eagles, and horned larks are more common. The selection of a wind power project site in a migration corridor, in specific types of habitat, number and diversity of birds in the area, and the behavior of an individual species plays a large role in its risk of collision.

Of the nonraptor avian groups, passerines constitute the most abundant avian fatalities at newer-generation wind facilities, often comprising more than 80 percent of the avian fatalities.[50] Based on species and seasonal information, in some studies up to 70 percent of fatalities found were believed to be migrants;[51] however, fatality estimates are highly variable and range from 0 to 70 percent. In general, the number of migrant fatalities is higher in wind projects in the eastern U.S.[52] The overall national average for passerine fatalities at wind projects has been approximately 2.2 birds per turbine per year.[53]

[50] Erickson, W., G.D. Johnson, M.D. Strickland, et al. 2001. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. Prepared by: Western EcoSystems Technology Inc. for National Wind Coordinating Committee, Cheyenne, WY.

[51] Howe, R.W., W. Evans, and A.T. Wolf. 2002. *Effects of Wind Turbines on Birds and Bats in Northeastern Wisconsin*. Technical Report submitted to Wisconsin Public Service Corporation and Madison Gas and Electric Company, Madison, WI.

[52] Erickson, W., G. Johnson, D. Young, et al. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc. for Bonneville Power Administration, Cheyenne, WY.

[53] Erickson, W., G. Johnson, D. Young, et al. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems

Frequency indices of nonraptors indicate that the common raven, barn swallow, horned lark, and mountain bluebird are most likely to be exposed to potential collisions with wind turbines at the project property, as these four species comprise nearly 74 percent of the total number of bird observations (includes repeat observations) recorded during the 2004–2005 survey season. Despite relatively high use and exposure, common ravens are rarely reported as fatalities according to monitoring studies at other wind energy facilities.[54,55] At the Tehachapi Pass Wind Resource Area in California, common ravens were found to be the most common large bird, yet no fatalities for this species were documented during intensive studies.[56] Most nonraptors had relatively low exposure indices due to the majority of individuals flying below the zone of risk. Because they tend to fly at relatively high altitudes, birds conducting long-range migrations may not be likely to be impacted by turbines except during weather conditions that induce them to fly low.[57] Resident birds may have a higher probability of colliding with turbines than migrants, given that residents tend to fly lower and spend more time in any given area.[58]

Predicting numbers of fatalities is difficult in large part due to the lack of postconstruction monitoring studies in the American Southwest and similar desert environments as the project. However, due to generally low impacts for other western wind projects and the low exposure risks at the project study area, it is unlikely that populations of passerine bird species would be adversely affected by direct mortality from the operation of the project; any impacts would be on individuals and not species. Thus, this level of mortality is not expected to result in population level impacts to any nonraptor avian species with the possible exception of horned lark, as breeding and nonbreeding individuals have been killed from collisions with wind turbines at many sites in western North America. The horned lark is generally common at the project property; species populations in the Mojave Desert lack any special-status designation by resource agencies.

Based on the mortality estimates from the other wind farms studied,[59] the midrange expected for passerine mortality would be approximately 1.2 to 1.8 birds per turbine per year. To put this into context, an in depth review of avian mortalities associated with collisions with human structures (roads, power lines, communication towers, buildings, and windows) suggests that about 0.01 to

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Technology, Inc. for Bonneville Power Administration, Cheyenne, WY.

[54] Erickson, W., G.D. Johnson, M.D. Strickland, et al. 2001. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. Prepared by: Western EcoSystems Technology Inc. for National Wind Coordinating Committee, Cheyenne, WY.

[55] Erickson, W., G. Johnson, D. Young, et al. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc. for Bonneville Power Administration, Cheyenne, WY.

[56] Anderson, R.L., J. Tom, N. Neumann, and J.A. Cleckler. 1996. *Avian Monitoring and Risk Assessment at Tehachapi Pass Wind Resource Area, California*. Sacramento, CA: California Energy Commission.

[57] Hanowski, J.M., and R.Y. Hawrot, 2000, "Avian Issues in the Development of Wind Energy in Western Minnesota." *Proceedings of the NWCC National Avian-Wind Power Planning Meeting III, San Diego, Calif., May 1998*.

[58] Janss, G., 2000, "Bird Behavior in and near a Wind Farm at Tarifa, Spain: Management Considerations." *Proceedings of NWCC National Avian-Wind Power Planning Meeting III, San Diego, Calif., May 1998*.

[59] Erickson, W., G.D. Johnson, M.D. Strickland, et al. 2001. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. Prepared by: Western EcoSystems Technology Inc. Prepared for: National Wind Coordinating Committee, Cheyenne, WY.

0.02 percent of all avian mortalities are associated with wind turbines.[60] This equates to 1 to 2 out of every 10,000 bird deaths.

<u>Raptors</u>

Substantial data on raptor mortality at wind energy facilities are available from studies in California and throughout the West and Midwest.[61] The annual mean raptor use at the project study area was compared with other wind energy facilities that implemented similar protocols and had data for at least three or four seasons. Similar studies were conducted at 36 other wind resource sites proposed for wind energy facility construction. The annual mean raptor use at these wind energy facilities ranged from 0.09 birds per 20-minute survey at San Gorgonio in California to 2.34 birds per 20-minute survey at High Winds, California.[62] Raptor use at the project study area ranged from 0.16 birds per 20-minute survey in 2004 to 0.5 birds per 20-minute survey in 2005,[63] which is in the low range of all the site studies. Although high numbers of raptor fatalities have been documented at some wind energy facilities (e.g., Altamont Pass in California), a review of studies at wind energy facilities across the U.S. reported that only 3.2 percent of casualties were raptors.[64] Although raptors occur in most areas with the potential for wind energy development, individual species appear to differ from one another in their susceptibility to collision.[65] A regression analysis of raptor use and mortality for 12 new-generation wind energy facilities, where similar methods were used to estimate raptor use and mortality, found that there was a significant positive correlation between use and mortality within species at different sites. These estimates, however, are based on survey methods that may or may not be equivalent between wind energy facilities and may not accurately estimate actual mortality estimates. Nevertheless, raptor fatalities at most western wind energy facilities have been relatively low, between 0 and 0.14 raptors per MW per year.[66]

Exposure indices may provide some insight into what species might be the most likely turbine casualties based on site-specific data on abundance and flight behavior. Such indices would consider the relative probability of exposure based on abundance, proportion of activity recorded as flying, and observed flight height of each species. The analysis is based on observations of birds made during the studies and does not take into consideration varying ability among species to detect and avoid turbines, habitat selection, or other factors that may influence exposure to

[60] Erickson, W., G.D. Johnson, M.D. Strickland, et al. 2001. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. Prepared by: Western EcoSystems Technology Inc. Prepared for: National Wind Coordinating Committee, Cheyenne, WY.

[61] Young, D.P., Jr., J.D. Jeffrey, K. Bay, and W.P. Erickson. 2009. *Puget Sound Energy, Hopkins Ridge Wind Project Phase 1, Post-construction Avian and Bat Monitoring, Second Annual Report, January–December 2008*. Prepared for: Puget Sound Energy, Dayton, WA.

[62] Young, D.P., Jr., J.D. Jeffrey, K. Bay, and W.P. Erickson. 2009. *Puget Sound Energy, Hopkins Ridge Wind Project Phase 1, Post-construction Avian and Bat Monitoring, Second Annual Report, January–December 2008*. Prepared for: Puget Sound Energy, Dayton, WA.

[63] Sapphos Environmental, Inc. 2006. *PdV Wind Energy Project Biological Resources Technical Report*. Pasadena, CA.

[64] Erickson, W., G.D. Johnson, M.D. Strickland, et al. 2001. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. Prepared by: Western EcoSystems Technology Inc. for National Wind Coordinating Committee, Cheyenne, WY.

[65] National Research Council. 2007. *Environmental Impacts of Wind Energy Projects*. Washington, DC: National Academies Press.

[66] Young, D.P., Jr., D. Tidhar, D. Solick, and K. Bay. 2008. *Avian and Bat Studies for the Grapevine Canyon Wind Energy Project, Coconino County, Arizona*. Prepared for: Foresight Flying M, LLC. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY.

turbines such as breeding or hunting behavior. Based on species composition of the most common raptor fatalities at other western wind energy facilities, species composition of raptors observed during 2004 and 2005 surveys conducted within the adjacent Manzana Project study area, and considering the exposure indices evaluated, the diurnal raptors most likely at risk of turbine collision would be the red-tailed hawk, ferruginous hawk, golden eagle, and American kestrel. Only the red-tailed hawk is common at the project property. Small numbers of fatalities of other raptors, including other falcons, accipiters, and harriers may also occur over the life of the project, but are expected to be rare. Based on the seasonal use estimates, it is also expected that risk to raptors would be at lowest risk during the postbreeding period in summer when resources have been depleted and temperatures are very high, when very few raptors were observed, and highest during the fall and winter seasons, due to increased number of migrants passing through the area and renewal of resource productivity brought upon by regular winter season rainfall and cooler temperatures.

Studies of raptor behavior have documented high raptor collision avoidance behaviors, noting that the diurnal flight of raptors may provide these birds with the ability to visually and acoustically detect turbines. It is also noted that raptor activity at the project study area during the fall of 2005 was among the lower passage rates (0.5 birds per 20-minute survey) as compared with other wind energy facilities in California. The red-tailed hawk, turkey vulture, and American kestrel were the most commonly observed raptor species recorded during the 2004–2005 survey season, though only the red-tailed hawk could be described as common.[67]

Because the avian studies found that raptor use in the project study area is lower than at other wind farms operating in the region, raptor mortality is likewise expected to be lower than many of the wind farms with similar turbine types. The American kestrel and red-tailed hawk account for much of the raptor use at the site and are expected to be the species with the highest mortality. Turkey vultures appear less susceptible to collision than most other raptors.[68] Golden eagle use of the site is low relative to other wind sites, and the mortality risk for golden eagles is also expected to be correspondingly low. Nevertheless, the project proponent would coordinate with the USFWS regarding the potential need to obtain an incidental take permit under the BGEPA (see Special-status Species discussion, below).

In addition, the iterative operational practices aspects of the Bird and Bat Conservation Strategy (BBCS) would help address any take of migratory birds including passerine and raptor species. Implementation of the ABPP would minimize project-related impacts and help ensure that the project would be in compliance with the MBTA and BGEPA and amendments thereto. Applicable significance thresholds for migratory passerine birds and raptors are not expected to be exceeded. During migration, bird species within the project study area are at risk of turbine collision; however, previous studies of avian use of the project area and the surrounding region suggest these species only migrate in low numbers over the study area. The risk assessment aspect of the proposed BBCS, which would be prepared for the project, would include construction requirements, postconstruction monitoring and reporting requirements, and operational practices. This proactive approach would help ensure that the operational aspects of the project would be in compliance with the MBTA and BGEPA, and the expected level of mortality of passerines, raptors, and other bird species would be below applicable significance thresholds.

[67] Sapphos Environmental, Inc. 2006. *PdV Wind Energy Project Biological Resources Technical Report*. Pasadena, CA.

[68] Orloff, S., and A. Flannery. 1992. *Wind Turbine Effects on Avian Activity, Habitat Use, and Mortality in Altamont Pass and Solano County Wind Resource Areas*. Work performed by: BioSystems Analysis, Inc., Tiburon, CA. Sacramento, CA: California Energy Commission.

Bats

Bat mortality has been associated with wind farm operations, where bats can be killed or injured through collision with turbine blades. Most studies have shown that the majority of bat mortalities at wind plants are long-distance migratory tree and foliage roosting species, such as the hoary bat (*Lasiurus cinereus*), little brown myotis (*Myotis lucifugus*), and silver-haired bat (*Lasionycteris noctivagans*). Of these species, the hoary bat has a higher wind turbine impact mortality rate than all other species in the West.[69,70] The data also show that mortality is almost nonexistent during the breeding season and generally occurs during migration and dispersal in late summer between July and September.[71,72] The same studies also showed that mortality rates were higher during fall migration than spring. This was attributed to a lower migration concentration because females leave earlier than males in the spring, but not in the fall.[73] Studies also indicate that bats follow large migrations of moths during the fall months. Furthermore, it is well documented that these same species have a history of impact mortality with transmission interconnect lines, television and communication towers, and even lighthouses.[74]

The evidence also shows that resident bats, which are foraging or commuting between roosts, do not make up the bulk of collision mortality.[75,76] This is based on impact distribution data among turbines and observed forage habitat characteristics. Since resident bats would have a defined flight corridor between roosts, they should exhibit higher densities of fatalities in these corridors; but in a majority of the cases that were studied, there were no patterns. There were no areas of appreciably higher densities in the distribution of fatalities.[77,78]

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[69] Erickson, W., G. Johnson, D. Young, et al. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc. for Bonneville Power Administration, Cheyenne, WY.

[70] Gruver, J.C. 2002. "Assessment of Bat Community Structure and Roosting Habitat Preferences of the Hoary Bat (Lasiurus cinereus) Near Foot Creek Rim, Wyoming." Master's thesis, Department of Zoology and Physiology, University of Wyoming, Laramie.

[71] Johnson, G.D., W.P. Erickson, D.A. Shepard, et al. 2002. *Bat Interactions with Wind Turbines at the Buffalo Ridge, Minnesota Wind Resource Area: 2001 Field Season*. Palo Alto, CA: Electric Power Research Institute.

[72] Gruver, J.C. 2002. "Assessment of Bat Community Structure and Roosting Habitat Preferences of the Hoary Bat (Lasiurus cinereus) Near Foot Creek Rim, Wyoming." Master's thesis, Department of Zoology and Physiology, University of Wyoming, Laramie.

[73] Gruver, J.C. 2002. "Assessment of Bat Community Structure and Roosting Habitat Preferences of the Hoary Bat (Lasiurus cinereus) Near Foot Creek Rim, Wyoming." Master's thesis, Department of Zoology and Physiology, University of Wyoming, Laramie.

[74] Erickson, W., G. Johnson, D. Young, et al. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc. for Bonneville Power Administration, Cheyenne, WY.

[75] Crawford, R.L., and W.W. Baker. 1981. "Bats Killed at a North Florida Television Tower: A 25 Year Record." *Journal of Mammalogy*, *62*: 651–652.

[76] Johnson, G.D., D.P. Young, W.P. Erickson, et al. 2000. *Avian and Bat Mortality Associated with Initial Phase of the Foot Creek Rim Wind Power Project, Carbon County, Wyoming: November 3, 1998 - October 31, 1999*. Technical report prepared for: SeaWest Energy Corporation, San Diego, CA; and Bureau of Land Management, Rawlins, WY.

[77] Johnson, G.D., D.P. Young, W.P. Erickson, et al. 2000. *Wildlife Monitoring Studies: SeaWest Wind Power Project, Carbon County, Wyoming: 1995-1999*. Technical Report prepared by: West, Inc., for: SeaWest Energy Corporation, San Diego, CA; and Bureau of Land Management, Rawlins, WY, p. 195.

[78] Erickson, W., G. Johnson, D. Young, et al. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc. for Bonneville Power Administration, Cheyenne, WY.

In addition to flight corridor data, evidence from foraging behavior demonstrates that it is unlikely that fatalities would occur in resident bat populations.[79] Normally, bats do not forage at heights associated with turbine activity or in areas associated with wind-turbine projects, since these areas generally are very flat and windy and have reduced insect populations. Rather, they are normally associated with less wind and more water.[80]

Migratory bat species may be more likely to be involved with collision mortality events because they fly higher in the air and in denser clusters when migrating.[81] This not only puts the bats at a height associated with the turbines rotor swept area, but because they migrate in groups, their ability to use echolocation is affected.[82] Evidence also shows that fatality events during migration may be dependent on the surrounding habitat. Studies done at Foote Creek Rim (Wyoming) and Buffalo Ridge (Minnesota) wind plants have shown an inverse relationship between the number of turbine mortalities and the distance to the nearest woodland habitat.[83,84]

A review of mortality studies consistently finds that most bats were killed on nights with low wind speed (<6 m/sec) and that fatalities increased immediately before and after passage of storm fronts.[85] Based on a review of 21 postconstruction fatality studies conducted at 19 facilities in five U.S. regions and one Canadian province, estimates of bat fatalities were highest at wind energy facilities located on forested ridges in the eastern United States (20.8 to 69.6 annual bat fatalities per turbine), while the Pacific Northwest region had among the lowest fatality rates. For the five studies completed in the Pacific Northwest, mortality ranged from 0.7 to 3.4 bats per turbine per year. In these five Pacific Northwest studies, the predominance of the composition of the bat fatalities were hoary bat (up to 64 percent), followed by, in four studies, silver-haired bat (up to 56 percent). While there are no known published studies of bat mortality at wind projects in the desert Southwest, other western projects including those in California have generally shown relatively low impacts. The recently published Dillon, California fatality project showed a bat fatality rate of 2.17 fatalities per turbine per year (2.17 fatalities per MW per year).[86]

Due to the current lack of understanding of bat populations in North America, the species and relative abundance of bats occurring within the project study area are difficult to determine. Using

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[79] Erickson, W.P., G.D. Johnson, M.D. Strickland, et al. 2000. *Avian and Bat Mortality Associated with the Vansycle Wind Project, Umatilla County, Oregon: 1999 Study Year*. Technical Report prepared by: West, Inc. for Umatilla County Department of Resource Services and Development, Pendleton, OR.

[80] Johnson, G.D., W.P. Erickson, D.A. Shepard, et al. 2002. *Bat Interactions with Wind Turbines at the Buffalo Ridge, Minnesota Wind Resource Area: 2001 Field Season*. Palo Alto, CA: Electric Power Research Institute.

[81] Harvey, M.J., J.S. Altenbach, and T.L. Best. 1999. *Bats of the United States*. Little Rock: Arkansas Game and Fish Commission.

[82] Griffin, D. R. 1970. "Migrations of Homing Bats." In *Biology of Bats*, Volume 1. New York, NY: Academic Press.

[83] Erickson, W., G. Johnson, D. Young, et al. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc. for Bonneville Power Administration, Cheyenne, WY.

[84] Johnson, G.D., D.P. Young, W.P. Erickson, et al. 2000. *Avian and Bat Mortality Associated with Initial Phase of the Foot Creek Rim Wind Power Project, Carbon County, Wyoming: November 3, 1998 - October 31, 1999*. Technical report prepared for: SeaWest Energy Corporation, San Diego, CA; and Bureau of Land Management, Rawlins, WY.

[85] Arnett, E.B., K. Brown, W.P. Erickson, J. Fiedler, T.H. Henry, G.D. Johnson, J. Kerns, R.R. Kolford, C.P. Nicholson, T. O'Connell, M. Piorkowski, and R. Tankersley Jr. 2008. "Patterns of Bat Fatalities at Wind Energy Facilities in North America." *Journal of Wildlife Management*, *72*: 61–78.

[86] Chatfield, A., W. Erickson, and K. Bay. 2009. *Avian and Bat Fatality Study Dillon Wind Energy Facility, Riverside, California*. Technical report prepared by: West, Inc., for: Iberdrola Renewables, Portland, OR.

the ratios of 2.17 fatalities per turbine per year from the recently published Dillon, California bat mortality study, it could be reasonably estimated that approximately 74 bats would be killed per year at the project. Hoary bats and silver-haired bats, which are likely to occur in the project study area, would be expected to represent the majority of wind-turbine-related bat fatalities from the proposed action. Hoary bats and silver-haired bats are widely distributed species that, in North America, found within most of the United States and parts of Canada and Mexico.[87,88]

Based on the available information, larger, less maneuverable, migrating species are primarily associated with wind turbine mortality events. In addition, those species, most notably hoary and silver haired bats in the western U.S., migrating in large colonies in late fall, make up the majority of fatalities observed and recorded.[89,90] Although there have been limited quantifiable data about wind turbine / bat collision effects on bat populations, qualitative and circumstantial data suggest that turbine mortalities do not appreciably contribute to population declines,[91] at least in the West.

A postconstruction monitoring study would be implemented to determine the overall level of bat fatalities resulting from operation of the project. In addition, avian and bat protection measures would be developed prior to construction to mitigate potential direct impacts to bats. Applicable significance thresholds for bats are not expected to be exceeded. The risk assessment aspect of the proposed ABPP, which would be prepared for the project, would include would include construction requirements, postconstruction bat monitoring and reporting requirements, and operational practices. With the iterative operational practices aspects of the proposed ABPP, the project would minimize impacts to bats, and applicable significance standards for bats would not be exceeded.

Special-status Species

In general, construction and operational impacts of the project on special-status plant and wildlife species and their habitats would be similar to those discussed in the preceding sections for vegetation communities, general wildlife, and avian and bat species. However, these impacts can be more severe for special status plant and wildlife species, if present, since the distribution and abundance of many of these species are limited in the project area and surrounding region.

Special-status Plants

No protected special-status plant species were identified as occurring within or near the project area. However, the proposed access roads traverse several relatively high-density areas of Joshua trees and cacti, which are protected species under the California Desert Native Plants Act. Proposed access roads and turbine pad sites associated with this project are likely to lead to the

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[87] Bolster, Betsy C. 2005. *Lasiurus cinereus Hoary Bat*. Species Accounts. Rapid City, ND: Western Bat Working Group.

[88] Perkins, Mark. 2005. *Lasionycteris noctivagans Silver-haired Bat*. Species Accounts. Rapid City, ND: Western Bat Working Group.

[89] Erickson, W., G. Johnson, D. Young, et al. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc. for Bonneville Power Administration, Cheyenne, WY.

[90] Johnson, G.D., D.P. Young, W.P. Erickson, et al. 2000. *Wildlife Monitoring Studies: SeaWest Wind Power Project, Carbon County, Wyoming: 1995-1999*. Technical Report prepared by: West, Inc., for: SeaWest Energy Corporation, San Diego, CA; and Bureau of Land Management, Rawlins, WY, p. 195.

[91] Erickson, W., G. Johnson, D. Young, et al. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc. for Bonneville Power Administration, Cheyenne, WY.

removal of some of these Joshua trees and cacti, and therefore inventories, harvest permits, and associated fees will be required prior to construction.

Special-status Wildlife

Amphibians

Two special-status amphibian species were identified as potentially occurring in the project study area: the Tehachapi slender salamander, a state threatened species and a BLM sensitive species; and the yellow-blotched salamander, a state species of special concern and a BLM sensitive species. Detailed surveys were conducted for these two species in suitable habitat within the adjacent Manzana Project study area, and neither species was observed during the detailed surveys. Therefore, based on the results of detailed surveys, as well as literature review, agency coordination, and consultation with experts, it has been determined these two special-status amphibian species are unlikely to occur on the project study area; and the project, therefore, has a low potential to impact these species.

Reptiles

Two special-status reptile species were identified as potentially occurring in the project property: the desert tortoise, which is a federally and state-listed threatened species, and the coast horned lizard, which is a state species of special concern and BLM sensitive species.

Desert Tortoise. No desert tortoise or diagnostic sign indicative of desert tortoise presence (e.g., track, scat, active or inactive burrows, scutes, courtship rings, pallets, drinking depressions, and/or live tortoise) was observed on the project property during surveys in October 2011 or on the adjacent Manzana Project study area during protocol-level surveys of desert tortoise conducted during spring 2005. While the project is located near the westernmost edge of the range of the desert tortoise and the project property contains marginal habitat to support this species, there is no evidence to suggest that desert tortoise inhabit the project property or areas in the immediate vicinity of the project property.

Additional surveys conducted during 2008, 2009, and 2011 for other projects in areas within the general geographic region of the project study area[92,93,94] resulted in two live desert tortoises approximately 5 miles to the east and one inactive burrow approximately 6 miles to the east. The nearest CNDDB occurrence of desert tortoise is approximately 7 miles east of the project study area.

While the results from these past surveys indicate that desert tortoise is likely to occur in areas near and adjacent to the project area, it is concluded that desert tortoise are unlikely to occur within the project study area due to negative survey results from the 2011 protocol-level survey effort on the property; negative survey results from the 2005 protocol-level survey effort in the adjacent Manzana Project study area; lack of observations within the project area from CNDDB records; and results of other survey efforts conducted from 2005 to 2009, which failed to detect tortoises in

[92] Sapphos Environmental, Inc. 2009. *Pacific Wind Energy Project Biological Resources Technical Report*. Pasadena, CA.

[93] Sapphos Environmental, Inc. 2011. *Avalon Wind Energy Project Biological Resources Technical Report*. Pasadena, CA.

[94] Sapphos Environmental, Inc. 2011. *Catalina Renewable Energy Project Biological Resources Technical Report*. Pasadena, CA.

the margins of areas directly adjacent to the project study area. Therefore, potential direct and indirect effects on desert tortoise from implementation of the project are not expected to occur.

Coast Horned Lizard. The species has been determined to be present in the adjacent Manzana Project study area as a result of detailed field surveys. Therefore, this sensitive species has the potential to be present in the project study area. Direct impacts to this species, if present, could include being hit by vehicles on access roads; mechanical crushing during WTG site preparation, grading of new access roads, and preparation of staging locations; and general disturbance due to increased human activity. Furthermore, project implementation may result in permanent loss of habitat due to permanent structures and/or roads and temporary loss of habitat from construction activities.

Due to the limited number of individuals that could inhabit the area and the general habitat limited amount of suitable habitat for this species in the project area, it is expected that impacts would be limited to no more than a few individuals—a level of impact that would not have a measurable impact on the locally breeding populations. Thus, overall, impacts to this species are expected to be low and not significant.

Avian Species

Resident Sensitive Birds

Golden Eagle. During detailed field surveys conducted for the project study area, no golden eagle nests were identified within the project property. However, resident golden eagles from nearby areas were observed foraging in portions of the adjacent Manzana Project study area throughout the year and were observed during spring and fall migration. Migrants in fall were generally observed flying above 1,000 feet, whereas the more numerous resident birds frequently foraged at heights below 100 feet above ground level.

A golden eagle was reportedly killed at the nearby Oak Creek Energy Systems (OCES) Wind Farm, indicating their susceptibility to wind turbine collisions despite low incidences of occurrence. It is believed that this golden eagle kill may have been an anomaly due to recent fires in the area driving birds out of their normal foraging habitats. In addition to the reported fatality at the OCES Wind Farm in 2009, two additional golden eagle fatalities were documented at the Pine Tree Wind Energy Project in 2010. The Pine Tree Wind Energy Project is located approximately 23.8 miles north of the project.

No golden eagles were reported killed in studies conducted from 1996 to 1998 during a 19-month study in the Tehachapis,[95] although approximately 43 individuals of other species of raptors (e.g., red-tailed hawk, great horned owl) were killed.

The probability of collision fatality of raptors at wind farms, including the golden eagle, has often not depended on raptor abundance. Rather, the probability of collision fatality of raptors at wind farms has usually depended upon species-specific flight behaviors particularly avoidance behaviors as well as location, local topographic characteristics of the wind farm site, weather, turbine design,

[95] Anderson, R.N., J.T. Neumann, W.R. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. *Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area*. Golden, CO: National Renewable Energy Laboratory, U.S. Department of Energy.

and wind farm design.[96,97,98] Nonetheless, the golden eagle has been susceptible to collisions with wind turbines, and not only at the Altamont Pass WRA, which has one of the highest breeding concentrations of golden eagles in the world. In the Valencia region of eastern Spain for example, preconstruction site-specific data incorporated into an additive scoring model based on the attributes of raptor species produced a raptor sensitivity index that identified the golden eagle as the most vulnerable of nine raptors to collisions with wind turbines at this site.[99] Based on these factors and the species population levels and habitat use within the project area, the level of risk associated with the project for the golden eagle is considered to be moderate to high.

The iterative operational practices aspects of the BBCS that would be developed for the project would help address any take of golden eagles. Implementation of the BBCS would minimize project-related impacts and help ensure that the project would be in compliance with the BGEPA and MBTA and amendments thereto. Applicable significance thresholds for the golden eagle are not expected to be exceeded.

Mitigation measures will be developed to address impacts that are likely to occur as disclosed in the EIS. Postconstruction monitoring and risk assessment validation is designed to evaluate the project during operation to determine actual impacts. Adaptive management has been designed to use monitoring data to evaluate whether impacts are nearing or exceeding those disclosed in the EIS and, if so, to implement measures to reduce them to acceptable levels based on the EIS. Compensatory mitigation actions have been developed to address impacts from unmitigated mortality to the golden eagle. This proactive approach would help ensure that the operational aspects of the project would be in compliance with the BGEPA and MBTA, and the expected level of mortality of the golden eagle would be below applicable significance thresholds.

The project proponent is in the process of preparing a BBCS for the project that will be used to support authorization by the USFWS of a programmatic permit for nonpurposeful take of golden eagles under the BGEPA. The report summarizes the literature search on the status of golden eagles in western North America, with the emphasis on California especially for distribution information within three Bird Conservation Regions that include or are adjacent to the project study area. The report also presents results from the May 2010, February 2011, and May 2011 aerial surveys that included the project study area and surrounding region; evaluates the likelihood and magnitude of take of golden eagles based on established thresholds; and suggests advanced conservation practices that include best available techniques to reduce eagle disturbance/mortality to a level where any remaining take is unavoidable. The information will be used to support a programmatic take permit for non-purposeful take of golden eagles pursuant to the BGEPA, when the permitting process is finalized by the USFWS and permits become available.

California Condor. There are no known occurrences of the California condor within the project study area. Condors were not detected during avian surveys for the project and during avian surveys conducted over several thousand hours on over 30,000 acres in the immediate

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[96] Madders, M., and D.P. Whitfield. 2006. "Upland Raptors and the Assessment of Wind Farm Impacts." *Ibis*, *148*: 43–56.

[97] De Lucas, M., F.E.J. Guyonne, D.P. Whitfield, and M. Ferrer. 2008. "Collision Fatality of Raptors in Wind Farms Does Not Depend on Raptor Abundance." *Journal of Applied Ecology*, *45*: 1695–1703.

[98] Noguera, J.C., I. Pérez, and E. Mínguez. 2010. "Impact of Terrestrial Wind Farms on Diurnal Raptors: Developing a Spatial Vulnerability Index and Potential Vulnerability Maps." *Ardeola*, *57*: 41–53.

[99] Noguera, J.C., I. Pérez, and E. Mínguez. 2010. "Impact of Terrestrial Wind Farms on Diurnal Raptors: Developing a Spatial Vulnerability Index and Potential Vulnerability Maps." *Ardeola*, *57*: 41–53.

surrounding area. Furthermore, results of the probability of use model developed for the condor in the Antelope Valley, as it merges with the Tehachapi and San Gabriel Mountains, have shown that the entire project study area is located in a zone of low probability of use for condors.

Although the nearest California condor was observed approximately 3.9 miles west of the project area, the species' potential for occurrence on the project property is still low because the entire project area supports marginal foraging habitat, lacks available nesting sites and traditional and temporary roost sites for overnight and diurnal roosting locations, and provides a different air transport mechanism than that of the adjacent Tejon Ranch and designated critical habitat.

There are no known nesting sites within the project study area or the Tejon Ranch CHU. All recently documented California condor nest sites in Southern California are located on public lands within the Los Padres, Angeles, and Sequoia National Forests. No cliffs or large trees of the size required by California condors exist in the project area or within the Tejon Ranch CHU.

Based on the lack of known occurrence of the California condor within the project area and habitat use, the level of risk associated with the project for the California condor was considered to be low. In light of the overall low probability for a California condor in the southern flock to be present outside its historic range, it is conceivable for a California condor to wander into the project area. The ability of condors to avoid wind turbines is unknown. Based on preliminary searches of the scientific literature, there appears to be a potential risk of collision to California condors from wind turbines if and when the condor range and wind turbines are located within close proximity of historical nesting sites and primary movement corridors. However, to date, there are no known California condor deaths that have been attributed to wind turbines. It is important to stress that designation of unknown causes for condor mortality are just that—unknown—and inferring probable causes for these unknown deaths is problematic. Thus, it is unlikely that few if any California condors that have died from unknown causes have been killed by wind turbines in the TWRA. As California condor numbers continue to increase in Southern California, including the Tehachapis, and their range expands, even into the margin of the Mojave Desert, the risk of condor mortality from collisions with wind turbines increases.

Cooper's Hawk and Prairie Falcon. The Cooper's hawk and prairie falcon are resident raptor species in the project study area and were observed in low numbers during both the winter raptor surveys and the spring and fall migratory surveys in the adjacent Manzana Project study area. No nests were identified to occur within or near the project area. Implementation of the proposed action would result in the direct disturbance of a small amount (approximately 37.62 acres) of Joshua Tree Woodland, Mojave Desert Wash Scrub, Mojavean Juniper Woodland and Scrub, and Mojave Mixed Woody Scrub, which provide foraging habitat for these species. Short-term (due to construction activity) mortality effects from the project on these species are considered unlikely to occur.

Cooper's hawks and prairie falcons in the area might be at risk of collision with turbines; however, studies of raptor behavior have documented high raptor collision avoidance behaviors, noting that the diurnal flight of raptors may provide these birds with the ability to visually and acoustically detect turbines. It is also noted that raptor activity at the project study area during the fall of 2005 was among the lower passage rates (0.5 birds per 20-minute survey) as compared with other wind energy facilities in California. The red-tailed hawk, turkey vulture, and American kestrel were the most commonly observed raptor species recorded during the 2004–2005 survey season, though only the red-tailed hawk could be described as common.[100] While it is possible that small numbers of fatalities of Cooper's hawks and prairie falcons could occur over the life of the project, such events are expected to be rare and impacts are not expected to be substantial.

Burrowing Owl. Several burrowing owls were observed over-wintering within grassland and open shrub habitats in the project property during various surveys conducted for the adjacent Manzana Project study area. During surveys for this species on the project property in October of 2011, three occupied burrows were recorded. All recorded burrows were located in washes. The project's design avoids crossing any drainages, and therefore risks to this species during construction would be minimized. Implementation of the proposed action would result in the direct disturbance of a small amount (approximately 11.47 acres) of Mojave Desert Wash Scrub and Non-native Grassland, which provide foraging habitat for these species. Short-term (due to construction activity) mortality effects from the project on these species are considered unlikely to occur.

While burrowing owls flying within the project area would have some exposure to turbine mortality, there have been no documented burrowing owl fatalities at wind energy facilities in the region. Any mortality that might occur over the project life would be at a very low level and would not have a measurable effect on burrowing owl populations. Operation of the project should have minimal disturbance effect on burrowing owls, based primarily on their relative scarcity and low use of the project area.

Loggerhead Shrike and Le Conte's Thrasher. The loggerhead shrike and Le Conte's thrasher are breeding residents in the study area and were observed in low numbers during the spring and summer. Implementation of the proposed action would result in the direct disturbance of a small amount (approximately 37.62 acres) of Joshua Tree Woodland, Mojave Desert Wash Scrub, Mojave Mixed Woody Scrub, and Mojavean Juniper Woodland and Scrub, which are considered breeding, nesting, foraging, and loafing habitat for these species. Short-term (due to construction activity) mortality effects from the project on these species are considered unlikely to occur. Loggerhead shrikes, Le Conte's thrashers, and sage sparrows in the area might be at risk of collision with turbines; however, due to the low level of use of the project area by these species, mortality impacts are not expected to be substantial.

Migratory Sensitive Birds

Swainson's Hawk, Northern Goshawk, Ferruginous Hawk, American Peregrine Falcon, American White Pelican, White-tailed Kite, Northern Harrier, Sharp-shinned Hawk, Merlin, and Vaux's Swift. Each of these species was observed migrating through the project property during spring and fall migration. Implementation of the proposed action would result in the direct disturbance of a small amount (approximately 37.62 acres) of Joshua Tree Woodland, Mojave Desert Wash Scrub, Mojave Mixed Woody Scrub, and Mojavean Juniper Woodland and Scrub, which are considered suitable foraging and loafing habitat for many of these species. Short-term (due to construction activity) mortality effects from the project on these species are considered unlikely to occur, since equally suitable or better foraging habitats are available elsewhere within the region.

Impacts to the Swainson's hawk, northern goshawk, ferruginous hawk, American peregrine falcon, American white pelican, white-tailed kite, northern harrier, sharp-shinned hawk, merlin, and Vaux's swift flying between 200 and 400 feet may also result during project operation due to

[100] Sapphos Environmental, Inc. 2006. *PdV Wind Energy Project Biological Resources Technical Report*. Pasadena, CA.

potential for collision with turbines and power lines that could result in injury and/or direct mortality. American white pelicans in particular were observed flying within this range during the spring surveys conducted at the Manzana Project site; however, the American white pelican has not been documented to be killed at any wind farm. The Vaux's swift was observed in limited numbers during migration surveys conducted at the Manzana Project site. It is an aerial insectivore and frequently migrates at altitudes favorable for collision (197–410 feet). However, this species is primarily a diurnal migrant, so it is less vulnerable to collisions.

The low number of Swainson's hawks, northern goshawks, ferruginous hawks, northern harriers, sharp-shinned hawks, white-tailed kites, and merlins; the flight behavior of these species; and the fact that only breeding populations are considered greatly reduce concern about any potential impacts to these species from potential collisions with wind turbines at the project property. Available data from comparable sites in California, including the Antelope Valley and Tehachapi Mountains, and western North America appear to generally support the conclusion that few birds other than selected species of diurnal raptors, such as red-tailed hawks, are killed at modern wind turbine farms of tubular and not lattice construction,[101,102,103,104,105,106,107] especially when compared to collision rates at other structures such as communication towers.[108,109] Furthermore, at Altamont, California, the Altamont Monitoring Team 2008 has, to date, documented a sharp decline in raptor mortality from collisions with wind turbines at large turbines, such as ones proposed to be built at

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[101] Erickson, W.P., G.D. Johnson, M.D. Strickland, D.P. Young, Jr., K.J. Sernka, and R.E. Good. 2001. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. Washington, DC: National Wind Coordinating Committee. Available at: http://nationalwind.org/

[102] National Wind Coordinating Committee. November 2004. *Wind Turbine Interactions with Birds and Bats: A Summary of Research Results and Remaining Questions*. Fact Sheet. 2nd Edition. Available at: www.nationalwind.org

[103] Erickson, W.P., G.D. Johnson, and D.P. Young, Jr. 2005. "A Summary and Comparison of Bird Mortality from Anthropogenic Causes with an Emphasis on Collisions." In *Bird Conservation Implementation and Integration in the Americas: Proceedings at the Third International Partners in Flight Conference; 2002 March 20–24; Asilomar, CA*, Volume 2, ed. C.J. Ralph and T.D. Rich. General Technical Report PSW-GTR-191. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, pp. 1029–1042.

[104] Manville, A.M., II. 2005. "Bird Strikes and Electrocutions at Communication Towers, Power Lines, and Wind Turbines: State of the Art and State of the Science – Next Steps Toward Mitigation." In *Bird Conservation Implementation and Integration in the Americas: Proceedings at the Third International Partners in Flight Conference; 2002 March 20–24; Asilomar, CA*, Volume 2, ed. C.J. Ralph and T.D. Rich. General Technical Report PSW-GTR-191. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, pp. 1051–1064.

[105] Erickson, W.P., M.D. Strickland, D.P. Young Jr., and G.D. Johnson. 2008. "Avian Collisions with Wind Turbines. A Summary of Avian and Bat Fatality at Wind Facilities in the United States." Presented at the National Wind Coordinating Collaborative Wind Wildlife Research Meeting VII, October 28–29, 2008, Milwaukee, WS. Available at: http://nationalwind.org/events/meetings/presentations.htm

[106] Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. *Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area Period of Performance: October 2, 1996–May 27, 1998*. National Renewable Energy Laboratory Contract No. DE-AC36-99-GO10337. Washington, DC: U.S. Department of Energy.

[107] Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, D.A. Shepherd, and S.A. Sarappo. 2002. "Collision Mortality of Local and Migrant Birds at a Large-scale Wind Power Development on Buffalo Ridge, Minnesota." *Wildlife Society Bulletin*, *30*: 879–887.

[108] Kerlinger, P. 2001. *Avian Mortality at Communication Towers: A Review of Recent Literature, Research, and Methodology*. Arlington, VA: U.S. Fish and Wildlife Service. Available at: http://www.towerkill.com

[109] Erickson, W.P., G.D. Johnson, and D.P. Young, Jr. 2005. "A Summary and Comparison of Bird Mortality from Anthropogenic Causes with an Emphasis on Collisions." In *Bird Conservation Implementation and Integration in the Americas: Proceedings at the Third International Partners in Flight Conference; 2002 March 20–24; Asilomar, CA*, Volume 2, ed. C.J. Ralph and T.D. Rich. General Technical Report PSW-GTR-191. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, pp. 1029–1042.

the project , compared to small turbines.[110] No mortality of these species was documented in the 19-month avian mortality study at the Tehachapi Pass WRA.[111] Thus, construction and operation of the project would not be expected to result in significant impacts to these species.

Mammals

Mohave Ground Squirrel. The Mohave ground squirrel has been determined to be absent from the project area; therefore, no impacts to this species would occur from implementation of the project.

American Badger and San Joaquin Pocket Mouse. The American badger and San Joaquin pocket mouse were determined to be present within the project property, and the permanent and temporary loss of habitat as a result of construction activities could affect habitat for these species. Although there is no way to accurately quantify these effects, the impact is likely to be moderate in the short term and to be reduced over time as reclaimed areas produce suitable habitats. The American badger and San Joaquin pocket mouse, while locally scarce, are widely distributed throughout the project area and surrounding region, and the loss of some habitat for these individuals would have a negligible impact on populations of these species throughout the region. Indirect effects due to displacement of these species could also occur as a result of construction activities associated with the project. These effects would be similar to those previously described for general wildlife.

Sensitive Bat Species

Although the potential of incidental loss of resident and migratory sensitive bats through collision with operational wind turbines exists, the project would not be expected to adversely affect the survival and recovery in the wild of the four sensitive bat species that have the potential to occur within the project property. Collisions of migratory bats with wind turbines have been reported for wind farms in the United States.[112] Based on a review of 21 postconstruction fatality studies conducted at 19 facilities in five United States regions and one Canadian province, estimates of bat fatalities were highest at wind energy facilities located on forested ridges in the eastern United States (20.8 to 69.6 annual bat fatalities per turbine), and the Pacific Northwest region possessed among the lowest fatality rates. For the five studies completed in the Pacific Northwest, mortality ranged from 0.7 to 3.4 bats per turbine per year. In these studies, the predominance of the composition of the bat fatalities were hoary bat (up to 64 percent), followed by, in four studies, silver-haired bat (up to 56 percent). While there are no known published studies of bat mortality at wind projects in the desert Southwest, other western projects including those in California have generally shown low impacts. The recently published Dillon, California fatality project showed a bat fatality rate of 2.17 fatalities per turbine per year (2.17 fatalities per MW per year).[113]

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[110] Erickson, W.P., M.D. Strickland, D.P. Young Jr., and G.D. Johnson. 2008. "Avian Collisions with Wind Turbines. A Summary of Avian and Bat Fatality at Wind Facilities in the United States." Presented at the National Wind Coordinating Collaborative Wind Wildlife Research Meeting VII, October 28–29, 2008, Milwaukee, WS. Available at: http://nationalwind.org/events/meetings/presentations.htm

[111] Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. *Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area Period of Performance: October 2, 1996–May 27, 1998*. National Renewable Energy Laboratory Contract No. DE-AC36-99-GO10337. Washington, DC: U.S. Department of Energy.

[112] Johnson, Greg. September 2004. "Bat Ecology Related to Wind Development and Lessons Learned about Impacts on Bats from Wind Development." In *Proceedings of the Wind Energy and Birds/Bats Workshop: Understanding and Resolving Bird and Bat Impacts*. Washington, DC.

[113] Chatfield, A., W. Erickson, and K. Bay. 2009. *Avian and Bat Fatality Study Dillon Wind Energy Facility, Riverside, California*. Technical report prepared by: West, Inc., for: Iberdrola Renewables, Portland, OR.

Due to the current lack of understanding of bat populations in North America, the species and relative abundance of bats occurring within the project study area are difficult to determine. Using the rate of 2.17 fatalities per turbine per year from the recently published Dillon, California bat mortality study, it could be reasonably estimated that approximately 74 bats would be killed per year at the project property. Hoary bats and silver-haired bats, which are likely to occur in the project study area, would be expected to represent the majority of wind-turbine-related bat fatalities from operation of the project. Hoary bats and silver-haired bats are widely distributed species that, in North America, are found within most of the United States and parts of Canada and Mexico.[114,115]

Based on the available information, larger, less maneuverable, migrating species are primarily associated with wind turbine mortality events. In addition, those species, most notably hoary and silver-haired bats in the western United States, migrating in large colonies in late fall, make up the majority of fatalities observed and recorded.[116,117] Although there have been limited quantifiable data about wind turbine/bat collision effects on bat populations, qualitative and circumstantial data suggest that turbine mortalities do not appreciably contribute to population declines,[118] at least in the West.

Based on species population factors and/or habitat use, the level of risk associated with the project for the four sensitive bat species is considered to be low. While these bat species within the project area would have some exposure to turbine mortality, there have been few documented fatalities of these species at wind energy plants in the region. Any mortality that might occur over the project life would be at a low level and is unlikely to have an appreciable effect on populations of these species.

The iterative operational practices aspects of the BBCS that would be prepared for the project would help address any impacts to sensitive bat species from collisions with wind turbines. Additionally, mitigation measures have been developed to address impacts that are likely to occur as disclosed in the EIS. Postconstruction monitoring and risk assessment validation is designed to evaluate the project during operation to determine actual impacts. Adaptive management has been designed to use monitoring data to evaluate whether impacts are nearing or exceeding those disclosed in the EIS and, if so, to implement measures to reduce them to acceptable levels. Compensatory mitigation actions have been developed to address impacts from unmitigated mortality to sensitive bat species. This proactive approach would help ensure that the expected level of mortality of sensitive bat species would be below applicable significance thresholds.

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[114] Bolster, Betsy, C. 2005. *Lasiurus cinereus Hoary Bat*. Species Accounts. Rapid City, ND: Western Bat Working Group.

[115] Perkins, Mark. 2005. *Lasionycteris noctivagans Silver-haired Bat*. Species Accounts. Rapid City, ND: Western Bat Working Group.

[116] Erickson, W., G. Johnson, D. Young, et al. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc. for Bonneville Power Administration, Cheyenne, WY.

[117] Johnson, G.D., D.P. Young, W.P. Erickson, et al. 2000. *Wildlife Monitoring Studies: Seawest Wind Power Project, Carbon County, Wyoming: 1995-1999*. Technical report prepared by: West, Inc. for SeaWest Energy Corporation, San Diego, CA; and Bureau of Land Management, Rawlins, WY, p. 195.

[118] Erickson, W., G. Johnson, D. Young, et al. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc. for Bonneville Power Administration, Cheyenne, WY.

5.6.2 Direct and Indirect Impacts of the No Action Alternative

There would be no new facilities built or other activities under the no action alternative. As such, there would be no change, either positive or negative, to vegetation, general wildlife or wildlife habitats, and sensitive plant and animal species under this alternative.

Anderson, R.N., N. Neumann, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. *Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area*. Golden, CO: National Renewable Energy Laboratory, U.S. Department of Energy.

Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. *Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area Period of Performance: October 2, 1996–May 27, 1998*. National Renewable Energy Laboratory Contract No. DE-AC36-99-GO10337. Washington, DC: U.S. Department of Energy.

Anderson, R.L., J. Tom, N. Neumann, and J.A. Cleckler. 1996. *Avian Monitoring and Risk Assessment at Tehachapi Pass Wind Resource Area, California*. Sacramento, CA: California Energy Commission.

Arnett, E.B., K. Brown, W.P. Erickson, J. Fiedler, T.H. Henry, G.D. Johnson, J. Kerns, R.R. Kolford, C.P. Nicholson, T. O'Connell, M. Piorkowski, and R. Tankersley Jr. 2008. "Patterns of Bat Fatalities at Wind Energy Facilities in North America." *Journal of Wildlife Management*, *72*: 61–78.

Bloom, P.H., and W.S. Clark. 2001. "Molt and Sequence of Plumages of Golden Eagles, and a Technique for In-hand Ageing." *North American Bird Bander*, *26*: 97–116.

Bolster, Betsy C. 2005. *Lasiurus cinereus Hoary Bat*. Species Accounts. Rapid City, ND: Western Bat Working Group.

Bureau of Land Management. 2005. *Land Use Planning*. Handbook H-1601-1. Washington, DC. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/ak/aktest/planning/planning_general.Par.65225.File.dat/blm_lup_handbook.pdf

Bureau of Land Management. 2008. *National Environmental Policy Act Program*. Handbook H-1790-1. Washington, DC. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.24487.File.dat/h1790-1-2008-1.pdf

Bureau of Land Management. 2009. *Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species*. Available at: http://www.blm.gov/ca/dir/pdfs/2009/im/CAIM2009-026ATT1.pdf

The California Burrowing Owl Consortium. April 1993. *California Burrowing Owl Survey Protocol and Mitigation Guidelines*. Available at: http://www.dfg.ca.gov/wildlife/nongame/docs/boconsortium.pdf

California Department of Fish and Game. 2004. *Rarefind 2: A Database Application for the Use of the California Department of Fish and Game Natural Diversity Database*. Sacramento, CA.

California Department of Fish and Game. 2005. *Rarefind 3: A Database Application for the Use of the California Department of Fish and Game Natural Diversity Database*. Sacramento, CA.

California Department of Fish and Game. Accessed April 2010. *Natural Community Conservation Planning (NCCP)*. Available at: http://www.dfg.ca.gov/habcon/nccp/status.html

California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game. Sacramento, CA.

California Energy Commission and California Department of Fish and Game. 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Commission Final Report. CEC-700-2007-008-CMF. Sacramento, CA: California Energy Commission, Renewables Committee, and Energy Facilities Siting Division, and California Department of Fish and Game, Resources Management and Policy Division. Available at: www.energy.ca.gov/renewables/06-0II-1/documents

California Natural Resources Agency. 2009. *Protocols for Surveying and Evaluating Impacts to Special-status Native Plant Populations and Natural Communities*. Sacramento CA: California Department of Fish and Game. Available at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/Protocols_for_Surveying_and_Evaluating_Impacts.pdf

Cannon, W.L., R.S. Sikes, and the Animal Care and Use Committee of the American Society of Mammalogists. 2007. "Guidelines of the American Society of Mammalogists for the Use of Wild Mammals in Research." *Journal of Mammalogy*, *88*: 809–823.

Chatfield, A., W. Erickson, and K. Bay. 2009. *Avian and Bat Fatality Study Dillon Wind Energy Facility, Riverside, California*. Technical report prepared by: West, Inc. Prepared for: Iberdrola Renewables, Portland, OR.

Clark, W.S. 2001. "Ageing Eagles at Hawk Watches: What Is Possible and What Is Not." In *Hawkwatching in the Americas*, ed. K.L. Bildstein and D. Klem Jr. North Wales, PA: Hawk Migration Association of America, pp. 143–148.

Clark, W.S., and B. Wheeler. 2001. *Peterson Field Guides: Hawks of North America*. 2nd ed. New York, NY: Houghton Mifflin.

Comrack, L., and R. Logsdon. 2008. *Status Review of the American Peregrine Falcon in California*. California Department of Fish and Game, Wildlife Branch, Nongame Wildlife Program Report 2008-06. Sacramento, CA: California Department of Fish and Game.

Crawford, R.L., and W.W. Baker. 1981. "Bats Killed at a North Florida Television Tower: A 25 Year Record." *Journal of Mammalogy*, *62*: 651–652.

Davis, F.W., D.M. Stoms, A.D. Hollander, K.A. Thomas, P.A. Stine, D. Odion, M.I. Borchert, J.H. Thorne, M.V. Gray, R.E. Walker, K. Warner, and J. Graae. 1998. *The California Gap Analysis Project–Final Report*. Santa Barbara, CA: University of California, Santa Barbara. Available at: http://www.biogeog.ucsb.edu/projects/gap/gap_rep.html

De Lucas, M., F.E.J. Guyonne, D.P. Whitfield, and M. Ferrer. 2008. "Collision Fatality of Raptors in Wind Farms Does Not Depend on Raptor Abundance." *Journal of Applied Ecology*, *45*: 1695–1703.

Environmental Studies Board. 1974. *Rehabilitation Potential of Western Coal Lands*. Study Committee on the Potential for Rehabilitating Lands Surface Mined for Coal in the Western United States, National Academy of Sciences, National Academy of Engineering. Cambridge, MA: Ballinger.

Erickson, W.P., G.D. Johnson, M.D. Strickland, et al. 2000. *Avian and Bat Mortality Associated with the Vansycle Wind Project, Umatilla County, Oregon: 1999 Study Year*. Technical report prepared by: West, Inc. Prepared for: Umatilla County Department of Resource Services and Development, Pendleton, OR.

Erickson, W., G.D. Johnson, M.D. Strickland, et al. 2001. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. Prepared by: Western EcoSystems Technology Inc. Prepared for: National Wind Coordinating Committee, Cheyenne, WY.

Erickson, W.P., G.D. Johnson, M.D. Strickland, D.P. Young, Jr., K.J. Sernka, and R.E. Good. 2001. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. Washington, DC: National Wind Coordinating Committee. Available at: http://nationalwind.org/

Erickson, W., G. Johnson, D. Young, et al. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc. Prepared for: Bonneville Power Administration, Cheyenne, WY.

Erickson, W.P., G.D. Johnson, and D.P. Young, Jr. 2005. "A Summary and Comparison of Bird Mortality from Anthropogenic Causes with an Emphasis on Collisions." In *Bird Conservation Implementation and Integration in the Americas: Proceedings at the Third International Partners in Flight Conference; 2002 March 20–24; Asilomar, CA*, Volume 2, ed. C.J. Ralph and T.D. Rich. General Technical Report PSW-GTR-191. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, pp. 1029–1042.

Erickson, W.P., M.D. Strickland, D.P. Young Jr., and G.D. Johnson. 2008. "Avian Collisions with Wind Turbines. A Summary of Avian and Bat Fatality at Wind Facilities in the United States." Presented at the National Wind Coordinating Collaborative Wind Wildlife Research Meeting VII, October 28–29, 2008, Milwaukee, WS. Available at: http://nationalwind.org/events/meetings/presentations.htm

Executive Order 11990. 18 May 2001. *Actions to Expedite Energy-Related Projects*. Available at: http://water.epa.gov/lawsregs/guidance/wetlands/eo11990.cfm

Executive Order 13112. 18 May 2001. *Actions to Expedite Energy-Related Projects*. Available at: http://www.nepa.gov/nepa/regs/eos/eo13112.html

Federal Register. 20 May 2008. "Notices." *73* (98): 29075–29084.

Fisser, H.G. 1981. "Shrub Establishment, Dominance, and Ecology on the Juniper and Sagebrush-Grass Types in Wyoming." In *Shrub Establishment on Disturbed arid and Semi-arid Lands: Proceedings of the Symposium Held at Laramie, Wyoming, December 2-3, 1980*, L.H. Stelter, E.J. DePuit, and S.A. Mikol, Technical Coordinators. Cheyenne, WY: Wyoming Game and Fish Department, pp. 23–28.

Goodrich, L.J., and J.P. Smith. 2008. "Raptor Migration in North America." In *State of North America's Birds of Prey*, ed. K.L. Bildstein, J.P. Smith, E. Ruelas Inzunza, and R.R. Veit. Cambridge, MA: Nuttall Ornithological Club; and Washington, DC: The American Ornithologists' Union, pp. 37–150.

Grantham, J. 2007. "Reintroduction of California Condors into Their Historical Range: The Recovery Program in California." In *California Condors in the 21st Century*, ed. A. Mee and L.S. Hall. Cambridge, MA: Nuttall Ornithological Club; and Washington, DC: The American Ornithologists' Union.

Griffin, D. R. 1970. "Migrations of Homing Bats." In *Biology of Bats*, Volume 1. New York, NY: Academic Press.

Gruver, J.C. 2002. "Assessment of Bat Community Structure and Roosting Habitat Preferences of the Hoary Bat (Lasiurus cinereus) Near Foot Creek Rim, Wyoming." Master's thesis, Department of Zoology and Physiology, University of Wyoming, Laramie.

Hanowski, J.M., and R.Y. Hawrot, 2000, "Avian Issues in the Development of Wind Energy in Western Minnesota." *Proceedings of the NWCC National Avian-Wind Power Planning Meeting III, San Diego, Calif., May 1998*.

Harvey, M.J., J.S. Altenbach, and T.L. Best. 1999. *Bats of the United States*. Little Rock: Arkansas Game and Fish Commission.

Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

Hickman, J.C., ed. 1993. *The Jepson Manual: Higher Plants of California*. Berkeley, CA: University of California Press.

Holland, Robert F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Sacramento, CA: California Department of Fish and Game.

Howe, R.W., W. Evans, and A.T. Wolf. 2002. *Effects of Wind Turbines on Birds and Bats in Northeastern Wisconsin*. Technical report submitted to Wisconsin Public Service Corporation and Madison Gas and Electric Company, Madison, WI.

Janss, G. 2000, "Bird Behavior in and Near a Wind Farm at Tarifa, Spain: Management Considerations." *Proceedings of the NWCC National Avian-Wind Power Planning Meeting III, San Diego, Calif., May 1998*.

Johnson, Greg. September 2004. "Bat Ecology Related to Wind Development and Lessons Learned about Impacts on Bats from Wind Development." In *Proceedings of the Wind Energy and Birds/Bats Workshop: Understanding and Resolving Bird and Bat Impacts*. Washington, DC.

Johnson, G.D., D.P. Young, W.P. Erickson, et al. 2000. *Avian and Bat Mortality Associated with Initial Phase of the Foot Creek Rim Wind Power Project, Carbon County, Wyoming: November 3, 1998 - October 31, 1999*. Technical report prepared for: SeaWest Energy Corporation, San Diego, CA; and Bureau of Land Management, Rawlins, WY.

Johnson, G.D., D.P. Young, W.P. Erickson, et al. 2000. *Wildlife Monitoring Studies: SeaWest Wind Power Project, Carbon County, Wyoming: 1995-1999*. Technical report prepared by: West, Inc., for: SeaWest Energy Corporation, San Diego, CA; and Bureau of Land Management, Rawlins, WY.

Johnson, G.D., W.P. Erickson, D.A. Shepard, et al. 2002. *Bat Interactions with Wind Turbines at the Buffalo Ridge, Minnesota Wind Resource Area: 2001 Field Season*. Palo Alto, CA: Electric Power Research Institute.

Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, D.A. Shepherd, and S.A. Sarappo. 2002. "Collision Mortality of Local and Migrant Birds at a Large-scale Wind Power Development on Buffalo Ridge, Minnesota." *Wildlife Society Bulletin*, *30*: 879–887.

Kerlinger, P. 1989. *Flight Strategies of Migrating Hawks*. Chicago, IL: University of Chicago Press.

Kerlinger, P. 2001. *Avian Mortality at Communication Towers: A Review of Recent Literature, Research, and Methodology*. Arlington, VA: U.S. Fish and Wildlife Service. Available at: http://www.towerkill.com

Madders, M., and D.P. Whitfield. 2006. "Upland Raptors and the Assessment of Wind Farm Impacts." *Ibis*, *148*: 43–56.

Manville, A.M., II. 2005. "Bird Strikes and Electrocutions at Communication Towers, Power Lines, and Wind Turbines: State of the Art and State of the Science—Next Steps toward Mitigation." In *Bird Conservation Implementation and Integration in the Americas: Proceedings at the Third International Partners in Flight Conference; 2002 March 20–24; Asilomar, CA*, Volume 2, ed. C.J. Ralph and T.D. Rich. General Technical Report PSW-GTR-191. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, pp. 1051–1064.

McCarty, R. 1975. "*Onychomys Torridus*." *Mammalian Species*, *59*: 1–5.

Mendez, Irena, Sapphos Environmental, Inc., Pasadena, CA. 22 June 2006. Letter to Mr. Aaron Allen, U.S. Army Corps of Engineers, Ventura, CA. Subject: Determination of Non-Jurisdiction for Proposed PdV Wind Energy Project in Southern Kern County.

Meretsky, V.J., and N.F.R. Snyder. 1992. "Range Use and Movements of California Condors." *Condor*, *94*: 313–335.

Munz, P. 1974. *A Flora of Southern California*. Berkeley, CA: University of California Press.

National Research Council. 2007. *Environmental Impacts of Wind Energy Projects*. Washington, DC: National Academies Press.

National Wind Coordinating Committee. November 2004. *Wind Turbine Interactions with Birds and Bats: A Summary of Research Results and Remaining Questions*. Fact Sheet. 2nd Edition. Available at: www.nationalwind.org

Noguera, J.C., I. Pérez, and E. Mínguez. 2010. "Impact of Terrestrial Wind Farms on Diurnal Raptors: Developing a Spatial Vulnerability Index and Potential Vulnerability Maps." *Ardeola*, *57*: 41–53.

Orloff, S., and A. Flannery. 1992. *Wind Turbine Effects on Avian Activity, Habitat Use, and Mortality in Altamont Pass and Solano County Wind Resource Areas*. Work performed by: BioSystems Analysis, Inc., Tiburon, CA. Sacramento, CA: California Energy Commission.

Pagel, J.E., D.M. Whittington, and G.T. Allen. 2010. *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance*. Carlsbad, CA: U.S. Fish and Wildlife Service.

Pavlik, B., and M. Skinner. 1994. "Ecological Characteristics of California's Rare Plants." In *Inventory of Rare and Endangered Vascular Plants of California*, 5th Edition, ed. M. Skinner and B. Pavlik. Sacramento, CA: California Native Plant Society.

Perkins, Mark. 2005. *Lasionycteris noctivagans Silver-haired Bat*. Species Accounts. Rapid City, ND: Western Bat Working Group.

Plummer, A.P., D.R. Christensen, and S.B. Monsen. 1968. *Restoring Big-game Range in Utah*. Utah Division of Fish and Game Publication No. 68-3. Salt Lake City, UT.

Rejmanek, M., and M.J. Pitcairn. 1999. "When Is Eradication of Exotic Pest Plants a Realistic Goal?" In *Turning the Tide: The Eradication of Invasive Species*. San Juan Capistrano, CA: California Exotic Pest Plan Council.

Sapphos Environmental, Inc. 2006. *PdV Wind Energy Project Biological Resources Technical Report*. Pasadena, CA.

Sapphos Environmental, Inc. 23 January 2006. Memorandum for the Record No. 6. Subject: Trapping Surveys for White-eared Pocket Mouse in Support of the PdV Wind Energy Project. Pasadena, CA.

Sapphos Environmental, Inc. 23 January 2006. Memorandum for the Record No. 7. Subject: Results of 2004 Raptor Nest Surveys for Proposed PdV Wind Energy Project Site, Kern County, California. Pasadena, CA.

Sapphos Environmental, Inc. 21 July 2008. Memorandum for the Record No. 3. Subject: Results of Small Mammal Surveys at the Pacific Wind Energy Project, Kern County, California. Pasadena, CA.

Sapphos Environmental, Inc. 2009. *Pacific Wind Energy Project Biological Resources Technical Report*. Pasadena, CA.

Sapphos Environmental, Inc. 2 April 2010. *Screen Check California Condor Position Paper*. Prepared for: enXco Development Corporation. Pasadena, CA.

Sapphos Environmental, Inc. 16 August 2010. *Golden Eagle Aerial Surveys: May 20–May 31, 2010*. Pasadena, CA.

Sapphos Environmental, Inc. 2011. *Avalon Wind Energy Project Biological Resources Technical Report*. Pasadena, CA.

Sapphos Environmental, Inc. 2011. *Catalina Renewable Energy Project Biological Resources Technical Report*. Pasadena, CA.

Sapphos Environmental, Inc. July 2011. Memorandum for the Record: 2010 Annual Bat Survey Results from Meteorological Tower No. 30 for the Proposed Tylerhorse Wind Energy Project, Kern County, California. Prepared for: enXco Development Corporation. Pasadena, CA.

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

Sawyer, J.O., T. Keeler-Wolf, and J.M. Evens. 2009. *A Manual of California Vegetation*. 2nd Edition. Sacramento, CA: California Native Plant Society.

Shuford, W.D., and T. Gardali, eds. 2008. *California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California*. Studies of Western Birds 1. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

Small, A. 1994. *California Birds: Their Status and Distribution*. Vista, CA: Ibis.

Studer, C.D. 1983. "Effects of Kern County Cattle Ranching on California Condor Habitat." Master's thesis, Michigan State University, East Lansing, MI.

U.S. Army Corps of Engineers. January 1987. *Corp of Engineers Wetlands Delineation Manual*. Final Technical Report Y-87-1. Vicksburg, MS. Prepared by: Environmental Laboratory, U.S. Army Engineer Research and Development Center, Waterways Experiment Station, Vicksburg, MS.

U.S. Army Corps of Engineers. 10 July 2006. Letter from Antal Szijj, Acting Chief of the North Coast Section, Regulatory Branch, U.S. Army Corps of Engineers, to Dr. Irena Mendez, Sapphos Environmental, Inc. Subject: Letter No. 2006-01345-AOA dated June 22, 2006, Regarding Permit to Construct a Wind Energy Project.

U.S. Department of the Interior, Bureau of Land Management. 1980. *California Desert Conservation Area Plan*. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/cdd/cdcaplan.Par.15259.File.dat/CA_Desert_.pdf

U.S. Department of the Interior, Bureau of Land Management. 1980. *Final Environmental Impact Report and Statement for the West Mojave Plan*. Moreno Valley, CA: California Desert District. Available at: http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-1-Chapter1_Bookmarks.pdf

U.S. Department of the Interior, Bureau of Land Management. January 2005. *West Mojave Plan—A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment Final Environmental Impact Report and Statement*. Moreno Valley, CA. Available at: http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-1-Chapter1_Bookmarks.pdf

U.S. Fish and Wildlife Service. [August 1986] 1995. *National Wetlands Inventory Map, Tylerhorse Canyon, California*. Washington, DC.

U.S. Fish and Wildlife Service. 1996. *California Condor Recovery Plan*. 3rd Revision. Portland, OR.

U.S. Fish and Wildlife Service. 1996. *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed, and Candidate Plants*. Sacramento, CA.

U.S. Fish and Wildlife Service. 21 March 2006. *National Wetlands Inventory*. Portland, OR. Available at: http://www.fws.gov/nwi/

U.S. Fish and Wildlife Service. May 2007. *National Bald Eagle Management Guidelines*. Available at: http://www.fws.gov/pacific/eagle/NationalBaldEagleManagementGuidelines.pdf

U.S. Fish and Wildlife Service. May 2009. *Habitat Conservation Plans*. Region 8. Available at: http://ecos.fws.gov/conserv_plans/servlet/gov.doi.hcp.servlets.PlanReport?region=8&type=HCP&rtype=2&hcpUser=&view=report

U.S. Fish and Wildlife Service. Accessed July 2009. *Federal Endangered Species Act*. Available at: http://www.fws.gov/Endangered/pdfs/esaall.pdf

U.S. Fish and Wildlife Service. 2010. *Interim Guidelines for the Development of a Project Specific Avian and Bat Protection Plan for Wind Energy Facilities*. Sacramento, CA: U.S. Fish and Wildlife Service, Pacific Southwest Region.

U.S. Fish and Wildlife Service. 2010. *Preparing for Any Action That May Occur within the Range of the Mojave Desert Tortoise (*Gopherus agassizii*)*. Ventura, CA. Available at: http://www.deserttortoise.org/documents/2010DTPre-projectSurveyProtocol.pdf

U.S. Fish and Wildlife Service. n.d. *Bald Eagle Management Guidelines and Conservation Measures: Bald and Golden Eagle Protection Act*. Available at: http://www.fws.gov/midwest/Eagle/guidelines/bgepa.html

U.S. Fish and Wildlife Service, Wind Turbine Guidelines Advisory Committee. 4 March 2010. *Recommendations to Avoid or Minimize Impacts to Wildlife and Habitat from Wind Energy Development*. Washington, DC.

U.S. Geological Survey. 1965. *7.5-minute Series, Tylerhorse Canyon, California, Topographic Quadrangle*. Scale 1:24,000. Reston, VA.

U.S. Geological Survey. [1965] Revised 1995. *7.5-minute Series, Tylerhorse Canyon, California, Topographic Quadrangle*. Reston, VA.

U.S. Geological Survey. 1977. *60-minute Series Los Angeles, CA, County Map*. Reston, VA.

U.S. Geological Survey. 1979. *30×60-minute Series Lancaster, CA, Topographic Quadrangle*. Reston, VA.

U.S. Supreme Court. 9 January 2001. Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers. No. 99-1178, 531 U.S. 159.

Walters, J.R., S.R. Derrickson, D.M. Fry, S.M. Haig, J.M. Marzluff, and J.M. Wunderle Jr. August 2008. *Status of the California Condor and Efforts to Achieve Its Recovery*. Sacramento, CA: AOU Committee on Conservation, California Condor Blue Ribbon Panel, a Joint Initiative of the American Ornithologists' Union and Audubon California.

Wasser, C.H., and J. Shoemaker. 1982. *Ecology and Culture of Selected Species Useful in Revegetating Disturbed Lands in the West*. FWS/OBS-82/56. Washington, DC: Biological Services Program, U.S. Fish and Wildlife Service.

Whittaker, R.H. 1967. "Gradient Analysis of Vegetation." *Biological Reviews*, *42*: 207–264.

Young, D.P., Jr., J.D. Jeffrey, K. Bay, and W.P. Erickson. 2009. *Puget Sound Energy, Hopkins Ridge Wind Project Phase 1, Post-construction Avian and Bat Monitoring, Second Annual Report, January–December 2008*. Prepared for: Puget Sound Energy, Dayton, WA.

Young, D.P., Jr., G.D. Johnson, W.P. Erickson, M.D. Strickland, R.E. Good, and P. Becker. 2001. *Avian and Bat Mortality Associated with the Initial Phase of the Foote Creek Rim Wind Power Project, Carbon County, Wyoming: November 3, 1998 - October 31, 2000*. Technical report prepared by: West, Inc. Prepared for: SeaWest Energy Corporation, San Diego, CA; and Bureau of Land Management, Rawlins, WY.

Young, D.P., Jr., D. Tidhar, D. Solick, and K. Bay. 2008. *Avian and Bat Studies for the Grapevine Canyon Wind Energy Project, Coconino County, Arizona*. Prepared for: Foresight Flying M, LLC. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY.

\+ Observed on-site
* Nonnative

FLORA

GYMNOSPERMS

Cupressaceae—Cypress Family

Juniperus californica
California juniper

Ephedraceae—Ephedra Family

Ephedra nevadensis
Nevada ephedra
Ephedra viridis
green ephedra

DICOTS

Asteraceae—Sunflower Family

Acamptopappus sphaerocephalus
goldenhead
Ambrosia acanthicarpa
annual burr-sage
Ambrosia salsola
cheesebush
Encelia actonii
Acton encelia
Ericameria cooperi
Cooper's goldenbush
Ericameria linearifolia
narrowleaf goldenbush
Chrysothamnus mohavensis
Mojave rabbitbrush
Ericameria nauseosa
rubber rabbitbrush
Lasthenia californica
goldfields
Lepidospartum squamatum
scalebroom

Stephanomeria pauciflora
wirelettuce
Tetradymia axillaris var. *longispina*
long-spined cottonthorn

Cactaceae—Cactus Family

Cylindropuntia echinocarpa
silver cholla
Opuntia basilaris var. *basilaris*
beavertail cactus

Chenopodiaceae—Goosefoot Family

Krascheninnikovia lanata
winterfat

Cuscutaceae—Dodder Family

Cuscuta denticulata
dodder

Euphorbiaceae—Spurge Family

Chamaesyce albomarginata
rattlesnake weed
Croton setigerus
dove weed

Fabaceae—Legume Family

Astragalus lentiginosus var. *variabilis*
freckled milkvetch
Acmispon strigosus
Stiff-haired lotus

Geraniaceae—Geranium Family

Erodium cicutarium
red-stemmed filaree

Lamiaceae—Mint Family

Salvia columbariae
chia
Salvia dorrii var. *pilosa*
purple sage

Nyctaginaceae—Four O'Clock Family

Mirabilis laevis
wishbone bush

Polemoniaceae—Phlox Family

Eriastrum densifolium
shrubby eriastrum
Eriastrum pluriflorum
Tehachapi woolystar

Polygonaceae—Buckwheat Family

Eriogonum angulosum
angle-stemmed buckwheat
Eriogonum baileyi var. *baileyi*
Bailey's buckwheat
Eriogonum fasciculatum var. *polifolium*
California buckwheat
Eriogonum plumatella
yucca buckwheat

Solanaceae—Nightshade Family

Lycium andersonii
Anderson's boxthorn

Tamaricaceae—Tamarisk Family

**Tamarix* sp.
salt cedar

Viscaceae—Mistletoe Family

Phoradendron juniperinum
juniper mistletoe

Zygophyllaceae—Caltrop Family

Larrea tridentata
creosote bush

MONOCOTS

Aspargaceae— Asparagus Family

Yucca brevifolia
Joshua tree

Poaceae—Grass Family

Avena barbata
slender wildoats
Avena fatua
common wildoats
Bromus madritensis ssp. rubens
red brome
Bromus tectorum
cheatgrass
Elymus elymoides
squirreltail
Schismus barbatus
Arabian grass
Stipa hymenoides
Indian ricegrass
Stipa speciosa
Desert needlegrass
Vulpia microstachys
few-flowered fescue

FAUNA

TERRESTRIAL INSECTS

Pogonomyrmex rugosus +
red harvester ants
Eloedes spp. +
darkling beetle

BUTTERFLIES

Pieridae—Whites and Sulphurs

Neophasia menapia
pine white
Pontia beckerii
Becker's white
Pontia sisymbrii sisymbrii
spring white
Pieris rapae
cabbage white
Euchloe lotta
desert marble
Colias eurytheme +
orange sulphur

Lycaenidae

Strymon melinus +
grey hairstreak
Brephidium exile
western pygmy-blue
Plebeius acmon +
acmon blue

Riodinidae

Vanessa cardui +
painted lady butterfly

Danainae

Danaus plexippus +
monarch

Hesperidae

Heliopetes ericetorum +
northern white skipper

Hesperia juba+
juba skipper

ARACHNIDS—SPIDERS

Aphonopelma sp.
tarantula

TERRESTRIAL VERTEBRATES

AMPHIBIANS

Bufonidae

Bufo boreas halophilus
California toad

Hylidae

Hyla regilla
Pacific chorus frog

Ranidae

*Rana catesbiana**
bullfrog

REPTILES

Iguanidae—Iguanid Lizards

Dipsosaurus dorsalis+
desert iguana

Crotaphytidae—Collared and Leopard Lizards

Gambelia wislizenii+
long-nosed leopard lizard

Phrynosomatidae

Callisaurus draconoides+
zebra-tailed lizard
Phrynosoma platyrhinos+
desert horned lizard
Phrynosoma coronatum+
coast horned lizard
Sceloporus occidentalis+
western fence lizard

Sceloporus graciosus gracilis
western sagebrush lizard
Sceloporus magister
desert spiny lizard
Uta stansburiana+
common side-blotched lizard

Scincidae—Skinks

Eumeces gilberti
Gilbert's skink
Eumeces skiltonianus
western skink

Teiidae—Whiptail Lizards

Aspidoscelis tigris+
western whiptail

Anguidae—Alligator Lizards and Relatives

Elgaria multicarinata multicarinata
alligator lizard

Leptotyphlopidae—Slender Blind Snakes

Leptotyphlops humilis
western blind snake

Colubridae—Colubrid Snakes

Arizona elegans
glossy snake
Hypsiglena torquata
night snake
Trimorphodon biscutatus
western lyre snake
Diadophis puctatus
ring-necked snake
Lampropeltis getula
common kingsnake
Masticophis flagellum+
coachwhip
Masticophis lateralis
California whipsnake
Pituophis catenifer+
gopher snake
Rhinocheilus lecontei
western long-nosed snake

Viperidae—Vipers

Crotalus cerastes
sidewinder
Crotalus scutulatus +
Mojave rattlesnake
Crotalus viridis +
western rattlesnake

BIRDS

Phasianidae—Chukars, Pheasants, and Turkeys

Alectoris chukar + *
Chukar

Odontophoridae—Quails

Callipepla californica +
California quail

Pelecanidae—Pelicans

Pelecanus erythrorhynchos +
American white pelican

Cathartidae—New World Vultures

Cathartes aura +
turkey vulture

Accipitridae—Hawks

Elanus leucurus +
white-tailed kite
Pandion haliaetus +
osprey
Circus cyaneus +
northern harrier
Accipiter striatus +
sharp-shinned hawk
Accipiter cooperii +
Cooper's hawk
Accipiter gentilis +
northern goshawk
Buteo swainsoni +
Swainson's hawk
Buteo jamaicensis +
red-tailed hawk

Buteo regalis +
ferruginous hawk
Buteo lagopus +
rough-legged hawk
Aquila chrysaetos +
golden eagle

Falconidae—Falcons

Falco sparverius +
American kestrel
Falco columbarius +
merlin
Falco mexicanus +
prairie falcon
Falco peregrinus +
peregrine falcon

Columbidae—Pigeons and Doves

*Columba livia**
rock pigeon
Patagioenas fasciata +
band-tailed pigeon
Zenaida asiatica +
white-winged dove
Zenaida macroura +
mourning dove

Cuculidae—Cuckoos and Roadrunners

Geococcyx californianus +
greater roadrunner

Tytonidae—Barn Owls

Tyto alba +
barn owl

Strigidae—True Owls

Megascops kennicottii +
western screech-owl
Bubo virginianus +
great horned owl
Athene cunicularia +
burrowing owl
Asio otus
long-eared owl

Asio flammeus
short-eared owl

Caprimulgidae—Goatsuckers

Chordeiles acutipennis+
lesser nighthawk
Phalaenoptilus nuttallii+
common poorwill

Apodidae—Swifts

Chaetura vauxi+
Vaux's swift
Aeronautes saxatalis+
white-throated swift

Trochilidae—Hummingbirds

Archilochus alexandri
black-chinned hummingbird
Calypte anna+
Anna's hummingbird
Calypte costae
Costa's hummingbird

Picidae—Woodpeckers

Melanerpes formicivorus+
acorn woodpecker
Picoides scalaris+
ladder-backed Woodpecker
Picoides nuttallii+
Nuttall's woodpecker
Picoides pubescens+
downy woodpecker
Picoides villosus
hairy woodpecker
Colaptes auratus+
northern flicker

Tyrannidae—Tyrant Flycatchers

Contopus sordidulus
western wood-pewee
Empidonax wrightii
gray flycatcher
Sayornis nigricans+
black phoebe

Sayornis saya+
Say's phoebe
Myiarchus cinerascens+
ash-throated flycatcher
Tyrannus verticalis+
western kingbird

Laniidae—Shrikes

Lanius ludovicianus+
loggerhead shrike

Vireonidae—Vireos

Vireo vicinior
gray vireo

Corvidae—Jays and Crows

Aphelocoma californica+
western scrub-jay
Corvus brachyrhynchos+
American crow
Corvus corax+
common raven

Alaudidae—Larks

Eremophila alpestris+
horned lark

Hirundinidae—Swallows

Tachycineta bicolor+
tree swallow
Tachycineta thalassina+
violet-green swallow
Stelgidopteryx serripennis+
northern rough-winged swallow
Hirundo pyrrhonota+
cliff swallow
Hirundo rustica+
barn swallow

Paridae—Titmice

Baeolophus inornatus+
oak titmouse

Aegithalidae—Bushtits

Psaltriparus minimus+
bushtit

Troglodytidae—Wrens

Campylorhynchus brunneicapillus+
cactus wren
Salpinctes obsoletus+
rock wren
Catherpes mexicanus
canyon wren
Thryomanes bewickii+
Bewick's wren
Troglodytes aedon+
house wren

Regulidae—Kinglets

Regulus satrapa
golden-crowned kinglet
Regulus calendula+
ruby-crowned kinglet

Sylviidae—Gnatcatchers

Polioptila caerulea+
blue-gray gnatcatcher

Turdidae—Thrushes

Sialia mexicana
western bluebird
Sialia currucoides+
mountain bluebird
Catharus guttatus+
hermit thrush

Mimidae—Thrashers

Mimus polyglottos+
northern mockingbird
Oreoscoptes montanus+
sage thrasher
Toxostoma redivivum
California thrasher
Toxostoma lecontei+
Le Conte's thrasher

Sturnidae—Starlings

Sturnus vulgaris + *
European starling

Motacillidae—Pipits

Anthus rubescens +
American pipit

Bombycillidae—Waxwings

Bombycilla cedrorum
cedar waxwing

Ptilogonatidae—Silky-Flycatchers

Phainopepla nitens +
Phainopepla

Parulidae—Wood Warblers

Vermivora celata +
orange-crowned warbler
Dendroica coronata +
yellow-rumped warbler
Dendroica nigrescens +
black-throated gray warbler
Dendroica townsendi +
Townsend's warbler
Oporornis tolmiei +
MacGillivray's warbler
Wilsonia pusilla +
Wilson's warbler

Thraupidae—Tanagers

Piranga ludoviciana +
western tanager

Emberizidae—Buntings and Sparrows

Pipilo chlorurus +
green-tailed towhee
Pipilo maculatus +
spotted towhee
Aimophila ruficeps
rufous-crowned sparrow
Spizella passerina +
chipping sparrow

Spizella breweri +
Brewer's sparrow
Pooecetes gramineus +
vesper sparrow
Chondestes grammacus +
lark sparrow
Spizella atrogularis
black-chinned sparrow
Amphispiza bilineata +
black-throated sparrow
Amphispiza belli +
sage sparrow
Passerculus sandwichenis +
savannah sparrow
Melospiza melodia +
song sparrow
Zonotrichia leuchophrys +
white-crowned sparrow
Zonotrichia atricapilla +
golden-crowned sparrow
Junco hyemalis +
dark-eyed junco
Calcarius lapponicus +
Lapland longspur

Cardinalidae—Grosbeaks and Buntings

Pheucticus melanocephalus +
black-headed grosbeak
Passerina caerulea
blue grosbeak
Passerina amoena
lazuli bunting

Icteridae—Blackbirds and Orioles

Sturnella neglecta +
western meadowlark
Euphagus cyanocephalus +
Brewer's blackbird
Quiscalus mexicanus
great-tailed grackle
Molothrus ater
brown-headed cowbird
Icterus cucullatus +
hooded oriole
Icterus parisorum +
Scott's oriole

Fringillidae—Finches

Capodacus pupureus
purple finch
Carpodacus mexicanus+
house finch
Carduelis pinus+
pine siskin
Carduelis psaltria+
lesser goldfinch
Carduelis lawrencei+
Lawrence's goldfinch
Carduelis tristis
American goldfinch

Passeridae—Old World Sparrows

Passer domesticus+*
house sparrow

MAMMALS

Scoricidae—Shrews

Notiosorex crawfordi
desert shrew

Vespertilionidae—Vesper Bats

Antrozous pallidus
pallid bat
Corynorhinus townsendii
Townsend's big-eared bat
Eptesicus fuscus
big brown bat
Euderma maculatum
spotted bat
Lasionycteris noctivagans
silver-haired bat
Lasiurus blossevillii
western red bat
Lasiurus cinereus
hoary bat
Myotis yumanensis
Yuma myotis
Myotis evotis
long-eared myotis
Myotis thysanodes
fringed myotis

Myotis volans
long-legged myotis
Myotis californicus
California myotis
Myotis ciliolabrum
small-footed myotis
Pipistrellus hesperus
western pipistrelle

Molossidae—Free-tailed Bats

Tadarida brasiliensis
Mexican free-tailed bat
Eumops perotis
western mastiff bat

Leporidae—Hares and Rabbits

Sylvilagus audubonii+
desert cottontail
Sylvilagus bachmani
brush rabbit
Lepus californicus+
black-tailed jackrabbit

Sciuridae—Squirrels

Neotamias merriami
Merriam's chipmunk
Ammospermophilus leucurus+
white-tailed antelope squirrel
Spermophilus beecheyi+
California ground squirrel
Sciurus niger
fox squirrel
Sciurus griseus
western grey squirrel

Geomyidae—Pocket Gophers

Thomomys bottae
Botta's pocket gopher

Heteromyidae—Pocket Mice and Kangaroo Rats

Chaetodipus californicus+
California pocket mouse
Dipodomys deserti+
desert kangaroo rat

Dipodomys microps
chisel-toothed kangaroo rat
Dipodomys panamintinus
Panamint kangaroo rat
Perognathus inornatus +
San Joaquin pocket mouse

Muridae—Mice, Rats, and Voles

Neotoma lepida +
desert woodrat
Onychomys torridus
Southern grasshopper mouse
Peromyscus maniculatus +
deer mouse

Canidae—Wolves and Foxes

Canis latrans +
coyote
Urocyon cinereoargenteus
grey fox
Vulpes vulpes
red fox
Vulpes macrotis +
kit fox

Procyonidae—Raccoons and Ringtails

Bassariscus astutus
ringtail
Procyon lotor
raccoon

Mustelidae—Weasels, Skunks, and Otters

Mephitis mephitis
striped skunk
Spilogale putorius
spotted skunk
Mustela frenata
long-tailed weasel
Taxidea taxus +
American badger

Felidae—Cats

Felis rufus+
bobcat
Panthera concolor
mountain lion

Cervidae—Deers

Odocoileus hemionus+
mule deer

Bovidae—Sheep, Goats, and Cattle

Antiliocapra americana
pronghorn

Suidae—Pigs

*Sus scrofa**
feral pig

APPENDIX C-2
Addendum to the Biological Resources Technical Report for the Tylerhorse Wind Energy Project

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Sapphos
environmental inc.

March 26, 2013
Job Number: 1612-028
Tylerhorse Wind Energy Project

MEMORANDUM FOR THE RECORD
2.6 1612-028.M1

TO: Bureau of Land Management, California Desert District Office (Mr. Cedric Perry, Ms. Lynette Elsner, and Ms. Kim Marsden)

FROM: Sapphos Environmental, Inc. (Dr. Joseph Platt and Ms. Mary Davis)

SUBJECT: Addendum to the Biological Resources Technical Report for the Tylerhorse Wind Energy Project in Kern County, California

ATTACHMENTS:

1. Memorandum for the Record No. 10: Results of Fall 2011 Protocol-Level Surveys for Special-status Plants, Desert Tortoise, and Burrowing Owl
2. Memorandum for the Record No. 11: Results of 2011–2012 Winter Bird Use and Burrowing Owl Surveys
3. Memorandum for the Record No. 1: Results of 2012 Spring Bird Use Surveys and Special-Status Plant Surveys
4. Mohave ground squirrel *(Xerospermophilus mohavensis)* Trapping Results
5. Memorandum for the Record No. 2: Results of 2012 Summer Bird Use Surveys and Summer Burrowing Owl Surveys
6. Memorandum for the Record No. 3: Results of 2012 Fall Bird Use Surveys

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EXECUTIVE SUMMARY

As discussed during the Stakeholders Meeting held on January 16, 2013, this Memorandum for the Record (MFR) conveys the results of four biological resources field investigations that were undertaken in 2012 to refresh earlier studies completed for the Tylerhorse Wind Energy Project (project) and the adjacent Manzana (formerly PdV) Wind Energy Projects that were used as the basis of development of the Biological Resources Technical Report (BRTR) prepared in support of the Plan of Development. The BRTR was submitted to U.S. Department of the Interior Bureau of Land Management (BLM) on March 30, 2012.[1] Subsequent to submittal of the BRTR, four additional field investigations were updated in response to a request from the California Desert Conservation Office (CDCO):

1. Special-status plant surveys conducted in spring 2012
2. Trapping results for Mohave ground squirrel (*Xermospermophilus mohavensis*; MGS) in spring 2012
3. Phase III surveys for burrowing owl occupancy in the spring 2012 breeding season and 2011–2012 wintering season
4. One year of bird surveys conducted between December 2011 and November 2012

The results of the four additional surveys validate and are consistent with the results and conclusions reported in the BRTR.

SUMMARY OF METHODS AND RESULTS

Spring 2012 Special-Status Plant Surveys

Sapphos Environmental, Inc. conducted special-status plant surveys in April 2012 to determine potential presence of spring-blooming special-status plants on the project.[2] Prior to conducting the field survey, Sapphos Environmental, Inc. queried the California Natural Diversity Database (CNDDB),[3] CALFLORA, the Biogeographic Information and Observation System (BIOS), and the Consortium of California Herbaria[4] to compile a document that included all listed, sensitive, and locally important plant species with the potential to occur within the project study area. The field surveys were completed by Sapphos Environmental, Inc. qualified biologists (Ms. Shelby Petro and Mr. Brian J. Bielfelt). The surveys were conducted on 6 days between April 10–12 and 18–20, 2012. Special-status plant surveys were consistent with the BLM's California Instruction Memorandum CA IM 2009-026, *Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species*.[5] The special-status plant survey area included all potential impact areas, including areas within 200 feet of all proposed project elements, and, thus, included all areas that may be impacted by construction or

[1] Sapphos Environmental, Inc. 30 March 2012. *Tylerhorse Wind Energy Project: Biological Resources Technical Report*. Prepared for: Bureau of Land Management, California Desert District, Moreno Valley, CA. Prepared by: Sapphos Environmental, Inc., Pasadena, CA.

[2] Sapphos Environmental, Inc. 24 July 2012. Memorandum for the Record No. 1. Subject: Results of 2012 Spring Bird Use Surveys and Special-Status Plant Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: Iberdrola Renewables, LLC, Portland, OR. Pasadena, CA.

[3] California Department of Fish and Game. 2012. *Rarefind 4: A Database Application for the Use of the California Department of Fish and Game Natural Diversity Database*. Sacramento, CA.

[4] Consortium of California Herbaria. 2012. Consortium of California Herbaria: Search Page. Available at: http://ucjeps.berkeley.edu/consortium/

[5] U.S. Department of the Interior, Bureau of Land Management, California State Office. 7 July 2009. *Survey Protocols Required for NEPA and ESA Compliance for BLM Special Status Plant Species*. CA IM 2009-026. Sacramento, CA. Available at: http://www.blm.gov/ca/dir/pdfs/2009/im/CAIM2009-026ATT1.pdf

operation of the project. Field surveys were performed by walking transects within 200 feet of all proposed impact areas. Transects were spaced at 10- to 20-meter intervals. Surveys occurred during the appropriate season and were floristic in nature. All plants encountered during the surveys were identified to the highest taxonomic level necessary for a rare plant determination.[6,7] No federally or state-listed threatened or endangered plant species, nor any plant species included under the California Rare Plant Ranks (California Native Plant Survey [CNPS]) ranking system or considered sensitive by the BLM were identified within 200 feet of the proposed project elements on the project site. These results confirm the results of spring and fall special-status plant surveys previously conducted on the project in spring 2010 and fall 2011.[8,9] Therefore, construction and operation of the project is not expected to impact any special-status plant species.

Spring 2012 Mohave Ground Squirrel Trapping Surveys

At the request of Sapphos Environmental, Inc., Phoenix conducted MGS trapping surveys within the project in the spring and summer of 2012.[10] The site is located approximately 12 miles west of the MGS range boundary. There are several CNDDB records within the project vicinity, the closest of which is 11 miles to the northeast.[11] Protocol trapping surveys, using the January 2003 Survey Guidelines, was implemented to satisfy the California Department of Fish and Wildlife (CDFW; formerly California Department of Fish and Game [CDFG]) requirements.[12] The principal investigator, Mr. Ryan Young, and independent field investigators Ms. Christine Halley and Ms. Cathy Halley performed the field work under the auspices of a Memorandum of Understanding (MOU) between the CDFW and Phoenix. The visual survey was conducted on April 9, 2012. All potential MGS habitat within the approximate grid locations was surveyed during this visit. Three trapping grids were deployed by Phoenix throughout the project site to sample the diurnal rodent populations during three trapping sessions per grid during the months of April to July. Within the three grids, 100 traps per grid were deployed at 35-meter spacing over the suitable habitat. Two grids consisted of 4 by 25 linear grid arrays and the third grid consisted of a 10 by 10 array. The grid configurations were determined by the project boundaries and presence of suitable habitat. The results of the visual survey and trapping sessions were negative for MGS. These results are consistent with the conclusions reached in the project's BRTR, which stated that based on literature review, agency coordination, consultation with experts, and field surveys at adjacent wind energy projects, this species is likely absent from the project property, and, therefore, the project would not likely impact this species.

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[6] U.S. Department of the Interior, Bureau of Land Management, California State Office. 7 July 2009. *Survey Protocols Required for NEPA and ESA Compliance for BLM Special Status Plant Species*. CA IM 2009-026. Sacramento, CA. Available at: http://www.blm.gov/ca/dir/pdfs/2009/im/CAIM2009-026ATT1.pdf

[7] U.S. Department of the Interior, Bureau of Land Management, California State Office. 12 May 2010. *Survey Protocols Required for NEPA and ESA Compliance for BLM Special Status Plant Species*. CA IB 2010-012. Sacramento, CA. Available at: http://www.blm.gov/ca/dir/pdfs/2010/ib/CAIB2010-012.pdf

[8] Sapphos Environmental, Inc. 30 March 2012. *Tylerhorse Wind Energy Project: Biological Resources Technical Report*. Prepared for: Bureau of Land Management, California Desert District, Moreno Valley, CA. Prepared by: Sapphos Environmental, Inc., Pasadena, CA.

[9] Sapphos Environmental, Inc. 30 March 2012. Memorandum for the Record No. 10. Subject: Results of Fall 2011 Protocol-Level Surveys for Special-status Plants, Desert Tortoise, and Burrowing Owl for the Tylerhorse Wind Energy Project. Prepared for: enXco Development Corporation, San Ramon, CA. Pasadena, CA.

[10] Phoenix Biological Consulting. 3 September 2012. *Mohave ground squirrel (*Xerospermophilus mohavensis*) Trapping Results for Tylerhorse Wind Energy Project, Kern County, California*. Prepared for: Sapphos Environmental, Inc., Pasadena, CA, and California Department of Fish and Game, Sacramento, CA. Pinon Hills, CA.

[11] California Department of Fish and Game. 2012. *Rarefind 4: A Database Application for the Use of the California Department of Fish and Game Natural Diversity Database*. Sacramento, CA.

[12] California Department of Fish and Game. January 2003. *Mohave Ground Squirrel Survey Guidelines*. Sacramento, CA.

Winter 2011–2012 and Summer 2012 Phase III Burrowing Owl Burrow Occupancy Surveys

Winter and breeding season burrowing owl burrow checks were completed to ascertain burrowing owl occupancy at the three burrows observed during the Phase II burrow survey conducted in October 2011.[13,14,15] An additional burrow discovered during 2012 special-status plant surveys was also monitored during the breeding season. The winter and breeding season burrow checks are consistent with the Phase III surveys described within the California Burrowing Owl Consortium's *California Burrowing Owl Survey Protocol and Mitigation Guidelines*.[16] Winter surveys were conducted between December 8, 2011 and January 12, 2012, and during the breeding season between June 7 and August 31, 2012. A complete seasonal burrowing owl survey consisted of four site visits to each burrow. Burrows were visited from 2 hours before sunset to 1 hour after or from 1 hour before sunrise to 2 hours after. Four observers (Ms. Mary Davis, Ms. Margaret Schaap, Mr. Ryan Villanueva, and Ms. Shelby Petro) conducted both the winter and summer burrowing owl checks. Biologists observed each burrow for approximately one-half hour during each visit, taking care to avoid disturbance of owls at the potential burrows. All observed burrowing owl activity and burrowing owl sign such as excrement, pellets, or burrow decorations (or absence thereof) were recorded during each visit. Burrow occupancy status was determined based on the presence or absence of burrowing owls and/or sign. To determine burrow occupancy, a comparison was made over the course of the four burrow visits. If no change was observed between the initial visit and the final visit, the burrow was considered unoccupied. If burrowing owls were observed or new burrowing owl sign was observed at the burrow during at least one of the four visits, the burrow was considered occupied.

Of the three burrowing owl burrows monitored for winter season occupancy, two were occupied and one was unoccupied (Table 1, *2011–2012 Burrowing Owl Winter and Summer Burrow Occupancy*). Of the four burrowing owl burrows (three originally monitored for winter occupancy and one observed incidentally during spring special status plant surveys) monitored for summer breeding season occupancy, only one burrow was determined to be actively occupied in the breeding season. No owls or recent sign were documented at this burrow during the three preceding visits to the burrow; nor was any activity recorded on a camera placed in view of the burrow entrance. Based on the timing of the final burrow check, the individual was likely a post-breeding adult or dispersing juvenile that was temporarily occupying the burrow.

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[13] Sapphos Environmental, Inc. 30 March 2012. Memorandum for the Record No. 10. Subject: Results of Fall 2011 Protocol-Level Surveys for Special-status Plants, Desert Tortoise, and Burrowing Owl for the Tylerhorse Wind Energy Project. Prepared for: enXco Development Corporation, San Ramon, CA. Pasadena, CA.

[14] Sapphos Environmental, Inc. 30 March 2012. Memorandum for the Record No. 11. Subject: Results of 2011–2012 Winter Bird Use and Burrowing Owl Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: enXco Development Corporation, San Ramon, CA. Pasadena, CA.

[15] Sapphos Environmental, Inc. 11 March 2013. Memorandum for the Record No. 2. Subject: Results of 2012 Summer Bird Use Surveys and Summer Burrowing Owl Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: Iberdrola Renewables, LLC, Portland, OR. Pasadena, CA.

[16] The California Burrowing Owl Consortium. April 1993. *California Burrowing Owl Survey Protocol and Mitigation Guidelines*. Available at: http://www.dfg.ca.gov/wildlife/nongame/docs/boconsortium.pdf

TABLE 1
2011–2012 BURROWING OWL WINTER AND SUMMER BURROW OCCUPANCY

Name	Winter 2011–2012 Occupancy	Number of Winter Visits Where Burrowing Owls or Sign Observed	Summer 2012 Occupancy	Number of Summer Visits Where Burrowing Owls or Sign Observed	Location (UTM Easting, Northing)
1	Occupied	1	Unoccupied	0	370723 E, 3867136 N
2	Unoccupied	0	Unoccupied	0	370203 E, 3866977 N
3	Occupied	3	Unoccupied	0	368852 E, 3866748 N
4	N/A*	N/A*	Occupied	1	370119 E, 3867268 N

NOTE: *Burrow discovered after winter 2011–2012 burrow site visits.

These occurrences are consistent with the burrowing owl occurrences identified in the BRTR. The project's design avoids crossing any drainages and, therefore, risks to this species during construction would be minimized. Implementation of the proposed action would result in the direct disturbance of a small amount of Mojave Desert Wash Scrub and Non-Native Grassland, which provide foraging habitat for these species. Short-term (due to construction activity) mortality effects from the project on these species are considered unlikely to occur.

Winter 2011–2012 through Fall 2012 Bird Use Count Surveys

Sapphos Environmental, Inc. conducted four seasons of bird use count (BUC) surveys at the project between December 2011 and November 2012.[17,18,19,20] BUCs were performed in accordance with the *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development* published by the California Energy Commission (CEC Guidelines).[21] CEC Guidelines for BUCs recommend approximately 1 to 1.5 points per square mile.[22] The project property encompasses approximately 1,207 acres. Based on this recommendation and the noncontiguous nature of the three parcels that constitute the project, three BUC points were selected as part of the survey effort. Four seasons of BUC surveys were conducted by four Sapphos Environmental, Inc. avian biologists (Mr. Brian Bielfelt, Ms. Margaret Schaap, Ms. Mary Davis, and Mr. John Ivanov). During each season, biologists conducted six 30-minute unlimited distance counts at each of three points within the project property to count birds in each of the five habitats. The observer surveyed each point four times in the morning and twice in the evening during the course of each season. Observers collected observations

[17] Sapphos Environmental, Inc. 30 March 2012. Memorandum for the Record No. 11. Subject: Results of 2011–2012 Winter Bird Use and Burrowing Owl Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: enXco Development Corporation, San Ramon, CA. Pasadena, CA.

[18] Sapphos Environmental, Inc. 24 July 2012. Memorandum for the Record No. 1. Subject: Results of 2012 Spring Bird Use Surveys and Special-Status Plant Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: Iberdrola Renewables, LLC, Portland, OR. Pasadena, CA.

[19] Sapphos Environmental, Inc. 11 March 2013. Memorandum for the Record No. 2. Subject: Results of 2012 Summer Bird Use Surveys and Summer Burrowing Owl Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: Iberdrola Renewables, LLC, Portland, OR. Pasadena, CA.

[20] Sapphos Environmental, Inc. 12 March 2013. Memorandum for the Record No. 3. Subject: Results of 2012 Fall Bird Use Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: Iberdrola Renewables, LLC, Portland, OR. Pasadena, CA.

[21] California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento.

[22] California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento.

of the number and species of birds observed, their activity, and estimated distance from the observer when necessary. For flying birds, the observer noted the bird's estimated height above the ground. Observers also conducted reconnaissance surveys throughout the project property during BUC site visits. The reconnaissance surveys primarily focused on recording three types of observations: (1) species not observed during other survey types, (2) special-status species, and (3) raptors.

Over four seasons of BUCs and reconnaissance surveys, a total of 64 species were recorded. Number of species observed, overall avian detection rate, raptor detection rate, and the top three species detected varied depending on the season (Table 2, *Bird Use Count Survey Results by Season*). The five most abundant species detected during a year of BUCs were house finch (*Haemorhous mexicanus*), white-crowned sparrow (*Zonotrichia leucophrys*), western meadowlark (*Sturnella neglecta*), lark sparrow (*Chondestes grammacus*), and common raven (*Corvus corax*). A total of nine raptor species were detected, accounting for 0.7 percent of total birds seen. The most numerous raptor detected was the red-tailed hawk (*Buteo jamaicensis*). Seven special-status species were detected over a year of surveys, including: northern harrier (*Circus cyaneus*), Swainson's hawk (*Buteo swainsoni*), ferruginous hawk (*Buteo regalis*), merlin (*Falco columbaris*), prairie falcon (*Falco mexicanus*), burrowing owl (*Athene cunicularia*), and loggerhead shrike (*Lanius ludovicianus*). No golden eagle (*Aquila chrysaetos*) or California condor (*Gymnogyps californianus*) was observed over the year of avian surveys conducted on the project.

TABLE 2
BIRD USE COUNT SURVEY RESULTS BY SEASON

Season	Dates Conducted	Number of Species Observed*	Overall BUC Detection Rate per Survey Hour	Raptor BUC Detection Rate per Survey Hour	Top Three Species Detected and Percentage
Winter	12/8/2011 through 2/27/2012	27	94.8	0.33	House finch, 41% White-crowned sparrow, 33% Lark sparrow, 7%
Spring	3/14/2012 through 5/16/2012	43	31.8	0.00	Chipping sparrow (*Spizella passerina*), 19%, Western meadowlark, 19% House finch, 16%
Summer	6/7/2012 through 8/31/2012	27	14.2	0.44	Western meadowlark, 27% California quail (*Callipepla californica*), 10% Common raven, 9 % House finch, 9%
Fall	9/9/2012 through 11/29/2012	27	50.3	0.56	House finch, 72% Lark sparrow, 8% Mountain bluebird (*Sialia currucoides*), 4%

NOTE: This species total includes BUCs and reconnaissance surveys

The results of an additional year of avian surveys on the project between December 2011 and November 2012 are consistent with the results and conclusions reached in the BRTR.

Sapphos Environmental, Inc. looks forward to responding to any questions or comments regarding the information contained in this MFR. Please contact Dr. Joseph Platt or Ms. Mary Davis at (626) 683-3547.

REFERENCES

California Burrowing Owl Consortium. April 1993. *California Burrowing Owl Survey Protocol and Mitigation Guidelines*. Available at: http://www.dfg.ca.gov/wildlife/nongame/docs/boconsortium.pdf

California Department of Fish and Game. January 2003. *Mohave Ground Squirrel Survey Guidelines*. Sacramento, CA.

California Department of Fish and Game. 2012. *Rarefind 4: A Database Application for the Use of the California Department of Fish and Game Natural Diversity Database*. Sacramento, CA.

California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento.

Consortium of California Herbaria. 2012. Consortium of California Herbaria: Search Page. Available at: http://ucjeps.berkeley.edu/consortium/

Phoenix Biological Consulting. 3 September 2012. *Mohave ground squirrel (*Xerospermophilus mohavensis*) Trapping Results for Tylerhorse Wind Energy Project, Kern County, California*. Prepared for: Sapphos Environmental, Inc., Pasadena, CA, and California Department of Fish and Game, Sacramento, CA. Pinon Hills, CA.

Sapphos Environmental, Inc. 30 March 2012. Memorandum for the Record No. 10. Subject: Results of Fall 2011 Protocol-Level Surveys for Special-status Plants, Desert Tortoise, and Burrowing Owl for the Tylerhorse Wind Energy Project. Prepared for: enXco Development Corporation, San Ramon, CA. Pasadena, CA.

Sapphos Environmental, Inc. 30 March 2012. Memorandum for the Record No. 11. Subject: Results of 2011–2012 Winter Bird Use and Burrowing Owl Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: enXco Development Corporation, San Ramon, CA. Pasadena, CA.

Sapphos Environmental, Inc. 30 March 2012. *Tylerhorse Wind Energy Project: Biological Resources Technical Report*. Prepared for: Bureau of Land Management, California Desert District, Moreno Valley, CA. Prepared by: Sapphos Environmental, Inc., Pasadena, CA.

Sapphos Environmental, Inc. 24 July 2012. Memorandum for the Record No. 1. Subject: Results of 2012 Spring Bird Use Surveys and Special-Status Plant Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: Iberdrola Renewables, LLC, Portland, OR. Pasadena, CA.

Sapphos Environmental, Inc. 11 March 2013. Memorandum for the Record No. 2. Subject: Results of 2012 Summer Bird Use Surveys and Summer Burrowing Owl Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: Iberdrola Renewables, LLC, Portland, OR. Pasadena, CA.

Sapphos Environmental, Inc. 12 March 2013. Memorandum for the Record No. 3. Subject: Results of 2012 Fall Bird Use Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: Iberdrola Renewables, LLC, Portland, OR. Pasadena, CA.

U.S. Department of the Interior, Bureau of Land Management, California State Office. 7 July 2009. *Survey Protocols Required for NEPA and ESA Compliance for BLM Special Status Plant Species*. CA IM 2009-026. Sacramento, CA. Available at: http://www.blm.gov/ca/dir/pdfs/2009/im/CAIM2009-026ATT1.pdf

U.S. Department of the Interior, Bureau of Land Management, California State Office. 12 May 2010. *Survey Protocols Required for NEPA and ESA Compliance for BLM Special Status Plant Species*. CA IB 2010-012. Sacramento, CA. Available at: http://www.blm.gov/ca/dir/pdfs/2010/ib/CAIB2010-012.pdf

ATTACHMENT 1
MEMORANDUM FOR THE RECORD NO. 10: RESULTS OF FALL 2011 PROTOCOL-LEVEL SURVEYS FOR SPECIAL-STATUS PLANTS, DESERT TORTOISE, AND BURROWING OWL

Sapphos environmental inc.

March 30, 2012
Job Number: 1378-043
Tylerhorse Wind Energy Project

MEMORANDUM FOR THE RECORD
2.6 1378-043.M10

TO: enXco Development Corporation
(Mr. Rick Miller)

FROM: Sapphos Environmental, Inc.
(Mr. Ryan Villanueva)

SUBJECT: Results of Fall 2011 Protocol-level Surveys for Special-status Plants, Desert Tortoise, and Burrowing Owl for the Tylerhorse Wind Energy Project

FIGURES:
1. Regional Vicinity Map
2. Topographic Map with USGS 7.5-minute Quadrangle Index
3. Project in Relation to the West Mojave Plan
4. Plant Communities within the Project
5. Special-status Species Survey Map
6. Burrowing Owl Survey Results

ATTACHMENTS:
A. Floral Compendium
B. Faunal Compendium

EXECUTIVE SUMMARY

This Memorandum for the Record (MFR) transmits information regarding the results of the fall 2011 biological surveys in support of the Tylerhorse Wind Energy Project (project), located on 1,207 acres of Bureau of Land Management (BLM)–administered land located in the unincorporated territory of Kern County, California. In October 2011, protocol-level surveys for sensitive plant species, desert tortoise (*Gopherus agassizii*), and burrowing owl (*Athene cunicularia*) were conducted by Sapphos Environmental, Inc. within 100 percent of the project site (study area). As a result of these surveys, no special-status plant species and no direct observations of live desert tortoise or their sign (e.g., track, scat, scutes, courtship rings, pallets, drinking depressions, or tortoise carcasses (or parts thereof) were located; however, four burrowing owls and three burrowing owl burrows were observed. Therefore Sapphos Environmental, Inc. finds no evidence to support the presence of fall-blooming special-status plant species or desert tortoise within the project area but has determined that burrowing owl are present and active within the boundary of the project site. Due to the presence of burrowing owl at the site, additional surveys are warranted to perform census counts of burrowing owls present and to evaluate the activity of burrows present within the project boundary. The results of these surveys are consistent with the results of surveys reported in the Biological Resources Technical Report and the Environmental Impact Report (EIS). Additional surveys are warranted to determine the presence of spring-blooming special-status plant species in accordance with National Environmental Policy Act (NEPA) guidelines.

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INTRODUCTION

This MFR was prepared to provide determinations of presence and/or absence of special-status plants and animals within the project area in light of related planning and regulatory statutes and guidelines. This MFR incorporates the results of literature review; reviews of applicable federal, state, and local statues and guidelines; database searches; field surveys; and geospatial analyses. This MFR also takes into consideration the results of earlier investigations conducted by Sapphos Environmental, Inc. biologists on surrounding and adjacent properties including the 6,970-acre Manzana (formerly PdV) Wind Energy Project.[1], the 9,576-acre Pacific Wind Energy Project,[2] and the 6,739-acre Catalina Renewable Energy Project.[3] The project property consists of three separate parcels that total approximately 1,207 acres (approximately 2 square miles) of BLM-administered land located in the south-central portion of the unincorporated area of Kern County (Figure 1, *Regional Vicinity Map*).

The project constitutes a project pursuant to the NEPA, as it is located on land administered by the U.S. Department of the Interior, BLM. Acting in its capacity as a lead agency under NEPA, the BLM would need to determine the potential for the project to result in significant impacts, consider mitigation measures and alternatives capable of avoiding significant impacts, and consider the environmental effects of the project as part of the decision-making process. Protocol-level surveys for special-status species that have the potential to occur within the project area are required to fulfill conditions of environmental review and will be incorporated into the final EIS for the project.

The habitats present within the project boundary may have the potential to support special-status plant species, desert tortoise, and/or burrowing owl. To determine presence and/or absence of the special-status plants and animals that have the potential to occur within the project area, protocol-level surveys covering 100 percent of the parcels were conducted in October 2011.

PROJECT LOCATION

The project study area is located approximately 32 miles north of the City of Santa Clarita, County of Los Angeles, California; and roughly 42 miles southeast of the City of Bakersfield, County of Kern, California. The nearest populated areas to the project study area in the County of Kern are the City of Mojave, the unincorporated community of Rosamond, and the City of Tehachapi, which are located approximately 17 miles west, 15 miles west, and 13 miles northeast of the project study area, respectively. Other communities within the vicinity of the project study area are California City in the County of Kern and the Cities of Lancaster and Palmdale in the County of Los Angeles, which are roughly 26 miles northeast, 20 miles southeast, and 28 miles southeast, respectively (Figure 1). Edwards Air Force Base is located approximately 29 miles east of the project study area (Figure 1).

The highways nearest to the project study area are State Route (SR) 14 (Antelope Valley Freeway), located 15 miles to the west; SR 58 (Blue State Memorial Highway), located approximately 12.5 miles to the north; SR 138, located approximately 8 miles to the south; and Interstate 5 (Golden

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[1] Sapphos Environmental, Inc. 2006. *PdV Wind Energy Project Biological Resources Technical Report*. Prepared for: enXco Development Corporation. Pasadena, CA.

[2] Sapphos Environmental, Inc. 2009. *Pacific Wind Renewable Energy Project Biological Resources Technical Report*. Prepared for: enXco Development Corporation. Pasadena, CA.

[3] Sapphos Environmental, Inc. 2011. *Catalina Renewable Energy Project Biological Resources Technical Report*. Prepared for: enXco Development Corporation. Pasadena, CA.

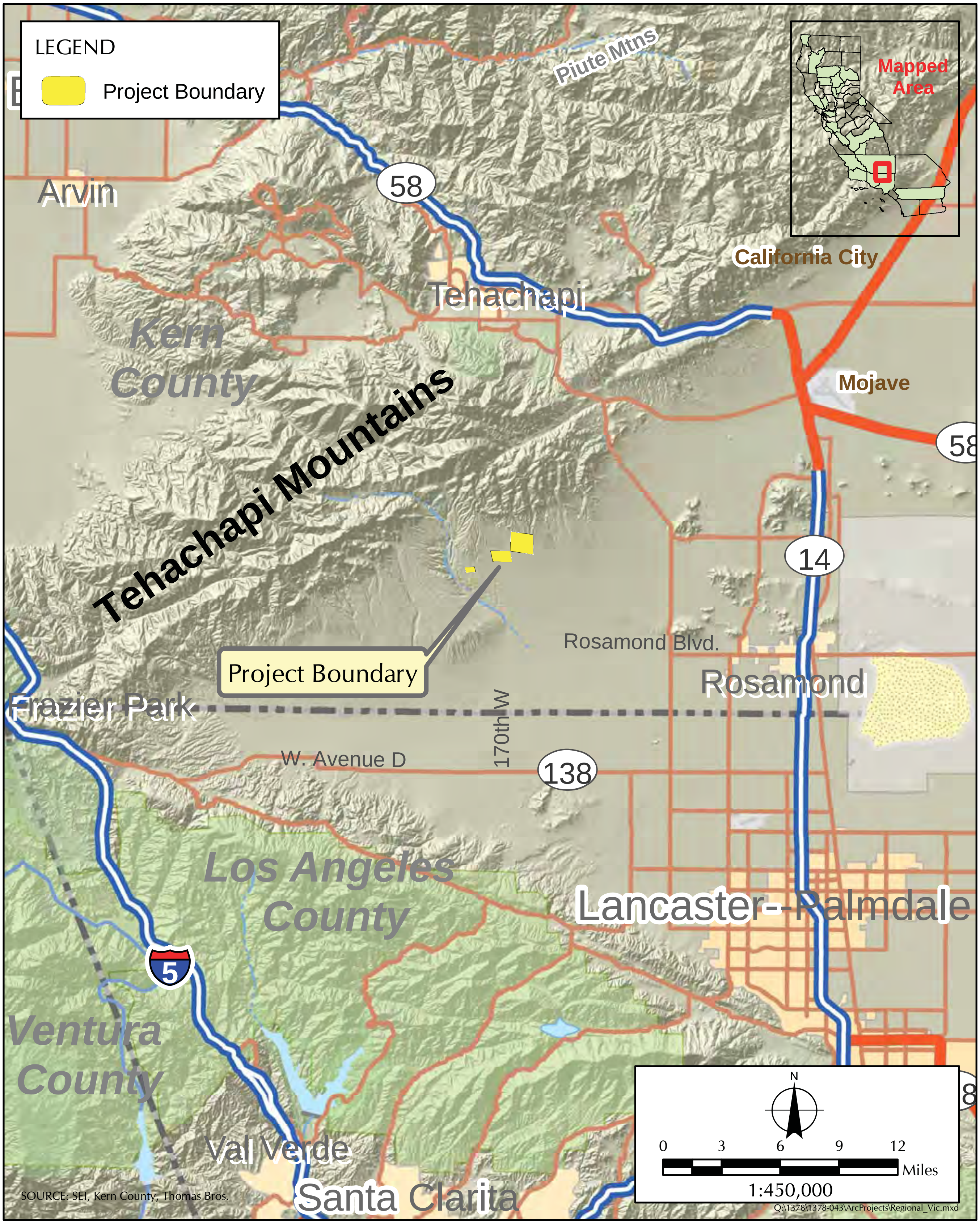

FIGURE 1
Regional Vicinity Map

State Freeway), located approximately 22 miles to the west (Figure 1). The project study area is located south of the Tehachapi Mountains and is relatively flat, although there are a number of small intermittent drainages present at the site.

The project study area is located within the U.S. Geological Survey (USGS) 7.5-minute series, Tylerhorse Canyon, California, topographic quadrangle (Figure 2, *Topographic Map with USGS 7.5-minute Quadrangle Index*).[4] The elevation ranges from 3,480 feet above mean sea level (MSL) to 3,960 feet above MSL.

REGULATORY FRAMEWORK

This regulatory framework identifies the federal, state, and local statutes, ordinances, or policies that govern the conservation and protection of biological resources that must be considered during the decision-making process for projects that have the potential to affect biological resources.

Federal

Federal Endangered Species Act

The federal Endangered Species Act (ESA) defines species as endangered and threatened and provides regulatory protection for listed species. The federal ESA provides a program for conservation and recovery of threatened and endangered species and conservation of designated critical habitat that the U.S. Fish and Wildlife Service (USFWS) has determined is required for the survival and recovery of these listed species. Section 9 of the federal ESA prohibits the take of species listed by USFWS as threatened or endangered. *Take* is defined as follows: "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in such conduct." In recognition that take cannot always be avoided, Section 10(a) of the federal ESA includes provisions for take that is incidental to, but not the purpose of, otherwise lawful activities. Section 10(a)(1)(B) permits (Incidental Take Permits) may be issued if take is incidental and does not jeopardize the survival and recovery of the species.

Section 7(a)(2) of the federal ESA requires that all federal agencies, including USFWS and BLM, evaluate projects with respect to any species proposed for listing or already listed as endangered or threatened and any proposed or designated critical habitat for the species. Federal agencies must undertake programs for the conservation of endangered and threatened species and are prohibited from authorizing, funding, or carrying out any action that will jeopardize a listed species or destroy or modify its critical habitat.

As defined in the federal ESA, "Individuals, organizations, states, local governments, and other non-Federal entities are affected by the designation of critical habitat only if their actions occur on Federal lands, require a Federal permit, license, or other authorization, or involve Federal funding."

West Mojave Plan

The West Mojave Plan is an amendment to the BLM's California Desert Conservation Area Plan. The West Mojave Plan also has a proposed Habitat Conservation Plan (HCP) component that, if and when finalized, would provide a program for complying with the federal ESA on private lands

[4] U.S. Geological Survey. [1965] Revised 1995. *7.5-minute Series, Tylerhorse Canyon, California, Topographic Quadrangle*. Reston, VA.

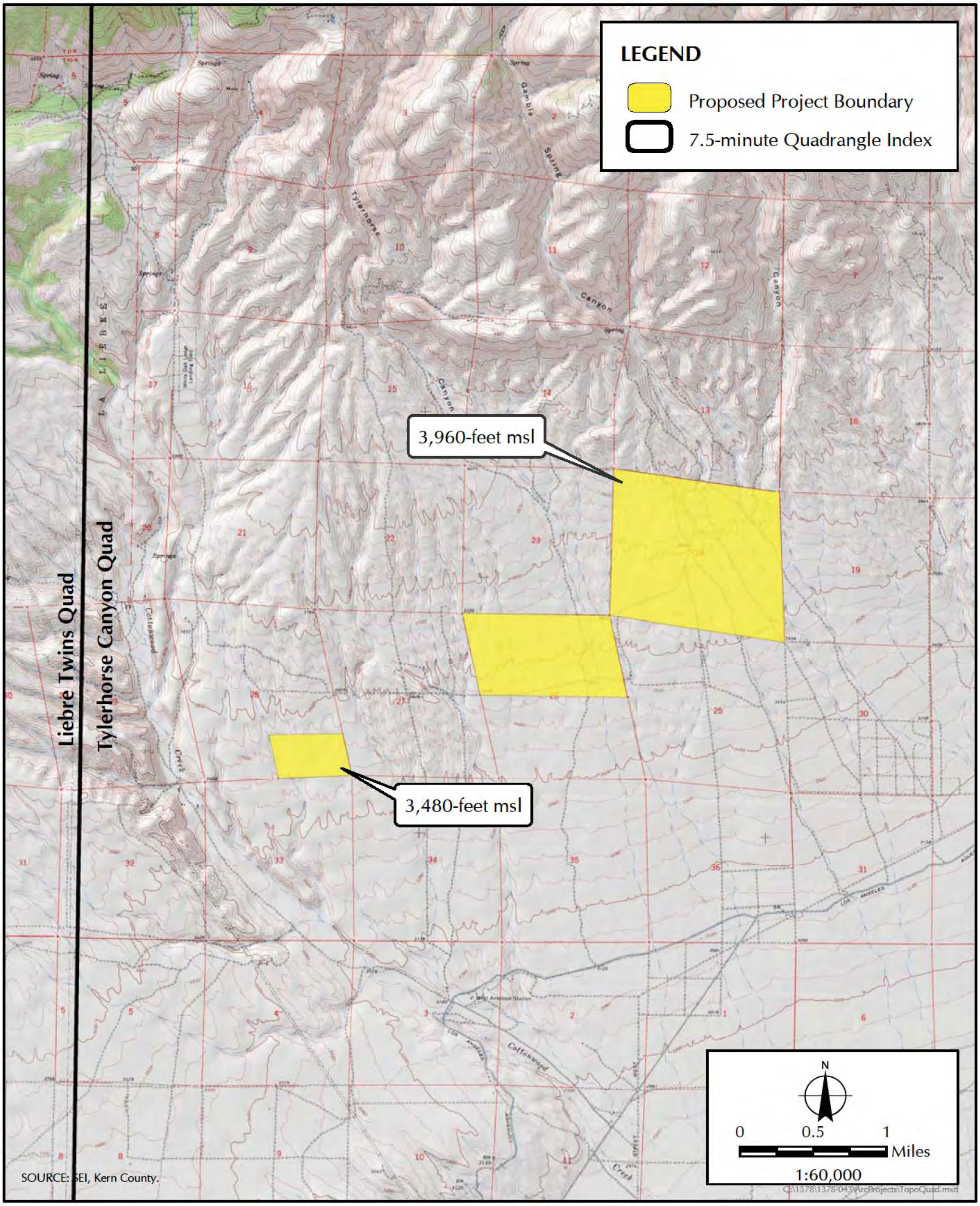

FIGURE 2

Topographic Map with USGS 7.5-minute Quadrangle Index

within the West Mojave Plan area. Together, the West Mojave Plan and the proposed HCP component would cover over 9 million acres north of the Los Angeles metropolitan area with a purpose of creating a comprehensive strategy to conserve and protect the desert tortoise, the Mohave ground squirrel (*Xerospermophilus mohavensis*), and almost 100 other sensitive species as well as the natural communities in which they reside.[5] The project falls within the West Mojave Plan planning area (Figure 3, *Project in Relation to the West Mojave Plan*).

State

California Endangered Species Act

The California ESA (California Fish and Game Code §§ 2050 *et seq.*) prohibits the take of listed species except as otherwise provided in state law. Unlike the federal ESA, the California ESA applies the take prohibitions to species petitioned for listing (state candidates). State lead agencies are required to consult with the California Department of Fish and Game (CDFG) to ensure that any actions undertaken by that lead agency are not likely to jeopardize the continued existence of any state-listed species or result in destruction or degradation of required habitat. CDFG is authorized to enter into Memoranda of Understanding (MOUs) with individuals, public agencies, universities, zoological gardens, and scientific or educational institutions to import, export, take, or possess listed species for scientific, educational, or management purposes.

Section 2080 of the California ESA states that

> no person shall import into this state [California], export out of this state, or take, possess, purchase, or sell within this state, any species, or any part or product thereof, that the commission [State Fish and Game Commission] determines to be an endangered species or threatened species, or attempt any of those acts, except as otherwise provided in this chapter, or the Native Plant Protection Act, or the California Desert Native Plants Act.

Pursuant to Section 2081 of the California ESA, CDFG may authorize individuals or public agencies to import, export, take, or possess any state-listed endangered, threatened, or candidate species. These otherwise prohibited acts may be authorized through permits or MOUs if (1) the take is incidental to an otherwise lawful activity, (2) impacts of the authorized take are minimized and fully mitigated, (3) the permit is consistent with any regulations adopted pursuant to any recovery plan for the species, and (4) the applicant ensures adequate funding to implement the measures required by CDFG. CDFG shall make this determination based on available scientific information and shall include consideration of the ability of the species to survive and reproduce.

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[5] U.S. Department of Interior, Bureau of Land Management. 1980. *Final Environmental Impact Report and Statement for the West Mojave Plan*. Moreno Valley, CA: California Desert District. Available at: http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-1-Chapter1_Bookmarks.pdf

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FIGURE 3

Project in Relation to the West Mojave Plan

Local

Kern County General Plan

The Kern County General Plan includes the following goals related to biological resources:[6]

- Protection of threatened and endangered plant and wildlife species in accordance with state and federal laws;
- Avoidance or minimization of impacts to fish, wildlife, and botanical resources;
- Protection of listed plant and wildlife species through conservation plans and other methods promoting management and conservation of habitat lands;
- Promote public awareness of endangered species laws; and
- Solicit comments from CDFG and USFWS when an environmental document is prepared.

The Kern County General Plan designates a small section in the southeast corner of the proposed project study area as Specific Plan Required. This designation recognizes the need for additional assessment and evaluation and requires the project applicant to demonstrate the suitability of the study area for the conceptual uses and densities.

METHODS

This section describes the methods used for the protocol-level surveys for sensitive plants, desert tortoise, and burrowing owl using the recommendations contained in the USFWS 2010 protocols. The surveys were conducted on October 28 and 31, 2011 in areas identified as having the potential to support special-status species as a result of a literature review, agency consultation, and habitat assessment. The protocol-level surveys were designed and performed to take into account the particular life history traits and habitat requirements of species targeted for fall surveys.

Habitat Assessments

Special-status Plants

Sapphos Environmental, Inc. queried the California Natural Diversity Database (CNDDB),[8] the Biogeographic Information & Observation System (BIOS), [9] the California Native Plant Society (CNPS) online inventory of rare and endangered plants,[10] Calflora,[11] and the Consortium of

[6] County of Kern. 15 June 2004. *Kern County General Plan, Land Use, Open Space, and Conservation Element*. Bakersfield, CA. Available at: http://www.co.kern.ca.us/planning/pdfs/kcgp/KCGPChp1LandUse.pdf

[8] California Department of Fish and Game. 2011. *Rarefind 4: A Database Application for the Use of the California Department of Fish and Game Natural Diversity Database*. Sacramento, CA.

[9] California Department of Fish and Game. 2011.*Biogeographic Information & Observation System*. Sacramento, CA.

[10] California Native Plant Society. 2011. *8th Inventory of Rare and Endangered Plants*. Online Edition, v8-01a. Available at: http://www.rareplants.cnps.org

[11] California Native Plant Society. 2011. *8th Inventory of Rare and Endangered Plants*. Online Edition, v8-01a. Available at: http://www.rareplants.cnps.org

California Herbaria[12] to identify special-status species, including listed, sensitive, and locally important plant species with the potential to occur within and adjacent to the project study area (Table 1, *Special-status Species with the Potential to occur within the Vicinity of the Project Area*). The database queries were conducted for the geographical areas encompassed by the following nine USGS 7.5-minute series topographic quadrangles that include and surround the project area: Cummings Mountain, Tehachapi South, Monolith, Liebre Twins, Tylerhorse Canyon, Willow Springs, Neenach School, Fairmont Butte, and Little Buttes. Additionally, the CNPS Online Inventory of Rare and Endangered Plants,[13] the Consortium of California Herbaria[14] and *The Jepson Manual*[15,16] were consulted for detailed biological, distributional, and phenological information prior to field surveys.

Desert Tortoise

A habitat assessment conforming to the specifications of the USFWS desert tortoise survey protocol was undertaken on the project study area (approximately 1,207 acres) for the desert tortoise.[17] The purpose of the habitat assessment was to determine the presence of potentially suitable habitat. The evaluation of plant communities was undertaken in a three-phase effort consisting of site reconnaissance, preliminary in-house mapping, and verification and refinement of plant community mapping. The final plant community map was based on the field identification of regional assemblages of vegetation characterized by the presence of dominant plant species (Figure 4, *Plant Communities within the Project*).[18] The description of plant communities follows the classification system provided in *Preliminary Descriptions of the Terrestrial Natural Communities of California*[19] and cross-referenced to vegetation series described in *A Manual of California Vegetation*.[20] Scientific names and common names are according to *The Jepson Manual*.[21] Common names not available from *The Jepson Manual* are taken from *A Flora of Southern California*.[22] The habitat assessment was undertaken within and adjacent to the study area and evaluated extant plant communities suitable to support desert tortoise during plant mapping at the project site in 2010. Criteria taken into consideration included vegetation, elevation, and topography. Typical vegetation used by the desert tortoise throughout their geographic range was subject to the habitat assessment and included Joshua Tree Woodland, Mojave Desert Wash Scrub, Mojave Mixed Woody Scrub, and Mojavean Juniper Woodland and Scrub.

[12] Consortium of California Herbaria. 2011. Consortium of California Herbaria: Search Page. Available at: http://ucjeps.berkeley.edu/consortium/

[13] California Native Plant Society. 2011. *8th Inventory of Rare and Endangered Plants*. Online Edition, v8-01a. Available at: http://www.rareplants.cnps.org

[14] Consortium of California Herbaria. 2011. Consortium of California Herbaria: Search Page. Available at: http://ucjeps.berkeley.edu/consortium/

[15] Hickman, J.C., ed. 1993. *The Jepson Manual: Higher Plants of California*. Berkeley, CA: University of California Press.

[16] Baldwin, B.G., et al., eds. 2012. *The Jepson Manual: Higher Plants of California*. 2nd Edition. Berkeley, CA: University of California Press. Eflora available at: http://ucjeps.berkeley.edu/IJM.html

[17] U.S. Fish and Wildlife Service. 2010. *Preparing for Any Action That May Occur within the Range of the Mojave Desert Tortoise*. Ventura, CA.

[18] Munz, Philip A., and D.D. Keck. 1949. "California Plant Communities." *El Aliso*, *2*(1): 87–105.

[19] Holland, Robert F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Sacramento, CA: California Department of Fish and Game.

[20] Sawyer, J.O., and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. Sacramento, CA: California Native Plant Society.

[21] Hickman, J.C., ed. 1993. *The Jepson Manual: Higher Plants of California*. Berkeley, CA: University of California Press.

[22] Munz, P. 1974. *A Flora of Southern California*. Berkeley, CA: University of California Press.

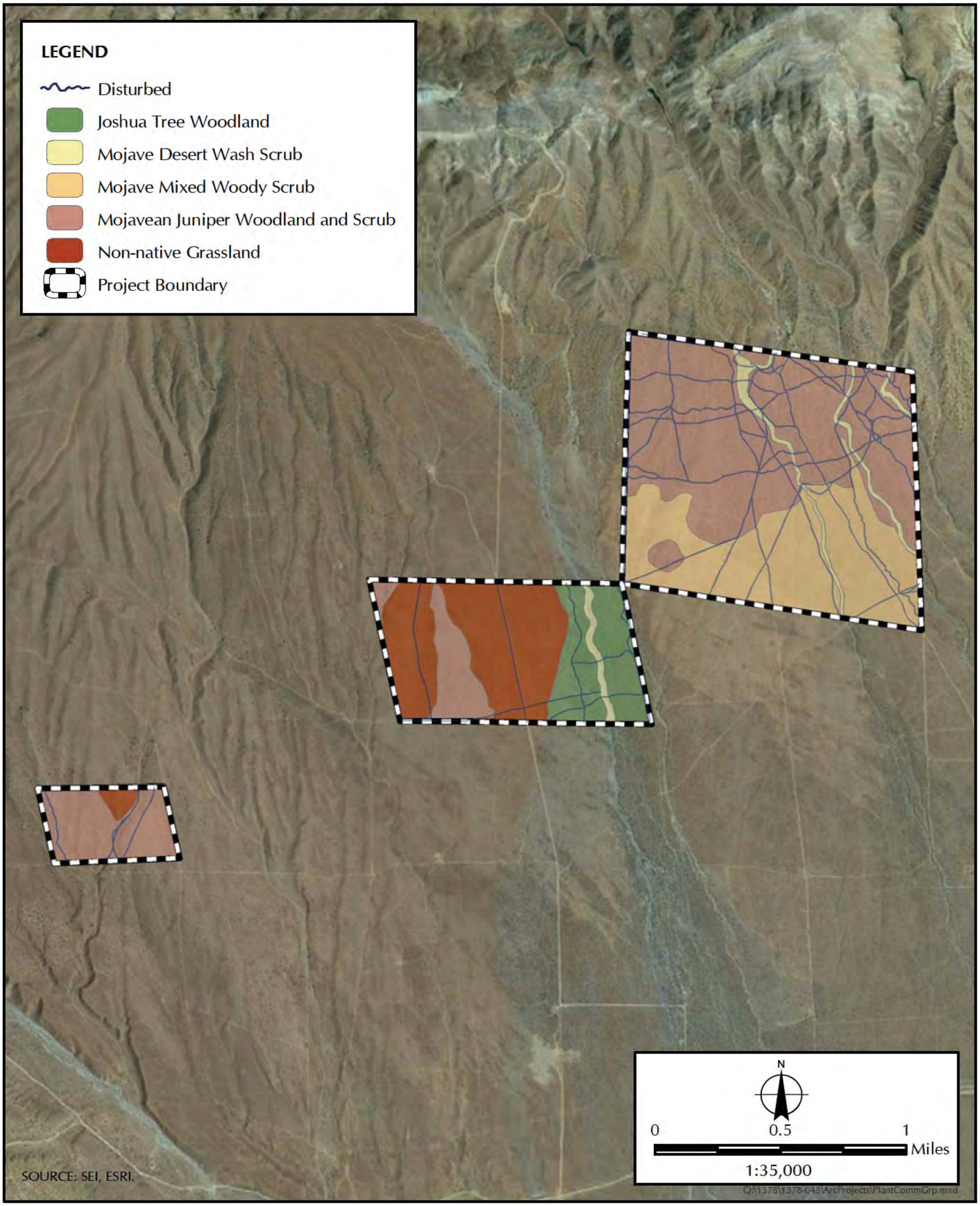

FIGURE 4
Plant Communities within the Project

TABLE 1
SPECIAL-STATUS PLANT SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE VICINITY OF THE PROJECT AREA

Species	Status: Federal/State/ BLM/ CNPS/ WeMo	Habitat and Phenology	Potential to Occur within the Study Area	Directed Surveys
Darwin rock-cress (*Arabis pulchra* var. *munciensis*)	—/—/ BLM/ CNPS 1B.1/ –	Chenopod and Mojavean scrub, in carbonate soil; at elevations of 1,100–2,075 meters above MSL; perennial herb in the Brassicaceae family that blooms in April	Low: Habitat not present.	No. Targeted for spring 2012.
	—/—/ BLM/ CNPS 1B.1/ —	Alkali regions at lake beds margins, meadows and seeps, and playas; at elevations 60–850 meters above MSL; annual herb in the Fabaceae family that blooms from May to October	Low: Habitat not present.	Yes.
	—/—/ BLM/ CNPS 1B.1/ —	Cismontane woodland, valley and foothill grassland; at elevations 15–1,200 meters above MSL; annual herb in the Geraniaceae family that blooms from March to May	Low: Habitat not present.	No. Targeted for spring 2012.
	—/—/ —/ CNPS 1B.2/ —	Chaparral, lower montane coniferous forest, meadows and seeps; in mesic areas; at elevations 1,000–2,390 meters above MSL; bulbiferous herb in the Liliaceae family that blooms from April to July	Low: Habitat not present.	No. Targeted for spring 2012.
Clokey's cryptantha (*Cryptantha clokeyi*)	—/—/ BLM, CNPS 1B.2/ —	Mojavean desert scrub; at elevations 2,620–4,200 feet (800–1,280 m) above MSL; annual herb in the Boraginaceae family that blooms in April	High: Habitat (Mojavean Desert Scrub) present.	No. Targeted for spring 2012.
	—/SR/ BLM/ CNPS 1B.2/ —	Chaparral and cismontane woodlands; at elevations of 315–1,125 meters above MSL; annual herb in the Polemoniaceae family that blooms from June to July	Low: Habitat not present.	No. Targeted for summer 2012.

TABLE 1
SPECIAL-STATUS PLANT SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE VICINITY OF THE PROJECT AREA, *Continued*

Species	Status: Federal/State/ BLM/ CNPS/ WeMo	Habitat and Phenology	Potential to Occur within the Study Area	Directed Surveys
	—/—/ BLM/ CNPS 1B.1/ —	Coastal salt marshes and swamps, playas, and vernal pools; at elevations 1–120 meters above MSL; annual herb in the Asteraceae family that blooms from February to June	Low: Habitat not present.	No. Targeted for spring 2012.
	—/—/ BLM/ CNPS 1B.1/ —	Cismontane woodland, coastal scrub, pinyon and juniper woodland, valley and foothill grasslands; in alkaline or clay or clay substrates; at elevations 300–1,705 meters above MSL; annual herb in the Asteraceae family that blooms from March to June	Low: Habitat not present.	No. Targeted for spring 2012.
	—/—/ —/ CNPS 1B.2/ —	Cismontane woodland, lower montane coniferous forest; at elevations 300–1,300 meters above MSL; annual herb in the Polemoniaceae family that blooms from April to May	Low: Habitat not present.	No. Targeted for spring 2012.
	—/—/ BLM/ CNPS 1B.2/ —	Broadleafed upland forest, cismontane woodland, on granitic and disturbed substrates; at elevations 100–1,300 meters above MSL; annual herb in the Phymaceae family that blooms from March to May	Low: Habitat not present.	No. Targeted for spring 2012.
	—/—/ BLM/ CNPS 1B.3/ —	Lower montane coniferous forest, pinyon and juniper woodland, upper montane coniferous forest; at elevations from 900–2,470 meters above MSL; rhizomatous herb in the Lamiaceae family that blooms from June through August	Low: Habitat not present.	No. Targeted for Summer 2012.
	—/—/ —/ CNPS 1B.2/ —	Openings within chaparral, lower montane coniferous forest, meadows and seeps, mesic areas within pinyon and juniper woodland; at elevations 1,500–2,300 meters above MSL; annual herb in the Polemoniaceae family that blooms from June to August	Low: Habitat not present.	No. Targeted for summer 2012.

TABLE 1
SPECIAL-STATUS PLANT SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE VICINITY OF THE PROJECT AREA, *Continued*

Species	Status: Federal/State/ BLM/ CNPS/ WeMo	Habitat and Phenology	Potential to Occur within the Study Area	Directed Surveys
	FE/SE/ —/ CNPS 1B.1/ —	Chenopod scrub, cismontane woodland, or valley and foothill grassland on sandy or gravelly substrates; at elevations 120–1,140 meters above MSL; perennial stem succulent that blooms April through May.	Low: Habitat not present.	Yes.

KEY:
BLM = sensitive species under Bureau of Land Management
SE = state endangered
SR = state rare
ST = state threatened
WeMo = West Mojave Plan
CNPS = California Native Plant Society
List 1B: Rare, threatened, or endangered in California and elsewhere
0.1: Seriously endangered in California
0.2: Fairly endangered in California
0.3: Not very endangered in California
List 2: Rare, threatened, or endangered in California, but more common elsewhere
0.2: Fairly endangered in California
List 3: Review list, more information required
List 4: Limited distribution (Watch List)
0.1: Seriously endangered in California
0.2: Fairly endangered in California
0.3: Not very endangered in California
MSL = mean sea level

Burrowing Owl

Habitat assessments for burrowing owl followed *California Burrowing Owl Survey Protocol and Mitigation Guidelines*.[29] Habitat assessments correspond to Phase 1 of the *Guidelines*. A site visit was conducted in 2010 by Sapphos Environmental, Inc. (Ms. Saudamini Sindhar) to identify and map the extent of various plant communities at the project property. The resulting plant community map was used to determine surveys areas including the following five plant communities: Mojave Mixed Woody Scrub, Mojave Desert Wash Scrub, Mojavean Juniper Woodland and Scrub, Non-native Grassland, and Joshua Tree Woodland. One hundred percent of the 1,207-acre proposed project property was considered potential burrowing owl habitat.

Protocol-level Surveys for Special-status Plants, Desert Tortoise, and Burrowing Owl

To make a presence or absence determination, protocol-level surveys for special-status plants, desert tortoise, and burrowing owl were conducted by Sapphos Environmental, Inc. within all suitable habitat areas (approximately 1,207 acres) of the project property on October 28 and 31, 2011 (Figure 5, *Special-status Species Survey Map*). The surveys were conducted by Sapphos

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[29] The California Burrowing Owl Consortium. April 1993. *California Burrowing Owl Survey Protocol and Mitigation Guidelines*. Available at: http://www.dfg.ca.gov/wildlife/nongame/docs/boconsortium.pdf

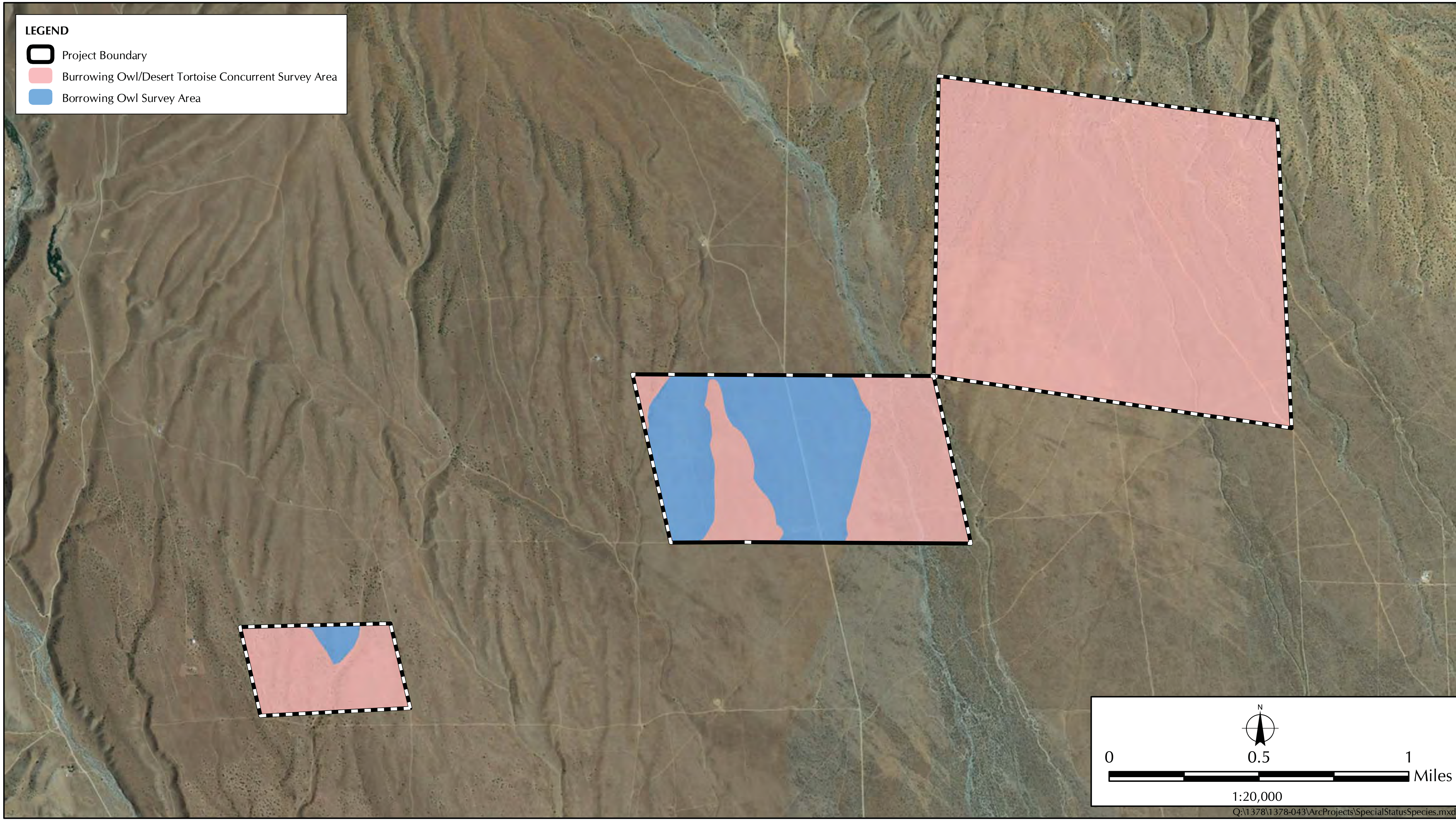

FIGURE 5
Special-Status Species Survey Map

Environmental, Inc. biologists Mr. Ryan Villanueva (CDFG Permit No. 009578 for desert tortoise), Ms. Debra De La Torre, Ms. Charlene Wu, Ms. Marlise Fratinardo, Ms. Mary Davis, Mr. Brian Bielfelt, Ms. Elizabeth Kempton, Ms. Margaret Schaap, and Ms. Amy Rowland. Surveys were in accordance with the USFWS 100 percent coverage recommendations for desert tortoise, using 10-meter belt transects in habitats determined suitable for desert tortoise. In burrowing owl habitat that was not suitable for desert tortoise, parallel transects were spaced 30 meters apart, in accordance with Phase 2 of the *California Burrowing Owl Survey Protocol and Mitigation Guidelines*. These surveys were also compatible with requirements for special-status plants surveys in accordance with BLM (constituting a complete survey),[30] USFWS,[31] CDFG,[32, 33] and CNPS guidelines.

Burrowing Owl

In the protocol-level survey stage of burrowing owl surveys, corresponding to Phase 2 in the *Guidelines*, a systematic survey of all potential burrowing owl habitat was conducted on-site to locate any burrows in suitable habitat and within 150 meters of project impact areas. The burrow survey was led by Sapphos Environmental, Inc. biologists (Ms. Debra De La Torre and Mr. Ryan Villanueva), with six to seven surveyors walking parallel transects 30 meters apart through the survey areas. A handheld global positioning system (GPS) unit was used to record the location of any burrowing owls, burrows, and sign. The habitat requirements of burrowing owls overlap substantially with those of desert tortoise, and transect survey protocols are also compatible. In these areas, surveys for the two species were conducted concurrently and parallel transects were spaced 10 meters apart. In burrowing owl habitat that was not suitable for desert tortoise, parallel transects were spaced 30 meters apart.

RESULTS

Habitat Assessment

Special-status Plants

As a result of the habitat assessment for rare plants, it was determined that 2 of the 13 plant species with the potential to occur in the project site may be observable during the fall survey including Horn's milk-vetch (*Astragalus hornii*) and Bakersfield cactus (*Opuntia basilaris* var. *trealeasei*). These species were targeted for fall surveys.

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[30] Bureau of Land Management. 2009. *Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species*. Available at: http://www.blm.gov/ca/dir/pdfs/2009/im/CAIM2009-026ATT1.pdf

[31] U.S. Fish and Wildlife Service. 1996. *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed, and Candidate Plants*. Sacramento, CA.

[32] California Department of Fish and Game. [9 December 1983] Revised 8 May 2000. *Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities*. Available at: http://www.fws.gov/sacramento/es/documents/rare_plant_protocol.PDF

[33] California Natural Resources Agency. 2009. *Protocols for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Natural Communities*. Sacramento CA: California Department of Fish and Game. Available at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/Protocols_for_Surveying_and_Evaluating_Impacts.pdf

Desert Tortoise

Desert tortoises are known to occupy Joshua tree, Mojave yucca, creosote bush, and saltbush scrub communities in valleys, flat areas, fans, bajadas, and washes below 4,000 feet (1,220 meters) above MSL in the Mojave Desert. Approximately 979 acres within four plant communities present within the project site provide potentially suitable habitat including: Joshua Tree Woodland, Mojave Desert Wash Scrub, Mojave Mixed Woody Scrub, and Mojavean Juniper Woodland and Scrub. The desert tortoise requires friable soils for constructing burrows and adequate annual and perennial plants in the spring and/or summer for forage, including annual wildflowers, annual and perennial grasses, and fresh pads and buds of cacti.[34]

Suitable desert tortoise habitat occurs in the project area and is dominated by Mojavean Juniper Woodland and Scrub and Mojave Mixed Woody Scrub. The habitat on the project study area contains suitable soils and vegetation for forage. The area has low vehicle use and is bisected by dirt roads, often with graded roadsides, which could create a barrier to travel by the desert tortoise. There is evidence of on- and off-road vehicle use in the project site that may deter desert tortoise.

Burrowing Owl

Burrowing owls are known to occupy annual and perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Suitable habitat may also include trees and shrubs if the canopy layer is less than 30 percent of the ground surface. Burrows are essential to the burrowing owl habitat and are primarily created by fossorial mammals such as ground squirrels or badgers. Burrowing owls may also use human-made structures such as pipes and debris piles as artificial burrows.

Approximately 1,181 acres within five plant communities present within the project site provide potentially suitable habitat including: Joshua Tree Woodland, Mojave Desert Wash Scrub, Mojave Mixed Woody Scrub, Mojavean Juniper Woodland and Scrub, and Non-Native Grassland. Suitable burrowing owl habitat occurs in the project area and is dominated by Mojavean Juniper Woodland and Scrub and Mojave Mixed Woody Scrub. The habitat on the project study area contains suitable burrow sites and a seemingly abundant prey base of small mammals and reptiles.

Protocol-level Surveys for Special-status Plants, Desert Tortoise, and Burrowing Owl

Special-status Plants

No special-status plants were observed within the study area. Surveys were conducted when the two targeted species, Horn's milk-vetch (*Astragalus hornii*) and Bakersfield cactus (*Opuntia basilaris* var. *trealeasei*), should have been observable. If present, Horn's milk-vetch would have been identifiable by fruit characters; and Bakersfield cactus, although not flowering or fruiting, is a perennial plant species and would have been identifiable through a number of conspicuous vegetative features. As a result of these surveys, both Horn's milk-vetch and Bakersfield cactus are determined to be absent from the project property. Additional surveys are necessary for the remaining 11 spring- or summer-blooming species that have the potential to occur within the study area.

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[34] Jennings, Bryan W. 1997. "Habitat Use and Food Preference of the Desert Tortoise *Gopherus agassizii* in Western Mojave Desert and Impacts of Off-road Vehicles." In *Proceedings: Conservation, Restoration, and Management of Tortoises and Turtles–An International Conference*. Mamaroneck, NY: New York Turtle and Tortoise Society, pp. 42–45.

Desert Tortoise

No desert tortoise or diagnostic sign indicative of desert tortoise presence (e.g., track, scat, scutes, courtship rings, pallets, drinking depressions, and tortoise carcasses or parts thereof) was observed on the study area during surveys of desert tortoise conducted during fall 2011. While the project study area is located near the westernmost edge of the range of the desert tortoise and the study area contains suitable habitat to support this species, there is no evidence to suggest that desert tortoise inhabit the study area or areas in the immediate vicinity. Desert tortoise density in the area is considered low, with only two incidental desert tortoise observations (approximately 5 miles east) and an inactive desert tortoise burrow (approximately 4 miles southeast) located during desert tortoise 100 percent coverage surveys on the Catalina Renewable Energy Project. Desert tortoise occurrences or sign were observed on neither the Manzana Wind Energy Project to the west nor the Pacific Wind Energy Project to the south.

Burrowing Owl

Four burrowing owls and three of their burrows were observed while conducting fall 2011 burrowing owl and desert tortoise surveys on the project site (Figure 6, *Burrowing Owl Survey Results*). All three of the burrows were actively used by burrowing owls and contained either owls or their sign (scat, pellets, molting, etc.). Additional surveys are necessary to determine burrow activity during the winter and spring/summer seasons according to Phase 3 of the California Burrowing Owl Consortium's *Guidelines*.

Should there be any questions regarding the information contained in this MFR, please contact Mr. Ryan Villanueva at (626) 683-3547.

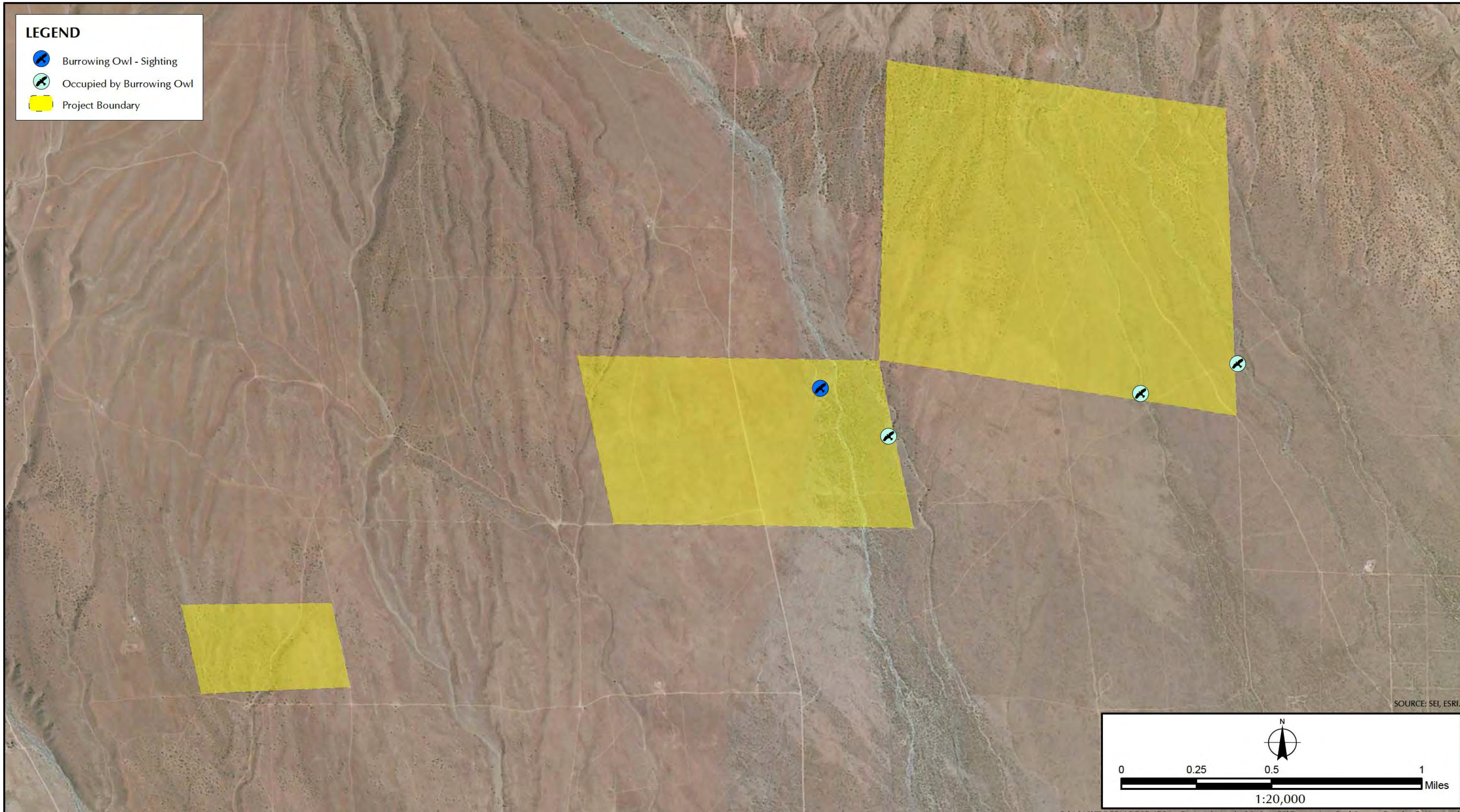

FIGURE 6
Burrowing Owl Survey Results

REFERENCES

Baldwin, B.G., et al., eds. 2012. *The Jepson Manual: Higher Plants of California*. 2nd Edition. Berkeley, CA: University of California Press. Eflora available at: http://ucjeps.berkeley.edu/IJM.html

Bureau of Land Management. 2009. *Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species*. Available at: http://www.blm.gov/ca/dir/pdfs/2009/im/CAIM2009-026ATT1.pdf

California Burrowing Owl Consortium. April 1993. *California Burrowing Owl Survey Protocol and Mitigation Guidelines*. Available at: http://www.dfg.ca.gov/wildlife/nongame/docs/boconsortium.pdf

California Department of Fish and Game. [9 December 1983] Revised 8 May 2000. *Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities*. Available at: http://www.fws.gov/sacramento/es/documents/rare_plant_protocol.PDF

California Department of Fish and Game. 2011. *Rarefind 4: A Database Application for the Use of the California Department of Fish and Game Natural Diversity Database*. Sacramento, CA.

California Department of Fish and Game. 2011. *Biogeographic Information & Observation System*. Sacramento, CA.

California Native Plant Society. 2011. *8th Inventory of Rare and Endangered Plants*. Online Edition, v8-01a. Available at: http://www.rareplants.cnps.org

California Natural Resources Agency. 2009. *Protocols for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Natural Communities*. Sacramento CA: California Department of Fish and Game. Available at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/Protocols_for_Surveying_and_Evaluating_Impacts.pdf

Consortium of California Herbaria. 2011. Consortium of California Herbaria: Search Page. Available at: http://ucjeps.berkeley.edu/consortium/

County of Kern. 15 June 2004. *Kern County General Plan, Land Use, Open Space, and Conservation Element*. Bakersfield, CA. Available at: http://www.co.kern.ca.us/planning/pdfs/kcgp/KCGPChp1LandUse.pdf

County of Kern. Amended 1 April 2008. *Willow Springs Specific Plan*. Resolution No. 2008-082. Bakersfield, CA. Available at: http://www.co.kern.ca.us/planning/pdfs/SPs/WillowSprings_SP.pdf

Hickman, J.C., ed. 1993. *The Jepson Manual: Higher Plants of California*. Berkeley, CA: University of California Press.

Holland, Robert F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Sacramento, CA: California Department of Fish and Game.

Jennings, Bryan W. 1997. “Habitat Use and Food Preference of the Desert Tortoise *Gopherus agassizii* in Western Mojave Desert and Impacts of Off-road Vehicles.” In *Proceedings: Conservation, Restoration, and Management of Tortoises and Turtles--An International Conference*. Mamaroneck, NY: New York Turtle and Tortoise Society, pp. 42–45.

Munz, P. 1974. *A Flora of Southern California*. Berkeley, CA: University of California Press.

Munz, Philip A., and D.D. Keck. 1949. “California Plant Communities.” *El Aliso*, *2*(1): 87–105.

Sapphos Environmental, Inc. 2006. *PdV Wind Energy Project Biological Resources Technical Report*. Prepared for: enXco Development Corporation. Pasadena, CA.

Sapphos Environmental, Inc. 2009. *Pacific Wind Renewable Energy Project Biological Resources Technical Report*. Prepared for: enXco Development Corporation. Pasadena, CA.

Sapphos Environmental, Inc. 2011. *Catalina Renewable Energy Project Biological Resources Technical Report*. Prepared for: enXco Development Corporation. Pasadena, CA.

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

U.S. Department of Interior, Bureau of Land Management. 1980. *Final Environmental Impact Report and Statement for the West Mojave Plan*. Moreno Valley, CA: California Desert District. Available at: http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-1-Chapter1_Bookmarks.pdf

U.S. Fish and Wildlife Service. 1996. *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed, and Candidate Plants*. Sacramento, CA.

U.S. Fish and Wildlife Service. 2010. *Preparing for Any Action That May Occur within the Range of the Mojave Desert Tortoise*. Ventura, CA.

U.S. Geological Survey. [1965] Revised 1995. *7.5-minute Series, Tylerhorse Canyon, California, Topographic Quadrangle*. Reston, VA.

ATTACHMENT A
FLORAL COMPENDIUM

PLANTS

Technical note: Family delineations here follow the current Angiosperm Phylogeny Group III descriptions,[1] rather than the families given in the *Jepson Manual*.[2] Taxonomic names below the rank of family follow names included in the *Index to California Plant Names*.[3]

Nonnative plants are indicated with an asterisk (*).

All plants listed were observed on-site during surveys conducted in fall 2011.

Gymnosperms

Cupressaceae—Cypress Family

Juniperus californica
California juniper

Ephedraceae—Ephedra Family

Ephedra nevadensis
Nevada ephedra
Ephedra viridis
green ephedra

Dicots

Asteraceae—Sunflower Family

Acamptopappus sphaerocephalus
goldenhead
Ambrosia acanthicarpa
annual burr-sage
Ambrosia salsola
cheesebush
Encelia actonii
Acton encelia
Ericameria cooperi
Cooper's goldenbush
Ericameria linearifolia
narrowleaf goldenbush
Chrysothamnus mohavensis
Mojave rabbitbrush

[1] Stevens, P.F. 2011. *Angiosperm Phylogeny*. Version 9. Available at: http://www.mobot.org/MOBOT/research/APweb/

[2] Hickman, J.C. 1993. *The Jepson Manual*. Berkeley, CA: University of California Press.

[3] Rosatti, T. 2011. *Index to California Plant Names*. Berkeley, CA: Regents of the University of California.

Ericameria nauseosa
rubber rabbitbrush
Lasthenia californica
goldfields
Lepidospartum squamatum
scalebroom
Stephanomeria pauciflora
wirelettuce
Tetradymia axillaris var. *longispina*
long-spined cottonthorn

Cactaceae—Cactus Family

Cylindropuntia echinocarpa
silver cholla
Opuntia basilaris var. *basilaris*
beavertail cactus

Chenopodiaceae—Goosefoot Family

Krascheninnikovia lanata
winterfat

Cuscutaceae—Dodder Family

Cuscuta denticulata
dodder

Euphorbiaceae—Spurge Family

Chamaesyce albomarginata
rattlesnake weed
Croton setigerus
dove weed

Fabaceae—Legume Family

Astragalus lentiginosus var. *variabilis*
freckled milkvetch
Acmispon strigosus
Stiff-haired lotus

Geraniaceae—Geranium Family

Erodium cicutarium
red-stemmed filaree

Lamiaceae—Mint Family

Salvia columbariae
chia
Salvia dorrii var. *pilosa*
purple sage

Nyctaginaceae—Four O'Clock Family

Mirabilis laevis
wishbone bush

Polemoniaceae—Phlox Family

Eriastrum densifolium
shrubby eriastrum
Eriastrum pluriflorum
Tehachapi woolystar

Polygonaceae—Buckwheat Family

Eriogonum angulosum
angle-stemmed buckwheat
Eriogonum baileyi var. *baileyi*
Bailey's buckwheat
Eriogonum fasciculatum var. *polifolium*
California buckwheat
Eriogonum plumatella
yucca buckwheat

Solanaceae—Nightshade Family

Lycium andersonii
Anderson's boxthorn

Tamaricaceae—Tamarisk Family

**Tamarix* sp.
salt cedar

Viscaceae—Mistletoe Family

Phoradendron juniperinum
juniper mistletoe

Zygophyllaceae—Caltrop Family

Larrea tridentata
creosote bush

Monocots

Aspargaceae—Asparagus Family

Yucca brevifolia
Joshua tree

Poaceae—Grass Family

**Avena barbata*
slender wildoats
**Avena fatua*
common wildoats
**Bromus madritensis ssp. rubens*
red brome
**Bromus tectorum*
cheatgrass
Elymus elymoides
squirreltail
**Schismus barbatus*
Arabian grass
Stipa hymenoides
Indian ricegrass
Stipa speciosa
Desert needlegrass
Vulpia microstachys
few-flowered fescue

ATTACHMENT B
FAUNAL COMPENDIUM

WILDLIFE

All wildlife listed were observed on-site during surveys conducted in fall 2011.

Mammals

Leporidae—Rabbits and Hares

Lepus californicus
black-tailed jackrabbit

Sciuridae—Squirrels

Ammospermophilus leucurus
antelope ground squirrel

Canidae—Canids

Canis latrans
coyote

Birds

Falconidae—Falcons

Falco mexicanus
prairie falcon

Odontophoridae—Quails

Callipepla californica
California quail

Columbidae—Pigeons and Doves

Zenaida macroura
mourning dove

Falconidae—Owls

Athena cunicularia
burrowing owl

Asio otus
long-eared owl

Picidae—Woodpeckers

Colaptes auratus
northern flicker

Laniidae—Shrikes

Lanius ludovicianus
loggerhead shrike

Corvidae—Jays and Crows

Corvus corax
common raven

Aphelocoma californica
western scrub-jay

Alaudidae—Larks

Eremophila alpestris
horned lark

Troglodytidae—Wrens

Thyromanes bewickii
Bewick's wren

Turdidae—Thrushes

Sialia mexicana
western bluebird

Emberizidae—Buntings and Sparrows

Amphispiza belli
sage sparrow

Zonotrichia leucophrys
white-crowned sparrow

Icteridae—Blackbirds

Sturnella neglecta
western meadowlark

Reptiles

Phrynosomatidae—Spiny Lizards

Sceloporus occidentalis
western fence lizard

Teiidae—Whiptails

Aspidoscelis tigris
western whiptail

ATTACHMENT 2
MEMORANDUM FOR THE RECORD NO. 11: RESULTS OF 2011–2012 WINTER BIRD USE AND BURROWING OWL SURVEYS

Sapphos environmental inc.

March 30, 2012
Job Number: 1378-043
Tylerhorse Wind Energy Project

MEMORANDUM FOR THE RECORD
2.6 1378-043.M11

TO:	enXco Development Corporation (Mr. Rick Miller)
FROM:	Sapphos Environmental, Inc. (Ms. Mary Davis and Dr. Joseph Platt)
SUBJECT:	Results of 2011–2012 Winter Bird Use and Burrowing Owl Surveys at the Tylerhorse Wind Energy Project, Kern County, California
FIGURES:	1. Regional Vicinity Map 2. Winter 2011–2012 Bird Use Count Locations 3. Observed Avian Flight Heights 4. Winter 2011–2012 Burrowing Owl Burrow Occupancy 5. Winter 2011–2012 Special-Status Birds Observed
ATTACHMENT:	A. Avifaunal Compendium

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EXECUTIVE SUMMARY

This Memorandum for the Record (MFR) documents the results of the survey efforts for both the 2011–2012 winter bird use surveys as well as winter burrowing owl (*Athene cunicularia*) burrow checks at the Tylerhorse Wind Energy Project (project) property. The project property consists of three separate parcels that total approximately 1,207 acres (approximately 2 square miles) of Bureau of Land Management (BLM)–administered land located in the unincorporated territory of south-central Kern County, California. The results of the supplemental survey efforts for 2011–2012 winter bird surveys at the project are consistent with the results of surveys reported in the Biological Resources Technical Report and the Environmental Impact Report (EIS). Bird use surveys were performed consistent with the *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development* (CEC Guidelines) published by the California Energy Commission (CEC).[1] Burrowing owl surveys were consistent with the *California Burrowing Owl Survey Protocol and Mitigation Guidelines*.[2] Winter bird use surveys and burrowing owl checks were conducted on 12 days between December 8, 2011 and February 27, 2012. Winter bird use surveys consisted of the identification of winter birds using two methods: one directed survey type (bird use counts [BUCs]) and reconnaissance surveys.

- Twenty-seven avian species were recorded at the project property as a result of all winter bird surveys. Four of the species are raptors, of which the burrowing owl was the most frequently observed.

- Four of the 27 species were observed flying within the rotor-swept zone (200–400 feet above ground level): northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), prairie falcon (*Falco mexicanus*), and common raven (*Corvus corax*).

- No bird species listed as threatened or endangered by the U.S. Fish and Wildlife Service or the CDFG were observed on or near the project property. Four special-status or sensitive avian species were observed on the project property:

    1. Northern harrier, a California Department of Fish and Game (CDFG) Species of Special Concert (nesting) and considered in the BLM's West Mojave Plan;
    2. Prairie falcon, on the CDFG Watch List (nesting) and a U.S. Fish and Wildlife Service (USFWS) Bird of Conservation Concern;
    3. Burrowing owl, a CDFG Species of Special Concern (burrow sites and some wintering sites), a USFWS Bird of Conservation Concern, and considered in the BLM's West Mojave Plan; and
    4. Loggerhead shrike (*Lanius ludovicianus*), a CDFG Species of Special Concern (nesting) and considered in the BLM's West Mojave Plan.

- Two of the three burrowing owl burrows identified during fall 2011 Phase II surveys were determined to be occupied in winter; there was no burrowing owl activity observed at the single remaining burrow.

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[1] California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento, CA.

[2] California Burrowing Owl Consortium. April 1993. *California Burrowing Owl Survey Protocol and Mitigation Guidelines*. Available at: http://www.dfg.ca.gov/wildlife/nongame/docs/boconsortium.pdf

INTRODUCTION

The Tylerhorse Wind Energy Project constitutes a project pursuant to the National Environmental Policy Act (NEPA), as it is located on land administered by the U.S. Department of the Interior, BLM. Acting in its capacity as a lead agency under NEPA, the BLM would need to determine the potential for the project to result in significant impacts, consider mitigation measures and alternatives capable of avoiding significant impacts, and consider the environmental effects of the proposed project as part of the decision-making process.

Sapphos Environmental, Inc. conducted winter bird use counts and burrowing owl surveys in late 2011 and early 2012 within the 1,207-acre project property to confirm the conclusions reached in the Biological Resources Technical Report and the EIS for the project.

BUC is a recommended survey method for wind energy projects to characterize the avian species that are present within the project property and assess the potential for adverse effects on resident and migratory bird species. Winter burrowing owl checks were completed to ascertain burrowing owl occupancy at the three burrows observed during the Phase II burrow survey conducted in October 2011. In addition to supplementing the earlier survey work, the purpose of the winter bird surveys is to collect baseline data on all bird species within the project property. The results of these surveys will confirm the estimation of avian diversity and numbers within the project area. This MFR describes the methods used and results of winter bird use surveys and burrowing owl checks at the project property.

PROJECT LOCATION

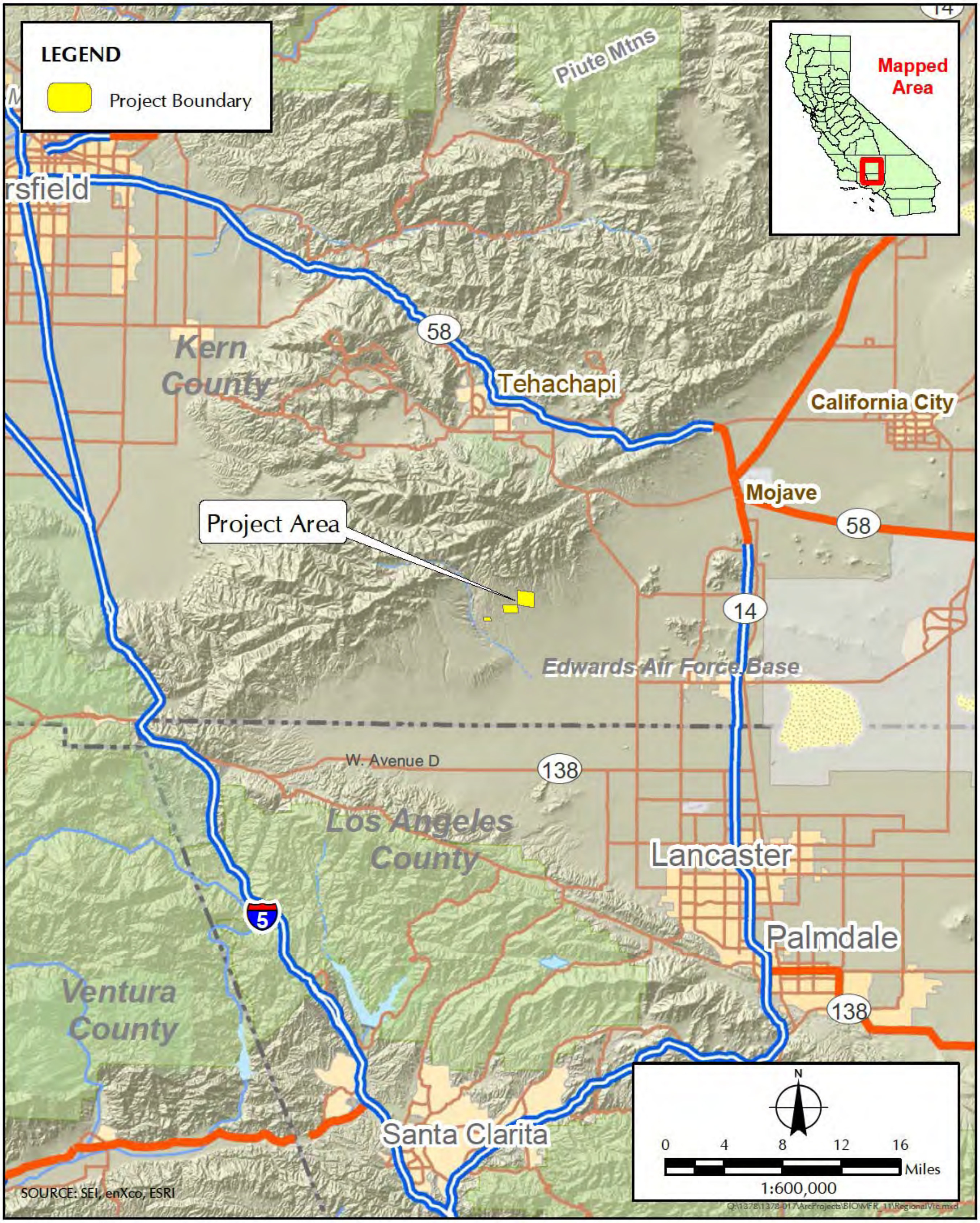
The project property consists of approximately 1,207 acres (approximately 2 square miles) located in the south-central portion of the unincorporated area of Kern County, California (Figure 1, *Regional Vicinity Map*). The project property is generally bordered by the Tehachapi Mountains to the north and northwest. The project property ranges in elevation from 3,480 to 3,960 feet above mean sea level.

METHODS

These supplemental field surveys were undertaken and designed to characterize the baseline conditions regarding special-status, resident, and/or migratory avian species that have the potential to be present within the proposed project property. These special-status species include avian species designated as such in local or regional plans, policies, or regulations or by the CDFG, the BLM, and the USFWS.

The avian winter surveys were conducted by five Sapphos Environmental, Inc. avian biologists (Ms. Mary Davis, Mr. Brian Bielfelt, Mr. Ryan Villanueva, Ms. Shelby Petro, and Mr. John Ivanov), using a combination of directed and reconnaissance survey methods to detect the frequency of occurrence and relative abundance of wintering bird species in five habitats: Joshua Tree Woodland, Mixed Mojave Woody Scrub, Mojave Desert Wash Scrub, Mojavean Juniper Woodland and Scrub, and Non-native Grassland.

All survey personnel were knowledgeable of the CEC Guidelines for conducting avian studies in support of wind energy projects. All survey personnel were experienced in the undertaking of field surveys for special-status avian species, as well as knowledgeable of the identification and ecology



enXco
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FIGURE 1
Regional Vicinity Map

of both resident and migratory avian species. All survey personnel were familiar with both federal and state statutes related to listed and sensitive avian species and their collection, in addition to being experienced with analyzing the impacts of development on special-status avian species, their habitats, and communities. Surveyors had in-depth knowledge and familiarity with the avian species of the area, including rare, threatened, and endangered species. In addition, the field team was knowledgeable of the habitat requirements for the target resident and migratory avian species, locations of various habitats within the project property suitable to support resident and migratory avian species, and the characteristics and ecology of the target avian species. The team was equipped with standardized field notebooks and checklists for field annotations when applicable, binoculars, and aerial photographs of the project property at a scale of 1 inch equals 400 feet.

The winter 2011 bird use surveys comprised two different surveys:

- BUCs: six 30-minute unlimited distance counts at each of the three points within the project property in the five main habitats.

- Reconnaissance surveys: conducted opportunistically throughout the project property during survey visits.

The winter avian surveys, including BUCs and burrowing owl winter burrow checks, were conducted from December 8, 2011 to February 27, 2012, for a total of 12 days (Table 1, *Survey Dates and Methods*).

TABLE 1
SURVEY DATES AND METHODS

Survey Dates	Bird Use Counts	Reconnaissance	Burrowing Owl Burrow Checks
December 8, 2011		X	X
December 15, 2011	X	X	X
December 16, 2011	X	X	
December 19, 2011	X	X	X
January 10, 2012	X	X	
January 12, 2012	X	X	X
January 17, 2012	X	X	
January 20, 2012	X	X	
January 24, 2012	X	X	
February 7, 2012	X	X	
February 24, 2012	X	X	
February 27, 2012	X	X	

Bird Use Counts

CEC Guidelines for BUCs recommend approximately 1 to 1.5 points per square mile.[3] The project property encompasses approximately 1,207 acres. Based on this recommendation, and the

[3] California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento, CA.

noncontiguous nature of the three parcels that constitute the project, three BUC points were selected as part of the survey effort (Figure 2, *Winter 2011–2012 Bird Use Count Locations*). The number and location of these points have been proportionally distributed among the main habitat types on-site: one BUC point at the intergrade between Mojavean Juniper Woodland and Scrub and Mojave Desert Wash Scrub, one BUC point at the intergrade between Non-native Grassland and Joshua Tree Woodland, and one BUC point in Mojavean Juniper Woodland and Scrub. When possible, BUC points were located at suitable vantage points where an unobstructed view of as much of the surrounding area as possible was provided. The exact location of each BUC point was marked using a Garmin global positioning system (GPS), and photographs were taken in each of the four cardinal directions using a digital camera.

Four observers (Ms. Mary Davis, Mr. Brian Bielfelt, Ms. Margaret Schaap, and Mr. Ryan Villanueva) conducted six 30-minute unlimited distance counts at each of three points within the project property to count birds in each of the five habitats. The observer surveyed each point four times in the morning and twice in the evening. Surveys were conducted over 11 days from December 15, 2011 to February 27, 2012. Methods follow the BUC section of the CEC Guidelines.[4] Observers collected observations of the number and species of birds observed, their activity, and estimated distance from the observer when necessary. For flying birds, the observer noted the bird's estimated height above the ground.

Reconnaissance

Observers conducted reconnaissance surveys throughout the project property on 12 survey days (Table 1). The reconnaissance surveys primarily focused on recording three types of observations: (1) species not observed during other survey types, (2) special-status species, and (3) raptors. Prey species for raptors, particularly black-tailed jackrabbits (*Lepus californicus*), were also recorded when observed within the project property. Observations were marked on a Garmin GPS and described in field notebooks.

Special care in all surveys was taken to avoid double-counting birds. Age and sex were determined, when possible, to distinguish individuals from one another. Temperature, estimated wind speed, wind direction, and percentage of cloud cover were recorded at the beginning and end of each observation period. Surveys were not conducted under average wind speeds greater than 20 miles per hour or in the event of sustained heavy precipitation.

The combination of both BUC and reconnaissance surveys, in all five habitats, resulted in 100 percent visual and/or aural coverage of the project property during winter bird surveys.

Burrowing Owl Winter Burrow Checks

Winter burrowing owl burrow checks were completed in order to determine winter occupancy of the three active burrowing owl burrows observed during Phase II burrow surveys in October 2011. The fall 2011 surveys are summarized in MFR 10. Phase III winter burrowing owl surveys followed the *California Burrowing Owl Survey Protocol and Mitigation Guidelines*.[5] A complete burrowing

[4] California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento, CA.

[5] California Burrowing Owl Consortium. April 1993. *California Burrowing Owl Survey Protocol and Mitigation Guidelines*. Available at: http://www.dfg.ca.gov/wildlife/nongame/docs/boconsortium.pdf

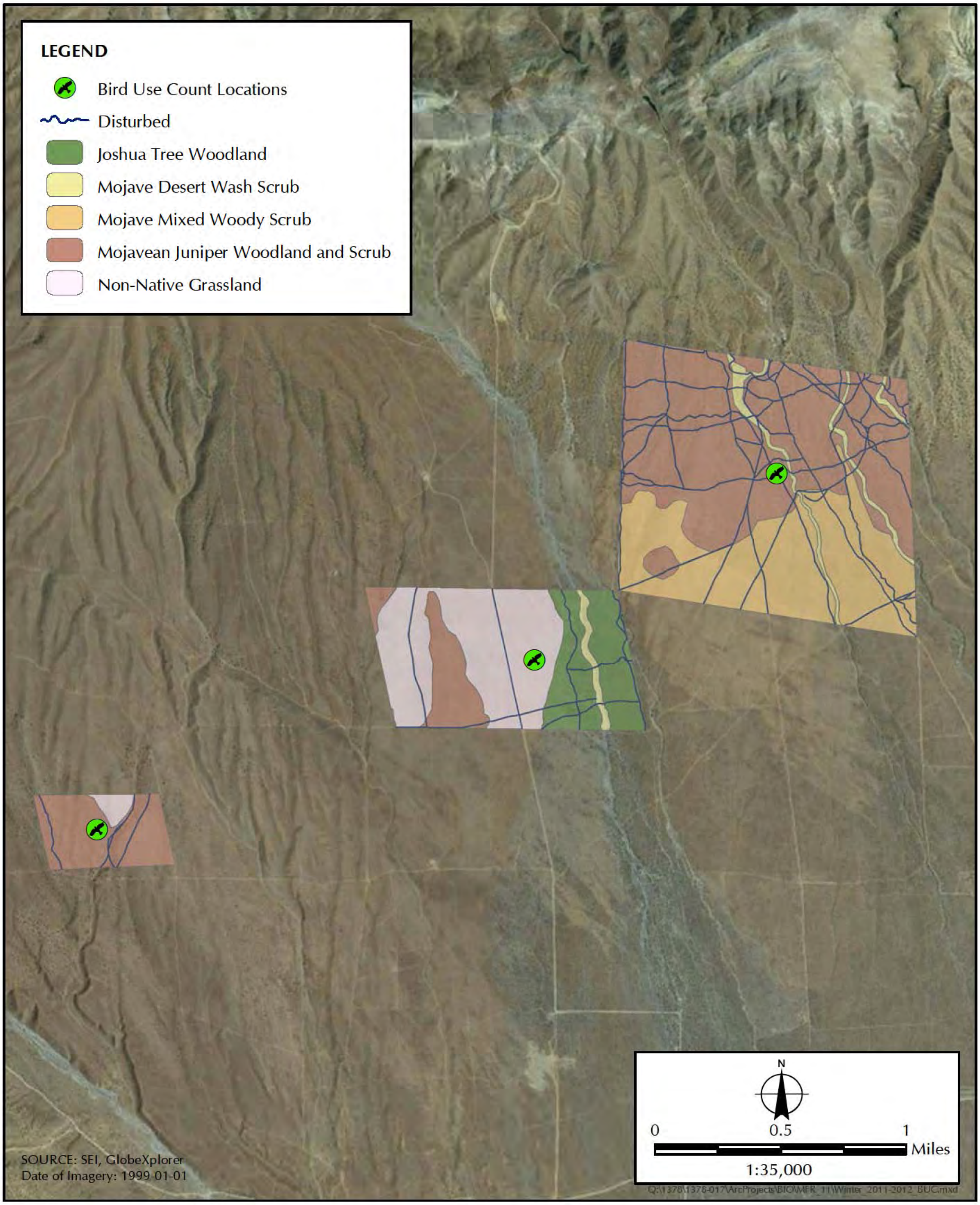


FIGURE 2
Winter 2011-2012 Bird Use Count Locations

owl survey consisted of four site visits to each burrow. Winter surveys were conducted between December 1 and January 31, during the period when wintering owls are most likely to be present. Burrows were visited from 2 hours before sunset to 1 hour after or from 1 hour before sunrise to 2 hours after. Biologists observed each burrow for approximately one-half hour during each visit, taking care to avoid disturbance of owls at the potential burrows. All observed burrowing owl activity and burrowing owl sign such as excrement, pellets, or burrow decorations (or absence thereof) were recorded during each visit.

Burrow occupancy status was determined based on the presence or absence of burrowing owls and/or sign. To determine burrow occupancy, a comparison was made over the course of the four burrow visits. If no change was observed between the initial visit and the final visit, the burrow was considered unoccupied. If burrowing owls were observed or new burrowing owl sign was observed at the burrow during at least one of the four visits, the burrow was considered occupied.

Four observers (Ms. Mary Davis, Ms. Margaret Schaap, Mr. Ryan Villanueva, Ms. Shelby Petro) conducted winter burrowing owl checks, consisting of four separate site visits for each burrow, between December 8, 2011 and January 12, 2012.

Determination of Migratory/Resident Status

The presence or absence of resident and migratory species was based on the known range and life cycle for each species as well as other readily available data. All resident and migratory birds, including resident, listed, sensitive, and migratory species, were assigned one of three designations for their winter status based on their distribution, abundance, and frequency of occurrence at the project property: (1) year-round resident, (2) migrant wintering on site, and (3) migrant present during the breeding season.

RESULTS

All Species

A total of 27 avian species were recorded at the project property during the course of all winter-season bird surveys conducted from December 8, 2011 through February 27, 2012 (Attachment A, *Avifaunal Compendium*). All of the 27 species were land birds, and 4 of these were diurnal raptors. The winter avian community included 18 resident and 9 migratory species.

Bird Use Counts

During winter BUCs, a total of 851 individuals of 25 species were recorded during 11 days of sampling at the project property between December 15, 2011 and February 27, 2012 (Table 1). A total of 2 individuals could not be identified to species and were recorded as the closest identifier possible (e.g., "unknown sparrow species"). The detection rate, which can be used as an approximation of bird use, was 94.8 birds per survey-hour.

Two species accounted for 74 percent of the observations. House finch (*Carpodacus mexicanus*), a common resident on the project property, comprised 41 percent of the observations. White-crowned sparrow (*Zonotrichia leucophrys*), a common winter migrant on the project property, comprised 33 percent of the observations. Observations of other species accounted for 26 percent of observations.

Three raptor species were observed during BUCs, including the red-tailed hawk, northern harrier, and prairie falcon, all of which were observed once. Raptors were infrequently observed at BUC points, with an overall rate of 0.333 raptor detections per survey hour.

One additional species, wrentit (*Chamaea fasciata*), was recorded during BUCs that was previously undocumented on the project property. The wrentit is a fairly common resident of chaparral habitats to the west and north of the project property, and the individual was likely a rare transient on the property. This species would not be expected to typically forage or breed on the project property.

Height above ground level (AGL) was recorded for each bird observed in flight during a BUC count. Of the 25 species observed during BUCs, 21 were never observed flying higher than 150 feet AGL and, therefore, were not observed within the 200- to 400-foot altitude band that would comprise the rotor-swept zone (Figure 3, *Observed Avian Flight Heights*). The four species observed flying within the rotor-swept zone include (1) northern harrier, (2) red-tailed hawk, (3) prairie falcon, and (4) common raven.

Reconnaissance Counts

Two additional species were detected during reconnaissance counts that were not detected during BUCs. A greater roadrunner (*Geococcyx californianus*) was observed running west along the main road through the easternmost parcel of the project property on January 10, 2012. In addition, burrowing owls were observed four times during various winter burrowing owl checks on December 15 and 19, 2011 and January 12, 2012.

Burrowing Owl Winter Burrow Checks

Three burrowing owl burrows were recorded on the proposed project property during the course of Phase II burrow surveys conducted in October 2011. These same burrows were monitored for winter occupancy from December 8, 2011 through January 12, 2012. Two were occupied and one was unoccupied (Table 2, *Burrowing Owl Winter Burrow Occupancy* and Figure 4, *Winter 2011–2012 Burrowing Owl Burrow Occupancy*). No additional burrowing owl sightings, nor any additional burrows, were observed during the entirety of bird surveys conducted on the proposed project property in the winter survey season.

TABLE 2
BURROWING OWL WINTER BURROW OCCUPANCY

Name	Occupied	Unoccupied	Number of Visits Where Burrowing Owls Observed	Location (UTM Easting, Northing)
1	X		1	370723 E, 3867136 N
2		X	0	370203 E, 3866977 N
3	X		3	368852 E, 3866748 N

Special-status Species

No federally threatened, endangered, or candidate bird species were observed at the proposed project property. Furthermore, no species listed by the State of California as threatened or endangered were observed. Special-status listings for species present included USFWS Birds of Conservation Concern, CDFG Watch List species, and CDFG Species of Special Concern. USFWS

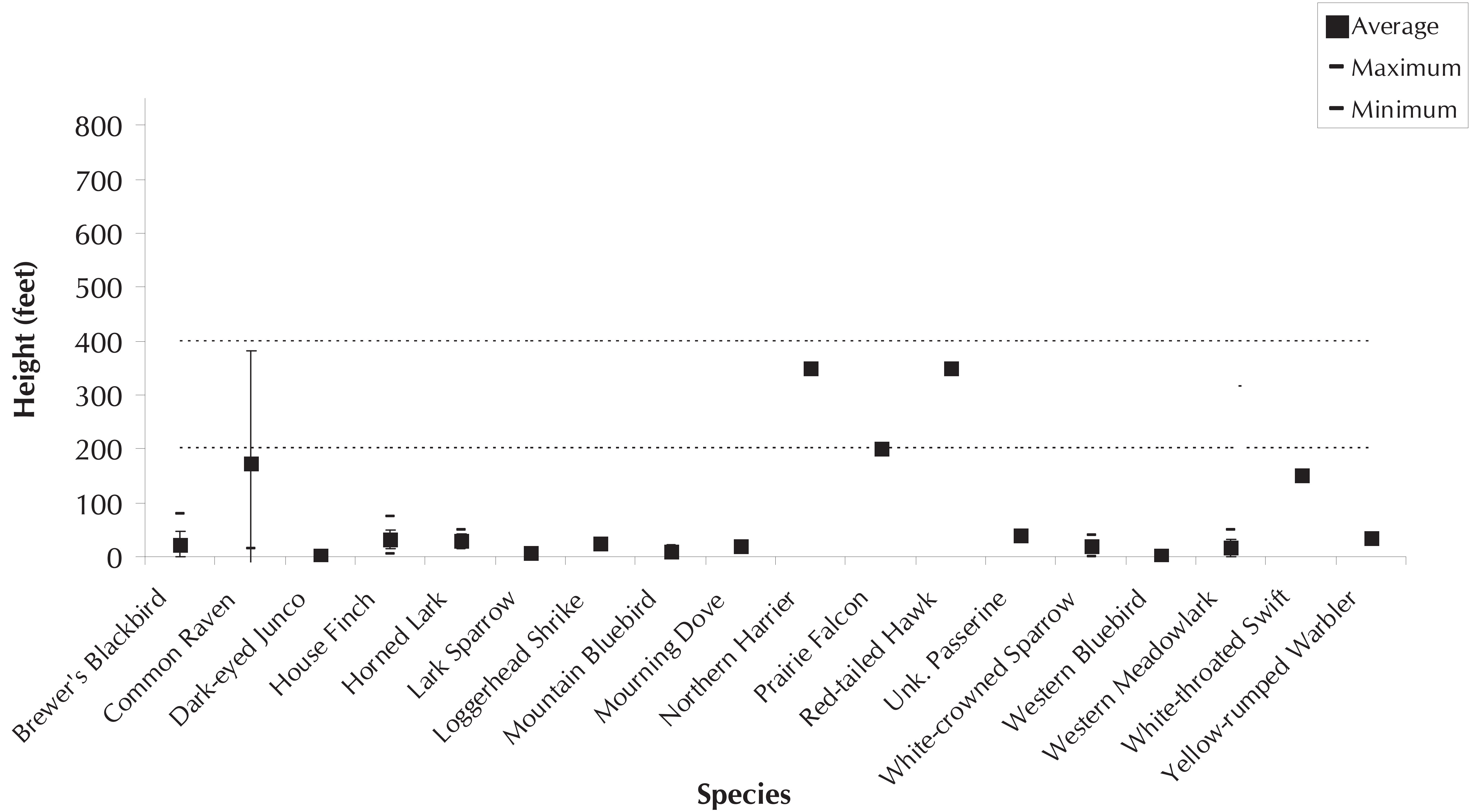
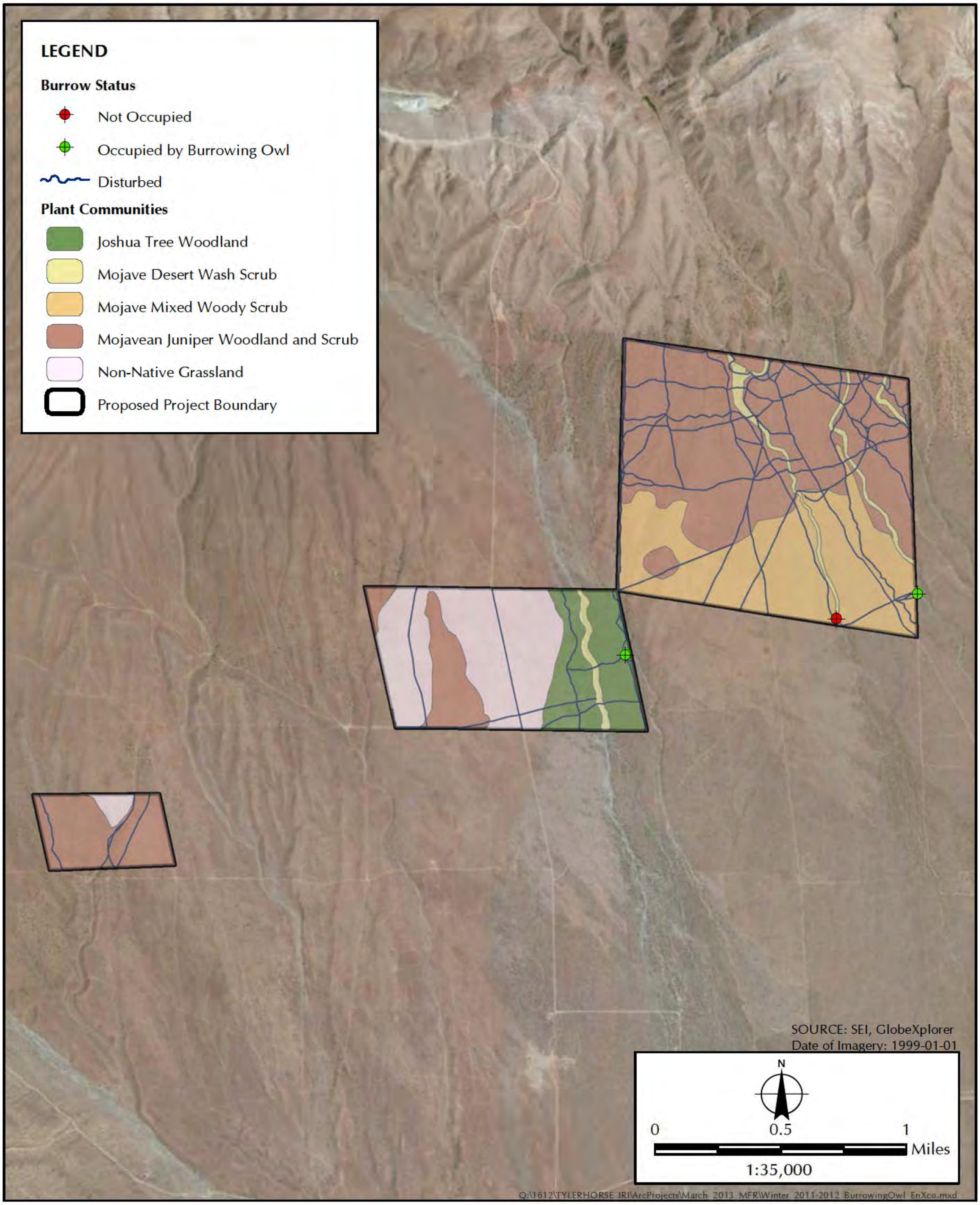


FIGURE 3
Observed Avian Flight Heights



enXco
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FIGURE 4

Winter 2011-2012 Burrowing Owl Burrow Occupancy

Birds of Conservation Concern are priorities for conservation actions and will be considered for actions taken on federal lands pursuant to Executive Order 13186, which, as the entire project property consists of lands administered by the federal BLM, is applicable to this project.[6] CDFG Species of Special Concern are not formally protected by the State of California, but they should be taken into consideration during the environmental review process in analyzing the impacts of projects under the California Environmental Quality Act (CEQA).[7] Given that the proposed project property lies entirely on federal lands, CEQA review, and thus consideration of CDFG Species of Special Concern, may not be applicable. The CDFG Watch List consists of birds that were once listed federally or in the State of California as threatened or endangered, or as CDFG Species of Special Concern, but that are no longer on any of these lists. It also includes California fully protected species.[8] Inclusion on the CDFG Watch List has no formal implications for listed species, and no consequences are anticipated for the project.

All of the bird species observed during the winter avian surveys are protected under the Migratory Bird Treaty Act. Of these, the northern harrier, prairie falcon, burrowing owl, and loggerhead shrike have additional special status. A single northern harrier was observed at BUC point 2. A single prairie falcon was observed at BUC point 1. Burrowing owls were observed a total of four times at two known burrowing owl burrows, and loggerhead shrikes were observed at all three BUC points (Figure 5, *Winter 2011–2012 Special-Status Birds Observed*).

DISCUSSION

All Species

During winter avian surveys, most measures of bird use were very low. The species diversity at the site was low overall, with 27 species determined to be present in the winter. An average of 94.8 birds were observed per survey-hour during BUCs. The high observational rate, despite low species diversity, is likely due to the large flocks of common passerine species wintering on the proposed project, such as house finches and white-crowned sparrows. Raptors were very infrequently observed using the project property, at a rate of 0.33 raptors per survey-hour during BUCs.

The survey data do not support the project property as an important corridor or wintering location for migratory birds. Similarly, raptors were not observed in significant numbers; nor were those observed flying in consistent directional flights indicative of migration.

Special-status Species

Northern Harrier

The migratory northern harrier is listed as a California species of special concern (priority 3) by CDFG and is considered under the BLM's West Mojave Plan.[9,10] The entire approximately 1,207-

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[6] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. December 2008. *Birds of Conservation Concern 2008*. Arlington, VA.

[7] *California Public Resources Code*, §§ 21000–21177.

[8] California Department of Fish and Game, Biogeographic Data Branch, California Natural Diversity Database. January 2011. *Special Animals List*. Sacramento, CA.

[9] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of*

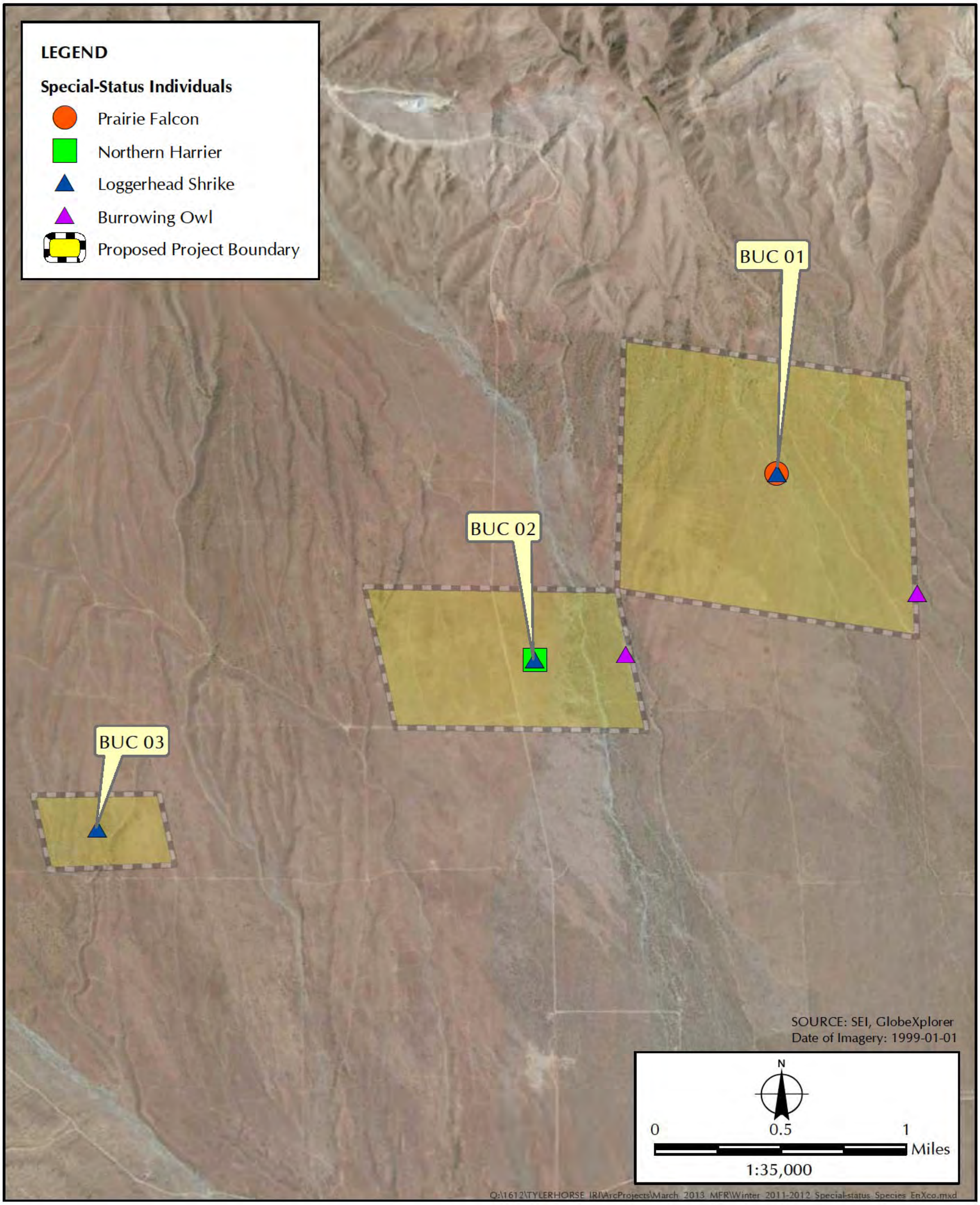

FIGURE 5
Winter 2011-2012 Special-Status Birds Observed

acre project study area provides suitable and occupied foraging habitat for the northern harrier. Northern harriers are widespread and fairly numerous in many areas of North America but have declined in abundance in Southern California due to loss of open and semiopen habitats.[11,12] In eastern Kern County, the northern harrier is a fairly common winter visitor, and a rare breeder, but it does not breed within or near the project property.[13] One male northern harrier was observed soaring over the project property during the winter survey period, flying at 350 feet AGL. While foraging, northern harriers normally fly less than 5 meters (16.4 feet) AGL, but they may fly higher during migration; thus, flight heights can reach the proposed rotor-swept range of wind turbines (200–400 feet) in the project property.[14] Because northern harriers were observed only once during winter avian surveys, mortality risk due to collision with wind turbines is likely to be low. Implementation of the project may have indirect impacts (loss of foraging habitat) on northern harriers foraging in or migrating through the project study area.

Prairie Falcon

The prairie falcon is listed on the CDFG Watch List and as a USFWS Bird of Conservation Concern in Bird Conservation Region (BCR) 33.[15,16] The prairie falcon is an uncommon year-round resident of many open habitats throughout California, and it is most commonly found near perennial grasslands, savannahs, rangeland, agricultural fields, and desert scrub. Prairie falcons require cliff ledges for shelter and eyrie (nest) placement; these do not occur within the project property. A single prairie falcon was observed at BUC 1 on January 20, 2012, flying at a maximum height of 200 feet AGL, which is at the lower end of the rotor-swept zone. Prairie falcons in the area might be at risk of collision with turbines; however, studies of raptor behavior have documented high raptor collision avoidance behaviors, noting that the diurnal flight of raptors may provide these birds with the ability to visually and acoustically detect turbines.[17,18] Implementation of the project may have direct and indirect impacts (loss of foraging habitat, displacement) to this species. While it is possible that small numbers of prairie falcon fatalities could occur over the life of the project, such events are expected to be rare, and impacts to the population are not expected to be significant.

Western Birds 1. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

[10] Bureau of Land Management. 2005. *Final Environmental Impact Report and Statement for the West Mojave Plan: A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment*. Volume 1. Available at: http://www.blm.gov/ca/st/en/fo/cdd/wemo.html

[11] Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society, pp. 76–77.

[12] Sibley, D.A. 2000. *The Sibley Guide to Birds*. New York, NY: Knopf.

[13] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

[14] Macwhirter, R. Bruce and Keith L. Bildstein. 1996. “Northern Harrier (Circus cyaneus).” In *The Birds of North America Online*, ed. A. Poole. Ithaca, NY: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/210

[15] California Department of Fish and Game, Biogeographic Data Branch, California Natural Diversity Database. January 2011. *Special Animals List*. Sacramento, CA.

[16] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. 2008. *Birds of Conservation Concern 2008*. Arlington, VA.

[17] Whitfield, D.P., and M. Madders. 2006. *A Review of the Impacts of Wind Farms on Hen Harriers Circus cyaneus and an Estimation of Collision Avoidance Rates*. Natural Research Information Note 1 (Revised). Banchory, UK: Natural Research Ltd.

[18] Chamberlain, D.E., M.R. Rehfisch, A.D. Fox, M. Desholm, and S.J. Anthony. 2006. “The Effect of Avoidance Rates on Bird Mortality Predictions Made by Wind Turbine Collision Risk Models.” *Ibis*, *148*: 198–202.

Burrowing Owl

The burrowing owl is a California Species of Special Concern, priority 2, a USFWS Bird of Conservation Concern in BCR 33, and is considered in the West Mojave Plan.[19,20,21] The burrowing owl is a grassland- and desert-inhabiting species that nests underground, usually in ground squirrel burrows. This species nests in small numbers in the Antelope Valley. Burrowing owls have sharply declined in California because of the loss of open and semiopen habitats; their largest numbers now occur in the Imperial Valley, where more than 70 percent of the statewide population is located.[22,23] Their normal range includes the desert province of eastern Kern County in native desert and agricultural habitats.[24,25]

Four adult burrowing owl observations occurred during winter bird surveys, and all four observations were made at two previously documented burrow sites within Mojave Desert Wash Scrub habitat. These occurrences are consistent with the burrowing owl occurrences identified in the EIS. The project's design avoids crossing any drainages, and therefore risks to this species during construction would be minimized. Implementation of the proposed action would result in the direct disturbance of a small amount of Mojave Desert Wash Scrub and Non-native Grassland, which provide foraging habitat for these species. Short-term (due to construction activity) mortality effects from the project on these species are considered unlikely to occur.

Burrowing owls normally forage at less than 100 feet AGL, and thus potential foraging heights are below the proposed rotor-swept range of wind turbines (200–400 feet) in the project. Burrowing owls can be susceptible to collision mortality at small turbines with very low to low rotor-swept heights;[26] however, the project will only be utilizing larger, newer-generation turbines. No burrowing owls were killed during postconstruction mortality studies at the Tehachapi Wind Resource Area (WRA).[27] Any mortality that might occur over the project life would be at a very low

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[19] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

[20] U.S. Fish and Wildlife Service. 2008, Division of Migratory Bird Management. *Birds of Conservation Concern 2008*. Arlington, VA.

[21] Bureau of Land Management. 2005. *Final Environmental Impact Report and Statement for the West Mojave Plan: A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment*. Volume 1. Available at: http://www.blm.gov/ca/st/en/fo/cdd/wemo.html

[22] Santa Cruz Predatory Bird Research Group. 10 January 2006. California Burrowing Owl Consortium. Available at: http://www2.ucsc.edu/scpbrg/statemap.htm

[23] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

[24] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

[25] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

[26] Smallwood, K.S., C.G. Thelander, M.L. Morrison, and L.M. Rugge. 2007. "Burrowing Owl Mortality in the Altamont Pass Wind Resource Area." *Journal of Wildlife Management*, *71*: 1513–1524.

[27] Anderson, R.L., J. Tom, N. Neumann, and J.A. Cleckler. 2004. *Avian Monitoring and Risk Assessment at Tehachapi Pass Wind Resource Area, California*. Sacramento, CA: California Energy Commission.

level and would not have a measurable effect on burrowing owl populations. Although the risk of collision with wind turbine generators is low, mitigation measures identified in the EIS and the Bird and Bat Conservation Strategy will reduce these impacts.

Loggerhead Shrike

Loggerhead shrike is a USFWS Bird of Conservation Concern in BCR 33 and a CDFG Species of Special Concern, priority 2.[28,29] The loggerhead shrike is still fairly common in appropriate habitat in many areas of California and western North America, including many areas of the Mojave Desert.[30,31] A sharp decline of mainland populations of the loggerhead shrike occurred in parts of California, especially coastal Southern California, from 1968 to 1979, although statewide BBS trends were stable from 1980 to 2004.[32] Loggerhead shrikes may occur throughout the approximately 1,207-acre project property.

The loggerhead shrike is generally not at risk of mortality from collision with wind turbines because nearly all of its foraging activities occur below 50 feet AGL. Implementation of the project may have indirect impacts (loss of nest sites, loss of foraging habitat, displacement) and may result in the loss of loggerhead shrikes at the project property. This is consistent with the conclusions reached in the Biological Resources Technical Report and EIS.

Should there be any questions regarding the information contained in this MFR, please contact Dr. Joseph Platt or Ms. Mary Davis at (626) 683-3547.

REFERENCES

Anderson, R.L., J. Tom, N. Neumann, and J.A. Cleckler. 2004. *Avian Monitoring and Risk Assessment at Tehachapi Pass Wind Resource Area, California*. Sacramento, CA: California Energy Commission.

Bureau of Land Management. 2005. *Final Environmental Impact Report and Statement for the West Mojave Plan: A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment*. Volume 1. Available at: http://www.blm.gov/ca/st/en/fo/cdd/wemo.html

California Burrowing Owl Consortium. April 1993. *California Burrowing Owl Survey Protocol and Mitigation Guidelines*. Available at: http://www.dfg.ca.gov/wildlife/nongame/docs/boconsortium.pdf

[28] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

[29] U.S. Fish and Wildlife Service. 2008. *Birds of Conservation Concern 2008*. Arlington, VA

[30] Sibley, D.A. 2000. *The Sibley Guide to Birds*. New York, NY: Knopf.

[31] Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society, p. 408.

[32] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

California Department of Fish and Game, Biogeographic Data Branch, California Natural Diversity Database. January 2011. *Special Animals List*. Sacramento, CA.

California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento, CA.

California Public Resources Code, §§ 21000–21177.

Chamberlain, D.E., M.R. Rehfisch, A.D. Fox, M. Desholm, and S.J. Anthony. 2006. "The Effect of Avoidance Rates on Bird Mortality Predictions Made by Wind Turbine Collision Risk Models." *Ibis*, *148*: 198–202.

Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society.

Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

Macwhirter, R. Bruce, and Keith L. Bildstein. 1996. "Northern Harrier (Circus cyaneus)." In *The Birds of North America Online*, ed. A. Poole. Ithaca, NY: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/210

Santa Cruz Predatory Bird Research Group. 10 January 2006. California Burrowing Owl Consortium. Available at: http://www2.ucsc.edu/scpbrg/statemap.htm

Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

Sibley, D.A. 2000. *The Sibley Guide to Birds*. New York, NY: Knopf.

Smallwood, K.S., C.G. Thelander, M.L. Morrison, and L.M. Rugge. 2007. "Burrowing Owl Mortality in the Altamont Pass Wind Resource Area." *Journal of Wildlife Management*, *71*: 1513–1524.

U.S. Fish and Wildlife Service, Division of Migratory Bird Management. December 2008. *Birds of Conservation Concern 2008*. Arlington, VA.

Whitfield, D.P., and M. Madders. 2006. *A Review of the Impacts of Wind Farms on Hen Harriers Circus cyaneus and an Estimation of Collision Avoidance Rates*. Natural Research Information Note 1 (Revised). Banchory, UK: Natural Research Ltd.

ATTACHMENT A
AVIFAUNAL COMPENDIUM

AVIAN SPECIES OBSERVED AT THE PROJECT PROPERTY DURING WINTER 2011–2012

		Residency Status				Detections by Survey Type	
Family / Species	**Special Status**	**Year-round**	**Migrant, Winter, or Transient**	**Migrant, Breeding**	**Nest Found**	**Bird Use Count (BUC)**	**Reconnaissance**
Accipitridae—Hawks, Eagles, Kites, and Harriers							
Circus cyaneus Northern harrier	CDFG SSC, WeMo	+				1	
Buteo jamaicensis Red-tailed hawk		+				1	
Falconidae—Falcons							
Falco mexicanus Prairie falcon	CDFG WL, USFWS BCC	+				1	
Columbidae—Pigeons and Doves							
Zenaida macroura Mourning dove		+				1	
Cuculidae—Cuckoos							
Geococcyx californianus Greater roadrunner		+					1
Strigidae—Owls							
Athena cunicularia Burrowing owl	CDFG SSC, WeMo, USFWS BCC	+					4
Apodidae—Swifts							
Aeronautes saxatalis White-throated swift			+			1	
Laniidae—Shrikes							
Lanius ludovicianus Loggerhead shrike	CDFG SSC, WeMo,	+				9	
Corvidae—Jays and Crows							
Aphelocoma californica Western scrub-jay		+				1	
Corvus corax Common raven		+				37	

AVIAN SPECIES OBSERVED AT THE PROJECT PROPERTY DURING WINTER 2011–2012, *Continued*

Family / Species	Special Status	Residency Status: Year-round	Migrant, Winter, or Transient	Migrant, Breeding	Nest Found	Detections by Survey Type: Bird Use Count (BUC)	Reconnaissance
Alaudidae—Larks							
Eremophila alpestris Horned lark		+				11	
Troglodytidae—Wrens							
Campylorhynchus brunneicapillus Cactus wren		+				2	
Salpincted obsoletus Rock wren		+				3	
Regulidae—Kinglets							
Regulus calendula Ruby-crowned kinglet			+			1	
Sylviidae—Old World Warblers							
Chamaea fasciata Wrentit			+			2	
Turdidae—Thrushes							
Sialia Mexicana Western bluebird		+				2	
Sialia currucoides Mountain bluebird			+			32	
Mimidae—Thrashers							
Mimus polyglottos Northern mockingbird		+				1	
Oreoscoptes montanus Sage thrasher			+			1	
Parulidae—Wood-Warblers							
Setophaga coronata Yellow-rumped warbler			+			1	
Emberizidae—Buntings and Sparrows							
Chondestes grammacus Lark sparrow			+			63	
Amphispiza bilineata Black-throated sparrow		+				5	
Zonotrichia leucophrys White-crowned sparrow			+			283	
Junco hyemalis Dark-eyed junco			+			6	

AVIAN SPECIES OBSERVED AT THE PROJECT PROPERTY DURING WINTER 2011–2012, *Continued*

Family / Species	Special Status	Residency Status: Year-round	Residency Status: Migrant, Winter, or Transient	Residency Status: Migrant, Breeding	Residency Status: Nest Found	Detections by Survey Type: Bird Use Count (BUC)	Detections by Survey Type: Reconnaissance
Icteridae—Blackbirds							
Sturnella neglecta Western meadowlark		+				28	
Euphagus cyanocephalus Brewer's blackbird		+				8	
Fringillidae—Finches							
Carpodacus mexicanus House finch		+				349	
Other							
Passerine species						1	
Sparrow species						1	

KEY:
CDFG SSC = California Department of Fish and Game Species of Special Concern
CDFG WL = California Department of Fish and Game Watch List
WeMo = Considered under the Bureau of Land Management's West Mojave Plan
USFWS BCC = United States Fish and Wildlife Service Bird of Conservation Concern (Bird Conservation Region 33)

ATTACHMENT 3
MEMORANDUM FOR THE RECORD NO. 1: RESULTS OF 2012 SPRING BIRD USE SURVEYS AND SPECIAL-STATUS PLANT SURVEYS

Sapphos
environmental inc.

July 24, 2012
Job Number: 1612-021
Tylerhorse Wind Energy Project

MEMORANDUM FOR THE RECORD
2.6 1612-021.M01

TO: Iberdrola Renewables, LLC
(Ms. Amy Parsons and Ms. Sara Parsons-McMahon)

FROM: Sapphos Environmental, Inc.
(Ms. Mary Davis and Dr. Joseph Platt)

SUBJECT: Results of 2012 Spring Bird Use Surveys and Special-Status Plant Surveys at the Tylerhorse Wind Energy Project, Kern County, California

FIGURES:
1. Regional Vicinity Map
2. Spring 2012 Bird Use Count Locations
3. Spring 2012 Special-Status Plant Survey Area
4. Observed Avian Flight Heights
5. Spring 2012 Special-Status Avian Species

ATTACHMENTS:
A. Avifaunal Compendium
B. Flora Compendium

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EXECUTIVE SUMMARY

This Memorandum for the Record (MFR) documents the results of survey efforts for both the 2012 spring bird use surveys as well as the spring 2012 special-status plant surveys at the Tylerhorse Wind Energy Project (project) property. The project property consists of three separate parcels that total approximately 1,207 acres (approximately 2 square miles) of Bureau of Land Management (BLM)–administered land located in the unincorporated territory of south-central Kern County, California. The results of the supplemental survey efforts for 2012 spring bird surveys and special-status plant surveys at the project are consistent with the results of surveys reported in the Biological Resources Technical Report (BRTR) and the Environmental Impact Report (EIS). Bird use surveys were performed consistent with the *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development* published by the California Energy Commission (CEC Guidelines).[1] Special-status plant surveys were consistent with the BLM's California Instruction Memorandum CA IM 2009-026, *Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species*.[2] Spring bird use surveys and special-status plant surveys were conducted on 10 days between March 14 and May 16, 2012.

- Forty-three avian species were recorded at the project property as a result of all spring bird surveys. Six of the species are raptors.

- None of the 23 species recorded during bird use counts (BUCs) was observed flying within the rotor-swept zone (200–400 feet above ground level).

- The Swainson's hawk (*Buteo swainsoni*), which is listed as Threatened under the California Endangered Species Act and considered in the West Mojave Plan, was observed incidentally during special-status plant surveys. Four additional special-status or sensitive avian species, or potential nesting sites for such species, were observed on the project property:

    1. Ferruginous hawk (*Buteo regalis*), a California Department of Fish and Game (CDFG) Watch List species (wintering) and considered in the BLM's West Mojave Plan;
    2. Merlin (*Falco columbarius*), on the CDFG Watch List (wintering);
    3. Burrowing owl (*Athene cunicularia*), a CDFG Species of Special Concern (burrow sites and some wintering sites), a U.S. Fish and Wildlife Service (USFWS) Bird of Conservation Concern, and considered in the BLM's West Mojave Plan; and
    4. Loggerhead shrike (*Lanius ludovicianus*), a CDFG Species of Special Concern (nesting) and considered in the BLM's West Mojave Plan

- No special-status plants were observed within 200 feet of the proposed project elements within the 1,207-acre project.

[1] California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento, CA.

[2] U.S. Department of the Interior, Bureau of Land Management, California State Office. 7 July 2009. *Survey Protocols Required for NEPA and ESA Compliance for BLM Special Status Plant Species*. CA IM 2009-026. Sacramento, CA. Available at: http://www.blm.gov/ca/dir/pdfs/2009/im/CAIM2009-026ATT1.pdf

INTRODUCTION

The Tylerhorse Wind Energy Project constitutes a project pursuant to the National Environmental Policy Act (NEPA), as it is located on land administered by the U.S. Department of the Interior. Acting in its capacity as a lead agency under NEPA, the BLM would need to determine the potential for the project to result in significant impacts, consider mitigation measures and alternatives capable of avoiding significant impacts, and consider the environmental effects of the project as part of its decision-making process.

Sapphos Environmental, Inc. conducted spring BUCs and special-status plant surveys in spring 2012 within the 1,207-acre project property to confirm the conclusions reached in the BRTR and the EIS for the project. In addition to supplementing earlier survey work, the purpose of the spring bird surveys is to collect baseline data on all bird species within the project property. The results of these surveys will confirm the estimation of avian diversity and numbers within the project area. Spring plant surveys were conducted to ascertain the presence of spring-blooming special-status plants on the project property. Special-status plant surveys had previously been conducted on the project for spring-blooming plants in May 2010, and for fall-blooming plants in October 2010 and again in October 2011. No special-status plants were found in on the project in any of the previously conducted surveys, as reflected in the BRTR and EIS.

PROJECT LOCATION

The project property consists of approximately 1,207 acres (approximately 2 square miles) located in the south-central portion of the unincorporated area of Kern County, California (Figure 1, *Regional Vicinity Map*). The project property is generally bordered by the Tehachapi Mountains to the north and northwest. The project property ranges in elevation from 3,480 to 3,960 feet above mean sea level.

METHODS

Avian Surveys

These supplemental field surveys were undertaken and designed to characterize the baseline conditions regarding special-status, resident, and/or migratory avian species that have the potential to be present within the project property. These special-status species include avian species designated as such in local or regional plans, policies, or regulations or by the CDFG, the BLM, and the USFWS.

The spring surveys were conducted by three Sapphos Environmental, Inc. avian biologists (Ms. Mary Davis, Ms. Margaret Schaap, and Mr. Brian Bielfelt,), using a combination of directed and reconnaissance survey methods to detect the frequency of occurrence and relative abundance of spring bird species in five habitats: Joshua Tree Woodland, Mixed Mojave Woody Scrub, Mojave Desert Wash Scrub, Mojavean Juniper Woodland and Scrub, and Non-native Grassland.

All survey personnel were knowledgeable of the CEC Guidelines for conducting avian studies in support of wind energy projects. All survey personnel were experienced in the undertaking of field surveys for special-status avian species, as well as knowledgeable of the identification and ecology of both resident and migratory avian species. All survey personnel were familiar with both federal and state statutes related to listed and sensitive avian species and their collection, in addition to being experienced with analyzing the impacts of development on special-status avian species, their

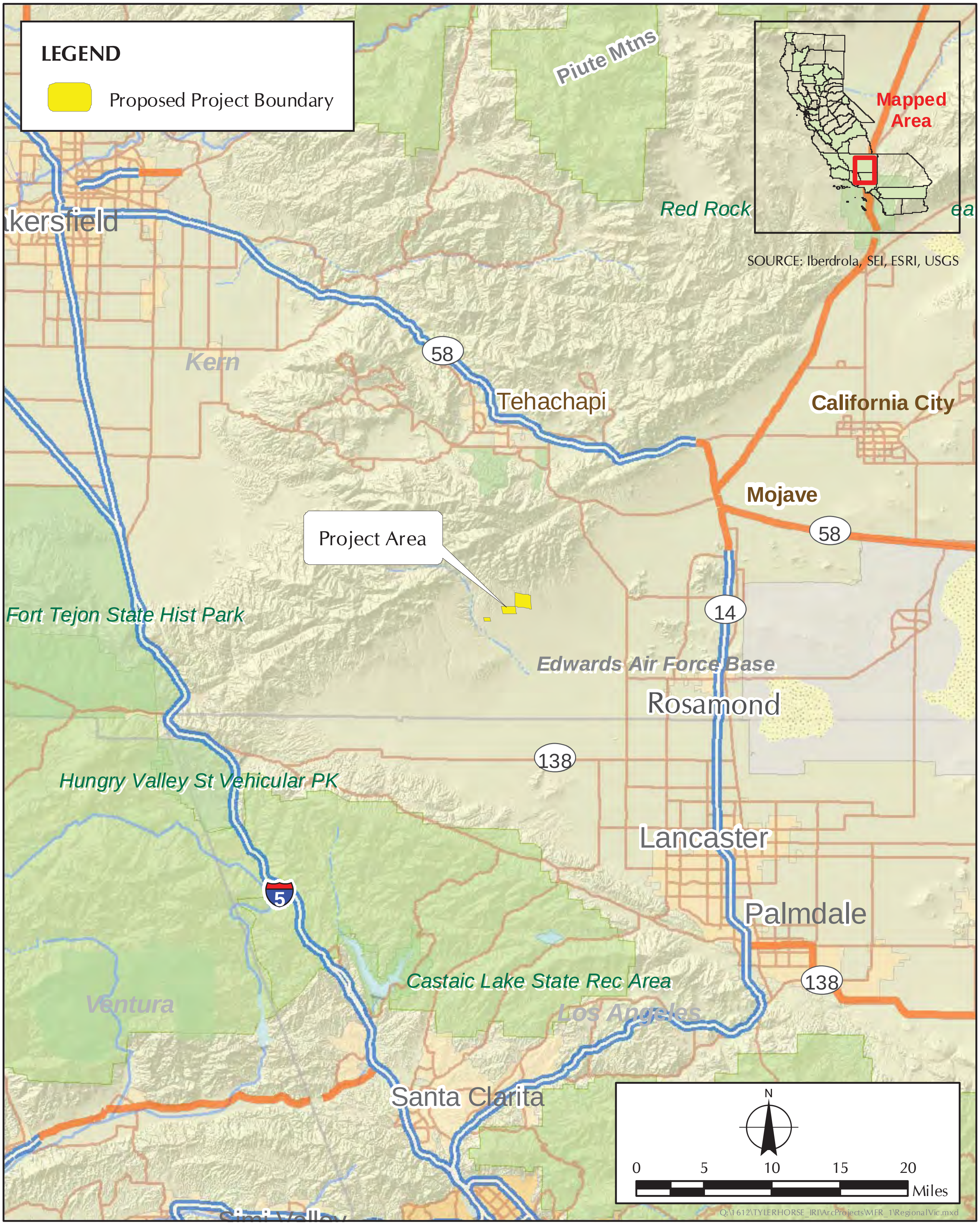


FIGURE 1
Regional Vicinity Map

habitats, and communities. The team was equipped with standardized field notebooks and checklists for field annotations when applicable, binoculars, and aerial photographs of the project property at a scale of 1 inch equals 400 feet.

The spring 2012 bird use surveys comprised two different surveys:

- BUCs: six 30-minute unlimited distance counts at each of the three points within the project property in the five main habitats; and
- Reconnaissance surveys: conducted opportunistically throughout the project property during survey visits.

The spring BUCs were conducted from March 14 to May 16, 2012, for a total of 6 days (Table 1, *Survey Dates and Methods*).

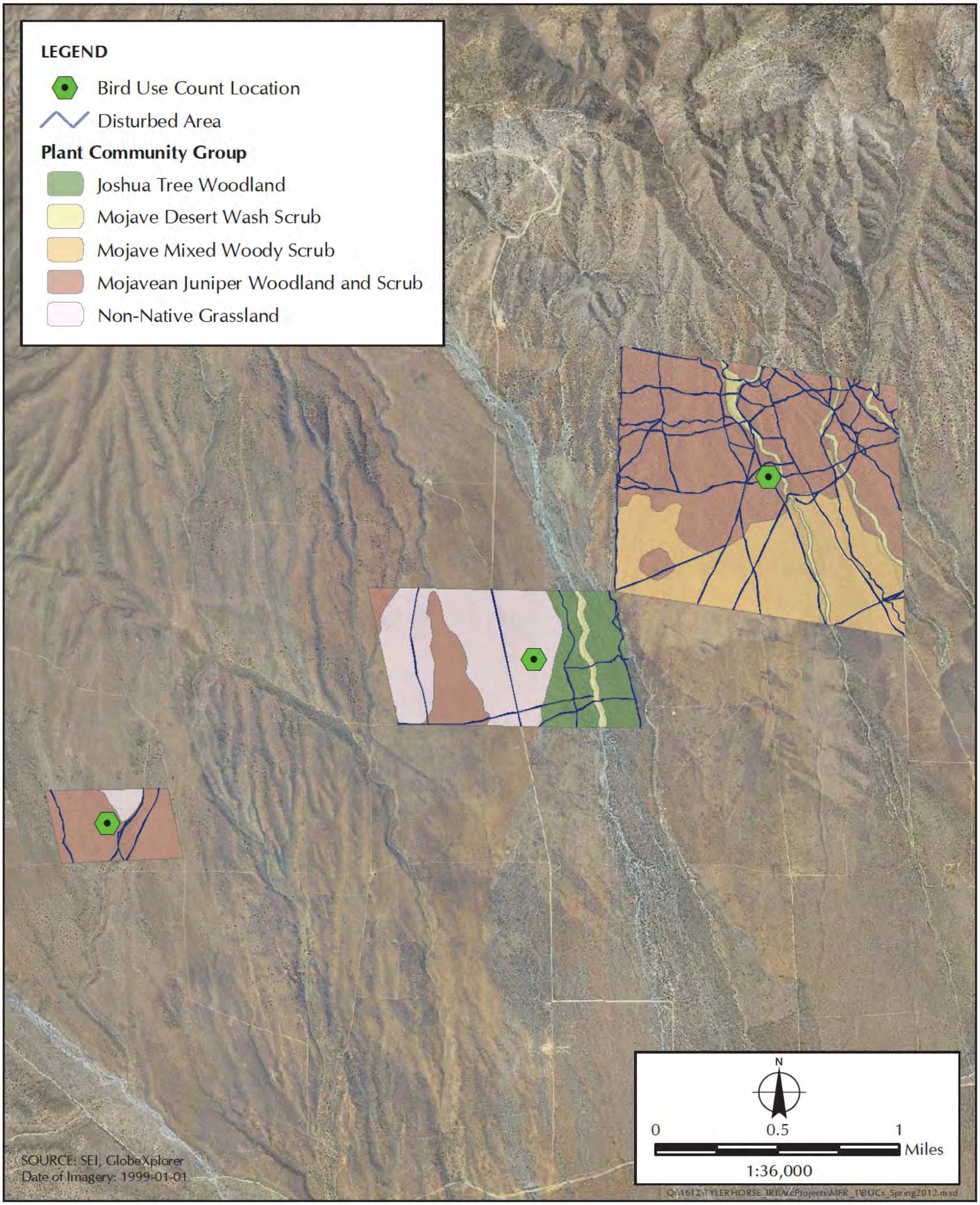
TABLE 1
SURVEY DATES AND METHODS

Survey Dates	Bird Use Counts	Reconnaissance
March 14, 2012	X	X
March 27, 2012	X	X
March 29, 2012	X	X
April 10, 2012		X
April 11, 2012		X
April 12, 2012	X	X
April 18, 2012		X
April 19, 2012		X
April 20, 2012	X	X
May 16, 2012	X	X

Bird Use Counts

CEC Guidelines for BUCs recommend approximately 1 to 1.5 points per square mile.[3] The project property encompasses approximately 1,207 acres. Based on this recommendation, and the noncontiguous nature of the three parcels that constitute the project, three BUC points were selected as part of the survey effort (Figure 2, *Spring 2012 Bird Use Count Locations*). The number and location of these points have been proportionally distributed among the main habitat types on-site: one BUC point at the intergrade between Mojavean Juniper Woodland and Scrub and Mojave Desert Wash Scrub, one BUC point at the intergrade between Non-native Grassland and Joshua Tree Woodland, and one BUC point in Mojavean Juniper Woodland and Scrub. When possible, BUC points were located at suitable vantage points where an unobstructed view of as much of the surrounding area as possible was provided. The exact location of each BUC point was marked using a Garmin global positioning system (GPS), and photographs were taken in each of the four cardinal directions using a digital camera.

[3] California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento, CA.



IBERDROLA RENEWABLES

FIGURE 2

Spring 2012 Bird Use Count Locations

Biologists conducted six 30-minute unlimited distance counts at each of three points within the project property to count birds in each of the five habitats. The observer surveyed each point four times in the morning and twice in the evening. Methods follow the BUC section of the CEC Guidelines.[4] Observers collected observations of the number and species of birds observed, their activity, and estimated distance from the observer when necessary. For flying birds, the observer noted the bird's estimated height above the ground.

Reconnaissance

Observers conducted reconnaissance surveys throughout the project property on 10 survey days (Table 1). The reconnaissance surveys primarily focused on recording three types of observations: (1) species not observed during other survey types, (2) special-status species, and (3) raptors. Prey species for raptors, particularly black-tailed jackrabbits (*Lepus californicus*), were also recorded when observed within the project property. Observations were marked on a Garmin GPS and described in field notebooks.

Special care in all surveys was taken to avoid double-counting birds. Age and sex were determined, when possible, to distinguish individuals from one another. Temperature, estimated wind speed, wind direction, and percentage of cloud cover were recorded at the beginning and end of each observation period. Surveys were not conducted under average wind speeds greater than 20 miles per hour or in the event of sustained heavy precipitation.

The combination of both BUC and reconnaissance surveys, in all five habitats, resulted in 100 percent visual and/or aural coverage of the project property during spring bird surveys.

Determination of Migratory/Resident Status

The presence or absence of resident and migratory species was based on the known range and life cycle for each species as well as other readily available data. All resident and migratory birds, including resident, listed, sensitive, and migratory species, were assigned one of three designations for their spring status based on their distribution, abundance, and frequency of occurrence at the project property: (1) year-round resident, (2) migrant wintering on-site, and (3) migrant present during the breeding season.

Special-Status Species

Special-status listings for avian species present included those listed as threatened or endangered under the federal and California Endangered Species Acts (ESAs), USFWS Birds of Conservation Concern, CDFG Watch List species, and CDFG Species of Special Concern. USFWS Birds of Conservation Concern are priorities for conservation actions and will be considered for actions taken on federal lands pursuant to Executive Order 13186, which, as the entire project property consists of lands administered by the federal BLM, is applicable to this project.[5] CDFG Species of Special Concern are not formally protected by the State of California, but they should be taken into consideration during the environmental review process in analyzing the impacts of projects under

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[4] California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento, CA.

[5] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. 2008. *Birds of Conservation Concern 2008*. Arlington, VA.

the California Environmental Quality Act (CEQA).[6] Given that the project property lies entirely on federal lands, CEQA review, and thus consideration of CDFG Species of Special Concern, may not be applicable. The CDFG Watch List consists of birds that were once listed federally or in the State of California as threatened or endangered, or as CDFG Species of Special Concern, but that are no longer on any of these lists. It also includes California fully protected species.[7] Inclusion on the CDFG Watch List has no formal implications for listed species, and no consequences are anticipated for the project.

Special-Status Plant Surveys

Database Searches

Prior to conducting the field survey, Sapphos Environmental, Inc. queried the California Natural Diversity Database (CNDDB),[8] CALFLORA, the Biogeographic Information and Observation System (BIOS), and the Consortium of California Herbaria[9] to compile a document that included all listed, sensitive, and locally important plant species with the potential to occur within the project study area. As required by the BLM, special-status plants include all plant taxa that are federally listed as threatened and endangered; proposed for federal listing; candidates for federal listing; State-listed as rare, threatened, or endangered; or BLM sensitive plants. All plant species that have been place on List 1B of the California Native Plant Society's (CNPS's) Inventory of Rare and Endangered Plants of California are also considered BLM sensitive species, along with others that have been designated as such by the California State Director.[10] The CNDDB query was conducted for the following nine U.S. Geological Survey (USGS) 7.5-minute series topographic quadrangles including and surrounding the entire project area: Cummings Mountain, Tehachapi South, Monolith, Liebre Twins, Tylerhorse Canyon, Willow Springs, Neenach School, Fairmont Butte, and Little Buttes. The *Jepson Manual*[11] was consulted for detailed biological, distributional, and phenological information.

Field Surveys

The field surveys were completed by Sapphos Environmental, Inc. qualified biologists (Ms. Shelby Petro and Mr. Brian J. Bielfelt). The surveys were conducted on 6 days between April 10–12 and 18–20, 2012. Survey personnel were experienced in undertaking field surveys for locally important plant species, as well as knowledgeable of the identification and ecology of target special-status species. All survey personnel were provided with a reference guide developed specifically for the study area that included a general description and at least one photograph of special-status plant

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[6] *California Public Resources Code*, §§ 21000–21177.

[7] California Department of Fish and Game, Biogeographic Data Branch, California Natural Diversity Database. January 2011. *Special Animals List*. Sacramento, CA.

[8] California Department of Fish and Game. 2012. *Rarefind 4: A Database Application for the Use of the California Department of Fish and Game Natural Diversity Database*. Sacramento, CA.

[9] Consortium of California Herbaria. 2012. Consortium of California Herbaria: Search Page. Available at: http://ucjeps.berkeley.edu/consortium/

[10] U.S. Department of the Interior, Bureau of Land Management, California State Office. 7 July 2009. *Survey Protocols Required for NEPA and ESA Compliance for BLM Special Status Plant Species*. CA IM 2009-026. Sacramento, CA. Available at: http://www.blm.gov/ca/dir/pdfs/2009/im/CAIM2009-026ATT1.pdf

[11] Baldwin, B.G., D.H. Goldman, D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken, eds. 2012. *The Jepson Manual: Vascular Plants of California*. 2nd Edition. Berkeley: University of California Press.

species with potential to occur within the study area. A *Jepson Manual*, the site-specific reference guide, and other plant guides were carried for reference during the surveys.

The special-status plant survey area included all potential impact areas, including areas within 200 feet of all proposed project elements, and thus included all areas that may be impacted by construction or operation of the project. Field surveys were performed by walking transects within 200 feet of all proposed impact areas (Figure 3, *Spring 2012 Special-Status Plant Survey Area*). The total survey area was 561 acres. Survey transects were spaced at 10- to 20-meter intervals. Surveys occurred during the appropriate season and were floristic in nature. All plants encountered during the surveys were identified to the highest taxonomic level necessary for a rare plant determination.[12,13] Nomenclature used follows the *Jepson Manual*. The team was equipped with standardized field notebooks and checklists for field annotations when applicable, in addition to an aerial photograph of the project study area at a scale of 1 inch to every 400 feet.

RESULTS

Avian Surveys

All Species

A total of 43 avian species were recorded at the project property during spring bird surveys conducted from March 14 through May 16, 2012 (Attachment A, *Avifaunal Compendium*). All of the 43 species were land birds, of which 6 species are raptors (5 diurnal raptors, 1 owl). The spring avian community included 20 resident and 23 migratory species. No raptor nests were observed within the proposed project property.

Bird Use Counts

During spring BUCs, a total of 286 individuals of 23 species were recorded during 6 days of sampling at the project property between March 14 and May 16, 2012 (Table 1). A total of 5 individuals could not be identified to species and were recorded as the closest identifier possible (e.g., "unknown swallow species"). The detection rate, which can be used as an approximation of bird use, was 31.8 birds per survey-hour.

Four species accounted for 64 percent of the observations. Chipping sparrow (*Spizella passerina*), a common migrant on the project property, and western meadowlark (*Sturnella neglecta*), a common resident on the project property, each comprised 19 percent of the observations. House finch (*Carpodacus mexicanus*), a common resident species, comprised 16 percent of the observations, and common raven (*Corvus corax*), a common resident species, comprised 10 percent of the observations. Observations of other species accounted for 36 percent of observations. No raptor species were observed during BUCs.

One additional species, Lincoln's sparrow (*Melospiza lincolnii*), was recorded during BUCs that

[12] U.S. Department of the Interior, Bureau of Land Management, California State Office. 7 July 2009. *Survey Protocols Required for NEPA and ESA Compliance for BLM Special Status Plant Species*. CA IM 2009-026. Sacramento, CA. Available at: http://www.blm.gov/ca/dir/pdfs/2009/im/CAIM2009-026ATT1.pdf

[13] U.S. Department of the Interior, Bureau of Land Management, California State Office. 12 May 2010. *Survey Protocols Required for NEPA and ESA Compliance for BLM Special Status Plant Species*. CA IB 2010-012. Sacramento, CA. Available at: http://www.blm.gov/ca/dir/pdfs/2010/ib/CAIB2010-012.pdf

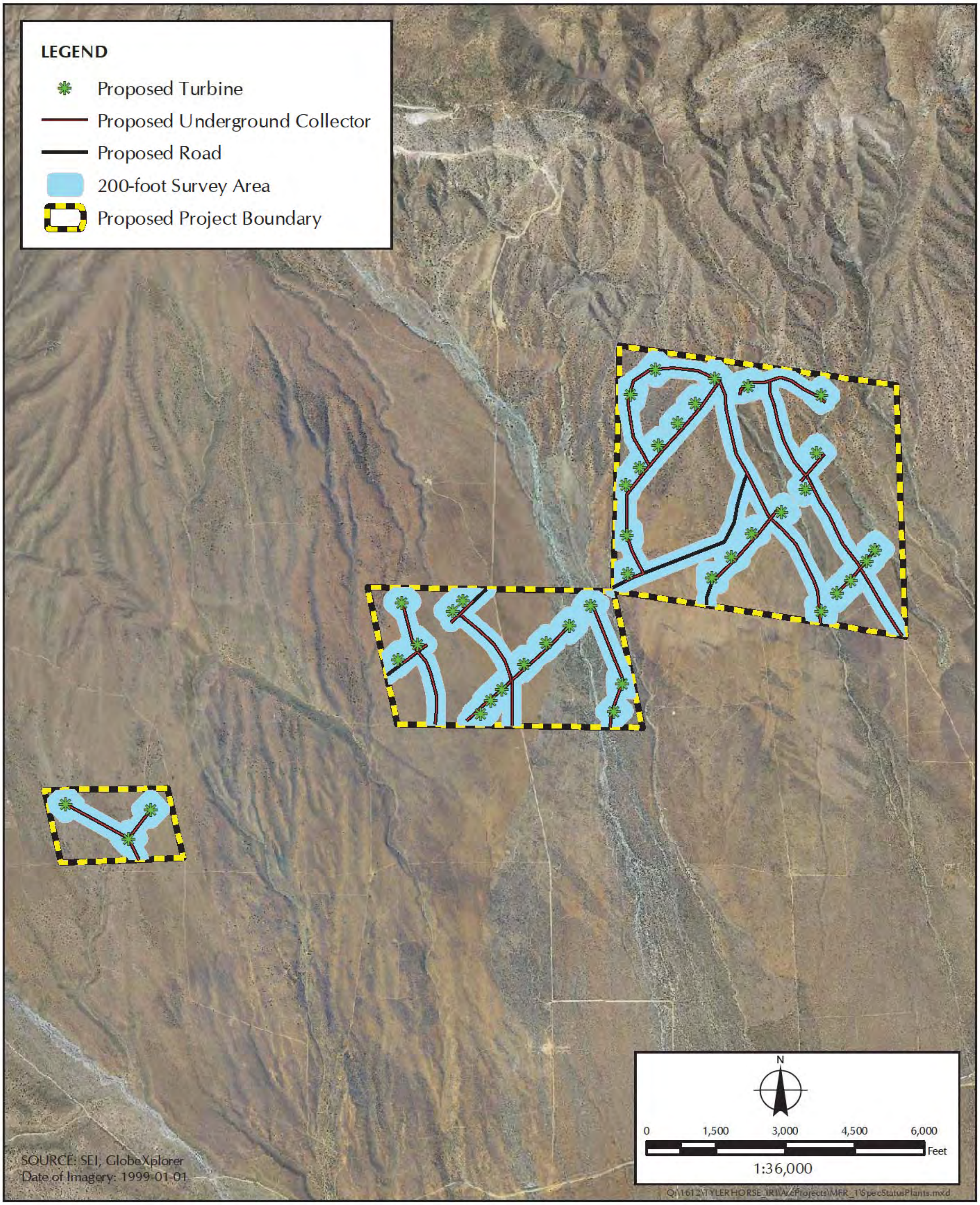


FIGURE 3

Spring 2012 Special-Status Plant Survey Area was previously undocumented on the project property. The Lincoln's sparrow is a fairly common migrant and uncommon winter visitor in eastern Kern County.[14] This species would not be expected to breed on the project property.

Height above ground level (AGL) was recorded for each bird observed in flight during a BUC count. Of the 23 species observed during BUCs, none was observed within the 200- to 400-foot altitude band that would comprise the rotor-swept zone (Figure 4, *Observed Avian Flight Heights*).

Reconnaissance Counts

Twenty additional species were detected during reconnaissance counts. The majority of these species were observed incidentally during special-status plant surveys and have been previously documented on the project property. One species, the Eurasian collared-dove (*Streptopelia decaocto*), was previously undocumented on the project property. The Eurasian collared-dove is an introduced species that continues to expand its range in North America. It is typically found in urban, surburban, and agricultural areas where plentiful grain, roost sites, and nest sites are available.[15] The individual seen incidentally was potentially a transient in the area as this species would not be typically expected to forage, roost, or nest within the project property.

Six raptor species were observed incidentally on the project property during the course of special-status plant surveys, including two commonly occurring resident species, the red-tailed hawk (*Buteo jamaicensis*) and the American kestrel (*Falco sparverius*); three diurnal raptor species with special status, including ferruginous hawk, merlin, and Swainson's hawk; and one nocturnal owl species, the great-horned owl (*Bubo virginianus*).

Special-Status Species

All of the native bird species observed during the spring avian surveys are protected under the Migratory Bird Treaty Act. One Swainson's hawk, listed as Threatened under the California ESA, was recorded foraging over the property on April 18, 2012. In addition, three species observed on the property have additional special status: ferruginous hawk, merlin, and loggerhead shrike (Figure 5, *Spring 2012 Special-Status Avian Species*). Although no burrowing owls were observed during spring surveys, one potentially active burrowing owl burrow, with scat present, but no adult, was recorded during special-status plant surveys.

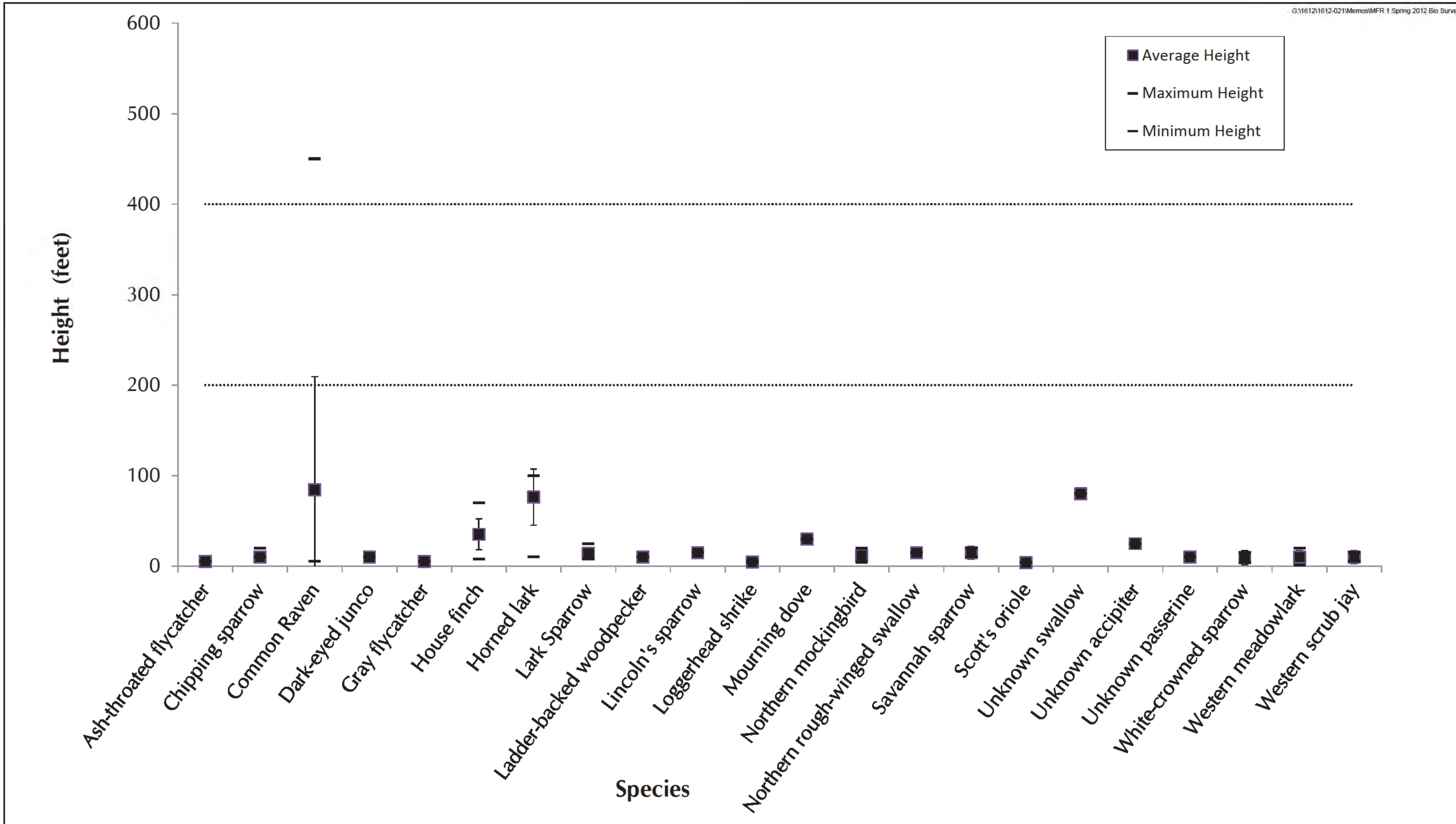
Plant Surveys

Database Surveys

As a result of the literature review and database queries, it was determined that the project study area has the potential to support 17 special-status or locally important plants (Table 2, *Special-Status Plant Species with the Potential to Occur within the Vicinity of the Project Area*). All species with CNDDB recorded occurrences within the USGS nine-quad area were included, as well as three BLM sensitive species not recorded in the CNDDB, but identified as having a high potential to be located on-site by the California BLM Ridgecrest office.

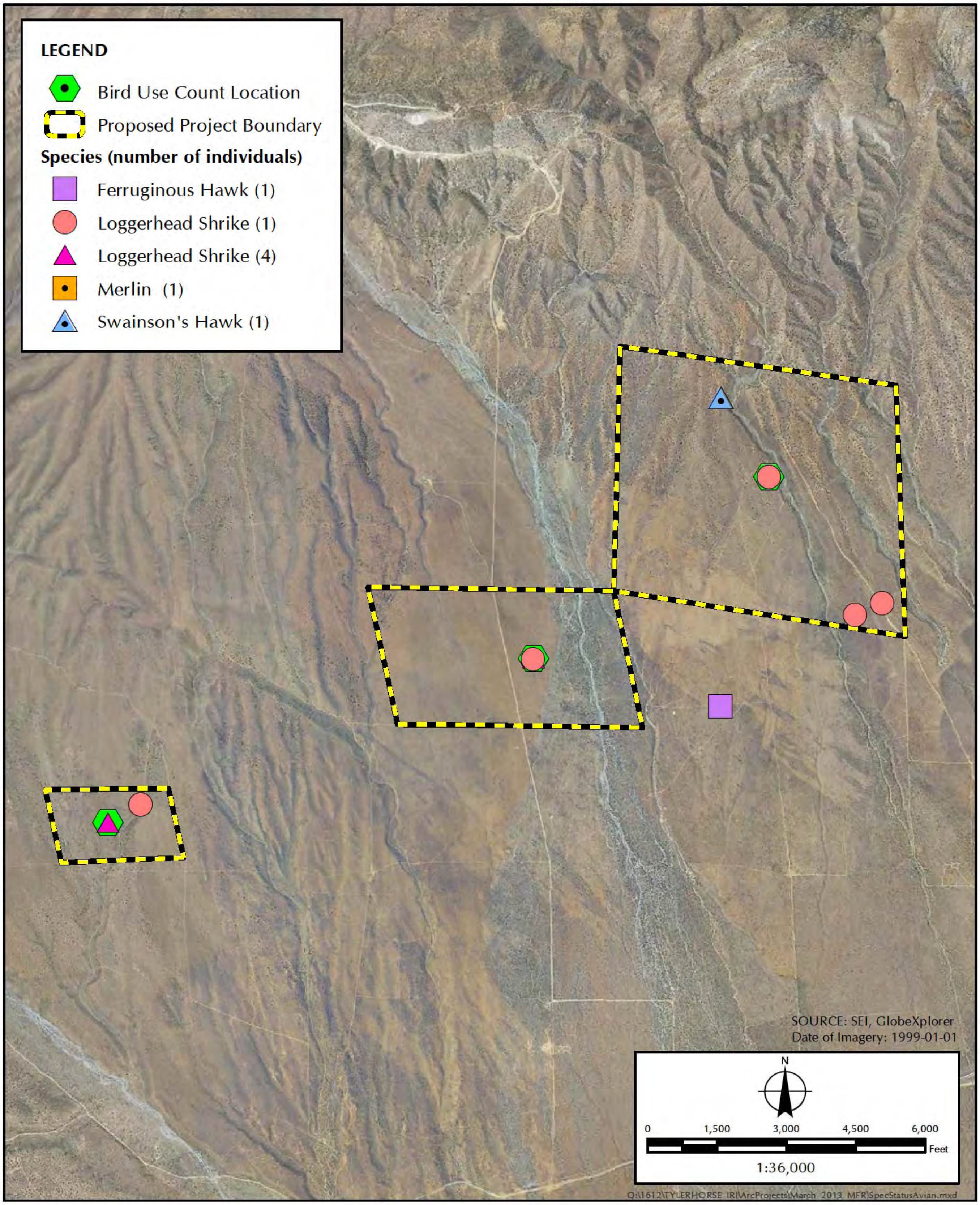
[14] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

[15] Romagosa, Christina Margarita. 2002. "Eurasian Collared-Dove (Streptopelia decaocto)." In *The Birds of North America Online*, ed. A. Poole. Ithaca, NY: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/630



IBERDROLA RENEWABLES

FIGURE 4
Observed Avian Flight Heights



IBERDROLA RENEWABLES

FIGURE 5

Spring 2012 Special-Status Avian Species

TABLE 2
SPECIAL-STATUS PLANT SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE VICINITY OF THE PROJECT AREA

Species	Status: Federal/State/ BLM/ CNPS/ WeMo	Habitat and Phenology	Potential to Occur within the Study Area	Presence on Project Site
Lincoln rockcress, (*Boechera lincolnensis*), formerly Darwin rock-cress (*Arabis pulchra var. munciensis*)	—/—/ BLM/ CNPS 2.3/ –	Chenopod and Mojavean scrub, in carbonate soil; at elevations of 1,400–2,000 meters above MSL; perennial herb in the Brassicaceae family that blooms in March to May	Low: Habitat not present	No
Horn's milk-vetch (*Astragalus hornii* var. *hornii*)	—/—/ BLM/ CNPS 1B.1/ —	Alkali regions at lake beds margins, meadows and seeps, and playas; at elevations 60–850 meters above MSL; annual herb in the Fabaceae family that blooms from May to October	Low: Habitat not present	No
Round-leaved filaree (*California macrophylla*)	—/—/ BLM/ CNPS 1B.1/ —	Cismontane woodland, valley and foothill grassland; at elevations 15–1,200 meters above MSL; annual herb in the Geraniaceae family that blooms from March to May	Low: Habitat not present	No
Palmer's mariposa lily (*Calochortus palmeri* var. *palmeri*)	—/—/ BLM/ CNPS 1B.2/ —	Chaparral, lower montane coniferous forest, meadows and seeps; in mesic areas; at elevations 1,000–2,390 meters above MSL; perennial bulbiferous herb in the Liliaceae family that blooms from April to July	Low: Habitat not present	No
Clokey's cryptantha (*Cryptantha clokeyi*)	—/—/ BLM/ CNPS 1B.2/ —	Mojavean desert scrub; at elevations 725–1,365 meters above MSL; annual herb in the Boraginaceae family that blooms in April	High: Habitat (Mojavean Desert Scrub) present	No
Tracy's eriastrum (*Eriastrum tracyi*)	—/SR/ BLM/ CNPS 1B.2/ —	Chaparral and cismontane woodlands; at elevations of 315–1,125 meters above MSL; annual herb in the Polemoniaceae family that blooms from June to July	Low: Habitat not present	No
Barstow woolly-sunflower (*Eriophyllum mohavense*)	—/—/ BLM/ CNPS 1B.2/ —	Chenopod scrub, Mojavean desert scrub, playas, and Creosote bush scrub in sandy or rocky places; at elevations of 500–960 meters above MSL; annual herb in the Asteraceae family that blooms from March to May	High: Habitat (Mojavean Desert Scrub) present	No

TABLE 2
SPECIAL-STATUS PLANT SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE VICINITY OF THE PROJECT AREA, *Continued*

Species	Status: Federal/State/ BLM/ CNPS/ WeMo	Habitat and Phenology	Potential to Occur within the Study Area	Presence on Project Site
Red Rock poppy, also known as Twisselman's Poppy (*Eschscholzia minutiflora ssp. twisselmannii*)	–/–/ BLM/ CNPS 1B.2/ WeMo	Mojavean Desert Scrub (volcanic tuff); occurs between 680 and 1,230 meters above MSL; annual herb in the Papaveraceae family that blooms from March to May	Moderate: Habitat (Mojavean Desert Scrub) present, but populations highly localized	No
Coulter's goldfields (*Lasthenia glabrata* ssp. *coulteri*)	—/—/ BLM/ CNPS 1B.1/ —	Coastal salt marshes and swamps, playas, and vernal pools; at elevations 1–1,220 meters above MSL; annual herb in the Asteraceae family that blooms from February to June	Low: Habitat not present	No
Pale-yellow layia (*Layia heterotricha*)	—/—/ BLM/ CNPS 1B.1/ —	Cismontane woodland, coastal scrub, pinyon and juniper woodland, valley and foothill grasslands; in alkaline or clay or clay substrates; at elevations 300–1,705 meters above MSL; annual herb in the Asteraceae family that blooms from March to June	Low: Habitat not present	No
Madera leptosiphon (*Leptosiphon serrulatus*)	—/—/ —/ CNPS 1B.2/ —	Cismontane woodland, lower montane coniferous forest; at elevations 300–1,300 meters above MSL; annual herb in the Polemoniaceae family that blooms from April to May	Low: Habitat not present	No
Calico monkeyflower (*Mimulus pictus*)	—/—/ BLM/ CNPS 1B.2/ —	Broadleafed upland forest, cismontane woodland, on granitic and disturbed substrates; at elevations 100–1,300 meters above MSL; annual herb in the Phymaceae family that blooms from March to May	Low: Habitat not present	No
Tehachapi monardella (*Monardella linoides* ssp. *oblonga*)	—/—/ BLM/ CNPS 1B.3/ —	Lower montane coniferous forest, pinyon and juniper woodland, upper montane coniferous forest; at elevations from 900–2,470 meters above MSL; perennial rhizomatous herb in the Lamiaceae family that blooms from June through August	Low: Habitat not present	No

TABLE 2
SPECIAL-STATUS PLANT SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE VICINITY OF THE PROJECT AREA, *Continued*

Species	Status: Federal/State/ BLM/ CNPS/ WeMo	Habitat and Phenology	Potential to Occur within the Study Area	Presence on Project Site
Baja navarettia (*Navarretia peninsularis*)	—/—/ —/ CNPS 1B.2/ —	Openings within chaparral, lower montane coniferous forest, meadows and seeps, mesic areas within pinyon and juniper woodland; at elevations 1,500–2,300 meters above MSL; annual herb in the Polemoniaceae family that blooms from June to August	Low: Habitat not present	No
Bakersfield cactus (*Opuntia basilaris* var. *treleasei*)	FE/SE/ BLM/ CNPS 1B.1/ —	Chenopod scrub, cismontane woodland,or valley and foothill grassland on sandy or gravelly substrates; at elevations 120–1,140 meters above MSL; perennial stem succulent in the Cactaceae family that blooms April through May	Low: Habitat not present	No
Charlotte's phacelia (*Phacelia nashiana*)	—/—/ BLM/ CNPS 1B.2/ WeMo	Joshua Tree Woodland, Mojavean Desert Scrub, Pinyon-Juniper Woodland in granitic or sandy soils; occurs between 600–2,200 meters above MSL; annual herb in the Boraginaceae family that blooms from March to June	High: Habitat (Mojavean Desert Scrub and Joshua Tree Woodland) present	No
Grey-leaved violet (*Viola pinetorum ssp. grisea*)	—/—/ —/ CNPS 1 B.3/ —	Meadows and seeps, subalpine coniferous forest, upper montane coniferous forests; occurs between 1,500–3,400 meters above MSL; perennial herb in the Violaceae family that blooms from April to July	Low: Habitat no present	No

KEY:
BLM = sensitive species under BLM
FE = federally endangered
SE = state endangered
SR = state rare
ST = state threatened
WeMo = West Mojave Plan
CNPS = California Native Plant Society
List 1B: Rare, threatened, or endangered in California and elsewhere
- 0.1: Seriously endangered in California
- 0.2: Fairly endangered in California
- 0.3: Not very endangered in California

List 2: Rare, threatened, or endangered in California, but more common elsewhere
- 0.2: Fairly endangered in California

List 3: Review list, more information required
List 4: Limited distribution (Watch List)
- 0.1: Seriously endangered in California
- 0.2: Fairly endangered in California
- 0.3: Not very endangered in California

MSL = mean sea level

Field Surveys

The survey was floristic in nature, and all plants observed within the survey area were identified to the highest/lowest taxonomic level practical given the phenology of the species (Appendix B, *Floral Compendium*). No federally or state-listed threatened or endangered plant species, nor any plant species included under the California Rare Plant Ranks (CNPS) ranking system or considered sensitive by the BLM were identified within 200 feet of the proposed project elements on the project site.

One plant was identified as one of the varieties of the *Arabis pulchra* group. The varieties within this species have been divided into three different species, including the special-status Lincoln rockcress (*Boechera lincolnensis*) and the common beautiful rockcress (*Boechera pulchra*). The Lincoln rockcress was too rare in the vicinity to visit a reference population; however, Mr. Brian J. Bielfelt visited several reference populations for the more common beautiful rockcress. Visiting the reference populations confirmed that the plant detected during surveys at the project was the more common beautiful rockcress and not the rare Lincoln rockcress.

DISCUSSION

Avian Surveys

All Species

During spring avian surveys, most measures of bird use were low. The species diversity at the site was moderate, with 43 species determined to be present in the spring. An average of 31.8 birds were observed per survey-hour during BUCs, which was a sharp decline from the 94.8 birds per survey-hour documented in winter 2011–2012. The low observational rate in spring, despite high species diversity, is likely due to small numbers of common passerine migrants on the project, including many warbler and sparrow species. Higher observational rates in winter were likely a result of large flocks of common passerine overwintering species, including house finches and white-crowned sparrows. The higher species diversity in spring is likely a result of two factors: more potential species passing through the property as spring migrants and more observational hours spent on the property outside of BUCs. No raptors were observed during BUCs, producing a rate of 0.00 raptors per survey-hour during BUCs, compared to 0.33 raptors per survey-hour detected in winter 2011–2012. No raptor nests were observed within the proposed project property.

The survey data do not support the project property as an important corridor or wintering location for migratory birds. Similarly, raptors were not observed in significant numbers; nor were those observed flying in consistent directional flights indicative of migration.

Special-Status Species

Swainson's Hawk

The Swainson's hawk is listed as Threatened pursuant to the California ESA and is considered in the West Mojave Plan. The species is a rare to uncommon fall migrant in the Antelope Valley and surrounding areas in Southern California. A few Swainson's hawk pairs also still nest in the Antelope Valley,[16,17,18,19] though none have been recorded in close proximity to the project.

A single Swainson's hawk was observed incidentally on the project property during special-status plant surveys on April 18, 2012. The individual was observed foraging over the property, flying between 75 and 150 feet. While foraging, Swainson's hawks can range from ground level to over 1,000 feet AGL; thus, potential foraging heights within the project property can occur within the rotor-swept range of anticipated wind turbines (200–400 feet AGL).

Based on species population factors and/or habitat use, the level of risk associated with the project for the Swainson's hawk is considered to be low. While Swainson's hawks flying within the project area would have some exposure to turbine mortality, there have been no documented fatalities of this species at wind energy plants in the region. Moreover, studies of raptor behavior have documented high raptor collision avoidance behaviors, noting that the diurnal flight of raptors may provide these birds with the ability to visually and acoustically detect turbines. While it is possible that small numbers of fatalities of Swainson's hawks could occur over the life of the project, such events are expected to be rare, and impacts are not expected to be significant.

Ferruginous Hawk

The ferruginous hawk is listed as a CDFG Watch List species and is considered under the BLM's West Mojave Plan. The species prefers a diverse range of open-country habitats, including grasslands, shrub-steppes, and deserts.[20] Although this species does not breed in Southern California, it is commonly observed wintering in the Antelope Valley. The entire approximately 1,207-acre project study area provides suitable and occupied foraging habitat for the ferruginous hawk.

One ferruginous hawk was observed foraging at approximately 25 feet AGL, approximately 0.3 mile west of the project property, during reconnaissance on April 12, 2012. Ferruginous hawks hunt using a variety of different pursuit techniques, including from perches, strikes from the ground, aerial hunting, or hovering during strong winds. Aerial hunting typically occurs below 30 meters AGL and seldom occurs above 100 meters AGL, indicating that foraging would typically occur below the rotor-swept zone of 200 to 400 feet. This species likely flies higher during migration; thus, flight heights can reach the proposed rotor-swept range of wind turbines in the project property. No ferruginous hawks were detected during winter avian surveys, and only a single individual was recorded during the spring period; thus, mortality risk due to collision with wind turbines is likely to be low. Implementation of the project may have indirect impacts (loss of foraging habitat) on ferruginous hawks foraging in or migrating through the project study area.

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[16] Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society, p. 408.

[17] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

[18] Sapphos Environmental, Inc. 25 August 2006. *Final Biological Resources Technical Report for the PdV Wind Energy Project, Kern County, California*. Pasadena, CA.

[19] California Energy Commission and California Department of Fish and Game. 2 June 2010. *Swainson's Hawk Survey Protocols, Impact Avoidance, and Minimization Measures for Renewable Energy Projects in the Antelope Valley of Los Angeles and Kern Counties, CA*. Sacramento, CA.

[20] Bechard, Marc J., and Josef K. Schmutz. 1995. "Ferruginous Hawk (*Buteo regalis*)." In *The Birds of North America Online*, ed. A. Poole. Ithaca, NY: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/172

Merlin

The merlin is a CDFG Watch List species and an uncommon migrant and winter visitor in appropriate habitat throughout California, including the Antelope Valley and eastern Kern County.[21,22,23,24] All approximately 1,207 acres of the project property constitute suitable foraging habitat for the merlin. One individual was observed flying through the project site at approximately 25 feet AGL during spring special-status plant surveys on April 10, 2012. Merlins typically hunt from a perch where they can scan for prey, and hunting flights are typically below treetop level or close to the ground; thus, foraging flights would be expected to be below the rotor-swept zone of wind turbines (200-400 feet AGL) in the project.[25] This species likely flies higher during migration; thus, flight heights can reach the proposed rotor-swept range of wind turbines. Due to this species' foraging habits and the paucity of observations on the project site, mortality risk due to collision with wind turbines is likely to be low. Implementation of the project may have indirect impacts (loss of foraging habitat) on merlins foraging in or migrating through the project study area.

Burrowing Owl

The burrowing owl is a California Species of Special Concern, priority 2, a USFWS Bird of Conservation Concern in BCR 33, and is considered in the West Mojave Plan.[26,27,28] The burrowing owl is a grassland- and desert-inhabiting species that nests underground, usually in ground squirrel burrows. This species nests in small numbers in the Antelope Valley. Burrowing owls have sharply declined in California because of the loss of open and semiopen habitats; their largest numbers now occur in the Imperial Valley, where more than 70 percent of the statewide population is located.[29,30] Their normal range includes the desert province of eastern Kern County in native desert and agricultural habitats.[31,32]

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[21] Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society, p. 408.

[22] Schram, B. 1998. *A Birder's Guide to Southern California*. Colorado Springs, CO: American Birding Association, p. 334.

[23] Sibley, D.A. 2000. *The Sibley Guide to Birds*. New York, NY: Knopf.

[24] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

[25] Warkentin, I.G., N.S. Sodhi, R.H. M. Espie, Alan F. Poole, L.W. Oliphant, and P.C. James. 2005. "Merlin (Falco columbarius)." In *The Birds of North America Online*, ed. A. Poole. Ithaca, NY: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/044

[26] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

[27] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. 2008. *Birds of Conservation Concern 2008*. Arlington, VA.

[28] Bureau of Land Management. 2005. *Final Environmental Impact Report and Statement for the West Mojave Plan: A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment*. Volume 1. Available at: http://www.blm.gov/ca/st/en/fo/cdd/wemo.html

[29] Santa Cruz Predatory Bird Research Group. 10 January 2006. California Burrowing Owl Consortium. Available at: http://www2.ucsc.edu/scpbrg/statemap.htm

[30] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

[31] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

No burrowing owls were observed on the project site during spring field surveys, and visits to known burrows were not conducted during the spring period. During the course of spring special-status plant surveys, one additional burrowing owl burrow was recorded approximately 0.25 mile north of a previously recorded burrow in a wash located in Section 24 of the project property. Four site visits will be made during the summer to determine the residency status of burrowing owls at these burrow locations. The project's design avoids crossing any drainages, and therefore risks to this species during construction would be minimized. Implementation of the proposed action would result in the direct disturbance of a small amount of Mojave Desert Wash Scrub and Non-native Grassland, which provide foraging habitat for these species. Short-term (due to construction activity) mortality effects from the project on these species are considered unlikely to occur.

Burrowing owls normally forage at less than 100 feet AGL, and thus potential foraging heights are below the proposed rotor-swept range of wind turbines (200–400 feet AGL) in the project. Burrowing owls can be susceptible to collision mortality at small turbines with very low to low rotor-swept heights;[33] however, the project will only be utilizing larger, newer-generation turbines. No burrowing owls were killed during postconstruction mortality studies at the Tehachapi Wind Resource Area (WRA).[34] Any mortality that might occur over the project life would be at a very low level and would not have a measurable effect on burrowing owl populations. Although the risk of collision with wind turbine generators is low, mitigation measures identified in the EIS and the Bird and Bat Conservation Strategy will reduce these impacts.

Loggerhead Shrike

Loggerhead shrike is a CDFG Species of Special Concern, priority 2.[35,36] The loggerhead shrike is still fairly common in appropriate habitats in many areas of California and western North America, including the Mojave Desert.[37,38] A sharp decline of mainland populations of the loggerhead shrike occurred in parts of California, especially coastal Southern California, from 1968 to 1979, although statewide Breeding Bird Survey (BBS) trends were stable from 1980 to 2004.[39] Loggerhead shrikes

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[32] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

[33] Smallwood, K.S., C.G. Thelander, M.L. Morrison, and L.M. Rugge. 2007. "Burrowing Owl Mortality in the Altamont Pass Wind Resource Area." *Journal of Wildlife Management 71*: 1513–1524.

[34] Anderson, R.L., J. Tom, N. Neumann, and J.A. Cleckler. 2004. *Avian Monitoring and Risk Assessment at Tehachapi Pass Wind Resource Area, California*. Sacramento, CA: California Energy Commission.

[35] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

[36] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. 2008. *Birds of Conservation Concern 2008*. Arlington, VA.

[37] Sibley, D.A. 2000. *The Sibley Guide to Birds*. New York, NY: Knopf.

[38] Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society, p. 408.

[39] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

are year-round residents in the Mojave Desert and may occur throughout the approximately 1,207-acre project property.

Eight loggerhead shrikes were detected during BUCs, comprising 3 percent of all detections. All observations were detected at between 4 and 6 feet AGL. In addition, three loggerhead shrikes were detected during spring special-status plant surveys in early to mid-April. The loggerhead shrike is generally not at risk of mortality from collision with wind turbines because nearly all of its foraging activities occur below 50 feet AGL. Implementation of the project may have indirect impacts (loss of nest sites, loss of foraging habitat, displacement) and may result in the loss of loggerhead shrikes at the project property. This is consistent with the conclusions reached in the BRTR and EIS.

Plant Surveys

No spring-blooming special-status plants were detected within the survey area during spring 2012 surveys, confirming the results of spring surveys previously conducted on the project in spring 2010. Therefore, construction and operation of the project is not expected to impact any special-status plant species.

The timing of spring field surveys was good for identification of spring-blooming species, as most spring-flowering herbaceous species were in flower and/or fruit at the time. Spring 2012 was a drier year for the project study area. Flowering plants at the project site were numerous, but the bloom period was brief. Common annuals such as goldfields (*Lasthenia californica*), white tidy-tips (*Layia glandulosa*), and most mustard species (Brassicaceae) were observed in flower and/or fruit within the project boundary.

Should there be any questions regarding the information contained in this MFR, please contact Dr. Joseph Platt or Ms. Mary Davis at (626) 683-3547.

REFERENCES

Anderson, R.L., J. Tom, N. Neumann, and J.A. Cleckler. 2004. *Avian Monitoring and Risk Assessment at Tehachapi Pass Wind Resource Area, California*. Sacramento, CA: California Energy Commission.

Baldwin, B.G., D.H. Goldman, D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken, eds. 2012. *The Jepson Manual: Vascular Plants of California*. 2nd Edition. Berkeley: University of California Press.

Bechard, Marc J., and Josef K. Schmutz. 1995. "Ferruginous Hawk (*Buteo regalis*)." In *The Birds of North America Online*, ed. A. Poole. Ithaca, NY: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/172

Bureau of Land Management. 2005. *Final Environmental Impact Report and Statement for the West Mojave Plan: A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment*. Volume 1. Available at: http://www.blm.gov/ca/st/en/fo/cdd/wemo.html

California Department of Fish and Game. 2012. *Rarefind 4: A Database Application for the Use of the California Department of Fish and Game Natural Diversity Database*. Sacramento, CA.

California Department of Fish and Game, Biogeographic Data Branch, California Natural Diversity Database. January 2011. *Special Animals List*. Sacramento, CA.

California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento, CA.

California Energy Commission and California Department of Fish and Game. 2 June 2010. *Swainson's Hawk Survey Protocols, Impact Avoidance, and Minimization Measures for Renewable Energy Projects in the Antelope Valley of Los Angeles and Kern Counties, CA*. Sacramento, CA.

California Public Resources Code, §§ 21000–21177.

Consortium of California Herbaria. 2012. Consortium of California Herbaria: Search Page. Available at: http://ucjeps.berkeley.edu/consortium/

Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society.

Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

Romagosa, Christina Margarita. 2002. "Eurasian Collared-Dove (Streptopelia decaocto)." In *The Birds of North America Online*, ed. A. Poole. Ithaca, NY: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/630

Santa Cruz Predatory Bird Research Group. 10 January 2006. California Burrowing Owl Consortium. Available at: http://www2.ucsc.edu/scpbrg/statemap.htm

Sapphos Environmental, Inc. 25 August 2006. *Final Biological Resources Technical Report for the PdV Wind Energy Project, Kern County, California*. Pasadena, CA.

Schram, B. 1998. *A Birder's Guide to Southern California*. Colorado Springs, CO: American Birding Association.

Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

Sibley, D.A. 2000. *The Sibley Guide to Birds*. New York, NY: Knopf.

Smallwood, K.S., C.G. Thelander, M.L. Morrison, and L.M. Rugge. 2007. "Burrowing Owl Mortality in the Altamont Pass Wind Resource Area." *Journal of Wildlife Management 71*: 1513–1524.

U.S. Department of the Interior, Bureau of Land Management, California State Office. 7 July 2009. *Survey Protocols Required for NEPA and ESA Compliance for BLM Special Status Plant Species*. CA IM 2009-026. Sacramento, CA. Available at: http://www.blm.gov/ca/dir/pdfs/2009/im/CAIM2009-026ATT1.pdf

U.S. Department of the Interior, Bureau of Land Management, California State Office. 12 May 2010. *Survey Protocols Required for NEPA and ESA Compliance for BLM Special Status Plant Species*. CA IB 2010-012. Sacramento, CA. Available at: http://www.blm.gov/ca/dir/pdfs/2010/ib/CAIB2010-012.pdf

U.S. Fish and Wildlife Service, Division of Migratory Bird Management. 2008. *Birds of Conservation Concern 2008*. Arlington, VA.

Warkentin, I.G., N.S. Sodhi, R.H. M. Espie, Alan F. Poole, L.W. Oliphant, and P.C. James. 2005. "Merlin (Falco columbarius)." In *The Birds of North America Online*, ed. A. Poole. Ithaca, NY: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/044

ATTACHMENT A
AVIFAUNAL COMPENDIUM

AVIAN SPECIES OBSERVED AT THE PROJECT PROPERTY DURING SPRING 2012

		Residency Status				Detections by Survey Type	
Family / Species	Special Status	Year-round	Migrant, Winter, or Transient	Migrant, Breeding	Nest Found	Bird Use Count (BUC)	Reconnaissance
Odontophoridae—Partridges and Quail							
Callipepla californica California quail		+					X
Accipitridae—Hawks, Eagles, Kites, and Harriers							
Buteo swainsoni Swainson's hawk	ST, WeMo			+			X
Buteo jamaicensis Red-tailed hawk		+					X
Buteo regalis Ferruginous hawk	CDFG WL, WeMo		+				X
Falconidae—Falcons							
Falco sparverius American kestrel		+					X
Falco columbarius Merlin	CDFG WL		+				X
Columbidae—Pigeons and Doves							
Streptopelia decaocto Eurasian collared-dove		+					X
Zenaida macroura Mourning dove		+				X	X
Cuculidae—Cuckoos							
Geococcyx californianus Greater roadrunner		+				X	
Strigidae—Owls							
Bubo virginianus Great horned owl		+					X
Trochilidae—Hummingbirds							
Calypte anna Anna's hummingbird		+					X
Picidae—Woodpeckers							
Picoides scalaris Ladder-backed woodpecker		+				X	

AVIAN SPECIES OBSERVED AT THE PROJECT PROPERTY DURING SPRING 2012, *Continued*

Family / Species	Special Status	Residency Status: Year-round	Residency Status: Migrant, Winter, or Transient	Residency Status: Migrant, Breeding	Residency Status: Nest Found	Detections by Survey Type: Bird Use Count (BUC)	Detections by Survey Type: Reconnaissance
Tyrannidae—Tyrant flycatchers							
Empidonax wrightii Gray flycatcher			+			X	
Myiarchus cinerascens Ash-throated flycatcher				+		X	X
Tyrannus verticalis Western kingbird				+			X
Laniidae—Shrikes							
Lanius ludovicianus Loggerhead shrike	CDFG SSC, WeMo,	+				X	X
Corvidae—Jays and Crows							
Aphelocoma californica Western scrub-jay		+				X	X
Corvus corax Common raven		+				X	X
Alaudidae—Larks							
Eremophila alpestris Horned lark		+				X	X
Hirundinidae—Swallows							
Tachycineta bicolor Tree swallow				+			X
Tachycineta thalassina Violet-green swallow				+			X
Stelgidopteryx serripennis Northern rough-winged swallow				+		X	
Petrochelidon pyrrhonota Cliff swallow				+			X
Paridae—Chickadees and Titmice							
Baeolophus inornatus Oak titmouse		+					X
Troglodytidae—Wrens							
Campylorhynchus brunneicapillus Cactus wren		+				X	X

AVIAN SPECIES OBSERVED AT THE PROJECT PROPERTY DURING SPRING 2012, *Continued*

Family / Species	Special Status	Residency Status: Year-round	Residency Status: Migrant, Winter, or Transient	Residency Status: Migrant, Breeding	Residency Status: Nest Found	Detections by Survey Type: Bird Use Count (BUC)	Detections by Survey Type: Reconnaissance
Mimidae—Thrashers							
Mimus polyglottos Northern mockingbird		+				X	
Parulidae—Wood-Warblers							
Geothylpis tolmiei MacGillivray's warbler			+				X
Setophaga coronata Yellow-rumped warbler			+			X	
Cardellina pusilla Wilson's warbler			+				X
Emberizidae—Buntings and Sparrows							
Spizella passerine Chipping sparrow			+			X	X
Pooecetes gramineus Vesper sparrow			+				X
Chondestes grammacus Lark sparrow		+				X	X
Amphispiza bilineata Black-throated sparrow				+		X	X
Amphispiza belli Sage sparrow		+					X
Passerculus sandwichensis Savannah sparrow			+			X	X
Melospiza lincolnii Lincoln's sparrow			+			X	
Zonotrichia leucophrys White-crowned sparrow			+			X	X
Junco hyemalis Dark-eyed junco			+			X	X
Cardinalidae—Cardinals, Tanagers, Grosbeaks, and Buntings							
Piranga ludoviciana Western tanager			+				X
Passerina amoena Lazuli bunting			+				X

AVIAN SPECIES OBSERVED AT THE PROJECT PROPERTY DURING SPRING 2012, *Continued*

Family / Species	Special Status	Residency Status: Year-round	Migrant, Winter, or Transient	Migrant, Breeding	Nest Found	Detections by Survey Type: Bird Use Count (BUC)	Reconnaissance
Icteridae—Blackbirds							
Sturnella neglecta Western meadowlark		+				X	X
Icterus parisorum Scott's oriole				+		X	X
Fringillidae—Finches							
Carpodacus mexicanus House finch		+				X	X
Other							
Accipiter species						X	
Passerine species						X	
Swallow species						X	

KEY:
CDFG SSC = California Department of Fish and Game Species of Special Concern
CDFG WL = California Department of Fish and Game Watch List
ST = Listed as threatened under the California Endangered Species Act
WeMo = Considered under the Bureau of Land Management's West Mojave Plan

ATTACHMENT B
FLORAL COMPENDIUM

ATTACHMENT B
FLORAL COMPENDIUM

Technical note: Family delineations here follow the current Angiosperm Phylogeny Group III descriptions,[1] rather than the families given in the *Jepson Manual*.[2] Taxonomic names below the rank of family follow names included in the *Index to California Plant Names*.[3]

Nonnative plants are indicated with an asterisk (*).

All plants listed were observed on-site during surveys conducted in spring 2012.

Gymnosperms

Cupressaceae—Cypress Family

Juniperus californica
California juniper

Ephedraceae—Ephedra Family

Ephedra nevadensis
Nevada ephedra

Dicots

Apiaceae—Carrot Family

Lomatium mohavense
Mojave Desert parsley

Asteraceae—Sunflower Family

Acamptopappus sphaerocephalus
goldenhead
Ambrosia salsola
cheesebush
Anisocoma acaulis
scale-bud
Artemisia tridentate
Great Basin sagebrush
Chaenactis fremontii
desert pincushion

[1] Stevens, P.F. 2011. *Angiosperm Phylogeny*. Version 9. Available at: http://www.mobot.org/MOBOT/research/APweb/

[2] Hickman, J.C. 1993. *The Jepson Manual*. Berkeley: University of California Press.

[3] Rosatti, T. 2011. *Index to California Plant Names*. Berkeley: Regents of the University of California.

Coreopsis bigelovii
tickseed
Encelia actonii
Acton encelia
Ericameria cooperi
Cooper's goldenbush
Ericameria linearifolia
narrowleaf goldenbush
Ericameria nauseosa
rubber rabbitbrush
Gutierrezia microcephala
sticky snakeweed
Lasthenia californica
goldfields
Layia glandulosa
white tidy-tips
Lepidospartum squamatum
scalebroom
Stephanomeria pauciflora
wirelettuce
Syntrichopappus fremontii
false woolydaisy
Uropappus lindleyi
silverpuffs
Xylorhiza tortifolia
Mojave aster

Boraginaceae—Borage Family

Amsinckia tessellata
checker fiddleneck
Cryptantha circumscissa
Western forget-me-not
Pectocarya linearis
sagebrush combseed
Pectocarya penicillata
sleeping combseed
Phacelia distans
common phacelia
Phacelia fremontii
Fremont's phacelia
Plagiobothrys arizonicus
Arizona popcornflower

Brassicaceae—Mustard Family

**Brassica nigra*
black mustard

Erysimum capitatum
Western wallflower
Guillenia lasiophylla
shaggy thelypod
Lepidium fremontii
desert alyssum
Sisymbrium altissimum
tumble mustard

Cactaceae—Cactus Family

Cylindropuntia echinocarpa
silver cholla
Opuntia basilaris var. *basilaris*
beavertail cactus

Chenopodiaceae—Goosefoot Family

Atriplex californicum
four-winged saltbush
Chenopodium califoricum
California goosefoot
Grayia spinosa
spiny hop-sage
Krascheninnikovia lanata
winterfat
**Salsola tragus*
Russian thistle

Euphorbiaceae—Spurge Family

Chamaesyce albomarginata
rattlesnake weed
Croton setigerus
turkey mullein

Fabaceae—Legume Family

Astragalus douglassi
Douglas milkvetch
Astragalus lentiginosus
freckled milkvetch
Acmispon strigosus
stiff-haired lotus
Lupinus concinnus
bajada lupine

Geraniaceae—Geranium Family

Erodium cicutarium
red-stemmed filaree

Lamiaceae—Mint Family

Salvia carduacea
thistle sage
Salvia columbariae
chia
Salvia dorrii var. *pilosa*
purple sage

Loasaceae—Evening Star Family

Mentzelia albicaulis
white stemmed blazing star
Mentzelia veatchiana
Veatch's blazing star

Malvaceae—Mallow Family

Eremalche exilis
small-flowered eremalche

Montiaceae—Miner's Lettuce Family

Calyptridium monandrum

Nyctaginaceae—Four O'clock Family

Mirabilis laevis
wishbone bush

Onagraceae—Primrose Family

Camissonia campestris
Mojave sun cup
Camissonia claviformis
brown-eyed primrose
Camissonia pallida
pale yellow sun cup

Orobanchaceae—Broomrape Family

Castilleja angustifolia
desert Indian paintbrush
Orobanche fasiculata
clustered broomrape

Papaveraceae—Poppy Family

Eschscholzia californica
California poppy
Platystemon californicus
cream cups

Plantaginaceae—Plantain Family

Penstemon incertus
Mojave beardtongue

Polemoniaceae—Phlox Family

Eriastrum densifolium ssp. mohavense
Mohave wooly star
Eriastrum eremicum
Desert woolystar
Gilia latiflora ssp. *davyi*
broad-flowered gilia
Loeseliastrum matthewsii
desert calico

Polygonaceae—Buckwheat Family

Eriogonum angulosum
angle-stemmed buckwheat
Eriogonum fasciculatum var. *polifolium*
California buckwheat
Eriogonum gracillimum
slender buckwheat
Eriogonum plumatella
yucca wild buckwheat
Eriogonum pusillum
yellow turbans
Mucronea perfoliata
perfoliate spineflower

Ranunculaceae—Buttercup Family

Delphinum parishii
Parish's larkspur

Rosaceae—Rose Family

Purshia tridentate var. *glandulosa*
antelope bush

Solanaceae—Nightshade Family

Lycium andersonii
Anderson's boxthorn
Lycium cooperi
Cooper's boxthorn

Viscaceae—Mistletoe Family

Phoradendron juniperinum
juniper mistletoe

Zygophyllaceae—Caltrop Family

Larrea tridentata
creosote bush

Monocots

Aspargaceae—Asparagus Family

Yucca brevifolia
Joshua tree

Liliaceae—Lily Family

Dichelostemma capitatum
blue dicks

Poaceae—Grass Family

**Bromus madritensis* ssp. *rubens*
red brome
**Bromus tectorum*
cheatgrass
Elymus elymoides
squirreltail
Poa annua
annual blue grass
Poa secunda
Nevada blue grass
Stipa speciosa
Desert needlegrass

ATTACHMENT 4
MOHAVE GROUND SQUIRREL (XEROSPERMOPHILUS MOHAVENSIS) TRAPPING RESULTS

Mohave ground squirrel (*Xerospermophilus mohavensis*) Trapping Results For Tylerhorse Wind Energy Project Kern County, California

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Executive Summary:

Phoenix Biological Consulting (Phoenix) conducted a Mohave ground squirrel (MGS; *Xerospermophilus mohavensis*) trapping survey for the Tylerhorse Wind Energy Project (TWEP) located northwest of the town of Rosamond, Kern County, California during the 2012 survey period. The project proponent, Iberdrola Renewables, LLC, plans to develop the site into a wind turbine energy generating facility. The principal investigator, Ryan Young, and independent field investigators Christine Halley and Cathy Halley performed the field work under the auspices of a Memorandum of Understanding (MOU) between the CDFG and Phoenix. The results of the visual survey and trapping sessions were negative for MGS. The results of the field work are good for up to one year from the final trap date.

Introduction & Purpose:

The Tylerhorse Wind Energy Project (TWEP) constitutes a project pursuant to the National Environmental Policy Act (NEPA), as it is located on land administered by the U.S. Department of the Interior. Acting in its capacity as a lead agency under NEPA, the BLM would need to determine the potential for the project to result in significant impacts, consider mitigation measures and alternatives capable of avoiding significant impacts, and consider the environmental effects of the project as part of its decision-making process.

At the request of Sapphos Environmental, Inc. (Sapphos), Phoenix conducted Mohave ground squirrel trapping surveys within the 1,207 acre site (TWEP) located northwest of the town of Rosamond, Kern County, California. The project proponent, Iberdrola Renewables, LLC, plans to develop the site into a wind turbine generating facility. The site is situated beyond the western edge of the MGS range (Figure 4). The MGS was listed as a rare species in 1971 under the authority of the State Endangered Species Act of 1970. It was re-designated as a state threatened species under the California Endangered Species Act (CESA) in 1985 (Gustafson, 1993). Due to its sensitive status, presence/absence pre-project surveys are typically required to determine if MGS are present within the project boundaries. Alternatively, mitigation, through an incidental take permit, may be obtained, in lieu of trapping. Typically, protocol trapping, using the January 2003 Survey Guidelines, is implemented to satisfy the California Department of Fish and Game (CDFG) requirements. The principal investigator, Ryan Young, and independent field investigator Christine Halley and Cathy Halley performed the field work under the auspices of a Memorandum of Understanding (MOU) between the CDFG and Phoenix. The visual survey was conducted on April 9th. The trapping dates are listed on Table 1. Three trapping grids were deployed throughout the project site to sample the diurnal rodent populations. The trapping schedule consisted of three trapping sessions per grid, and took place during the months of April to July. The results of the visual survey and trapping sessions were negative for MGS.

Location:

The multi-shaped polygon, 1,207 acre project site, is located west of highway 14 and north of the Rosamond Boulevard (Figure 1-2). Tehachapi Mountains are to the north and northwest. The site consists of three separate parcels of Bureau of Land Management (BLM)-administered land located in the unincorporated territory of south-central Kern County. The site is situated within the Tylerhouse Canyon Quadrangle 7.5 minute series topographic map. There are numerous dirt roads along the edges and throughout the site.

The site is located approximately twelve (12) miles west of the MGS range boundary. There are several California Natural Diversity Database (CNDDB) records within the project vicinity (Figure 4). The three closet occurrences are #326, #281 and #296. The first record, #326, is approximately 11 miles to the northeast. One MGS was observed at this location in 2006. The second record, #281, is approximately 14 miles to the east. An unknown number of MGS were detected by Dr. Anthony Recht. The last record, #296, is approximately 19 miles to the east. Two adult MGS were captured at this location in 1994.

Due to the suitable habitat on the project site and relatively proximity of known occurrences, protocol MGS trapping surveys were implemented.

Current Land Use:

The site is situated along the edge of the Tehachapi Mountains in the lower foothills. The habitat is considered creosote scrub but it lies within proximity of a transitional zone or ecotone. Juniper scrub habitat is situated above at higher elevations which transitions to coniferous habitat. The elevation within the project site ranges from 3,480 to 3,960 feet. The site has a southeasterly aspect and numerous drainages bisect the site in a northwest to southeast aspect. There are numerous dirt roads bisecting the project site. In most cases the dirt roads are narrow and are aligned along section borders.

The present habitat within the site consists of creosote scrub, Mohave mixed-woody scrub, Juniper woodlands and disturbed habitat. Dominant shrubs include creosote (*Larrea* *tridentata*), goldenbush (*Ericameria cooperi*), burrowbush (*Ambrosia dumosa*), Joshua tree (*Yucca brevifolia*), California buckwheat (*Eriogonum fasciculatum*) and Mormon tea (*Ephedra nevadensis*). The majority of habitat is undisturbed (Figure 5-7). However, there are signs of disturbance in the form of OHV trails, scattered residential units, utility corridors and aqueduct (Figure 3). The residential areas are low density and there are no obvious barriers preventing the dispersal of animals to and from the site. Habitat connectivity may provide movement of resident MGS populations and, conversely, allow potential surrounding populations to move onto or through the site. MGS populations, like those of most rodents, are known to contract and expand in response to rainfall (Leitner, 1998). In the event of a reproductive year, MGS may disperse and re-colonize surrounding areas. However, the trapping sites were negative for MGS presence during the 2012 trapping season. Active small mammal burrows are present throughout the grid locations and AGS were heard vocalizing during the second and third trapping sessions. The soils range from decomposed granite with hard-packed pebbly-loam to pebbly-sand consistency.

Mohave Ground Squirrel Natural History

The Mohave ground squirrel is small, grayish, diurnal squirrel that is currently listed under the California Endangered Species Act as a threatened species. The California Department of Fish and Game is the responsible agency that provides oversight through the California Environmental Quality Act (CEQA) for project related activities.

MGS occur in the western half of the Mojave Desert. Its historical range encompasses an area between Antelope Valley and Lucerne Valley, in the south. However, MGS occurrences in the southern portion of its range are very rare. The northern limits of the range are near Owens Dry Lake bed, in the north, and through China Lake Naval Weapons Station and Fort Irwin Military base, in the east. The eastern limits extend to Barstow and south along the Mojave River. The western limits loosely follow highway 14 and the foothills of the southern Sierra Nevada escarpment. MGS are dormant in the fall and winter months. They emerge from hibernation in February and begin pair bonding and mating during March. If rainfall is adequate, MGS will reproduce. If rainfall levels do not provide sufficient rainfall to support significant annual plant growth then MGS will merely forage on herbaceous perennials and shrubs in order to gain enough body mass to survive another prolonged period of dormancy and will not reproduce in that year. The adult males can enter dormancy as early as late May. Juveniles will remain above-ground until August in order to gain sufficient fat reserves prior to entering dormancy.

Several other common squirrels occur within their range; antelope ground squirrel (AGS; *Ammospermophilus leucurus*), round-tailed ground squirrel (RTGS; Xero*spermophilus tereticaudus*) and the California ground squirrel (CGS; *Spermophilus beecheyi*). RTGS and CGS are commonly mistaken as MGS. AGS occur throughout the range of the MGS but are easily distinguished by a lateral white stripe on each side. RTGS occur along a contact zone that exists in the Barstow and Lucerne Valley area of the MGS range. Within the contact zone the range of RTGS and MGS overlap. RTGS also occur throughout the eastern Mojave Desert. CGS is typically found near human habitation with scattered populations throughout the MGS range but primarily in the southern portion of the range or in irrigated areas.

Methodologies:

The visual survey was conducted on April 9th. All potential MGS habitat within the approximate grid locations was surveyed during this visit. A list of the plant and animal species detected during the initial visit and during the trapping sessions was compiled (Table 4-6). Phoenix's role was to implement the live-trapping for three grids within the project site. The general locations and number of grids was pre-determined through Sapphos. Within the three grids, one hundred (100) traps per grid were deployed at thirty-five meter spacing over the suitable habitat (Table 2). Two grids consisted of four by twenty-five linear grid arrays and the third grid consisted of a ten by ten array. The grid configurations were determined by the project boundaries and suitable habitat. Each grid covered approximately thirty-two acres. Grid placement was determined by suitable vegetation cover, proximity to surrounding habitat and availability of access roads. The grid naming convention was based on the closest access roads (i.e.-U Line, T Line and A Line access roads). The total area sampled, utilizing three grids, was 240 hundred acres. This acreage total is based on the MGS protocol sampling that allows for one grid for every eighty (80) acres.

Standard, small-mammal, aluminum, foldable, ventilated 12” Sherman Traps were used. Cardboard boxes were used as shade covers for each trap. Traps and shade covers were placed on the north side of the nearest bush on a north-south axis to provide the greatest shade cover possible. Temperature readings were taken and recorded every hour at one foot and at ground level in the shade of a bush. Traps were checked every two to four hours depending on temperature and other influential factors such as potential pregnant or lactating females in traps, dogs on grids, cold weather, expected juveniles etc. Traps were open within one hour after sunrise and closed within one hour before sunset. Traps were closed when air temperature reached 90 °F, when temperature fell below 50 °F or during periods of rainy weather. The bait used consisted of crushed four-way grains with molasses and mixed with peanut butter and water.

Table 1: Trap Dates

Grid Name/#	First Session	Second Session	Third Session
“U Line” Grid 1	04/10/2012 to 04/15/2012	05/11/2012 to 05/15/2012	06/20/2012 to 06/24/2012
“A Line” Grid 2	04/11/2012 to 04/15/2012	05/16/2012 to 05/20/2012	06/25/2012 to 06/29/2012
“Western T Line” Grid 3	04/25/2012 to 04/29/2012	05/21/2012 to 05/25/2012	06/30/2012 to 07/04/2012

Results:

MGS were not seen nor heard during the visual survey. Furthermore, MGS were not trapped on any of the three grids. A total of three (3) species were trapped on the three grids: Antelope ground squirrels (*Ammospermophilus leucurus*), desert woodrat (*Neotoma lepida*) and western whiptails (*Cnemidophorus tigris*). All the above-named species are commonly occurring, non-listed species.

Total trap hours were 408.50 for the total project site, averaging 136.17 hours per grid. Total captures were 150. 148 captures were AGS and 24 of the total captures were juvenile AGS which indicates reproduction amongst AGS occurred during the 2012 trapping season but was reduced due to drought conditions. Average rainfall throughout the Mojave Desert was lower than expected for MGS to reproduce during the 2012 breeding season. Adult male AGS comprised 66 of the total captures and female adult AGS comprised 58 captures. Incidental captures totaled 2 for the all three grids. The highest capture total was grid two (U-Line) with 84 total AGS captures. The lowest capture total was grid three (T-Line) with 12 total captures.

The results of the survey are good for up to one year from the final trap date.

Table 2: Grid Locations

Grid #	Grid Corners (Easting/Northing) NAD 83
"U-Line" Grid 1	NW: 367905 E, 3866548 N NE: 368570 E, 3866565 N SE: 368609 E, 3866425 N SW: 367940 E, 3866417 N
"A-Line" Grid 2	NW: 369793 E, 3867957 N NE: 369933 E, 3867969 N SE: 369948 E, 3867292 N SW: 369781 E, 3867286 N
"T-Line Access Western" Grid 3	NW: 365233 E, 3865710 N NE: 365548 E, 3865710 N SE: 365548 E, 3865395 N SW: 3 65233 E, 3865395 N

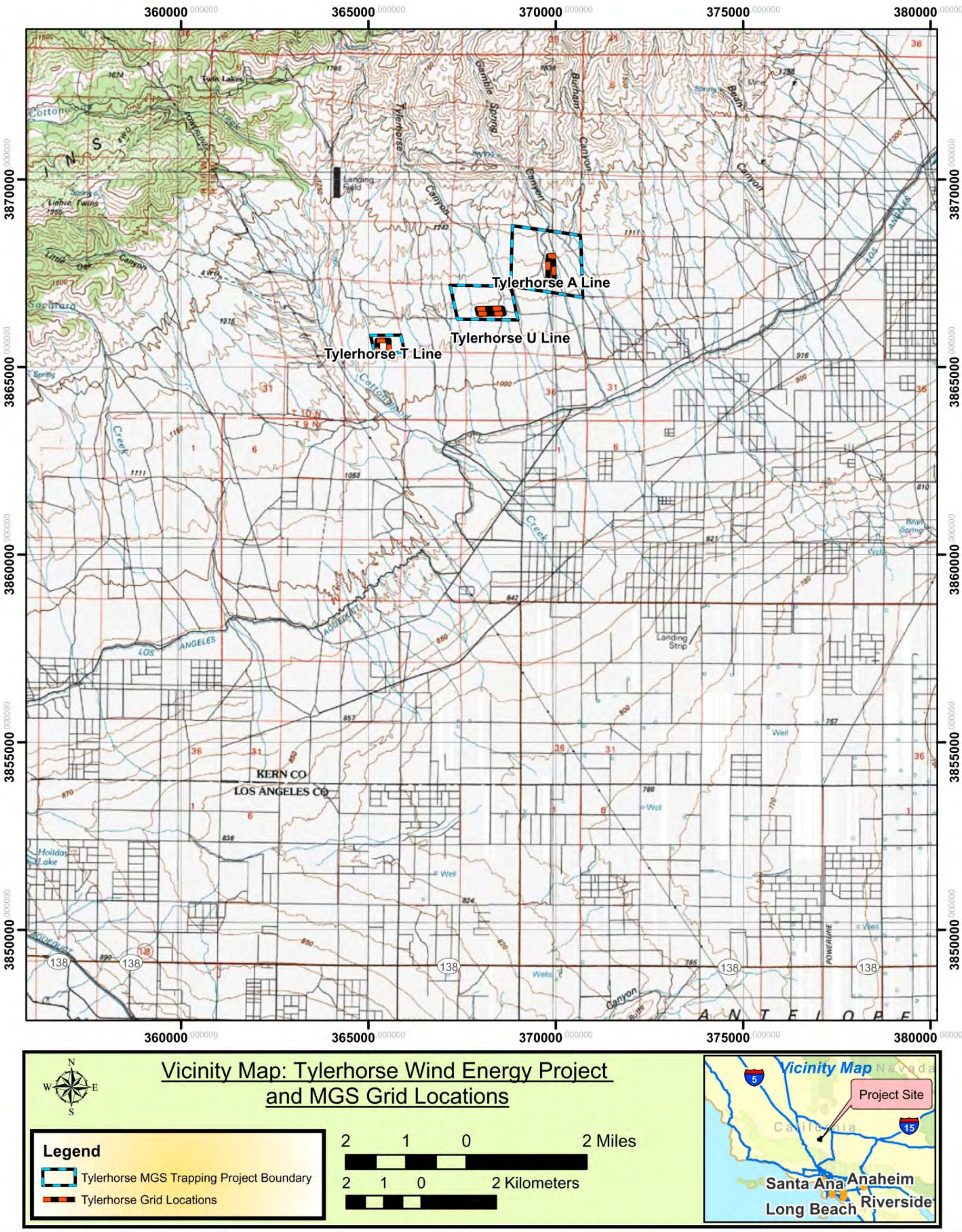
Table 3: Trap Results

	"U-Line" Grid 1	"A-Line" Grid 2	"T-Line " Grid 3	Total for Project	Average Per Grid (n=3)
Trap Hours Per Trap	136	120.25	152.25	408.50	136.17
Total Captures	84	54	12	150	50
Total AGS	83	53	12	148	49.33
AGS Adult Male	35	26	5	66	22
AGS Adult Female	30	22	6	58	19.33
AGS Juvenile Male	8	2	1	11	3.67
AGS Juvenile Female	10	3	0	13	4.33
AGS Unknown Sex	0	0	0	0	0
Incidental captures (excluding AGS)	1	1	0	2	0.67
Number of species captured	2	2	1	3	1

Table 4: List of vertebrate species trapped

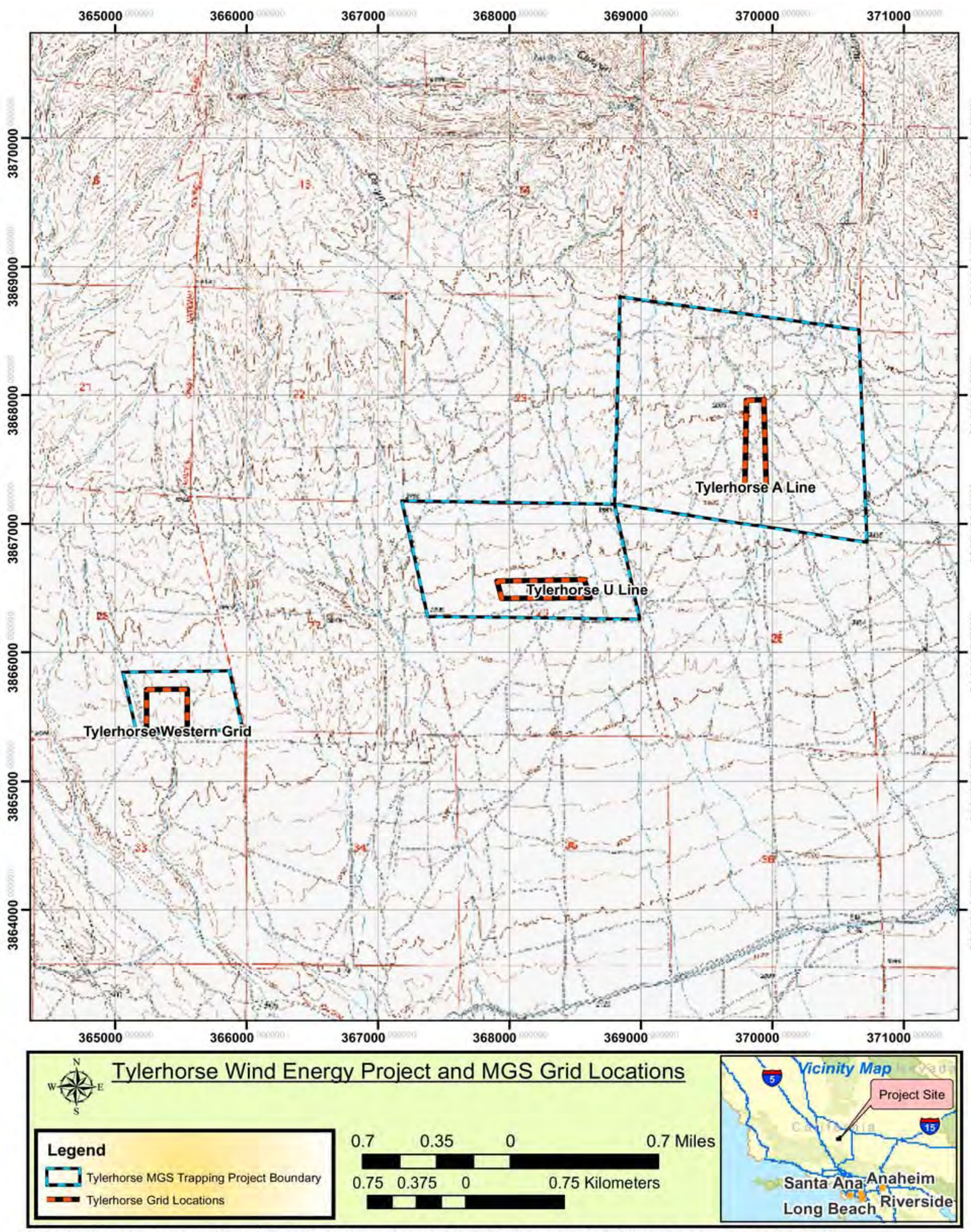
Mammals	Total captures	Captures per grid		
		"U-Line" Grid 1	"A-Line" Grid 2	"T-Line" Grid 3
Antelope ground squirrel (*Ammospermophilus leucurus*)	148	83	53	12
Desert woodrat (*Neotoma lepida*)	1	0	1	0
Reptiles				
Western whiptail (*Cnemidophorus tigris*)	1	1	0	0
Total animals trapped	150			

Figure 1: Vicinity Map for the Tylerhorse Wind Energy Project & MGS Grids



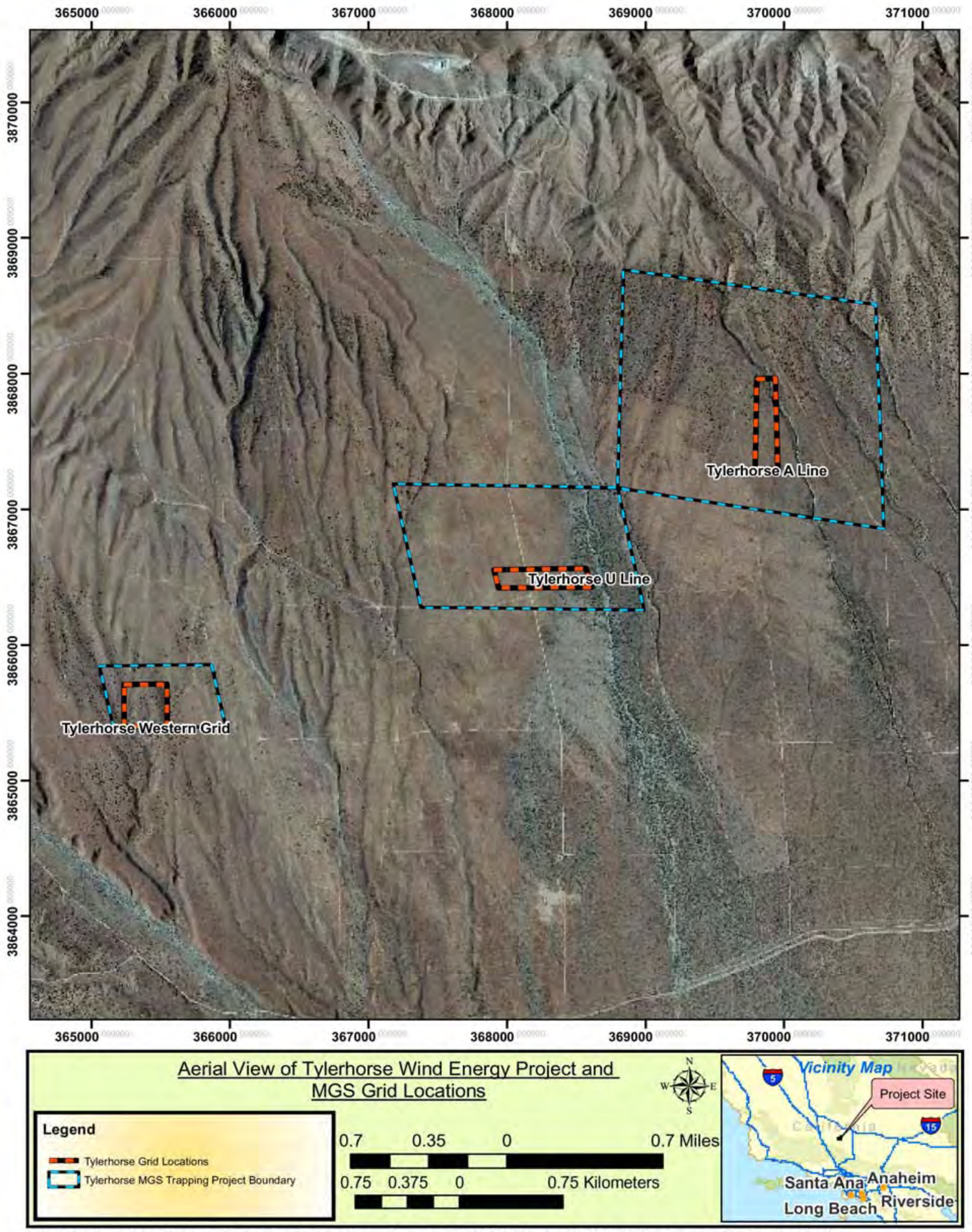
Map Produced by Phoenix Ecological Consulting. August 12, 2012. Source: ESRI, 2012, Terrain Navigator, 2012

Figure 2: Topographic View of "U Line", "A Line" and "T Line" Grids



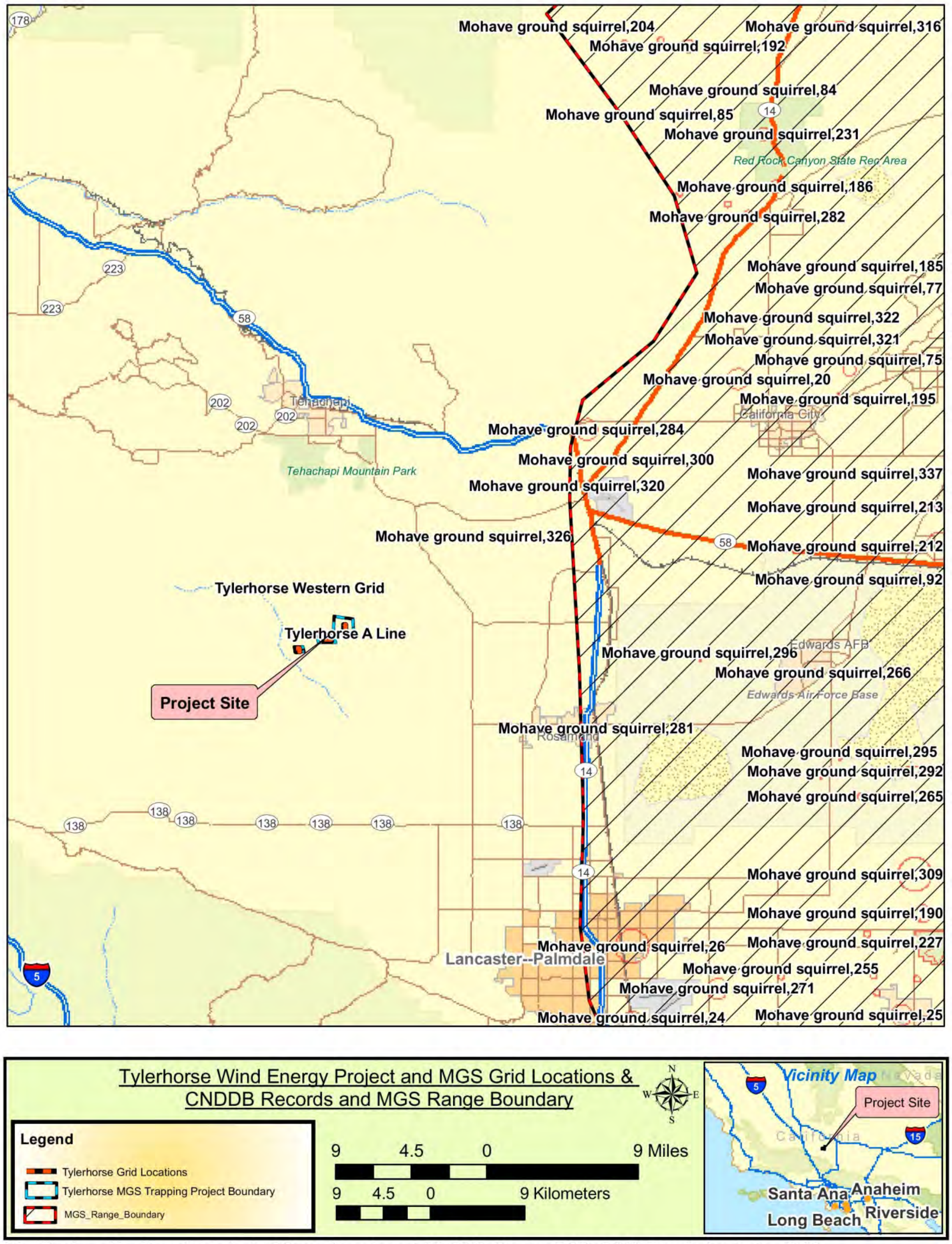
Map Produced by Phoenix Ecological Consulting. August 12, 2012. Source: ESRI, 2012, Terrain Navigator, 2012

Figure 3: Aerial View of "A Line", "U Line" and "T Line" Grids for Tylerhorse Wind Energy Project



Map Produced by Phoenix Ecological Consulting. August 12, 2012. Source: ESRI, 2012, Terrain Navigator, 2012

Figure 4: CNDDB MGS Database Search Results and MGS Boundary for Tylerhorse Wind Energy Project



Map Produced by Phoenix Ecological Consulting. August 12, 2012. Source: ESRI, 2012, Terrain Navigator, 2012

Table 5: List of vascular plants encountered on site

FAMILY Species	Common Name	Habit	Present on Grid
APIACEAE			
Lomatium mohavense	Desert parsley	annual	1-3
ASTERACEAE			
Acamptopappus sphaerocephalus	Golden heads	perennial shrub	1-3
Ambrosia acanthicarpa	Annual bursage	annual	1-3
Ambrosia dumosa	White bur-sage	perennial shrub	1-3
Ambrosia salsola	Cheesebush	perennial shrub	1-3
Artemesia tridentata	Great-basin sagebrush	perennial shrub	3
Camissonia campestris	Sun cups	annual	2,3
Chaenactis fremontii	Fremont pincushion	annual	2-3
Chrysothamnus nauseosus	Rubber rabbitbush	perennial shrub	1-3
Encelia farinose	Brittlebush	shrub	1-3
Eriastrum sapphrinium.	Unknown eriastrum	perennial	1-3
Ericameria cooperii	Golden bush	perennial shrub	1-3
Eriophyllum pringlei	Pringle's woolly daisy	Annual	1-3
Eriophyllum wallacei	Wallace's eriophyllum	annual	3
Ericameria linearifolia	Interior goldenbush	perennial shrub	1-3
Gutierrezia sarothrae	Snakeweed	subshrub	2-3
Lasthenia californica	Goldfields	annual	1-3
Layia glanulosa	White tidy-tips	annual	1-3
Lepidospartum squamatum	Scale broom	perennial	2,3
Lessingia lemmonii	Vinegar weed	annual	1-3
Malacothrix glabrata	Desert dandelion	annual	1-3
Stephanomeria pauciflora	Wire lettuce	annual	1-3
Tetradymia axillaris	Cotton thorn	perennial shrub	1-3
BORAGINACEAE			
Amsinckia tessellata	Fiddleneck	annual	1-3
Cryptantha pterocarya.	Forget-me-not	annual	1-3

Pectocarya penicillata		annual	1-3
Plagiobothrys sp.	Popcorn flower	annual	1-3
BRASSICACEAE			
Arabis pulchra	Prince's rock-cress	perennial	2-3
Brassica tournefortii	African mustard	annual	2
Descurania pinnata	Tansy mustard	annual	1-3
Lepidium fremontii	Bush peppergrass	shrub	2
*Sisymbrium altissimum**	Tumble mustard	annual	2,3
*Sisymbrium orientale**	Eastern rocket	annual	1,2
Stanleya pinnata	Prince's plume	annual	3
CACTACEAE			
Opuntia basilaris	Beavertail cactus	perennial	1-3
Opuntia echinocarpa	Silver cholla	perennial	2
CHENOPODIACEAE			
Atriplex canescens	Four wing saltbush	perennial shrub	2-3
Grayia spinosa	Spiny hopsage	perennial shrub	1-3
Krasheninnikovia lanata	Winterfat	perennial shrub	1-3
*Salsola tragus**	Russian thistle	annual	1-3
CUCURBITACEAE			
Marah fabaceus	California man-root	perennial	3
CUPRESSACEAE			
Juniperus californica	California juniper	shrub or tree	2-3
EPHEDRACEAE			
Ephedra nevadensis	Mormon tea	perennial shrub	1-3
EUPHORBIACEAE			
Chamaesyce albomarginata	Rattlesnake weed	annual	1-3
FABACEAE			
Astragalus lentiginosus	Milkvetch	annual	1-3
GERANIACEAE			
*Erodium cicutarium**	Red-stemmed filaree	annual	1-3
HYDROPHYLLACEAE			
Nama demissum	Purple mat	annual	2-3

Nemophila menziesii	Baby blue-eyes	annual	2
Phacelia distans		annual	2-3
Phacelia fremontii		annual	2-3
Pholistoma membranaceum		annual	3
LAMIACEAE			
Marrubium vulgare	Horehound	perennial	1-3
Salazaria mexicana	Bladder sage		1-3
Salvia columbariae	Chia		1-3
Salvia dorrii	Purple sage	perennial	1-3
Salazaria mexicana	Bladder sage	perennial	1-3
LILIACEAE			
Calochortus kennedyi	Mariposa lily	annual	2-3
Dichelostemma capitatum	Desert hyacinth	annual	1-3
Yucca brevifolia	Joshua Tree	Tree	1-3
LOASACEAE			
Mentzelia obscura	mentzelia	annual	1-3
MALVACEAE			
Eremalche exilis		annual	1-3
NYCTAGINACEAE			
Mirabilis bigelovii	Wishbone bush	perennial	1-3
ONAGRACEAE			
Camissonia campestris	Mojave sun cups	annual	1-3
Camissonia claviformis	Brown-eyed primrose	annual	1,2
Oenothera sp.	Evening primrose	perennial	2,3
POACEAE			
Achnatherum hymenoides	Indian ricegrass	perennial	1-3
Achnatherum speciosum	Desert needlegrass	perennial	1-3
Bromus madritensis ssp. *rubens**	Red brome	annual	1-3
*Bromus tectorum**	Cheat grass	annual	1-3
*Schismus arabicus**	Arabian grass	annual	1-3
POLEMONIACEAE			
Eriastrum saphirinium.		annual	1-3
Loeseliastrum mathewsii	Desert calico	Annual	2

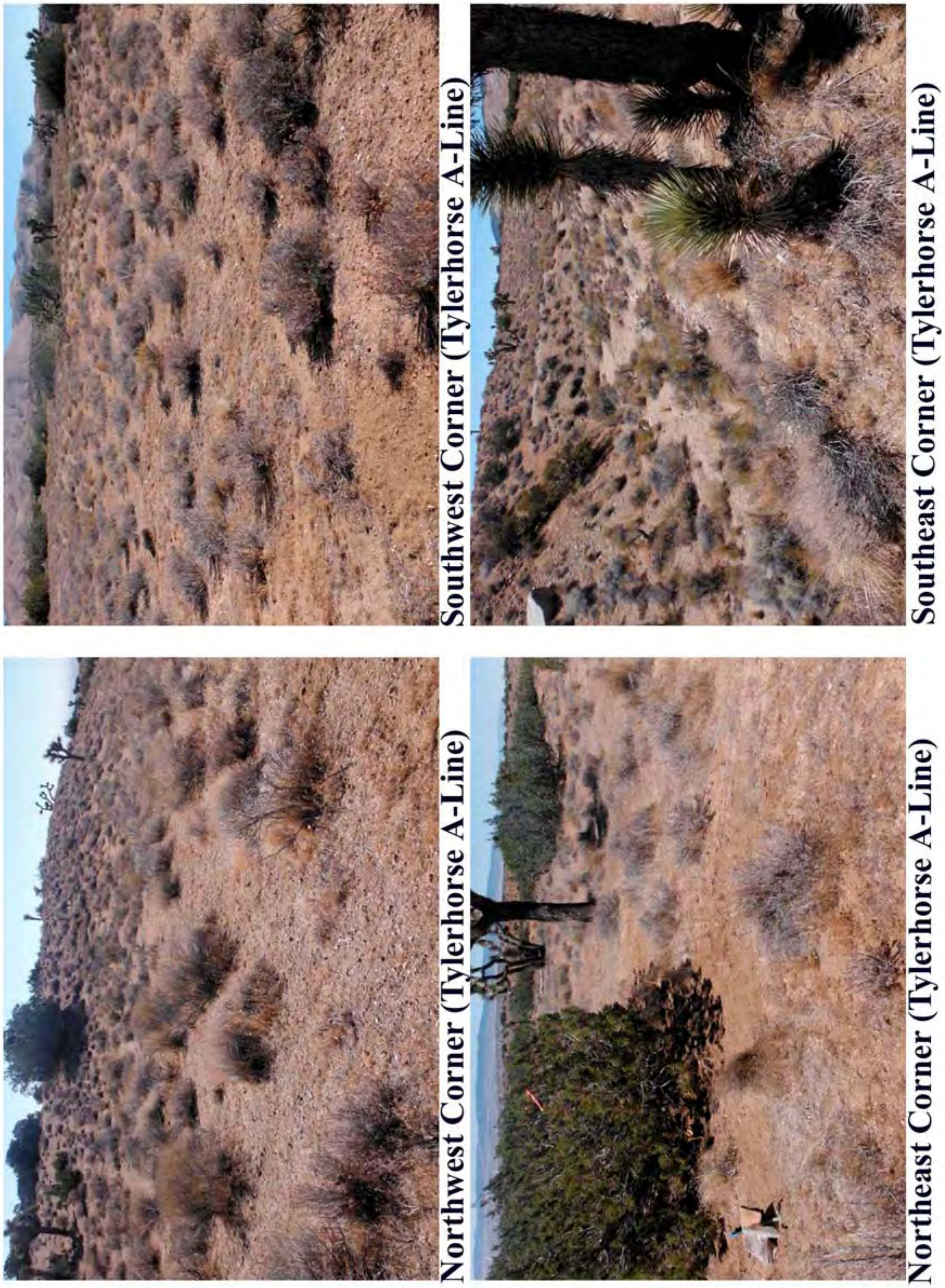
POLYGONACEAE			
Eriogonum fasciculatum	California buckwheat	perennial	1-3
Eriogonum sp.	Unknown buckwheat	annual	1
Oxytheca perfoliata		annual	2-3
Rumex hymenosepalus	Wild-rhubarb	perennial	1
SCROPHULARIACEAE			
Castilleja angustifolia	Desert paintbrush	annual	2
SOLANAECEAE			
Datura wrightii	Datura	Annual or perennial	2-3
Lycium andersonii	Anderson's boxthorn	perennial shrub	1-3
Lycium cooperi	Cooper's boxthorn	perennial shrub	1-3
ZYGOPHYLLACEAE			
Larrea tridentata	Creosote	shrub	1-3

Table 6: List of vertebrate species visual/aurally detected on site

Mammals	**Present on Grid**
Antelope Squirrel (*Ammospermophilus leucurus*)	1-3
Black tailed jack rabbit (*Lepus californicus*)	1-3
Coyote (*Canis latrans*)	1-3
Desert cottontail (*Sylvilagus audubonii*)	1-3
Desert Kit fox (*Vulpes velox*)	2-3
Desert woodrat (*Neotoma lepida*)	1-3
Merriam's kangaroo rat (*Dipodomys merriami*)	1-3
Birds	
Ash throated flycatcher (*Myiarchus cinerascens*)	1-3
Black-throated sparrow (*Amphispiza bilineata*)	1-3
Bullock's oriole (*Icterus bullockii*)	1-3
Common nighthawk (*Chordeiles minor*)-flying overhead	1-3
Common Raven (*Corvus corax*)-nesting on grid 1-2	1-3
Eurasian collared dove (*Streptopelia decaocto*)	On site
European starling (*Sturnus vulgaris*)	On site
Gambel's quail (*Callipepla gambelii*)	On site
Greater roadrunner (*Geococcyx californianus*)	1-2
Horned lark (*Eremophila alpestris*)	1-3
House finch (*Carpodacus mexicanus*)	1-3
House sparrow (*Passer domesticus*)	On site
Loggerhead shrike (*Lanius ludovicianus*)	1-3
Mourning dove (*Zenaida macroura*)	On site
Northern mockingbird (*Mimus polyglottos*)	1-3
Red-tailed Hawk (*Buteo jamacensis*)	On site
Sage sparrow (*Amphispiza belli*)	1-3
Say's phoebe (*Sayornis saya*)	1-3
Turkey vulture (*Cathartes aura*)-flying overhead	On site
Violet-green swallow (*Tachycineta thalassina*)-flying overhead	On site
Western kingbird (*Tyrannus verticalis*)	1-3
Western meadowlark (*Sturnella neglecta*)	1-3
Western tanager (*Piranga ludoviciana*)	1,2
White crowned sparrow (*Zonotrichia leucophrys*)-migrant	1-3
Wilson's warbler (*Wilsonia pusilla*)-migrant	2
Yellow rumped warbler (*Dendroica coronata*)	2

Reptiles	
Coachwhip (*Masticophis flagellum*)	2
Desert horned lizard (*Phrynosoma platyrhinos*)	1
Desert night lizard (*Xantusia vigilis*)	1
Desert spiny lizard (*Sceloporus magister*)	1-3
Gopher snake (*Pituophis catenifer*)	On site
Mojave rattlesnake (*Crotalus scutulatus*)	3
Racer (*Coluber constrictor*)	3
Side blotched lizard (*Uta stansburiana*)	1-3
Western Whiptail (*Cnemidophorus tigris*)	1-3

Figure 5: Habitat Grid Photos



Southwest Corner (Tylerhorse A-Line)

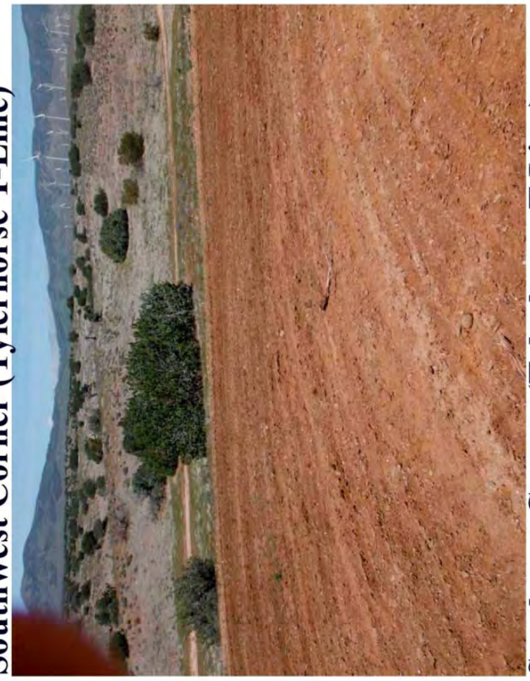
Southeast Corner (Tylerhorse A-Line)

Northwest Corner (Tylerhorse A-Line)

Northeast Corner (Tylerhorse A-Line)

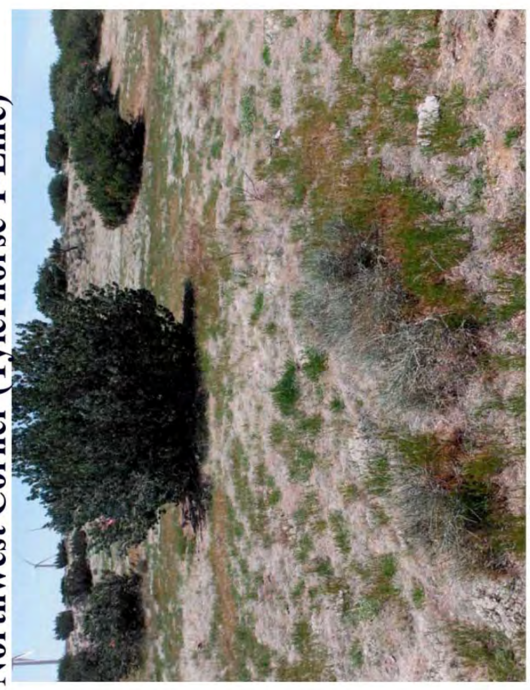
Figure 6: Habitat Grid Photos

Southwest Corner (Tylerhorse T-Line)



Southeast Corner (Tylerhorse T-Line)

Northwest Corner (Tylerhorse T-Line)



Northeast Corner (Tylerhorse T-Line)

Figure 7: Habitat Grid Photos

Northeast Corner (Tylerhorse U-Line)

Southeast Corner (Tylerhorse U-Line)

Southwest Corner (Tylerhorse U-Line)

Northwest Corner (Tylerhorse U-Line)

Bibliography:

Bureau of Land Management. January 2005. Final Environmental Impact Report and Statement for the West Mojave Plan. Vol. 1A.

California Department of Fish and Game. Mohave Ground Squirrel Survey Guidelines. January 2003.

California Department of Fish and Game, California Natural Diversity Database Rarefind 4, 2011.

Gustafson, John. A Status Review of the Mojave Ground Squirrel (*Spermophilus mohavensis*). Department of Fish and Game. Wildlife Management Division. March 1993.

Leitner, P., Leitner, B.M. Coso Grazing Exclosure Monitoring Study. Mohave Ground Squirrel Study. Coso Known Geothermal Resource Area. Major Findings 1988-1996. Final Report. May 1998.

Certification:

I hereby certify that the statements furnished above and in the attached exhibits present the data and information presented are true and correct to the best of my knowledge and belief. Field work conducted for this report was performed by me or under my direct supervision. I certify that I have not signed a non-disclosure or consultant confidentiality agreement with the project applicant or applicant's representative and that I have no financial interest in the project.

Date: ______September 3, 2012____ Signed: ___________________________________
Report Author

Cordially,

Ryan Young
Phoenix Biological Consulting
PO Box 720949
Pinon Hills, CA 92372-0949

Mohave Ground Squirrel Survey Guidelines
January 2003

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Mohave Ground Squirrel (MGS) Survey and Trapping Form (photocopy as needed)

PART I - PROJECT INFORMATION (use a separate form for each sampling grid)

Project name: Tylerhorse Property owner: Private

Location: Township T10N ; Range R15W ; Section 21,26,28 ; ¼ Section ________

Quad map/series: Tylerhorse Canyon UTM coordinates: See Report
GPS coordinates of trapping-grid corners

Acreage of Project Site: 1207 Acreage of potential MGS habitat on site: ________

Total acreage visually surveyed on project site: 120 Acres Date(s): April 9, 2012
visual surveys

Visual surveys conducted by: Ryan Young
names of all persons by date (use back of form, if needed)

Total acres trapped: 120 Acres Number of sampling grids: Three

Trapping conducted by: Ryan Young, Chris Hulley, Cathy Hulley
names of all persons by sampling term and sampling grid (use back of form, if needed)

Dates of sampling term(s): FIRST See Report SECOND ________ THIRD ________
if required if required

PART II - GENERAL HABITAT DESCRIPTION (use back of form, if needed)
Vegetation: dominant perennials: See Report
other perennials: ________
dominant annuals: ________

other annuals: ________

Land forms (mesa, bajada, wash): Middle - Upper Bajada

Soils description: Gravelly - loam

Elevation: 3,592' Slope: 5%

PART III - WEATHER (report measurements in the following categories for each day of visual survey and each day of trapping; using 24-hour clock, indicate time of day that each measurement was made; use a separate blank sheet for each day)

Temperature: AIR minimum and maximum; SOIL minimum and maximum; Cloud Cover: % in AM and % in PM; Wind Speed: in AM and in PM

Appendix B: Weather Data Example, Grid 3 – "T-Line", Session 1
Tylerhorse Wind Energy Project

PART III – WEATHER

Project Name: Tylerhorse Wind Energy Project
Property Owner: Public/Private

Year: 2012 (Trapping Period _1_)

Grid Number: #3 "T-Line"

WEATHER (temperature = °C; cloud cover = %; wind speed = mph)

DATE: 04/25/2012 **ACTIVITY:** trapping Day 1

WEATHER CONDITION	VALUE	TIME
AIR TEMPERATURE, MIN.	14.3	08:00
AIR TEMPERATURE, MAX.	22.3	14:00
SOIL TEMPERATURE, MIN.	10.8	08:00
SOIL TEMPERATURE, MAX.	23.1	14:00
CLOUD COVER, AM	20%	08:00
CLOUD COVER, PM	50%	14:00
WIND SPEED, AM	2MPH	08:00
WIND SPEED, PM	5MPH	14:00

DATE: 04/26/2012 **ACTIVITY:** trapping Day 2

WEATHER CONDITION	VALUE	TIME
AIR TEMPERATURE, MIN.	11.0	10:30
AIR TEMPERATURE, MAX.	12.0	11:30
SOIL TEMPERATURE, MIN.	10.1	10:30
SOIL TEMPERATURE, MAX.	10.5	11:30
CLOUD COVER, AM	80%	10:30
CLOUD COVER, PM	80%	11:30
WIND SPEED, AM	8MPH	10:30
WIND SPEED, PM	8MPH	11:30

DATE: 04/27/2012 **ACTIVITY:** trapping Day 3

WEATHER CONDITION	VALUE	TIME
AIR TEMPERATURE, MIN.	12.2	12:00
AIR TEMPERATURE, MAX.	15.5	14:00
SOIL TEMPERATURE, MIN.	10.1	12:00
SOIL TEMPERATURE, MAX.	15.7	14:00
CLOUD COVER, AM	40%	12:00
CLOUD COVER, PM	50%	14:00
WIND SPEED, AM	10 MPH	12:00
WIND SPEED, PM	10 MPH	14:00

DATE: 04/28/2012 **ACTIVITY:** trapping Day 4

WEATHER CONDITION	VALUE	TIME
AIR TEMPERATURE, MIN.	17.3	07:00
AIR TEMPERATURE, MAX.	17.1	18:30
SOIL TEMPERATURE, MIN.	16.5	07:00
SOIL TEMPERATURE, MAX.	16.7	18:30
CLOUD COVER, AM	10%	07:00
CLOUD COVER, PM	20%	18:30
WIND SPEED, AM	15	07:00
WIND SPEED, PM	25	18:30

DATE: 04/29/2012 **ACTIVITY:** trapping Day 5

WEATHER CONDITION	VALUE	TIME
AIR TEMPERATURE, MIN.	17.0	06:30
AIR TEMPERATURE, MAX.	16.6	18:30
SOIL TEMPERATURE, MIN.	16.0	06:30
SOIL TEMPERATURE, MAX.	17.2	18:30
CLOUD COVER, AM	0%	06:30
CLOUD COVER, PM	0%	18:30
WIND SPEED, AM	5	06:30
WIND SPEED, PM	10	18:30

Appendix B: Weather Data Example, Grid 3 – "T-Line", Sessions 2
Tylerhorse Wind Energy Project

PART III – WEATHER

Project Name: Tylerhorse Wind Energy Project
Property Owner: Public

Year: 2012 (Trapping Period _2_)

Grid Number: # 3 "T-line"

WEATHER (temperature = °C; cloud cover = %; wind speed = mph)

DATE: 05/21/2012 **ACTIVITY:** trapping Day 1

WEATHER CONDITION	VALUE	TIME
AIR TEMPERATURE, MIN.	21.7	06:30
AIR TEMPERATURE, MAX.	31.1	12:30
SOIL TEMPERATURE, MIN.	20.5	06:30
SOIL TEMPERATURE, MAX.	32.2	12:30
CLOUD COVER, AM	1%	06:30
CLOUD COVER, PM	10%	12:30
WIND SPEED, AM	5MPH	06:30
WIND SPEED, PM	5MPH	12:30

DATE: 05/22/2012 **ACTIVITY:** trapping Day 2

WEATHER CONDITION	VALUE	TIME
AIR TEMPERATURE, MIN.	17.4	06:30
AIR TEMPERATURE, MAX.	30.2	13:00
SOIL TEMPERATURE, MIN.	16.5	06:30
SOIL TEMPERATURE, MAX.	31.5	13:00
CLOUD COVER, AM	0%	06:30
CLOUD COVER, PM	15%	13:00
WIND SPEED, AM	10MPH	06:30
WIND SPEED, PM	10MPH	13:00

DATE: 05/23/2012 **ACTIVITY:** trapping Day 3

WEATHER CONDITION	VALUE	TIME
AIR TEMPERATURE, MIN.	16.5	06:30
AIR TEMPERATURE, MAX.	21.8	19:30
SOIL TEMPERATURE, MIN.	15.5	06:30
SOIL TEMPERATURE, MAX.	22.6	19:30
CLOUD COVER, AM	10%	06:30
CLOUD COVER, PM	35%	19:30
WIND SPEED, AM	0MPH	06:30
WIND SPEED, PM	15MPH	19:30

DATE: 05/24/2012 **ACTIVITY:** trapping Day 4

WEATHER CONDITION	VALUE	TIME
AIR TEMPERATURE, MIN.	17.7	08:30
AIR TEMPERATURE, MAX.	17.0	19:30
SOIL TEMPERATURE, MIN.	16.7	08:30
SOIL TEMPERATURE, MAX.	17.8	19:30
CLOUD COVER, AM	0%	08:30
CLOUD COVER, PM	0%	19:30
WIND SPEED, AM	25MPH	08:30
WIND SPEED, PM	25MPH	08:30

DATE: 05/25/2012 **ACTIVITY:** trapping Day 5

WEATHER CONDITION	VALUE	TIME
AIR TEMPERATURE, MIN.	10.9	07:00
AIR TEMPERATURE, MAX.	15.3	19:30
SOIL TEMPERATURE, MIN.	10.3	07:00
SOIL TEMPERATURE, MAX.	16.5	19:30
CLOUD COVER, AM	20%	07:00
CLOUD COVER, PM	60%	19:30
WIND SPEED, AM	20MPH	07:00
WIND SPEED, PM	20MPH	19:30

Appendix B: Weather Data Example, Grid 3 – "T-Line", Sessions 3
Tylerhorse Wind Energy Project

PART III – WEATHER

Project Name: Tylerhorse Wind Energy Project
Property Owner: Public

Year: 2012 (Trapping Period _3_)

Grid Number: #3-"T-Line"

WEATHER (temperature = °C; cloud cover = %; wind speed = mph)

DATE: 06/30/2012 **ACTIVITY:** trapping Day 1

WEATHER CONDITION	VALUE	TIME
AIR TEMPERATURE, MIN.	21.3	06:30
AIR TEMPERATURE, MAX.	22.6	19:45
SOIL TEMPERATURE, MIN.	20.4	06:30
SOIL TEMPERATURE, MAX.	24.1	19:45
CLOUD COVER, AM	0%	06:30
CLOUD COVER, PM	0%	19:45
WIND SPEED, AM	21MPH	06:30
WIND SPEED, PM	28MPH	19:45

DATE: 07/01/2012 **ACTIVITY:** trapping Day 2

WEATHER CONDITION	VALUE	TIME
AIR TEMPERATURE, MIN.	20.6	07:00
AIR TEMPERATURE, MAX.	24.9	20:00
SOIL TEMPERATURE, MIN.	19.6	07:00
SOIL TEMPERATURE, MAX.	23.3	20:00
CLOUD COVER, AM	4%	07:00
CLOUD COVER, PM	1%	20:00
WIND SPEED, AM	23MPH	07:00
WIND SPEED, PM	28MPH	20:00

DATE: 07/02/2012 **ACTIVITY:** trapping Day 3

WEATHER CONDITION	VALUE	TIME
AIR TEMPERATURE, MIN.	21.2	06:45
AIR TEMPERATURE, MAX.	33.4	14:00
SOIL TEMPERATURE, MIN.	19.8	06:45
SOIL TEMPERATURE, MAX.	33.7	14:00
CLOUD COVER, AM	0%	06:45
CLOUD COVER, PM	0%	14:00
WIND SPEED, AM	11MPH	06:45
WIND SPEED, PM	3MPH	14:00

DATE: 07/03/2012 **ACTIVITY:** trapping Day 4

WEATHER CONDITION	VALUE	TIME
AIR TEMPERATURE, MIN.	17.8	06:30
AIR TEMPERATURE, MAX.	33.1	12:45
SOIL TEMPERATURE, MIN.	17.0	06:30
SOIL TEMPERATURE, MAX.	33.9	12:45
CLOUD COVER, AM	0%	06:30
CLOUD COVER, PM	0%	12:45
WIND SPEED, AM	6MPH	06:30
WIND SPEED, PM	4MPH	12:45

DATE: 07/04/2012 **ACTIVITY:** trapping Day 5

WEATHER CONDITION	VALUE	TIME
AIR TEMPERATURE, MIN.	19.2	06:30
AIR TEMPERATURE, MAX.	31.9	12:30
SOIL TEMPERATURE, MIN.	18.1	06:30
SOIL TEMPERATURE, MAX.	32.5	12:30
CLOUD COVER, AM	10%	06:30
CLOUD COVER, PM	20%	12:30
WIND SPEED, AM	1MPH	06:30
WIND SPEED, PM	7MPH	12:30

ATTACHMENT 5
MEMORANDUM FOR THE RECORD NO. 2: RESULTS OF 2012 SUMMER BIRD USE SURVEYS AND SUMMER BURROWING OWL SURVEYS

Sapphos
environmental inc.

March 11, 2013
Job Number: 1612-021
Tylerhorse Wind Energy Project

MEMORANDUM FOR THE RECORD
2.6 1612-021.M02

TO: Iberdrola Renewables, LLC
(Ms. Amy Parsons and Ms. Sara Parsons-McMahon)

FROM: Sapphos Environmental, Inc.
(Ms. Mary Davis and Dr. Joseph Platt)

SUBJECT: Results of 2012 Summer Bird Use Surveys and Summer Burrowing Owl Surveys at the Tylerhorse Wind Energy Project, Kern County, California

FIGURES:
1. Regional Vicinity Map
2. Summer 2012 Bird Use Count Locations
3. Observed Avian Flight Heights
4. Summer 2012 Burrowing Owl Burrow Occupancy
5. Summer 2012 Special-Status Avian Species

ATTACHMENT: A. Avifaunal Compendium

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EXECUTIVE SUMMARY

This Memorandum for the Record (MFR) documents the results of survey efforts for both the 2012 summer bird use surveys as well as 2012 breeding season burrowing owl (*Athene cunicularia*) burrow checks at the Tylerhorse Wind Energy Project (project). The project consists of three separate parcels that total approximately 1,207 acres (approximately 2 square miles) of Bureau of Land Management (BLM)–administered land located in the unincorporated territory of south-central Kern County, California. The results of the supplemental survey efforts for 2012 summer bird surveys and breeding season burrowing owl surveys at the project are consistent with the results of surveys reported in the Biological Resources Technical Report (BRTR).[1] Bird use surveys were performed consistent with the *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development* published by the California Energy Commission (CEC Guidelines).[2] When initially planned, the breeding season burrowing owl survey protocol was based on the *California Burrowing Owl Survey Protocol and Mitigation Guidelines*,[3] but the surveys conducted on the project are also generally consistent with the new burrowing owl breeding season survey protocol recommended in the California Department of Fish and Game's (CDFG's) *Staff Report on Burrowing Owl Mitigation*.[4] Summer bird use surveys and breeding season burrowing owl surveys were conducted on 11 days between June 7, 2012 and August 31, 2012.

- Twenty-seven avian species were recorded at the project property as a result of all summer bird surveys. Four of the species were raptors.

- Only one of the 27 species recorded during bird use counts (BUCs), common raven (*Corvus corax*), was observed flying within the rotor-swept zone (200–400 feet above ground level).

- No bird species listed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS) or the CDFG were observed on or near the project property. Three special-status or sensitive avian species were observed on the project property:

-
    1. Prairie falcon (*Falco mexicanus*), a CDFG Watch List species (nesting) and a USFWS Bird of Conservation Concern
    2. Burrowing owl, a CDFG Species of Special Concern (burrow sites and some wintering sites), a USFWS Bird of Conservation Concern, and considered in the BLM's West Mojave Plan
    3. Loggerhead shrike (*Lanius ludovicianus*), a CDFG Species of Special Concern (nesting) and considered in the BLM's West Mojave Plan

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[1] Sapphos Environmental, Inc. March 2012. *Tylerhorse Wind Energy Project Biological Resources Technical Report*. Prepared for: Bureau of Land Management, California Desert District, Moreno Valley, CA. Pasadena, CA.

[2] California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento.

[3] California Burrowing Owl Consortium. April 1993. *California Burrowing Owl Survey Protocol and Mitigation Guidelines*. Available at: http://www.dfg.ca.gov/wildlife/nongame/docs/boconsortium.pdf

[4] California Department of Fish and Game. March 2012. *Staff Report on Burrowing Owl Mitigation*. Sacramento, CA.

- Four burrowing owl burrows, three originally identified during fall 2011 Phase II surveys and one identified incidentally during special-status plant surveys in spring 2012, were surveyed to determine breeding season occupancy. Three of the four surveyed burrows had no burrowing owl activity during the breeding season. The fourth and most recently discovered burrow was occupied by a single burrowing owl during the fourth survey visit in mid-July.

INTRODUCTION

The Tylerhorse Wind Energy Project constitutes a project pursuant to the National Environmental Policy Act (NEPA), as it is located on land administered by the U.S. Department of the Interior. Acting in its capacity as a lead agency under NEPA, the BLM would need to determine the potential for the project to result in significant impacts, consider mitigation measures and alternatives capable of avoiding significant impacts, and consider the environmental effects of the project as part of its decision-making process.

Sapphos Environmental, Inc. conducted summer BUCs and breeding season burrowing owl surveys in summer 2012 within the 1,207-acre project property to confirm the conclusions reached in the BRTR and the EIS for the project. In addition to supplementing earlier survey work, the purpose of the summer bird surveys is to collect baseline data on all bird species within the project property. The results of these surveys will confirm the estimation of avian diversity and numbers within the project area. Breeding season burrowing owl burrow checks were completed to ascertain burrowing owl occupancy at three burrows observed on the property during Phase II burrow surveys conducted in October 2011, as well as an additional burrow discovered incidentally on the property during special-status plant surveys in spring 2012. The previous three burrowing owl burrows had also been surveyed during the non-breeding season, and the results of those surveys were provided in an earlier MFR.[5]

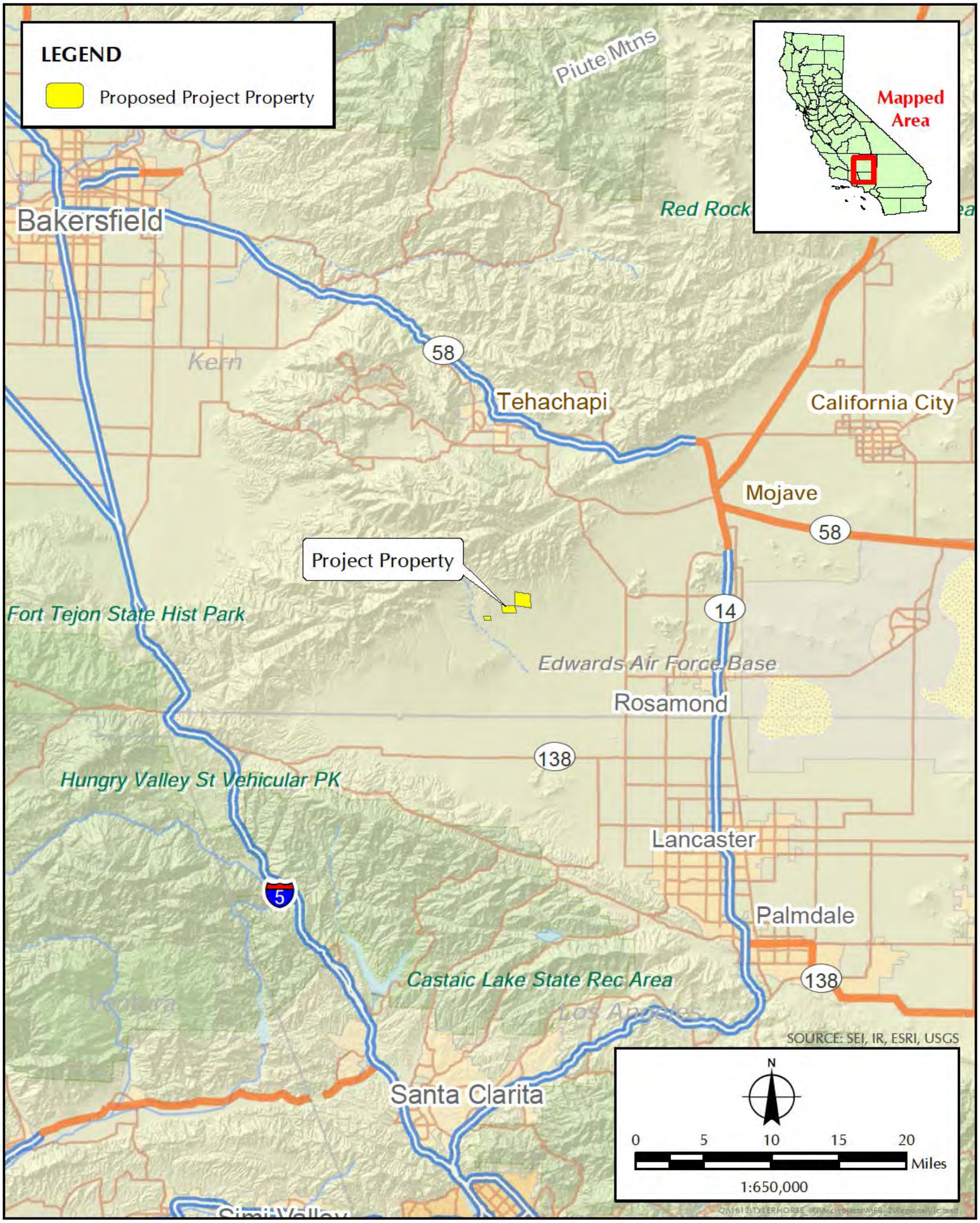
PROJECT LOCATION

The project property consists of approximately 1,207 acres (approximately 2 square miles) located in the south-central portion of the unincorporated area of Kern County, California (Figure 1, *Regional Vicinity Map*). The project property is generally bordered by the Tehachapi Mountains to the north and northwest. The project property ranges in elevation from 3,480 to 3,960 feet above mean sea level.

METHODS

These supplemental field surveys were undertaken and designed to characterize the baseline conditions regarding special-status, resident, and/or migratory avian species that have the potential to be present within the project property. These special-status species include avian species designated as such in local or regional plans, policies, or regulations or by the CDFG, the BLM, and the USFWS.

[5] Sapphos Environmental, Inc. 2012. Memorandum for the Record No. 11. Subject: Results of 2011–2012 Winter Bird Use and Burrowing Owl Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: enXco Development Corporation. Pasadena, CA.



IBERDROLA RENEWABLES

FIGURE 1
Regional Vicinity Map

The summer surveys were conducted by three Sapphos Environmental, Inc. avian biologists (Mr. Brian Bielfelt, Ms. Margaret Schaap, and Mr. John Ivanov), using a combination of directed and reconnaissance survey methods to detect the frequency of occurrence and relative abundance of summer bird species in five habitats: Joshua Tree Woodland, Mixed Mojave Woody Scrub, Mojave Desert Wash Scrub, Mojavean Juniper Woodland and Scrub, and Non-native Grassland.

All survey personnel were knowledgeable of the CEC Guidelines for conducting avian studies in support of wind energy projects. All survey personnel were experienced in the undertaking of field surveys for special-status avian species, as well as knowledgeable of the identification and ecology of both resident and migratory avian species. All survey personnel were familiar with both federal and state statutes related to listed and sensitive avian species and their collection, in addition to being experienced with analyzing the impacts of development on special-status avian species, their habitats, and communities. The team was equipped with standardized field notebooks and checklists for field annotations when applicable, binoculars, and aerial photographs of the project property at a scale of 1 inch equals 400 feet.

The summer 2012 bird use surveys comprised two different surveys:

- BUCs: six 30-minute unlimited distance counts at each of the three points within the project property in the five main habitats
- Reconnaissance surveys: conducted opportunistically throughout the project property during survey visits

The summer BUCs were conducted from June 7 to August 31, 2012, for a total of 11 days (Table 1, *Survey Dates and Methods*).

TABLE 1
SURVEY DATES AND METHODS

Survey Dates	Bird Use Counts	Burrowing Owl Burrow Checks	Reconnaissance
June 7, 2012	X	X	X
June 20, 2012	X	X	X
June 26, 2012		X	X
June 27, 2012		X	X
June 28, 2012	X		X
July 9, 2012	X	X	X
July 10, 2012	X	X	X
July 20, 2012	X		X
August 7, 2012	X		X
August 30, 2012	X		X
August 31, 2012	X		X

Bird Use Counts

CEC Guidelines for BUCs recommend approximately 1 to 1.5 points per square mile.[6] The project property encompasses approximately 1,207 acres. Based on this recommendation, and the noncontiguous nature of the three parcels that constitute the project, three BUC points were selected as part of the survey effort (Figure 2, *Summer 2012 Bird Use Count Locations*). The number and location of these points have been proportionally distributed among the main habitat types on-site: one BUC point at the intergrade between Mojavean Juniper Woodland and Scrub and Mojave Desert Wash Scrub, one BUC point at the intergrade between Non-native Grassland and Joshua Tree Woodland, and one BUC point in Mojavean Juniper Woodland and Scrub. When possible, BUC points were located at suitable vantage points where an unobstructed view of as much of the surrounding area as possible was provided. The exact location of each BUC point was marked using a Garmin global positioning system (GPS), and photographs were taken in each of the four cardinal directions using a digital camera.

Biologists conducted six 30-minute unlimited distance counts at each of three points within the project property to count birds in each of the five habitats. The observer surveyed each point four times in the morning and twice in the evening. Methods follow the BUC section of the CEC Guidelines.[7] Observers collected observations of the number and species of birds observed, their activity, and estimated distance from the observer when necessary. For flying birds, the observer noted the bird's estimated height above the ground.

Reconnaissance

Observers conducted reconnaissance surveys throughout the project property on 11 survey days (Table 1). The reconnaissance surveys primarily focused on recording three types of observations: (1) species not observed during other survey types, (2) special-status species, and (3) raptors. Prey species for raptors, particularly black-tailed jackrabbits (*Lepus californicus*), were also recorded when observed within the project property. Observations were marked on a Garmin GPS and described in field notebooks.

Special care in all surveys was taken to avoid double-counting birds. Age and sex were determined, when possible, to distinguish individuals from one another. Temperature, estimated wind speed, wind direction, and percentage of cloud cover were recorded at the beginning and end of each observation period. Surveys were not conducted under average wind speeds greater than 20 miles per hour or in the event of sustained heavy precipitation.

The combination of both BUC and reconnaissance surveys, in all five habitats, resulted in 100 percent visual and/or aural coverage of the project property during summer bird surveys.

Burrowing Owl Summer Burrow Checks

Summer burrowing owl burrow checks were completed in order to determine breeding season occupancy of the four burrowing owl burrows previously observed on the project property as a result of both Phase II burrow surveys conducted in October 2011 and incidental observations of

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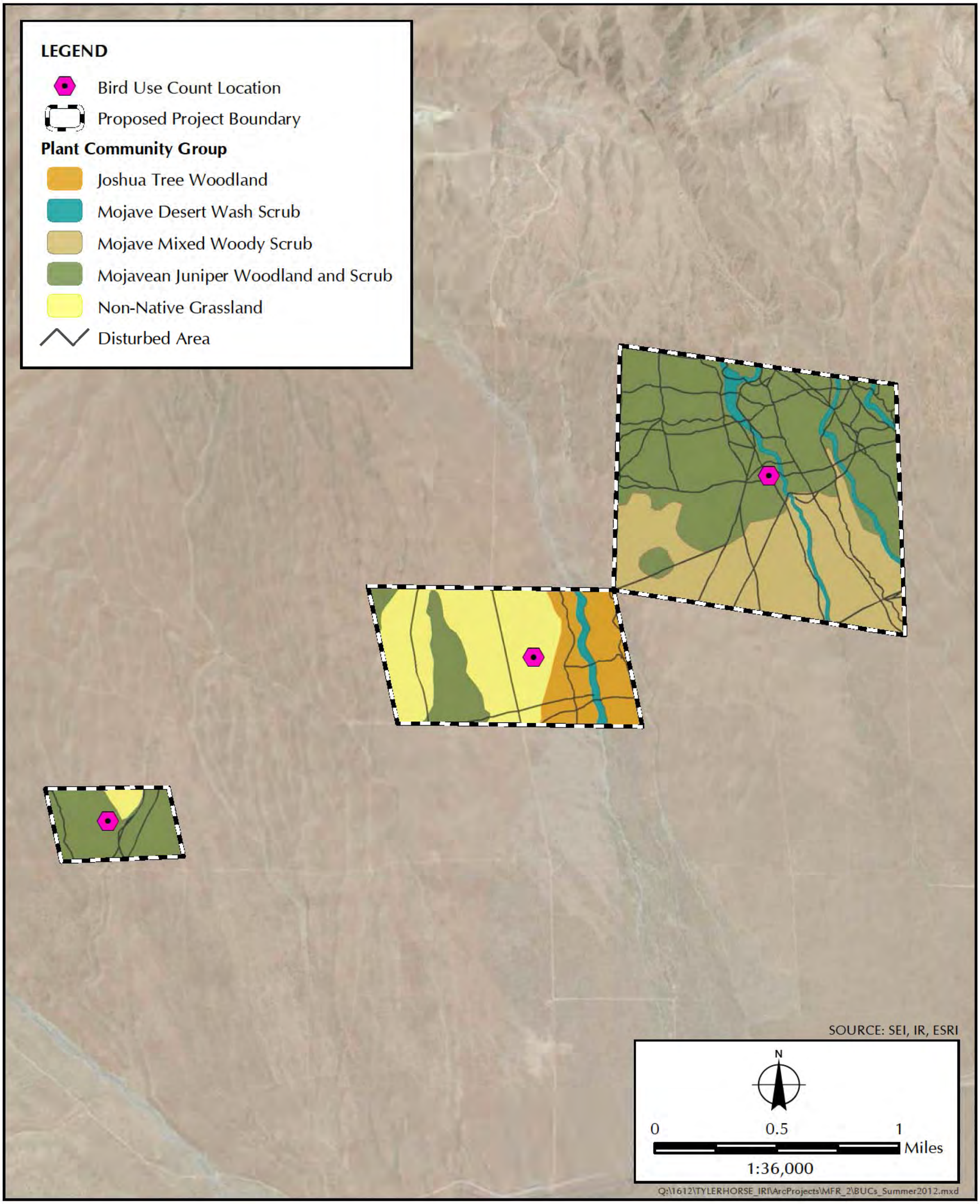
[6] California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento.

[7] California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento.



IBERDROLA RENEWABLES

FIGURE 2
Summer 2012 Bird Use Count Locations

burrows detected during spring 2012 special-status plant surveys. The fall 2011 Phase II burrow surveys and winter 2011–2012 Phase III winter occupancy burrow surveys are summarized in separate MFRs.[8,9] Phase II burrow surveys and Phase III winter burrowing owl surveys followed the *California Burrowing Owl Survey Protocol and Mitigation Guidelines*, the leading guidance on burrowing owl surveys, census, and mapping at the time of survey completion.[10] In March 2012, a new survey protocol was released by the CDFG, replacing earlier guidance.[11] Due to an initial delay in field mobilization, breeding season burrowing owl checks did not commence on the project until early June. Therefore, although surveys generally are consistent with the recommendations included in the 2012 CDFG report, an early burrow check between 15 February and April 15, as recommended in this report, was not completed. Rather, a total of four burrow checks were completed between April 15 and July 15, the peak of the burrowing owl breeding season, as initially recommended in the 1993 guidance.

A complete burrowing owl survey consisted of four site visits to each burrow. Breeding season surveys were conducted between April 15 and July 15, during the period when breeding owls are most likely to be present. Burrows were visited from 2 hours before sunset to 1 hour after or from 1 hour before sunrise to 2 hours after. Biologists observed each burrow for approximately one-half hour during each visit, taking care to avoid disturbance of owls at the potential burrows. All observed burrowing owl activity and burrowing owl sign such as excrement, pellets, or burrow decorations (or absence thereof) were recorded during each visit.

Remote cameras were also installed with a clear view of the entrances of all four burrows as a supplemental method to detect burrowing owl activity. Cameras were installed during the first burrow check on June 7, 2012, and all were removed by June 27, 2012.

Burrow occupancy status was determined based on the presence or absence of burrowing owls and/or sign. The CDFG considers burrowing owl habitat to be occupied if at least one burrowing owl, or its sign at or near a burrow entrance, has been observed within the past 3 years.[12] By this measure, all of the burrowing owl burrows found on the project and monitored during winter and summer periods are considered occupied, as owls or sign have been documented at all four burrows within the past 3 years. However, in an attempt to determine occupancy in individual seasons of activity, a comparison was made over the course of the four burrow visits. If no change was observed between the initial visit and the final visit, the burrow was considered unoccupied for that season. If burrowing owls were observed or new burrowing owl sign was observed at the burrow during at least one of the four visits, the burrow was considered occupied for that season.

Two observers (Ms. Margaret Schaap and Mr. Brian Bielfelt) conducted summer burrowing owl checks, consisting of four separate site visits for each burrow, between June 7, 2012 and July 10, 2012.

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[8] Sapphos Environmental, Inc. 2012. Memorandum for the Record No. 10. Subject: Results of Fall 2011 Protocol-level Surveys for Special-status Plants, Desert Tortoise, and Burrowing Owl for the Tylerhorse Wind Energy Project. Prepared for: enXco Development Corporation. Pasadena, CA.

[9] Sapphos Environmental, Inc. 2012. Memorandum for the Record No. 11. Subject: Results of 2011–2012 Winter Bird Use and Burrowing Owl Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: enXco Development Corporation. Pasadena, CA.

[10] California Burrowing Owl Consortium. April 1993. *California Burrowing Owl Survey Protocol and Mitigation Guidelines*. Available at: http://www.dfg.ca.gov/wildlife/nongame/docs/boconsortium.pdf

[11] California Department of Fish and Game. March 2012. *Staff Report on Burrowing Owl Mitigation*. Sacramento, CA.

[12] California Department of Fish and Game. March 2012. *Staff Report on Burrowing Owl Mitigation*. Sacramento, CA.

Determination of Migratory/Resident Status

The presence or absence of resident and migratory species was based on the known range and life cycle for each species as well as other readily available data. All resident and migratory birds, including resident, listed, sensitive, and migratory species, were assigned one of three designations for their spring status based on their distribution, abundance, and frequency of occurrence at the project property: (1) year-round resident, (2) migrant wintering on-site, and (3) migrant present during the breeding season.

Special-Status Species

Special-status listings for avian species present included those listed as threatened or endangered under the federal and California Endangered Species Acts (ESAs), USFWS Birds of Conservation Concern, CDFG Watch List species, and CDFG Species of Special Concern. USFWS Birds of Conservation Concern are priorities for conservation actions and will be considered for actions taken on federal lands pursuant to Executive Order 13186, which, as the entire project property consists of lands administered by the federal BLM, is applicable to this project.[13] CDFG Species of Special Concern are not formally protected by the State of California, but they should be taken into consideration during the environmental review process in analyzing the impacts of projects under the California Environmental Quality Act (CEQA).[14] Given that the project property lies entirely on federal lands, CEQA review, and thus consideration of CDFG Species of Special Concern, may not be applicable. The CDFG Watch List consists of birds that were once listed federally or in the State of California as threatened or endangered, or as CDFG Species of Special Concern, but that are no longer on any of these lists. It also includes California fully protected species.[15] Inclusion on the CDFG Watch List has no formal implications for listed species, and no consequences are anticipated for the project.

RESULTS

All Species

A total of 27 avian species were recorded at the project property during summer bird surveys conducted from June 7, 2012 through August 31, 2012 (Attachment A, *Avifaunal Compendium*). All of the 27 species were land birds, of which 4 species are raptors (3 diurnal raptors, 1 owl). The summer avian community included 22 resident and 5 migratory species. No raptor nests were observed within the proposed project property.

Bird Use Counts

During spring BUCs, a total of 128 individuals of 24 species were recorded during 9 days of sampling at the project property between June 7 and August 31, 2012 (Table 1). The detection rate, which can be used as an approximation of bird use, was 14.2 birds per survey-hour (Table 2, *Bird Use Count Detection Rate*).

[13] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. 2008. *Birds of Conservation Concern 2008*. Arlington, VA.

[14] *California Public Resources Code*, §§ 21000–21177.

[15] California Department of Fish and Game, Biogeographic Data Branch, California Natural Diversity Database. January 2011. *Special Animals List*. Sacramento, CA.

TABLE 2
BIRD USE COUNT DETECTION RATE

Season	Detection Rate Per Survey Hour	
	Overall	Raptors
Winter 2011 and 2012	94.8	0.33
Spring 2012	31.8	0.00
Summer 2012	14.2	0.44

Five species accounted for 63 percent of the observations. Four common resident species were the most frequently observed species: Western meadowlark (*Sturnella neglecta*) comprised 27 percent of the observations, California quail (*Carpodacus mexicanus),* comprised 10 percent of the observations, and common raven (*Corvus corax*) and house finch (*Carpodacus mexicanus*) each comprised 9 percent of the observations. Black-throated sparrow (*Amphispiza bilineata*), a common migrant species likely to breed on the project, comprised 8 percent of observations. Observations of 19 additional species accounted for the remaining 37 percent of observations.

Three raptor species were observed during BUCs: there were two observations of American kestrels (*Falco sparverius*), and one observation each of red-tailed hawk (*Buteo jamaicensis*) and prairie falcon (*Falco mexicanus*). Raptors were infrequently observed at BUC points, with an overall rate of 0.44 raptor detection per survey hour (Table 2).

Height above ground level (AGL) was recorded for each bird observed in flight during a BUC count. Of the 24 species observed during BUCs, only one, the common raven, was observed within the 200- to 400-foot altitude band that would comprise the rotor-swept zone (Figure 3, *Observed Avian Flight Heights*). Two common ravens were observed flying together at 300 feet AGL on July 20, 2012.

Reconnaissance Counts

Three additional species were detected during reconnaissance counts that were not detected during BUCs. One lesser nighthawk, a summer breeding species on the project, was observed on June 7, 2012 during a pre-dawn burrowing owl check. Lesser nighthawks are crepuscular foragers, making them infrequently detected on bird surveys. One northern flicker, a year-round resident species on the project, was observed on July 9, 2012, also during a burrowing owl check. Finally, one burrowing owl was observed during a summer burrowing owl burrow check on July 10, 2012.

Burrowing Owl Summer Burrow Checks

Three burrowing owl burrows were recorded on the proposed project property during the course of Phase II burrow surveys conducted in October 2011. An additional burrowing owl burrow on the project was recorded during special-status plant surveys conducted in spring 2012. Of the four total burrows visited during the summer breeding season to determine occupancy, burrowing owls or active sign were observed only at burrow 4, the most recently discovered burrow (Table 3, *2012 Burrowing Owl Summer Burrow Occupancy* and Figure 4, *Summer 2012 Burrowing Owl Burrow Occupancy*). A single burrowing owl flushed from this burrow on the last of four summer occupancy visits on July 10, 2012. Remote cameras, which were present on-site for approximately 3 weeks from early to late June, did not record any sign of burrowing owl occupancy at the four burrows. Two of the three burrows checked for winter occupancy in 2011–2012 were occupied

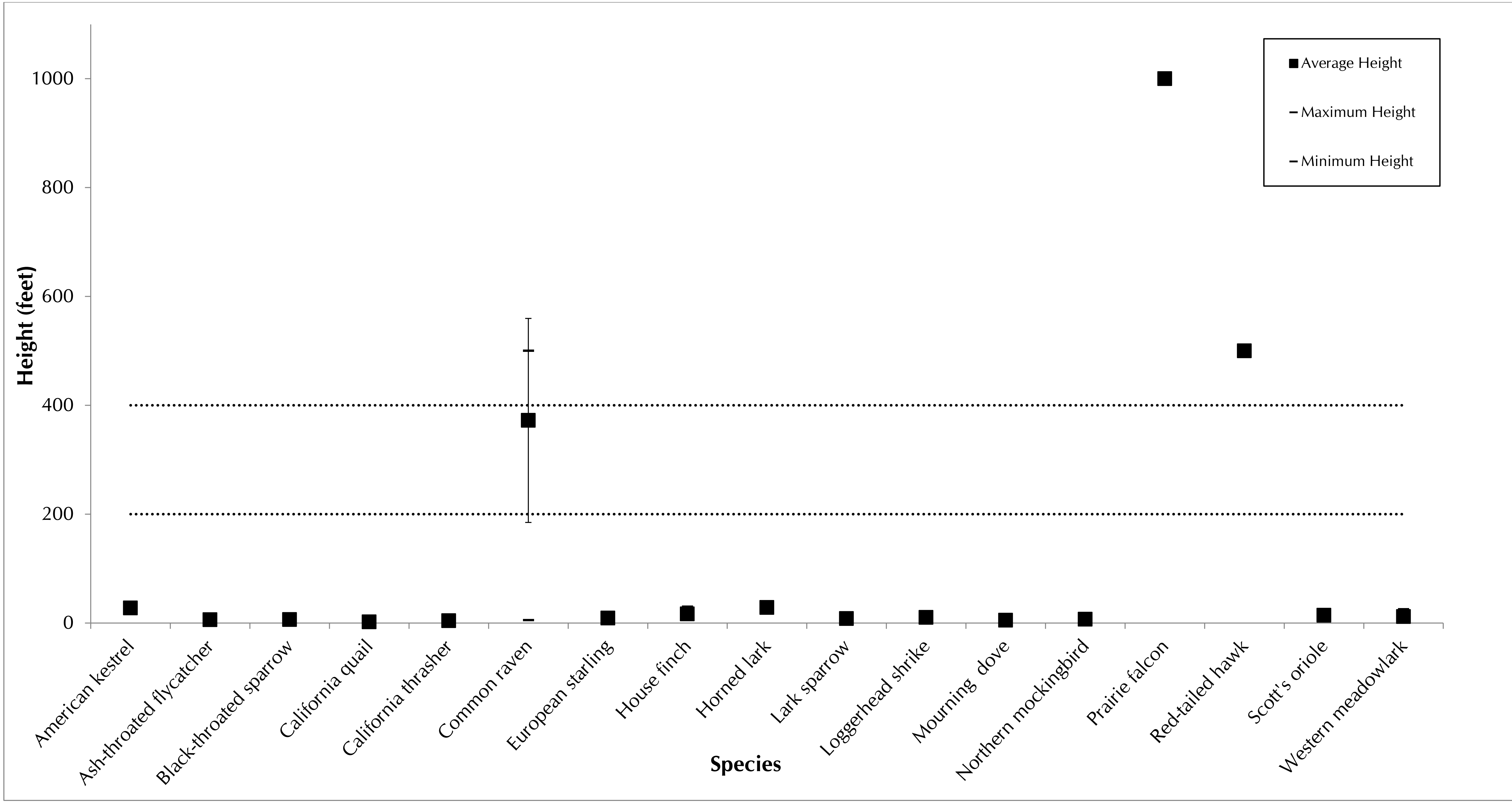
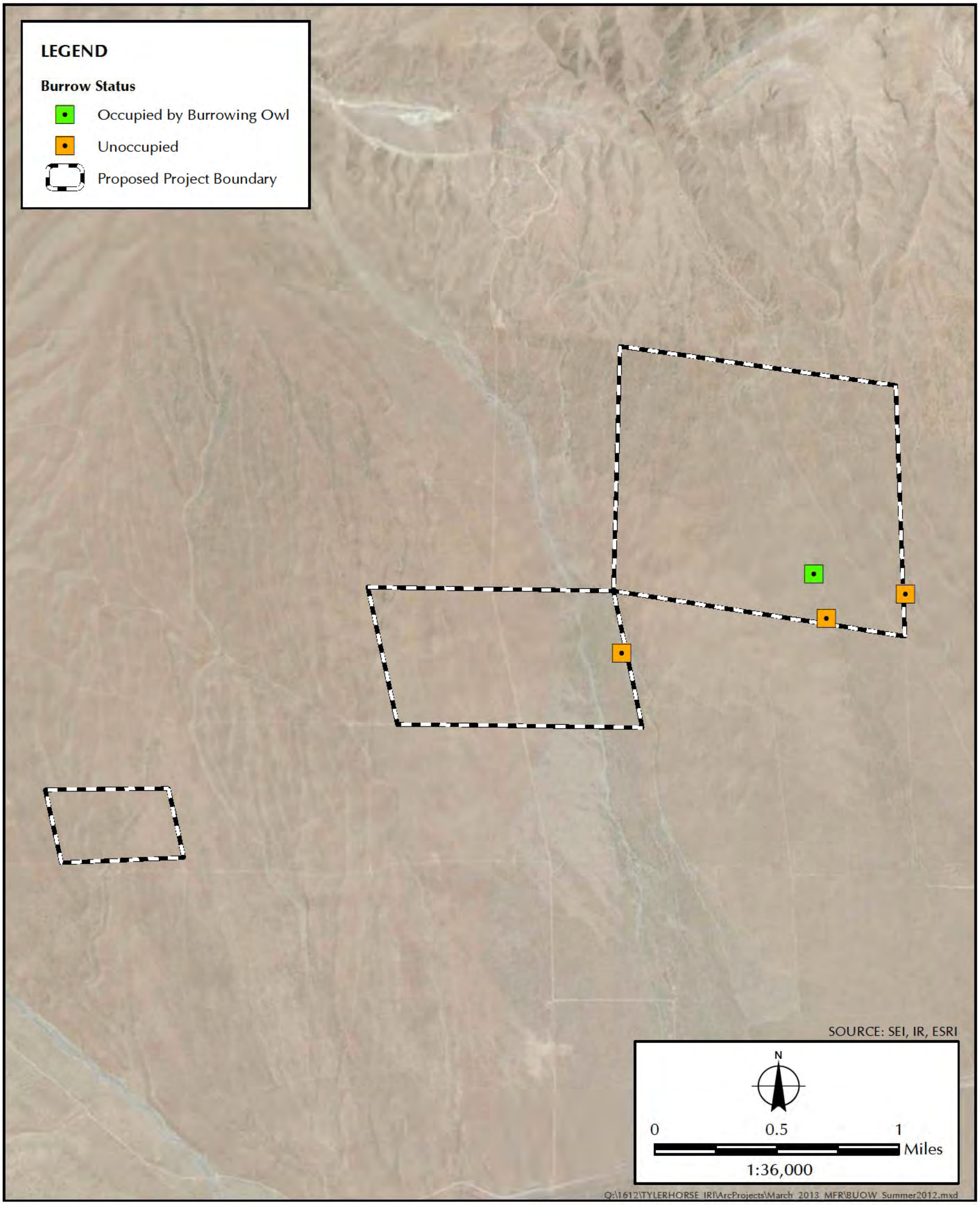


FIGURE 3
Observed Avian Flight Heights



IBERDROLA RENEWABLES

FIGURE 4

Summer 2012 Burrowing Owl Burrow Occupancy during winter, but all three burrows previously monitored in winter showed no sign of occupancy during the summer breeding season.

TABLE 3
2012 BURROWING OWL SUMMER BURROW OCCUPANCY

Name	Summer 2012 Occupancy	Number of Summer Visits Where Burrowing Owls or Sign Observed	Winter 2011–2012 Occupancy	Location (UTM Easting, Northing)
1	Unoccupied	0	Occupied	370723 E, 3867136 N
2	Unoccupied	0	Unoccupied	370203 E, 3866977 N
3	Unoccupied	0	Occupied	368852 E, 3866748 N
4	Occupied	1	NA*	370119 E, 3867268 N

NOTE: *Burrow discovered after winter 2011–2012 burrow site visits.

Special-Status Species

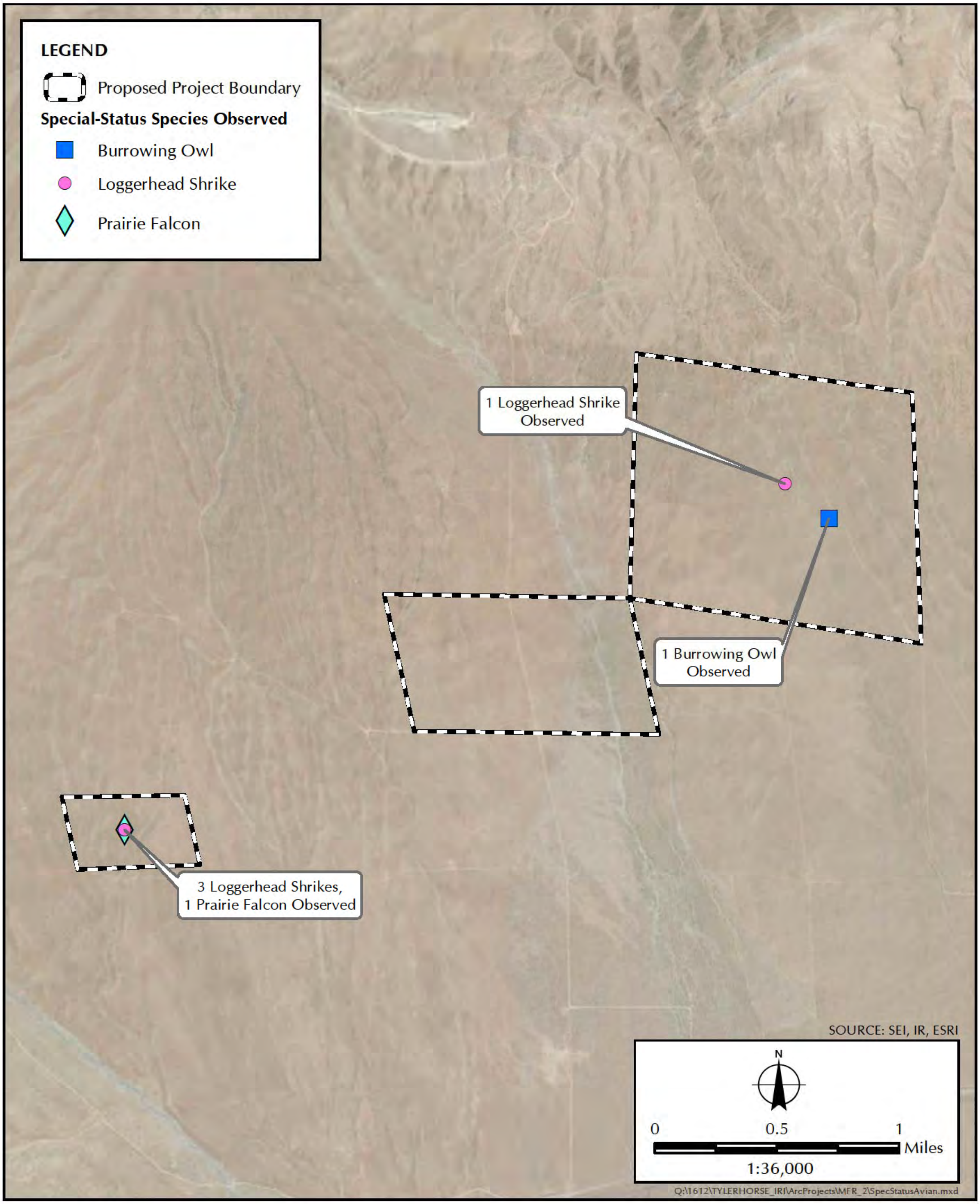
All of the native bird species observed during the summer avian surveys are protected under the Migratory Bird Treaty Act. No federally threatened, endangered, or candidate bird species were observed at the proposed project during the course of summer field surveys. Furthermore, no species listed by the State of California as threatened or endangered were observed. Three species observed on the property have additional special status: prairie falcon, burrowing owl, and loggerhead shrike (Figure 5, *Summer 2012 Special-Status Avian Species*).

DISCUSSION

All Species

During summer avian surveys, most measures of bird use were low. The species diversity at the site was low, with 27 species observed in the summer, compared to 27 species observed in winter and 43 species in spring. An average of 14.2 birds were observed per survey-hour during BUCs. This is the lowest rate yet observed on the project based on the three completed seasons of BUC surveys (Table 2). Furthermore, five species accounted for over 63 percent of the observations. The detection rate for raptors was 0.44 bird per BUC survey-hour in the summer. Although this rate was still relatively low, it was the highest experienced thus far on the project throughout three seasons of surveys (Table 2). No raptor nests were observed within the proposed project property.

The detection rate depends on a combination of factors, including the number of birds present and their activity levels. Bird detectability in the summer season is typically lower than in spring, as few species are still actively maintaining territories or feeding nestlings. In the Mojave Desert, food availability can vary substantially among years due to rainfall and temperature regimes. In a poor year, fewer birds may nest because resources within their territories may be insufficient to support breeding, and the breeding season may be shortened. Summer 2012 was preceded by a relatively dry spring and winter, and few desert annuals bloomed. In 2012, the overall avian species richness observed was low in comparison to what was detected during the spring of 2012; however, higher species diversity during spring surveys were expected due to migration.



IBERDROLA RENEWABLES

FIGURE 5

Summer 2012 Special-Status Avian Species

Special-Status Species

Prairie Falcon

The prairie falcon is listed on the CDFG Watch List and as a USFWS Bird of Conservation Concern in Bird Conservation Region (BCR) 33.[16,17] The prairie falcon is an uncommon year-round resident of many open habitats throughout California, and it is most commonly found near perennial grasslands, savannahs, rangeland, agricultural fields, and desert scrub. Prairie falcons require cliff ledges for shelter and eyrie (nest) placement; these do not occur within the project property. A single prairie falcon was observed at BUC 3 on July 20, 2012, flying at a maximum height of 1,000 feet AGL, significantly higher than the rotor-swept zone. Prairie falcons in the area might be at risk of collision with turbines; however, studies of raptor behavior have documented high raptor collision avoidance behaviors, noting that the diurnal flight of raptors may provide these birds with the ability to visually and acoustically detect turbines.[18,19] Implementation of the project may have direct and indirect impacts (loss of foraging habitat, displacement) to this species. While it is possible that small numbers of prairie falcon fatalities could occur over the life of the project, such events are expected to be rare, and impacts to the population are not expected to be signficant.

Burrowing Owl

The burrowing owl is a California Species of Special Concern, priority 2, a USFWS Bird of Conservation Concern in BCR 33, and is considered in the West Mojave Plan.[20,21,22] The burrowing owl is a grassland- and desert-inhabiting species that nests underground, usually in ground squirrel burrows. This species nests in small numbers in the Antelope Valley. Burrowing owls have sharply declined in California because of the loss of open and semiopen habitats; their largest numbers now occur in the Imperial Valley, where more than 70 percent of the statewide population is located.[23,24] Their normal range includes the desert province of eastern Kern County in native desert and agricultural habitats.[25,26]

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[16] California Department of Fish and Game, Biogeographic Data Branch, California Natural Diversity Database. January 2011. *Special Animals List*. Sacramento, CA.

[17] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. 2008. *Birds of Conservation Concern 2008*. Arlington, VA.

[18] Whitfield, D.P., and M. Madders. 2006. *A Review of the Impacts of Wind Farms on Hen Harriers Circus cyaneus and an Estimation of Collision Avoidance Rates*. Natural Research Information Note 1 (Revised). Banchory, UK: Natural Research Ltd.

[19] Chamberlain, D.E., M.R. Rehfisch, A.D. Fox, M. Desholm, and S.J. Anthony. 2006. "The Effect of Avoidance Rates on Bird Mortality Predictions Made by Wind Turbine Collision Risk Models." *Ibis*, *148*: 198–202.

[20] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

[21] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. 2008. *Birds of Conservation Concern 2008*. Arlington, VA.

[22] Bureau of Land Management. 2005. *Final Environmental Impact Report and Statement for the West Mojave Plan: A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment*. Volume 1. Available at: http://www.blm.gov/ca/st/en/fo/cdd/wemo.html

[23] Santa Cruz Predatory Bird Research Group. 10 January 2006. California Burrowing Owl Consortium. Available at: http://www2.ucsc.edu/scpbrg/statemap.htm

[24] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of*

Burrowing owls are unusual in their dependence on burrows for shelter throughout the year.[27] As the species is migratory, different individuals may be present during the breeding season (spring and summer) as compared to the nonbreeding season (fall and winter). Burrowing owls typically use or expand abandoned mammal burrows (e.g., kit fox) for breeding, but some individuals will dig their own burrows. CDFG defines a site as occupied if at least one burrowing owl has been observed occupying a burrow there within the last 3 years.[28] Because of the importance of burrows to this species, impacts to burrows known to be occupied at any point during the past 3 years should be avoided or mitigated. Burrows used in either the breeding or winter season are considered occupied for the purposes of planning avoidance or mitigation measures; however, CDFG has recently emphasized a greater importance on burrows occupied during the breeding season.[29]

Of the four burrowing owl burrows monitored for summer breeding season occupancy, only one burrow was determined to be actively occupied in the breeding season. No owls or recent sign were documented at this burrow during the three preceding visits to the burrow; nor was any activity recorded on a camera placed in view of the burrow entrance. Based on the timing of the final burrow check, the individual was likely a post-breeding adult or dispersing juvenile that was temporarily occupying the burrow. However, based on CDFG's definition of occupancy, all four burrows monitored on the site would be designated as occupied, as at least one burrowing owl, or its sign, was documented within the last 3 years.

The project's design avoids crossing any drainages, and therefore risks to this species during construction would be minimized. Implementation of the proposed action would result in the direct disturbance of a small amount of Mojave Desert Wash Scrub and Non-native Grassland, which provide foraging habitat for this species. Short-term (due to construction activity) mortality effects from the project on burrowing owls are considered unlikely to occur.

Burrowing owls normally forage at less than 100 feet AGL, and thus potential foraging heights are below the proposed rotor-swept range of wind turbines (200–400 feet AGL) in the project. Burrowing owls can be susceptible to collision mortality at small turbines with very low to low rotor-swept heights;[30] however, the project will only be utilizing larger, newer-generation turbines. No burrowing owls were killed during postconstruction mortality studies at the Tehachapi Wind Resource Area (WRA).[31] Any mortality that might occur over the project life would be at a very low

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Western Birds 1. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

25 Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

26 Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

27 Poulin, Ray, L. Danielle Todd, E.A. Haug, B.A. Millsap, and M.S. Martell. 2011. "Burrowing Owl (Athene cunicularia)." In *The Birds of North America Online*, ed. A. Poole. Ithaca, NY: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/061

28 California Department of Fish and Game. March 2012. *Staff Report on Burrowing Owl Mitigation*. Sacramento, CA.

29 California Department of Fish and Game. March 2012. *Staff Report on Burrowing Owl Mitigation*. Sacramento, CA.

30 Smallwood, K.S., C.G. Thelander, M.L. Morrison, and L.M. Rugge. 2007. "Burrowing Owl Mortality in the Altamont Pass Wind Resource Area." *Journal of Wildlife Management*, *71*: 1513–1524.

31 Anderson, R.L., J. Tom, N. Neumann, and J.A. Cleckler. 2004. *Avian Monitoring and Risk Assessment at Tehachapi Pass Wind Resource Area, California*. Sacramento, CA: California Energy Commission.

level and would not have a measurable effect on burrowing owl populations. Although the risk of collision with wind turbine generators is low, mitigation measures identified in the EIS and the Bird and Bat Conservation Strategy[32] will reduce these impacts.

Loggerhead Shrike

Loggerhead shrike is a CDFG Species of Special Concern, priority 2.[33,34] The loggerhead shrike is still fairly common in appropriate habitats in many areas of California and western North America, including the Mojave Desert.[35,36] A sharp decline of mainland populations of the loggerhead shrike occurred in parts of California, especially coastal Southern California, from 1968 to 1979, although statewide Breeding Bird Survey (BBS) trends were stable from 1980 to 2004.[37] Loggerhead shrikes are year-round residents in the Mojave Desert and may occur throughout the approximately 1,207-acre project property.

Four loggerhead shrikes were detected during BUCs, comprising 3 percent of all detections. Of these four observations, only one individual was detected in flight and was observed at approximately 10 feet AGL. The loggerhead shrike is generally not at risk of mortality from collision with wind turbines because nearly all of its foraging activities occur below 50 feet AGL. Implementation of the project may have indirect impacts (loss of nest sites, loss of foraging habitat, displacement) and may result in the loss of loggerhead shrikes at the project property. This is consistent with the conclusions reached in the BRTR and EIS.

Should there be any questions regarding the information contained in this MFR, please contact Dr. Joseph Platt or Ms. Mary Davis at (626) 683-3547.

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[32] Sapphos Environmental, Inc. 9 December 2011. *Tylerhorse Wind Energy Project Bird and Bat Conservation Strategy*. Prepared for: U.S. Fish and Wildlife Service, Ventura, CA. Pasadena, CA.

[33] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

[34] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. 2008. *Birds of Conservation Concern 2008*. Arlington, VA.

[35] Sibley, D.A. 2000. *The Sibley Guide to Birds*. New York, NY: Knopf.

[36] Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society, p. 408.

[37] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

REFERENCES

Anderson, R.L., J. Tom, N. Neumann, and J.A. Cleckler. 2004. *Avian Monitoring and Risk Assessment at Tehachapi Pass Wind Resource Area, California*. Sacramento, CA: California Energy Commission.

Bureau of Land Management. 2005. *Final Environmental Impact Report and Statement for the West Mojave Plan: A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment*. Volume 1. Available at: http://www.blm.gov/ca/st/en/fo/cdd/wemo.html

California Burrowing Owl Consortium. April 1993. *California Burrowing Owl Survey Protocol and Mitigation Guidelines*. Available at: http://www.dfg.ca.gov/wildlife/nongame/docs/boconsortium.pdf

California Department of Fish and Game, Biogeographic Data Branch, California Natural Diversity Database. January 2011. *Special Animals List*. Sacramento, CA.

California Department of Fish and Game. March 2012. *Staff Report on Burrowing Owl Mitigation*. Sacramento, CA.

California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento.

California Public Resources Code, §§ 21000–21177.

Chamberlain, D.E., M.R. Rehfisch, A.D. Fox, M. Desholm, and S.J. Anthony. 2006. "The Effect of Avoidance Rates on Bird Mortality Predictions Made by Wind Turbine Collision Risk Models." *Ibis*, *148*: 198–202.

Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society, p. 408.

Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

Poulin, Ray, L. Danielle Todd, E.A. Haug, B.A. Millsap, and M.S. Martell. 2011. "Burrowing Owl (Athene cunicularia)." In *The Birds of North America Online*, ed. A. Poole. Ithaca, NY: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/061

Santa Cruz Predatory Bird Research Group. 10 January 2006. California Burrowing Owl Consortium. Available at: http://www2.ucsc.edu/scpbrg/statemap.htm

Sapphos Environmental, Inc. 9 December 2011. *Tylerhorse Wind Energy Project Bird and Bat Conservation Strategy*. Prepared for: U.S. Fish and Wildlife Service, Ventura, CA. Pasadena, CA.

Sapphos Environmental, Inc. 2012. Memorandum for the Record No. 10. Subject: Results of Fall 2011 Protocol-level Surveys for Special-status Plants, Desert Tortoise, and Burrowing Owl for the Tylerhorse Wind Energy Project. Prepared for: enXco Development Corporation. Pasadena, CA.

Sapphos Environmental, Inc. 2012. Memorandum for the Record No. 11. Subject: Results of 2011–2012 Winter Bird Use and Burrowing Owl Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: enXco Development Corporation. Pasadena, CA.

Sapphos Environmental, Inc. March 2012. *Tylerhorse Wind Energy Project Biological Resources Technical Report*. Prepared for: Bureau of Land Management, California Desert District, Moreno Valley, CA. Pasadena, CA.

Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

Sibley, D.A. 2000. *The Sibley Guide to Birds*. New York, NY: Knopf.

Smallwood, K.S., C.G. Thelander, M.L. Morrison, and L.M. Rugge. 2007. "Burrowing Owl Mortality in the Altamont Pass Wind Resource Area." *Journal of Wildlife Management*, *71*: 1513–1524.

U.S. Fish and Wildlife Service, Division of Migratory Bird Management. 2008. *Birds of Conservation Concern 2008*. Arlington, VA.

Whitfield, D.P., and M. Madders. 2006. *A Review of the Impacts of Wind Farms on Hen Harriers Circus cyaneus and an Estimation of Collision Avoidance Rates*. Natural Research Information Note 1 (Revised). Banchory, UK: Natural Research Ltd.

ATTACHMENT A
AVIFAUNAL COMPENDIUM

AVIAN SPECIES OBSERVED AT THE PROJECT PROPERTY DURING SUMMER 2012

Family / Species	Special Status	Residency Status			Detections by Survey Type	
		Year-Round	Migrant, Winter, or Transient	Migrant, Breeding	Bird Use Count (BUC)	Reconnaissance
Odontophoridae—Partridges and Quail						
Callipepla californica California quail		+			X	
Accipitridae—Hawks, Eagles, Kites, and Harriers						
Buteo jamaicensis Red-tailed hawk		+			X	
Falconidae—Falcons						
Falco sparverius American kestrel		+			X	
Falco mexicanus Prairie falcon	CDFG WL, BCC	+			X	
Columbidae—Pigeons and Doves						
Streptopelia decaocto Eurasian collared-dove		+			X	
Zenaida macroura Mourning dove		+			X	
Cuculidae—Cuckoos						
Geococcyx californianus Greater roadrunner		+			X	
Strigidae—Owls						
Athene cunicularia Burrowing owl	CDFG SSC, BCC, WeMo	+				X
Caprimulgidae—Goatsuckers						
Chordeiles acutipennis Lesser nighthawk				+		X
Picidae—Woodpeckers						
Caloptes auratus Northern flicker		+				X
Tyrannidae—Tyrant flycatchers						
Sayornis saya Say's phoebe		+			X	
Myiarchus cinerascens Ash-throated flycatcher				+	X	
Laniidae—Shrikes						
Lanius ludovicianus Loggerhead shrike	CDFG SSC, WeMo,	+			X	

AVIAN SPECIES OBSERVED AT THE PROJECT PROPERTY DURING SUMMER 2012, *Continued*

Family / Species	Special Status	Residency Status: Year-Round	Residency Status: Migrant, Winter, or Transient	Residency Status: Migrant, Breeding	Detections by Survey Type: Bird Use Count (BUC)	Detections by Survey Type: Reconnaissance
Corvidae—Jays and Crows						
Aphelocoma californica Western scrub-jay		+			X	
Corvus corax Common raven		+			X	
Alaudidae—Larks						
Eremophila alpestris Horned lark		+			X	
Troglodytidae—Wrens						
Campylorhynchus brunneicapillus Cactus wren		+			X	
Thryomanes bewickii Bewick's wren		+			X	
Polioptilidae—Gnatcatchers						
Polioptila caerulea Blue-gray gnatcatcher			+		X	
Mimidae—Thrashers						
Mimus polyglottos Northern mockingbird		+			X	
Toxostoma redivivum California thrasher		+			X	
Sturnidae—Starlings and Mynas						
Sturnus vulgaris European starling		+			X	
Emberizidae—Buntings and Sparrows						
Chondestes grammacus Lark sparrow		+			X	
Emberizidae—Buntings and Sparrows						
Amphispiza bilineata Black-throated sparrow				+	X	
Icteridae—Blackbirds						
Sturnella neglecta Western meadowlark		+			X	
Icterus parisorum Scott's oriole				+	X	
Fringillidae—Finches						
Carpodacus mexicanus House finch		+			X	

KEY:
BCC = Bird of Conservation Concern
CDFG SSC = California Department of Fish and Game Species of Special Concern
CDFG WL = California Department of Fish and Game Watch List
WeMo = Considered under the Bureau of Land Management's West Mojave Plan

ATTACHMENT 6
MEMORANDUM FOR THE RECORD NO. 3: RESULTS OF 2012 FALL BIRD USE SURVEYS

Sapphos environmental inc.

March 12, 2013
Job Number: 1612-021
Tylerhorse Wind Energy Project

MEMORANDUM FOR THE RECORD
2.6 1612-021.M03

TO: Iberdrola Renewables, LLC
(Ms. Amy Parsons and Ms. Sara Parsons-McMahon)

FROM: Sapphos Environmental, Inc.
(Ms. Mary Davis and Dr. Joseph Platt)

SUBJECT: Results of 2012 Fall Bird Use Surveys at the Tylerhorse Wind Energy Project, Kern County, California

FIGURES:
1. Regional Vicinity Map
2. Fall 2012 Bird Use Count Locations
3. Observed Avian Flight Heights
4. Fall 2012 Special-Status Avian Species

ATTACHMENT: A. Avifaunal Compendium

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EXECUTIVE SUMMARY

This Memorandum for the Record (MFR) documents the results of survey efforts for the 2012 fall bird use surveys at the Tylerhorse Wind Energy Project (project). The project consists of three separate parcels that total approximately 1,207 acres (approximately 2 square miles) of Bureau of Land Management (BLM)–administered land located in the unincorporated territory of south-central Kern County, California. The results of the supplemental survey efforts for 2012 fall bird surveys are consistent with the results of surveys reported in the Biological Resources Technical Report (BRTR).[1] Bird use surveys were performed in accordance with the *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development* published by the California Energy Commission (CEC Guidelines).[2] Fall bird use surveys were conducted on 9 days between September 9, 2012 and November 29, 2012.

- Twenty-seven avian species were recorded at the project property as a result of all fall bird surveys. Four of the species were raptors.
- None of the 27 species recorded during bird use counts (BUCs) were observed flying within the rotor-swept zone (200–400 feet above ground level).
- No bird species listed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS) or the California Department of Fish and Wildlife (CDFW) were observed on or near the project property. Three special-status or sensitive avian species were observed on the project property:

    1. Merlin (*Falco columbarius*), a CDFW Watch List species (wintering)
    2. Prairie falcon (*Falco mexicanus*), a CDFW Watch List species (nesting) and a USFWS Bird of Conservation Concern
    3. Loggerhead shrike (*Lanius ludovicianus*), a CDFW Species of Special Concern (nesting) and considered in the BLM's West Mojave Plan

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[1] Sapphos Environmental, Inc. March 2012. *Tylerhorse Wind Energy Project Biological Resources Technical Report*. Prepared for: Bureau of Land Management, California Desert District, Moreno Valley, CA. Pasadena, CA.

[2] California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento.

INTRODUCTION

The Tylerhorse Wind Energy Project constitutes a project pursuant to the National Environmental Policy Act (NEPA), as it is located on land administered by the U.S. Department of the Interior. Acting in its capacity as a lead agency under NEPA, the BLM would need to determine the potential for the project to result in significant impacts, consider mitigation measures and alternatives capable of avoiding significant impacts, and consider the environmental effects of the project as part of its decision-making process.

Sapphos Environmental, Inc. conducted BUCs in fall 2012 within the 1,207-acre project property to confirm the conclusions reached in the BRTR and the Environmental Impact Study (EIS) for the project. In addition to supplementing earlier survey work, the purpose of the fall bird surveys is to collect baseline data on all bird species within the project property. The results of these surveys will confirm the estimation of avian diversity and numbers within the project area. Surveys during fall of 2012 constituted the fourth consecutive season of bird use surveys on the project.

PROJECT LOCATION

The project property consists of approximately 1,207 acres (approximately 2 square miles) located in the south-central portion of the unincorporated area of Kern County, California (Figure 1, *Regional Vicinity Map*). The project property is generally bordered by the Tehachapi Mountains to the north and northwest. The project property ranges in elevation from 3,480 to 3,960 feet above mean sea level.

METHODS

These supplemental field surveys were undertaken and designed to characterize the baseline conditions regarding special-status, resident, and/or migratory avian species that have the potential to be present within the project property. These special-status species include avian species designated as such in local or regional plans, policies, or regulations or by the CDFW, the BLM, and the USFWS.

The fall surveys were conducted by two Sapphos Environmental, Inc. avian biologists (Mr. Brian Bielfelt and Ms. Margaret Schaap), using a combination of directed and reconnaissance survey methods to detect the frequency of occurrence and relative abundance of fall bird species in five habitats: Joshua Tree Woodland, Mixed Mojave Woody Scrub, Mojave Desert Wash Scrub, Mojavean Juniper Woodland and Scrub, and Non-Native Grassland.

All survey personnel were knowledgeable of the CEC Guidelines for conducting avian studies in support of wind energy projects. All survey personnel were experienced in the undertaking of field surveys for special-status avian species, as well as knowledgeable of the identification and ecology of both resident and migratory avian species. All survey personnel were familiar with both federal and state statutes related to listed and sensitive avian species and their identification, in addition to being experienced with analyzing the impacts of development on special-status avian species, their habitats, and their communities. The team was equipped with standardized field notebooks and checklists for field annotations when applicable, binoculars, and aerial photographs of the project property at a scale of 1 inch equals 400 feet.

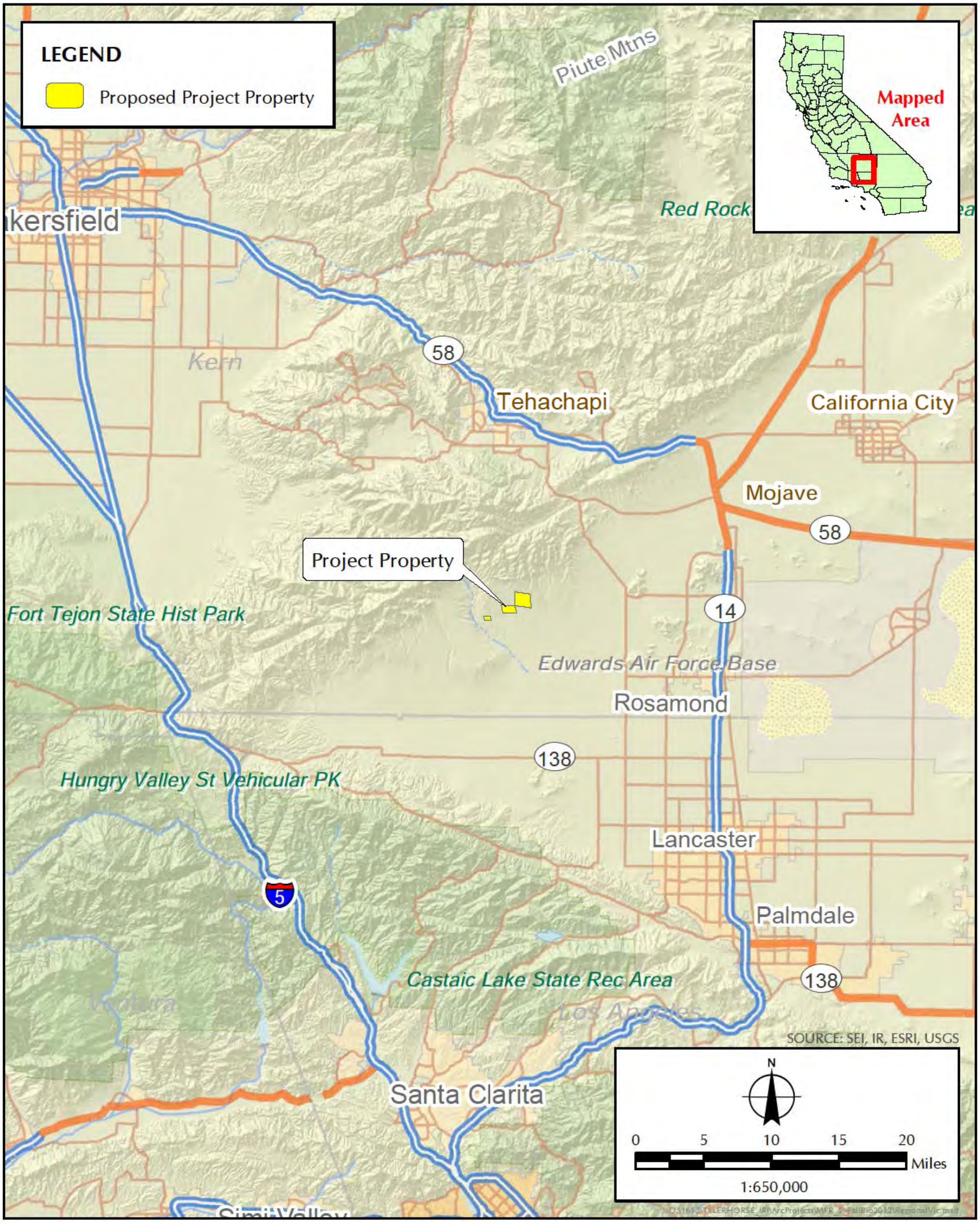

FIGURE 1

Regional Vicinity Map

The fall 2012 bird use surveys comprised two different surveys:

- BUCs: six 30-minute unlimited distance counts at each of the three points within the project property in the five main habitats
- Reconnaissance surveys: conducted opportunistically throughout the project property during survey visits

The fall BUCs were conducted from September 9 to November 29, 2012, for a total of 9 days (Table 1, *Survey Dates and Methods*).

TABLE 1
SURVEY DATES AND METHODS

Survey Dates	Bird Use Counts	Reconnaissance
September 9, 2012	X	X
September 27, 2012	X	X
October 4, 2012	X	X
October 9, 2012	X	X
October 30, 2012	X	X
October 31, 2012	X	X
November 20, 2012	X	X
November 28, 2012	X	X
November 29, 2012	X	X

Bird Use Counts

CEC Guidelines for BUCs recommend approximately 1 to 1.5 points per square mile.[3] The project property encompasses approximately 1,207 acres. Based on this recommendation, and the noncontiguous nature of the three parcels that constitute the project, three BUC points were selected as part of the survey effort (Figure 2, *Fall 2012 Bird Use Count Locations*). The number and location of these points have been proportionally distributed among the main habitat types on-site: one BUC point at the intergrade between Mojavean Juniper Woodland and Scrub and Mojave Desert Wash Scrub, one BUC point at the intergrade between Non-Native Grassland and Joshua Tree Woodland, and one BUC point in Mojavean Juniper Woodland and Scrub. When possible, BUC points were located at suitable vantage points where an unobstructed view of as much of the surrounding area as possible was provided. The exact location of each BUC point was marked using a Garmin global positioning system (GPS), and photographs were taken in each of the four cardinal directions using a digital camera.

Biologists conducted six 30-minute unlimited distance counts at each of three points within the project property to count birds in each of the five habitats. The observer surveyed each point four times in the morning and twice in the evening. Methods follow the BUC section of the CEC Guidelines.[4] Observers collected observations of the number and species of birds observed, their

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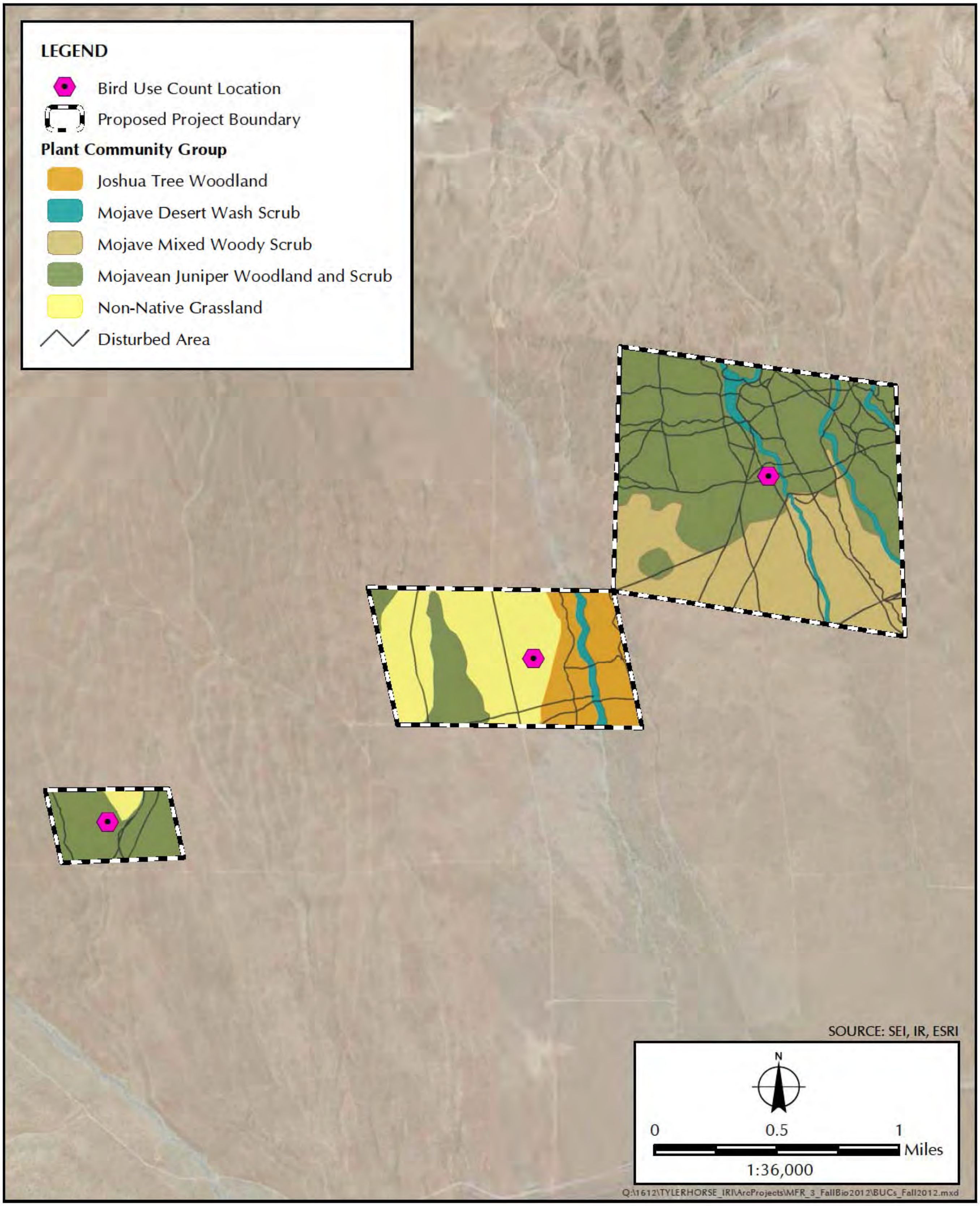
[3] California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento.

[4] California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento.



IBERDROLA RENEWABLES

FIGURE 2
Fall 2012 Bird Use Count Locations

activity, and estimated distance from the observer when necessary. For flying birds, the observer noted the bird's estimated height above the ground.

Reconnaissance Surveys

Observers conducted reconnaissance surveys throughout the project property on 9 survey days (Table 1). The reconnaissance surveys primarily focused on recording three types of observations: (1) species not observed during other survey types, (2) special-status species, and (3) raptors. Prey species for raptors, particularly black-tailed jackrabbits (*Lepus californicus*), were also recorded when observed within the project property. Observations were marked on a Garmin GPS and described in field notebooks.

Special care in all surveys was taken to avoid double-counting birds. Age and sex were determined, when possible, to distinguish individuals from one another. Temperature, estimated wind speed, wind direction, and percentage of cloud cover were recorded at the beginning and end of each observation period. Surveys were not conducted under average wind speeds greater than 20 miles per hour or in the event of sustained heavy precipitation.

The combination of both BUC and reconnaissance surveys, in all five habitats, resulted in 100 percent visual and/or aural coverage of the project property during fall bird surveys.

Determination of Migratory/Resident Status

The presence or absence of resident and migratory species was based on the known range and life cycle for each species as well as other readily available data. All resident and migratory birds, including resident, listed, sensitive, and migratory species, were assigned one of three designations for their spring status based on their distribution, abundance, and frequency of occurrence at the project property: (1) year-round resident, (2) migrant wintering on-site, and (3) migrant present during the breeding season.

Special-Status Species

Special-status listings for avian species present included those listed as threatened or endangered under the federal and California Endangered Species Acts (ESAs), USFWS Birds of Conservation Concern, CDFW Watch List species, and CDFW Species of Special Concern. USFWS Birds of Conservation Concern are priorities for conservation actions and will be considered for actions taken on federal lands pursuant to Executive Order 13186, which, as the entire project property consists of lands administered by the federal BLM, is applicable to this project.[5] CDFW Species of Special Concern are not formally protected by the State of California, but they should be taken into consideration during the environmental review process in analyzing the impacts of projects under the California Environmental Quality Act (CEQA).[6] Given that the project property lies entirely on federal lands, CEQA review, and thus consideration of CDFW Species of Special Concern, may not be applicable. The CDFW Watch List consists of birds that were once listed federally or in the State of California as threatened or endangered, or as CDFW Species of Special Concern, but that are no

[5] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. 2008. *Birds of Conservation Concern 2008*. Arlington, VA.

[6] *California Public Resources Code*, §§ 21000–21177.

longer on any of these lists. It also includes California fully protected species.[7] Inclusion on the CDFW Watch List has no formal implications for listed species, and no consequences are anticipated for the project.

RESULTS

All Species

A total of 27 avian species were recorded at the project property during fall bird surveys conducted from September 9, 2012 through November 29, 2012 (Attachment A, *Avifaunal Compendium*). All of the 27 species were land birds, of which 4 species are diurnal raptors. The fall avian community included 19 resident and 8 migratory species.

Bird Use Counts

During fall BUCs, a total of 458 individuals of 27 species were recorded, 453 individuals of which were identified to species. Five individuals could not be identified to species; therefore, they were identified to the highest possible taxonomic level (e.g., unknown sparrow and hummingbird species). The detection rate, which can be used as an approximation of bird use, was 50.3 birds per survey-hour (Table 2, *Bird Use Count Detection Rate*).

TABLE 2
BIRD USE COUNT DETECTION RATE

	Detection Rate Per Survey Hour	
Season	**Overall**	**Raptors**
Winter 2011–2012	94.8	0.33
Spring 2012	31.8	0.00
Summer 2012	14.2	0.44
Fall 2012	50.3	0.56

One species, the house finch (*Carpodacus mexicanus*), a resident species that gathers in large flocks in fall, accounted for 72 percent of the observations. In all, seven species comprised 92 percent of all observations. Besides the house finch, this included four common resident species and two migrant species. Of the resident species, lark sparrow (*Chondestes grammacus*) comprised 8 percent of the observations; and common raven (*Corvus corax*), Western meadowlark (*Sturnella neglecta*), and northern flicker (*Caloptes auratus*) each comprised 2 percent of the observations. Of the migrant species, dark-eyed junco (*Junco hyemalis*) comprised 2 percent of the observations and mountain bluebird (*Sialia currucoides*) comprised 4 percent of observations. Observations of 20 additional species accounted for the remaining 8 percent of observations.

Four raptor species were observed during BUCs: there were two observations of red-tailed hawk (*Buteo jamaicensis*), and one observation each of merlin (*Falco columbarius*), northern harrier (*Circus cyaneus*), and prairie falcon (*Falco mexicanus*). Raptors were infrequently observed at BUC points, with an overall rate of 0.56 raptor detection per survey hour (Table 2).

[7] California Department of Fish and Game, Biogeographic Data Branch, California Natural Diversity Database. January 2011. *Special Animals List*. Sacramento, CA.

Height above ground level (AGL) was recorded for each bird observed in flight during a BUC count. Of the 27 species observed during BUCs, no individuals were detected within the 200- to 400-foot altitude band that would comprise the rotor-swept zone (Figure 3, *Observed Avian Flight Heights*).

Reconnaissance Counts

No additional avian species were detected during reconnaissance counts that were not detected during BUCs.

Special-Status Species

All of the native bird species observed during the fall avian surveys are protected under the Migratory Bird Treaty Act. No federally threatened, endangered, or candidate bird species were observed at the proposed project during the course of fall field surveys. Furthermore, no species listed by the State of California as threatened or endangered were observed. Three species observed on the property have additional special status: merlin, prairie falcon, and loggerhead shrike (Figure 4, *Fall 2012 Special-Status Avian Species*).

DISCUSSION

All Species

During fall avian surveys, most measures of bird use were moderate. The species diversity at the site was low, with 27 species observed in the fall, compared to 27 species observed in summer and winter and 43 species in spring. An average of 50.3 birds were observed per survey-hour during BUCs. This is the second highest rate yet observed on the project based on the four completed seasons of BUC surveys (Table 2). Although observation rates were higher than in spring and summer 2012, only seven species accounted for approximately 92 percent of the observations. The detection rate for raptors was 0.56 bird per BUC survey-hour in the fall. Although this rate was still relatively low, it was the highest experienced thus far on the project throughout four seasons of surveys (Table 2).

The detection rate depends on a combination of factors, including the number of birds present and their activity levels. Bird passage rates in the fall season are typically higher than in summer, as fall migration brings species that breed in more northerly climates that possibly winter, or pass through, the Mojave desert. Many resident species also gather in large flocks during the fall and winter periods. This may explain the higher detection rates recorded on the project property in the fall, as over 72 percent of observations were of house finches, which were observed in groups of up to 80 individuals.

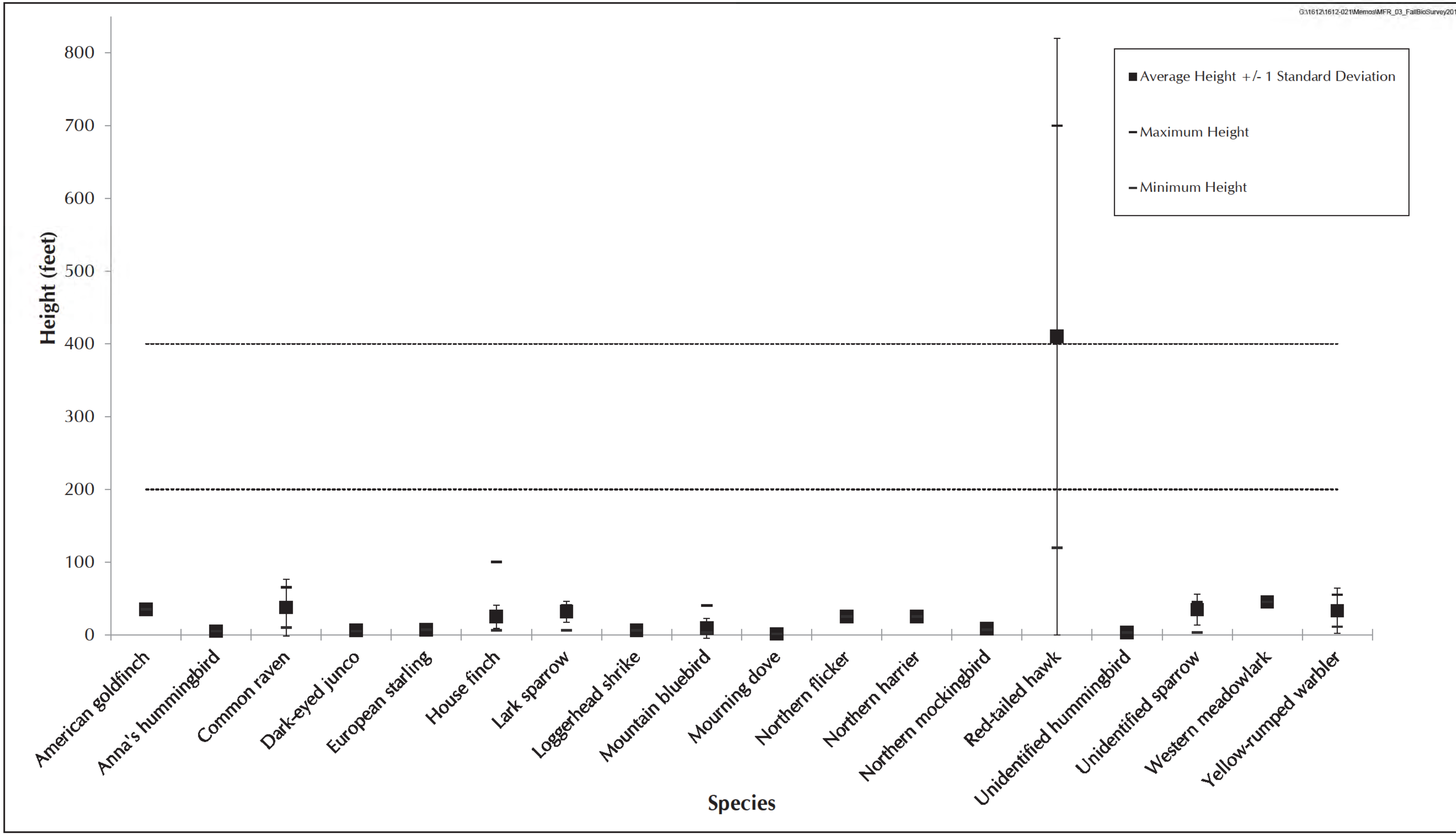
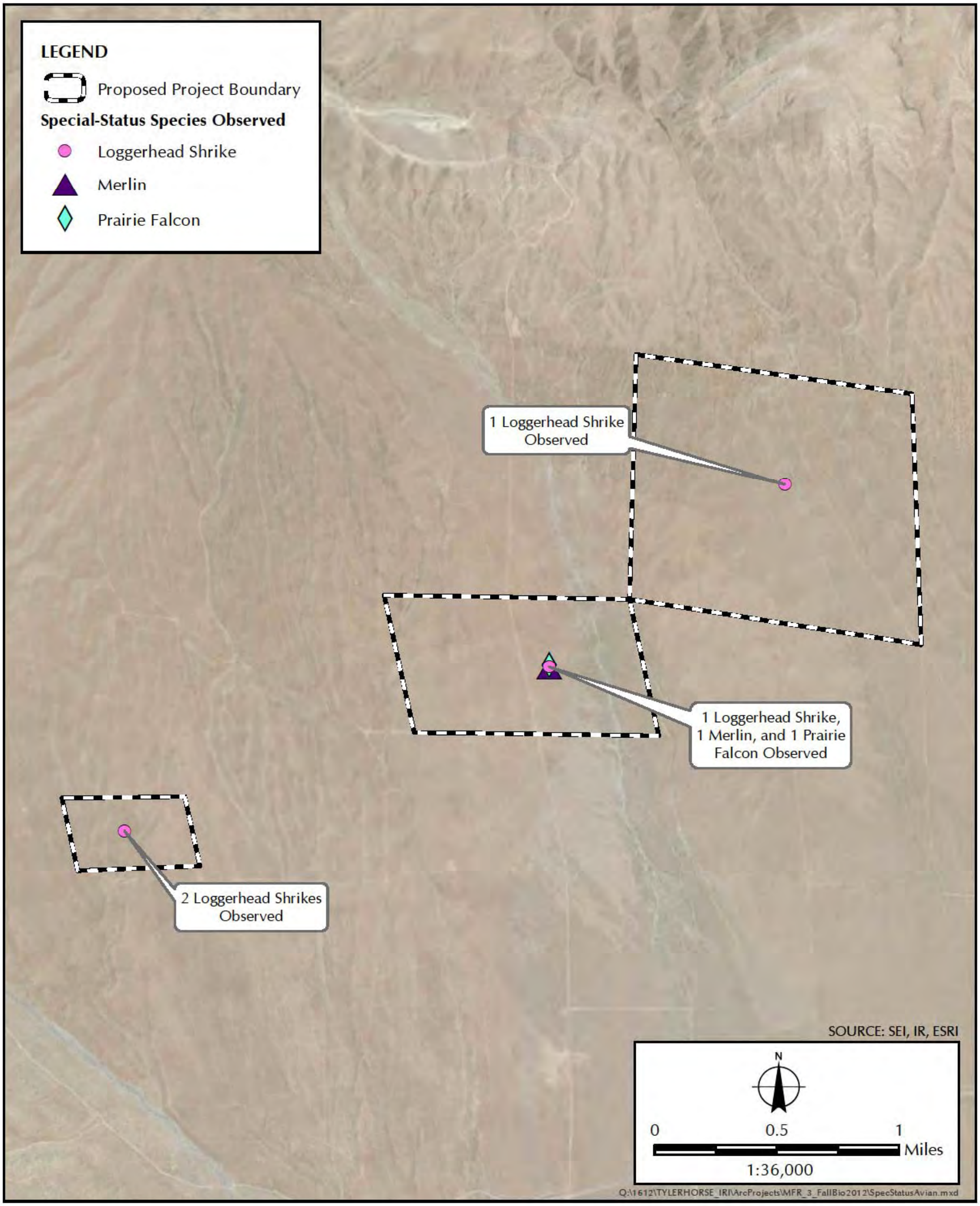


FIGURE 3
Observed Avian Flight Heights



IBERDROLA RENEWABLES

FIGURE 4

Fall 2012 Special-Status Avian Species

Special-Status Species

Merlin

The merlin is a CDFW Watch List species and an uncommon migrant and winter visitor in appropriate habitat throughout California, including the Antelope Valley and eastern Kern County.[8,9,10,11] All approximately 1,207 acres of the project property constitute suitable foraging habitat for the merlin in winter or during migration. One individual was observed perched within the project site for approximately 10 minutes during a BUC count at point 2 on October 30, 2012 (Figure 4). Merlins typically hunt from a perch where they can scan for prey, and hunting flights are typically below treetop level or close to the ground; thus, foraging flights would be expected to be below the rotor-swept zone of wind turbines (200–400 feet AGL) in the project.[12] This species likely flies higher during migration; thus, flight heights can reach the proposed rotor-swept range of wind turbines. Due to this species' foraging habits and the paucity of observations on the project site, mortality risk due to collision with wind turbines is likely to be low. Implementation of the project may have indirect impacts (loss of foraging habitat) on merlin foraging in or migrating through the project study area.

Prairie Falcon

The prairie falcon is listed on the CDFW Watch List and as a USFWS Bird of Conservation Concern in Bird Conservation Region (BCR) 33.[13,14] The prairie falcon is an uncommon year-round resident of many open habitats throughout California, and it is most commonly found near perennial grasslands, savannahs, rangeland, agricultural fields, and desert scrub. Prairie falcons require cliff ledges for shelter and eyrie (nest) placement; these do not occur within the project property. A single prairie falcon was observed at BUC 2 on November 20, 2012 (Figure 4), flying at a maximum height of 9 feet AGL, significantly lower than the rotor-swept zone. Prairie falcons in the area might be at risk of collision with turbines; however, studies of raptor behavior have documented high raptor collision avoidance behaviors, noting that the diurnal flight of raptors may provide these birds with the ability to visually and acoustically detect turbines.[15,16] Implementation of the project may have direct and indirect impacts (loss of foraging habitat, displacement) to this species. While it is possible that small numbers of prairie falcon fatalities could occur over the life

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[8] Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society, p. 408.

[9] Schram, B. 1998. *A Birder's Guide to Southern California*. Colorado Springs, CO: American Birding Association, p. 334.

[10] Sibley, D.A. 2000. *The Sibley Guide to Birds*. New York, NY: Knopf.

[11] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

[12] Warkentin, I.G., N.S. Sodhi, R.H. M. Espie, Alan F. Poole, L.W. Oliphant, and P.C. James. 2005. "Merlin (Falco columbarius)." In *The Birds of North America Online*, ed. A. Poole. Ithaca, NY: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/044

[13] California Department of Fish and Game, Biogeographic Data Branch, California Natural Diversity Database. January 2011. *Special Animals List*. Sacramento, CA.

[14] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. 2008. *Birds of Conservation Concern 2008*. Arlington, VA.

[15] Whitfield, D.P., and M. Madders. 2006. *A Review of the Impacts of Wind Farms on Hen Harriers Circus cyaneus and an Estimation of Collision Avoidance Rates*. Natural Research Information Note 1 (Revised). Banchory, UK: Natural Research Ltd.

[16] Chamberlain, D.E., M.R. Rehfisch, A.D. Fox, M. Desholm, and S.J. Anthony. 2006. "The Effect of Avoidance Rates on Bird Mortality Predictions Made by Wind Turbine Collision Risk Models." *Ibis*, *148*: 198–202.

of the project, such events are expected to be rare, and impacts to the population are not expected to be significant.

Loggerhead Shrike

Loggerhead shrike is a CDFW Species of Special Concern, priority 2 and is considered in the BLM's West Mojave Plan.[17,18] The loggerhead shrike is still fairly common in appropriate habitats in many areas of California and western North America, including the Mojave Desert.[19,20] A sharp decline of mainland populations of the loggerhead shrike occurred in parts of California, especially coastal Southern California, from 1968 to 1979, although statewide Breeding Bird Survey (BBS) trends were stable from 1980 to 2004.[21] Loggerhead shrikes are year-round residents in the Mojave Desert and may occur throughout the approximately 1,207-acre project property.

Four loggerhead shrikes were detected during BUCs, comprising 1 percent of all detections (Figure 4). Of these four observations, only one individual was detected in flight and was observed at approximately 6 feet AGL. The loggerhead shrike is generally not at risk of mortality from collision with wind turbines because nearly all of its foraging activities occur below 50 feet AGL. Implementation of the project may have indirect impacts (loss of nest sites, loss of foraging habitat, displacement) and may result in the loss of loggerhead shrikes at the project property.

Should there be any questions regarding the information contained in this MFR, please contact Dr. Joseph Platt or Ms. Mary Davis at (626) 683-3547.

REFERENCES

Bureau of Land Management. 2005. *Final Environmental Impact Report and Statement for the West Mojave Plan: A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment*. Volume 1. Available at: http://www.blm.gov/ca/st/en/fo/cdd/wemo.html

California Department of Fish and Game, Biogeographic Data Branch, California Natural Diversity Database. January 2011. *Special Animals List*. Sacramento, CA.

California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento.

[17] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

[18] Bureau of Land Management. 2005. *Final Environmental Impact Report and Statement for the West Mojave Plan: A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment*. Volume 1. Available at: http://www.blm.gov/ca/st/en/fo/cdd/wemo.html

[19] Sibley, D.A. 2000. *The Sibley Guide to Birds*. New York, NY: Knopf.

[20] Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society, p. 408.

[21] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

California Public Resources Code, §§ 21000–21177.

Chamberlain, D.E., M.R. Rehfisch, A.D. Fox, M. Desholm, and S.J. Anthony. 2006. "The Effect of Avoidance Rates on Bird Mortality Predictions Made by Wind Turbine Collision Risk Models." *Ibis*, *148*: 198–202.

Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society.

Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

Sapphos Environmental, Inc. March 2012. *Tylerhorse Wind Energy Project Biological Resources Technical Report*. Prepared for: Bureau of Land Management, California Desert District, Moreno Valley, CA. Pasadena, CA.

Schram, B. 1998. *A Birder's Guide to Southern California*. Colorado Springs, CO: American Birding Association, p. 334.

Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

Sibley, D.A. 2000. *The Sibley Guide to Birds*. New York, NY: Knopf.

U.S. Fish and Wildlife Service, Division of Migratory Bird Management. 2008. *Birds of Conservation Concern 2008*. Arlington, VA.

Warkentin, I.G., N.S. Sodhi, R.H. M. Espie, Alan F. Poole, L.W. Oliphant, and P.C. James. 2005. "Merlin (Falco columbarius)." In *The Birds of North America Online*, ed. A. Poole. Ithaca, NY: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/044

Whitfield, D.P., and M. Madders. 2006. *A Review of the Impacts of Wind Farms on Hen Harriers Circus cyaneus and an Estimation of Collision Avoidance Rates*. Natural Research Information Note 1 (Revised). Banchory, UK: Natural Research Ltd.

ATTACHMENT A
AVIFAUNAL COMPENDIUM

ATTACHMENT A
AVIFAUNAL COMPENDIUM

AVIAN SPECIES OBSERVED AT THE PROJECT PROPERTY DURING FALL 2012

Family / Species	Special Status	Residency Status: Year-Round	Residency Status: Migrant, Winter, or Transient	Residency Status: Migrant, Breeding	Detections by Survey Type: Bird Use Count (BUC)	Detections by Survey Type: Reconnaissance
Accipitridae—Hawks, Eagles, Kites, and Harriers						
Circus cyaneus Northern harrier		+			X	
Buteo jamaicensis Red-tailed hawk		+			X	
Falconidae—Falcons						
Falco columbarius Merlin	CDFW WL		+		X	
Falco mexicanus Prairie falcon	CDFW WL, BCC	+			X	
Columbidae—Pigeons and Doves						
Zenaida macroura Mourning dove		+			X	
Trochilidae—Hummingbirds						
Calypte anna Anna's hummingbird		+			X	
Picidae—Woodpeckers						
Caloptes auratus Northern flicker		+			X	
Tyrannidae—Tyrant Flycatchers						
Sayornis saya Say's phoebe		+			X	
Laniidae—Shrikes						
Lanius ludovicianus Loggerhead shrike	CDFW SSC, WeMo,	+			X	
Corvidae—Jays and Crows						
Aphelocoma californica Western scrub-jay		+			X	
Corvus corax Common raven		+			X	
Alaudidae—Larks						
Eremophila alpestris Horned lark		+			X	
Troglodytidae—Wrens						
Campylorhynchus brunneicapillus Cactus wren		+			X	
Thryomanes bewickii Bewick's wren		+			X	
Troglodytes aedon House wren		+			X	

AVIAN SPECIES OBSERVED AT THE PROJECT PROPERTY DURING FALL 2012, *Continued*

Family / Species	Special Status	Residency Status			Detections by Survey Type	
		Year-Round	Migrant, Winter, or Transient	Migrant, Breeding	Bird Use Count (BUC)	Reconnaissance
Polioptilidae—Gnatcatchers						
Polioptila caerulea Blue-gray gnatcatcher			+		X	
Regulidae—Kinglets						
Regulus calendula Ruby-crowned kinglet			+		X	
Sylviidae—Wrentit						
Chamaea fasciata Wrentit			+		X	
Turdidae—Thrushes						
Sialia currucoides Mountain bluebird			+		X	
Mimidae—Thrashers						
Mimus polyglottos Northern mockingbird		+			X	
Sturnidae—Starlings and Mynas						
Sturnus vulgaris European starling		+			X	
Parulidae—Wood-Warblers						
Setophaga coronata Yellow-rumped warbler			+		X	
Emberizidae—Buntings and Sparrows						
Chondestes grammacus Lark sparrow		+			X	
Junco hyemalis Dark-eyed junco			+		X	
Icteridae—Blackbirds						
Sturnella neglecta Western meadowlark		+			X	
Fringillidae—Finches						
Carpodacus mexicanus House finch		+			X	
Spinus tristis American goldfinch			+		X	

KEY:
BCC = Bird of Conservation Concern
CDFW SSC = California Department of Fish and Game Species of Special Concern
CDFW WL = California Department of Fish and Game Watch List
WeMo = Considered under the Bureau of Land Management's West Mojave Plan

APPENDIX C-3
Addendum No. 2 to the Biological Resources Technical Report for the Tylerhorse Wind Energy Project

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Sapphos environmental inc.

March 28, 2014
Job Number: 1612-028
Tylerhorse Wind Energy Project

MEMORANDUM FOR THE RECORD
2.6 1612-028.M03

TO: U.S. Department of the Interior, Bureau of Land Management, (Mr. Cedric Perry, Ms. Lynnette Elser, and Ms. Kim Marsden)

FROM: Sapphos Environmental, Inc. (Ms. Mary Davis and Ms. Marie Campbell)

SUBJECT: Addendum No. 2 to the Biological Resources Technical Report for the Tylerhorse Wind Energy Project in Kern County, California

FIGURES:
1. Project Location Map
2. Conceptual Site Plan
3. Typical Wind Turbine Site Work Area and Pads
4. Plant Community Map
5. Proposed Access Roads in Relation to Ephemeral Drainages

INTRODUCTION

This Memorandum for the Record (MFR) serves as Addendum No. 2 to the Biological Resources Technical Report (BRTR) and reflects refinements to the project description and ground disturbance impact area for the Tylerhorse Wind Energy Project (proposed action) as contemplated by the Applicant in updates to the proposed Plan of Development. These impact changes reflect empirical data for the scale of temporary and permanent ground disturbance impacts necessary for the construction of renewable energy projects in Kern County, between 2007 and 2013. This addendum to the BRTR provides qualitative and quantitative assessments to biological resources that would result from the proposed refinements, particularly the potential for direct and indirect effects on plant communities. The refinements do not affect the key elements of the Applicant's proposed action in relation to the anticipated total megawatts (MW) of wind generating capacity or the range of turbines under consideration to achieve the development objectives. The analysis contained in this addendum to the BRTR supersedes and replaces the quantitative analysis of direct temporary and permanent impacts to plant communities based on earlier interim versions of the proposed action originally presented in the 2011 BRTR. The analysis and conclusion of potential operational effects to other biological resources in the BRTR, such as waters and wetlands and wildlife, both general and those species considered special-status, remain consistent despite the increase in ground disturbance impacts. Regional cumulative impacts remain unchanged as the generating capacity and range and size of turbines has not been affected by the Applicant's refinements to the proposed action.

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PROJECT DESCRIPTION

Heartland Wind, LLC (Heartland), a wholly-owned subsidiary of Iberdrola Renewables, LLC, proposes to develop a commercial wind-generating facility, pursuant to a right-of-way (ROW) permit from the U.S. Department of the Interior, Bureau of Land Management (BLM). As described in the Plan of Development, the proposed action would be located on 1,207 acres of BLM-administered lands, located immediately adjacent to two existing wind farms in operation on privately owned lands in Kern County, one operated by the Applicant, and a second wind farm operated by another commercial enterprise. The proposed action would be located approximately 15 miles west of California State Highway 14 (Antelope Valley Freeway), 12.5 miles south of California State Highway 58 (Blue State Memorial Highway), and 8 miles north of State Route 138 (West Avenue D) in southern Kern County, California (Figure 1, *Project Location Map*). The proposed action would consist of up to 40 wind turbine generators of 1.5 to 3 megawatts (MW) generating capacity per turbine, with an anticipated total generating capacity of up to 60 MW. To exploit economies of scale and reduce environmental impacts, the proposed action would use the ancillary facilities entitled for the adjacent Manzana (formerly PdV) Wind Energy Project (Manzana Project), Pacific Wind Energy Project (Pacific Wind Project), and Catalina Renewable Energy Project (Catalina Project), separate projects previously approved by the Kern County Board of Supervisors (Figure 1).

The principal components of the proposed action include:

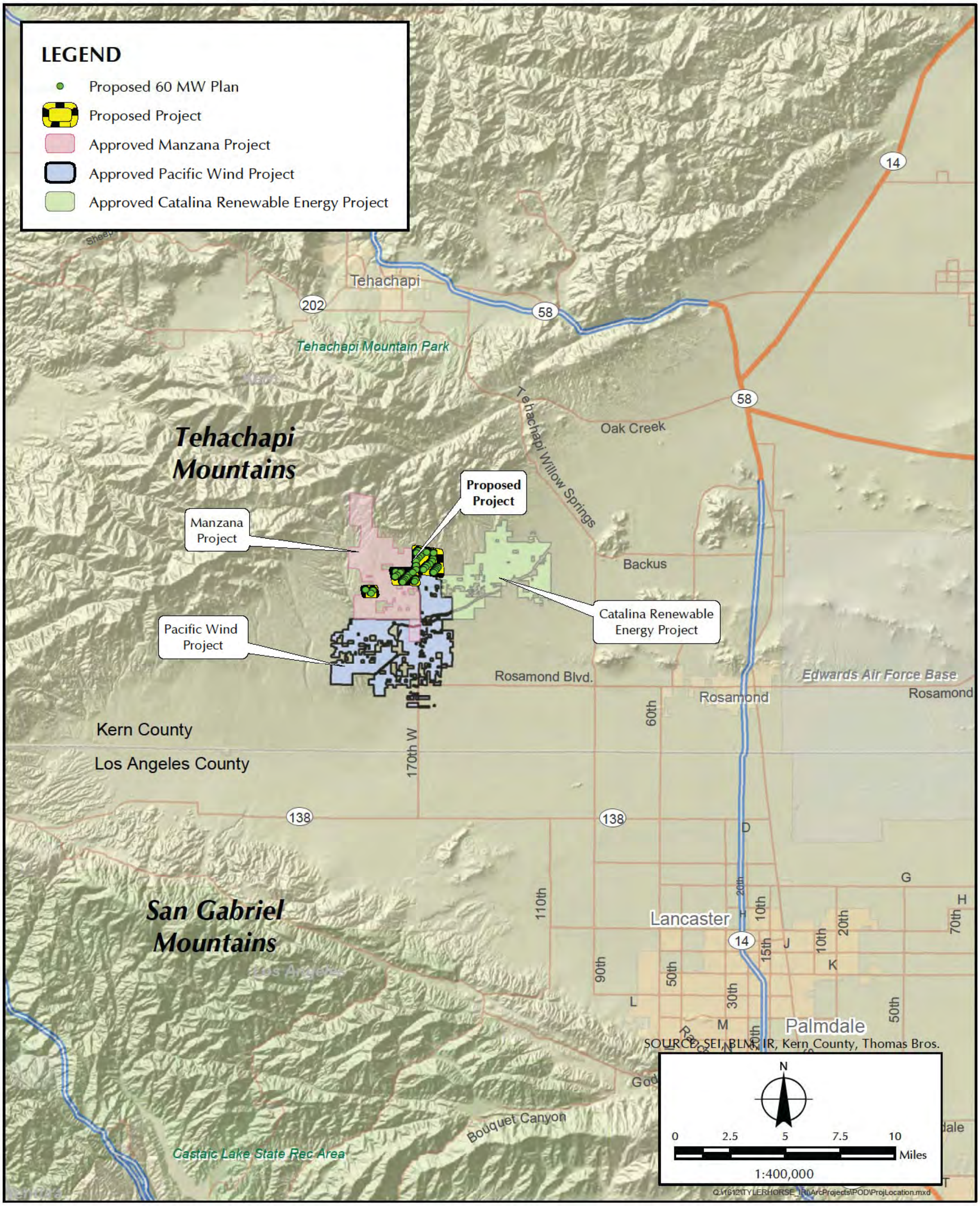
- Up to 40 wind turbine generators
- A 34.5-kV electrical collection system linking each turbine to an off-site substation previously permitted by Kern County
- An access road system avoiding any streambed crossings
- Supervisory control and data acquisition (SCADA) system and fiber optic communications

Subsequent to the finalization of the BRTR in December 2011, the conceptual layout of the proposed action was updated, though the principal components described above remained the same (Figure 2, *Conceptual Site Plan*). In March 2014, Heartland further updated the ground disturbance impact areas, while maintaining the conceptual layout of wind turbines and roads, to allow for greater flexibility during construction (Figure 3, *Typical Wind Turbine Site Work Area and Pads*).

The main changes to the impact areas include:

- The 15- to 18-foot-diameter wind turbine towers would be mounted on concrete foundations approximately 50 feet in diameter and would each occupy an approximately 55-foot by 40-foot permanent graveled pad.
- All tower structures, foundations, and pads would occur within each turbine's 220-foot-radius temporary work area
- Turbine connector roads would be tangential to the permanent wind tower pads and would have a permanent travel width of 20 feet and a road base or gravel surface. The total road width would be 36 feet, with 8 feet on either side to be reseeded but retained for future use, as needed.
- Collector lines would be installed within a 14-foot corridor along one side of the turbine access roads.

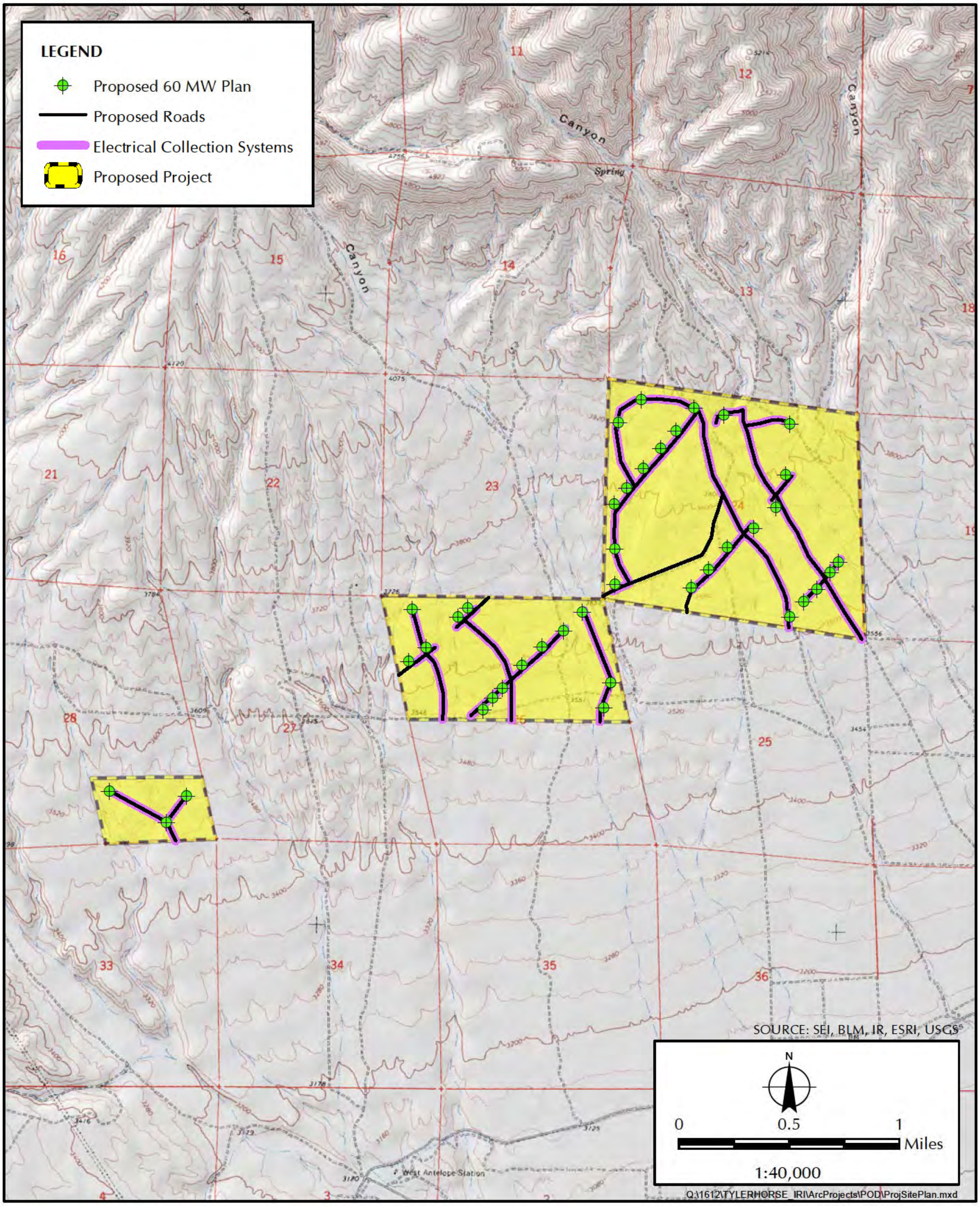
Temporary disturbance related to construction is estimated at approximately 171.1 acres, amounting to approximately 14 percent of the ROW area (Table 1, *Approximate Limits of Temporary and Permanent*



IBERDROLA RENEWABLES

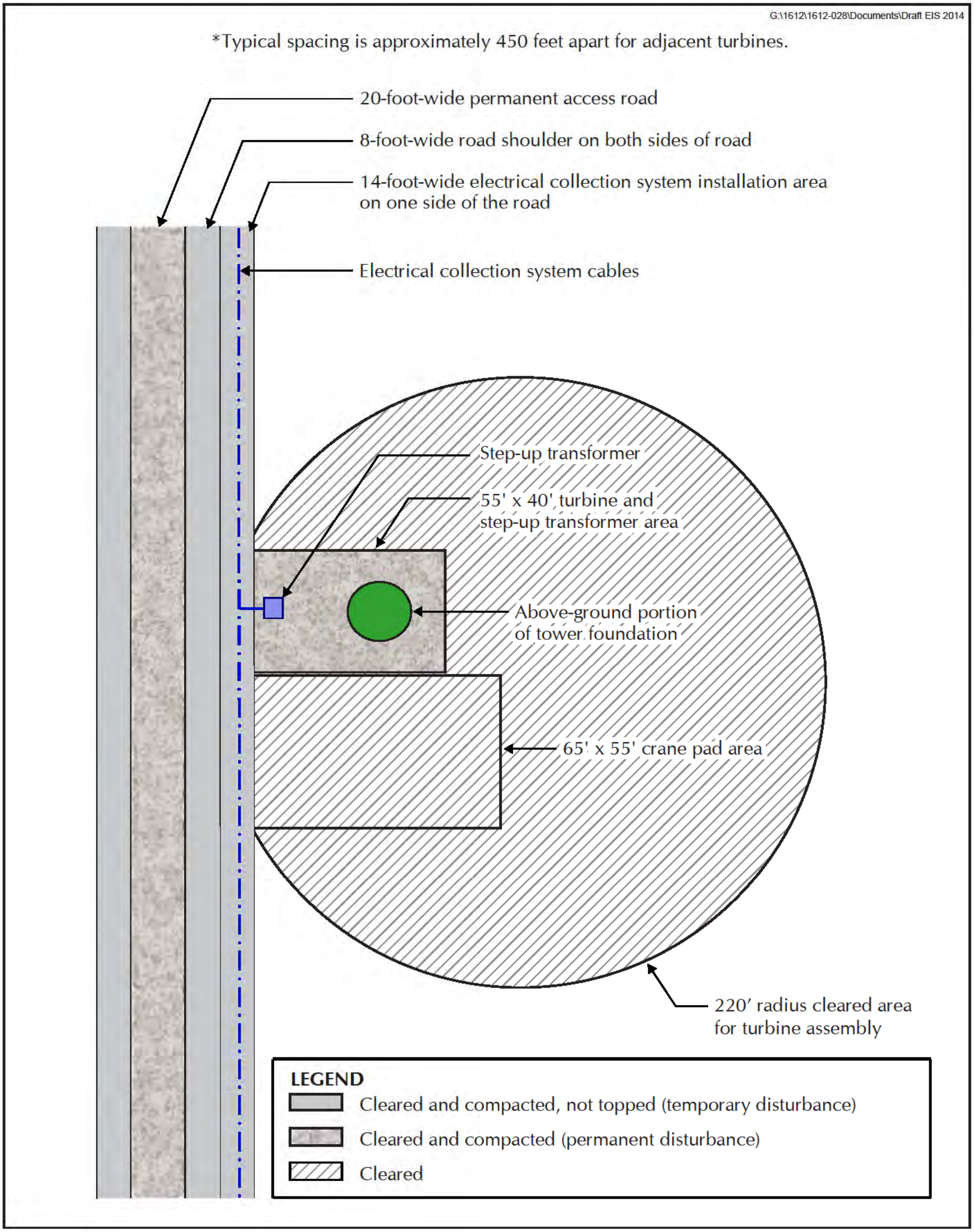
FIGURE 1

Project Location Map



IBERDROLA RENEWABLES

FIGURE 2
Project Site Plan



IBERDROLA RENEWABLES

FIGURE 3
Typical Wind Turbine Site Work Area and Pads

Disturbance). All temporarily disturbed lands will be restored to their previous condition. Permanent disturbance is estimated at approximately 24.3 acres, amounting to approximately 2 percent of the ROW area (Table 1). Approximately 22.3 acres of this total disturbance area would be associated with access roads. The wind turbine generators would together occupy only 2.0 acres for the permanent turbine tower pads.

TABLE 1
APPROXIMATE LIMITS OF TEMPORARY AND PERMANENT DISTURBANCE

Component	Temporary Disturbance	Permanent Disturbance
Wind Turbine Tower Pads (55 by 40 feet permanent turbine pad, within a 220-foot radius temporary work area)	139.4 acres	2.0 acres
Electrical Collection System (14 feet on one side of access road)	43,306 feet 13.9 acres	0
Access Roads (20 feet wide permanent travel width, with 8-foot-wide temporary shoulders on each side of road)	48,489 feet 17.8 acres	48,489 feet 22.3 Acres
SCADA and Fiber Optic Cable	Within electrical collection system disturbance	
Material Storage / Staging / Laydown Areas	N/A	N/A
Concrete Batch Plant	N/A	N/A

Updated Direct and Indirect Impacts of the Proposed Action

Vegetation

Five plant communities are present within the proposed action study area (Figure 4, *Plant Community Map*). Construction and operation of the proposed action would result in direct and indirect impacts to natural vegetation communities. Direct effects to vegetation would occur from disturbance or removal of vegetation at the turbine pad sites, temporary work areas around the pads, along access roads, and in association with the 34.5-kV underground electrical collection system. Vegetation would be removed as a result of surface-disturbing activities associated with blading, grading, vehicular traffic, and trenching. Areas adjacent to the proposed turbine pad sites, access roads, and underground electrical collection system would experience temporary disturbance associated with equipment access, materials, stockpile locations, and workspace requirements. Indirect impacts would include the increased potential for the establishment and spread of noxious weeds, exposure of soils to accelerated wind and water erosion, shifts in vegetation community composition, increase in the potential for fires, and loss of biodiversity.

Implementation of the proposed action using the updated impact areas would result in the direct disturbance of approximately 190.9 acres of vegetation (excluding permanent and temporary construction impacts on previously disturbed areas, constituting 4.6 acres), or approximately 15.8 percent of the ROW area. This includes approximately 16.8 acres of Joshua Tree Woodland, 79.4 acres of Mojavean Juniper Woodland and Scrub, 42.6 acres of Non-native Grassland, 2.3 acres of Mojave Desert Wash Scrub, and 49.8 acres of Mojave Mixed Woody Scrub (Table 2, *Vegetation Communities Affected by the Proposed Action*). Following construction, portions of the turbine work area, road shoulders, the electrical collection system right-of-way, and extra workspace areas would be reclaimed and revegetated. Thus, under the proposed action, total permanent vegetation disturbance would be

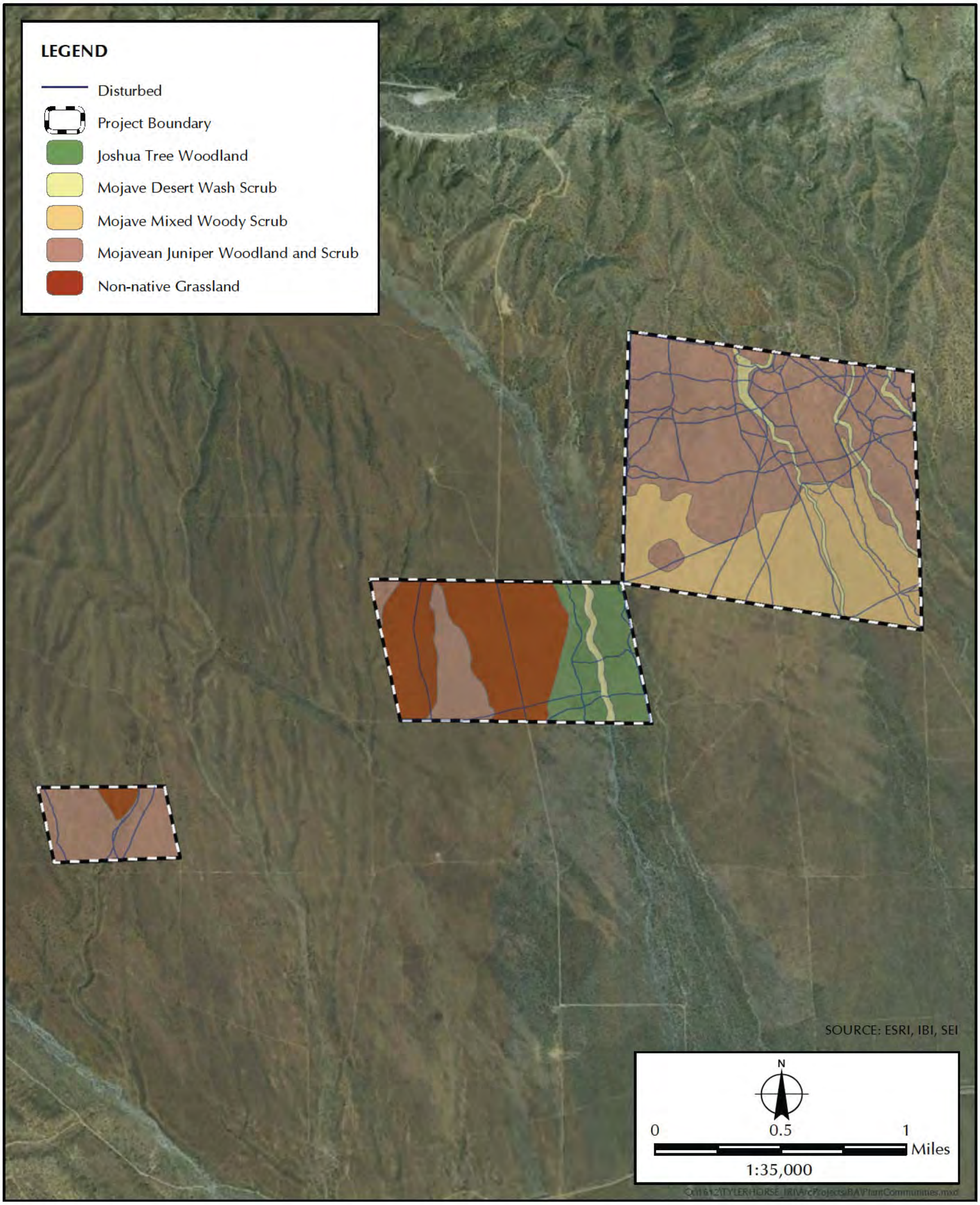


FIGURE 4
Plant Community Map

approximately 23.6 acres, or approximately 2 percent of the ROW area. The impacted plant communities are common and widely distributed throughout the Antelope Valley and the permanent loss of only 2 percent of the vegetation within the ROW area would have a negligible impact on plant communities throughout the region. Thus, although ground disturbance impact dimensions have increased subsequent to the original BRTR analysis, and there are some additional ground disturbance impacts to vegetation, the main thrust of the impact analysis remains consistent with the results and conclusions reported in the BRTR and Addendum No. 1 to the BRTR.

TABLE 2
VEGETATION COMMUNITIES AFFECTED BY THE PROPOSED ACTION

	Turbine Pads	Turbine Work Area	Electrical Collection System	Access Roads		Permanent plus Temporary Disturbance (acres)
Vegetation Community Type	Permanent Disturbance (acres)	Temporary Disturbance (acres)	Temporary Disturbance (acres)	Permanent Disturbance (acres)	Temporary Disturbance (acres)	
Joshua Tree Woodland	0.2	12.9	1	1.5	1.2	16.8
Mojavean Juniper Woodland and Scrub	0.8	54	6.3	10.2	8.1	79.4
Non-native Grassland	0.5	32	2.6	4.2	3.3	42.6
Mojave Desert Wash Scrub	0.0	2.1	0.1	0.1	0.0	2.3
Mojave Mixed Woody Scrub	0.5	35.7	3.5	5.6	4.5	49.8
Total	**2.0**	**136.7**	**13.5**	**21.6**	**17.1**	**190.9**

Jurisdictional Waters and Wetlands

There are no National Wetland Inventory wetlands located within the ROW area. There are several ephemeral streams located within and adjacent to the ROW area; however, the road system has been designed to demonstrate the feasibility of avoiding alteration of drainages that would be potentially subject to the jurisdiction of the California Department of Fish and Wildlife pursuant to Section 1600 of the State Fish and Game Code (Figure 5, *Proposed Access Roads in Relation to Ephemeral Drainages*). Although impact dimensions have increased subsequent to the original BRTR analysis, there will be no new impacts to jurisdictional waters or wetlands, thus the impacts are consistent with the results and conclusions reported in the BRTR and Addendum No. 1 to the BRTR.

Wildlife and Special Status Species

It is anticipated that by increasing the impacts from those considered within the BRTR analysis, the primary difference in impacts would be the acreage of land that would result in permanent and temporary loss of wildlife habitat during construction and operation. Direct disturbance to wildlife habitat includes activities such as ground surface grading and excavation, tree and shrub removal,

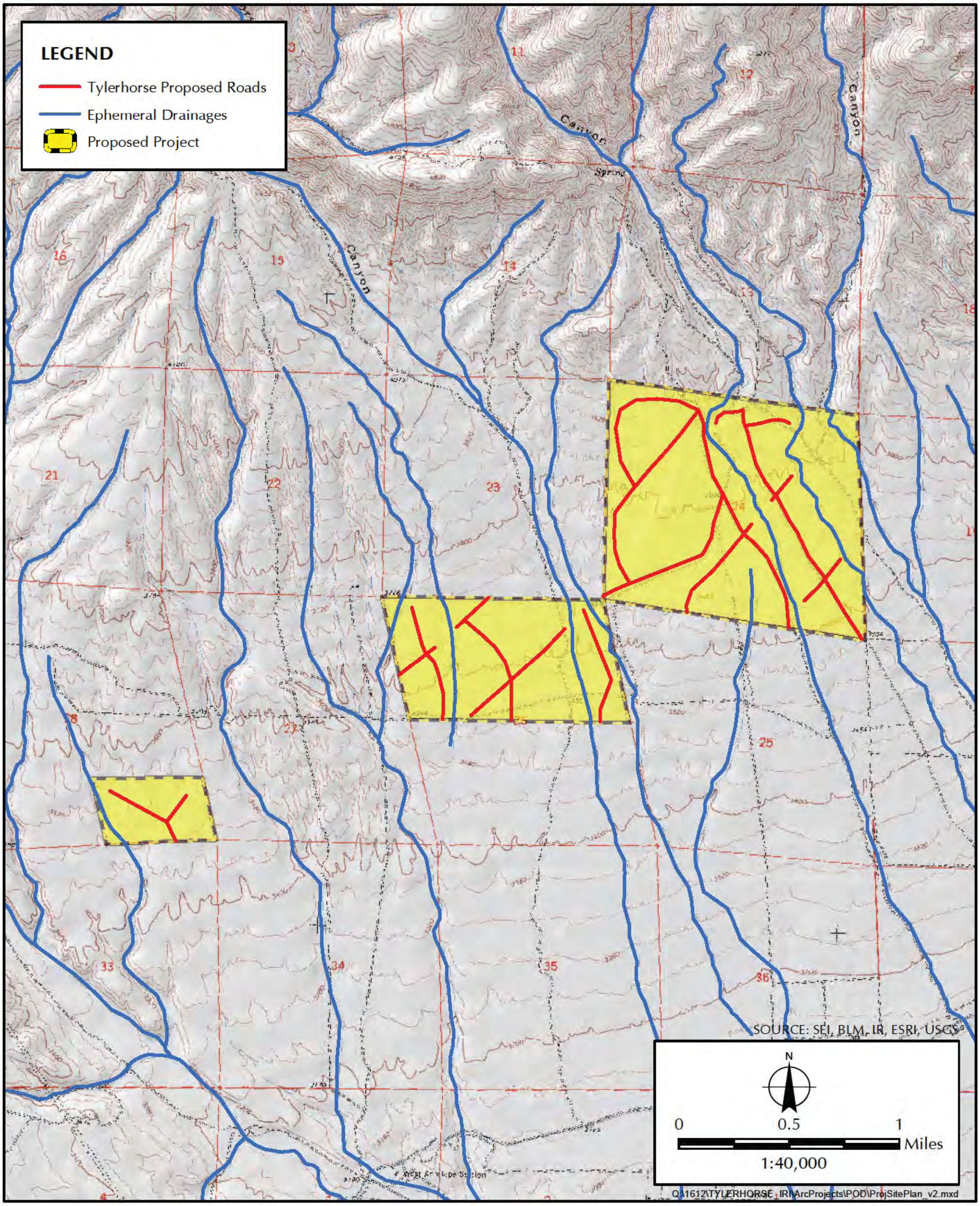


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FIGURE 5

Proposed Access Roads in Relation to Ephemeral Drainages and/or scraping of road surfaces that disturbs surface and subsurface soils. Each of these activities could effectively remove and/or degrade existing habitat, thereby reducing its availability to local wildlife populations.

As described above, implementation of the proposed action using the updated impact areas would result in the direct disturbance of approximately 190.9 acres of vegetation (excluding permanent and temporary construction impacts on previously disturbed areas, constituting 4.6 acres), or approximately 15.8 percent of the ROW area. Following construction, portions of the turbine work area, road shoulders, the electrical collection system right-of-way, and extra workspace areas would be reclaimed and revegetated. Thus, under the proposed action, total permanent habitat loss would be approximately 23.6 acres, or approximately 2 percent of the ROW area.

Permanent and temporary loss of habitat as a result of construction activities could affect some small mammal, reptile, and/or amphibian species with very limited home ranges and mobility. Although there is no way to accurately quantify these effects, the impact is likely to be moderate in the short term and to be reduced over time as reclaimed areas produce suitable habitats. Most of these wildlife species would be common and widely distributed throughout the Antelope Valley, and the loss of some individuals as a result of habitat removal would have a negligible impact on populations of these species throughout the region. Thus, although ground disturbance impact dimensions have increased subsequent to the original BRTR analysis, and there are some additional ground disturbance impacts to wildlife habitat, the main thrust of the impact analysis remains consistent with the results and conclusions reported in the BRTR and Addendum No. 1 to the BRTR.

Sapphos Environmental, Inc. looks forward to responding to any questions or comments regarding the information contained in this MFR. Please contact Ms. Marie Campbell or Ms. Mary Davis at (626) 683-3547.

APPENDIX C-4
Draft Bird and Bat Conservation Strategy

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TYLERHORSE WIND ENERGY PROJECT
DRAFT BIRD AND BAT CONSERVATION STRATEGY

PREPARED FOR:

Heartland Wind LLC
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September 19, 2013

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A	Bird and Bat Compendium
B	BLM Wind Energy Program Policies and Best Management Practices (BMPs)

SECTION 1.0
INTRODUCTION

Heartland Wind LLC (HW) proposes to construct the Tylerhorse Wind Energy Project (project) in the Tehachapi region of Southern California to provide up to 60 megawatts (MW) of clean, renewable energy. The project would be located on lands administered by the U.S. Bureau of Land Management (BLM), in the unincorporated territory of south-central Kern County.

This Bird and Bat Conservation Strategy (BBCS) documents the efforts undertaken by HW to voluntarily and proactively avoid and minimize impacts to avian and bat species during the siting, design, construction, and operation of the project. This document is intended to support HW's compliance with federal and state statutes and regulations through the implementation of procedures designed to avoid and minimize impacts to birds and bats and their habitats and to compensate or mitigate for unavoidable impacts to these resources.

This BBCS will discuss potential impacts to birds and bats from the construction, operation, and decommissioning of the project, as well as offer protection strategies to minimize these impacts. Many of the general avoidance and conservation measures identified in this BBCS will have the added benefit of minimizing risk and potential impacts for two high-profile species: the California condor (*Gymnogyps californicus*), afforded protection under the Migratory Bird Treaty Act (MBTA) and the California and Federal Endangered Species Acts (ESAs); and the golden eagle (*Aquila chrysaetos*), afforded protection under the MBTA and the Bald and Golden Eagle Protection Act (BGEPA).

California Instruction Memorandum (CA IM) No. 2013-030 (further described in Section 1.3 below) defines how BLM will work with the U.S. Fish and Wildlife Service (USFWS) and renewable energy and transmission right-of-way (ROW) applicants on public land to comply with BGEPA in California. Per this IM, the BLM requires applicants to provide documentation of their decision whether or not to pursue a BGEPA take permit. As such, HW provided documentation to BLM via an August 20, 2013, letter that describes its decision to pursue the "No BGEPA Take Permit Sought" path outlined in CA IM No. 2013-030. The letter confirmed that HW reviewed the "No BGEPA Take Permit Sought" path and understands that the BLM may sign a Record of Decision (ROD) and issue an ROW authorization that requires mitigation to reduce impacts to eagles. Furthermore, HW understands that if it later decides to pursue a BGEPA take permit during the BLM ROW National Environmental Policy Act (NEPA) process, that decision must be documented with the BLM and USFWS, and such a decision may require the BLM-NEPA review process to be extended to incorporate information needed by the USFWS to evaluate issuing a BGEPA take permit. Because this could require additional scoping; delay the release of draft NEPA documents; or require the preparation of supplemental NEPA documents to incorporate new alternatives, additional analysis, or other USFWS-required data or information, HW wants to avoid this situation. If HW later decides to apply for an eagle take permit, it anticipates doing so after completion of the BLM ROW NEPA process and receipt of the BLM ROD; and HW understands that in this case, USFWS would need to do a separate NEPA analysis on the eagle take permit application.

As such, while this document is not an Eagle Conservation Plan (ECP) developed strictly in accordance with each of the recommendations of the USFWS's *Eagle Conservation Plan*

Guidance (*ECP Guidance*),[1] it will address potential risks to golden eagles and present avoidance and conservation measures aimed to reduce golden eagle take to the “no-net-loss” standard required by the Final Take Permit Regulations under 50 CFR 22.26 and 22.27.

This BBCS is organized in five sections, as summarized below, based on recommended tiers and stages of environmental review, risk analysis, and siting decision-making included in both the USFWS’s *Final Land-Based Wind Energy Guidelines* (*Final Guidelines*) and *ECP Guidance*.[2,3] The contents of these advisory documents are discussed in Section 1.3.

- Section 1 discusses HW’s commitment to avoid and minimize the potential for conflict between wind energy development and conservation of native avian and bat species. It also gives an overview of the project and summarizes key laws and regulations that currently protect birds and bats.

- Section 2 describes the site assessment process undertaken by HW to site the project in a manner that minimizes the potential for impacts to avian and bat species. This section corresponds to Tiers 1 and 2 of the *Final Guidelines* and Stage 1 of the *ECP Guidance*.

- Section 3 presents the methods and results of site-specific surveys and assessments conducted on the project and in the project vicinity, corresponding to Tier 3 of the *Final Guidelines* and Stage 2 of the *ECP Guidance*.

- Section 4 analyzes the fatality risks for avian and bat species at the project, corresponding to the impact prediction segment of Tier 3 of the *Final Guidelines* and Stage 3 of the *ECP Guidance*.

- Section 5 presents the avoidance and minimization measures, including postconstruction mortality monitoring, to be implemented based on the risk analysis, as well as adaptive management practices that will be put into place if avian and bat mortality exceeds expected thresholds. It will also include protective measures committed to by HW in other environmental documents for the project, including the BLM’s Environmental Impact Statement (EIS) and the USFWS’s Biological Opinion. This section corresponds to Tiers 4 and 5 of the *Final Guidelines* and Stage 4 and 5 of the *ECP Guidance*.

1.1 POLICY AND COMMITMENT TO ENVIRONMENTAL PROTECTION

HW, a wholly owned subsidiary of Iberdrola Renewables, LLC (Iberdrola), proposes to develop the project. Iberdrola develops, builds, and operates renewable energy projects throughout North America and in 23 countries worldwide. Iberdrola is the second largest wind operator in the U.S. since entering the market in 2006, with over 5,700 MW in operation or under contract. Iberdrola is supported by the resources of its international corporate parent, Iberdrola, S.A, a private, Spain-

[1] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. *Eagle Conservation Plan Guidance*. Module 1—“Land-Based Wind Energy.” Version 2. Arlington, VA.

[2] U.S. Fish and Wildlife Service Wind Turbine Guidelines Advisory Committee. 23 March 2012. *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines*. Available at: www.fws.gov/windenergy/docs/WEG_final.pdf

[3] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. *Eagle Conservation Plan Guidance*. Module 1—“Land-Based Wind Energy.” Version 2. Arlington, VA.

based multinational electric utility company that is the fourth largest utility company in the world by market cap.

The focus on the development of clean energy and respect for the environment are some of the pillars of Iberdrola's company model and the factors that distinguish it as one of the world's leading energy companies in the 21st century. As such, HW, as a subsidiary of Iberdrola, is committed to siting, designing, constructing, and operating wind energy projects in an environmentally sustainable manner in an effort to avoid and minimize potential impacts to birds, bats, and other wildlife and their habitats. HW has voluntarily developed this BBCS to document the specific methods and approaches used to achieve impact avoidance minimization, including compliance with all applicable laws and regulations. These actions have included, and will continue to include:

1. Adoption of approved avian-adapted construction design standards.

2. Careful selection of turbine locations within the project that avoid and minimize the potential for impacts to avian and bat species.

3. Regular coordination with regulatory agencies, such as BLM, the California Department of Fish and Wildlife (CDFW), and USFWS, on potential impacts to avian and bat species within the project. Continued coordination will allow for discussion of new research results, new technologies, and evolving regulations and how they may apply to the project.

4. Development of specific avoidance and minimization measures to reduce impacts to avian and bat species.

5. Provision of ongoing training to all personnel involved in the construction, operation, maintenance, and decommission of the project of conservation measures presented in this BBCS so that personnel understand and comply with all BBCS requirements.

6. Initiation of avian and bat fatality monitoring during the initial phases of operation to document avian and bat mortalities and injuries at wind turbines and associated project elements.

1.2 DESCRIPTION AND BACKGROUND OF PROJECT

The purpose of the project is to construct and operate a wind energy generation facility located in the southern foothills and lower bajada slopes of the Tehachapi Mountains to provide up to 60 MW of renewable wind energy. The project is located in the south-central unincorporated area of Kern County, California, approximately 11 miles south of the City of Tehachapi, and approximately 8 miles northwest of the unincorporated community of Rosamond, California (Figure 1.2-1, *Regional Vicinity Map*). The project property consists of three separate parcels that total approximately 1,207 acres (slightly less than 2 square miles) of BLM-administered land. Two adjacent operating wind projects, the 6,970-acre Manzana (formerly PdV) Wind Energy Project (Manzana Project) and the 9,576-acre Pacific Wind Energy Project (Pacific Wind Project), are in close proximity to the project (Figure 1.2-2, *Project Vicinity Map*). The Manzana Project surrounds the western and central Tylerhorse parcels on three sides, and borders the easternmost Tylerhorse parcel on its western boundary. The Pacific Wind Project is located approximately 0.5

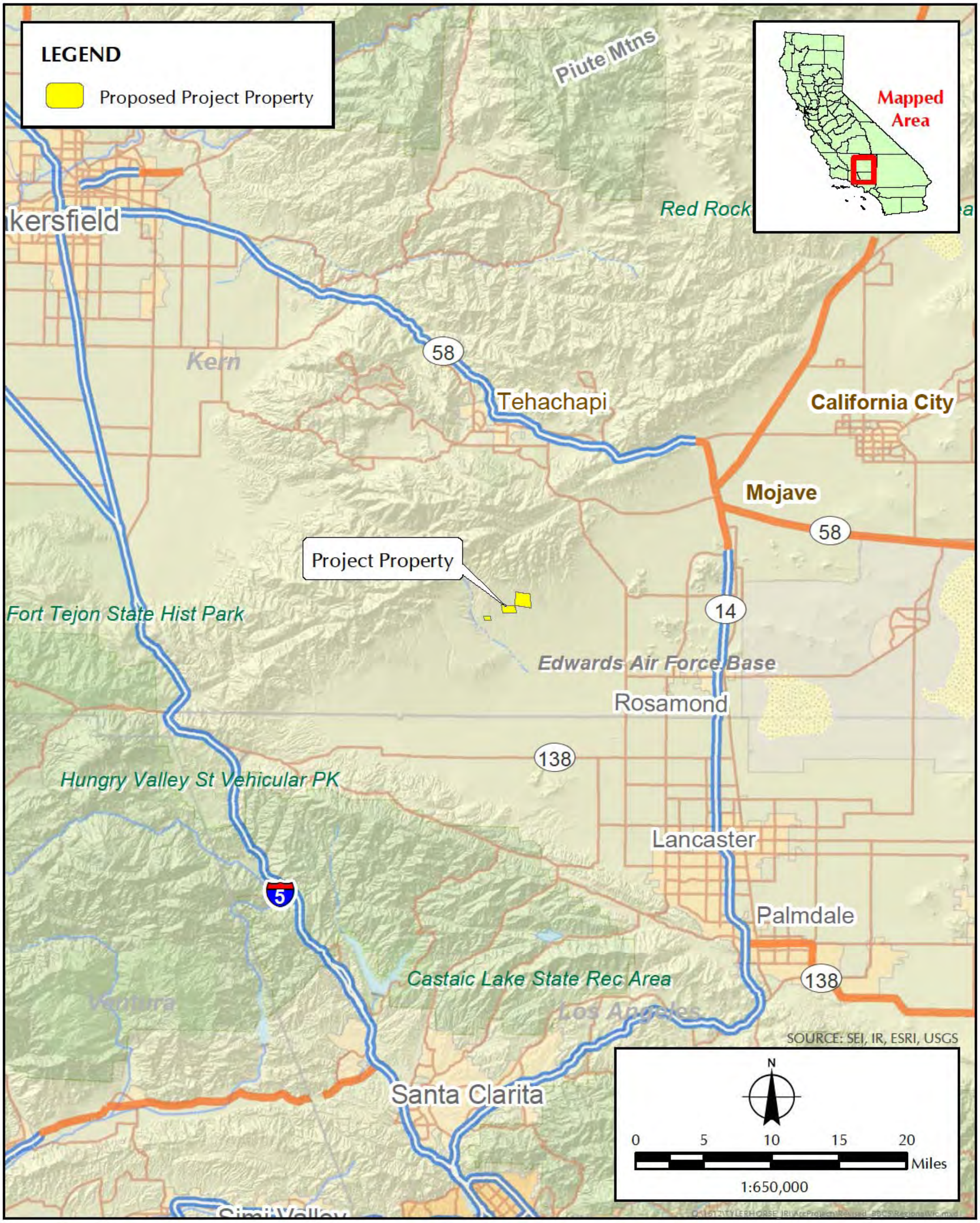

FIGURE 1.2-1
Regional Vicinity Map

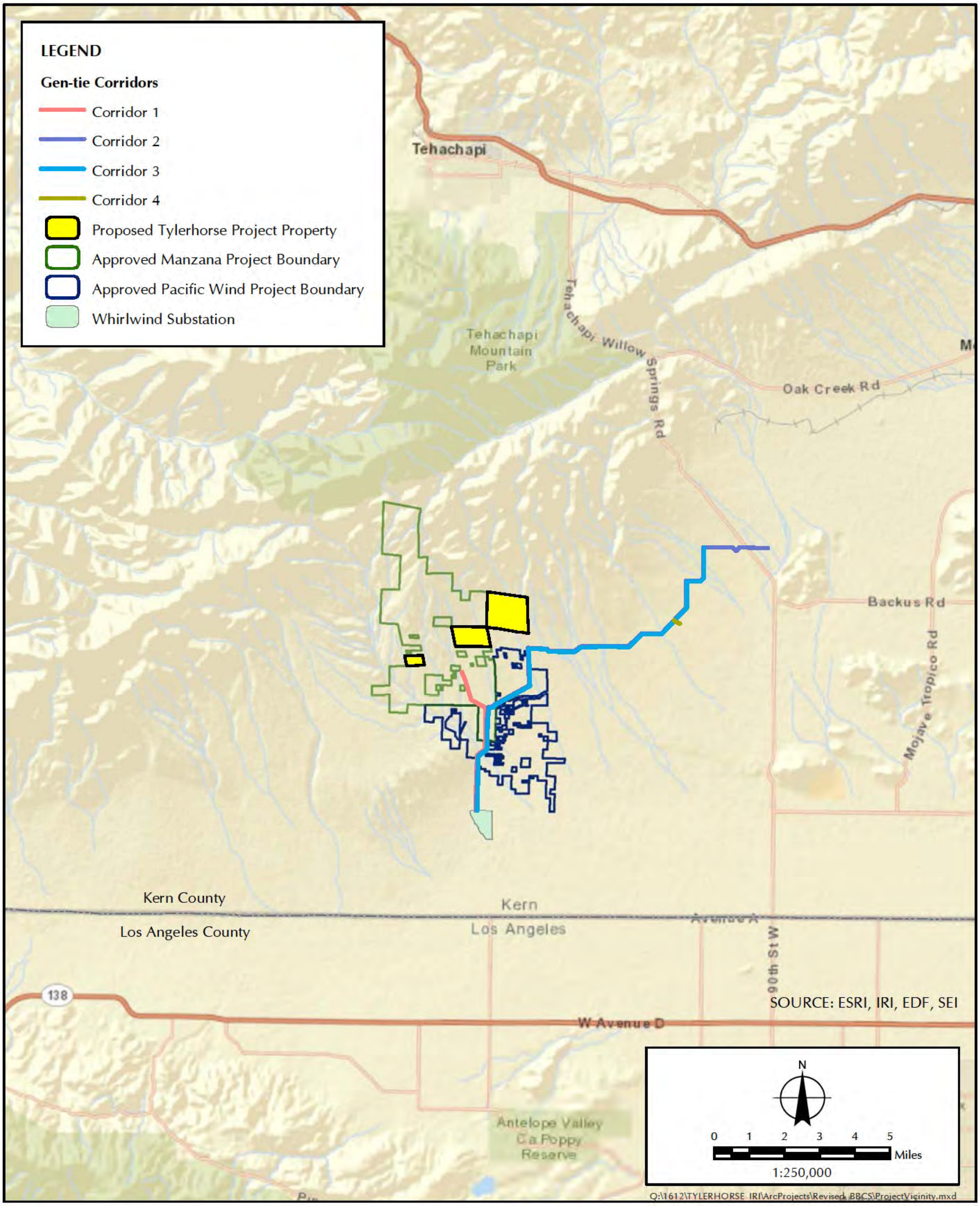

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FIGURE 1.2-2
Project Vicinity Map

mile southeast of the central Tylerhorse parcel and less than 1 mile south of the eastern Tylerhorse parcel. The project is bordered by the Tehachapi Mountains to the northwest.

The project would consist of up to 40 wind turbine generators (WTGs) with an anticipated total generating capacity of up to 60 MW. Related and supporting components would include an underground, 34.5-kilovolt (kV) electrical collection system to collect energy from turbines, an interconnecting road network, supervisory control and data acquisition (SCADA) system and fiber optic communications, and fencing of each wind turbine cluster or exterior boundary of the project. The project would use three-bladed WTGs, each ranging from 1.5 MW to 3.0 MW (generator nameplate capacity). Vestas and GE turbines are two of the wind turbine models being considered (Table 1.2-1, *Examples of Wind Turbine Specifications*). The specifications provided in the table are representative of all wind turbine models being considered in terms of impact assessment. Depending on equipment availability, different combinations of turbine types being considered could be installed at the project. Each combination would result in a total project energy capacity of up to 60 MW. The WTGs would be arranged in parallel arrays (turbine strings) generally running northeast to southwest, though spacing of the wind turbines along the arrays would be based on the final turbine selection. The wind turbine rotors would be up to approximately 370 feet in diameter. The maximum total height from tower base to blade tip would be 500 feet. In general, the turbines are spaced 2.5 to 3 rotor diameters apart side-to-side and 6 to 8 rotor diameters between downwind turbine strings (Figure 1.2-3, *Conceptual Site Plan*).

TABLE 1.2-1
EXAMPLES OF WIND TURBINE SPECIFICATIONS

Manufacturer	Model	Capacity (MW)	Rotor Diameter (feet)	Hub Height (feet)	Maximum Height from Tower Base to Blade Tip (feet)
Vestas	112–3.0 MW	3.0	367	275	460
GE	SLE	1.5	253	262	389

To exploit economies of scale and reduce environmental impacts, the project would use the ancillary facilities of the adjacent Manzana Project, a separate wind farm project approved by the Kern County Board of Supervisors on July 29, 2008, which is controlled by Iberdrola on approximately 6,970 acres of private lands. Such facilities include the Manzana Project's previously approved operations and maintenance (O&M) facility, staging and refueling areas, and concrete batch plant. Construction was completed in 2012, and the Manzana Project is currently operating.

If approved, power generated at the project would connect via underground collector lines to a substation located off-site on the Manzana Project. The power generated would in turn be transferred to the Southern California Edison's (SCE's) Whirlwind Substation (Tehachapi Renewable Transmission Project [TRTP] Substation 5) by means of a 220-kV overhead transmission line that has been constructed as part of the Manzana Project (Figure 1.2-2). The impacts of this interconnection were analyzed in the Pacific Wind Project's Environmental Impact Report (EIR). The power would then be sold to a power purchaser (via a power purchase agreement), who in turn would sell energy output to California investor-owned utilities, municipalities, or other purchasers, in furtherance of the goals of the California Renewables Portfolio Standard (RPS) and other similar renewable programs in the state.

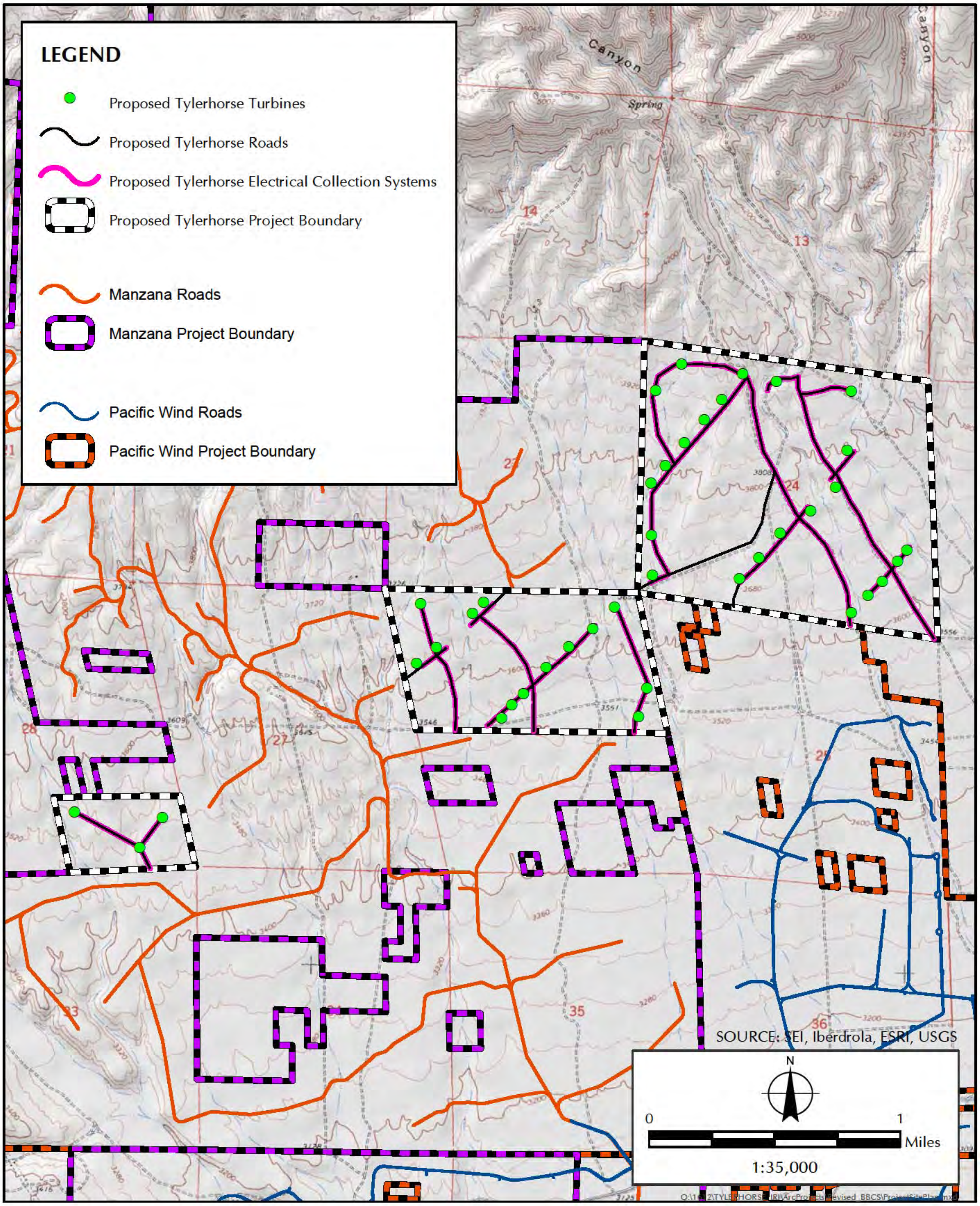

FIGURE 1.2-3
Conceptual Site Plan

The project property is located within an area identified as the Tehachapi Wind Resource Area (WRA), which contains some of the best wind resources in California. Several wind energy projects are currently operating in the region, and several others are currently seeking project approval under the regulatory review process (Figure 1.2.4, *Operating Wind Energy Projects within the Tehachapi Wind Resource Area in Relation to the Project*).

1.3 KEY LAWS, REGULATIONS, GUIDELINES, AND INSTRUCTION MEMORANDUMS

1.3.1 Laws and Regulations

Federal

Federal Endangered Species Act

The 1973 ESA (16 USC 1531–1544) provides a framework for the protection of endangered and threatened plant and animal species. Federal agencies may not jeopardize the existence of listed species, which includes ensuring that actions they authorize, fund, or carry out do not adversely affect the species or adversely modify designated critical habitats. Under the federal ESA, all federal departments and agencies must utilize their authorities, as appropriate, to promote the recovery of listed species. The federal ESA prohibits all persons, including federal agencies, from harming or killing ("taking") individuals of a listed species without authorization. Although federal agencies must consult with the USFWS or National Marine Fisheries Service when their activities may affect listed species, projects cannot be stopped unilaterally by the services. However, for any anticipated take to be authorized, applicable measures to minimize the take that are developed in the consultation must be followed.

The California condor is designated as endangered pursuant to the federal ESA. Condors have not been recorded within the project, neither historically nor as a result of on-the-ground surveys; however, due to the species' continued population growth, there is some risk that condors will begin to expand outside of their historic range, particularly into the foothills of the Tehachapis where the project is located. Thus, BLM is engaged in a Section 7 consultation with the USFWS to ensure that the BLM's action in approving the ROW for HW to construct, operate and decommission a wind energy facility does not jeopardize the existence of the California condor.

Migratory Bird Treaty Act

The MBTA of 1918 (16 USC 703–712), as amended, provides for federal protection of all migratory bird species, including California condor and golden eagle, and does not include provisions for authorized take. Under the Act, it is unlawful to pursue, hunt, take, capture, kill, or sell birds, their active nests, eggs, parts, and so forth. The U.S. government is exempt from the MBTA permit requirements based on the court decision in *Newton County Wildlife Assn. v. U.S. Forest Service*, 113 F. 3d 110 (8th Cir. 1997), but its agencies must minimize take caused by their activities. Nesting birds and the contents of the nest within the project are afforded protection during the nesting season pursuant to the MBTA. Nonfederal contractors are required to obtain a depredation permit from the USFWS prior to removal or disturbance of nesting birds. In addition, a Federal Migratory Bird Special Purpose Salvage permit would be needed to collect dead migratory birds, nests, eggs, or parts from the wild.

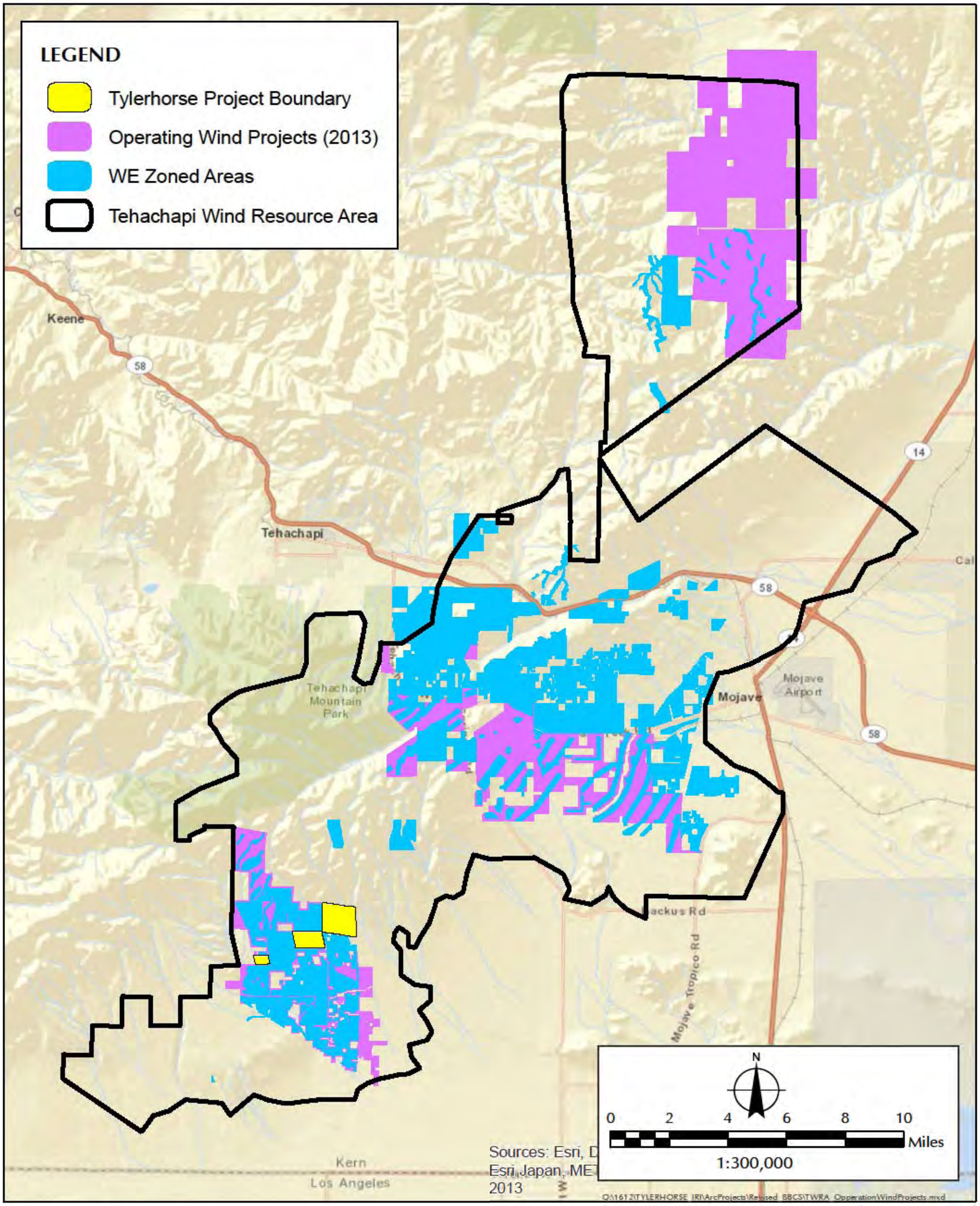

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FIGURE 1.2-4

Operating Wind Energy Projects in the Tehachapi Wind Resource Area

Bald and Golden Eagle Protection Act

The BGEPA (16 USC 668–668d, 54 Stat. 250) is administered by the USFWS to protect bald eagles (*Haliaeetus leucocephalus*) and golden eagles, their nests, eggs, and parts.[4] The BGEPA states that no person shall take, possess, sell, purchase, barter, offer for sale, purchase or barter, transport, export, or import any bald or golden eagle alive or dead, or any part, nest, or egg without a valid permit to do so. The BGEPA also prohibits the take of bald and golden eagles unless pursuant to regulations. *Take* is defined by the BGEPA as an action "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." *Disturb* is defined in the BGEPA as follows:

> to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available; (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

In addition to immediate impacts, this definition covers impacts from human-caused alterations initiated near a previously used nest site during a time when eagles were not present.

Although the bald eagle was removed from the Endangered Species List in June 2007, it is still federally protected under the BGEPA. The *National Bald Eagle Management Guidelines* were published in conjunction with delisting by the USFWS in May 2007 to provide provisions to continue to protect bald eagles from harmful actions and impacts.[5] Unlike the bald eagle, the golden eagle has never been federally listed and is protected solely under BGEPA and MBTA.

<u>Final Eagle Programmatic Take Permits under 50 CFR 22.26 and 22.27</u>

On September 11, 2009, the USFWS implemented new rules governing the take of bald and golden eagles.[6,7] The new rules address authorization of (1) disturbance-type take of bald and golden eagles due to otherwise lawful activities (50 CFR 22.26) and (2) removal or relocation of eagle nests in rare cases where their location poses a risk to human safety or the eagles themselves (50 CFR 22.27).[8]

Permits are distinguished as either individual take or programmatic take permits. Permit issuance is conditioned on various criteria, the most important of which is that the permitted take is consistent with the goal of stable or increasing breeding populations for bald and golden eagles. A programmatic permit is available to industries or agencies undertaking activities that may disturb or otherwise take eagles on an ongoing operational basis. The USFWS has defined

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[4] U.S. Fish and Wildlife Service. n.d. *Bald Eagle Management Guidelines and Conservation Measures: Bald and Golden Eagle Protection Act*. Available at: http://www.fws.gov/midwest/Eagle/guidelines/bgepa.html

[5] U.S. Fish and Wildlife Service. May 2007. *National Bald Eagle Management Guidelines*. Available at: http://www.fws.gov/pacific/eagle/NationalBaldEagleManagementGuidelines.pdf

[6] U.S. Fish and Wildlife Service. 11 September 2009. "Eagle Permits; Take Necessary to Protect Interests in Particular Localities; Final Rules." *Federal Register*, *74*(175): 46836–46879.

[7] U.S. Fish and Wildlife Service. 20 May 2008. "Authorizations under the Bald and Golden Eagle Protection Act for Take of Eagles. Final Rule." *Federal Register*, *73* (98): 29075–29084.

[8] U.S. Fish and Wildlife Service. 11 September 2009. "Eagle Permits; Take Necessary to Protect Interests in Particular Localities; Final Rules." *Federal Register*, *74* (175): 46836–46879.

programmatic take as “take that is recurring, is not caused solely by indirect effects, and that occurs over the long term or in a location or locations that cannot be specifically identified.”[9] Projects seeking programmatic permits are required to propose avoidance and minimization measures sufficient “to reduce the take to the maximum degree practicable” and apply advanced conservation practices (ACPs) developed in concert with the USFWS, such that any additional take after ACP application is unavoidable.[10]

Bureau of Land Management California Desert Conservation Area Plan

Administered by the BLM, the California Desert Conservation Area (CDCA) Plan requires that proposed development projects are compatible with policies that provide for the protection, enhancement, and sustainability of fish and wildlife species, wildlife corridors, riparian and wetland habitats, and native vegetation resources. The project is located on lands administered by the BLM that are designated in the CDCA Plan as Unclassified. According to the CDCA “Energy Production and Utility Corridors” section, “Sites associated with power generation or transmission not identified in the Plan will be considered through the Plan Amendment Process.”[11] Therefore, a Plan Amendment will be required for this project in accordance with the CDCA.

West Mojave Plan

BLM produced the West Mojave Plan as an amendment to the CDCA Plan. The West Mojave Plan is a federal land use plan amendment that (1) presents a comprehensive strategy to conserve and protect the desert tortoise (*Gopherus agassizii*), the Mohave ground squirrel (*Xerospermophilus mohavensis*), and nearly 100 other plants and animals and the natural communities of which they are a part and (2) provides a streamlined program for complying with the requirements of the California and federal ESAs.[12,13]

The impacts to avian and bat species listed under the West Mojave Plan were considered within this BBCS.

State

California Endangered Species Act

The California ESA (California Fish and Game Code §§ 2050 et seq.) prohibits the take of listed species, except as otherwise provided in state law. The *take* for the California ESA is defined as

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[9] U.S. Fish and Wildlife Service. 11 September 2009. “Eagle Permits; Take Necessary to Protect Interests in Particular Localities; Final Rules.” *Federal Register*, *74* (175): 46836–46879.

[10] U.S. Fish and Wildlife Service. 11 September 2009. “Eagle Permits; Take Necessary to Protect Interests in Particular Localities; Final Rules.” *Federal Register*, *74* (175): 46836–46879.

[11] U.S. Department of the Interior, Bureau of Land Management. 1980. *California Desert Conservation Area Plan*. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/cdd/cdcaplan.Par.15259.File.dat/CA_Desert_.pdf

[12] U.S. Department of the Interior, Bureau of Land Management. 1980. *Final Environmental Impact Report and Statement for the West Mojave Plan*. Moreno Valley, CA: California Desert District. Available at: http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-1-Chapter1_Bookmarks.pdf

[13] U.S. Department of the Interior, Bureau of Land Management. January 2005. *West Mojave Plan—A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment Final Environmental Impact Report and Statement*. Moreno Valley, CA. Available at: http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-1-Chapter1_Bookmarks.pdf

it is in the federal ESA; however, unlike the federal ESA, the California ESA also applies the take prohibitions to species petitioned for listing as state candidates rather than only those listed species. State lead agencies are required to consult with the CDFW to ensure that any actions undertaken by the lead agency are not likely to jeopardize the continued existence of any state-listed species or result in destruction or degradation of required habitat. CDFW is authorized to enter into Memoranda of Understanding (MOUs) with individuals, public agencies, universities, zoological gardens, and scientific or educational institutions to import, export, take, or possess listed species for scientific, educational, or management purposes.

Section 2080 of the California ESA states:

> no person shall import into this state [California], export out of this state, or take, possess, purchase, or sell within this state, any species, or any part or product thereof, that the commission [State Fish and Game Commission] determines to be an endangered species or threatened species, or attempt any of those acts, except as otherwise provided in this chapter, or the Native Plant Protection Act, or the California Desert Native Plants Act.

Due to the potential presence of state-listed threatened, endangered, or candidate species within the project, compliance with the California ESA was considered in the evaluation of the project.

Title 14, California Code of Regulations, Sections 670.2 and 670.5

These state regulations list plant and animal species designated as threatened and endangered under the California ESA. California Species of Special Concern (CSC) are those species that are indicators of regional habitat changes or are considered potential future protected species. CSCs do not have any special legal status but are intended by CDFW for use as a management tool to take these species into special consideration when decisions are made concerning the future of any land parcel.

Due to the potential presence of CSC within the project, impacts to these species were considered in the evaluation of the project.

California Fish and Game Code Section 3511

The State of California classifies certain animals as “fully protected.” This classification was the State’s initial effort in the 1960’s to identify and provide additional protection to certain species that were rare or faced possible extinction. Lists were made for fish, mammals, amphibians and reptiles, birds, and mammals. Section 3511 of the California Fish and Game Code lists 13 species of fully protected birds. Fully protected species may not be taken or possessed at any time. Additionally, no permits or licenses may be issued for their take, except for scientific research and relocation of bird species for the protection of livestock.

Due to the potential presence of several fully protected bird species within the project, impacts to these species were considered in the evaluation of the project.

1.3.2 Guidelines

Federal

Interim Technical Guidance

In February 2010, the USFWS published the *Interim Technical Guidance*, including a description of survey methods recommended to use in characterizing golden eagle use on and adjacent to projects that may require a programmatic take permit.[14] The recommendations cover both aerial and ground-based survey options for use in determining habitat occupancy, and emphasize recording and observing golden eagle nest sites. Given the large survey areas involved, aerial surveys are generally more effective and appropriate than ground-based surveys in most areas.

This technical guidance was implemented in Sapphos Environmental, Inc.'s design of the aerial golden eagle surveys conducted in 2013 in the 10-mile-radius project survey area.

Draft Eagle Conservation Plan Guidance and Technical Appendices

In January 2011, the USFWS published the *Draft Guidance*,[15] which expanded on the permit issuance criteria described in the final take permit regulations under 50 CFR 22.26. This *Draft Guidance* delineates the conditions for issuance of programmatic permits for incidental take of eagles under BGEPA, with particular focus on the wind energy industry, and is designed to assist developers in complying with two core environmental laws: the MBTA and the BGEPA. As described in the *Draft Guidance*, conservation measures must be implemented that will avoid and minimize take to the maximum extent possible, and advanced conservation practices must be used such that any residual take is unavoidable. Furthermore, when the permitted take would otherwise cause eagle populations to decline, compensatory mitigation must be employed such that no net population decline occurs. The *Draft Guidance* recommend five stages in coordinating with the USFWS in the development of an ECP to support application for programmatic permits for take of eagles, including: (1) an initial site assessment using publicly available data to identify potential eagle use areas, as well as the potential risk involved with development of these areas; (2) completion of rigorous on-site surveys for the selected site to obtain data allowing for eagle mortality; (3) estimate of mortality risk from wind turbines based on the survey data; (4) identification and evaluation of the anticipated effectiveness of ACPs to avoid mortality and, if necessary, identification of compensatory mitigation; and (5) postconstruction monitoring to determine whether actual take exceeds anticipated take such that adaptive management will be required. The *Draft Guidance* was the only document available during development of the 2011–2012 avian field studies on the project, and so bird use count methodology (described in Section 3.0) was based on recommendations within this document.

[14] Pagel, J.E., D.M. Whittington, and G.T. Allen. 2010. *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance*. Arlington, VA: U.S. Fish and Wildlife Service, Division of Migratory Bird Management

[15] U.S. Fish and Wildlife Service. January 2011. *Draft Eagle Conservation Plan Guidance*. Available at: http://www.fws.gov/windenergy/docs/ECP_draft_guidance_2_10_final_clean_omb.pdf

The Eagle Conservation Plan Guidance Technical Appendices (*Draft ECP Technical Appendices*), written to accompany the Final Eagle Conservation Plan Guidance, became available to project proponents and consultants in a draft form on August 17, 2012.[16] These appendices recommend current methods approved by USFWS for assessing and documenting risks to eagles associated with wind project development; however these technical appendices became available after project-specific surveys on the project commenced.

Eagle Conservation Plan Guidance

In April 2013, the USFWS published the most recent version of the *ECP Guidance*, which clarified the permit issuance criteria described in the final take permit regulations under 50 CFR 22.26.[17] The document reiterates that the approaches within the appendices are recommendations only, but that following the guidance will assist project proponents in complying with regulatory requirements and avoiding unintentional take of eagles at wind energy projects, and will also provide a framework for the biological data needed to support permit applications for project proponents that wish to pursue a permit.

Project siting and design, as well as pre-permitting biological resource studies, were completed prior to the release of the *ECP Guidance*; however, this BBCS has, when possible, integrated recommendations from this guidance, particularly in regard to document structure.

Land-Based Wind Energy Guidelines

As wind energy proliferates across the U.S., growing concern has been placed on the impact of these developments on environmental resources during both short-term construction and long-term operation. As a response, the USFWS issued their voluntary Interim Guidelines in 2003 to advise developers on recommended methods to assess, develop, and site their project in order to reduce adverse effects to environmental resources, particularly fish and wildlife. The Wind Turbine Guidelines Federal Advisory Committee was established by USFWS in 2007 in order to review and make recommendations going forward on improvements to the Interim Guidelines. The Committee's final recommendations were submitted in 2010. The USFWS subsequently used these to develop a new set of voluntary guidelines, the draft *Land-Based Wind Energy Guidelines*, released after public comment and peer review in July 2011. Following additional rounds of comments and language refinement, the *Final Guidelines* were released on March 23, 2012.[18]

The *Final Guidelines* outline effective measures to avoid or minimize impacts to wildlife and their habitats from wind energy facilities. They also encourage reviewing agencies and other professionals to complete five tiers of analysis to determine impacts and design avoidance and minimization strategies:

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[16] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. August 2012. *Eagle Conservation Plan Guidance*, Module 1—"Land-Based Energy Technical Appendices." Washington, DC: U.S. Department of the Interior.

[17] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. *Eagle Conservation Plan Guidance*. Module 1—"Land-Based Wind Energy." Version 2. Arlington, VA.

[18] U.S. Fish and Wildlife Service Wind Turbine Guidelines Advisory Committee. 23 March 2012. *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines*. Available at: www.fws.gov/windenergy/docs/WEG_final.pdf

- **Tier 1:** Preliminary site evaluation, including landscape-level assessment and literature review
- **Tier 2:** Site characterization, including potential presence of species of concern
- **Tier 3:** Field studies and impact prediction
- **Tier 4:** Postconstruction (operational) studies to estimate impacts
- **Tier 5:** Other postconstruction studies and research

The key laws, regulations, and guidelines described above have been closely followed in order to inform both the study designs conducted on the project and the avoidance and minimization measures designed to protect birds and bats during project construction and operation. Furthermore, the guidelines issued by the USFWS, including the *ECP Guidance* and the *Final Guidelines*, have been used to critically evaluate the project for potential impacts to birds and bats at each level of project development. These levels of evaluation are mirrored in the organization of this BBCS.

State

California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development

The California Energy Commission (CEC) together with the CDFW issued voluntary guidelines for reducing impacts to birds and bats from wind energy development in 2007.[19] Similar to the federal *Final Guidelines*, previously described in this section, these guidelines provide information to help reduce impacts to birds and bats from new development or repowering of wind energy projects in California. They include preliminary screening of proposed wind energy project sites; pre-permitting study design and methods; assessing direct, indirect, and cumulative impacts to birds and bats in accordance with state and federal laws; developing avoidance and minimization measures; establishing appropriate compensatory mitigation; and post-construction operations monitoring, analysis, and reporting methods. The subject guidelines have not been approved or disapproved by the CEC or the CDFW; nor has the CEC or the CDFW passed on the accuracy or adequacy of the guidelines. Nevertheless, due to the potential for effects as a result of project implementation to birds and bats, the avian and bat studies conducted in support of baseline characterization of avian and bat resources found at the proposed project property were designed to be consistent with the CEC Guidelines.

1.3.3 Instruction Memorandums

Federal

Bureau of Land Management Instruction Memorandum No. 2010-156

The purpose of IM No. 2010-156 is to provide direction to renewable energy projects for complying with the BGEPA, including its implementing regulations (i.e., September 11, 2009, Eagle Rule 50 CFR Parts 13 and 22). This compliance will ensure environmentally responsible authorization and development of renewable energy projects on BLM-administered lands. The BLM directs that "consideration of golden eagles and their habitat must be incorporated in the

[19] California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development.* Final Committee Report. Prepared for: California Department of Fish and Game. Sacramento, CA.

National Environmental Policy Act (NEPA) analysis for all renewable energy projects." This should include a direct and indirect effects analysis, cumulative effects analysis, and best management practices to avoid or minimize the unintentional take of eagles. Further, as a condition of the right-of-way grant, BLM will require an Avian Protection Plan (APP, now referred to as a BBCS), or a plan considering both birds and bats at the discretion of the applicant, which should evaluate options to avoid and minimize project impacts to birds and/or bats in the siting, operations, and monitoring phases of the project. Coordination on potential impacts to golden eagles and their habitat should be started early with USFWS, and the project must document in their administrative record any and all correspondence from USFWS on whether or not the project will likely take golden eagles. The USFWS must also address whether USFWS considers the development of an APP as a feasible option for the project. This coordination should be incorporated into the project's NEPA document. If USFWS considers an APP as a feasible option, a letter of concurrence must be sought and received from the USFWS that addresses the adequacy of the document. This letter of concurrence should be included in the administrative record. The BLM will not issue an ROD approving the project if the USFWS indicates that an APP is not sufficient to avoid or minimize take resulting from the proposed project. If an APP is deemed appropriate by the USFWS, the BLM may issue an ROD approving the project, but BLM will not issue a Notice to Proceed until the USFWS letter of concurrence for the project APP is received.

State

Bureau of Land Management Instruction Memorandum No. 2013-030

The purpose of IM No. CA-2013-013 is to provide supplemental guidance on implementation of the BLM Washington Office IM 2010-156, described above, in California. Specifically, it defines how BLM will work with the USFWS and renewable energy and transmission right-of-way applicants on public land to comply with BGEPA in California. This IM, however, does not replace the IM 2010-156 policies.

The IM notes that BGEPA protects eagles and their nests from take, and that take of such birds without a permit is punishable by criminal and civil penalties. Renewable energy projects on BLM-administered land have the potential to affect, and even take, eagles. USFWS has an established protocol for authorizing take of eagles for activities that are otherwise lawful under the BGEPA and its implementing regulations, as long as take is unavoidable even though advanced conservation practices are implemented. Renewable energy applicants are not legally required to seek or obtain an eagle take permit under BGEPA, but any take of an eagle without a permit would be a violation of BGEPA and may result in law enforcement actions against the owner and/or operator. Additionally, BLM requires ROW grant holders to comply with all applicable federal and state laws and regulations; therefore, although pursuing an eagle take permit on BLM-managed public land is voluntary, take without a permit is a violation of federal law and a violation of the BLM ROW authorization.

The BLM recommends that coordination between the applicant, BLM, and the USFWS begin as soon as possible in the permitting process. If applicable, BLM will recommend that the ROW applicant begin collecting eagle data following the *ECP Guidance* and the BLM will concurrently review available information about golden eagle use of the proposed project area to determine if the project will have the potential for take under BGEPA. BLM will discuss the findings of this review with the USFWS. If BLM and USFWS determine the project has a potential for take, the BLM will recommend the applicant collect at least 2 years of eagle use data as described in Appendix C of the *ECP Guidance*, and will also invite USFWS to be a cooperating agency during the NEPA process. Furthermore, the USFWS will recommend that the applicant prepare an ECP and, if appropriate, submit a BGEPA take permit applicant. USFWS will document this recommendation to BLM in written form. Once USFWS has recommended that an applicant apply for a take permit, it is the applicant's decision whether to pursue a permit or not, but this decision by the applicant should be provided in writing to the BLM. The process at this point will then diverge based on the applicant's decision whether or not to pursue a BGEPA permit.

If a permit is sought, an acceptable take permit application package must be sent to the USFWS in advance of release of the project's Draft EIS so that relevant eagle risk assessment can be incorporated in the environmental analysis. BLM will not issue a Draft EIS until these steps are completed. The BLM and the USFWS will then coordinate the ROW and BGEPA permitting process, which will result in the preparation of a joint NEPA document, in most cases.

If no permit is sought by the applicant, the BLM will continue to process the ROW application. In the Draft EIS, the BLM will analyze any conservation measures proposed by the applicant to avoid and minimize impacts on eagles. The NEPA analysis will also include an eagle risk assessment. The BLM may sign an ROD and issue an ROW authorization that requires mitigation to reduce impacts to eagles. The ROW authorization will include terms and conditions that identify any actions that the applicant must perform if an eagle is taken without a take permit from USFWS. These terms and conditions will also make clear that these restrictions would be replaced by the terms and conditions of a BGEPA permit, should the applicant decide to pursue one later. If the project subsequently takes an eagle without a take permit, the project will be considered in violation of the BGEPA, and the USFWS will retain sole authority to seek law enforcement action against the project proponent under BGEPA. The BLM, regardless of the USFWS's decision on enforcement, will retain its authority to suspend, terminate, or modify the project's ROW authorization.

Renewable energy applicants that have initiated the NEPA process at the issuance of this IM, as is the case for the project, will follow the process detailed within this IM as closely as is feasible.

HW has decided to pursue at this time the "No BGEPA Take Permit Sought" path outlined in the above IM. HW has reviewed the "No BGEPA Take Permit Sought" path and understands that the BLM may sign a ROD and issue an ROW authorization that requires mitigation to reduce impacts to eagles.

SECTION 2.0
TIER 1 AND TIER 2 – PRELIMINARY SITE SELECTION AND SITE CHARACTERIZATION

This section of the BBCS describes the initial site selection process for the project, and also details the steps taken by the former applicant, enXco Development Corporation (enXco, now EDF Renewable Energy) to conduct a preliminary site evaluation and characterization of the project vicinity, corresponding to Tiers 1 and 2 of the *Final Guidelines*[20] and Stage 1 of the *ECP Guidance*.[21] As part of the transfer of the ROW application for the project to HW from the former applicant in 2012, all investigations related to biological resources transferred to HW and became the property of HW; therefore, all work undertaken by enXco on the project between 2004 and 2011 is ascribed to HW within this document.

The preliminary site selection and site characterization for the project was undertaken in concert with the preliminary site selection and site characterization for two wind energy projects that are now in operation on adjacent privately held properties, the Manzana Project, permitted for up to 300 MW; and the Pacific Wind Project, permitted for up to 151 MW. The preliminary site selection and characterization process involved a review of published and unpublished literature and databases; coordination with agencies and stakeholders, including the USFWS and the BLM; as well as reconnaissance-level site visits to evaluate baseline site characteristics. More detailed, directed studies on the project were subsequently conducted beginning in 2011 and continuing through 2013, to further quantify bird and bat use on the project property. This section of the BBCS focuses on the early stages of site assessment and characterization done in the general project vicinity.

2.1 PRELIMINARY SITE SELECTION

Preliminary site selection for the project was initiated in 2004, based on a number of factors, including a preliminary wind resource assessment, environmental and cultural considerations, review of terrain and topography, and access to interconnection and transmission. The determination of a strong, recoverable wind resource on the site, and the proximity to the approved Whirlwind VI facility led to entitlement applications being initiated for the adjacent Manzana and Pacific Wind Projects. The anticipated development of the Pacific Wind and Manzana Projects was expected to create an infrastructure of roads and transmission lines that provide an opportunity for infill development that would allow the applicant to exploit economies of scale and minimize environmental impacts. Development of the project would also be consistent with the management objectives outlined the Energy Policy Act of 2005, which established a goal for the Secretary of the Interior to approve 10,000 MW of non-hydropower renewable energy projects located on public lands.

Concurrent with the initial consideration of siting the project on these specific parcels of BLM-administered land, the use of private lands within Kern County, as well as other BLM-administered land within the Tehachapi WRA, was also considered. In general, the project, as now sited, proved more favorable than all considered alternatives due to the site's superior wind

[20] U.S. Fish and Wildlife Service Wind Turbine Guidelines Advisory Committee. 23 March 2012. *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines*. Available at: www.fws.gov/windenergy/docs/WEG_final.pdf

[21] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. *Eagle Conservation Plan Guidance*. Module 1—"Land-Based Wind Energy." Version 2. Arlington, VA.

resource, location in less environmentally sensitive habitats than other available lands, proximity to existing interconnection points, economic infeasibility of aggregating sufficient parcels under private ownership, and impact reductions and economies associated with strategic "infill" development.

2.2 SITE CHARACTERIZATION METHODS

To determine potential impacts to environmental resources, particularly avian and bat species, resulting from the development of the Project, the site characterization was initiated in 2004 with a constraints analysis. The constraints analysis was based on information gathered during a desktop analysis, coordination with regulatory oversight agencies and wildlife advocacy organizations, and field assessments. More detailed studies conducted on the site between 2011 and 2013 to update and quantify bird and bat use of the project are discussed in Section 3.

2.2.1 Desktop Analysis

The desktop analysis included a review of existing and potential Habitat Conservation Plans[22] and Natural Community Conservation Plans;[23] as well as the West Mojave Plan,[24] an element of the CDCA Plan; and the Kern County General Plan.[25] A query of the California Natural Diversity Database (CNDDB)[26,27,28] was undertaken to identify special-status species, including listed, sensitive, and locally important species with the potential to occur within, and adjacent to, the project property. The query was conducted for the U.S. Geological Survey (USGS) 7.5-minute series, Tylerhorse Canyon, topographic quadrangle, in which the project property is located, as well as the eight surrounding 7.5-minute series topographic quadrangles (Cummings Mountain, Tehachapi South, Monolith, Willow Springs, Little Buttes, Fairmont Butte, Neenach School, and Liebre Twins). The National Wetlands Inventory (NWI) was reviewed for the same USGS topographic quadrangles.[29] In addition, the USGS quadrangles were reviewed to assess the location of blue-line drainages. Finally, a review of proposed and designated critical habitat for federally listed threatened and endangered species was conducted.[30]

[22] U.S. Fish and Wildlife Service. May 2009. *Habitat Conservation Plans.* Region 8. Available at: http://ecos.fws.gov/conserv_plans/servlet/gov.doi.hcp.servlets.PlanReport?region=8&type=HCP&rtype=2&hcpUser=&view=report

[23] California Department of Fish and Game. Accessed April 2010. *Natural Community Conservation Planning (NCCP)*. Available at: http://www.dfg.ca.gov/habcon/nccp/status.html

[24]Bureau of Land Management. January 2005. Final Environmental Impact Report and Statement for the West Mojave Plan. California Desert District, Moreno Valley, CA. Available at: http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-1-Chapter1_Bookmarks.pdf

[25] Kern County. 15 July 2004 (Amended 13 March 2007). Kern County General Plan, Land Use, Conservation and Open Space Element. Bakersfield, CA. Available at: http://www.co.kern.ca.us/planning/pdfs/kcgp/KCGPChp1LandUse.pdf

[26] California Department of Fish and Game. 2004. *Rarefind 2: A Database Application for the Use of the California Department of Fish and Game Natural Diversity Database*. Sacramento, CA.

[27] California Department of Fish and Game. 2005. *Rarefind 3: A Database Application for the Use of the California Department of Fish and Game Natural Diversity Database*. Sacramento, CA.

[28] California Department of Fish and Game. 2012. *Rarefind 4: A Database Application for the Use of the California Department of Fish and Game Natural Diversity Database*. Sacramento, CA.

[29] U.S. Fish and Wildlife Service. [August 1986] 1995. *National Wetlands Inventory Map, Tylerhorse Canyon, California*. Available at: http://www.fws.gov/wetlands/data/index.html

[30] U.S. Fish and Wildlife Service. 2013. Critical Habitat Portal. Available at: http://criticalhabitat.fws.gov/crithab/

2.2.2 Agency Coordination

Informal consultation was undertaken with the USFWS to review the scope of federally listed, candidate, and other sensitive species that have the potential to occur in the project property, as well as to confirm field methods to be used in assessing the presence or absence of these species.

Other agencies contacted included BLM, CDFW, the U.S. Army Corps of Engineers (USACOE), and Kern County. Coordination was initiated in 2004 and 2005. Further coordination with agencies continued between 2011 and the present.

2.2.3 Field Assessment Methods

Sapphos Environmental, Inc. conducted a variety of environmental baseline surveys between 2004 and 2011 to provide a general overview of the habitat and wildlife in the project vicinity. These surveys were conducted to determine the location and extent of plant communities, sensitive habitats, and the potential for occurrences of sensitive plant and animal species.

The majority of the surveys conducted on the project from 2004 to 2011 were reconnaissance-level and were characterized by pedestrian or vehicle-based surveys of the project vicinity. In general, the surveys focused on documenting the following:

- Migratory bird presence and habitat
- Raptor presence and habitat
- General wildlife habitat
- Vegetation community types
- Wetland locations

Habitat Assessments

The preliminary habitat assessment was conducted by Sapphos Environmental, Inc. on June 24, July 1, July 8, July 22, and July 29, 2004. Additional surveys were undertaken on January 28, July 12, and July 13, 2005. Field surveys during this period were undertaken by six to eight Sapphos Environmental, Inc. biologists. The project property was resurveyed on July 6, 7, and 8, 2009 to verify that no substantial changes had occurred that would necessitate major revision of the conclusions of the 2004 and 2005 surveys. The habitat assessment served as the tool for identification of areas within the project property with the potential to support special-status species.

Plant Community Mapping

The purpose of the plant community mapping was to characterize the plant communities within the project property. The plant community map provided the basis for determining the presence or absence of state-designated sensitive plant communities, including wetland, aquatic, and riparian habitats. The plant community mapping also served as one source of information for making a determination regarding the ability of the project to provide suitable habitat for sensitive plant and wildlife species.

Project data and aerial photographs were reviewed, and site visits were conducted on April 14 and 15, 2005, to map and characterize the vegetation communities within the project. The site was revisited on November 23, 2011, to further refine the boundaries of the plant communities present on-site. The description of plant communities followed the classification system provided in *Preliminary Descriptions of the Terrestrial Natural Communities of California*[31] and cross-referenced to vegetation series described in *A Manual of California Vegetation*.[32] Scientific names and common names were determined using *The Jepson Manual*.[33] Common names not available from *The Jepson Manual* were taken from *A Flora of Southern California*.[34]

Riparian and Wetland Mapping

Information gathered from a literature review was analyzed to determine the presence of hydric soils, drainage features, and the potential presence of drainages / isolated dry washes and intermittently flooded features. Geographic information systems (GIS) were used to identify the locations of drainage feature crossings (i.e., road crossings and underground power lines) to determine the potential presence of features subject to CDFW jurisdiction pursuant to Section 1600 of the State Fish and Game Code.

The determination of presence or absence of federally protected wetlands, as defined in Section 404 of the Clean Water Act, conformed to the protocols specified in the *Corps of Engineers Wetlands Delineation Manual*,[35] as modified by the U.S. Supreme Court case, *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers*, No. 99-1178 (January 9, 2001).[36] The determination regarding the potential presence or absence of federally protected wetlands included review of USGS topographic maps and NWI maps, interpretation of aerial photographs, spatial analysis using GIS, plant community mapping, field analysis, and coordination with the USACOE.

Field surveys were conducted on June 7 and 8, 2006, to determine the presence or absence of potential waters of the United States not evident on the NWI or USGS maps. A team of two certified wetland delineators conducted the field investigations. The results of the determination of presence or absence of federally protected wetlands were documented in a letter and transmitted to the USACOE.[37]

2.3 SITE CHARACTERIZATION RESULTS

As a result of the desktop analysis, coordination with agencies and stakeholders, and multiple reconnaissance-level field investigations, the general attributes of the project property in terms

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[31] Holland, Robert F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Sacramento, CA: California Department of Fish and Game.

[32] Sawyer, J.O., and T. Keeler-Wolf. 1995. *A Manual of California Vegetation*. Sacramento, CA: California Native Plant Society.

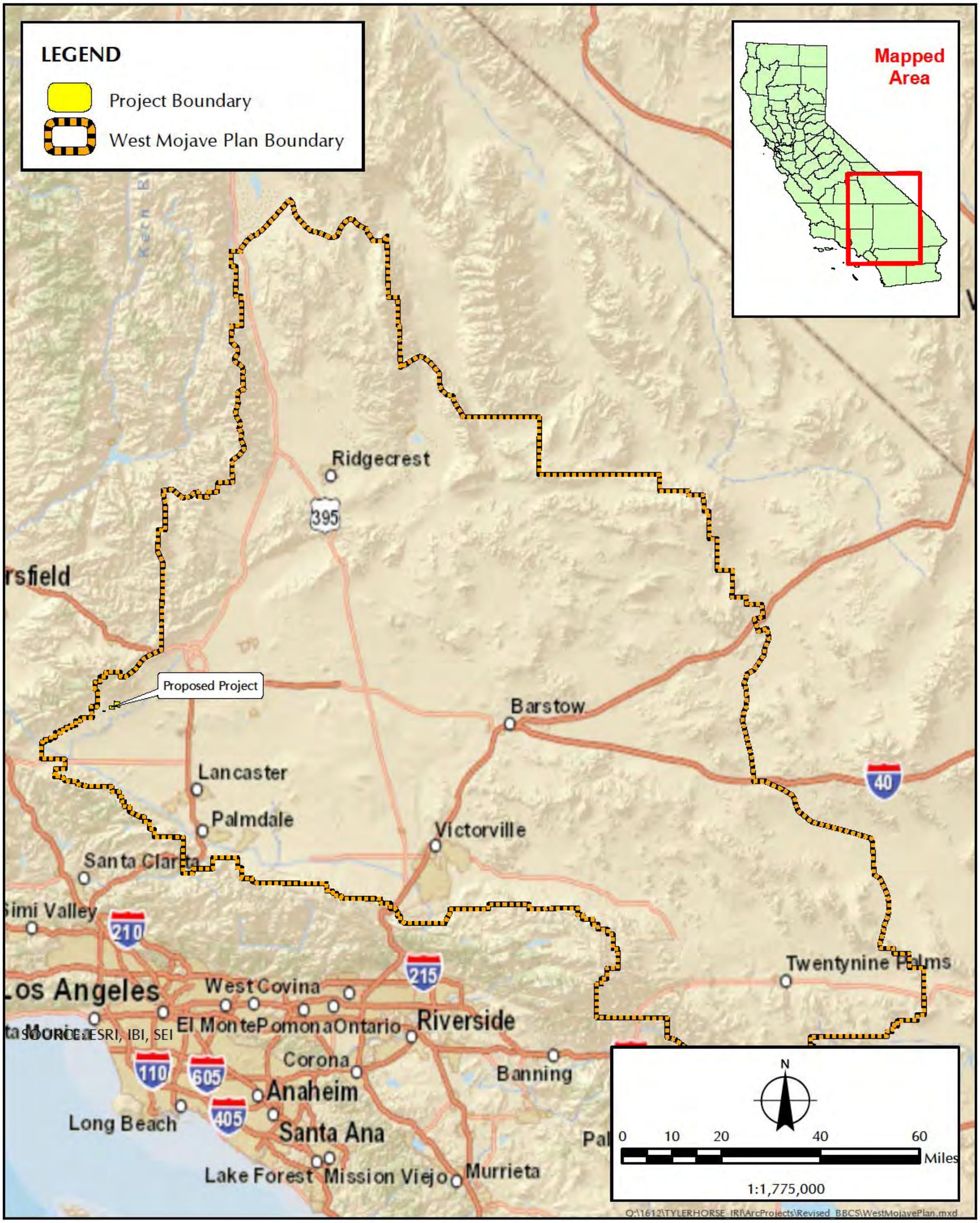
[33] Hickman, J.C., ed. 1993. *The Jepson Manual: Higher Plants of California*. Berkeley, CA: University of California Press.

[34] Munz, P. 1974. *A Flora of Southern California*. Berkeley, CA: University of California Press.

[35] U.S. Army Corps of Engineers. January 1987. *Corp of Engineers Wetlands Delineation Manual*. Final Technical Report Y-87-1. Vicksburg, MS. Prepared by: Environmental Laboratory, U.S. Army Engineer Research and Development Center, Waterways Experiment Station, Vicksburg, MS.

[36] U.S. Supreme Court. 9 January 2001. Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers. No. 99-1178, 531 U.S. 159.

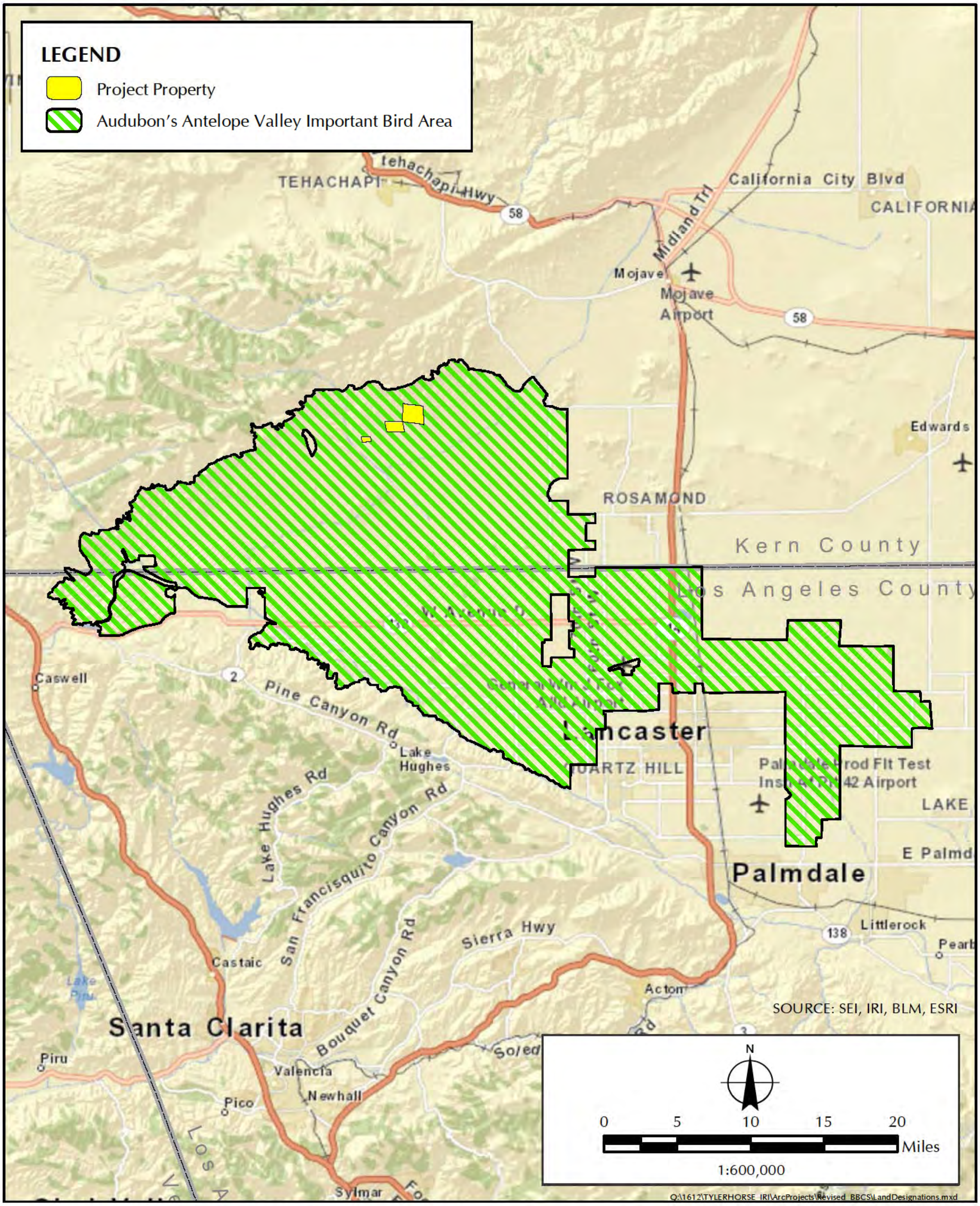
[37] Mendez, Irena, Sapphos Environmental, Inc., Pasadena, CA. 22 June 2006. Letter to Mr. Aaron Allen, U.S. Army Corps of Engineers, Ventura, CA. Subject: Determination of Non-Jurisdiction for Proposed PdV Wind Energy Project in Southern Kern County.



IBERDROLA RENEWABLES

FIGURE 2.3.1-1

Project in Relation to the West Mojave Plan



IBERDROLA RENEWABLES

FIGURE 2.3.1-2

Project in Relation to Audubon's Antelope Valley Important Bird Area

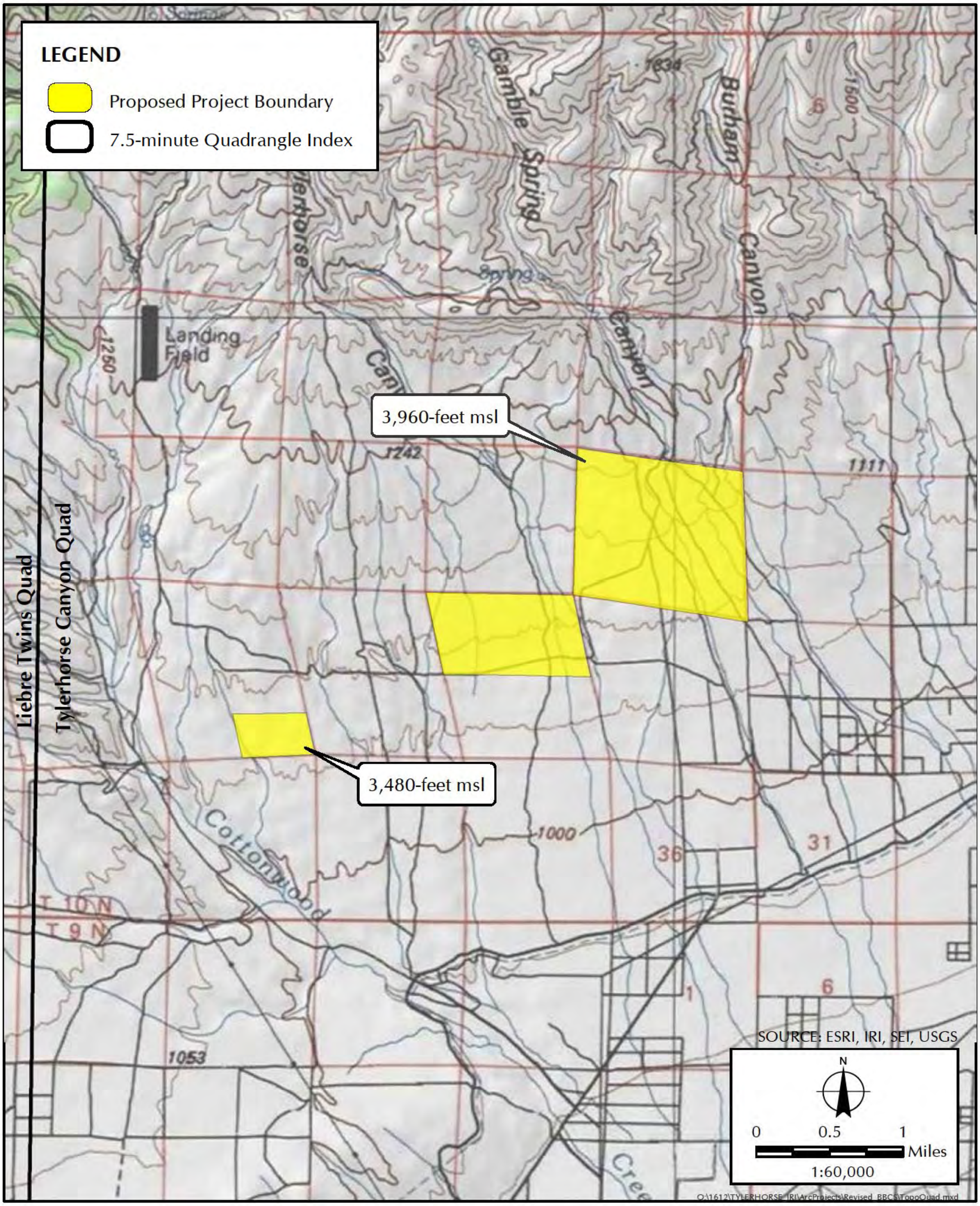


FIGURE 2.3.2-1

Topographic Map with USGS 7.5-minute Quadrangle Index

of their potential for harboring or attracting bird and bat species were characterized in relation to land use designations, topography and plant communities, land use and habitat connectivity, riparian and wetland habitats, presence of migratory corridors and wildlife congregation areas, and potential presence of special status bird and bat species.

2.3.1 Land Designations

The project property consists of four noncontiguous parcels comprising a total of 1,207 acres on lands administered by the BLM. The project property is within the West Mojave Plan boundary (Figure 2.3.1-1, *Project in Relation to the West Mojave Plan*). Due to the location of the project study area within the boundaries of the West Mojave Plan, plant and animal species addressed in this Plan were evaluated for their potential to be present within the project vicinity.

The project also lies at the northern edge of the Antelope Valley Important Bird Area (IBA), a 300,000-acre area designated by The Audubon Society for its grassland bird and raptor communities. (Figure 2.3.1-2, *Project in Relation to Audubon Important Bird Areas*).[38] Audubon identifies IBAs based on the presence of healthy bird populations; IBAs do not necessarily include declining or imperiled bird species.[39]

The project is not located within critical habitat for any federally threatened or endangered avian or bat species. The Tejon Ranch Critical Habitat Unit, designated critical habitat for the California condor, is located approximately 2.7 miles west of the project property.

2.3.2 Topography

The project is located within the USGS 7.5-minute series Tylerhorse Canyon topographic quadrangle (Figure 2.3.2-1, *Topographic Map with USGS 7.5-Minute Quadrangle Index*) in the northwestern Antelope Valley portion of the Mojave Desert. The Antelope Valley consists of approximately 1,200 square miles (3,108 square kilometers) of elevated desert terrain. It is primarily an alluvial desert plain containing bedrock hills and low mountains. The geology of the Antelope Valley is characterized by relatively flat-lying topography and valley fill deposits.

The project straddles the desert floor and the adjacent foothills of the Tehachapi Mountains, a short transverse range that connects the southernmost Sierra Nevada Mountains (to the northeast) with the San Emigdio Mountains (to the southwest). Elevation on the project ranges between 3,480 feet to 3,960 feet above mean sea level (MSL).

2.3.3 Plant Communities

The project is located within the western Mojave Desert region of the desert floristic province.[40] Mojave Desert vegetation is dominated by low, widely spaced shrubs. The species composition of the Mojave Desert has common elements with the Great Basin to the north and many succulent species common to the Sonoran Desert to the south and east. The most widely

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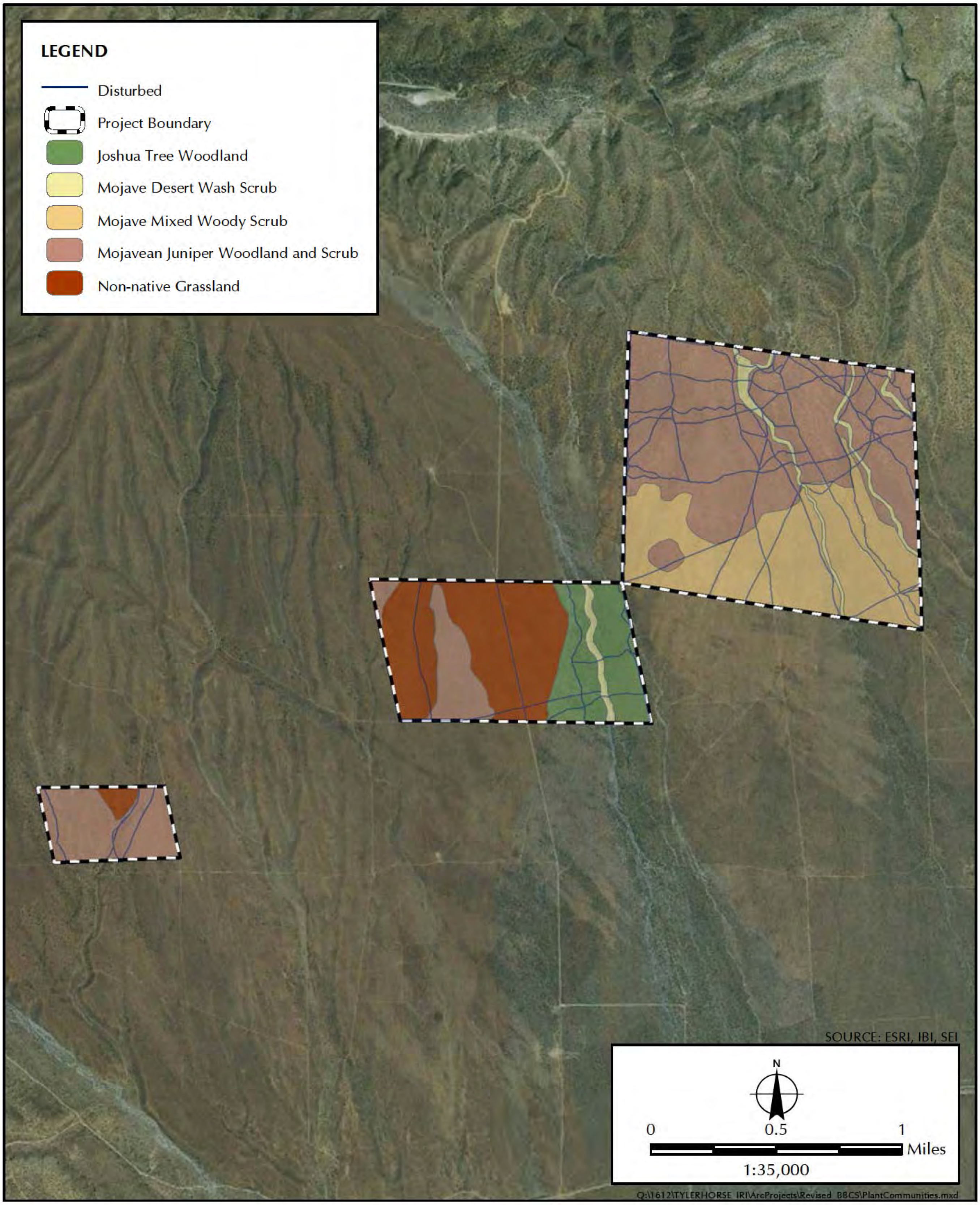
[38] National Audubon Society. Accessed May 2013. “Antelope Valley (Lancaster) Site Profile Report.” Available at: http://netapp.audubon.org/iba/Reports/270

[39] National Audubon Society. Updated June 2012. “Important Bird Areas Program.” Available at: http://web4.audubon.org/bird/iba/

[40] Hickman, J.C., ed. 1993. *The Jepson Manual: Higher Plants of California*. Berkeley, CA: University of California Press.



IBERDROLA RENEWABLES

FIGURE 2.3.3-1

Plant Community Map

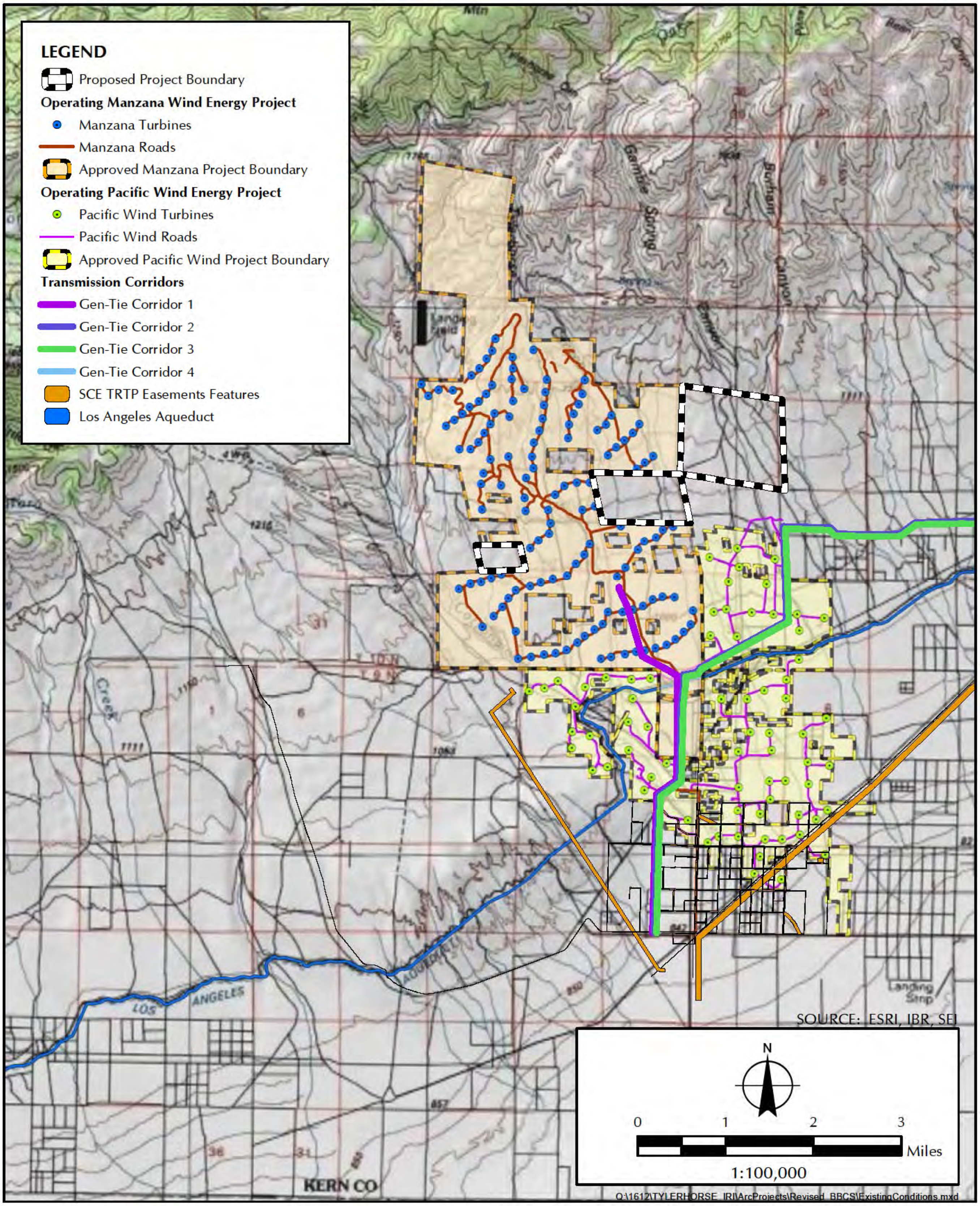


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FIGURE 2.3.4-1

Existing Land Uses in Relation to Project distributed plant is the creosote bush (*Larrea tridentata*), which covers extensive areas in nearly pure stands, often in close association with bursage (*Ambrosia dumosa*).

Five plant communities were identified within the project property: Mojavean Juniper Woodland and Scrub, Non-native Grassland, Joshua Tree Woodland, Mojave Desert Wash Scrub, and Mojave Mixed Woody Scrub. One plant community present on the project property, Joshua Tree Woodland, is designated as sensitive by the CDFW (Figure 2.3.3-1, *Plant Community Map*; and Table 2.3.3-1, *Plant Communities Present within the Project Property*). A total of 26 acres have been mapped as “Disturbed“ to account for areas that have been previously impacted such that native vegetation is no longer present. The plant communities found on the project are widespread through the Antelope Valley region and are not unique to the project property.

TABLE 2.3.3-1
PLANT COMMUNITIES PRESENT WITHIN THE PROJECT PROPERTY

Plant Community	Element Code / Type	Total Project (acres)
Mojavean Juniper Woodland and Scrub	CTT72220CA (CNDDB) / 72220 (Holland)	565
Non-native Grassland	CTT42200CA (CNDDB) / 42200 (Holland)	202
Joshua Tree Woodland	CTT75400CA (CNDDB) / 73000 (Holland)	98
Mojave Desert Wash Scrub	CTT63700CA (CNDDB) / 63700 (Holland)	40
Mojave Mixed Woody Scrub	CTT34210CA (CNDDB) / 34210 (Holland)	276
Disturbed	N/A	26
TOTAL		**1,207**

KEY:
CNDDB = California Natural Diversity Database
SOURCES:
1. California Department of Fish and Game. 2009. *Rarefind3: California Natural Diversity Database*. Sacramento, CA.
2. Holland, Robert F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Sacramento, CA: California Department of Fish and Game.

2.3.4 Land Use and Habitat Connectivity

The project property is currently largely vacant and used for seasonal livestock grazing and off-road vehicle (ORV) use. There is no developed roadway system within the project; however, there is an existing, rather dense network of two-track dirt roads and single ORV tracks that have been used historically to support ORV use and ranch operations. No paved roads exist within the project.

The land surrounding the project property consists of two commercial wind energy projects, several electrical transmission lines, the Los Angeles Aqueduct, a patchwork of undeveloped parcels with a network of two-track dirt roads, and several rural residences (Figure 2.3.4-1, *Existing Land Uses in Relation to the Project*). The Manzana Project, operated by HW’s parent company Iberdrola, is a 6,970-acre wind energy facility that began operations in 2012. The facility currently consists of 126, 1.5-MW capacity wind turbine generators (189-MW generation capacity) and associated infrastructure. The Manzana Project almost completely surrounds both the project property’s western and central parcels (Figure 2.3.4-1). The Pacific Wind Project, operated by EDF Renewable Energy, is a 9,576-acre wind energy facility that also began operations in 2012. The facility currently consists of 70, 2-MW WTGs (140 MW generation capacity) and associated infrastructure. The as-built footprint of the Pacific Wind Project is located approximately 1 mile south of the project’s eastern parcel and approximately 0.5 mile southeast of the project’s central parcel.

Although the project property itself, as well as the land to the north and east of the largest eastern parcel, is largely undeveloped, in general the area is fairly fragmented and provides little in the form of habitat connectivity with the surrounding landscape. Due to the proximity of two large operating wind energy facilities adjacent to the project property, construction of a wind energy facility on the project property itself would cause little habitat fragmentation. Rather, it would provide an opportunity to strategically infill these parcels with compatible development.

2.3.5 Riparian and Wetland Habitats

There were no NWI wetlands identified within the project property, and the nearest wetland is located approximately 1.3 miles northwest of the project property. Multiple intermittent or ephemeral drainages in the project property were identified, which, during extreme rain events, convey surface water runoff to Rosamond Lake located on Edwards Air Force Base northeast of Lancaster. The USGS 7.5 minute series Tylerhorse Canyon quadrangle depicts Tylerhorse Canyon, an ephemeral blue-line drainage crossing through the northeastern portion of the parcel in section 26, Gamble Springs Canyon crossing through the middle of the parcel in Section 24, Burham Canyon crossing through the northeast corner of the parcel in Section 24, and six additional unnamed ephemeral drainage crossing through the proposed project area (Figure 2.3.5-1, *Drainage System*). Cottonwood Creek, a major drainage in the western Antelope Valley, is located approximately 1 mile to the west of the project study area in a northwest-southeast direction. Runoff from the Tehachapi Mountains flows within Cottonwood Creek towards Rosamond Dry Lake.

There is no riparian or wetland habitat within the project property, and very little in the greater project vicinity. Therefore, bird and bat species that depend on such habitat for nesting or stopover activities would not be expected to occur frequently on the project.

2.3.6 Presence of Migratory Corridors and Wildlife Congregation Areas

The topography of the project vicinity is predominately characterized by flat scrubland or grasslands and low hills with little topographical relief. There are no obvious geophysical or hydrological features that would tend to create natural points of wildlife congregation or “funnels,” such as prominent ridgelines or mountain gaps that could potentially serve as a large-scale or regional migratory pathway. Data collected during habitat assessments did not indicate that the project is located within a known major migratory pathway for any major species group, including neotropical migrants, waterfowl, raptors, particularly golden eagles, or bats.

For the majority of avian and bat species, the particular habitat types present on the project do not act as an attractant that would tend to concentrate large groupings of wildlife. Habitats on the project, such as desert scrub, juniper and Joshua tree woodland, and non-native grassland, are common and plentiful throughout the greater Mojave Desert. The project area does not appear to provide important stopover habitat for migrating birds or bats, especially those that depend on open water or forested environments for stopover habitat. Nesting or roosting substrates, such as Joshua trees, scattered residential windbreaks, and transmission towers, provide some habitat for nesting raptors and corvids, such as red-tailed hawk, American kestrel, and common raven; but no suitable nesting locations for larger-bodied raptors of concern, such as golden eagle or California condor, were identified on the project during initial site characterization.

2.3.7 Potential Presence of Special Status Bird and Bat Species

The project is located in an area that provides potentially suitable habitat for 17 special-status avian species and 4 species of bats. Special-status species include those listed as threatened or endangered under the federal and California ESAs, species proposed for listing, species of special concern, and other species identified either by the USFWS, BLM, or CDFW as unique or rare, and that have the potential to occur within the project area. In addition, all species included in the West Mojave Plan and raptor species included on the CDFW Watch List were also considered as potentially occurring sensitive species. Of particular concern among the 17 special status avian species, California condor is federally and state- listed as endangered, as well as "fully protected" under the California Fish and Game Code; Swainson's hawk is state-listed as threatened; and the golden eagle is afforded protection under the BGEPA and is listed as "Fully Protected" under the California Fish and Game Code. A comprehensive list of the special status avian and bat species potentially occurring on the project, their status, habitat requirements, and the likelihood of their occurrence based on habitat and field surveys is provided in Table 2.3.7-1, *Special Status Bird and Bat Species Potentially Present Within the Project Vicinity*.

TABLE 2.3.7-1
SPECIAL STATUS BIRD AND BAT SPECIES POTENTIALLY PRESENT WITHIN THE PROJECT VICINITY

Species	Status (Federal/State/ BLM/WeMo)	Habitat	Potential Occurrence on the Project
Birds			
American white pelican (*Pelecanus erythrorhynchos*)	--/CSC/ --/WeMo	Sandy coastal beaches and lagoons, waterfronts and pilings, and rocky cliffs.	Present. Observed migrating through the project property in large numbers.
California condor (*Gymnogyps californianus*)	FE/SE, CFP/--/--	Lives in rocky scrubland, coniferous forests, and oak savannas. They are often found near cliffs or large trees, which they use as nesting sites. Individual birds have a large home range and have been known to travel up to 150 miles in search of carrion.	No known occurrences of this species within the project property or the immediate surrounding region. Nearest known occurrence of this species, based on USFWS GPS-transmitters, is approximately 3.7 miles to the west.
White-tailed kite (*Elanus leucurus*)	--/CFP/BLM/--	Low foothills or valley areas with valley or live oaks, riparian areas, and marshes near open grasslands for foraging.	Present. One individual was observed flying through the Manzana Project. No nesting available, but may be present during migration.
Northern harrier (*Circus cyaneus*)	--/CSC/ --/WeMo	Grasslands, meadows, marshes, and seasonal and agricultural wetlands.	Present. No known nesting, but common during winter and during migration.
Sharp-shinned hawk (*Accipiter striatus*)	--/WL/-- /WeMo	Nests in riparian growths of deciduous trees and live oaks. Preys mostly on small passerine birds.	Present. Not known to breed in Southern California. Common migrant.

TABLE 2.3.7-1
SPECIAL STATUS BIRD AND BAT SPECIES POTENTIALLY PRESENT WITHIN THE PROJECT VICINITY, *Continued*

Species	Status (Federal/State/ BLM/WeMo)	Habitat	Potential Occurrence on the Project
Cooper's hawk (*Accipiter cooperii*)	--/WL/--/WeMo	Nests in a wide variety of habitat types, from riparian woodlands and digger pine-oak woodlands through mixed conifer forests.	Present. Potential breeding species, but not currently known to nest on-site. Common local resident and migrant in the Antelope Valley.
Northern goshawk (*Accipiter gentilis*)	--/CSC/BLM/--	Found in coniferous and deciduous forests; during the cold winter months migrates to warmer areas, usually at lower elevations.	Present, but extremely rare. A single adult was observed flying north on spring migration at the Manzana Project. Very uncommon species south of the southern Sierra Nevada Mountains.
Swainson's hawk (*Buteo swainsoni*)	--/ST/ BLM/WeMo	Nests in oaks or cottonwoods, often in or near riparian habitats. Forages for small mammals, birds, and reptiles in grasslands, irrigated pastures, and grain fields.	Present. No nesting population, but were observed using the Manzana Project during migration. Individual Swainson's hawks were documented flying at the Pacific Wind Project and foraging over the project.
Ferruginous hawk (*Buteo regalis*)	--/WL/--/WeMo	Breeds outside of California. Forages in open grasslands.	Present. Not known to nest in project property, but common as a winter resident.
Golden eagle (*Aquila chrysaetos*)	BGEPA/WL, CFP/BLM/--	Nests in canyons and large trees in open habitats. Forages chiefly for mammalian prey in grasslands and over open areas.	Present. No nesting population, but were observed using the project property during migration. Nearest known active nest is approximately 15 miles northwest of the project property in 2013.
Merlin (*Falco columbarius*)	--/WL/--/--	Breeds outside California; inhabits coastlines, open grasslands, savannahs, and woodlands.	Present. Not known to nest, but expected in low numbers during migration.
American peregrine falcon (*Falco peregrinus anatum*)	--/CFP/--/--	An aerial forager that preys almost chiefly on birds; prefers open areas, habitats along rivers, sea cliffs, and islands.	Present. No nesting population, but one individual was observed at adjacent Manzana Project during migration.
Prairie falcon (*Falco mexicanus*)	--/WL/--/--	Primarily inhabits perennial grasslands, savannahs, and rangeland. Nests on cliffs, canyons, and rock outcrops.	Present. No known nests on-site, but ranges from an infrequent or common year-round resident and migrant.

TABLE 2.3.7-1
SPECIAL STATUS BIRD AND BAT SPECIES POTENTIALLY PRESENT WITHIN THE PROJECT VICINITY, *Continued*

Species	Status (Federal/State/ BLM/WeMo)	Habitat	Potential Occurrence on the Project
Burrowing owl (*Athene cunicularia*)	--/CSC/BLM/ WeMo	Level, open, dry, heavily grazed, or low-stature grassland or desert vegetation with burrows excavated by badgers, prairie dogs, or ground squirrels. Preys on small mammals and insects.	Present. Burrowing owls and occupied burrows observed on the project during both breeding and wintering seasons.
Vaux's swift (*Chaetura vauxi*)	--/CSC/ --/WeMo	Feeds aerially on small insects; breeds in forest habitats.	Present. Observed at both the Manzana and Pacific Wind Projects. Project is not within breeding range. Expected to be seen only during migration.
Loggerhead shrike (*Lanius ludovicianus*)	--/CSC/ --/WeMo	Nests in shrublands and forages in open grasslands. Often found associated with agriculture and urbanized areas. All plant community types in the project property provide suitable habitat.	Present as a year-round resident at the project property.
Le Conte's thrasher (*Toxostoma lecontei*)	--/CSC/ BLM/WeMo	Resides in desert scrub habitats, primarily open desert wash, alkali desert scrub, and desert succulent scrub. Occupies deserts with sparse vegetation consisting of cholla and creosote bush. Suitable habitat in the project property includes Mojave Desert Wash Scrub, Mojave Creosote Bush Scrub, Mojavean Juniper Woodland and Scrub, Joshua Tree Woodland, and Mojave Mixed Woody Scrub plant communities.	Present as a year-round resident at the project property.
Bats			
Western small-footed myotis (*Myotis ciliolabrum*)	--/--/BLM/--	Found in deserts and desert mountains in the western U.S. Occupies daytime roosts in cracks in canyon walls, caves, mines, tree bark, or abandoned houses. It hibernates in caves or mine tunnels within the summer range, and is active during winter. Formerly regarded as a subspecies of *Myotis leibii*. Recent work has shown that *M. ciliolabrum* should be elevated to specific status. Trees and rock crevices in the project property could provide suitable roosting habitat.	No records in the USGS 7.5-minute Tylerhorse Canyon topographic quadrangle or the eight surrounding quadrangles. No roosts found, but may migrate through and forage on habitat in the project property.

TABLE 2.3.7-1
SPECIAL STATUS BIRD AND BAT SPECIES POTENTIALLY PRESENT WITHIN THE PROJECT VICINITY, *Continued*

Species	Status (Federal/State/ BLM/WeMo)	Habitat	Potential Occurrence on the Project
Yuma myotis (*Myotis yumanensis*)	--/--/BLM/--	Common in western U.S., generally prefers open forests and woodlands with sources of water. Feeds on small flying insects and forages over water sources. Roosts in buildings, mines, caves, and crevices; and separate night roosts may be used. Roost location and foraging proximity is closely tied to bodies of water.	No records in the USGS 7.5-minute Tylerhorse Canyon topographic quadrangle or the eight surrounding quadrangles. No roosts found, but may migrate through and forage on habitat in the project property.
Pallid bat (*Antrozous pallidus*)	--/CSC/BLM/--	Occurs throughout the American West. Roosts in rock crevices, caves, mineshafts, under bridges, in buildings, and within hollow trees. Consumes crickets, scorpions, beetles, grasshoppers, and other invertebrates. Roosts in small colonies of 10–100 and emerges late at night to forage on the ground. Forms nursery colonies, and gives birth usually in June.	No records in the USGS 7.5-minute Tylerhorse Canyon topographic quadrangle or the eight surrounding quadrangles. No roosts found, but may migrate through and forage on habitat in the project property.
Western mastiff bat (*Eumops perotis*)	--/CSC/BLM/--	In the Southwest U.S., generally away from human developments. Takes diurnal refuge in vertical rock crevices on cliffs. Roost entrances are large and horizontally oriented, and face downward as they are entered from below, where there is an unobstructed drop of several meters. Colonies from 2 to several dozen bats. Leaves day roosts late in the evening to forage on moths, crickets, and grasshoppers. Not believed to use night roosts. Normally one young, probably in June to early July, within nursery colonies.	No records in the USGS 7.5-minute Tylerhorse Canyon topographic quadrangle or the eight surrounding quadrangles. No roosts found, but may migrate through and forage on habitat in the project property.

KEY:
BGEPA = Bald and Golden Eagle Protection Act
BLM = Bureau of Land Management sensitive species
CSC = California Department of Fish and Wildlife (CDFW) species of special concern
FE = U.S. Fish and Wildlife Service federally endangered species
CFP = CDFW fully protected species
SE = CDFW state-endangered species
ST = CDFW state-threatened species
WeMo = avian species included in the West Mohave Plan
WL = CDFW Watch List
USGS = U.S. Geological Survey

2.4 CONCLUSIONS

Based on the information collected from the desktop analysis, informal consultation with the agencies, and baseline site characterizations, it was determined that the project property was relatively unconstrained for wind development in relation to potential conflicts with birds and bats. Specifically, as a result of site characterizations it was determined that the project would likely have a relatively low potential for population-level impacts to the majority of bird and bat species, including two species of particular conservation interest in the region, the golden eagle and the California condor. However, due to the presence of these and other special-status species in the project vicinity, it was determined that additional site-specific surveys were warranted to further document the wildlife and habitat present on the project. These survey methods and results are summarized in Section 3.0.

SECTION 3.0
TIER 3 – SITE-SPECIFIC SURVEYS AND ASSESSMENT

This section details the exhaustive number of directed avian and bat surveys conducted within and adjacent to the project since 2004, including a description of the survey methods employed and general results. Based on the initial site assessments of the project, and the determination that the project could potentially support species of special concern, including golden eagles and California condors, enXco engaged Sapphos Environmental, Inc. in 2004 to assess the biological resources of the greater project area by way of site-specific surveys on adjacent privately held potential wind energy facilities, including the Manzana Project and the Pacific Wind Project. Overall, Sapphos Environmental, Inc. completed thousands of hours of biological surveys within the renewable energy project properties adjacent to the project. In October 2011, in coordination with the BLM, it was determined that additional updated biological resource surveys should be conducted within the boundaries of the specific project parcels to further assess the biological resources. Sapphos Environmental, Inc. began these surveys in 2011, including a full year of bird use counts (BUCs), burrowing owl habitat assessment and burrow occupancy, and aerial eagle nesting surveys. The methods and results of the project-specific avian surveys conducted between 2011 and 2013; the methods and results for avian migration, avian use, and bat surveys conducted at the Manzana and Pacific Wind Projects between 2004 and 2010; and the desktop analysis of California condor distribution in the Antelope Valley described below correspond to Tier 3 of the *Final Guidelines*[41] and Stage 2 of the *ECP Guidance*.[42]

The combined results of the surveys quantify the distribution, relative abundance, behavior, and use of birds and bats in the project vicinity. A risk assessment for general avian and bat species, as well as individual risk accounts for special-status species, including the golden eagle and California condor, is presented in Section 4.0, *Risk Analysis*.

3.1 SITE-SPECIFIC AVIAN AND BAT SURVEYS

3.1.1 Avian Surveys

Avian surveys conducted within and adjacent to the project between 2004 and 2013 included the following survey types: 2011–2012 Tylerhorse Bird Use Counts; 2013 Aerial Golden Eagle Nest Surveys; Ground-Based Eagle Surveys at Adjacent Projects, including 2004–2005 Manzana Project Raptor Migration Counts, 2008–2009 Pacific Wind Project Bird Use Counts, and Pacific Wind Project Diurnal Raptor Transects; 2005–2012 Tylerhorse California Condor Analysis; and 2011–2012 Tylerhorse Burrowing Owl Surveys. The survey methods and general results of these surveys are described in the following sections.

[41] U.S. Fish and Wildlife Service Wind Turbine Guidelines Advisory Committee. 23 March 2012. *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines*. Available at: www.fws.gov/windenergy/docs/WEG_final.pdf

[42] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. *Eagle Conservation Plan Guidance*. Module 1—"Land-Based Wind Energy." Version 2. Arlington, VA.

3.1.1.1 2011–2012 Tylerhorse Bird Use Counts

Methods

Sapphos Environmental, Inc. conducted four seasons of BUC surveys at Tylerhorse for one continuous year between December 2011 and November 2012.[43,44,45,46] BUCs were designed in accordance with the CEC guidelines and the most current ECP guidelines at the time of survey design (*Draft Guidance*).[47,48] The *Draft Guidance* recommended 30-minute point count surveys at 800-meter-radius plots within and adjacent to the project footprint. This recommendation is quite different from the current *ECP Guidance*, which recommends much longer survey periods, between 1 and 4 hours per point count.[49] The CEC recommends approximately 1 to 1.5 BUC points per square mile. The project property encompasses approximately 1,207 acres (1.9 square miles). Based on this recommendation and the noncontiguous nature of the three parcels that constitute the project, three BUC points were selected as part of the survey effort (Figure 3.1.1.1-1, *2004–2012 Avian Survey Locations*). The number and location of these points have been proportionally distributed among the main habitat types onsite: one BUC point in Mojavean Juniper Woodland and Scrub, one BUC point at the intergrade between Mojavean Juniper Woodland and Scrub and Mojave Desert Wash Scrub, and one BUC point at the intergrade between Non-Native Grassland and Joshua Tree Woodland. When possible, points were located at high vantage points where an unobstructed view of the surrounding area was provided. The exact location of each BUC point was marked using a Garmin global positioning system (GPS) unit, and photographs were taken in each of the four cardinal directions.

During each of four seasons, biologists conducted six 30-minute unlimited distance counts at each of three points within the Tylerhorse property. Biologists surveyed each point four times in the morning (between sunrise and 12:00 p.m.) and twice in the afternoon and evening (between 12:00 p.m. and sunset) during the course of each season. Methods follow the BUC section of the CEC Guidelines and the Point Counts section of the *Draft Guidance*.[50,51] Biologists collected

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[43] Sapphos Environmental, Inc. 30 March 2012. Memorandum for the Record No. 11. Subject: Results of 2011–2012 Winter Bird Use and Burrowing Owl Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: enXco Development Corporation, San Ramon, CA. Pasadena, CA.

[44] Sapphos Environmental, Inc. 24 July 2012. Memorandum for the Record No. 1. Subject: Results of 2012 Spring Bird Use Surveys and Special-Status Plant Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: Iberdrola Renewables, LLC, Portland, OR. Pasadena, CA.

[45] Sapphos Environmental, Inc. 11 March 2013. Memorandum for the Record No. 2. Subject: Results of 2012 Summer Bird Use Surveys and Summer Burrowing Owl Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: Iberdrola Renewables, LLC, Portland, OR. Pasadena, CA.

[46] Sapphos Environmental, Inc. 12 March 2013. Memorandum for the Record No. 3. Subject: Results of 2012 Fall Bird Use Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: Iberdrola Renewables, LLC, Portland, OR. Pasadena, CA.

[47] California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento.

[48] U.S. Fish and Wildlife Service. January 2011. *Draft Eagle Conservation Plan Guidance*. Available at: http://www.fws.gov/windenergy/docs/ECP_draft_guidance_2_10_final_clean_omb.pdf

[49] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. *Eagle Conservation Plan Guidance*. Module 1—"Land-Based Wind Energy." Version 2. Arlington, VA.

[50] California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento.

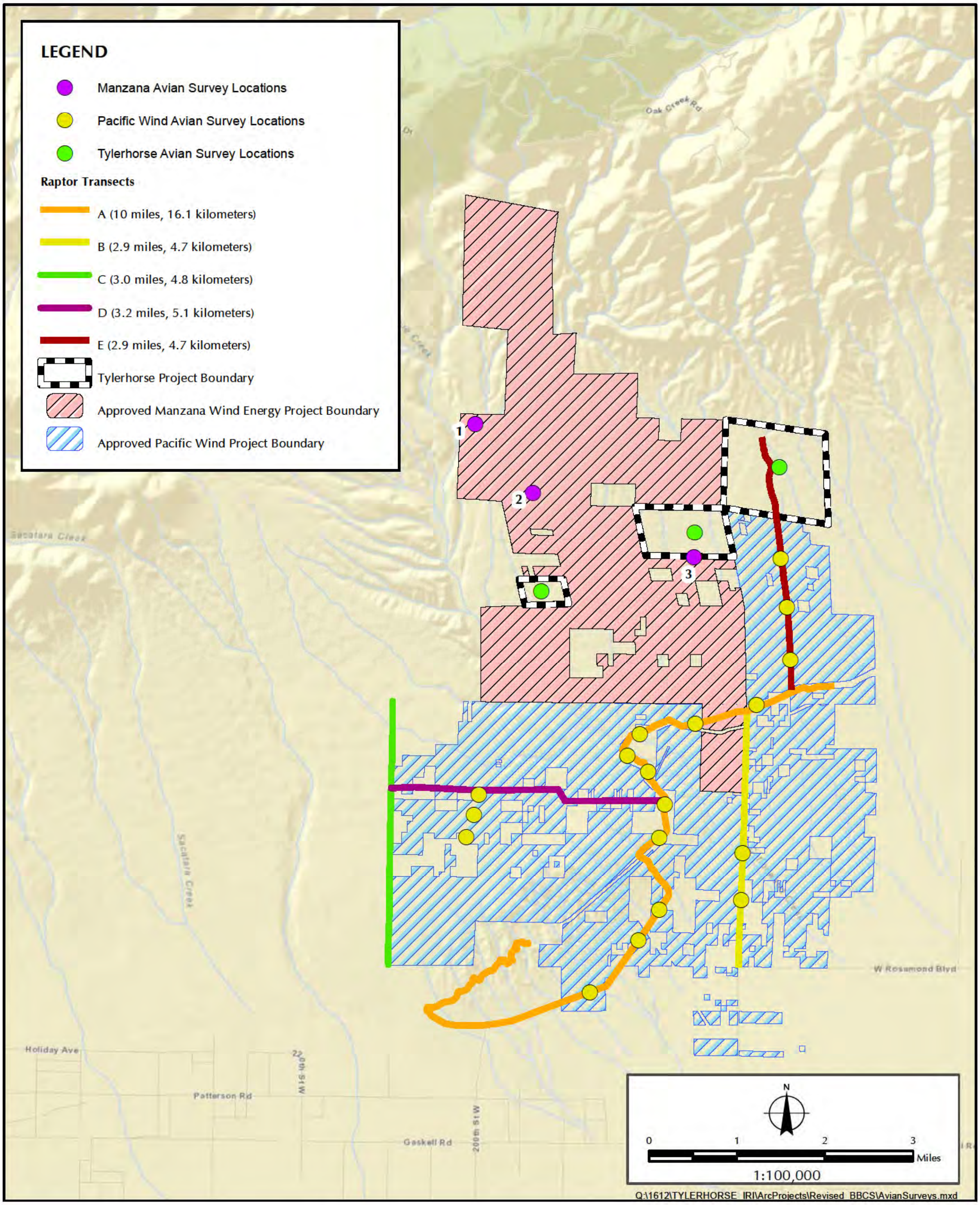

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FIGURE 3.1.1.1-1

2004-2012 Avian Survey Locations

observations of the number and species of birds observed, their activity, and estimated distance from the observer. For flying birds, the observer noted the bird's estimated height above the ground.

Results

During BUC surveys, 1,716 observations of individuals representing 45 species were recorded over 35 days of sampling (24 sampling replicates) within the project between December 15, 2011, and November 28, 2013 (Appendix A, *Bird and Bat Compendium*). In addition to the 45 confirmed species recorded, fifteen individual birds could not be identified to species and were identified to the lowest possible taxonomic level, such as Unknown *Toxostoma* Sp., or Unknown Sparrow. The overall yearly bird detection rate was 23.8 birds per 30-minute survey or 47.7 birds per survey hour.

Five species of passerine land birds accounted for more than three-quarters of all bird observations. House finch, a resident species that gathers in large flocks in fall, was the most commonly observed species with a total of 731 individual observations (42.6 percent of all observed individuals). The white-crowned sparrow, a common overwintering species, was the second most common species, with 298 recorded observations (17.4 percent of all observed individuals), followed by three resident species: the western meadowlark with 129 recorded observations (7.5 percent of all observed individuals); lark sparrow with 110 recorded observations (6.4 percent of all observed individuals); and finally common raven with 85 recorded observations (5.0 percent of all observed individuals).

The species richness, bird detection rate, and most prevalent species were also calculated by season in order to determine any seasonal differences in bird use at the project (Table 3.1.1.1-1, *Bird Use Count Survey Results by Season*). Species richness was similar throughout all four seasons (ranging between 23 and 27 species observed). Detection rates differed depending on the season, with the highest rates experienced in the winter (94.8 birds per survey hour), likely as a result of large flocks of common passerine species wintering on the project, such as house finches and white-crowned sparrows. The lowest detection rate occurred in summer (14.2 birds per survey hour); detectability is likely lower in this season as a result of fewer species actively maintaining territories or feeding nestlings. Spring and fall detection rates were between these two extremes, with 31.8 and 50.3 birds detected per survey hour, respectively. During all four seasons, the house finch was one of the top three species detected. Seasonal differences included high rates of white-crowned sparrows in the winter and flocks of mountain bluebirds in the fall.

[51] U.S. Fish and Wildlife Service. January 2011. *Draft Eagle Conservation Plan Guidance*. Available at: http://www.fws.gov/windenergy/docs/ECP_draft_guidance_2_10_final_clean_omb.pdf

TABLE 3.1.1.1-1
BIRD USE COUNT SURVEY RESULTS BY SEASON

Season	Dates Conducted	Number of Species Observed*	Overall BUC Detection Rate per Survey Hour	Raptor BUC Detection Rate per Survey Hour	Top Three Species Detected and Percentage
Winter	12/8/2011 through 2/27/2012	25	94.8	0.33	House finch, 41% White-crowned sparrow, 33% Lark sparrow, 7%
Spring	3/14/2012 through 5/16/2012	23	31.8	0.00	Chipping sparrow (*Spizella passerina*), 19%, Western meadowlark, 19% House finch, 16%
Summer	6/7/2012 through 8/31/2012	24	14.2	0.44	Western meadowlark, 27% California quail (*Callipepla californica*), 10% Common raven, 9 % House finch, 9%
Fall	9/9/2012 through 11/29/2012	27	50.3	0.56	House finch, 72% Lark sparrow, 8% Mountain bluebird (*Sialia currucoides*), 4%

NOTE: This species total only includes those species observed during the course of BUC surveys

A total of 12 observations of five diurnal raptor species were recorded during BUCs: 4 observations of red-tailed hawk, 3 observations of prairie falcon, 2 observations of American kestrel and northern harrier, and 1 observation of merlin. Altogether, raptors accounted for only 0.7 percent of all bird observations. The overall raptor detection rate for BUCs was 0.33 raptor per survey hour, or 0.17 raptor per 30-minute survey (mean raptor use) (Table 3.1.1.1-2, *Characteristics of Raptor Use at the Project*). To allow comparison with data collected at other U.S. wind energy projects raptor use estimates from this study were adjusted from 30-minute to 20-minute, by including only those raptors observed during the first 20 minutes of the survey period. This results in a raptor detection rate of 0.13 raptor per 20-minute survey. Mean raptor use for the project was generally low, with red-tailed hawk and prairie falcon occurring most frequently. No golden eagles were observed over the course of the 72, 30-minute BUC survey replicates, nor were any golden eagles recorded incidentally during other survey types at the project. The golden eagle mean use at the project was, therefore, 0.00 eagle per 30-minute survey.

TABLE 3.1.1.1-2
CHARACTERISTICS OF RAPTOR USE AT THE PROJECT

Species	Number Observed	Percent of all Raptors Observed	Mean Raptor Use (observations/ 30-minute survey)
Red-tailed hawk	4	33.3	0.06
Prairie falcon (WL)	3	25.0	0.04
American kestrel	2	16.7	0.03
Northern harrier (CSC, WEMO)	2	16.7	0.03
Merlin (WL)	1	8.3	0.01
Total	**12**	**100**	**0.17**

Key:
CSC=California Department of Fish and Wildlife (CDFW) species of special concern
WEMO=Avian species included in the West Mohave Plan
WL=CDFW Watch List

The mean (average) flight height for all birds observed in flight was 33.9 feet. The majority of the 1,175 birds detected in flight during bird use counts were at heights lower than the expected rotor-swept zone (115–189 feet above ground level [AGL]) (*n*=1,155 birds, or 98.3 percent of all birds observed in flight) (Table 3.1.1.1-3, *Flight Heights Observed during Bird Use Counts*). Twenty-eight of the 33 species detected in flight were not observed within the rotor-swept zone; the only five species with flights observed in this band were the northern harrier, red-tailed hawk, prairie falcon, white-throated swift, and common raven. A single northern harrier was recorded on December 19, 2011, soaring at approximately 350 feet AGL. Of the 4 red-tailed hawks recorded flying, 2 (50 percent) were observed at a height within the rotor-swept zone. The mean flight height of red-tailed hawks during all BUCs was 417.5 feet, indicating that this species spends considerable time within the rotor-swept zone. Of the two prairie falcons observed in flight, 1 (50 percent) was recorded flying within the rotor-swept zone at 200 feet AGL on January 12, 2012. A single white-throated swift was recorded flying at 150 feet AGL on December 19, 2011. Finally, a total of 59 common ravens were observed in flight during BUCs, with a mean flight height of 159.8 feet AGL, directly within the rotor-swept zone. Of these 59, 15 individuals (25.4 percent of all ravens) were observed within the rotor-swept zone.

TABLE 3.1.1.1-3
FLIGHT HEIGHTS OBSERVED DURING BIRD USE COUNTS

Species	Flight Height (feet)			Number Observed in Flight	Flights in the Rotor-Swept Zone
	Minimu m	Maximum	Mean		
Galliformes					
California quail	2	2	2.0	2	0 (0%)
Accipitriformes					
Northern harrier	25	350	187.5	2	1 (50%)
Red-tailed hawk	120	700	417.5	4	2 (50%)
Unknown accipiter species	25	25	25.0	1	0 (0%)
Falconiformes					
American kestrel	25	30	27.5	2	0 (0%)
Prairie falcon	200	1000	600.0	2	1 (50%)

TABLE 3.1.1.1-3
FLIGHT HEIGHTS OBSERVED DURING BIRD USE COUNTS, *Continued*

Species	Flight Height (feet)			Number Observed in Flight	Flights in the Rotor-Swept Zone
	Minimum	Maximum	Mean		
Columbiformes					
Mourning dove	1	30	10.3	6	0 (0%)
Apodiformes					
White-throated swift	150	150	150.0	1	1 (100%)
Anna's hummingbird	5	5	5.0	1	0 (0%)
Unknown hummingbird	3	3	3.0	1	0 (0%)
Piciformes					
Ladder-backed woodpecker	10	10	10.0	1	0 (0%)
Northern flicker	25	25	25.0	2	0 (0%)
Passeriformes					
Unknown *Empidonax* species	5	5	5.0	2	0 (0%)
Ash-throated flycatcher	5	6	5.5	2	0 (0%)
Loggerhead shrike	5	25	10.4	5	0 (0%)
Western Scrub-jay	5	5	5.0	1	0 (0%)
Common raven	5	800	159.8	59	15 (25.4%)
Horned lark	10	100	54.8	24	0 (0%)
Northern Rough-winged swallow	15	15	15.0	6	0 (0%)
Unknown swallow species	80	80	80.0	3	0 (0%)
Western bluebird	3	3	3.0	2	0 (0%)
Mountain bluebird	3	40	9.3	29	0 (0%)
Northern mockingbird	4	20	8.7	9	0 (0%)
Unknown *Toxostoma* species	4	4	4.0	1	0 (0%)
European starling	7	9	8.5	8	0 (0%)
Yellow-rumped warbler	11	55	33.7	3	0 (0%)
Chipping sparrow	10	20	10.2	51	0 (0%)
Lark sparrow	2	40	26.4	45	0 (0%)
Black-throated sparrow	5	15	6.3	8	0 (0%)
Savannah sparrow	10	10	10.0	1	0 (0%)
Lincoln's sparrow	15	15	15.0	1	0 (0%)
White-crowned sparrow	1	40	20.0	200	0 (0%)
Dark-eyed junco	1	10	4.6	14	0 (0%)
Unknown sparrow species	3	45	34.5	4	0 (0%)
Western meadowlark	1	50	13.3	38	0 (0%)
Brewer's blackbird	15	80	23.1	8	0 (0%)
Scott's oriole	14	14	14.0	1	0 (0%)
House finch	5	100	28.6	621	0 (0%)
American goldfinch	35	35	35.0	2	0 (0%)
Unknown passerine species	10	40	25.0	2	0 (0%)

3.1.1.2 2013 Aerial Golden Eagle Nest Surveys

Methods

The primary purpose of the aerial golden eagle nest surveys was to identify eagle nesting sites and current use in the vicinity of the project. Of the two eagle species, only golden eagles are likely to nest in the vicinity of the project; bald eagles in Southern California breed only near large water bodies that do not occur near the project (e.g., Big Bear Lake, Lake Hemet) or the ocean, which is more than 50 miles away. The survey was designed and conducted according to the methods recommended in the *ECP Guidance*,[52] based on the *Interim Golden Eagle Technical Guidance*.[53]

<u>Database and Literature Search</u>

Prior to conducting the surveys, Sapphos Environmental, Inc. conducted a database and literature search to identify golden eagle nests previously recorded in the area. The Sapphos Environmental, Inc. database included golden eagle nest locations in and around the Tehachapi Mountains observed during surveys that Sapphos Environmental, Inc. has conducted, as well as locations obtained from reports made publicly available through Environmental Impact Reports (EIRs) or EISs.

Golden eagle nest location data was obtained from additional EIRs/EISs, either from reported location coordinates or by georeferencing maps contained in the original survey reports published in the technical appendices of the EIRs/EISs for nearby projects in Kern County:

- Alta Infill II Wind Energy Project[54]
- Alta-Oak Creek Mojave Project[55]
- Morgan Hills Wind Energy Project[56]
- Tejon Mountain Village[57]
- Alta East Wind Project[58]

[52] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. *Eagle Conservation Plan Guidance*. Module 1—"Land-Based Wind Energy." Version 2. Arlington, VA.

[53] Pagel, J.E., D.M. Whittington, and G.T. Allen. February 2010. *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance*. Carlsbad, CA: U.S. Fish and Wildlife Service, Ecological Services Office; and Arlington, VA: U.S. Fish and Wildlife Service, Division of Migratory Bird Management.

[54] Kern County. August 2011. *Alta Infill II Wind Energy Project Supplemental Environmental Impact Report*. Prepared by: Kern County Planning and Community Development Department, Bakersfield, CA, with technical assistance from Aspen Environmental Group, Agoura Hills, CA.

[55] *Kern County. October 2009.* Alta-Oak Creek Mojave Project Environmental Impact Report*. Prepared by: Kern County Planning Department, Bakersfield, CA, with technical assistance by Aspen Environmental Group, Agoura Hills, CA.*

[56] Kern County. October 2011*. Morgan Hills Wind Energy Project Environmental Impact Report*. Prepared by: Kern County Planning and Community Development Department, Bakersfield, CA.

[57] Kern County. June 2009. *Tejon Mountain Village Environmental Impact Report*. Prepared by: Kern County Planning Department, Bakersfield, CA.

[58] Kern County. January 2013. *Plan Amendment and Environmental Impact Statement/Environmental Impact Report for the Alta East Wind Project*. Prepared by: Kern County Planning and Community Development Department, Bakersfield, CA, and U.S. Department of the Interior, Bureau of Land Management, California Desert District Office, Moreno Valley, CA.

- Manzana (formerly PdV) Wind Energy Project[59]

All reported nest locations were included on field maps and loaded onto GPS units carried during the aerial surveys.

Aerial Surveys

Sapphos Environmental, Inc. conducted two aerial surveys for golden eagles in the vicinity of the project property. The surveys were conducted in accordance with methods recommended by the USFWS in the *ECP Guidance* and earlier protocols.[60,61,62] Published USFWS protocols recommend conducting surveys in a 10-mile buffer around the proposed project property, which, for the current project, translates to a focal survey area of 408 square miles (Figure 3.1.1.2-1, *2013 Focal Survey Area and Previously Reported Nest Locations*). The reported locations of golden eagle nests up to 15.3 miles outside the focal survey area were also visited, as the associated territories were considered to have potential to overlap with the focal survey area. Although this is not specifically recommended by the USFWS, it can be useful in interpreting the results of the survey within the focal survey.

Consistent with previous recommendations, the current *ECP Guidance*[63] recommends conducting two surveys during the golden eagle breeding season, at least 30 days apart. In Southern California, nest-building and courtship can start in the fall and extend through February; eggs are laid in February or March.[64] The first aerial survey was conducted on April 11 and 12, 2013, and the second survey was conducted on May 30 and 31, 2013.

The surveys were conducted by experienced avian biologists, each of whom had hundreds of hours of aerial survey experience, including prior experience conducting aerial surveys for eagles in the Tehachapi area. The first survey was conducted by Dr. Joseph Platt and Dr. Pauline Roberts, and the second survey was conducted by Dr. Pauline Roberts and Mr. John Ivanov. The biologists were knowledgeable of the nesting behavior, nest types, and nesting habitat requirements for golden eagles and other raptors found in and around the study area, as well as the locations of various habitats within the study area. All previously reported nest sites obtained as a result of the literature and database search were visited during the surveys. All potentially suitable nesting habitat, including areas with cliffs, rocky outcrops, large trees, or utility towers, and all previously reported nest sites were visited and searched during the surveys. All areas of the focal survey area were visited to determine whether potential nesting habitat was present. At each occupied or unoccupied nest structure, observers recorded the time; date; location; nest condition; aspect; site description; bird species; and any observations

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[59] Kern County. September 2007. *PdV Wind Energy Project Environmental Impact Report*. Prepared by: Kern County Planning Department, Bakersfield, CA.

[60] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. *Eagle Conservation Plan Guidance*. Module 1—"Land-Based Wind Energy." Version 2. Arlington, VA.

[61] U.S. Fish and Wildlife Service. January 2011. *Draft Eagle Conservation Plan Guidance*. Available at: http://www.fws.gov/windenergy/docs/ECP_draft_guidance_2_10_final_clean_omb.pdf

[62] Pagel, J.E., D.M. Whittington, and G.T. Allen. February 2010. *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance*. Carlsbad, CA: U.S. Fish and Wildlife Service, Ecological Services Office; and Arlington, VA: U.S. Fish and Wildlife Service, Division of Migratory Bird Management.

[63] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. *Eagle Conservation Plan Guidance*. Module 1—"Land-Based Wind Energy." Version 2. Arlington, VA.

[64] Dixon, James B. 1937. "The Golden Eagle in San Diego County, California." *The Condor* 39(2): 49–56.

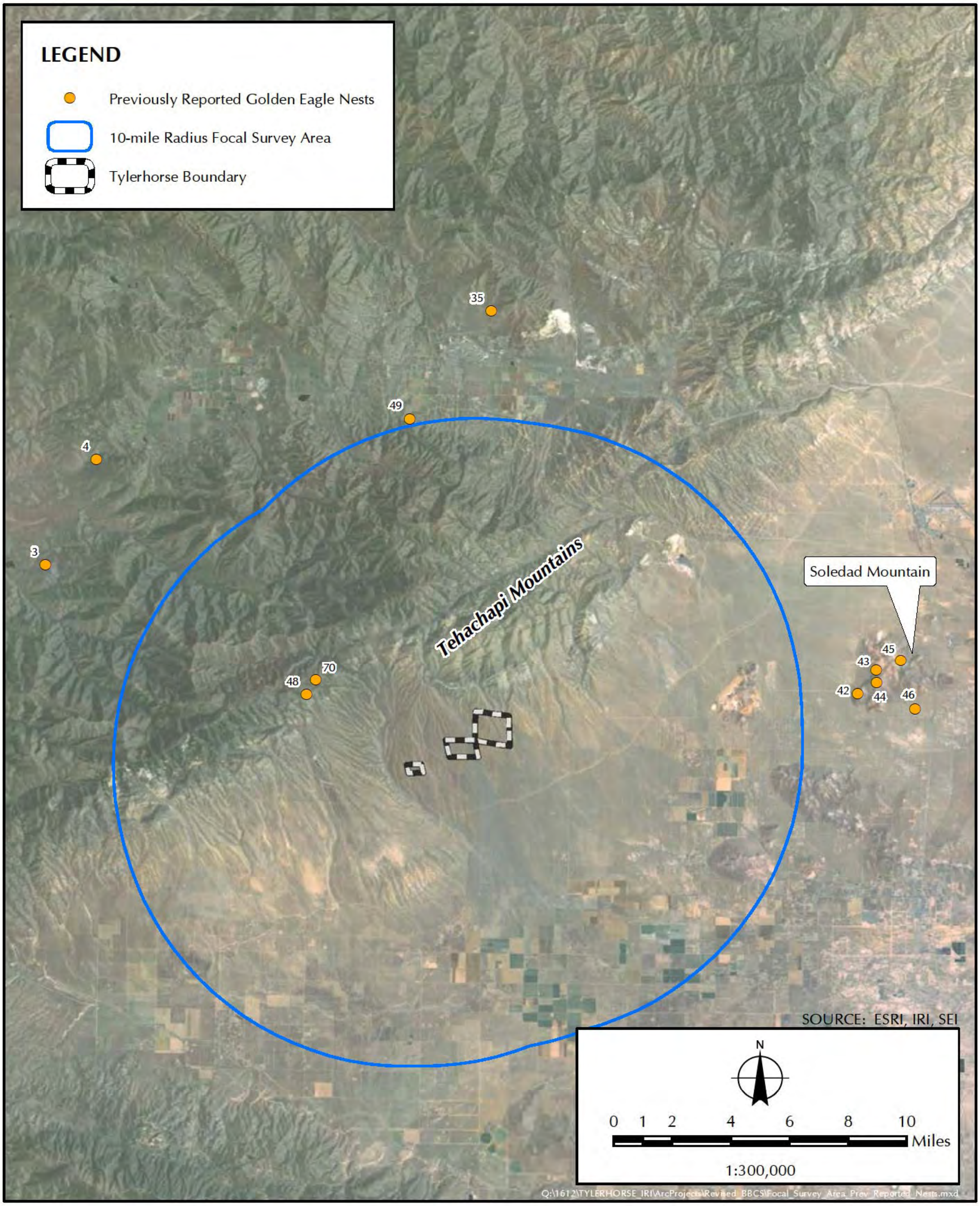

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FIGURE 3.1.1.2-1

2013 Focal Survey Area and Previously Reported Nest Locations of chicks, eggs, or adults nearby. Individual golden eagles were classified by age as adult or subadult according to plumage characteristics.[65,66] The survey was conducted in a Hughes 500 helicopter, a light utility helicopter with the power and maneuverability demanded by the survey conditions, such as the need to hover near cliffs in windy conditions. The pilots were experienced at conducting surveys for golden eagles and other wildlife.

Results

Database and Literature Search

As a result of the database and literature, two reported golden eagle nest sites within the 10-mile-radius focal survey area were identified. One, Nest 48, was observed during surveys conducted for the Morgan Hills and Alta East Wind Energy Projects in 2011 and included in reports appended to their EIRs/EISs (Figure 2). The other, Nest 70, was observed in 2004. Bloom Biological, Inc. conducted ground-based and aerial surveys for eagle and raptor nests within 2 miles of the adjacent Manzana Project, and reported a golden eagle nest west of the Manzana Project, approximately 4.2 miles west of the current project. The exact nest site was apparently not discovered, as the observation was described as follows: “one adult pair was observed with a nest in either a cliff, digger pine, or valley oak.” Bloom Biological also reported the presence of a cliff within the Tylerhorse Canyon that was considered suitable for nesting by golden eagles, although no location was provided. The Bloom Biological report was included in the technical appendices of the Manzana Project EIR.

Additional nest locations were identified as reported in EIRs/EISs for nearby projects, all outside the focal survey area. A total of 11 nest sites up to 15.3 miles from the proposed project (including the 2 within the focal survey area) were identified as having the potential to represent territories that might overlap with the focal survey area (Figure 2). Additional nest locations on Tejon Ranch and to the northeast of the project property, all more than 16 miles from the project, were identified but were not considered to have the potential to represent golden eagle territories that could overlap with the focal survey area.

Aerial Surveys

The first aerial survey was conducted on April 11 and 12, 2013, and the second replicate survey was conducted on May 30 and 31, 2013. The weather was clear and sunny on all survey days, as is typical of the western Mojave Desert. Wind conditions ranged from calm to speeds of up to approximately 30 knots (35 miles per hour). During both surveys, all areas of potentially suitable habitat were covered and a search for nests conducted. All of the previously reported nests in the vicinity of the project, up to 15.3 miles away, were visited to determine their current status (Table 3.1.1.2-1, *2013 Status of Golden Eagle Nests and Reported Nest Sites*). No potential nest trees or cliffs were observed on the floor of the Antelope Valley or in the northern foothills of the San Gabriel Mountains, to the south of the project. Extra search effort was made when suitable sites were observed, such as where cliffs or rock outcrops were present; where forested areas with emergent trees were present, especially those that were distant from human residences, on windward or north-facing slopes; and where tall utility towers were present.

[65] Clark, W.S. 2001. “Ageing Eagles at Hawk Watches: What Is Possible and What Is Not.” In *Hawkwatching in the Americas*, ed. K.L. Bildstein and D. Klem Jr. North Wales, PA: Hawk Migration Association of America, pp. 143–148.

[66] Clark, W.S., and B. Wheeler. 2001. *Peterson Field Guides: Hawks of North America*. 2nd ed. New York, NY: Houghton Mifflin.

Areas near previously recorded nests and where eagles were observed were also carefully searched.

TABLE 3.1.1.2-1
2013 STATUS OF GOLDEN EAGLE NESTS AND REPORTED NEST SITES

Nest ID	Distance from Project (miles)	2013 Occupancy by Golden Eagle	Comments on 2013 Status	Reported Status in Previous Year(s)
3	14.9	Occupied (decorated)	Decorated but not actively used. No golden eagles or alternate nests observed.	2011: Active[1] 2012: Unknown
4	15.3	Occupied (active)	2 adults observed in April, 1 chick observed in May.	2011: Active[1] 2012: Unknown
35	13.7	Unoccupied	No signs of use. Immature golden eagle perched in nest tree in May 2013; no adults or alternate nests observed.	2010: Active[2] 2011: Unoccupied[3,4] 2012: Active[1]
42	12.0	Unoccupied	Appearance more like red-tailed hawk nest; would be unusually small for golden eagle.	2011: Unoccupied[3,4] 2012: Unoccupied[1]
43	12.6	Unknown	No nest found at reported location, no eagles observed.	2011: Unoccupied[3,4] 2012: Unknown[1]
44	12.6	Unoccupied	No eagles observed in the area.	2011: Unoccupied[3,4] 2012: Unoccupied[1]
45	13.5	Unoccupied	No eagles observed in the area. Nest is in poor condition.	2011: Unoccupied[4] 2012: Unoccupied[1]
46	13.9	Unoccupied	Nest is very old and in very poor condition. No eagles observed in the area.	2011: Unoccupied[4] 2012: Unoccupied[1]
48	4.2	Unoccupied	In active use by common ravens. Nest is 30 feet up on rocky outcrop/headwall of a draw. Nest is smaller than typical for golden eagle, and nest cup is small, consistent with recent maintenance by common raven.	2011: Unoccupied golden eagle nest[3] 2012: Occupied by common ravens. Juvenile golden eagle observed flying 0.2 mile away.[1]
49	10.2	Unoccupied	In active use by red-tailed hawks. Nest located in a snag; small size and appearance consistent with nest built by red-tailed hawk.	2011: Unoccupied golden eagle nest[3] 2012: Occupied by red-tailed hawks[1]
70	4.2	Unknown	No nest observed in the area; no eagles observed.	2004: "one adult pair was observed with a nest in either a cliff, digger pine, or valley oak."[5] No other observations reported.

SOURCE:

[1] Observed status during survey conducted by Sapphos Environmental, Inc.

[2] Kern County. October 2009. *Alta-Oak Creek Mojave Project Environmental Impact Report*. Prepared by: Kern County Planning Department, Bakersfield, CA, with technical assistance by Aspen Environmental Group, Agoura Hills, CA.

[3] Kern County. October 2011. *Morgan Hills Wind Energy Project Environmental Impact Report*. Prepared by: Kern County Planning and Community Development Department, Bakersfield, CA.

[4] Kern County. January 2013. *Plan Amendment and Environmental Impact Statement/Environmental Impact Report for the Alta East Wind Project*. Prepared by: Kern County Planning and Community Development Department, Bakersfield, CA, and U.S. Department of the Interior, Bureau of Land Management, California Desert District Office, Moreno Valley, CA.

[5] Kern County. September 2007. *PdV Wind Energy Project Environmental Impact Report*. Prepared by: Kern County Planning Department, Bakersfield, CA.

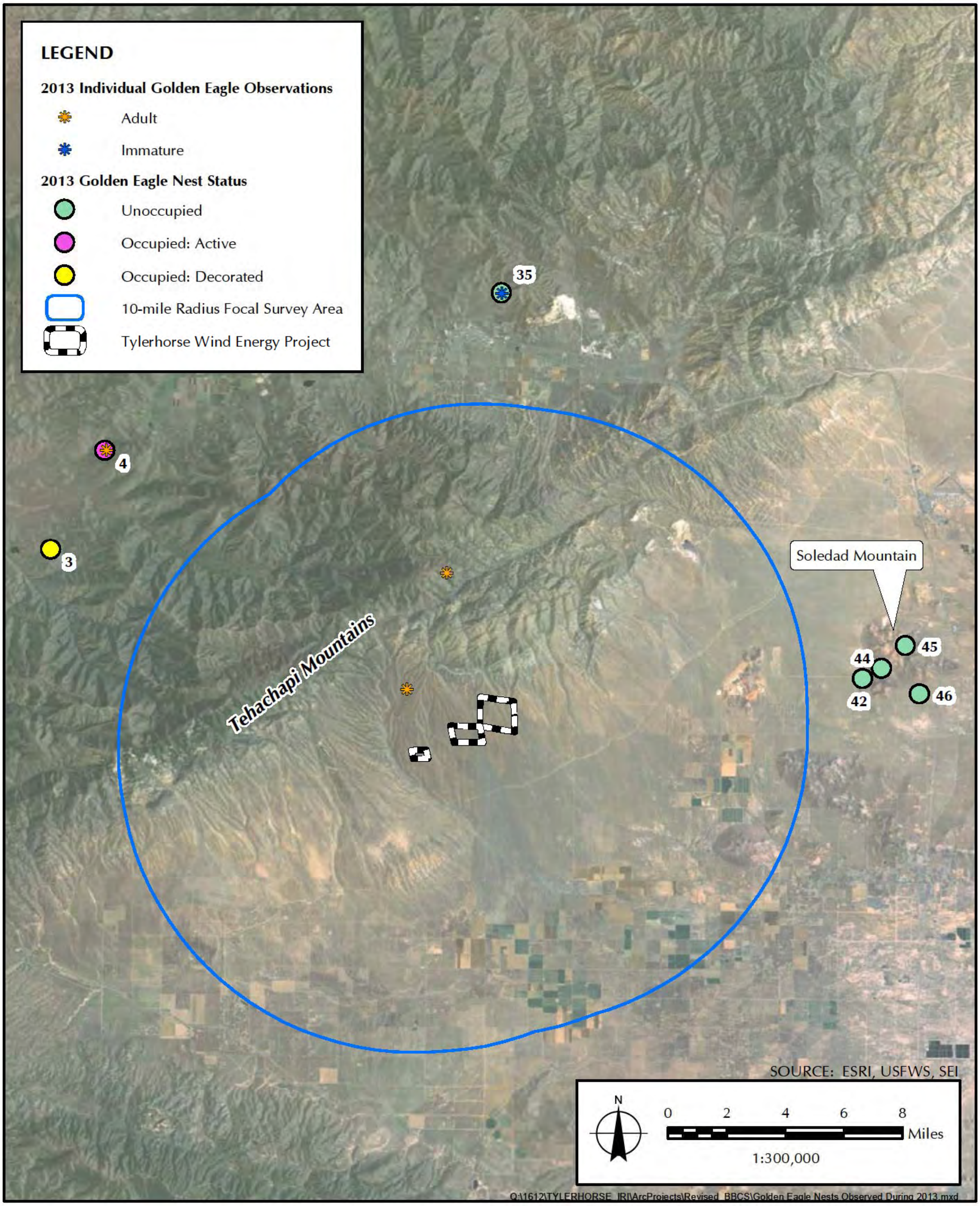

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FIGURE 3.1.1.2-2

Golden Eagle Nests and Individuals Observed During 2013 Aerial Surveys

Overall, most of the habitat containing potential nest sites consisted of areas with large trees. Such areas occurred in the Tehachapi Mountains running east-west to the north of the project, including the oak woodlands and oak savannah at the western edge of the survey area and coniferous forest in the northern and northeastern edges of the focal survey area. Few cliffs within the focal survey area were potentially suitable for use by nesting golden eagles. Most of the hilly and mountainous area lacked exposed rock, and what little was present was mostly composed of steep slopes of crumbly rock that lacked the inaccessible ledges of hard rock that golden eagles prefer. No cliffs were observed that were considered suitable for nesting by golden eagles within the project property. Both large trees and tall utility towers occurred within the focal survey area that could provide nesting sites for golden eagles, although no golden eagle nests were observed within the focal survey area. Large trees occurred in the Tehachapi Mountains to the north. Several occupied red-tailed hawk nests were observed on utility towers in the northwest of the focal survey area, along with unoccupied nests that could have been suitable for use by either red-tailed hawks or common ravens. However, none of the nests were large enough for use by golden eagles. Utility towers on the floor of the Antelope Valley were observed to be generally too small and/or too close to roads and human activity to be suitable nest sites.

No occupied or unoccupied golden eagle nests were observed within 10 miles of the project, inside the focal survey area. No nests were observed during the survey other than those that had been previously reported. No eagles were observed behaving in a manner suggesting a breeding pair, other than the two adults observed at the sole actively occupied nest. Two occupied golden eagle nests (one active and one decorated) and one unoccupied golden eagle nest were observed outside the focal survey area (Figure 3.1.1.2-2, *Golden Eagle Nests and Individuals Observed during 2013 Aerial Surveys*; Table 3.1.1.2-1).

Nest 3, located 14.9 miles to the northwest of the project, was in an oak tree on a north-facing slope. The nest was decorated with fresh green plant material in April, but no adults were observed nearby, and the nest had not been noticeably altered when it was revisited in late May. During both the April and May surveys, the area between Nest 3 and the focal survey area was carefully searched for additional nests, but no golden eagles or nests were observed.

Nest 4, located 15.3 miles to the northwest of the project, was active, and one chick was observed during the May survey. The nest was in a tall isolated oak tree on a northwest-facing hillside.

Nest 35, located 13.7 miles north of the project, immediately north of the town of Tehachapi, was not occupied in 2013. The nest was not decorated, there was no whitewash on or around the nest, and no adults were observed in the vicinity. When the nest was revisited on May 30, an immature golden eagle was perched at the top of the pine tree containing the nest. The bird had dark body plumage, its nape was not discernibly golden colored, and its tail was hidden by branches. The plumage was consistent with a bird in its second year, which would have hatched in 2012 and not yet completed molt into Basic I plumage.[67] Due to its age, the bird was presumed to be a nonbreeding individual. A search for alternate nests within approximately 1 mile did not result the observation of any golden eagle nests, but there is ample potential habitat to the north that was not searched due to the distance from the focal survey area.

[67] Bloom, Peter H., and William S. Clark. 2001. “Molt and Sequence of Plumages of Golden Eagles and a Technique for In-Hand Ageing.” *North American Bird Bander* 26(3): 97–116.

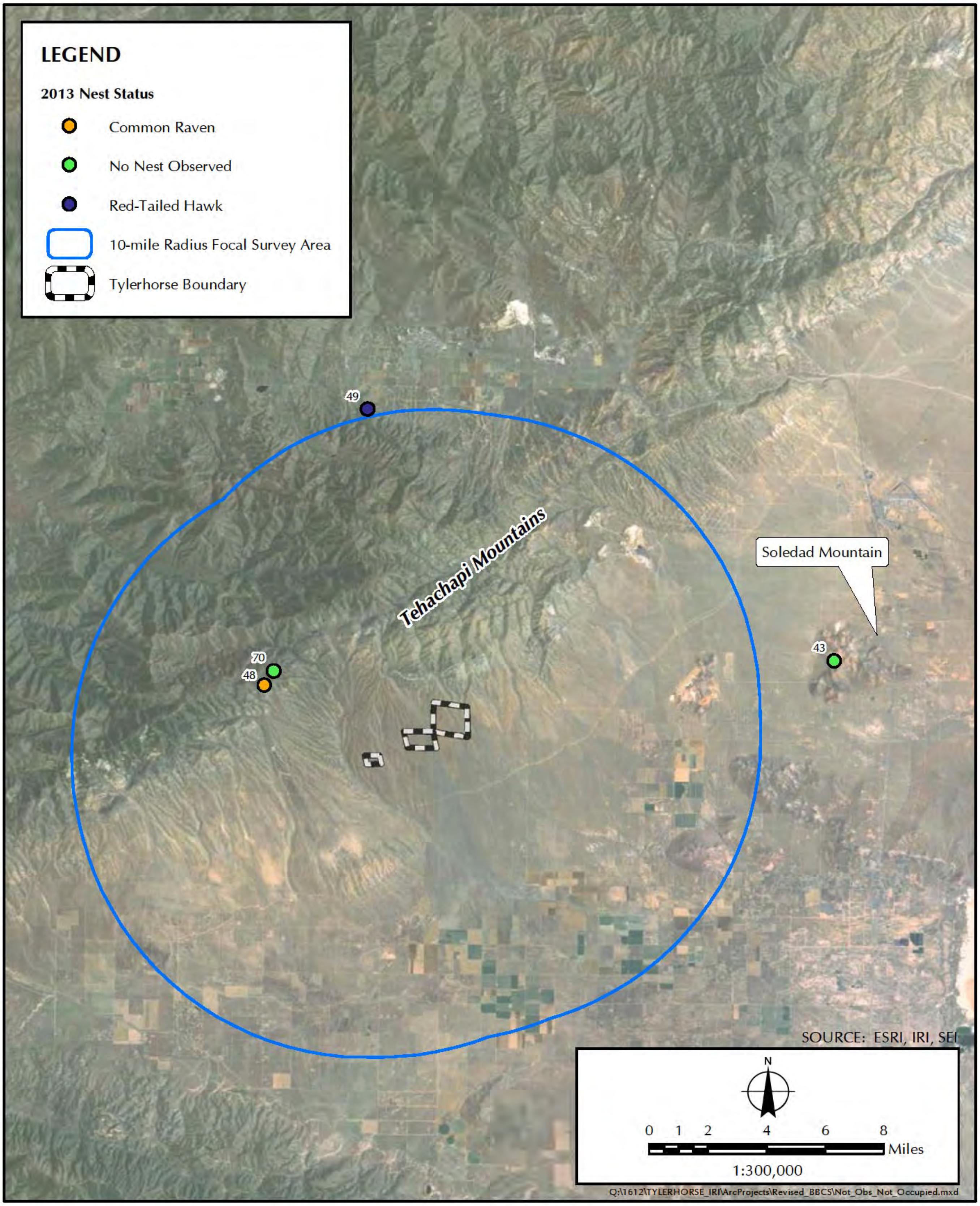

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FIGURE 3.1.1.2-3

2013 Results of Visits to Additional Previously Reported Golden Eagle Nest Sites

Nests 44, 45, and 46, all located east of the project on Soledad Mountain (12.6, 13.5, and 13.9 miles from the project, respectively) were not occupied, and no eagles were observed in the area. The nests were consistent in appearance with golden eagle nests, but did not have signs of recent use.

Observations made at the locations of other previously reported nests were less confirmatory of use by golden eagles (Figure 3.1.1.2-3, *2013 Results of Visits to Additional Previously Reported Golden Eagle Nest Sites*).

Nest 42, located 12.0 miles east of the project on Soledad Mountain, was smaller than a typical golden eagle nest, and lacked the broad top that is commonly seen in golden eagle nests. The nest was in poor condition and has not been reported as occupied by any observers for 3 years in a row. No eagles were seen in the area of this nest, or others in the cluster (43, 44, 45, and 46). There is a lack of evidence confirming this as being a golden eagle nest.

Nest 43, located 12.6 miles east of the project on Soledad Mountain, was not found by biologists during the 2013 surveys, despite a focused search, and no eagles were observed in the area.

Nest 48, located 4.2 miles west of the project, was not occupied by golden eagles. Instead, the nest was in active use by common ravens. The nest was smaller than is typical of golden eagles, and the nest cup was too small for use by golden eagles, although the cup would be maintained and rebuilt each year by whichever species of bird was actively using the nest. The nest was roughly 30 feet up on a rocky outcrop that cut across a shallow draw or drainage (no running water was present), on a flat ledge set into the rock face. This nest has not been observed as occupied by golden eagles, and thus the lack of evidence of recent use by golden eagles suggests that it might not be appropriate to classify it as a golden eagle nest, although additional surveys would be warranted to support the classification. This nest was only 0.6 mile from Nest 70, reported as a golden eagle nest in 2004, although the description suggests a nest was not directly observed.

Nest 49, located 10.2 miles north of the project, was in active use by a pair of red-tailed hawks, and was observed with two large chicks and one attending adult on May 30. The nest was located in a snag, and its size was typical for red-tailed hawks, but it was substantially smaller than a typical golden eagle nest. The nest also actively used by red-tailed hawks in 2012, and was reported as an unoccupied golden eagle nest in 2011. The lack of evidence of recent use by golden eagles and the nest's physical appearance suggest that it should not be classified as a golden eagle nest, but additional surveys would be warranted to support the classification.

Nest 70, located 4.2 miles west of the project, was not found during the surveys. The biologists searched trees in the area, but were unable to identify any golden eagle nests. Nest 70 was originally reported in 2004, and the report suggests that the biologists at the time did not find the specific nest location, but rather inferred its location and existence based on behavior of two adult golden eagles. Nest 70 is only 0.6 mile from the site of Nest 48, which is on a short cliff and was reported as unoccupied in 2011, and occupied by common ravens in 2012 and 2013. It is possible that the eagles observed in 2004 may have been nesting at Nest 48, although its current appearance is not consistent with use by golden eagles and it was occupied by common ravens in 2012 and 2013.

Golden eagles were observed at a total of four locations during the aerial surveys, only two away from nests (Figure 3.1.1.2-2). One adult was observed in flight over the Antelope Valley on April 12, 2013, flying at 200 feet AGL; this eagle was presumably hunting. A second observation was made of an adult flying in the Tehachapi Mountains on April 12; this individual was traveling westward, flying approximately 100 feet over closed canopy coniferous forest. Its flight was direct and was more consistent with travel than with hunting. An attempt was made to follow this individual at a distance, but visual contact was lost as it passed over ridges. At nests, two adults were observed at the active nest (Nest 4) during the April survey, and a single immature individual, as mentioned above, was observed at Nest 35 in May.

3.1.1.3 Ground-Based Eagle Surveys at Adjacent Projects

No golden eagles were observed within the project as a result of the year of BUCs conducted on the project between December 2011 and November 2012, nor were they observed as a result of reconnaissance surveys conducted on the project during survey efforts for other special status species; however, this species is known to occur in the area, albeit infrequently, as a result of surveys conducted on approved wind energy projects located adjacent to the project, the Manzana Project and the Pacific Wind Project. For that reason, survey methods and results designed to detect golden eagles at these two projects are described below to provide a fuller picture of golden eagle use in the general study area. Pacific Wind BUCs were conducted prior to the release of the *Draft Guidance*, but survey methods comply with the methodology for eagle surveys recommended in that document.[68] Pre-permitting studies for the Manzana Project, including the 2004–2005 raptor migration counts described below, were conducted prior to the release of the CEC Guidelines or the multiple iterations of the USFWS's *ECP Guidance*. Therefore, the surveys conducted at the Manzana Project were not conducted in accordance with these recommended methodologies for assessing golden eagle use, in the form of eagle exposure minutes, at wind energy projects. Despite this, the results of the Manzana Project surveys are valuable with respect to characterizing regional use of the area by golden eagles.

2004-2005 Manzana Project Raptor Migration Counts

<u>Methods</u>

Standardized avian use surveys at the Manzana Project consisted of both fall and spring raptor migration counts in fall 2004, spring 2005, and fall 2005.[69,70,71,72] Bloom Biological, working as a subconsultant to Sapphos Environmental, Inc., conducted four seasons of raptor migration surveys at the Manzana Project. Fall and spring surveys were designed to detect migrating raptors. Consistent with studies conducted at many raptor migration monitoring stations across the United States, measurements for raptors per hour or raptors per day were gathered. This

[68] U.S. Fish and Wildlife Service. January 2011. *Draft Eagle Conservation Plan Guidance*. Available at: http://www.fws.gov/windenergy/docs/ECP_draft_guidance_2_10_final_clean_omb.pdf

[69] Sapphos Environmental, Inc. 25 August 2006. *PdV Wind Energy Project Biological Resources Technical Report.* Prepared for: enXco Development Corporation. Prepared by: Sapphos Environmental, Inc., Pasadena, CA.

[70] Sapphos Environmental, Inc. 11 August 2006. *PdV Wind Energy Project Biological Resources Technical Report Technical Appendices.* Prepared for: enXco Development Corporation. Prepared by: Sapphos Environmental, Inc., Pasadena, CA.

[71] Bloom, P.H. 15 October 2005. *Fall-Spring Raptor Migration and Winter Raptor Survey of the Proposed PdV Wind Energy Project, Kern County, California, 2004-2005*. Santa Ana, CA.

[72] Bloom, P.H. 30 March 2006. *Fall 2005 Raptor Migration Study of the Proposed PdV Wind Energy Project, Kern County, California.* Santa Ana, CA.

study design is in sharp contrast to point count survey designs, which often gather data for less than 1 hour per day. Hawk migration survey methods were adapted after procedures established by Hawk Watch International (HWI). The Manzana Project's study area originally consisted of approximately 6,440 acres. A total of three observation points were established within the study area for use as raptor migration survey locations (Figure 3.1.1.1-1). Two observation points (Points 1 and 2 in Figure 3.1.1.1-1) were used in fall 2004, one observation point (Point 2 in Figure 3.1.1.1-1) was used in spring 2005, and three observation points (Points 1, 2, and 3 in Figure 3.1.1.1-1) were used in fall 2005. Each count station was staffed by one biologist per survey day. Observers surveyed the skyline using the naked eye, high-powered spotting scopes, and binoculars. Observers recorded all raptor observations within their field of view and were in radio contact to minimize double counting. In the final data compilation, every effort was made to eliminate duplicate daily observations from the final species totals. Resident raptors were observed daily and identified by behavioral and plumage characteristics. Suspected residents, as inferred by their predictable locations, defensive behavior toward other raptors, and in some cases distinct plumages, were counted only once per day. When evaluating raptor totals, it is important to note that observations likely included both migrating and resident birds. Therefore, totals may suggest a higher number of individuals than were actually present, as multiple observations for each individual on the same day were likely recorded on occasion. The effort to avoid repeatedly recording known or presumed residents more than once each day illustrates the focus on counting individuals present, as opposed to raptor usage rates. Due to the methodology of these surveys, in which every passage of a migratory eagle was recorded, but not passage of every resident eagle, extracting data, such as eagle exposure minutes, would be prohibitively difficult given the complexity and age of the data.

Winter raptor presence-absence surveys were also conducted by Bloom Biological in winter 2004–2005.[73] Methods for winter surveys consisted of one person driving accessible locations of the Manzana Project over a 6 to 8 hour period each day to record wintering raptors; thus, observations are considered to be opportunistic rather than recorded with standardized methodology.

<u>Results</u>

Raptor migration surveys in fall 2004 were conducted over 26 days from October 3 to November 16. Two count stations (Figure 3.1.1.1-1) were each staffed by one biologist each daily, and observations were conducted for a at least 8 hours per person per day, yielding approximately 16 count hours per survey day and 474 total survey hours. Over the total 474 survey hours, a total of 1,143 raptors were detected passing directly over the count stations. Of these 1,143 raptor observations, 45 golden eagle observations were recorded (comprising approximately 4 percent of all raptors observed). Biologists estimated that these 45 observations were likely made up of 8 migrating golden eagles, as evidenced by their tendency to soar over 1,000 feet and fly direct routes over the site, and 4 year-round or overwintering resident local birds, based on their pattern of traveling back and forth between the Manzana Project and the Tehachapi Mountains.

Spring raptor migration surveys were conducted over 30 days from February 16 to April 20, 2005. A single count station (Figure 3.1.1.1-1) was staffed by one biologist daily, and 6 to 7

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[73] Bloom, P.H. 15 October 2005. *Fall-Spring Raptor Migration and Winter Raptor Survey of the Proposed PdV Wind Energy Project, Kern County, California, 2004-2005*. Santa Ana, CA.

hours of observations were conducted each day, yielding 198 total survey hours. Over the total 198 survey hours, a total of 1,249 raptors were detected passing over the single count station. Of these 1,249 raptors, 11 golden eagle observations were recorded (comprising approximately 1 percent of all raptors observed). Biologists estimated that these 11 observations likely consisted of 5 individual golden eagles, only one of which was considered a potential spring migrant. No more than 3 golden eagles were seen on any one day.

Raptor migration surveys in fall 2005 were conducted during 52 days from August 15 to November 12. Three count stations (Figure 3.1.1.1-1) were occupied by one biologist daily, and observations were conducted between 7 to 10 hours per day, yielding 1,257 total survey hours. Over the total 1,257 survey hours, a total of 1,932 raptors were recorded passing over the three count stations. Of these, 74 golden eagle observations were recorded (comprising approximately 4 percent of all raptors observed). Biologists estimated that the majority of the 74 golden eagle observations were duplicate observations of the 4 to 5 resident or floater eagles seen during previous surveys on-site, as no more than 3 observations were made in any single survey day. Beyond the 4 to 5 estimated resident or floater birds, it was estimated that the observations represented 10 to 15 migrant eagles passing over the site and 4 to 5 eagles wintering in the area.

Winter presence-absence surveys in winter 2004–2005 were conducted between November 30, 2004, and February 15, 2005. Surveys were conducted for 30 days, approximately 6 to 8 hours each day, for a total of 187 survey hours. A total of 220 raptors were recorded during the surveys, of which 11 golden eagle observations were recorded (comprising approximately 5 percent of all raptors observed). Biologists estimated that the 11 observations consisted of 4 resident eagles, 3 migrants, and 2 to 3 wintering birds.

2008–2009 Pacific Wind Project Bird Use Counts

<u>Methods</u>

Sapphos Environmental, Inc. conducted four seasons of BUC surveys at the Pacific Wind Project between March 2008 and March 2009.[74,75,76,77] BUCs were performed in accordance with the CEC Guidelines, as described for the Tylerhorse BUCs, which recommend approximately 1 to 1.5 BUC points per square mile. The Pacific Wind Project originally encompassed approximately 8,300 acres (approximately 13 square miles), and based on the recommended number of points, 18 points were selected as part of the survey effort (Figure 3.1.1.1-1). When possible, points were located at high vantage areas where an unobstructed view of the surrounding area was provided. In each season, biologists conducted three 30-

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[74] Sapphos Environmental, Inc. 17 October 2008. Memorandum for the Record No. 6. Subject: Results of 2008 Avian Spring Migration Surveys at the Proposed Pacific Wind Energy Project, Kern County, California. Prepared for: enXco Development Corporation, San Ramon, CA.

[75] Sapphos Environmental, Inc. 22 October 2008. Memorandum for the Record No. 8. Subject: Results of 2008 Avian Summer Season Surveys at the Proposed Pacific Wind Energy Project, Kern County, California. Prepared for: enXco Development Corporation, San Ramon, CA.

[76] Sapphos Environmental, Inc. 14 January 2009. Memorandum for the Record No. 13. Subject: Results of 2008 Avian Autumn Surveys at the Proposed Pacific Wind Energy Project, Kern County, California. Prepared for: enXco Development Corporation, San Ramon, CA.

[77] Sapphos Environmental, Inc. 7 December 2009. *Pacific Wind Energy Project Biological Resources Technical Report. Volume 1.* Prepared for: enXco Development Corporation. Prepared by: Sapphos Environmental, Inc., Pasadena, CA.

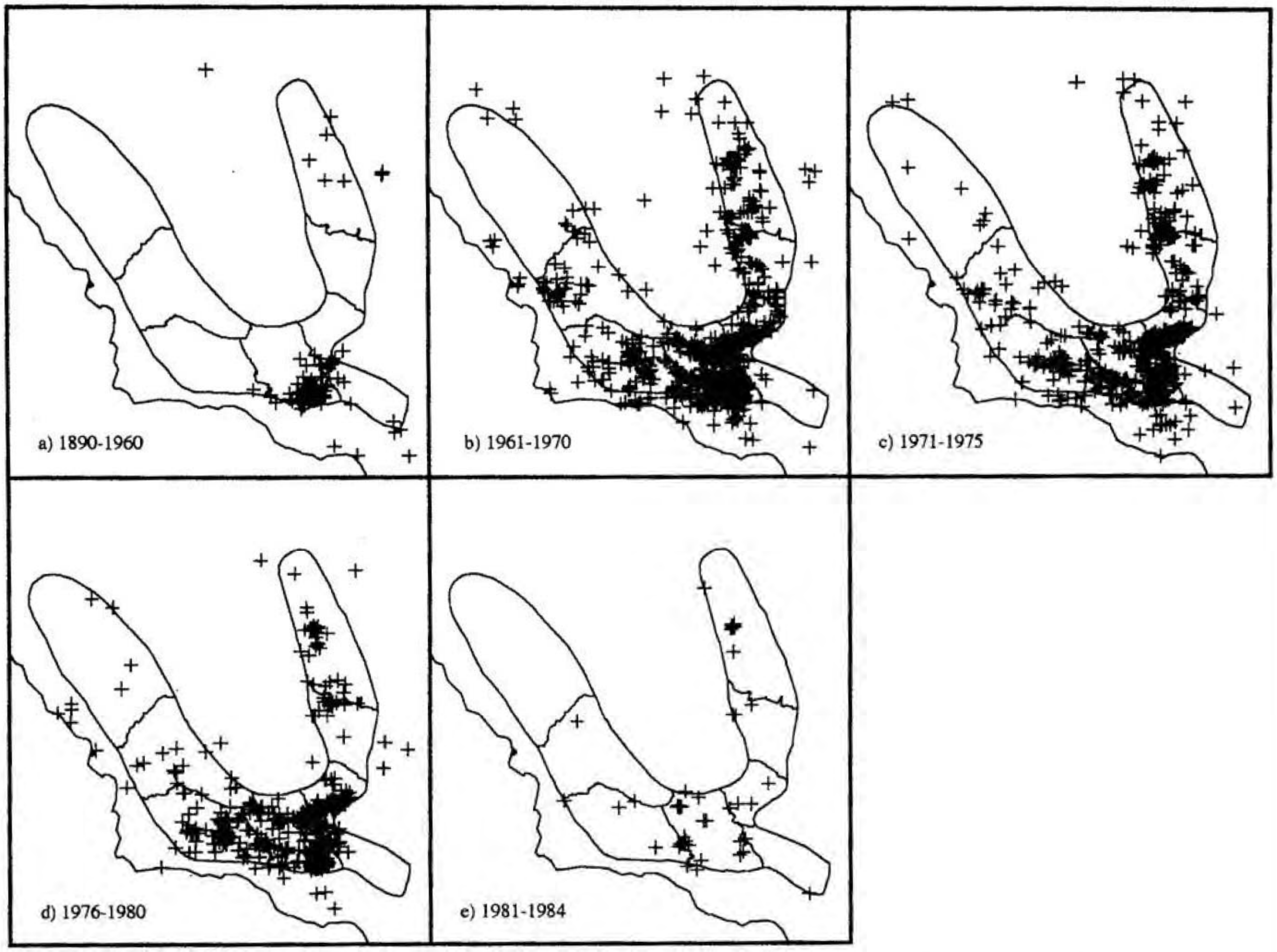

Figure 3. Maps of Condor sightings by time period: a) 1890-1960, b) 1961-1970, c) 1971-1975, d) 1976-1980, e) 1981-1984. Boundaries divide the range into physiographic regions used to analyze temporal patterns of Condor distribution.

SOURCE: Stoms, D.M., F.W. Davis, C.B. Cogan, M.O. Painho, B.W. Duncan, J. Scepan, and J.M. Scott. 1993. "Geographic Analysis of California Condor Sighting Data." Conservation Biology, 7: 148–159.

FIGURE 3.1.1.4-1
Maps of Historical Condor Sightings between 1890 and 1984

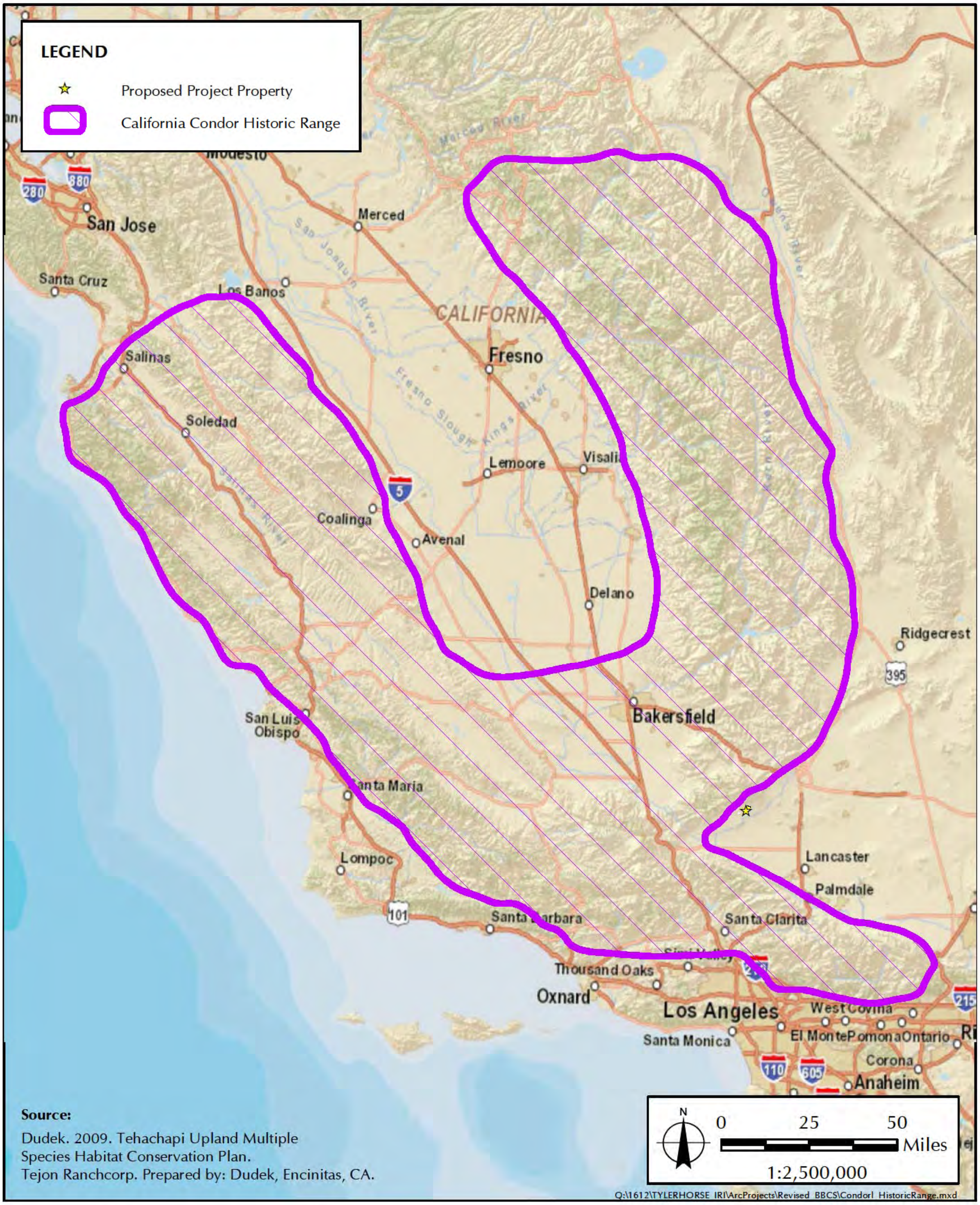

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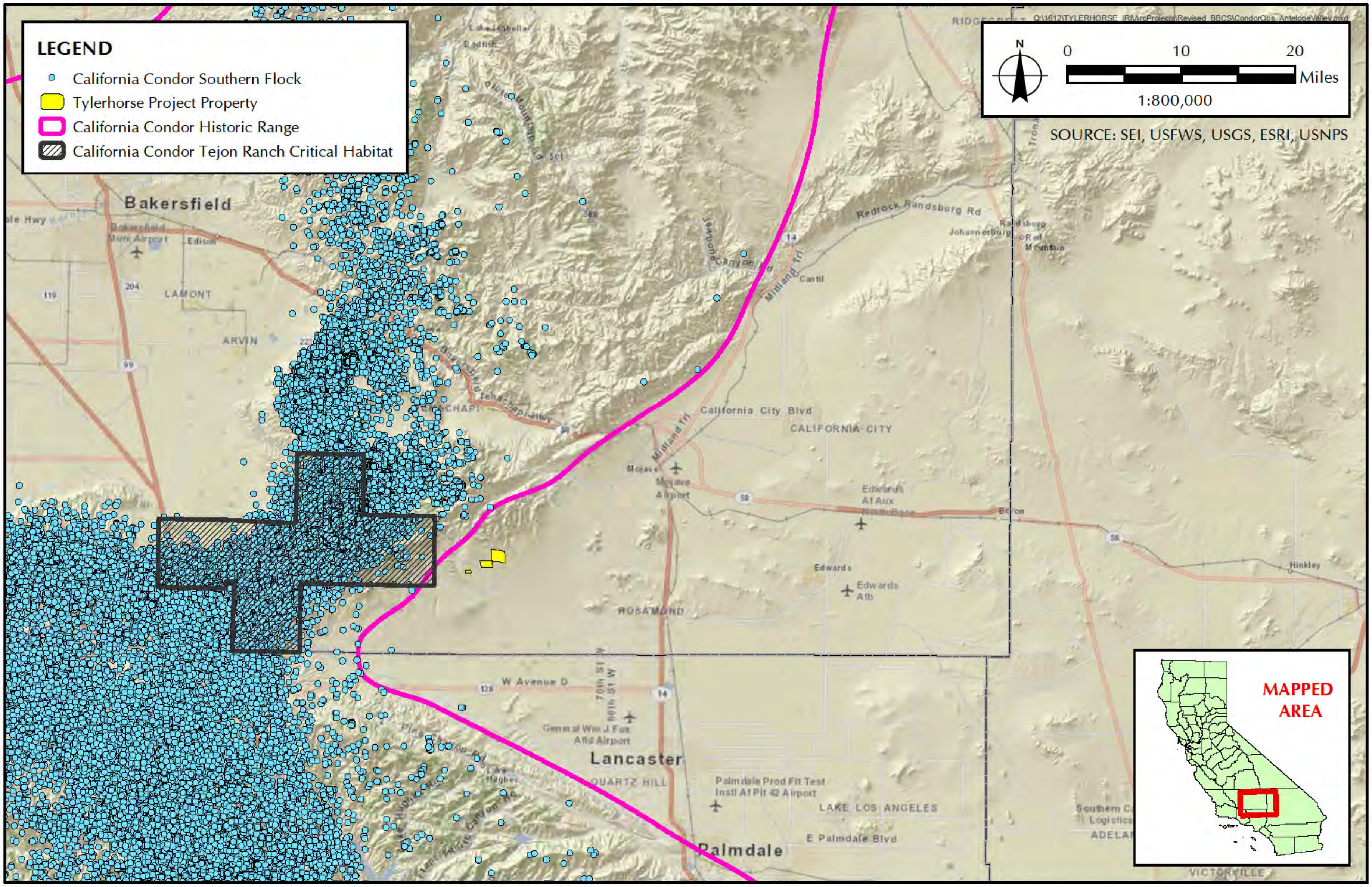
FIGURE 3.1.1.4-2

Historic Range of California Condor



IBERDROLA RENEWABLES

FIGURE 3.1.1.4-3

USFWS California Condor Southern Flock Data [Years 2005-2012] in Relation to Project Boundary minute unlimited distance counts at each of the 18 points to count birds in each of the six habitats. The observers surveyed each point twice in the morning and once in the evening. Observers collected observations of the number and species of birds observed, their activity, and estimated distance from the observer. For flying birds, the observer noted the bird's estimated height above the ground.

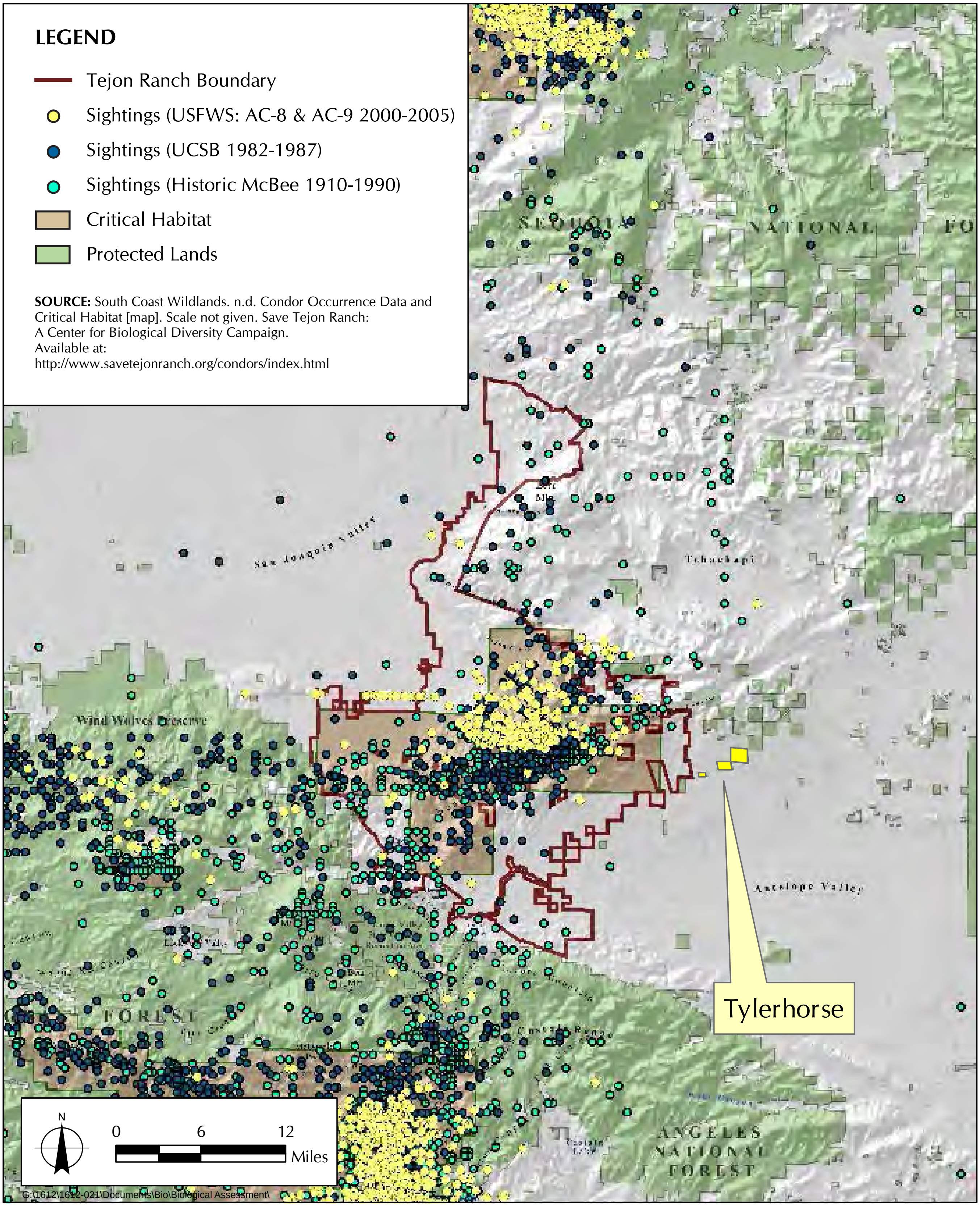


FIGURE 3.1.1.4-4

Historical California Condor Sightings: 1910–2005

Results

A total of 108 hours of BUCs were conducted at the Pacific Wind Project between March 25, 2008, and March 3, 2009. A single immature golden eagle was recorded flying approximately 300 feet above the ground on March 1, 2009. This was the sole golden eagle detected during the year of BUC surveys at the Pacific Wind Project. A total of 216, 30-minute BUC survey replicates were completed, resulting in a golden eagle mean use of 0.005 eagle per 30-minute survey.

2008–2009 Pacific Wind Project Diurnal Raptor Transects

Methods

Diurnal raptor survey transects, conducted on the Pacific Wind Project between April 14, 2008, and February 19, 2009, collected information on the occurrences and activities of diurnal raptors. A single observer during spring 2008 conducted three raptor diurnal counts standardized for distance (birds/kilometer), to count raptors and common ravens, from April 14 to May 27; a single observer during summer 2008 conducted one raptor diurnal count, standardized for distance (birds/kilometer), from July 30 to August 1; two observers during autumn 2008 conducted 11 weekly raptor diurnal counts from August 20 to November 13; and three observers during winter 2008–2009 conducted six weekly raptor diurnal counts, standardized for distance (birds/kilometer), from December 23 to February 19. The spring surveys were conducted along two preestablished unlimited distance survey transects (Figure 3.1.1.1-1; Transects A and B), and the summer, autumn, and winter surveys along five preestablished unlimited distance survey transects (Figure 3.1.1.1-1; Transects A, B, C, D, E) within and just beyond the Pacific Wind Project. Sapphos Environmental, Inc. used line transects of unequal distances and times for the raptor transects. Raptor transects A and B totaled a length of 12.9 miles (20.8 kilometers) during spring, whereas raptor transects A through E totaled a length of 22 miles (35.4 kilometers) during summer, autumn, and winter. Observation times were standardized for each transect, when possible. All transects within each sampling period were usually conducted on the same day to reduce concerns associated with repeat counts of birds. All line transects were driven at 5 miles per hour with frequent stops. Line transects were sampled at all times of day depending on seasons but mainly during midday (10:30 a.m.–3:00 p.m.) during the cold season when raptors are expected to be most abundant and active.

Results

Two golden eagles were recorded as a result of fall diurnal raptor transects on the Pacific Wind Project: 1 adult was recorded hunting over the Pacific Wind Project on August 21, 2008, and 1 subadult was observed hunting over the Pacific Wind Project on September 5, 2008. In addition, six golden eagles were observed on five occasions within and outside of the project during the course of other surveys: 1 immature was recorded hunting over the Pacific Wind Project on March 25, 2008; 1 immature was recorded hunting over the Pacific Wind Project on July 2, 2008; 1 eagle of unknown age was recorded 1 mile west of the Pacific Wind Project on February 23, 2009; 1 immature eagle was recorded incidentally at the Pacific Wind Project on March 1, 2009; and 2 immature eagles were recorded soaring over the Pacific Wind Project on March 3, 2009. The Pacific Wind Project is located due south, though it is not contiguous, with all of the project's parcels, thus all of the golden eagle sightings within or adjacent (1 mile west) of the Pacific Wind Project were greater than 0.5 mile away from the project boundary.

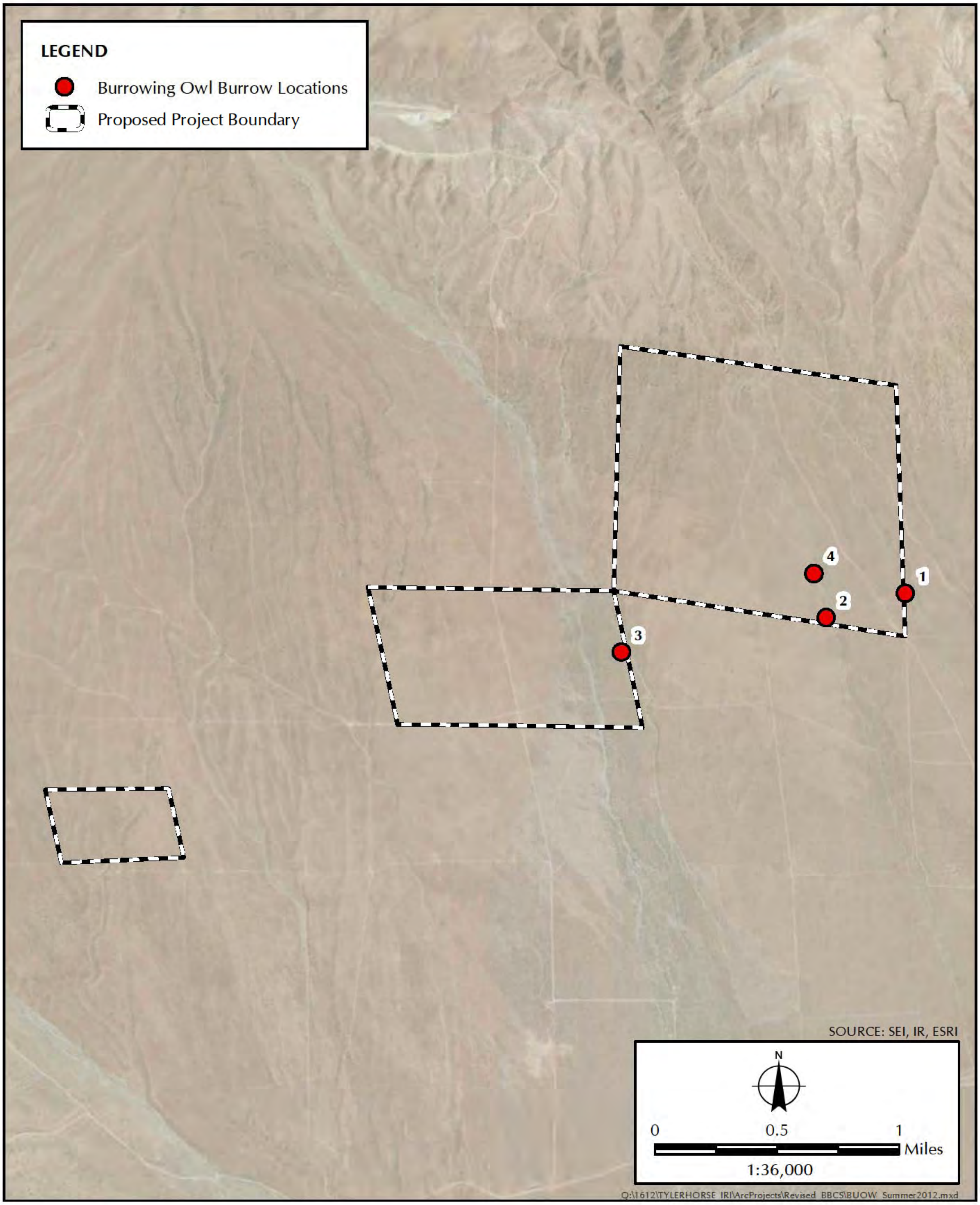


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FIGURE 3.1.1.5-1

2011-2012 Burrowing Owl Burrow Locations

3.1.1.4 2005-2012 California Condor Use Analysis

Methods

Surveys on the project and the surrounding adjacent renewable energy projects, including the BUCs, migration counts, diurnal raptor surveys, and raptor nest searches described above, were suitable for documenting California condor presence. California condors are extremely large, striking birds that are easily identifiable. Directed surveys for this species were not necessary to ascertain their presence or absence.

Rather, Sapphos Environmental, Inc. has done extensive research into the historical locations of condors within Southern California to determine the species' historical presence in the project area. Extensive condor telemetry data, provided by the USFWS and inclusive of dates between June 2005 and December 2012, has also informed Sapphos Environmental, Inc.'s assessment on the current movements of condors, and the likelihood of the species to frequent the project area.

Results

Despite a 100,000-year-old fossil record that shows occurrences in northeast Mexico, across the southwestern states from California to Texas, and even in Florida and New York,[78] by the mid-20th century, California condors were largely confined to Southern California (Figure 3.1.1.4-1, *Maps of Historical Condor Sightings between 1890 and 1984*).[79,80,81] Despite protection offered under the federal and state ESAs in the 1960s and 1970s when the wild population began to dramatically decline, condor numbers continued to plummet during the early 1980s; and by 1987, the last wild condors were captured and placed in a breeding program at both the San Diego and Los Angeles zoos.[82] By the late 1980s, the range of California condors in Southern California occupied an area of approximately 2 million hectares (7,720 square miles).[83] California condors primarily occupied a wishbone-shaped area comprising six counties in Southern California; this range, designated by the 1984 California Condor Recovery Plan, is the primary range of concern according to the USFWS[84] (Figure 3.1.1.4-2, *Historical Range of California Condor*).

The Mojave Desert geographic region, where the project is located, lies largely outside the historical range of the California condor. The nearest recorded observation of a California condor to the project boundary, based on a total of 428,041 occurrences from the USFWS Southern Flock GPS data from June 2005 to December 2012, was 3.7 miles to the west and was recorded in June of 2009, in the vicinity of the Tejon Ranch CHU (Figure 3.1.1.4-3, *USFWS*

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[78] Snyder, N.F., and J. Schmitt. 2002. "California Condor (*Gymnogyps californianus*)." In *The Birds of North America*. Philadelphia, PA.

[79] Stoms, D.M., F.W. Davis, C.B. Cogan, M.O. Painho, B.W. Duncan, J. Scepan, and J.M. Scott. 1993. "Geographic Analysis of California Condor Sighting Data." *Conservation Biology*, *7*: 148–159.

[80] Koford, C.B. 1953. *The California Condor*. National Audubon Society Research Report Number 4. Washington, DC: National Audubon Society.

[81] Wilbur, S.R. 1978. *The California Condor, 1966–76: A Look at Its Past and Future*. U.S. Fish and Wildlife Service North American Fauna 72. Washington, DC: U.S. Department of the Interior.

[82] U.S. Fish and Wildlife Service. 1996. *California Condor Recovery Plan.* 3rd Revision. Portland, OR.

[83] Meretsky, V.J., and N.F.R. Snyder. 1992. "Range Use and Movement of California Condors." *Condor*, *94*: 313–335.

[84] U.S. Fish and Wildlife Service. 1984. *California Condor Recovery Plan*. 2nd Revision. Portland, OR.

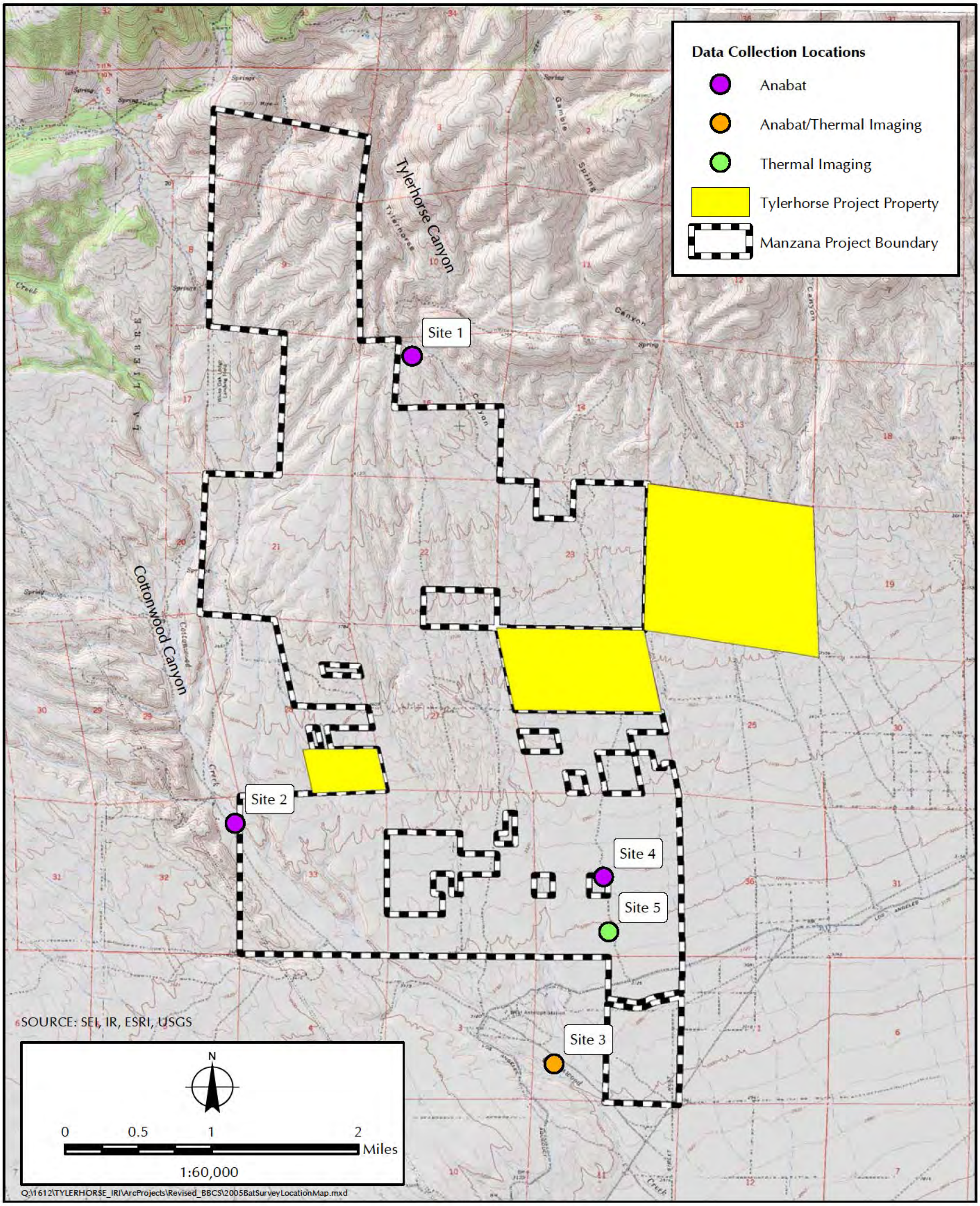

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FIGURE 3.1.2.1-1

2005 Bat Survey Location Map

California Condor Southern Flock Data [Years 2005–2012] in Relation to Project Boundary). The Tejon Ranch CHU is located approximately 2.7 miles west of the project boundary. Although there is no nesting habitat within this CHU, it remains an important foraging ground for condors, particular because of its close proximity to the Sespe-Piru Condor nesting area.[85] Despite the proximity of this CHU to the project, historically California condors appear to have rarely descended below the upper slopes of the Tehachapi Uplands and down into the Antelope Valley. Based on historical data collected in the Tejon Ranch and adjacent areas between 1910 and 2005, only a handful of sightings occurred on the floor of the Antelope Valley, with the vast majority occurring in upland habitat on the Tejon Ranch and within the Angeles National Forest (Figure 3.1.1.4-4, *Historical California Condor Sightings: 1910–2005*).

California condors generally inhabit rugged canyons, gorges, and forested mountains mainly between 985 and 8,860 feet in elevation and nest primarily between 2,000 and 4,500 feet. Typically, condors lay eggs on shelves in holes on cliff faces or caves. Roost sites are nearly always on the upper limbs of tall conifers and cliff edges. Wind conditions are an important component to suitable habitat. Condors require areas where the wind blows consistently and strongly enough to provide lift for soaring. The delineation of the California condor historic range, therefore, is largely a result of the availability of appropriate topography, wind resources, nesting habitat, and food resources in this horseshoe-shaped region that are required by condors. Therefore, it is not surprising that only 305 out of 428,041 total condor GPS observations (0.071 percent) over the past 8 years have occurred outside of the historic range, where resources required by condors are not readily available. As well as historically, within the last decade condors infrequently use the floor of the Antelope Valley and the foothills rising out of it: only 5 out of 428,041 total condor GPS observations (0.0012 percent) were located outside of the historic range and on the floor of the Antelope Valley.

There are no known occurrences of California condor within the project, either historically or within the past decade, when a significant proportion of the wild-flying condor population has been tracked via telemetry as well as with GPS transmitters. No condors were detected during a full year of BUC surveys on the project property (December 2011 through November 2012); nor have they been detected during avian surveys conducted over several thousand hours on more than 30,000 acres in the immediately surrounding area over an 8-year time period.

The species' potential for expansion into areas of the Antelope Valley, specifically in the vicinity of the project, is low for three reasons: (1) lack of complex terrain and predominant meteorological conditions required to create the thermal air lift California condors use to soar, (2) marginal foraging habitat, and (3) lack of available overnight and diurnal nesting and roosting locations. Although there is a recoverable wind resource within the project area, the topography, wind, and associated thermal weather patterns do not have the same characteristics as those in the adjacent Tehachapi Mountains, which condors consistently use as a foraging zone and a traveling route between foraging areas in Ventura County and the southern Sierra Nevada Mountains. There are no known nesting sites within the project area. All recently documented California condor nest sites in Southern California are located on public lands within the Los Padres, Angeles, and Sequoia National Forests.[86] Finally, no cliffs or large trees of the size

[85] Dudek. 2009. *Tehachapi Upland Multiple Species Habitat Conservation Plan*. Prepared for: Tejon Ranchcorp. Prepared by: Dudek, Encinitas, CA. Available at: http://www.fws.gov/ventura/endangered/habitat_conservation_planning/hcp/docs/draft/TehachapiUpland/04_Section4_CaliforniaCondor.pdf

[86] Dudek. 2009. *Tehachapi Upland Multiple Species Habitat Conservation Plan*. Prepared for: Tejon Ranchcorp. Prepared by: Dudek, Encinitas, CA. Available at:

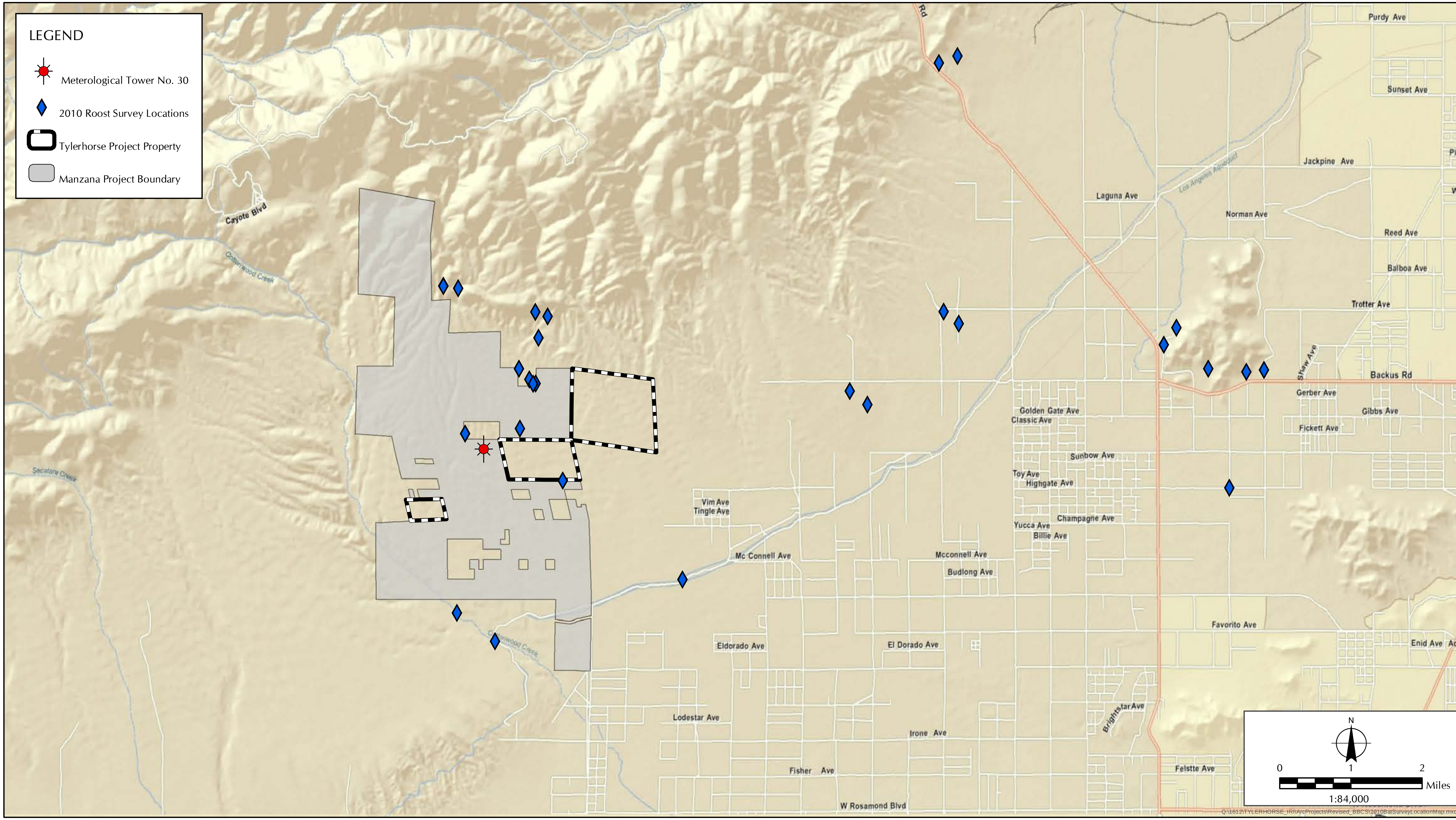

FIGURE 3.1.2.2-1

2010 Bat Survey Location Map

required by California condors for nesting exist in the project property or within the Tejon Ranch CHU, and similarly there are no suitable substrates for roosting within the project area or the general vicinity.

Despite the unlikely probability of a condor utilizing the floor of the Antelope Valley in the vicinity of the project, it cannot be conclusively stated that condors will never fly within the project boundary during the life of the project (estimated to be 30 years), and risks to this species from the construction and operation of the project should be assessed.

3.1.1.5 2011–2012 Tylerhorse Burrowing Owl Surveys

Methods

Phase I, II, and III burrowing owls surveys, pursuant to the 1993 *California Burrowing Owl Survey Protocol and Mitigation Guidelines,*[87] were conducted by Sapphos Environmental, Inc. on the project property to assess the site for burrowing owl use. This survey methodology was updated in March 2012 by CDFG's *Staff Report on Burrowing Owl Mitigation*;[88] however, as surveys on the project were under way at the time of this report's release, the original 1993 methods were followed.

Phase 1 (of three) of the *Guidelines* recommends a habitat assessment to determine the potential presence of burrowing owl habitat on the project site. A site visit was conducted in 2010 by Sapphos Environmental, Inc. to identify and map the extent of various plant communities at the project property and, concurrently, to assess the compatibility of the project property for burrowing owl occupancy. Based on the plant communities determined to be present, one-hundred percent of the 1,207-acre proposed project property was considered potential burrowing owl habitat.

Due to suitable habitat for burrowing owls within the project property, Sapphos Environmental, Inc. conducted Phase II burrow surveys over the entire 1,207 project property, and not just within the project impact areas and associated 150-meter buffer as stipulated within the 1993 protocol. Surveys for burrowing owl were completed in conjunction with desert tortoise protocol-level surveys on October 28 and 31, 2011. Surveys were in accordance with the USFWS 100 percent coverage recommendations for desert tortoise, using 10-meter belt transects in habitats determined suitable for desert tortoise. In burrowing owl habitat that was not suitable for desert tortoise, parallel transects were spaced 30 meters apart, in accordance with Phase II of the *California Burrowing Owl Survey Protocol and Mitigation Guidelines*. A handheld GPS unit was used to record the location of any burrowing owls, burrows, and sign encountered.

Due to the confirmed presence of burrowing owls, burrows, and sign on the project as a result of Phase II surveys, both winter and breeding season burrowing owl burrow checks, consistent with *California Burrowing Owl Survey Protocol and Mitigation Guidelines*, were completed to

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http://www.fws.gov/ventura/endangered/habitat_conservation_planning/hcp/docs/draft/TehachapiUpland/04_Section4_CaliforniaCondor.pdf

[87] The California Burrowing Owl Consortium. April 1993. *California Burrowing Owl Survey Protocol and Mitigation Guidelines*. Available at: http://www.dfg.ca.gov/wildlife/nongame/docs/boconsortium.pdf

[88] California Department of Fish and Game. 7 March 2012. Staff Report on Burrowing Owl Mitigation. Available at: http://www.dfg.ca.gov/wildlife/nongame/docs/BUOWStaffReport.pdf

ascertain burrowing owl occupancy.[89] Winter surveys were conducted between December 8, 2011, and January 12, 2012; and breeding season surveys were conducted between June 7 and August 31, 2012. A complete seasonal burrowing owl survey consisted of four site visits to each burrow. Burrows were visited from 2 hours before sunset to 1 hour after or from 1 hour before sunrise to 2 hours after. Biologists observed each burrow for approximately one-half hour during each visit, taking care to avoid disturbance of owls at the potential burrows. All observed burrowing owl activity and burrowing owl sign such as excrement, pellets, or burrow decorations (or absence thereof) were recorded during each visit. Burrow occupancy status was determined based on the presence or absence of burrowing owls and/or sign. To determine burrow occupancy, a comparison was made over the course of the four burrow visits. If no change was observed between the initial visit and the final visit, the burrow was considered unoccupied. If burrowing owls were observed or new burrowing owl sign was observed at the burrow during at least one of the four visits, the burrow was considered occupied.

Results

As a result of the Phase I surveys in 2010, it was determined that habitat within the project property was suitable burrowing owl habitat, based on the presence of plant communities that burrowing owls are known to occupy, the presence of suitable burrow sites, and a observed prey base consisting of small mammals and reptiles.

As a result of the Phase II burrowing owl burrow surveys in fall of 2011, four burrowing owls and three of their burrows were recorded (Figure 3.1.1.5-1, *2011–2012 Burrowing Owl Burrow Locations*). All three of the burrows were actively used by burrowing owls and contained either owls or their sign (pellets, whitewash, feathers, or burrow decoration). The three burrows observed during the Phase II burrow survey were monitored during the winter as part of the Phase III occupancy surveys. Of these three burrowing owl burrows, two were occupied and one was unoccupied (Table 3.1.1.5-1, *2011–2012 Burrowing Owl Winter and Summer Burrow Occupancy*).

TABLE 3.1.1.5-1
2011–2012 BURROWING OWL WINTER AND SUMMER BURROW OCCUPANCY

Name	Winter 2011–2012 Occupancy	Number of Winter Visits Where Burrowing Owls or Sign Observed	Summer 2012 Occupancy	Number of Summer Visits Where Burrowing Owls or Sign Observed	Location (UTM Easting, Northing)
1	Occupied	1	Unoccupied	0	370723 E, 3867136 N
2	Unoccupied	0	Unoccupied	0	370203 E, 3866977 N
3	Occupied	3	Unoccupied	0	368852 E, 3866748 N
4	N/A*	N/A*	Occupied	1	370119 E, 3867268 N

NOTE: *Burrow discovered after winter 2011–2012 burrow site visits.

The three original burrowing owl burrows found through Phase II surveys were also monitored during the breeding season for occupancy. An additional burrow discovered during 2012 special-status plant surveys was also monitored during the breeding season, bringing the total

[89] The California Burrowing Owl Consortium. April 1993. *California Burrowing Owl Survey Protocol and Mitigation Guidelines*. Available at: http://www.dfg.ca.gov/wildlife/nongame/docs/boconsortium.pdf

number of burrows to four (Table 3.1.1.5-1; Figure 3.1.1.5-1). Of the four total burrows visited during the summer breeding season to determine occupancy, burrowing owls or active sign were observed only at burrow 4, the most recently discovered burrow, during the final of four visits. No owls or recent sign were documented at this burrow during the three preceding visits to the burrow; nor was any activity recorded on a camera placed in view of the burrow entrance. Based on the timing of the final burrow check, the individual was likely a post-breeding adult or dispersing juvenile that was temporarily occupying the burrow.

3.1.2 Bat Surveys

Bat surveys conducted within and adjacent to the project between 2005 and 2010 included the following survey types: 2005 Manzana Project Bat Site Assessment and 2009–2010 Tylerhorse Project Active and Passive Bat Monitoring. The survey methods and general results of these surveys are described in the following sections.

3.1.2.1 2005 Manzana Project Bat Site Assessment

Methods

A general bat site assessment was conducted in fall of 2005 as part of the pre-permitting surveys for the Manzana Project, which is located just west of the largest project parcel, and surrounds the central and eastern parcels on three sides. In order to identify bat species that may occur at the Manzana Project, several different methods were employed. Sites with the potential to support bat roosts were inspected visually. Potential bat roosting sites were assessed by surveying a cliff face adjacent to the Manzana Project and abandoned buildings on-site. Thermal imaging cameras were used to assess general bat activity level at two sites with high-quality foraging habitat (Sites 3 and 5; Figure 3.1.2.1-1, *2005 Bat Survey Location Map*). Anabat acoustic bat detectors were deployed to identify low-flying bat species at four locations that had both roosting and high-quality foraging habitat (Sites 1, 2, 3, and 4). One site utilized both Anabat acoustic bat detectors and thermal imaging (Site 3). All sites were located between 0.5 and 2.5 miles of the Tylerhorse Project boundary. All sites with the potential to support bat roosts were inspected during the daytime on October 7, 2005. Thermal imaging and acoustic work was conducted on the evening of October 7, 2005.

Results

No bat roosts were detected on or adjacent to the Manzana Project as a result of visual surveys. A search of deserted buildings at the edge of Cottonwood Canyon did not yield evidence of bats, though a cliff face just outside of the Manzana Project in Tylerhorse Canyon, approximately 2 miles north-northwest of the Tylerhorse project boundary, in the vicinity of Site 1 (Figure 3.1.2.1-1) was identified as providing appropriate shelter for use by cliff-roosting species such as *Tadarida*, *Eumops*, and *Antrozous*. Other potential roosting sites on the Manzana Project include trees and rock crevices, which proved too extensive to survey accurately during this site assessment.

Bat activity in the area was confirmed with the thermal imager. Video recordings made in the area of the anemometer tower (Figure 3.1.2.1-1; site 5) and over Cottonwood Creek (Figure 3.1.2.1-1; site 3) showed bat passes at the rate of one per minute. Due to the similar size and shape of many North American bat species, thermal images do not allow for the elucidation of bat species. The majority of the bats were flying downstream (SE) during the period of the recordings.

The use of four Anabat detectors revealed the confirmed presence of one bat species, the pallid bat (*Antrozous pallidus*), that was recorded near the anemometer tower in the southern part of the project, near the Cottonwood Creek drainage.

3.1.2.2 2009–2010 Tylerhorse Project Active and Passive Bat Monitoring

Methods

Sapphos Environmental, Inc. conducted active monitoring in June 2010 to determine the suitability of roosting habitat within and adjacent to the project property. Visual surveys for potential roosts during daytime and active acoustic surveys for bats during nighttime occurred on June 8, 9, 21, and 22, 2010. Surveys consisted of driving and walking areas within and adjacent to the project property to identify suitable crevice-, cave-, and tree-roosting habitats. No activity was detected within the proposed project; therefore, Anabat recordings were made at more active sites at nearby creeks, canyons, quarries, and mines in order to build a library of calls from local bat species (Figure 3.1.2.2-1, *2010 Bat Survey Location Map*). Potential sites were identified visually during the day and subsequently surveyed acoustically from dusk to evening. Surveyors visually identified potential roost sites by positive presence of individual bats or colonies, and by the presence and identification of guano. The presence of bats was determined through visual identification and through acoustic monitoring via the Anabat SD2 bat detector. Captured bat call files were then analyzed using AnalookW, Version 3.8n.[190]

In July 2010, Sapphos Environmental, Inc. analyzed bat survey data provided by the U.S. Forest Service (USFS) from October 11, 2009, to October 21, 2010. The USFS previously installed two Anabat detectors on a single meteorological tower (Meteorological Tower No. 30) adjacent to the project site to continuously record passive data (Figure 3.1.2.2-1). Anabat detectors were placed at 2 meters AGL and 45 meters AGL on the single meteorological tower. Bat call files downloaded from the two Anabat units were analyzed using AnalookW bat detection software.

Results

As a result of 2010 visual surveys for roosting locations on and adjacent to the project, it was observed that some cave and rock crevice roosting habitat is present in portions of the project; however, suitable arboreal roosting habitat is lacking. Foraging habitat is present at the site, with foraging activities dependent on insect abundance for insectivorous bats. A variety of foraging bats were observed visually and recorded acoustically near the project; most sightings were of individual or pairs. A total of 15 bat call sequences were recorded during 2010 active acoustic field surveys. No listed or sensitive bats species were detected. Of the 15 bat call sequences, 14 were identified as the western pipistrelle and 1 was identified as the Mexican free-tailed bat; both are common species.

Passive survey data from the USFWS between October 11, 2009, and October 21, 2010 were analyzed by Sapphos Environmental, Inc. The 376 nights of data collection (376 nights × 2 detectors = 752 detector-nights) resulted in 536 recordings, all of which were reviewed in detail for species identification. Of the 536 recordings, 497 were identified as containing bat call sequences, resulting in (497 sequences ÷ 752 detector-nights) 0.66 bat call sequences per detector-night.

As a result of both 2010 active field surveys and year-round passive monitoring analysis, six bat species were identified as being present and six additional bat species were identified as being potentially present in the vicinity of the proposed project study area (Table 3.1.2.2-1, *Present*

[90] Corben, Chris. 16 January 2011. AnalookW. Version 3.8n. Brisbane, Australia: Titley Scientific.

and Potentially Present Bat Species in the Project Vicinity). It should be noted that positive species identification can be uncertain with acoustic detectors because some species have similar acoustic signatures. Therefore, these species are typically grouped by their characteristic frequency range (i.e., 40k Myotis and Q25) and designated as potentially present because specific species identification is difficult without a complete sequence of calls or visual confirmation. For example, the 40k Myotis group had the greatest number of recorded bat call sequences (202 of 497 bat calls, or 41 percent). This group consists of three possible species: western small-footed myotis, long-legged myotis, and little brown bat; thus all three are listed as potentially present.

TABLE 3.1.2.2-1
PRESENT AND POTENTIALLY PRESENT BAT SPECIES IN THE PROJECT VICINITY

Common Name	Genus and Species Name	Presence	Status	Population Status	Frequency Category*
Western mastiff (+)	*Eumops perotis*	Present	BLM, CSC	Resident	n/a
Hoary bat (+)	*Lasiurus cinereus*	Present	None	Migratory	Q25
Mexican free-tailed bat (++)	*Tadarida brasiliensis*	Present	None	Migratory	Q25
Big brown bat (++)	*Eptesicus fuscus*	Present	None	Migratory	Q25
Silver-haired bat	*Lasionycteris noctivagans*	Potentially present	None	Migratory	Q25
Pallid bat (+)	*Antrozous pallidus*	Present	BLM, CSC	Resident	Q25
Western small-footed myotis	*Myotis ciliolabrum*	Potentially present	BLM	Resident	40k myotis
Long-legged myotis	*Myotis volans*	Potentially present	None	Resident	40k myotis
Little brown bat	*Myotis lucifugus*	Potentially present	None	Migratory	40k myotis
Western pipistrelle (++)	*Parastrellus hesperus*	Present	None	Resident	n/a
California myotis	*Myotis californicus*	Potentially present	None	Resident	50k myotis
Yuma myotis	*Myotis yumanensis*	Potentially present	BLM	Resident	50k myotis

KEY:
n/a = Not applicable: the western mastiff has a very low and distinctive characteristic frequency; while the western pipistrelle has a distinctive call, marked by a characteristic frequency of 45 kHz, a low-frequency sweep (bandwidth), and a consistent call shape
BLM = Bureau of Land Management Sensitive Species
CSC = California Species of Special Concern
NOTES: * A single species of bat may belong to multiple frequency categories since this table makes a distinction between Q25 and Q30.
+ Diagnostic calls were acoustically recorded for these species during surveys.
++ These species were acoustically recorded and visually observed during surveys.

Of the bat calls derived from passive monitoring, approximately 80 percent of bat calls were recorded at temperatures greater than the mean of 41° F and 97 percent during periods with wind speed ≤ 8 MPH. The combination of these two conditions occurred in 149 out of 376 nights (40 percent), and 78 percent of all bat calls were recorded on these nights. Thus, the majority of the activity was limited to comparatively few nights. Furthermore, during each night, 91 percent of bat calls were recorded between the hours of 7:00 p.m. to 2:00 a.m.

3.1.3 Reconnaissance Surveys

Methods

Reconnaissance surveys, or incidental observations, of species of potential interest were recorded by biologists on an opportunistic basis. These observations were recorded while conducting BUC surveys, during aerial raptor flights, during burrowing owl burrow checks, while traveling between surveys, and during the course of non-avian-focused surveys, such as special status plant surveys.

Results

In addition to the 45 avian species identified during the 30-minute BUCs, 16 additional avian species were observed incidentally within the project vicinity during the course of all biological surveys conducted between 2011 and 2013. As a result of all surveys completed in the project vicinity between 2011 and 2013, a total of 61 avian species were recorded. (Appendix A). No additional bat species were recorded incidentally during surveys on the project between 2011 and 2013.

HW has been committed throughout the development of the project to design, site, construct, and operate the project in an environmentally sustainable way that avoids and minimizes impacts to birds and bats. In particular, to reduce environmental impacts, the project would use the ancillary facilities of the adjacent Manzana Project, such as the O&M facility, access roads, and transmission lines providing a connection to the Whirlwind substation, thus minimizing ground disturbance. The project has also been designed to avoid any streambed crossings, thus eliminating disturbance to these sensitive areas. As will be further detailed in Section 5.0, additional conservation measures have been developed to lessen the project's impacts to birds and bats.

Nevertheless, it is understood that even with many proactive preventative measures in place on the project, bird and bat species that migrate, breed, winter, or forage in the vicinity of the project have the potential to be adversely affected by wind energy projects as a result of habitat loss, nest disturbance, reduced quality of and accessibility to foraging habitat, and potential for collision with wind turbines resulting in injury or mortality. Furthermore, bird species, particularly raptors, are at risk of collision, bodily injury, or electrocution as a result of contact with overhead transmission lines.

The potential for project impacts to bird and bat species due to disturbance and displacement, habitat fragmentation, collision, electrocution (for birds), and barotrauma (for bats) are first discussed generally, and then in detail for each potential special status species with the potential to occur on the project, in an analysis that approximates the impact prediction segment of Tier 3 of the *Final Guidelines*.[91] This analysis, specifically for golden eagles, also approximates Stage 3 of the *ECP Guidance*,[92] although certain Stage 3 assessment methodologies have been modified or omitted as a result of project specific characteristics, or compatibility of some analyses with data gathered in the field. In all analyses herein, the project is compared to data obtained from similar wind energy projects already in operation. As much as possible, comparative data are drawn from projects that are in close proximity to the project, and/or have similar bird and bat communities and similar habitat types; however, the use of data from projects in the same geographic region are often limited by report availability.

4.1 IMPACTS TO THREATENED AND ENDANGERED WILDLIFE

4.1.1 Threatened and Endangered Bird Species

<u>No bird species listed as threatened or endangered by the USFWS have been detected within the project property.</u>

The California condor, listed as endangered in both the California and federal ESAs, is known to frequent more mountainous habitat to the northwest of the project in the Tehachapi mountains, but condors have not been documented entering the project, either historically or as a result of hundreds of hours of field surveys on the project. The closest documented observation of this

[91] U.S. Fish and Wildlife Service Wind Turbine Guidelines Advisory Committee. 23 March 2012. *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines*. Available at: www.fws.gov/windenergy/docs/WEG_final.pdf

[92] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. *Eagle Conservation Plan Guidance*. Module 1—"Land-Based Wind Energy." Version 2. Arlington, VA

species near the project is of a condor equipped with a global positioning system (GPS) tag, which was documented approximately 3.7 miles west of the project in 2009. A further description of potential risks to this species is presented in Section 4.3.2, *California Condor*.

A single Swainson's hawk, listed as threatened under the California ESA, was observed incidentally foraging over the project in April of 2012. A further description of potential risks to this species is presented in Section 4.3.8, *Swainson's Hawk*.

4.1.2 Threatened and Endangered Bat Species

No bat species listed as threatened or endangered by the USFWS or CDFW have been detected on the project, nor are any known records for these species within the project area. Therefore, the project is not anticipated to have any impacts on federally or state-listed bat species.

4.2 IMPACTS TO GENERAL AVIAN SPECIES

4.2.1 Disturbance and Displacement

Avian displacement due to disturbance during the construction or operational phases of wind energy projects can be impacted by several factors, including avoidance of turbine noise and vibration impacts, human maintenance activities surrounding turbines, or the lack of available habitat due to gravelling of turbine pads or presence of maintenance roads.[93] Compared to analyses of collision mortality and direct habitat loss, the risks of avian disturbance and displacement due to wind energy development have only recently been studied. Few studies, many of them focused on grassland passerine species, have been conducted, and those that have reveal mixed results on the degree of impact the construction and operation of wind energy projects have on avian disturbance and displacement.

A study conducted at the Buffalo Ridge Wind Resource Area (WRA) in Minnesota included a monitoring study using a before/after and control/impact (BACI) design. The analysis showed that 7 of 22 species of grassland breeding species had reduced use of the areas near turbines, and that this reduced use was primarily within 100 m of the turbine structure.[94] Preliminary results comparing preconstruction and postconstruction grassland bird transects at the Stateline Wind Project in Washington and Oregon suggested a relatively small-scale displacement impact on grassland breeding passerines.[95] Conversely, a postconstruction displacement study conducted at the Judith Gap Wind Energy Project (Judith Gap) in Wheatland County, Montana,

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[93] Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, and D.A. Shepherd. 2000. *Avian Monitoring Studies at the Buffalo Ridge, Minnesota Wind Resource Area: Results of a 4-year Study*. Prepared for: Northern States Power Company, Minneapolis, MN. Prepared by: WEST, Inc., Cheyenne, WY.

[94] Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, and D.A. Shepherd. 2000. *Avian Monitoring Studies at the Buffalo Ridge, Minnesota Wind Resource Area: Results of a 4-year Study*. Prepared for: Northern States Power Company, Minneapolis, MN. Prepared by: WEST, Inc., Cheyenne, WY.

[95] Erickson, W.P., J. Jeffrey, K. Kronner, and K. Bay. 2004. *Stateline Wind Project Wildlife Monitoring Final Report, July 2001 – December 2003*. Prepared for: FPL Energy, the Oregon Energy Facility Siting Council, and the State Technical Advisory Committee. Prepared by: WEST Inc., Cheyenne, WY.

in 2007 found that construction did not negatively impact numbers of breeding grassland birds but, rather, that there was an overall increase in grassland birds on all transects.[96]

Studies of raptor disturbance and displacement at wind energy projects are similarly scarce, and most evidence is anecdotal and related to nesting impacts. A raptor nest occupancy survey for five nests located within 3 miles of the Klondike Wind Project in Sherman County, Oregon, was conducted in 2001 and replicated in 2002, a year after operation began. One red-tailed hawk nest within 2.5 miles of the turbines remained active after operation; one red-tailed hawk, one great horned owl, and one Swainson's hawk nest within 1.75 miles, 1.6 miles, and 3 miles of turbine strings, respectively, did not appear active after operation began. Additionally, one Swainson's hawk nest within 0.25 mile of a turbine string, as well as within 0.25 miles of an access road and O&M facility did remain active.[97] At the Foote Creek Rim Wind Energy Project (Foote Creek Rim) in southern Wyoming, one red-tailed hawk nest was successful within 0.3 mile of a turbine string; and seven red-tailed hawk nests, one great horned owl nest, and one golden eagle nest within 1 mile of the wind facility were all successful.[98] Construction of Phase I of the Montezuma Hills, California, wind energy project did not appear to permanently disturb nesting raptors, as similar numbers of nests were found before and after construction.[99] Construction of the Stateline I project in Oregon and Washington, similarly, did not result in lowered nesting raptor rates within 2 miles of turbine locations; 11 total raptor nests (composed of red-tailed hawk, ferruginous hawk, and Swainson's hawk) were recorded during preconstruction surveys in 2001 as compared to 12 total nests recorded postconstruction in 2002.[100] The project has few natural substrates for diurnal raptor nesting; substrates are limited to scattered Joshua tree and junipers, whereas there are no cliffs or tall trees present within the project property. Thus, construction and operation of the project is not anticipated to cause significant disturbance or displacement to nesting raptors.

It is likely, and reasonable to assume, that activities associated with the construction and maintenance of the project, as well as the presence of project elements, such as project turbines, will disturb and, in some cases, displace birds from currently occupied habitat within the project footprint; however, it is unlikely that this displacement will have population-level ramifications for any of the common and widespread species found within the project vicinity.[101,102] Construction will disturb only a small amount of habitat (119.4 acres) within the

[96] TRC Environmental Corporation. 2008. *Post-Construction Avian and Bat Facility Monitoring and Grassland Bird Displacement Surveys at the Judith Gap Wind Energy Project, Wheatland County, Montana*. Prepared for: Judith Gap Energy, LLC, Chicago, IL. Laramie, WY.

[97] Johnson, G. D., W. P. Erickson, J. White, and R. McKinney. 2003. *Avian and Bat Mortality During the First Year of Operation at the Klondike Phase I Wind Project, Sherman County, OR.* Prepared for: Northwestern Wind Power, Goldendale, WA. WEST, INC., Cheyenne, WY.

[98] Johnson, G.D., D.P. Young Jr., C.E. Derby, W.P. Erickson, M.D. Strickland, and J.W. Kern. 2000. *Wildlife Monitoring Studies, SeaWest Windpower Plant, Carbon County, Wyoming, 1995-1999*. Prepared for: SeaWest Energy Corporation and Bureau of Land Management. Prepared by: WEST, Inc., Cheyenne, WY.

[99] Howell, J.A., and J. Noone. 1992. *Examination of Avian Use and Monitoring at a US Windpower Wind Energy Development Site, Montezuma Hills, Solano County, California*. Prepared for: Solano County Department of Environmental Management, Fairfield, CA.

[100] Erickson, W.P., J. Jeffrey, K. Kronner, and K. Bay. 2004. *Stateline Wind Project Wildlife Monitoring Final Report, July 2001 – December 2003*. Prepared for: FPL Energy, the Oregon Energy Facility Siting Council, and the State Technical Advisory Committee. Prepared by: WEST Inc., Cheyenne, WY.

[101] Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, and D.A. Shepherd. 2000. *Avian Monitoring Studies at the Buffalo Ridge, Minnesota Wind Resource Area: Results of a 4-year Study*. Prepared for: Northern States Power Company, Minneapolis, MN. Prepared by: WEST, Inc., Cheyenne, WY.

project; moreover, suitable habitat will remain both amongst project elements and in more natural, less fragmented lands, primarily located north of the largest parcel. The general project vicinity is currently characterized by two operating wind energy projects, transmission lines, meteorological towers, and off-highway vehicle (OHV) trails; thus existing disturbance activities are already common in the area.

4.2.2 Habitat Fragmentation

Habitat fragmentation is the process of dividing large, contiguous areas of intact habitat into smaller patches that are isolated from one another.[103] In general, wind energy projects cover relatively large areas, but their construction has a relatively low direct impact on existing habitat. The BLM's Programmatic Environmental Impact Statement, for example, estimated that the permanent footprint of wind energy projects is between 5 to 10 percent of the project site, including all project infrastructure.[104] Although direct habitat loss is low, the construction of access roads, which link dispersed turbines, and transmission lines, can lead to habitat fragmentation, which can decrease habitable patch size, increase seemingly less productive edge habitat, and increase the isolation of habitat patches from one another. Avian species within these smaller patches may experience higher nest predation and parasitism, interspecific competition, and lower pairing success and reduced dispersal opportunities.[105] Studies on the impact of habitat fragmentation have thus far been mostly focused on grassland birds. Thirteen grassland bird species have been found to favor larger patches of grassland, while seven grassland bird species have been shown to be edge-adverse.[106]

The construction of the project is not anticipated to significantly increase the degree of habitat fragmentation to the area. The majority of the wind project is sited in previously fragmented habitats that are surrounded by operating wind energy projects, and crisscrossed by existing roads and OHV trails. The project will minimize further habitat disturbance by relying on existing roads to the extent practicable, burying the majority of electrical collector lines, and avoiding important wildlife dispersal corridors, such as desert washes.

4.2.3 Collision

Avian species that migrate, breed, or winter within the project have the potential to be impacted by collisions with WTG or other project elements, such as power lines or meteorological towers, during project construction or operation. Collisions may occur with resident birds foraging and flying within the project site or with migrant birds seasonally moving through the area. However, because overall avian use of the project is lower compared to many areas in Southern California, where avian species concentrate at wetlands, oases, or along ridgelines where avian species are known to migrate in moderate to high numbers, risk to migrating, breeding, or

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[102] Powlesland, R.G. 2009. *Impacts of Wind Farms on Birds: A Review*. Science for Conservation: Volume 289. Wellington, New Zealand: Department of Conservation.

[103] Johnson, D.H. 2001. Habitat fragmentation effects on birds in grasslands and wetlands: a critique of our knowledge. Great Plains Research 11: 211-231.

[104] Bureau of Land Management (BLM). 2005. Final Programmatic Environmental Impact Statement on wind energy development on BLM administered land in the western United States. U.S. Department of the Interior, Bureau of Land Management, Washington, D.C. USA.

[105] Johnson, D.H. 2001. Habitat fragmentation effects on birds in grasslands and wetlands: a critique of our knowledge. Great Plains Research 11: 211-231.

[106] Johnson, D.H. 2001. Habitat fragmentation effects on birds in grasslands and wetlands: a critique of our knowledge. Great Plains Research 11: 211-231.

wintering birds is expected to be low at the project property.

Fatality rates for WTG collisions among facilities implementing appropriate carcass search methodologies across the United States are fairly consistent, with 42 of 63 studies (66.7 percent) reporting fatality estimates for all birds at or below 3.0 bird fatalities/MW/year.[107] When limiting the review to fatality rates documented for projects in arid environments in the western United States containing similar habitats, the average mortality rate is somewhat lower at 2.02 birds/MW/year (Table 4.2.3-1, *Estimates of Mean Bird Fatalities per Turbine and per Megawatt at Wind Energy Projects in the Arid Western United States*), which averaged 1.99 birds/MW/year.

In 2001, based on an estimate of 15,000 operational wind turbines in the U.S. by year's end, it was predicted that wind turbine collisions would result in approximately 10,000 to 40,000 bird fatalities per year. To put this into context, it is estimated that 100 million to well over 1 billion birds are killed each year as a result of collisions with all man-made structures (roads, power lines, communication towers, buildings, windows, and wind turbines). Altogether, it has been estimated that avian fatalities due to collisions with wind turbines amount to only 0.01 to 0.02 percent of anthropogenic avian fatalities in the U.S.[108]

Based on the results of fatality monitoring at other wind energy projects throughout the western U.S., the degree of WTG collision risk to birds at wind energy projects appears to be species-specific, except along important migration corridors where impacts are increased overall. For example, fatalities of common ravens, turkey vultures, and ferruginous hawks are generally low at studied wind energy projects; whereas fatalities of American kestrels, red-tailed hawks, and horned larks are more common.[109] Thus, the siting of a wind energy project in a migration corridor, in specific types of habitat, or in areas of high biodiversity, along with the behavior of individual species, plays an important role in the risk of WTG collision.

Avian species are also at risk from collision with power lines and related electrical transmission structures.[110,111,112] The risk of collision with power lines does not appear to be related to a species' flight frequency over power lines;[113] a species' flight performance is a better indicator of

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[107] Strickland, M.D., E.B. Arnett, W.P. Erickson, D.H. Johnson, G.D. Johnson, M.L. Morrison, J.A. Schaffer, and W. Warren-Hicks. 2011. *Comprehensive Guide to Studying Wind Energy/Wildlife Interactions*. Prepared for: National Wind Coordinating Collaborative, Washington, DC.

[108] Erickson, W., G.D. Johnson, M.D. Strickland, D. P. Young, K. J. Sernka, and R. E. Good. 2001. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: National Wind Coordinating Committee, Washington, DC.

[109] Erickson, W. P., G. D. Johnson, D. Young, D. Strickland, R. Good, M. Bourassa, K. Bay, and K. Sernka. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: Bonneville Power Administration, Portland, OR.

[110] Arnett, E.B., D.B. Inkley, D.H. Johson, R.P. Larkin, S. Manes, A.M. Manville, J.R. Mason, M.L. Morrison, M.D. Strickland, and R. Thresher. 2007. Impacts of wind energy facilities on wildlife and wildlife habitat. Wildlife Society Technical Review 07-2. The Wildlife Society, Bethesda, Maryland.

[111] Drewitt, A.L. and R.H. W. Langston. 2006. Assessing the impacts of wind farms on birds. Ibis 148: 29-42.

[112] Janss, G.F.E. 2000. Avian Mortality from Power Lines: A Morphologic Approach of a Species-Specific Mortality. Biological Conservation. 95: 353-359.

[113] Rusz, P.J., Prince, H.H., Rusz, R.D., Dawson, G.A., 1986. Bird collisions with transmission lines near power plant cooling pond. Wildlife Society Bulletin 14: 441-444.

collision risk.[114] Species of birds susceptible to collisions with power lines generally have a large body size, long wingspan, heavy body, poor maneuverability, and poor vision.[115,116] For example, larger, heavy-bodied birds with short wingspans and poor vision are more susceptible than smaller, lighter-weight birds with larger wingspans, better agility, and more acute vision.[117] Examples of avian groups particularly susceptible to power line collision include loons, storks, grebes, waterfowl, and some species of hawks and eagles.[118] Environmental and engineering factors also influence risk of power line collision. Environmental factors can include land uses, weather, visibility, and lighting, while engineering factors can include size, placement, orientation, and configuration of lines, as well as structure type.[119] In general, construction of the project will not entail the construction or maintenance of overhead electrical transmission lines, as all power generated on the project will be transferred via underground electrical collectors to a substation via ancillary facilities of the adjacent Manzana Project. In an effort to avoid any streambed alterations on the project itself, small sections of overhead transmission lines may be installed over drainages, but collision impacts from these small stretches of line are not anticipated to be substantial.

A collision risk assessment for passerines and raptors is presented below, as these would be expected to be the general avian groups most likely to be affected by collision, since they make up the majority of avian use on the project.

Passerines

Of the nonraptor avian groups, protected passerines (excluding introduced species such as house sparrows, European starlings, and rock doves) constitute the most abundant avian fatalities at newer-generation wind energy projects, often comprising more than 80 percent of the avian fatalities.[120,121] For passerine species, there seem to be few patterns linking specific species or groups with higher turbine collision risk; a wide variety of species have been observed as fatalities throughout the U.S.[122] Ninety-eight species of birds were recorded in

[114] Janss, G.F.E. 2000. Avian Mortality from Power Lines: A Morphologic Approach of a Species-Specific Mortality. Biological Conservation. 95: 353-359.

[115] Janss, G.F.E. 2000. Avian Mortality from Power Lines: A Morphologic Approach of a Species-Specific Mortality. Biological Conservation. 95: 353-359.

[116] Avian Power Line Interaction Committee (APLIC). 2012. Reducing Avian Collisions with Power Lines: The State of the Art in 2012. Edison Electric Institute and APLIC. Washington, D.C.

[117] Avian Power Line Interaction Committee (APLIC). 2012. Reducing Avian Collisions with Power Lines: The State of the Art in 2012. Edison Electric Institute and APLIC. Washington, D.C.

[118] Avian Power Line Interaction Committee (APLIC). 2012. Reducing Avian Collisions with Power Lines: The State of the Art in 2012. Edison Electric Institute and APLIC. Washington, D.C.

[119] Avian Power Line Interaction Committee (APLIC). 2012. Reducing Avian Collisions with Power Lines: The State of the Art in 2012. Edison Electric Institute and APLIC. Washington, D.C.

[120] Erickson, W., G.D. Johnson, M.D. Strickland, et al. 2001. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: National Wind Coordinating Committee, Washington, DC.

[121] Erickson, W.P., G.D. Johnson, M.D. Strickland, D.P. Young, K.J. Sernka, and R.E. Good. 2001. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: National Wind Coordinating Committee, Washington, DC.

[122] Erickson, W., G. Johnson, D. Young, D. Strickland, R. Good, M. Bourassa, K. Bay, and K. Sernka. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed*

Johnson and Erickson's 2011 synthesis of fatality reports from 23 wind energy projects in the Columbia Plateau Ecoregion (CPE) of Washington and Oregon.[123] Passerine fatalities at wind energy projects typically consist of both resident and migrant birds. In a synthesis of wind energy projects in the West and Midwest, nocturnal migrant fatalities made up between 34.3 and 59.9 percent of total fatalities;[124] however, the level of nocturnal migrant mortality is very low in proportion to the overall passage of nocturnal birds over wind energy projects where both nocturnal radar studies and fatality data have been collected.[125] For example, as many as 3.5 million birds per year migrated over the Buffalo Ridge, Minnesota, wind energy project, but the largest nocturnal migrant fatality event at this facility (and the single largest fatality event reported at any western U.S. wind energy project) was 14 birds at two turbines during data collected during spring migration.[126] Marine radar surveys for proposed wind energy projects have found that the majority of nocturnal migrants fly above the rotor-swept zone, putting them out of risk of turbine collision.[127]

Passerine observations were recorded in structured 30-minute unlimited distance bird use count (BUC) surveys between winter 2011–2012 and fall 2012. The species observed during these surveys includes a range of resident and migratory passerines common in the Mojave desert region of Southern California (Appendix A, *Bird and Bat Compendium*). The five species most often observed during BUCs were all common passerines and included, in order of abundance, house finch, white-crowned sparrow, western meadowlark, lark sparrow, and common raven.

The bird community and habitat composition at the project is similar to that documented at the Tehachapi Pass WRA and the San Gorgonio Pass WRA, both located in Southern California, and thus bird utilization and fatality data from these projects may be useful to indicate patterns of passerine fatalities that are likely to occur at the project. The Tehachapi Pass WRA is a large, diverse wind project, including over 3,000 operating turbines, in a project area that ranges from Mojave desert to high foothills of the Tehachapi Mountains in Kern County, California. Preconstruction bird utilization studies and fatality studies were delineated by distinct geographic areas of this WRA. The East Slope area of the Tehachapi WRA, which is characterized by desert shrubland with areas of perennial grasslands, junipers, Joshua trees, and creosote bushes, is similar to the habitats present at the project. Common raven, horned lark, western meadowlark, European starling, and dark-eyed junco were the five most abundant

and Existing Wind Developments. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: Bonneville Power Administration, Portland, OR.

[123] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

[124] Erickson, W.P., G.D. Johnson, M.D. Strickland, D.P. Young, K.J. Sernka, and R.E. Good. 2001. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: National Wind Coordinating Committee, Washington, DC.

[125] Erickson, W., G. Johnson, D. Young, D. Strickland, R. Good, M. Bourassa, K. Bay, and K. Sernka. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared for: Bonneville Power Administration, Portland, OR. Prepared by: WEST, Inc., Cheyenne, WY.

[126] Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, and D.A. Shepherd. 2000. *Avian Monitoring Studies at the Buffalo Ridge, Minnesota Wind Resource Area: Results of a 4-year Study*. Prepared for: Northern States Power Company, Minneapolis, MN. Prepared by: WEST, Inc., Cheyenne, WY.

[127] Young, D.P., Jr., and W.P. Erickson. 4–7 June 2006. "Wildlife Issue Solutions: What Have Marine Radar Surveys Taught Us about Avian Risk Assessment?" Presented at the American Wind Energy Association Windpower 2006 Conference and Exhibition, Pittsburgh, PA.

identified passerine species recorded in the East Slope between fall 1996 and summer 1998 during bird utilization counts.[128] Several of these common species also appear to be those most likely to be exposed to potential WTG collisions. Despite relatively high use and exposure, common ravens are rarely reported as fatalities according to monitoring studies at other wind energy facilities.[129,130] At the Tehachapi WRA in California, common ravens were found to be the most common large bird, yet few fatalities for this species were documented during intensive mortality studies.[131] A total of six passerines were recorded as fatalities at the East Slope of the Tehahchapi WRA during regular carcass searches between October 1996 and May 1998, only four of which could be identified to species. This included two fatalities each of horned lark and western meadowlark, each comprising 10.5 of all avian fatality observations at the East Slope. Similarly, bird utilization and fatality surveys were conducted concurrently at the San Gorgonio WRA, a project containing approximately 3,000 wind turbines, located in a narrow, low-elevation pass in the Coachella Valley of Southern California.[132] Vegetation in the WRA is dominated by creosote bush, white bursage, brittlebush, and scalebroom. House finch, common raven, European starling, white-crowned sparrow, and white-throated swift were the five most abundant identified passerine species recorded between March 1997 and May 2008. Four passerine fatalities accounted for 12.5 percent of the 32 total avian fatalities documented at near-turbine carcass search sites. These four fatalities included one each of common raven, European starling, white-throated swift, and western meadowlark. Three of these species were also among the five most frequently detected passerines during bird utilization surveys. It should be noted that for both WRAs, carcass search methods were not specifically designed to provide standardized estimates of avian mortality, and in some cases, the long interval between searches (in some cases 90 days), could lead to a high level of uncertainty in overall fatality estimates when searcher efficiency and carcass removal rates are considered. However, given the few publicly available postconstruction mortality reports for habitats similar to the project in Southern California, these two projects give a sense of the relationship between passerine use and rates of fatalities for projects operating in similar habitats with similar passerine species assemblages.

Assuming that the project has similar mortality rates as the two WRAs summarized above, as well as that of the other wind energy projects in the arid western U.S. (Table 4.2.3-1), it is unlikely that populations of passerine bird species would be adversely affected by direct mortality from collisions as a result of project construction or operation; any impacts would be on individuals and not species. Collision risk will be further minimized through measures taken by

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[128] Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area. Period of Performance: October 2, 1996 – May 27, 1998. Prepared for National Renewable Energy Laboratory, Golden, CO.

[129] Erickson, W., G.D. Johnson, M.D. Strickland, et al. 2001. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. Prepared by: Western EcoSystems Technology Inc., Cheyenne, WA. Prepared for: National Wind Coordinating Committee, Washington, DC.

[130] Erickson, W., G. Johnson, D. Young, et al. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: Bonneville Power Administration, Portland, OR.

[131] Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area. Period of Performance: October 2, 1996 – May 27, 1998. Prepared for National Renewable Energy Laboratory, Golden, CO.

[132] Anderson, R., J. Tom, N. Neumann , W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2005. Avian Monitoring and Risk Assessment at the San Gorgonio Wind Resource Area. Phase I Field Work: March 3, 1997 – May 29, 1998, Phase II field Work: August 18, 1999- August 11, 2000. Prepared for National Renewable Energy Laboratory, Golden, CO.

HW during construction and operation, such as ground disturbance restrictions, collection line burial, lighting minimization, and low-impact turbine and met tower design (summarized in Section 5.0).

TABLE 4.2.3-1
ESTIMATES OF MEAN BIRD FATALITIES PER TURBINE AND PER MEGAWATT AT WIND ENERGY PROJECTS IN THE ARID WESTERN UNITED STATES

Wind Energy Project and Location	Survey Years	Habitat	Estimated Mean Bird Fatality/ Turbine/Year	Estimated Mean Bird Fatality/ MW/Year	Estimated Raptor Fatality/ Turbine/Year	Estimated Raptor Fatality/ MW/Year	Reference
Alite, CA	2008–2009	Shrub/scrub grassland	n.d.	0.55	n.d.	0.12	Chatfield, A., W.P. Erickson, and K. Bay. 2010. Final Report: Avian and Bat Fatality Study at the Alite Wind-Energy Facility, Kern County, California. Final Report: June 15, 2009-June 15, 21010. Prepared by Western Ecosystems Technology, Inc. (WEST), Cheyenne, Wyoming. Prepared for CH2M Hill, Oakland, CA.
Biglow Canyon Phase I, OR	2008	Dryland agriculture, Conservation Reserve Program (CRP) grassland, shrub-steppe	2.9	1.76	0.06	0.03	Jeffrey, J.D., K. Bay, W.P. Erickson, M. Sonneberg, J. Baker, M. Kesterke, J.R. Boehrs, and A. Palochak. 29 April 2009. *Portland General Electric Biglow Canyon Wind Farm Phase I Post-Construction Avian and Bat Monitoring First Annual Report, Sherman County, Oregon. January 2008 - December 2008*. Technical report prepared for Portland General Electric Company, Portland, OR. Prepared by Western EcoSystems Technology (WEST) Inc., Cheyenne, WY.
Biglow Canyon Phase II, OR	2010–2011	Dryland agriculture, CRP grassland, shrub-steppe	5.98	2.6	0.06	0.03	Enk, T., K. Bay, M. Sonnenberg, and J.R. Boehrs. 2012. *Year 2 Post-Construction Avian and Bat Monitoring Report, Biglow Canyon Wind Farm Phase II, Sherman County, Oregon. September 13, 2010 – September 15, 2011*. Technical report prepared for Portland General Electric, Portland, OR. Prepared by WEST, Cheyenne, WY.
Biglow Canyon Phase III, OR	2010–2011	Dryland agriculture, CRP grassland, shrub-steppe	5.25	2.28	0.11	0.05	Enk, T., K. Bay, M. Sonnenberg, and J.R. Boehrs. 2012. *Draft Year 1 Avian and Bat Monitoring Report, Biglow Canyon Wind Farm - Phase III, Sherman County, Oregon, September 13, 2010 – September 9, 2011*. Technical report prepared for Portland General Electric Company, Portland, OR. Prepared by WEST, Cheyenne, WY.
Buena Vista, CA	2008–2009	Grassland, grazeland, sagebrush chaparral	1.15	1.15	0.44	0.44	Insignia 2009. *2008/2009 Annual Report for the Buena Vista Avian and Bat Monitoring Project*. Report prepared for Contra Costa County. Insignia 540 Bryant Street Suite 200, Palo Alto, CA 94301.
Dillon, CA	2008–2009	Desert scrub	n.d.	4.71	n.d.	0.00	Chatfield, A., W. Erickson, and K. Bay. 2009. Avian and Bat Fatality Study, Dillon Wind-Energy Facility, Riverside County, California. Final Report: March 26, 2008 – March 26, 2009. Prepared for Iberdrola Renewables, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. June 3, 2009.
Dry Lake, AZ	2009–2010	Desert scrub and grazeland	4.66	2.22	0.00	0.00	Thompson, J., D. Solick, and K.Bay. 2011. Post-construction Fatality Surveys for the Dry Lake Phase I Wind Project, Iberdrola Renewables: September 2009-November 2010. Prepared for Iberdrola Renewables, Portland, Oregon. Prepared by Western Ecosystems Technology, Inc. (WEST), Cheyenne, Wyoming. February 10, 2011.
Elkhorn Valley, OR	2008	Dryland agriculture and grazeland	1.06	0.64	0.10	0.06	Jeffrey, J.D., W.P. Erickson, K. Bay, M. Sonneberg, J. Baker, J.R. Boehrs, and A. Palochak. 2009. *Horizon Wind Energy, Elkhorn Valley Wind Project, Post-Construction Avian and Bat Monitoring, First Annual Report, January-December 2008*. Technical report prepared for Telocaset Wind Power Partners, a subsidiary of Horizon Wind Energy, Portland, OR. Prepared by WEST, Cheyenne, WY.
Foote Creek Rim, Phase I	1999–2002	Mixed grass prairie, sagebrush shrubland	1.5	n.d.	0.03	n.d.	Young, D.P. Jr., W.P. Erickson, R.E. Good, M.D. Strickland, and G.D. Johnson. 2003. *Avian and Bat Mortality Associated with the Initial Phase of the Foote Creek Rim Windpower Project, Carbon County, Wyoming, Final Report, November 1998 - June 2002*. Prepared for Pacificorp, Inc. Portland, OR, SeaWest Windpower Inc. San Diego, CA, and Bureau of Land Management, Rawlins District Office, Rawlins, WY.
High Winds, CA	2003–2005	Agriculture, grassland	2.45	1.36	n.d.	n.d.	Kerlinger, P., R. Curry, L. Culp, A. Jain, C. Wilkerson, B. Fischer, and A. Hasch. 2006. Post-Construction Avian and Bat Fatality Monitoring for the High Winds Wind Power Project, Solano County, California: Two Year Report. Prepared for High Winds LLC, FPL Energy by Curry and Kerlinger, LLC. April 2006.
Hopkins Ridge, WA	2006	Agriculture, grassland	2.21	1.23	0.25	n.d.	Young, D.P. Jr., W.P. Erickson, J. Jeffrey, and V.K. Poulton. 2007. *Puget Sound Energy Hopkins Ridge Wind Project Phase 1 Post-Construction Avian and Bat Monitoring First Annual Report, January - December 2006*. Technical report for Puget Sound Energy, Dayton, Washington and Hopkins Ridge Wind Project Technical Advisory Committee, Columbia County, WA. WEST, Cheyenne, WY.
Judith Gap, MT	2006–2007	Native Short-grass prairie, dryland agriculture, CRP grassland	4.52	3.01	n.d.	n.d.	TRC Environmental Corporation. January 2008. *Post-Construction Avian and Bat Fatality Monitoring and Grassland Bird Displacement Surveys at the Judith Gap Wind Energy Project, Wheatland County, Montana*. Prepared for Judith Gap Energy, LLC, Chicago, Illinois. TRC Environmental Corporation, Laramie, Wyoming. TRC Project 51883-01 (112416).
Judith Gap, MT	2009	Native Short-grass prairie, dryland agriculture, CRP grassland	3.33	2.22	0	0	Poulton, V., and W. Erickson. 2010. *Post-Construction Bat and Bird Fatality Study, Judith Gap Wind Farm, Wheatland County, Montana*. Prepared for: Judith Gap Energy LLC. Prepared by: Western EcoSystems Technology, Inc. (WEST), Cheyenne, WY.
Klondike I, OR	2001–2002	Dryland agriculture, grazeland, CRP grassland	1.42	0.95	0.00	0.00	Johnson, G.D., W.P. Erickson, and J. White. March 2003. *Avian and Bat Mortality during the First Year of Operation at the Klondike Phase I Wind Project, Sherman County, Oregon*. Technical report prepared for Northwestern Wind Power, Goldendale, Washington, by WEST, Cheyenne, WY.
Klondike II, OR	2007–2009	Dryland agriculture and grazeland	4.71	3.14	0.17	0.11	Northwest Wildlife Consultants, Inc. (NWC) and Western EcoSystems Technology, Inc. 17 July 2007. *Avian and Bat Monitoring Report for the Klondike II Wind Power Project. Sherman County, Oregon*. Prepared for PPM Energy, Portland, Oregon. Managed and conducted by NWC, Pendleton, OR. Analysis conducted by WEST, Cheyenne, WY.

TABLE 4.2.3-1
ESTIMATES OF MEAN BIRD FATALITIES PER TURBINE AND PER MEGAWATT AT WIND ENERGY PROJECTS IN THE ARID WESTERN UNITED STATES, *Continued*

Wind Energy Project and Location	Survey Years	Habitat	Estimated Mean Bird Fatality/ Turbine/Year	Estimated Mean Bird Fatality/ MW/Year	Estimated Raptor Fatality/ Turbine/Year	Estimated Raptor Fatality/ MW/Year	Reference
Klondike III, OR	2007–2009	Agriculture, Columbia Basin shrub-steppe	5.65	3.19	0.27	0.15	Gritski, R., S. Downes, and K. Kronner. [21 April 2010] Updated September 2010. *Klondike III (Phase 1) Wind Power Project Wildlife Monitoring: October 2007-October 2009*. Prepared for Iberdrola Renewables, Inc. (IRI), Portland, Oregon, for Klondike Wind Power III LLC. Prepared by Northwest Wildlife Consultants, Inc. (NWC), Pendleton, OR.
Nine Canyon, WA	2002–2003	Dryland agriculture, CRP grassland, grazed shrub-steppe	3.59	2.76	0.07	n.d.	Erickson, W.P., K. Kronner, and R. Gritski. October 2003. *Nine Canyon Wind Power Project Avian and Bat Monitoring Report. September 2002 – August 2003*. Prepared for the Nine Canyon Technical Advisory Committee and Energy Northwest by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, and Northwest Wildlife Consultants (NWC), Pendleton, OR.
San Gorgonio Phase I and II, CA	1997–1998; 1999–2000	Desert shrub	0.04	n.d.	0.003	n.d.	Anderson, R., J. Tom, N. Neumann, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2005. Avian Monitoring and Risk Assessment at the San Gorgonio Wind Resource Area. Phase I Field Work: March 3, 1997-May 29, 1998, Phase II Field Work: August 18, 1999 – August 11, 2000.
Stateline, OR/WA	2001–2003	Dryland agriculture, native grassland, CRP grassland, limited sagebrush	1.93	2.92	0.06	n.d.	Erickson, W.P., J. Jeffrey, K. Kronner, and K. Bay. December 2004. *Stateline Wind Project Wildlife Monitoring Annual Report. July 2001 - December 2003*. Technical report peer-reviewed by and submitted to FPL Energy, the Oregon Energy Facility Siting Council, and the Stateline Technical Advisory Committee. WEST, Cheyenne, WY.
Stateline, OR/WA	2006	Dryland agriculture, native grassland, CRP grassland, limited sagebrush	0.81	1.23	0.07	n.d.	Erickson, W.P., K. Kronner, and K.J. Bay. 2007. *Stateline 2 Wind Project Wildlife Monitoring Report, January - December 2006*. Technical report submitted to FPL Energy, the Oregon Energy Facility Siting Council, and the Stateline Technical Advisory Committee.
Vancycle, OR	1999	Dryland agriculture, grassland	0.63	0.95	0.00	0.00	Erickson, W.P., G.D. Johnson, M.D. Strickland, and K. Kronner. 2000. *Avian and Bat Mortality Associated with the Vansycle Wind Project, Umatilla County, Oregon*. Technical Report prepared by WEST, Inc., for Umatilla County Department of Resource Services and Development, Pendleton, OR.
Wild Horse, WA	2007	Mixed grass prairie	2.79	1.55	0.17	n.d.	Erickson, W.P., J. Jeffrey, and V.K. Poulton. 2008. *Avian and Bat Monitoring: Year 1 Report. Puget Sound Energy Wild Horse Wind Project, Kittitas County, Washington*. Prepared for Puget Sound Energy, Ellensburg, Washington, by WEST, Cheyenne, WY.
Mean Bird and Raptor Fatalities per Turbine and per Megawatt			**2.83**	**2.02**	**0.10**	**0.08**	

NOTE: Project data listed above as “n.d.” did not have publicly available data for that particular fatality parameter, or not enough information was available to facilitate conversion between MW/year and turbine/year. The mean calculated for each of the four parameters was only made with projects for which data was available for that parameter).

Raptors

Raptors appear to have a higher risk of turbine collision than other bird species in general, when use rates and fatality estimates are compared. For example, raptors typically make up an average of 6 percent of total reported wind energy project avian fatalities, yet often represent far less than 6 percent of recorded observations during preconstruction avian surveys.[133]

Substantial data on raptor mortality due to wind turbine collision at wind energy projects are available from studies throughout the western and midwestern U.S.[134] Relatively high numbers of raptor fatalities have been documented at some wind energy projects like Altamont Pass, with an estimate of 0.10 raptor per turbine per year between 1999 and 2000.[135] However, a review of studies at wind energy projects across the U.S. reported that collision-related raptor fatalities amounted to only 0.033 raptor fatality per turbine per year.[136] At newer-generation wind energy projects in the U.S., raptor mortality has been absent to relatively low when compared to that at Altamont Pass. Newer-generation wind energy projects are generally composed of fewer, larger, and slower-moving turbines, and raptor mortality at these plants has been found to range from 0 to 0.04 raptor fatality per turbine per year.[137] A multitude of factors likely influence the range of fatality rates that are observed between wind energy projects, such as species abundance, local concentrations, species-specific behaviors, weather, and facility characteristics.[138] For raptors in particular, abundance appears to explain a significant portion of the variability in raptor fatality rates between different wind energy projects. A regression analysis of raptor use and mortality for 13 newer-generation wind energy projects, where similar methods were used to estimate raptor use and mortality, found that there was a significant positive correlation between raptor use and mortality at different sites.[139]

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[133] Strickland, M.D., E.B. Arnett, W.P. Erickson, D.H. Johnson, G.D. Johnson, M.L. Morrison, J.A. Schaffer, and W. Warren-Hicks. 2011. *Comprehensive Guide to Studying Wind Energy/Wildlife Interactions*. Prepared for: National Wind Coordinating Collaborative, Washington, DC.

[134] Young, D.P., Jr., J.D. Jeffrey, K. Bay, and W.P. Erickson. 2009. *Puget Sound Energy, Hopkins Ridge Wind Project Phase 1, Post-Construction Avian and Bat Monitoring, Second Annual Report, January–December 2008*. Prepared for: Puget Sound Energy, Dayton, WA.

[135] Erickson, W.P., G.D. Johnson, M.D. Strickland, D.P. Young, K.J. Sernka, and R.E. Good. 2001. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: National Wind Coordinating Committee, Washington, DC.

[136] Erickson, W.P., G.D. Johnson, M.D. Strickland, D.P. Young, K.J. Sernka, and R.E. Good. 2001. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: National Wind Coordinating Committee, Washington, DC.

[137] Erickson, W., G. Johnson, D. Young, D. Strickland, R. Good, M. Bourassa, K. Bay, and K. Sernka. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: Bonneville Power Administration, Portland, OR.

[138] Strickland, M.D., E.B. Arnett, W.P. Erickson, D.H. Johnson, G.D. Johnson, M.L. Morrison, J.A. Schaffer, and W. Warren-Hicks. 2011. *Comprehensive Guide to Studying Wind Energy/Wildlife Interactions*. Prepared for: National Wind Coordinating Collaborative, Washington, DC.

[139] Strickland, M.D., E.B. Arnett, W.P. Erickson, D.H. Johnson, G.D. Johnson, M.L. Morrison, J.A. Schaffer, and W. Warren-Hicks. 2011. *Comprehensive Guide to Studying Wind Energy/Wildlife Interactions*. Prepared for: National Wind Coordinating Collaborative, Washington, DC.

Average (mean) raptor use noted to date was calculated at the project for comparison with data from similar wind energy projects in the western U.S., particularly those that have completed postconstruction monitoring. This comparison is useful in assessing the potential for raptor collision mortality at the project. Overall, raptor abundance in an area explains much, though not all, of the variability in raptor mortality rates across wind energy projects. As described in Section 3.1.1.1, *Tylerhorse Bird Use Counts 2011–2012*, the overall mean raptor use noted to date at the project has been 0.13 raptor observed per plot per 20-minute survey period based on 12 months of observations. This metric for the project is below the range of mean raptor use values reported by 13 newer-generation wind energy projects throughout the West and Midwest U.S.: 0.29 to 2.34 raptors observed per plot per 20-minute survey period.[140] Additionally, the project's mean raptor use is consistent with, if not much lower than, observed raptor use at 25 wind energy projects in the CPE of Washington and Oregon, which ranged between 0.26 and 1.64 raptors observed per plot per 20-minute survey period, with an overall average of 0.68.[141]

Similarly, raptor migration studies completed on the neighboring Manzana Project in 2004 and 2005 also found raptor use of the site to be low, especially compared with similar data collected at other raptor migration monitoring sites in Kern County and the western United States.[142] For example, fall 2005 raptor migration at the project resulted in an observation rate of 0.5 hawk/hour, whereas similar studies from the Goshute Mountains in Nevada (20.0 hawks/hour), Lipan Point in Arizona (4.8 hawks/hour), and the Marin Headlands in northern California (53.8 hawks/hour) resulted in much higher rates of raptor observation.

A total of five raptor species were detected on the project during the course of BUCs between 2011 and 2012, including (in order of abundance), red-tailed hawk, prairie falcon, American kestrel, northern harrier, and merlin. During the fall 2005 raptor migration study at the adjacent Manzana Project, three raptor species with no special status were the most commonly observed species, including the turkey vulture (42 percent of observations), red-tailed hawk (26 percent of observations), and American kestrel (11 percent of observations).[143] As a result of their use of the project area, these would be expected to be the raptor species with the highest collision risk on the project. The prairie falcon, northern harrier, and merlin are all considered species of special concern, and risk assessments for these species will be provided in Section 4.3, *Impacts to Special-Status Bird Species*. Of the three remaining species, turkey vultures appear less susceptible to turbine collision than most other raptors despite their high use and exposure. This is likely due to their foraging behavior and a propensity to scavenge rather than actively hunt.[144] Despite the fact that large groups of turkey vultures move through the Tehachapi Mountains during fall and spring migration, there was no turkey vulture mortality over a 1-year and 7-month study in the

[140] Strickland, M.D., E.B. Arnett, W.P. Erickson, D.H. Johnson, G.D. Johnson, M.L. Morrison, J.A. Schaffer, and W. Warren-Hicks. 2011. *Comprehensive Guide to Studying Wind Energy/Wildlife Interactions*. Prepared for: National Wind Coordinating Collaborative, Washington, DC.

[141] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

[142] Bloom, Peter H. March 2006. *Fall 2005 Raptor Migration Study of the Proposed PdV Wind Energy Project Kern County, California*. Prepared for: Sapphos Environmental, Inc., Pasadena, CA.

[143] Bloom, Peter H. March 2006. *Fall 2005 Raptor Migration Study of the Proposed PdV Wind Energy Project Kern County, California*. Prepared for: Sapphos Environmental, Inc., Pasadena, CA.

[144] Orloff, S., and A. Flannery. 1992. *Wind Turbine Effects on Avian Activity, Habitat Use, and Mortality in Altamont Pass and Solano County Wind Resource Areas*. Work Performed by: BioSystems Analysis, Inc., Tiburon, CA. Sacramento, CA: California Energy Commission.

637-turbine Tehachapi WRA.[145] American kestrels and red-tailed hawks, on the other hand, appear particularly susceptible to collision with wind turbines. Unlike turkey vultures, red-tailed hawks forage by stooping on prey, which requires high-speed flights and high concentration.[146] Due to their high abundance in many areas and active hunting behavior, red-tailed hawks seem very susceptible to collision at wind energy projects. In a synthesis of avian fatality data at several well-studied wind energy facilities over several years, the red-tailed hawk was the most abundant fatality, raptor or otherwise, at Altamont Pass (36 percent of total fatalities), Montezuma Hills (31 percent of total fatalities), and Tehachapi Pass (10.2 percent of total fatalities).[147] American kestrels are also not only one of the more commonly observed species at wind energy projects but also typically one of the more commonly recorded raptor fatalities.[148] This species accounted for 20 percent of raptor fatalities during mortality studies at the Tehachapi WRA.[149] Similarly, American kestrels accounted for 1.9 percent of all bird fatalities (19 total fatalities) during mortality studies at 23 wind energy projects in the CPE of Washington and Oregon, and was the most frequently detected raptor fatality.[150] Based on their documented presence within the project and in neighboring project areas, as well as their seemingly high propensity for collision with wind turbines, fatalities of both red-tailed hawks and American kestrels are likely during the life of the project, though population-level impacts are not expected from such a small project.

Average annual fatality estimates for raptors reported by 13 newer-generation wind energy projects throughout the West and Midwest U.S., including California, ranged from 0.00 to 0.87 raptor per MW per year.[151] Of 22 projects in the arid Western United States, for which raptor fatality information is publicly available, the average raptor fatality rate was 0.08 raptors/MW/year (Table 4.2.3-1).

Based on comparisons with a range of mean raptor use rates and raptor fatality rates from operating wind energy projects around the western U.S., particularly those that are located in similar habitats to that of the project, rates of non-special-status raptor fatalities will likely be in

[145] Anderson, R.N., J.T. Neumann, W.R. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. *Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area*. Golden, CO: National Renewable Energy Laboratory, U.S. Department of Energy.

[146] Orloff, S., and A. Flannery. 1992. *Wind Turbine Effects on Avian Activity, Habitat Use, and Mortality in Altamont Pass and Solano County Wind Resource Areas, 1989-1991*. Final Report to Alameda, Contra Costa and Solano Counties and the California Energy Commission. Prepared by: Biosystems Analysis, Inc., Tiburon, CA.

[147] Erickson, W., G.D. Johnson, M.D. Strickland, et al. 2001. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: National Wind Coordinating Committee, Washington, DC.

[148] Erickson, W., G. Johnson, D. Young, D. Strickland, R. Good, M. Bourassa, K. Bay, and K. Sernka. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: Bonneville Power Administration, Portland, OR.

[149] Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area. Period of Performance: October 2, 1996 – May 27, 1998. Prepared for National Renewable Energy Laboratory, Golden, CO.

[150] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

[151] Strickland, M.D., E.B. Arnett, W.P. Erickson, D.H. Johnson, G.D. Johnson, M.L. Morrison, J.A. Schaffer, and W. Warren-Hicks. 2011. *Comprehensive Guide to Studying Wind Energy/Wildlife Interactions*. Prepared for: National Wind Coordinating Collaborative, Washington, DC.

the low range of these other known projects. In general, it has been shown that, besides at Altamont, raptor fatality rates are relatively low at most modern wind energy projects.[152] All of the most frequently detected species observed on the project as a result of BUCs and raptor migration surveys, that are not designated as special status, are generally widespread and numerous in appropriate habitat throughout California. As such, it is unlikely that non-special-status raptor mortality rates at the project, which are predicted to be similar to low rates observed at other wind energy projects in the arid West, will result in population-level impacts. Postconstruction fatality monitoring and nest occupancy and productivity monitoring will provide the objective evidence to support this conclusion.

4.2.4 Electrocution

Overhead power lines, which are often an integral component of wind energy projects, can pose an electrocution risk to birds.[153] Avian electrocutions have typically been associated with distribution lines, which transmit electricity at less than 69 kilovolts (kV) to residences, businesses, and other individual users, as opposed to transmission lines, which are typically energized at 115 kV and above.[154] Electrocution occurs when birds come into contact with energized equipment.[155] Typically, this occurs for large birds, particularly raptors, whose outstretched wings (flesh to flesh contact, as feathers are typically nonconductive) easily span the distance between energized conductors, or a conductor and grounded hardware, thus completing a circuit that results in electrocution. Of the 50 species of diurnal raptors and owls that regularly breed in North America, 29 species have been reported as electrocution victims.[156] Raptors possess the requisite large wingspan and also regularly use power poles for hunting, resting, feeding, nesting, and territorial defense in open habitats that lack trees, and are therefore particularly susceptible to electrocution.[157] However, small birds can also be electrocuted on closely spaced equipment such as transformers. An additional 30 nonraptor species have been documented as electrocution victims, including crows, ravens, magpies, jays, storks, herons, pelicans, gulls, woodpeckers, sparrows, kingbirds, thrushes, starlings, and pigeons.[158]

The majority of electrical transmission components on the project will be in the form of

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[152] Strickland, M.D., E.B. Arnett, W.P. Erickson, D.H. Johnson, G.D. Johnson, M.L. Morrison, J.A. Schaffer, and W. Warren-Hicks. 2011. *Comprehensive Guide to Studying Wind Energy/Wildlife Interactions*. Prepared for: National Wind Coordinating Collaborative, Washington, DC.

[153] Avian Power Line Interaction Committee (APLIC). 2006. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. Washington, DC: Edison Electric Institute and APLIC; and Sacramento, CA: California Energy Commission.

[154] Lehman, R.N. 2011. Raptor electrocution on power lines: current issues and outlook. Wildlife Society Bulletin: 29(3): 804-813.

[155] Avian Power Line Interaction Committee (APLIC). 2006. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. Washington, DC: Edison Electric Institute and APLIC; and Sacramento, CA: California Energy Commission.

[156] Avian Power Line Interaction Committee (APLIC). 2006. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. Washington, DC: Edison Electric Institute and APLIC; and Sacramento, CA: California Energy Commission.

[157] Lehman, R.N. 2011. Raptor electrocution on power lines: current issues and outlook. Wildlife Society Bulletin: 29(3): 804-813.

[158] Avian Power Line Interaction Committee (APLIC). 2006. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. Washington, DC: Edison Electric Institute and APLIC; and Sacramento, CA: California Energy Commission.

underground electrical connector lines that will connect at collector sites located off-site on the constructed Manzana Project. Depending on final engineering design, some overhead transmission lines may be constructed over drainages at the project in order to avoid streambed alterations; though the possibility also exists that lines may be bored underneath drainages. In the event overhead transmission lines are installed on the project, all will be designed in compliance with APLIC recommendations, including 60 inches of horizontal separation and 40 inches of vertical separation between phase conductors and/or grounded hardware, as well as insulation or covering of phases and grounds.[159] With these modifications in place, avian electrocution on the project will be highly unlikely.

4.3 IMPACTS TO SPECIAL-STATUS AVIAN SPECIES

It has been determined that implementation of the project has the potential to result in impacts to 17 sensitive avian species that were documented within and adjacent to the project property as a result of field surveys, or have a high likelihood of presence during the approximately 30-year life of the project. Individual assessments of species' collision risk with WTGs as well as indirect impacts from the construction and operation of the project are presented below, in taxonomic order. In general, there is a dearth of recent, publicly available fatality monitoring results for wind energy projects in Southern California desert environments. As such, fatality results for each of the following special-status species are presented for both the San Gorgonio and Tehachapi WRAs, wind energy projects that contain a variety of turbine styles and shapes, for which carcass results were conducted in the late 1990s and early 2000s.[160,161] Fatality results for Johnson and Erickson's 2011 synthesis of fatality reports from 23 wind energy projects in the CPE of Washington and Oregon are also presented, as these provide recent standardized data from modern wind energy projects in habitat that resembles that of Southern California.[162] These 23 wind energy projects contain approximately 4,000 MW of wind energy; therefore, it is important to consider the cumulative nature of results when total fatalities of individual species are reported.

4.3.1 American White Pelican

The American white pelican is listed as a species of special concern by the CDFW. The species of special concern designation is limited to its nesting colonies. American white pelicans breed in colonies throughout the northern United States and Canada, typically in large freshwater lakes on small islands or remote dikes. This species is migratory within the Antelope Valley, travels in large flocks during migration, and has the potential to migrate over the project in spring or fall. Large migrating flocks of American white pelicans were observed soaring over the

[159] Avian Power Line Interaction Committee (APLIC). 2006. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. Washington, DC: Edison Electric Institute and APLIC; and Sacramento, CA: California Energy Commission.

[160] Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area. Period of Performance: October 2, 1996 – May 27, 1998. Prepared for National Renewable Energy Laboratory, Golden, CO.

[161] Anderson, R., J. Tom, N. Neumann , W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2005. Avian Monitoring and Risk Assessment at the San Gorgonio Wind Resource Area. Phase I Field Work: March 3, 1997 – May 29, 1998, Phase II field Work: August 18, 1999- August 11, 2000. Prepared for National Renewable Energy Laboratory, Golden, CO.

[162] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

adjacent Manzana Project during fall and spring raptor migration counts in both 2004 and 2005. Flocks of 50 to up to 2,270 individuals were observed, with the majority of flocks flying below 500 feet and therefore within the rotor-swept zone [91–460 feet, as determined by the specifications of two potential turbine types that may be used on the project (Table 1.2-1). However, this is subject to change based on turbine availability]. No American white pelicans were observed on the Pacific Wind Project or during BUCs or reconnaissance surveys of the current project.

The project is located outside the known breeding range for American white pelican. There are no aquatic habitats that would provide foraging or nesting opportunities for this species within the project; therefore, there are no anticipated impacts to American white pelicans from disturbance/displacement, habitat fragmentation, or electrocution effects. American white pelicans flying within the project property would only have exposure to turbine mortality during migration. No American white pelican fatalities have been reported at wind energy projects in the arid West. Due to this species' propensity to travel in migratory flights and to fly at lower altitudes, the project may result in impacts to American white pelicans due to direct impacts from wind turbine collision; however, due to the lack of reported instances of fatalities of this species associated with wind energy projects, this species is expected to have a relatively low risk of collision on the project.

4.3.2 California Condor

The California condor is listed as endangered pursuant to both the federal and state ESAs and is also a state fully protected species. The potential for take of this species from the operation, construction, and decommissioning of the project are being considered in a Biological Assessment prepared pursuant to a Section 7 consultation under the ESA between the BLM and USFWS.

There are no historical records for California condors within the project area; nor have there been any observations as a result of more than 9 years of avian surveys between 2004 and 2013 on the project and other renewable energy projects to the north, south, and east. Furthermore, USFWS GPS-based condor location data for the past 8 years reveal that despite relatively high condor use in suitable foraging habitat approximately 6 miles north and northwest of the project, near Table Mountain, there is currently an extremely low probability of condors occurring on the project site due to the significant difference in ecological, meteorological, and topographical characteristics between the Antelope Valley, where the project is located, and the Tehachapi uplands, which provides preferred foraging habitat for condors. However, condors are opportunistic scavengers and can be expected to utilize carcasses wherever they are found.[163] Therefore, despite the unlikely probability of a condor utilizing the floor of the Antelope Valley in the vicinity of the project, it cannot be conclusively stated that condors will never fly within the project boundary during the life of the project (estimated to be 30 years), and risks to this species from the construction and operation of the project should be assessed.

Disturbance, Displacement, and Habitat Fragmentation

The project area contains potential, albeit marginal, foraging habitat for condors. Condors have not been documented to use the proposed project and surrounding areas as foraging habitat, even though nonnative grassland and native grassland habitats, which condors use, are

[163] U.S. Fish and Wildlife Service. 1996. *California Condor Recovery Plan.* 3rd Revision. Portland, OR.

available within the project vicinity, though they are generally of low quality. The project does not contain extensive grasslands and oak savannah, habitat preferred by condors for foraging. The sparser vegetation in the project property and surrounding region provides limited grazing for seasonal livestock operations. There are no substantial native populations of ungulates such as deer within the project area; therefore, there is limited recreational hunting activity for ungulates, such as deer and feral pigs, which are more plentiful in the Tehachapi Mountains. Potential for carrion in the proposed project would be limited by periods of seasonal grazing activities by sheep, or by occasional trespass of cattle onto public land. Construction of the project would result in the disturbance of approximately 119.4 acres of vegetation, approximately 9.9 percent of the total project property. In addition, as a means of limiting condor attraction to the site, the project proponent is committed to removing any carcasses found on the project. This would effectively result in the loss of the entire project as potential foraging habitat for condors. However, the loss of 1,207 acres of marginal foraging habitat in a region that still contains plentiful appropriate condor foraging habitat is thought to be negligible. As condors do not currently use this habitat for foraging, nor are they likely to use it for nesting or roosting, disturbance, displacement, and habitat fragmentation impacts to this species from construction and operation of the project are not expected.

Collision

The main direct operational effect of the proposed action on California condors, in the extremely low-probability event that a condor were to travel outside the historic range and into the Antelope Valley (0.0012 percent of GPS-tagged condor observations between 2005 and 2012), would be the potential for collision with WTGs. The ability of condors to avoid WTGs, or other large, stationary project elements is unknown; however, the closely monitored Southern California condor population has coexisted with wind energy projects in the Tehachapis for nearly 30 years without a single reported incident of collision.

The turkey vulture, a common species throughout the Antelope Valley, is a large, scavenging species with a slightly lower wing-loading ratio than the condor. As a result of its high use of many wind farms in the region, this would be expected to be a species with a high degree of collision risk. Turkey vultures, however, appear less susceptible to turbine collision than most other raptors despite their high use and exposure. There was no turkey vulture mortality over a 1-year, 7-month study in the 637-turbine Tehachapi Pass WRA between 1996 and 1998, although a total of 404 turkey vultures were observed during concurrent bird use surveys.[164]

The California condor is also similar in size and ecological characteristics to the old world griffon vulture (*Gyps fulvus*). Both species are large scavengers that have highly social feeding behavior, congregate in large numbers at feeding and bathing sites, and associate in communal roosts at both nesting and foraging regions.[165] This species has been shown to be susceptible to WTG collision in Spain, where approximately 0.12 griffon vulture/turbine/year were estimated to be killed at two wind farms on the Iberian Peninsula. However, the griffon vulture is relatively common within its range, and its breeding range directly overlaps with numerous wind farm

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[164] Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area. Period of Performance: October 2, 1996 – May 27, 1998. Prepared for National Renewable Energy Laboratory, Golden, CO.

[165] Snyder, N.F., and J. Schmitt. 2002. “California Condor (*Gymnogyps califorianus*).” In *The Birds of North America*. Philadelphia, PA.

installations.[166,167] Furthermore, the two Iberian Peninsula wind farms at which the study was completed are located on mountaintop ridges—the same types of ridges predominately used by soaring raptors. Data for large birds of prey in Europe indicate that these species are most susceptible to collision with WTGs when turbines are placed within close proximity to primary movement corridors, nesting areas, or within areas of high concentrations.[168] In comparison, the project property is located more than 2 miles from the historic range of the condor, where the vast majority of condor movement is concentrated. All recent California condor nesting sites are located on public lands within the Los Padres, Angeles, and Sequoia National Forests.[169] The closest of these national forests is the Angeles, the border of which is located 15 miles south of the project property. Furthermore, with a population of just 64 individuals and a range that now extends over eight California counties, the free-flying Southern California flock of condors could not be considered highly concentrated.

Condors do not currently use the project; therefore in the short term, their risk from collision with project structures is likely very low. However, the Southern California flock of condors is growing; USFWS tracking indicates that they are using more of their historic range than in the recent past, and there is potential for the California condor to occupy its historic range or expand its current range during the life of the project, which is estimated to be 30 years. Subsequently, HW is committed to implementing a condor monitoring system on the project site, using an initial combination of human observation and telemetric tracking, which will allow HW to proactively avoid potential California condor collisions with project elements, particularly moving parts of WTGs, through active condor monitoring. The system will also have an adaptive management component, in case condor use increases near the project or if improved technology allows for an even more reliable monitoring system to be installed.

Electrocution

Rideout's analysis of primary cause of death for the entire wild-flying California condor population between 1992 and 2009 showed that during the initial years of the reintroduction program, power line collisions and electrocution were a frequent problem in California. Seven confirmed condor deaths from electrocution were documented between 1992 and 2007.[170] USFWS, in response to this issue, began a power pole aversion training for releasable condors in 1994 in an attempt to train the birds to avoid perching on power lines. Since this training began, there has been a significant decline in condor deaths attributable to power line collisions

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[166] Barrios, L., and A. Rodriguez. 2004. "Behavioural and Environmental Correlates of Soaring-Bird Mortality at On-Shore Wind Turbines." *Journal of Applied Ecology*, *41*: 72–81.

[167] Tellería, J.L. 2009. Overlap between wind power plants and Griffon Vultures Gyps fulvus in Spain. Bird Study 56(2): 268-271.

[168] Barrios, L., and A. Rodriguez. 2004. "Behavioural and Environmental Correlates of Soaring-Bird Mortality at On-Shore Wind Turbines." *Journal of Applied Ecology*, *41*: 72–81.

[169] Dudek. 2009. *Tehachapi Upland Multiple Species Habitat Conservation Plan*. Prepared for: Tejon Ranchcorp. Prepared by: Dudek, Encinitas, CA. Available at: http://www.fws.gov/ventura/endangered/habitat_conservation_planning/hcp/docs/draft/TehachapiUpland/04_Section4_CaliforniaCondor.pdf

[170] Rideout, B.A., I. Stalis, R. Papendick, A. Pessier, B. Puschner, M. Finkelstein, D.R. Smith, M. Johnson, M. Mace, R. Stroud, C. Stringfield, K. Orr, J. Zuba, M. Wallace, and J. Grantham. 2012. "Patterns of Mortality in Free-ranging California Condors (*Gymnogyps Californianus*)." *Journal of Wildlife Diseases* 48: 95–112.

or electrocutions, and there have been no recorded deaths from this source since 2007.[171]

There are no overhead transmission lines proposed for construction within the project property, only limited instances of overhead collector line crossings of streambeds. APLIC standards will be used to construct any overhead collector lines; therefore, there is a very low risk of electrocution with transmission lines for California condors on the project site.

4.3.3 White-Tailed Kite

The white-tailed kite is a state fully protected species. While this species may have once been predominantly distributed in marshes or grasslands, white-tailed kites are now found in a larger variety of habitats within the coastal plains and low foothills, including riparian woodlands and groves of oak and/or sycamore, bordering open fields or grasslands, cultivated lowlands or orchards, and even some suburban habitats. As such, the species has the potential to occur (although infrequently) within the project. A single white-tailed kite was observed in November 2005 within the adjacent Manzana Project flying over grassland at an elevation of 100 feet. No white-tailed kites were observed as a result of avian surveys on either the current project or the Pacific Wind Project.

This species is not expected to frequently move or forage over the project property, and therefore the risk of disturbance/displacement, habitat fragmentation, collision with project elements, or electrocution on the project is low. The white-tailed kite observed adjacent to the project was flying below the rotor-swept zone (91-460 feet), and white-tailed kites generally forage by hovering between 10 and 100 feet over potential prey. No white-tailed kites were recorded as fatalities at either the San Gorgonio or Tehachapi WRA, or the 23 Oregon and Washington wind energy projects.[172,173,174] Individuals of this species would have some exposure to turbine mortality on the project, but with relatively low population numbers on the project, these events are expected to be rare, and population level impacts are not expected.

4.3.4 Northern Harrier

The northern harrier is a California species of special concern and is considered in the West Mojave Plan. In eastern Kern County, the northern harrier is a fairly common winter visitor, and a rare breeder, but it is not expected to breed within or near the project.[175] Northern harriers were observed on the adjacent Manzana Project during fall, spring, and winter surveys in 2004 and 2005, though typically only one to two individuals were observed at a time. Most northern

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[171] Rideout, B.A., I. Stalis, R. Papendick, A. Pessier, B. Puschner, M. Finkelstein, D.R. Smith, M. Johnson, M. Mace, R. Stroud, C. Stringfield, K. Orr, J. Zuba, M. Wallace, and J. Grantham. 2012. “Patterns of Mortality in Free-ranging California Condors (*Gymnogyps Californianus*).” *Journal of Wildlife Diseases* 48: 95–112.

[172] Anderson, R., J. Tom, N. Neumann , W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2005. Avian Monitoring and Risk Assessment at the San Gorgonio Wind Resource Area. Phase I Field Work: March 3, 1997 – May 29, 1998, Phase II field Work: August 18, 1999- August 11, 2000. Prepared for National Renewable Energy Laboratory, Golden, CO.

[173] Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area. Period of Performance: October 2, 1996 – May 27, 1998. Prepared for National Renewable Energy Laboratory, Golden, CO.

[174] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

[175] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

harriers observed were recorded flying below 30 feet, which would be a typical foraging height. At the Pacific Wind Project, northern harriers were observed sporadically throughout spring and fall of 2008 and winter and spring of 2009. Both sexes, as well as immature birds, were observed on-site, with all observed flying below 100 feet above ground level (AGL). A total of two northern harriers were observed during the year-long BUCs conducted on the project itself between 2011 and 2012, resulting in a mean raptor use of the project of 0.03 northern harrier/30-minute survey period. A single male was observed flying at 350 feet on December 19, 2011, and a single female was observed flying at 25 feet on November 20, 2012.

Some foraging habitat would potentially be lost due to vegetation removal (119.4 acres) and habitat fragmentation, though ample habitat is available to the east of the project and throughout the Antelope Valley. Northern harriers have not been documented breeding within the project, nor would they be expected to breed within the project; therefore, disturbance/displacement impacts to breeding birds would not be anticipated. Potential migrating heights can reach the proposed rotor-swept range of wind turbines (91-460 feet) in the project property; although due to foraging habits that keep the birds relatively close to the ground, northern harrier mortality is generally low at studied sites.[176] Three northern harriers fatalities (0.3 percent of all fatalities) were recorded during mortality studies at 23 wind energy projects in the CPE of Washington and Oregon, inclusive of approximately 4,000 MW of wind power.[177] No northern harriers fatalities have been recorded at either the San Gorgonio or Tehachapi WRAs as a result of carcass searches conducted in the late 1990s and early 2000s, though northern harriers were observed utilizing both projects concurrently with fatality studies[178,179] While it is possible that small numbers of fatalities of northern harriers could occur over the life of the project, such events are expected to be rare, and collision risk is expected to be low.

4.3.5 Sharp-Shinned Hawk

The sharp-shinned hawk is a CDFW Watch List species and is also considered in the West Mojave Plan. The species is not known to breed in Southern California but is present during fall and spring migration, and can also be a winter visitor through the Antelope Valley. Several sharp-shinned hawks were observed during raptor migration counts at the adjacent Manzana Project in 2004 and 2005, with most observed flying or hunting low to the ground. At the Pacific Wind Project, a single immature sharp-shinned hawk was observed hunting at 40 feet or less AGL over 3 days in fall of 2008. In winter 2008, a single sharp-shinned hawk was also observed flying low to the ground. No sharp-shinned hawks were observed during the year-long BUCs conducted on the project itself between 2011 and 2012.

Sharp-shinned hawks are not known to breed within the project; therefore, disturbance / displacement impacts to breeding birds would not be anticipated. Some foraging habitat would potentially be lost due to vegetation removal (119.4 acres) and habitat fragmentation, though this would only impact migrating or wintering birds. Due to the low numbers of sharp-shinned hawks observed adjacent to the project property and their propensity to fly at low elevations, the mortality risk due to WTG collisions for this species is expected to be low. No sharp-shinned hawks were recorded as fatalities at either the San Gorgonio WRA or Tehachapi WRA, though sharp-shinned hawks comprised 1.01 percent of raptor observations on the Tehachapi

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[176] Erickson, W., G.D. Johnson, M.D. Strickland, et al. 2001. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: National Wind Coordinating Committee, Washington, DC.

[177] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

[178] Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area. Period of Performance: October 2, 1996 – May 27, 1998. Prepared for National Renewable Energy Laboratory, Golden, CO.

[179] Anderson, R., J. Tom, N. Neumann , W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2005. Avian Monitoring and Risk Assessment at the San Gorgonio Wind Resource Area. Phase I Field Work: March 3, 1997 – May 29, 1998, Phase II field Work: August 18, 1999- August 11, 2000. Prepared for National Renewable Energy Laboratory, Golden, CO.

WRA.[180,181] Two sharp-shinned hawk fatalities (0.2 percent of all fatalities) were recorded during mortality studies at 23 wind energy projects in the CPE of Washington and Oregon, inclusive of approximately 4,000 MW of wind power.[182]

4.3.6 Cooper's Hawk

The Cooper's hawk is a CDFW Watch List species and is also considered in the West Mojave Plan. This species normally nests in forested habitats and may occur as a resident or migrant in the vicinity of the Antelope Valley. During field surveys at the adjacent Manzana Project, this species was observed in surveys for resident raptors during the winter and in migratory spring and fall surveys. Cooper's hawk was observed overwintering within shrub habitats, but no nests were identified.

At the Pacific Wind Project, one Cooper's hawk was observed hunting at approximately 50 feet AGL in upland habitats in spring 2008, and a total of 10 Cooper's hawks (1 to 3 daily) were observed hunting at the site on 7 days from September 25 to October 10, 2008. Several of these individuals were seen flying at up to 300 feet AGL. A single adult was also observed hunting on November 14, 2008.

During the course of burrowing owl burrow checks in winter 2011, a single Cooper's hawk was incidentally observed flying at approximately 20 feet AGL, and subsequently perching, in a Joshua tree approximately 200 feet east of the central parcel of the project.

Although seen consistently during spring, winter, and fall raptor surveys, overall use of the area by Cooper's hawks was low. Some foraging habitat would potentially be lost due to vegetation removal (119.4) and habitat fragmentation, though ample habitat is available to the east of the project and throughout the Antelope Valley. Cooper's hawks are not known to breed within the project; therefore, disturbance/displacement impacts to breeding birds would not be anticipated. Though they were observed flying within the rotor-swept range of the wind turbines (91-460 feet), the majority of observations were below 60 feet AGL. Much like the sharp-shinned hawk, Cooper's hawks tend to fly and forage at low altitudes, and therefore are at low risk from wind turbine collisions. No Cooper's hawks were recorded as fatalities at either the San Gorgonio WRA or Tehachapi WRA.[183,184] A single Cooper's hawk fatality (0.1 percent of all fatalities) was

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[180] Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area. Period of Performance: October 2, 1996 – May 27, 1998. Prepared for National Renewable Energy Laboratory, Golden, CO.

[181] Anderson, R., J. Tom, N. Neumann , W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2005. Avian Monitoring and Risk Assessment at the San Gorgonio Wind Resource Area. Phase I Field Work: March 3, 1997 – May 29, 1998, Phase II field Work: August 18, 1999- August 11, 2000. Prepared for National Renewable Energy Laboratory, Golden, CO.

[182] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

[183] Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area. Period of Performance: October 2, 1996 – May 27, 1998. Prepared for National Renewable Energy Laboratory, Golden, CO.

[184] Anderson, R., J. Tom, N. Neumann , W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2005. Avian Monitoring and Risk Assessment at the San Gorgonio Wind Resource Area. Phase I Field Work: March 3, 1997 – May 29, 1998, Phase II field Work: August 18, 1999- August 11, 2000. Prepared for National Renewable Energy Laboratory, Golden, CO.

recorded during mortality studies at 23 wind energy projects in the CPE of Washington and Oregon, inclusive of approximately 4,000 MW of wind power.[185]

4.3.7 Northern Goshawk

The northern goshawk is listed as a California species of special concern and a BLM sensitive species. This species is an inhabitant of coniferous forests on its breeding grounds in northern California and is considered a very uncommon to very rare winter visitor in lowland areas.[186] Northern goshawks are considered very rare in Southern California.[187] A single northern goshawk was observed flying north in the spring of 2005 during a migration count on the adjacent Manzana Project. Northern goshawks were not detected as a result of avian surveys conducted at the Pacific Wind Project and the current project.

Due to this species' uncommon nature in the Antelope Valley and the paucity of observation records in Southern California, it is unlikely that displacement/disturbance, habitat fragmentation, mortality due to wind turbine collisions, or electrocution would impact this species as a result of construction and operation of the project.

4.3.8 Swainson's Hawk

Swainson's hawk is listed as threatened pursuant to the California ESA and is also considered in the West Mojave Plan. The species was listed as threatened in 1983 due to loss of habitat and a reduction in population numbers in California. In 2007, a state-wide survey determined that there were approximately 2,000 pairs remaining in California, 95 percent of which exist in the Central Valley. The breeding pair density within the Antelope Valley is classified as "sparse", or ≥1 breeding pair per 76+ square miles.[188] The Swainson's hawk is a migratory raptor that travels in flocks with as many as several hundred birds. Scrub and grassland habitats within the project property provide suitable foraging habitat for migratory individuals, or for the approximately 10 pairs of Swainson's hawk which continue to nest in the Antelope Valley, though no nest sites have been recorded in close vicinity to the project. [189,190,191,192]

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[185] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

[186] Shuford, W.D., and T. Gardali, eds. 2008. *California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California*. Studies of Western Birds 1. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

[187] Small, A. 1994. *California Birds: Their Status and Distribution*. Vista, CA: Ibis, p. 74.

[188]Department of Fish and Game Resource Assessment. 2007. California Swainson's Hawk Inventory: 2005-2006. University of California Davis Wildlife Health Center

[189] Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society, p. 408.

[190] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

[191] Sapphos Environmental, Inc. 25 August 2006. *Final Biological Resources Technical Report for the PdV Wind Energy Project, Kern County, California*. Pasadena, CA.

[192] California Energy Commission and California Department of Fish and Game. 2 June 2010. *Swainson's Hawk Survey Protocols, Impact Avoidance, and Minimization Measures for Renewable Energy Projects in the Antelope Valley of Los Angeles and Kern Counties, CA*. Sacramento, CA.

The migratory surveys conducted in the adjacent Manzana Project verified that Swainson's hawk migrates through the project property and surrounding area during the fall and spring migration over a short window of time. During the 2005 fall migration surveys, 48 birds were observed, and at least 35 individuals were reported flying below 330 feet. At the Pacific Wind Project, a single Swainson's hawk was observed foraging at 400 feet AGL as a result of 170 hours of directed avian studies during spring migration. A single Swainson's hawk was observed incidentally on the project during special-status plant surveys on April 18, 2012. The individual was observed foraging over the property, flying between 75 and 150 feet. No Swainson's hawks were detected during the 36 hours of BUCs on the project.

Approximately 119.4 acres of Swainson's hawk foraging habitat would potentially be lost due to vegetation removal during construction, and subsequent habitat fragmentation, though ample foraging habitat, in the form of alfalfa and fallow fields, remains to the east of the project and throughout the central Antelope Valley. Swainson's hawk is not known to breed within the project; therefore, disturbance/displacement impacts to breeding birds would not be anticipated. In flight, whether foraging or migrating, Swainson's hawks can range from ground level to over 1,000 feet AGL. Swainson's hawk were observed flying within the rotor swept zone (91-460 feet) at the project and adjacent wind energy projects; therefore, Swainson's hawks flying within the project property would have some exposure to turbine mortality. There have been no documented fatalities of this species in available fatality reports for wind energy plants in the Southern California region. Specifically, no Swainson's hawk fatalities were reported during the course of Tehachapi WRA and San Gorgonio WRA studies in the late 1990s and early 2000s.[193,194] Elsewhere in the western U.S., Swainson's hawk have been documented as wind turbine collision fatalities. A total of 15 Swainson's hawks were recorded during mortality studies at 23 wind energy projects in the CPE of Washington and Oregon, representing 9 percent of all raptor fatalities, but only 0.8 percent of all bird fatalities.[195] The project is not a significant migratory pathway for Swainson's hawk in California, and nests for the breeding pairs that remain in the Antelope Valley have not been documented within 2 miles of the project; therefore use of the project by Swainson's hawk appears low. However, it is possible that small numbers of fatalities of Swainson's hawk could occur over the life of the project, though such events are expected to be rare. Because this species is protected under the state ESA, the consideration of measures to avoid and minimize disturbance and/or collision risk are warranted.

4.3.9 Ferruginous Hawk

The ferruginous hawk is a State Watch List species and is also considered in the West Mojave Plan. Although this species does not breed in Southern California, it is commonly observed wintering in the Antelope Valley. Moderate numbers of ferruginous hawks, a total of 23 observations in the fall of 2005 alone, were observed during surveys conducted within the adjacent Manzana Project during winter presence surveys and spring and fall raptor migration

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[193] Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area. Period of Performance: October 2, 1996 – May 27, 1998. Prepared for National Renewable Energy Laboratory, Golden, CO.

[194] Anderson, R., J. Tom, N. Neumann , W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2005. Avian Monitoring and Risk Assessment at the San Gorgonio Wind Resource Area. Phase I Field Work: March 3, 1997 – May 29, 1998, Phase II field Work: August 18, 1999- August 11, 2000. Prepared for National Renewable Energy Laboratory, Golden, CO.

[195] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. WEST, Inc., Cheyenne, WY.

surveys. Although use of the project area was moderate for migration in the fall, only approximately five individual hawks hunted over the proposed project vicinity over winter. At the Pacific Wind Project, two individuals were observed flying at approximately 200 feet AGL during spring 2008 avian surveys. One ferruginous hawk was observed foraging at approximately 25 feet AGL, approximately 0.3 mile west of the project property, during reconnaissance on April 12, 2012. This species would normally be expected to be present within the project property from early fall to early spring.

Ferruginous hawks do not breed in Southern California; therefore construction of the project and potential disturbance/displacement impacts would not affect breeding birds of this species. Approximately 119.4 acres of foraging habitat for migrating or wintering birds would potentially be lost due to vegetation removal during construction and subsequent habitat fragmentation, though ample foraging habitat remains to the east of the project and throughout the Antelope Valley. Ferruginous hawks hunt using a variety of different pursuit techniques, including from perches, strikes from the ground, aerial hunting, or hovering during strong winds. Aerial hunting typically occurs below 98.4 feet AGL and seldom occurs above 328 feet AGL, indicating that some foraging flights may occur within the rotor swept zone (91-460 feet).[196] Ferruginous hawk fatalities are generally low at studied wind energy projects.[197] One ferruginous hawk fatality was reported in a postconstruction mortality study at the Tehachapi WRA between 1996 and 1998. This fatality accounted for 2.3 percent of raptor fatalities and 0.8 percent of total fatalities observed during the study.[198] No ferruginous hawks were recorded as fatalities as part of the San Gorgonio WRA fatality monitoring.[199] A total of four ferruginous hawk fatalities have been recorded between 1999 and 2010 during fatality monitoring programs at 23 wind energy projects in Washington and Oregon. These four ferruginous hawk fatalities accounted for 0.3 percent of total fatalities observed at the projects.[200] Individuals of this species would have some exposure to turbine mortality on the project, but with relatively low population numbers on the project, these events are expected to be rare, and population level impacts are not expected.

4.3.10 Golden Eagle

The golden eagle is afforded federal protection under the Bald and Golden Eagle Protection Act (BGEPA).[201] Furthermore, it is a fully protected species under the California Fish and Game

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[196] Bechard, Marc J. and Josef K. Schmutz. 1995. Ferruginous Hawk (Buteo regalis), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/172 doi: 10.2173/bna.172

[197] Erickson, W., G. Johnson, D. Young, et al. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: Bonneville Power Administration, Portland, OR.

[198] Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area. Period of Performance: October 2, 1996 – May 27, 1998. Prepared for National Renewable Energy Laboratory, Golden, CO.

[199] Anderson, R., J. Tom, N. Neumann , W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2005. Avian Monitoring and Risk Assessment at the San Gorgonio Wind Resource Area. Phase I Field Work: March 3, 1997 – May 29, 1998, Phase II field Work: August 18, 1999- August 11, 2000. Prepared for National Renewable Energy Laboratory, Golden, CO.

[200] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

[201] *U.S. Code*. 30 April 2004. Title 16, Sections 668–668d: "Bald and Golden Eagle Protection Act." Available at: http://www.fws.gov/le/pdffiles/bepa.pdf

Code, as well as listed as a CDFW Watch List species within nesting and wintering habitats in California. Golden eagles have the potential to occur throughout the entire State of California. Consequently, there are no sites for wind energy development within California, or in the western United States, where there is zero risk of impacts to golden eagle. However, careful site selection and application of advanced conservation practices can significantly minimize the risk to this species.

Some golden eagle populations may be declining, but other populations are generally stable in western North American,[202] and overall numbers are still substantial (e.g., over 21,000 golden eagles estimated in four conservation regions that cover approximately 80 percent of the species' range in the contiguous United States).[203]

The golden eagle is an uncommon resident throughout California, with eagles generally absent from the immediate coast, urbanized areas, and heavily forested mountains.[204] During winter there is some migratory movement, especially of immature eagles, into agricultural land, grassy plains, desert edges, and larger valleys, such as the Antelope Valley, where they may not occur during the nesting season.[205] Golden eagles favor open country such as broken woodland, savannahs, grasslands, chaparral, sagebrush flats, desert edge, montane valleys, and even occasionally alpine tundra; however nesting is restricted to rugged, mountainous country, such as the Tehachapi Mountains that border the Antelope Valley, where steep cliffs or medium-to-tall trees border on more open country for hunting or scavenging.[206]

Golden Eagle Use of the Project

To date, four different survey types were used to assess golden eagle use and habitat at various spatial scales. These survey types included: (1) standardized BUCs at the project itself, (2) aerial nesting surveys within a 10-mile radius of the project, (3) ground-based eagle surveys at adjacent wind energy projects, and (4) incidental observations of golden eagles during the course of other surveys at the project, Pacific Wind Project, and Manzana Project. Each of these survey methods convey different information about golden eagles; and yet the data gathered to date, and the confluence of the information provided from these different survey methods, would suggest that the project is adequately designed and sited to minimize displacement, disturbance, habitat fragmentation, collision, and electrocution risk to golden eagles.

Suitable golden eagle foraging habitat exists throughout the Antelope Valley, where the project is located; however, golden eagle use of these projects' area, as measured by standardized point count methodologies, remains low. Golden eagle mean use, expressed as number of individual eagles observed per standardized 30-minute BUC, during the period sampled was 0.00 golden eagle per 30-minute survey, and no incidental observations of golden eagle were recorded during the course of other biological surveys on the project. The adjacent Pacific Wind

[202] McCaffery, B.J., and C. McIntyre. 2005. "Disparities between Results and Conclusions: Do Golden Eagles Warrant Special Concern Based on Migration Counts in the Western United States?" *Condor*, *107*: 469–473.

[203] Nielson, R.M., L. McManus, T. Rintz, and L.L. McDonald. 2012. A survey of golden eagles (*Aquila chrysaetos*) in the western U.S.: 2012 Annual Report. A report for the U.S. Fish & Wildlife Service. WEST, Inc., Laramie, Wyoming.

[204] Garrett, K. and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society, Los Angeles, CA.

[205] Small, A. 1994. California birds: their status and distribution. Ibis Publishing Company. Vista, CA.

[206] Small, A. 1994. California birds: their status and distribution. Ibis Publishing Company. Vista, CA.

Project had 0.005 eagle per 30-minute survey, with two individual eagles (one adult and one subadult on separate occasions) observed during fall raptor transects in 2008, and six total observations recorded incidentally on and in the vicinity of the Pacific Wind Project during the course of other surveys.

The Manzana Project, which is located at higher elevations and closer to golden eagle nesting territories in the adjacent Tehachapi Mountains, did not conduct comparable point count surveys as its pre-permitting surveys took place before standardized wind energy protocols were released. Over 1,900 hours of migration studies conducted at Manzana in 2004 and 2005 showed moderate use of the northwestern section of Manzana by resident, wintering, and migrating eagles (Figure 3.1.1.1-1; Point Counts 1, 2 and 3), but biologists consistently estimated a total of only four to five resident golden eagles in the local area, though no more than three golden eagles were ever seen on any one day. The inherent difficulties in distinguishing numbers of unmarked individuals over such a long survey period should be noted, as should the fact that these survey results are almost a decade old. Many of the golden eagle observations during these surveys were of migrating eagles flying over 1,000 feet in elevation and, therefore, at low risk of wind turbine collision. The local area utilized by the eagles detected during the Manzana migration surveys is at the far western edge of the Antelope Valley at the transition of desert floor to the foothills and mountains of the southern Tehachapi Mountains. Both foraging habitat and breeding habitat for golden eagles are more suitable in these foothills and low mountains, and higher golden eagle use in these areas would be expected. This usage area is also at the far western edge of the assemblage of wind energy projects discussed herein.

As a result of the aerial surveys, no occupied golden eagle nests were observed within 10 miles of the proposed project, inside the focal survey area. Outside the focal survey area, two occupied golden eagle nests were observed, one decorated (Nest 3) and one active (Nest 4) (Figure 3.1.1.2-2). One unoccupied nest was located north of the focal survey area near the town of Tehachapi, and a cluster of unoccupied nests was located east of the proposed project, on Soledad Mountain. Soledad Mountain was the site of several mines dating from the early 20th century, including open pit gold mines, which significantly disturbed the area and altered the mountain's appearance. Resumption of open pit mining was approved in 2010.[207] Golden eagles are intolerant of human activity and disturbances near nest sites, and it is uncertain whether golden eagles would occupy these nests if mining operations are ongoing.

Overall, the literature and database search and aerial surveys indicate that golden eagles do not currently nest within 10 miles of the proposed project. The only prior report of a nest within 10 miles lacks the detail necessary to confirm the observation, and the observation was made 10 years ago.

The closest confirmed golden eagle nest that has been reported as occupied during surveys conducted in 2011, 2012, and 2013 was 14.9 miles from the proposed project, a distance that precludes the possibility of territory overlap given golden eagle ecology and behavior.[208,209] Due

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[207] Kern County. January 2010. *Soledad Mountain Project Supplemental Environmental Impact Report*. Prepared by: Kern County Planning Department, Bakersfield, CA.

[208] Kochert, M.N., K. Steenhof, C.L. Mcintyre, and E.H. Craig. 2002. "Golden Eagle (*Aquila chrysaetos*)." In *The Birds of North America Online*, ed. A. Poole. Ithaca, NY: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/684

[209] Dixon, James B. 1937. "The Golden Eagle in San Diego County, California." *The Condor* 39(2): 49–56.

to the lack of confirmed golden eagle nests within 10 miles of the proposed project, calculation of nesting territory metrics recommended in the *Eagle Conservation Plan Guidance* would not be appropriate. Specifically, calculation of the inter-nest distances to approximate golden eagle territory sizes and their potential to overlap with the project footprint is not warranted.

Disturbance, Displacement, and Habitat Fragmentation

Golden eagles are sensitive to human-related disturbance at their nesting sites during the breeding season (approximately February through July in California); however, no occupied golden eagle nests have been documented within a 10-mile radius of the project site despite repeated aerial surveys of the area, most recently in 2013. Due to the lack of confirmed golden eagle nests within the focal survey area, there is no reason to anticipate that the construction or operations of the proposed project would disturb breeding golden eagles.

The project area contains potential foraging habitat for golden eagles, and golden eagles would be expected to use the project infrequently based on survey results of mean use in the area. Although no eagles were detected during the course of directed and reconnaissance surveys on the project property, golden eagles have periodically been detected, though in low densities, foraging in wind energy projects that are adjacent to the project itself. Construction of the project would result in the disturbance of approximately 119.4 acres of vegetation, approximately 9.9 percent of the total project property. The loss of 119.4 acres of marginal foraging habitat in a region that still contains plentiful similar golden eagle foraging habitat, particularly in the areas to the north of the project, is thought to be negligible.

If project construction occurs in preferred foraging areas on the project, which is unlikely given the low use of the area, this may cause eagles to avoid the project, thus displacing them. Project operations may also disturb golden eagles if the presence of operational turbines or human maintenance activities causes golden eagles to avoid using the project. However, the likelihood of project construction or operation causing disturbance and displacement of golden eagles is tempered by the high level of activity that would likely already be disturbing to golden eagles in the project vicinity, including existing operating wind energy projects, OHV trail use, transmission lines, backpacking, and seasonal livestock operations.

Neither the project, nor the project vicinity, has been determined to be an important migratory corridor or stopover site for migrating golden eagles. Migratory season raptor counts (2004 and 2005) conducted at the Manzana Project revealed some migratory golden eagle use of areas to the west of the project, though passage rates were low in comparison to other western count stations, and golden eagle numbers at the Manzana Project are confounded by the fact that recorded birds could have included residents, migrants, and overwintering individuals, thus the numbers reported for migration may be overestimated.[210] A total of 11 golden eagles were detected over 198 hours of surveys at the Manzana Project in 2005, resulting in 0.06 golden eagle/hour, as compared to the Sandia Mountains, NM site, which had 348 golden eagles over 612 hours, resulting in 0.57 golden eagle/hour, approximately a tenfold difference between the two sites. Fall 2005 results were similar, with 0.06 golden eagle/hour at the Manzana Project, and 0.25, 0.27, and 0.16 golden eagle/hour, respectively, at the Goshute Mountains of Nevada, the Wellsville Mountains of Utah, and Manzano Mountains of New Mexico hawk watch migration

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[210] Bloom, P.H. 30 March 2006. *Fall 2005 Raptor Migration Study of the Proposed PdV Wind Energy Project, Kern County, California.* Santa Ana, CA.

stations.[211] The majority of migrating golden eagles recorded at the Manzana Project were flying over 1,000 feet, appreciably above the rotor-swept zone; thus the construction or operation of the project is not anticipated to displace migratory eagles from migrating over the project vicinity.

Collision Probability

The probability of collision fatality of raptors at wind energy projects, including the golden eagle, has often not depended solely on raptor abundance, but also upon species-specific flight behaviors, particularly avoidance behaviors, as well as location, local topographic characteristics of the wind energy project, weather, turbine design, and wind energy project design.[212,213,214] It is generally understood that golden eagles are susceptible to collisions with wind turbines, and not only at the Altamont Pass WRA, which has one of the highest breeding concentrations of golden eagles in the world.[215] It is estimated that Altamont kills between 40 to 60 subadult and adult golden eagles each year.[216] Nonetheless, it is suspected that Altamont is an anomaly in regard to the high numbers of golden eagle fatalities. There are many factors that likely contribute to the higher raptor mortality at Altamont, including high raptor use and prey densities, and unique topography with wind resources that attract raptors. In addition, turbine types and configuration have also played a role, including elements such as smaller turbines, high turbine density, lattice towers, and downwind, fast-spinning blades. Technology has changed dramatically since the first wind energy projects, including Altamont, were developed. Many of these changes were made in response to raptor fatalities, particularly golden eagles, at Altamont and have been subsequently integrated into the design of newer-generation wind energy projects, including the current project. The experience at Altamont Pass indicates the importance of developing wind farms at locations that are removed from primary breeding and migratory paths.

Golden eagle fatality rates at newer-generation wind energy projects are generally very low in comparison to Altamont. The American Wind Wildlife Institute recently synthesized the results of publicly available reports from 72 wind energy projects, representing more than 7,000 MW. All 72 projects conducted systematic carcass searches meeting specific selection criteria.[217] Of the 72 projects, 8 projects reported a total of 15 golden eagle fatalities between 2001 and 2010. The remaining 64 projects, all of which were located in areas that overlapped with golden eagle breeding and non-breeding ranges, had no reported golden eagle fatalities.[218]

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[211] Bloom, P.H. 30 March 2006. *Fall 2005 Raptor Migration Study of the Proposed PdV Wind Energy Project, Kern County, California.* Santa Ana, CA.

[212] Madders, M., and D.P. Whitfield. 2006. "Upland Raptors and the Assessment of Wind Farm Impacts." *Ibis*, *148*: 43–56.

[213] De Lucas, M., F.E.J. Guyonne, D.P. Whitfield, and M. Ferrer. 2008. "Collision Fatality of Raptors in Wind Farms Does Not Depend on Raptor Abundance." *Journal of Applied Ecology*, *45*: 1695–1703.

[214] Noguera, J.C., I. Pérez, and E. Mínguez. 2010. "Impact of Terrestrial Wind Farms on Diurnal Raptors: Developing a Spatial Vulnerability Index and Potential Vulnerability Maps." *Ardeola*, *57*: 41–53.

[215] Hunt, G. 2002. Golden eagles in a perilous landscape: predicting the effects of mitigation for wind turbine balde-strike mortality. California Energy Commission

[216] Hunt, G. 2002. Golden eagles in a perilous landscape: predicting the effects of mitigation for wind turbine balde-strike mortality. California Energy Commission

[217] Allison, T.D. 2012. *Eagles and Wind Energy: Identifying Research Priorities*. White Paper, American Wind Wildlife Institute, Washington, DC.

[218] Allison, T.D. 2012. *Eagles and Wind Energy: Identifying Research Priorities*. White Paper, American Wind Wildlife Institute, Washington, DC.

One method of predicting potential collision risk for golden eagle is to compare the level of golden eagle use and level of mortality at existing wind energy projects with that of the project. Preliminary analysis suggests that raptor abundance can explain much of the variability in fatality rates between wind energy projects.[219] The first 12 months of survey data at the project produced a golden eagle mean use of 0.00 eagle per plot per 20-minute period. Golden eagle use estimates from 12 other western state wind energy projects (selected because of similar geographical location and availability of both golden eagle use estimates and fatality reports) range between 0.01 and 0.30, placing the golden eagle use at the project at the very low end of the range (Table 4.1.10-1, *Golden Eagle Use Estimates and Reported Golden Eagle Fatalities at Thirteen Western Wind Energy Projects*). Based on preliminary analysis of data from 13 wind energy projects in the western U.S., there appears to be a wide gap in the preconstruction mean eagle use between those projects that have had golden eagle fatalities and those that have not. Of the 13 projects analyzed, those projects with high preconstruction eagle use (>0.25 golden eagle per plot per 20-minute survey) generally did have eagle fatalities, while those with low preconstruction use (generally <0.05 golden eagle per plot per 20-minute survey) did not have any recorded fatalities.[220]

Even at projects with high golden eagle use, few fatalities have been reported. Foote Creek Rim's golden eagle use is considered high, yet only one golden eagle fatality has been reported at the facility in more than a decade of operation. Golden eagle fatalities have been reported at wind energy projects within Southern California, though typically they occur on projects located in areas more conducive to high golden eagle use, with more concentrated turbine fields. At San Gorgonio (3,000 turbines), a single golden eagle wind turbine mortality was recorded between 1997 and 1998 (comprising 1.6 percent of all fatalities recorded), though golden eagles comprised 16.25 percent of raptors recorded during bird utilization surveys.[221] A 19-month mortality study conducted in the Tehachapi WRA (3,300 turbines) from 1996 to 1998 reported no golden eagle wind turbine mortalities, although approximately 43 individuals of other species of raptors (e.g., red-tailed hawk, great horned owl) were reported as fatalities, and golden eagles comprised 1.5 percent of raptors detected during bird utilization surveys at the site during the same time period.[222]

A total of six golden eagle fatalities were documented at the Pine Tree Wind Farm (80 turbines) between 2009 and 2011, a much higher rate of fatality than predicted by similar mortality estimates done for other wind projects within the Tehachapi WRA. The Pine Tree Wind Energy Project is located approximately 25 miles northeast of the proposed project. Pine Tree is located at a higher elevation with much different topography than the proposed project, including steep cliffs and outcroppings favored by nesting raptors, such as golden eagles, and prime golden

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[219] Strickland, M.D., E.B. Arnett, W.P. Erickson, D.H. Johnson, G.D. Johnson, M.L. Morrison, J.A. Schaffer, and W. Warren-Hicks. 2011. *Comprehensive Guide to Studying Wind Energy/Wildlife Interactions*. Prepared for: National Wind Coordinating Collaborative, Washington, DC.

[220] Allison, T.D. 2012. *Eagles and Wind Energy: Identifying Research Priorities*. White Paper, American Wind Wildlife Institute, Washington, DC.

[221] Anderson, R., J. Tom, N. Neumann , W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2005. Avian Monitoring and Risk Assessment at the San Gorgonio Wind Resource Area. Phase I Field Work: March 3, 1997 – May 29, 1998, Phase II field Work: August 18, 1999- August 11, 2000. Prepared for National Renewable Energy Laboratory, Golden, CO.

[222] Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area. Period of Performance: October 2, 1996 – May 27, 1998. Prepared for National Renewable Energy Laboratory, Golden, CO.

eagle foraging habitat in the form of open, rolling grasslands. The Pine Tree Wind Farm is also located in close proximity to the Kelso Valley and Butterbredt Springs, prime golden eagle foraging habitat. In addition, the Pine Tree Wind Farm is located within 5 miles of at least two golden eagle nests documented by Sapphos Environmental, Inc. during aerial raptor surveys in 2010 and 2011.

At the majority of modern wind energy projects, raptor fatality rates are low, and it is yet to be proven whether any population-level impacts to species have occurred. The one wind energy project where population impacts have been studied in detail, in regard to golden eagle population response to collision fatalities, is at Altamont Pass.[223] Despite large numbers of golden eagle fatalities at this site (estimated at a total of 495, or approximately 15 to 50 eagles a year),[224] Hunt found that golden eagle populations seemed to be self-sustaining.[225]

Under certain foraging conditions, such as when suitable prey (e.g., ground squirrels, jackrabbits, or prairie dogs) is concentrated, golden eagles seem to be susceptible to collisions with wind turbines. However, there appear to be no prey concentrations present within the project vicinity, particularly in close proximity to the turbine locations. No golden eagle nests were documented within 10 miles of the project; the closest active golden eagle nest was 15 miles northwest of the project boundary. In addition, ample suitable foraging habitat is located outside the project, particularly to the north in the Tehachapi Mountains, in close proximity to the occupied golden eagle nests. It is highly unlikely that specific prey sources on the project would draw golden eagles into the project once operation has commenced. While it is clearly possible that small numbers of golden eagle fatalities could, in fact, occur over the life of the project, such events are expected to be unusual and rare, and population-level impacts are anticipated to be insubstantial. Because of the low use of the project by eagles and the distance between the project and occupied golden eagle nests, in conjunction with the assurance of conservation measures taken and the proposed adaptive management techniques included in Section 5, the results of the studies conducted do not currently support the preparation of an Eagle Conservation Plan, and consequently an application for an eagle take permit will not be pursued at this time.

Electrocution

Golden eagles have proven to be particularly susceptible to power line electrocution. In a synthesis of electric utility data from 1986 to 1996, golden eagles were the most frequently reported species, comprising 748 of 1,428 reported electrocutions (52.4 percent), with 66 percent of these being juvenile birds.[226] Due to their large size and wing span, golden eagles are easily able to bridge conductive elements on older style transmission structures, thus

[223] Strickland, M.D., E.B. Arnett, W.P. Erickson, D.H. Johnson, G.D. Johnson, M.L. Morrison, J.A. Schaffer, and W. Warren-Hicks. 2011. *Comprehensive Guide to Studying Wind Energy/Wildlife Interactions*. Prepared for: National Wind Coordinating Collaborative, Washington, DC.

[224] Allison, T.D. 2012. *Eagles and Wind Energy: Identifying Research Priorities*. White Paper, American Wind Wildlife Institute, Washington, DC.

[225] Hunt, W.G. 2002. *Golden Eagles in a Perilous Landscape. Predicting the Effects of Mitigation for Wind Turbine Bladestrike Mortality*. California Energy Commission (CEC) Consultant Report P500-02-043F. Prepared for: CEC, Public Interest Energy Research (PIER), Sacramento, CA. Prepared by: University of California, Santa Cruz.

[226] Harness, R.E. and K.R. Wilson. 2001. Electric-utility Structures Associated with Raptor Electrocutions in Rural Areas. Wildlife Society Bulletin 29: 612-623.

allowing for circuit completion.[227] There are no overhead transmission lines proposed for construction within the project property, only limited instances of overhead collector line crossings of streambeds. APLIC) standards will be used to construct any overhead collector lines; therefore, there is a very low risk of electrocution with transmission lines for golden eagles on the project site.

[227] Avian Power Line Interaction Committee (APLIC). 2006. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. Washington, DC: Edison Electric Institute and APLIC; and Sacramento, CA: California Energy Commission.

TABLE 4.1.10-1
GOLDEN EAGLE USE ESTIMATES AND REPORTED GOLDEN EAGLE FATALITIES AT THIRTEEN WESTERN WIND ENERGY PROJECTS

Facility	Facility MW Capacity	First Year of Operation	Golden Eagle Use Estimate[1]	Golden Eagle Fatalities Reported	Number of Turbines	Turbine Size (MW)	Data Source (1) Use Estimate; (2) Fatality Estimate
Tylerhorse, CA	60	TBD	0.00	-	40	1.5	
Klondike, OR	24	2001	<0.01	0	16	1.5	1) Johnson, G.D., W.P. Erickson, K. Bay, and K. Kronner. May 2002. *Baseline Ecological Studies for the Klondike Wind Project, Sherman County, Oregon*. Final report prepared for Northwestern Wind Power, Goldendale, Washington. Prepared by: Western EcoSystems Technology, Inc. (WEST) Cheyenne, WY, and Northwest Wildlife Consultants, Inc. (NWC), Pendleton, OR. 2) Johnson, G.D., W.P. Erickson, and J. White. March 2003. *Avian and Bat Mortality During the First Year of Operation at the Klondike Phase I Wind Project, Sherman County, Oregon*. Prepared for: Northwestern Wind Power, Goldendale, WA. Prepared by: WEST, Cheyenne, WY.
Nine Canyon, WA	48.1	2002	<0.01	0	37	1.3	1) Erickson, W.P., E. Lack, M. Bourassa, K. Sernka, and K. Kronner. October 2001. *Wildlife Baseline Study for the Nine Canyon Wind Project*. Final Report May 2000–October 2001. Prepared for: Energy Northwest, Richland, WA. 2) Erickson, W.P., K. Kronner, and B. Gritski. October 2003. *Nine Canyon Wind Power Project Avian and Bat Monitoring Report.* September 2002–August 2003. Prepared for: Nine Canyon Technical Advisory Committee and Energy Northwest. Prepared by: WEST, Cheyenne, WY, and Northwest Wildlife Consultants (NWC), Pendleton, OR.
Hopkins Ridge, WA	150	2005	0.01	0	83	1.8	1) Young, D.P., Jr., W.P. Erickson, K. Bay, J. Jeffrey, E.G. Lack, R.E. Good, and H.H. Sawyer. April 2003. *Baseline Avian Studies for the Proposed Hopkins Ridge Wind Project, Columbia County, Washington*. Final Report, March 2002–March 2003. Prepared for: RES North America, LLC., Portland, OR. Prepared by: WEST, Cheyenne, WY. 2) Young, D.P. Jr., W.P. Erickson, J. Jeffrey, and V.K. Poulton. 2007. *Puget Sound Energy Hopkins Ridge Wind Project Phase 1 Post-Construction Avian and Bat Monitoring*. First Annual Report, January-December 2006. Prepared for: Puget Sound Energy, Dayton, WA, and Hopkins Ridge Wind Project Technical Advisory Committee, Columbia County, WA. Prepared by: WEST, Cheyenne, WY.
Stateline, OR/WA	300	2001	0.01	0	454	0.66	1) Erickson, W. P., G. D. Johnson, D. Young, D. Strickland, R. Good, M. Bourassa, K. Bay, and K. Sernka. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: Bonneville Power Administration, Portland, OR. 2) Erickson, W.P., J. Jeffrey, K. Kronner, and K. Bay. December 2004. *Stateline Wind Project Wildlife Monitoring Annual Report*. July 2001–December 2003. Technical report peer-reviewed by and submitted to FPL Energy, the Oregon Energy Facility Siting Council, and the Stateline Technical Advisory Committee. Prepared by: WEST, Cheyenne, WY.
Vansycle, OR	25	1998	0.01	0	38	0.66	1) Erickson, W. P., G. D. Johnson, D. Young, D. Strickland, R. Good, M. Bourassa, K. Bay, and K. Sernka. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: Bonneville Power Administration, Portland, OR. 2) Erickson, W.P., G.D. Johnson, M.D. Strickland, and K. Kronner. 2000. *Avian and Bat Mortality Associated with the Vansycle Wind Project, Umatilla County, Oregon: 1999 Study Year*. Prepared by: WEST, Cheyenne, WY. Prepared for: Umatilla County Department of Resource Services and Development, Pendleton, OR.
Leaning Juniper, OR	100.5	2006	0.02	0	67	1.5	1) Kronner, K., B. Gritski, J. Baker, V. Marr, G.D. Johnson, and K. Bay. November 2005. *Wildlife Baseline Study for the Leaning Juniper Wind Power Project, Gilliam County, Oregon*. Prepared for: PPM Energy, Portland, OR, and CH2MHILL, Portland, OR. Prepared by: Northwest Wildlife Consultants, Inc., Pendleton, OR, and WEST, Cheyenne, WY. 2a) Kronner, K., B. Gritski, Z. Ruhlen, and T. Ruhlen. 2007. “Leaning Juniper Phase I Wind Power Project, 2006-2007: Wildlife Monitoring Annual Report.” Unpublished report prepared by: Northwest Wildlife Consultants, Inc., Pendleton, OR. Prepared for: PacifiCorp Energy, Portland, OR. 2b) Gritski, B., K. Kronner, and S. Downes. December 2008. *Leaning Juniper Wind Power Project, 2006 − 2008*. Wildlife Monitoring Final Report. Prepared for: PacifiCorp Energy, Portland, OR. Prepared by: Northwest Wildlife Consultants, Inc., Pendleton, OR.
Combine Hills, WA	41	2004	0.03	0	41	1.0	1) Young, D.P., Jr., W.P. Erickson, J. Jeffrey, K. Bay, R.E. Good, and E.G. Lack. March 2003. *Avian and Sensitive Species Baseline Study Plan and Final Report. Eurus Combine Hills Turbine Ranch, Umatilla County, Oregon*. Prepared for: Eurus Energy America Corporation, San Diego, CA, and Aeropower Services, Inc., Portland, OR. Prepared by: WEST, Cheyenne, WY.
Foote Creek Rim I, WY	41.4	1998	0.26	1	69	0.6	1) Johnson, G.D., D.P. Young, W.P. Erickson, C.E. Derby, M.D. Strickland, and R.E. Good. August 2000. *Wildlife Monitoring Studies, Seawest Windpower Plant, Carbon County, Wyoming, 1995-1999*. Final report prepared for: SeaWest Energy Corporation, San Diego, CA, and the Bureau of Land Management, Rawlins, WY. Prepared by: WEST, Cheyenne, WY. 2) Young, D.P., Jr., W.P. Erickson, R.E. Good, M.D. Strickland, and G.D. Johnson. 2003. *Avian and Bat Mortality Associated with the Initial Phase of the Foote Creek Rim Windpower Project, Carbon County, Wyoming, Final Report, November 1998 - June 2002*. Prepared for: Pacificorp, Inc., Portland, OR, SeaWest Windpower Inc., San Diego, CA, and Bureau of Land Management, Rawlins District Office, Rawlins, WY.
Diablo Winds, CA	20.5	2005	0.27	2	31	0.66	1) WEST. 2006. *Diablo Winds Wildlife Monitoring Progress Report, March 2005 - February 2006*. Technical report submitted to FPL Energy and Alameda County California. Cheyenne, WY. 2) WEST. 2008. *Diablo Winds Wildlife Monitoring Progress Report: March 2005 – February 2007*. Cheyenne, WY.
Elkhorn Valley, OR	101	2007	0.27	4	61	1.65	1) WEST. 2005b. “Exhibit A: Ecological Baseline Study at the Elkhorn Wind Power Project.” Draft final report prepared for Zilkha Renewable Energy, LLC, Portland, OR. Cheyenne, WY. 2) Allison, T.D. May 2012. *Eagles and Wind Energy: Identifying Research Priorities*. A white paper of the American Wind Wildlife Institute, Washington, DC.
High Winds, CA	162	2003	0.3	2	90	1.8	1) Kerlinger, P., L. Culp, and R. Curry. 2005. *Post-Construction Avian Monitoring Study for the High Winds Wind Power Project, Solano County, California. Year One Report*. Prepared for: High Winds, LLC, and FPL Energy. Prepared by: Curry and Kerlinger, LLC, McLean, VA. 2) Kerlinger, P., R. Curry, L. Culp, A. Jain, C. Wilkerson, B. Fischer, and A. Hasch. April 2006. *Post-Construction Avian and Bat Fatality Monitoring for the High Winds Wind Power Project, Solano County, California: Two Year Report*. Prepared for: High Winds LLC, and FPL Energy. Prepared by: Curry and Kerlinger, LLC, McLean, VA.

NOTES: [1] Based on a the number of eagles observed /plot/20-minute survey period.

[2] NA indicates information is not available. This could indicate that either surveys were not conducted, studies were either not available or not completed, or for golden eagle fatalities, a wind project has not yet been built.

4.3.11 Merlin

The merlin is a CDFW Watch List species in its wintering range. It is a small falcon that breeds outside of California, yet is known as a regular visitor in the Antelope Valley during fall migration and winter. The entire 1,207-acre proposed project contains good-quality merlin foraging habitat. This species has been observed in limited numbers during both fall 2004 and fall 2005 raptor migration surveys in the adjacent Manzana Project; all individuals were passing through the site and were considered migrants, suggesting low use of the project property. One female merlin was observed hunting over nonnative grasslands in the northeast sector of the Pacific Wind Project at 50 feet above ground on April 5, 2008. In winter one observation was made of a merlin perched on a Joshua tree on January 27, 2009. One individual was observed flying through the project site at approximately 25 feet AGL during spring special-status plant surveys on April 10, 2012. Additionally, a single perched merlin was observed on October 30, 2012, on the project during the course of BUC surveys, resulting in a mean raptor use of 0.01 merlin/30-minute survey period.

Merlin do not breed in Southern California; therefore, construction and operation of the project and potential disturbance/displacement impacts would not affect breeding birds of this species. Approximately 119.4 acres of foraging habitat for migrating or wintering birds would potentially be lost due to vegetation removal during construction and subsequent habitat fragmentation, though ample foraging habitat remains to the east of the project and throughout the Antelope Valley. Merlin typically hunt from a perch, or while flying rapidly below the tree line and close to the ground; however, the species is also capable of rapid and spectacular aerial flights when pursuing prey.[228] Few merlin fatalities as a result of wind turbine collision have been reported in the arid West. No merlin fatalities were reported in a postconstruction mortality study at the Tehachapi WRA between 1996 and 1998, nor were they detected during bird utilization studies during the same time period. Similarly, no merlin were recorded as fatalities as part of the San Gorgonio WRA fatality monitoring,[229] and no merlin fatalities have been recorded between 1999 and 2010 during fatality monitoring programs at 23 wind energy projects in Washington and Oregon.[230] Individuals of this species, specifically migrants and overwintering birds, would have some exposure to turbine mortality on the project during migration and, but with very low population numbers on the project, these events are expected to be rare, and population level impacts are not expected.

4.3.12 American Peregrine Falcon

The American peregrine falcon was de-listed as an endangered species under the California ESA in 2008, but remains a fully protected state species. This species is adapted to open habitats, but shows a preference for nesting sites in proximity to water, with nearby vertical structures, such as cliffs or ledges, to serve as breeding sites, and a nearby abundant food

[228] Warkentin, I. G., N. S. Sodhi, R. H. M. Espie, Alan F. Poole, L. W. Oliphant and P. C. James. 2005. Merlin (Falco columbarius), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/044

[229] Anderson, R., J. Tom, N. Neumann , W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2005. Avian Monitoring and Risk Assessment at the San Gorgonio Wind Resource Area. Phase I Field Work: March 3, 1997 – May 29, 1998, Phase II field Work: August 18, 1999- August 11, 2000. Prepared for National Renewable Energy Laboratory, Golden, CO.

[230] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

source.[231] American peregrine falcons are migratory and may pass through the project property during their autumn migration from the northern hemisphere to the southern hemisphere, and then return during their spring migration. The American peregrine falcon does not breed in Kern County,[232] but the entire project property provides suitable foraging habitat for migrants or dispersing young. A single peregrine falcon was observed during fall 2005 raptor migration surveys in the adjacent Manzana Project. The bird was recorded flying east at approximately 500 feet AGL, bringing it just above the rotor-swept zone. This species was not observed at the Pacific Wind Project as a result of spring 2008 through winter 2008–2009 avian surveys or at the project as a result of 2011–2012 avian surveys.

American peregrine falcon do not breed in the Southern California desert; therefore construction and operation of the project and potential disturbance/displacement impacts would not affect breeding birds of this species. Approximately 119.4 acres of foraging habitat for migrating birds would potentially be lost due to vegetation removal during construction and subsequent habitat fragmentation, though ample foraging habitat remains to the east of the project and throughout the Antelope Valley.

The American peregrine falcon can range from ground level to over 1,000 feet AGL while foraging; thus, potential foraging heights within the project property can occur within the rotor-swept range of proposed wind turbines (91-460 feet). While migrating American peregrine falcons flying within the project property would have some exposure to turbine mortality, there have been no documented fatalities of this species at wind energy plants in the region. While it is possible that small numbers of fatalities of American peregrine falcons could occur over the life of the project, such events are expected to be rare, and impacts are not expected to be substantial.

4.3.13 Prairie Falcon

The prairie falcon is listed on the CDFW Watch List in its nesting range.[233] The prairie falcon is an uncommon year-round resident of many open habitats throughout California, and it is most commonly found near perennial grasslands, savannahs, rangeland, agricultural fields, and desert scrub. Prairie falcons require cliff ledges for shelter and eyrie (nest) placement; these substrates do not occur within the project property. The prairie falcon was observed foraging within most habitats during both the winter raptor surveys and the spring and fall migratory surveys at the Manzana Project in 2004 and 2005. It was estimated that at least four individuals, floaters and migrants, resided on or near the Manzana Project; most observations were of individuals perched on cliffs. In contrast, only one prairie falcon was observed in the Pacific Wind Project during a year of avian surveys. The individual was observed in summer 2008 flying approximately 135 feet AGL. A total of three prairie falcons were observed on the project during the course of BUC surveys, making it the second most frequently observed raptor with a mean raptor use of 0.04 prairie falcons/30-minute survey period. One prairie falcon was observed on January 20, 2012 flying at approximately 200 feet AGL; one was observed circling at over 100

[231] Comrack, L., and R. Logsdon. 2008. *Status Review of the American Peregrine Falcon in California*. California Department of Fish and Game, Wildlife Branch, Nongame Wildlife Program Report 2008-06. Sacramento, CA: California Department of Fish and Game.

[232] Comrack, L., and R. Logsdon. 2008. *Status Review of the American Peregrine Falcon in California*. California Department of Fish and Game, Wildlife Branch, Nongame Wildlife Program Report 2008-06. Sacramento, CA: California Department of Fish and Game.

[233] California Department of Fish and Game, Biogeographic Data Branch, California Natural Diversity Database. January 2011. *Special Animals List*. Sacramento, CA.

feet AGL on July 20, 2012, and one was observed perched in a tamarisk on November 20, 2012.

There is no appropriate substrate on which prairie falcons could nest within the project; therefore construction and operation of the project, and potential disturbance / displacement impacts would not affect breeding birds of this species. Approximately 119.4 acres of foraging habitat for resident and birds would potentially be lost due to vegetation removal during construction, and subsequent habitat fragmentation; though ample foraging habitat remains to the east of the project and throughout the Antelope Valley.

Prairie falcons have not been regularly reported as wind turbine collision fatalities at western wind energy projects. One prairie falcon fatality was reported during a postconstruction mortality study at the Tehachapi WRA, constituting 2.3 percent of raptor fatalities and 0.8 percent of total fatalities.[234] No prairie falcon collision fatalities were reported at the San Gorgonio WRA. Two prairie falcon fatalities, comprising 2 percent of total fatalities, have been recorded between 1999 and 2010 during fatality monitoring programs at 23 wind energy projects in Washington and Oregon.[235] While it is possible that small numbers of fatalities of prairie falcons could occur over the life of the project, such events are expected to be rare, and impacts are not expected to be substantial.

4.3.14 Burrowing Owl

The burrowing owl is a California Species of Special Concern and is considered in the West Mojave Plan.[236,237] The burrowing owl is a grassland- and desert-inhabiting species that nests underground, usually in ground squirrel burrows. This species nests in small numbers in the Antelope Valley. Their normal range includes the desert province of eastern Kern County in native desert and agricultural habitats.[238,239]

Burrowing owls were observed overwintering within grassland and open shrub habitats in the adjacent Manzana Project, but no nests were found. An abandoned burrowing owl (with whitewash, but no owl) was observed during desert tortoise protocol surveys in spring 2005.

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[234] Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area. Period of Performance: October 2, 1996 – May 27, 1998. Prepared for National Renewable Energy Laboratory, Golden, CO.

[235] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

[236] Shuford, W.D., and T. Gardali, eds. 2008. “California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California.” In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

[237] Bureau of Land Management. 2005. *Final Environmental Impact Report and Statement for the West Mojave Plan: A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment*. Volume 1. Available at: http://www.blm.gov/ca/st/en/fo/cdd/wemo.html

[238] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

[239] Shuford, W.D., and T. Gardali, eds. 2008. “California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California.” In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

At the Pacific Wind Project, seven burrowing owl burrows were found at five sites during spring 2008 surveys, indicating the presence of at least five pairs of resident burrowing owls. Burrowing owls were observed flying between 0 and 40 feet AGL on the Pacific Wind Project, which is consistent with their general foraging strategy.

A total of four burrowing owl burrows were observed during the course of Phase I, II, and III burrowing owl surveys on the project between fall 2011 and summer 2012 (Figure 3.1.1.5-1, *Burrowing Owl Burrow Locations*). Burrowing owls are unusual in their dependence on burrows for shelter throughout the year.[240] As the species is migratory, different individuals may be present during the breeding season (spring and summer) as compared to the nonbreeding season (fall and winter). CDFW defines a burrow as occupied if at least one burrowing owl has been observed occupying a burrow there within the last 3 years.[241] Because of the importance of burrows to this species, impacts to burrows known to be occupied at any point during the past 3 years should be avoided or mitigated. Although only one of the four burrowing owl burrows monitored for summer breeding season occupancy in 2012 was determined to be active, based on CDFW's definition of occupancy, all four burrows monitored on the site would be designated as occupied, as at least one burrowing owl, or its sign, was documented within the last 3 years.

The project's design avoids crossing any drainages, and therefore avoids the known burrowing owl burrows on the project. Further, HW would abide by prescribed construction buffers, or mitigation for the closing of active owl burrows, as outlined within the project's EIS, for additional burrows potentially discovered during preconstruction sweeps. Therefore impacts to this species during construction would be minimized. Implementation of the proposed action would result in the direct disturbance of a small amount of Mojave Desert Wash Scrub and Non-native Grassland, which provide foraging and breeding habitat for this species; though ample foraging habitat remains to the east of the project and throughout the Antelope Valley.

Burrowing owls normally stay low to the ground, with hover-hunting generally occurring at approximately 30 feet above ground, while direct flights back to nest are typically 3-6 feet above ground; thus most flights would be expected to be below the proposed rotor-swept range of wind turbines (91-460 feet AGL) in the project.[242] Burrowing owls has previously been susceptible to collision mortality at small turbines with very low to low rotor-swept heights;[243] however, the project will only be utilizing larger, newer-generation turbines. No burrowing owls were killed during postconstruction mortality studies at the Tehachapi WRA.[244] A single burrowing owl collision fatality was documented at the San Gorgonio WRA, comprising 1.6 percent of total fatalities.[245] No burrowing owl fatalities have been recorded between 1999 and

[240] Poulin, Ray, L. Danielle Todd, E.A. Haug, B.A. Millsap, and M.S. Martell. 2011. "Burrowing Owl (Athene cunicularia)." In *The Birds of North America Online*, ed. A. Poole. Ithaca, NY: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/061

[241] California Department of Fish and Game. March 2012. *Staff Report on Burrowing Owl Mitigation*. Sacramento, CA.

[242] Poulin, Ray, L. Danielle Todd, E. A. Haug, B. A. Millsap and M. S. Martell. 2011. Burrowing Owl (Athene cunicularia), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/061

[243] Smallwood, K.S., C.G. Thelander, M.L. Morrison, and L.M. Rugge. 2007. "Burrowing Owl Mortality in the Altamont Pass Wind Resource Area." *Journal of Wildlife Management*, *71*: 1513–1524.

[244] Anderson, R.L., J. Tom, N. Neumann, and J.A. Cleckler. 2004. *Avian Monitoring and Risk Assessment at Tehachapi Pass Wind Resource Area, California*. Sacramento, CA: California Energy Commission.

[245] Anderson, R., J. Tom, N. Neumann , W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2005. Avian Monitoring and Risk Assessment at the San Gorgonio Wind Resource Area. Phase I Field Work: March

2010 during fatality monitoring programs at 23 wind energy projects in Washington and Oregon.[246] While it is possible that small numbers of fatalities of burrowing owls could occur over the life of the project, such events are expected to be rare, and impacts are not expected to be substantial.

4.3.15 Vaux's Swift

Vaux's swift is a California species of special concern and is considered in the West Mojave Plan. Vaux's swift is a fairy common, but sporadic, migrant in eastern Kern County.[247] The Antelope Valley is outside of this species' published breeding range in the United States, which only includes portions of Washington, Oregon, Idaho, Montana, and northern to central California.

Several hundred individuals were observed during various field surveys in the adjacent Manzana Project between 2004 and 2005. Vaux's swifts were only observed during the spring or fall migration period, and almost all were recorded during midday (10:00 a.m. to 2:00 p.m.). At the Pacific Wind Project, individual Vaux's swifts were observed in the summer and autumn, but a total of 30 swifts (flock sizes: 1–16) were observed during spring migration. The largest flock, made up of 16 individuals, was detected flying at approximately 20 feet AGL. No Vaux's swifts were documented on the project during the course of directed and reconnaissance surveys in 2011-2012.

Vaux's swifts do no breed in southern California; therefore construction and operation of the project, and potential disturbance / displacement impacts, would not affect breeding birds of this species. Approximately 119.4 acres of foraging habitat for migrating birds would potentially be lost due to vegetation removal during construction, and subsequent habitat fragmentation; though ample foraging habitat remains to the east of the project and throughout the Antelope Valley. Vaux's swifts are diurnal migrants, and they generally fly at the limit of sight, though lower flights (1-2 meters above ground) may occur in cooler weather or in headwinds; thus flights can occur within the rotor-swept range of proposed wind turbines (91-460 feet).[248] No Vaux's swifts were recorded during postconstruction mortality studies at the Tehachapi WRA or the San Gorgonio WRA.[249,250] A total of 2 Vaux's swifts, comprising 0.3 percent of all bird fatalities were recorded between 1999 and 2010 during fatality monitoring programs at 23 wind

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3, 1997 – May 29, 1998, Phase II field Work: August 18, 1999- August 11, 2000. Prepared for National Renewable Energy Laboratory, Golden, CO.

[246] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

[247] Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

[248] Bull, Evelyn L. and Charles T. Collins. 2007. Vaux's Swift (Chaetura vauxi), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/077

[249] Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area. Period of Performance: October 2, 1996 – May 27, 1998. Prepared for National Renewable Energy Laboratory, Golden, CO.

[250] Anderson, R., J. Tom, N. Neumann , W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2005. Avian Monitoring and Risk Assessment at the San Gorgonio Wind Resource Area. Phase I Field Work: March 3, 1997 – May 29, 1998, Phase II field Work: August 18, 1999- August 11, 2000. Prepared for National Renewable Energy Laboratory, Golden, CO.

energy projects in Washington and Oregon, which overlaps with the species' breeding range.[251] While Vaux's swifts migrating low within the project property would have some exposure to turbine mortality, the low number of birds expected to pass through the project would indicate a low risk of collision. While it is possible that small numbers of fatalities of Vaux's swift could occur over the life of the project, such events are expected to be rare, and impacts are not expected to be substantial.

4.3.16 Loggerhead Shrike

Loggerhead shrike is a CDFG Species of Special Concern and is considered in the West Mojave Plan.[252] The loggerhead shrike is still fairly common in appropriate habitats in many areas of California and western North America, including the Mojave Desert.[253,254] A sharp decline of mainland populations of the loggerhead shrike occurred in parts of California, especially coastal Southern California, from 1968 to 1979, although statewide Breeding Bird Survey (BBS) trends were stable from 1980 to 2004.[255] Loggerhead shrikes are year-round residents in the Mojave Desert and may occur throughout the approximately 1,207-acre project property.

This species was observed during numerous surveys in the adjacent Manzana Project, and approximately 10 to 15 pairs were estimated to be breeding. Loggerhead shrike observations were numerous during avian surveys at the adjacent Pacific Wind Project, with most observations occurring in Joshua tree woodland in the eastern half of the property. Observations were relatively stable throughout the year, with shrikes being slightly more numerous during the summer breeding season. It is estimated that this site supported between 10 and 12 pairs of loggerhead shrikes; at least one active nest with eggs was found as well as several recently fledged young with adults. Between 4 to 10 loggerhead shrikes were detected during each season of BUCs on the project. Overall, this species accounted for 1.5 percent of all species detected on the project between winter 2011–2012 and fall 2012.

Loggerhead shrikes are year-round residents of the project, and nests of this species have been confirmed on adjacent wind energy projects; therefore construction and operation of the project, and potential disturbance / displacement impacts, would affect breeding birds of this species. HW will complete pre-construction sweeps of all construction impact zones in order to avoid actively nesting loggerhead shrikes, but human activity, vegetation removal, and habitat fragmentation may result in the displacement of some breeding pairs from the project. Approximately 119.4 acres of foraging habitat for foraging birds would also be lost due to

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[251] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

[252] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

[253] Sibley, D.A. 2000. *The Sibley Guide to Birds*. New York, NY: Knopf.

[254] Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Los Angeles Audubon Society, p. 408.

[255] Shuford, W.D., and T. Gardali, eds. 2008. "California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California." In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

vegetation removal during construction; though ample foraging habitat remains to the east of the project and throughout the Antelope Valley.

The loggerhead shrike normally ranges from ground level to below 100 feet AGL during its daily foraging and roosting activities, and the mean flight height for this species as a result of BUCs was 10.4 feet AGL, well below the rotor-swept range (91-460 feet AGL) of proposed wind turbines at the project. Loggerhead shrikes are the most numerous and widely distributed avian species of special status that occurs and breeds at both of the adjacent renewable energy projects. Due to its healthy population and a foraging strategy that keeps it generally below the rotor-swept zone, it is expected that the level of collision risk associated with this species at the project is low. A single loggerhead shrike fatality, comprising 0.8 percent of all recorded fatalities, was recorded at the Tehahcapi WRA, despite being one of the most commonly detected passerine species during bird utilization surveys.[256] No Loggerhead shrike fatalities were recorded at the San Gorgonio WRA, though this species was consistently among the top five frequently occurring species between seasons and geographic areas within the project.[257] Similarly, no loggerhead shrikes were recorded between 1999 and 2010 during fatality monitoring programs at 23 wind energy projects in Washington and Oregon. [258] While it is possible that small numbers of fatalities of loggerhead shrikes could occur over the life of the project, such events are expected to be rare, and impacts are not expected to be substantial.

4.3.17 Le Conte's Thrasher

Le Conte's thrasher is a California species of special concern and is considered in the West Mojave Plan. It is a permanent resident throughout its range, which includes portions of the Mojave, Colorado, and Sonoran deserts of California, Nevada, Arizona, Utah, and central and coastal Mexico. Suitable habitat for the species exists within the Mojave Desert Wash Scrub, Mojavean Juniper Woodland and Scrub, and Joshua Tree Woodland plant communities within the project.[259]

Based on detailed avian surveys on both the adjacent Manzana and Pacific Wind Projects, it has been determined that Le Conte's thrasher is present and a year-round resident of the area. LeConte's thrasher was not recorded on the project as a result of directed and reconnaissance surveys in 2011 and 2012, though due to the secretive, ground-based nature of this species, detection is difficult. The species is assumed to be present on the project based on suitability of habitat and confirmed presence at neighboring wind energy projects.

Suitable breeding and foraging habitat for this species exists on the project. No nests have been confirmed, but suitable nest sites, such as thorny desert shrubs or cholla cactus, are present;

[256] Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area. Period of Performance: October 2, 1996 – May 27, 1998. Prepared for National Renewable Energy Laboratory, Golden, CO.

[257] Anderson, R., J. Tom, N. Neumann , W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2005. Avian Monitoring and Risk Assessment at the San Gorgonio Wind Resource Area. Phase I Field Work: March 3, 1997 – May 29, 1998, Phase II field Work: August 18, 1999- August 11, 2000. Prepared for National Renewable Energy Laboratory, Golden, CO.

[258] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

[259] Dobkin, D. and S. Granholm. 2005. "Le Conte's Thrasher." Prepared for: California Department of Fish and Game. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2077&inline=1

therefore construction and operation of the project, and potential disturbance / displacement impacts, would affect breeding birds of this species. HW will complete pre-construction sweeps of all construction impact zones in order to avoid actively nesting Le Conte's thrasher, but human activity, vegetation removal, and habitat fragmentation may result in the displacement of some breeding pairs from the project. Approximately 119.4 acres of foraging habitat for foraging birds would also be lost due to vegetation removal during construction; though ample foraging habitat remains to the east of the project and throughout the Antelope Valley.

The Le Conte's thrasher is a secretive ground forager that is rarely observed in flight. Maximum reported flight height is 50–65 feet; though vast majority of flights are below the height of dominant shrubs (e.g., 5-6.5 feet AGL) and it is expected that the level of collision risk associated with this species at the project is low. No Le Conte's thrasher fatalities were recorded at the Tehachapi WRA, or the San Gorgonio WRA, though this species was occasionally among the top five frequently occurring species between seasons and geographic areas within the San Gorgonio WRA.[260,261] Similarly, no Le Conte's thrashers were recorded between 1999 and 2010 during fatality monitoring programs at 23 wind energy projects in Washington and Oregon.[262] While it is possible that small numbers of fatalities of Le Conte's thrasher could occur over the life of the project, such events are expected to be rare, and impacts are not expected to be substantial.

4.4 IMPACTS TO GENERAL BAT SPECIES

4.4.1 Disturbance and Displacement

The construction and operation of the project may impact bats through disturbance or loss of habitat; however, only direct mortality as a result of turbine collision or barotrauma has been documented thus far.[263] Disturbance to bats from wind turbines is unknown. Increased human activity at wind turbines, or other nearby roosting sites, may disturb roosting bats, but as of yet, there are no empirical data on this phenomenon.[264] In fact, there is some evidence that bats can become habituated to noise and other maintenance operations around human erected structures.[265] There are few roosting opportunities on the project, such as tall trees, rocky outcrops, cliffs, or abandoned mines. Roosting opportunities would be limited to scattered

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[260] Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area. Period of Performance: October 2, 1996 – May 27, 1998. Prepared for National Renewable Energy Laboratory, Golden, CO.

[261] Anderson, R., J. Tom, N. Neumann , W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2005. Avian Monitoring and Risk Assessment at the San Gorgonio Wind Resource Area. Phase I Field Work: March 3, 1997 – May 29, 1998, Phase II field Work: August 18, 1999- August 11, 2000. Prepared for National Renewable Energy Laboratory, Golden, CO.

[262] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

[263] National Wild Coordination Collaborative. 2010. Wind Turbine Interactions with Birds, Bats, and their Habitats: A Summary of Research Results and Priority Questions. Available at: http://www1.eere.energy.gov/wind/pdfs/birds_and_bats_fact_sheet.pdf

[264] Arnett, E.B., D.B. Inkley, D.H. Johson, R.P. Larkin, S. Manes, A.M. Manville, J.R. Mason, M.L. Morrison, M.D. Strickland, and R. Thresher. 2007. Impacts of wind energy facilities on wildlife and wildlife habitat. Wildlife Society Technical Review 07-2. The Wildlife Society, Bethesda, Maryland.

[265] Keeley, B.W., and M.D. Tuttle. 1999. Bats in American Bridges. Bat Conservation International. Resoure Publication No. 4. 40 pp. Available online at: http://www.batcon.org/pdfs/bridges/BatsBridges2.pdf

Joshua trees (*Yucca brevifolia*) and California junipers (*Juniperus californica*), both of which provide marginal roosting habitat. Removal of these trees could reduce some roosting habitat for bats, but due to the small amount of habitat disturbed by construction (119.4 acres), this is not anticipated to be a substantial impact.

Several studies have indicated that bats may even be attracted to wind energy projects.[266] Several hypotheses have been proposed to explain this apparent attraction: being relatively tall objects in a typically flat surrounding landscape, wind turbine towers may be perceived as potential roosts; bats are attracted to insect concentrations in areas of landscape alteration or due to the heat produced by wind turbine nacelles; or bats are attracted to audible and/or ultrasonic sound produced by wind turbines.[267] Although further research is warranted on many of these hypotheses to quantify the source of potential attraction, it appears that rather than displacing/disturbing bats, wind energy projects may effectively attract them.

4.4.2 Habitat Fragmentation

Little information exists on the impact of habitat fragmentation from wind energy projects on bats; however, modifications to vegetation structure and landscape as a result of wind energy project construction may benefit bats.[268] A study on the effect of small-scale habitat disturbance on insectivorous bat activity found that bat activity increased in disturbed areas, such as small tree harvest cutblocks areas and access roads in a forest setting.[269] Bats appear to forage readily in such small clearings, which are similar to those found around turbines. Furthermore, studies suggest that bat species use linear landscape elements, particularly edges created by clearings or roads built through habitat blocks, for improved navigation and travel, foraging,[270] echo-orientation,[271] and protection from predators or wind.[272] This evidence suggests that the construction and operation of the project would not negatively impact bats as a result of habitat fragmentation.

4.4.3 Collision

[266] Horn, J. W., E. B. Arnett, & T. H. Kunz. 2008. Behavioral Responses of Bats to Operating Wind Turbines. *Journal of Wildlife Management*. 72: 123–132.

[267] Kunz, T.H., E.B. Arnett, W.P. Erickson, A.R. Hoar, G.D. Johnson, R.P. Larkin, M.D. Strickland, R.W. Thresher, and M.D. Tuttle. 2007 Ecological Impacts of Wind Energy Development on Bats: Questions, Research Needs, and Hypotheses. Frontiers in Ecological Environments 5:315-324.

[268] Arnett, E.B., D.B. Inkley, D.H. Johson, R.P. Larkin, S. Manes, A.M. Manville, J.R. Mason, M.L. Morrison, M.D. Strickland, and R. Thresher. 2007. Impacts of wind energy facilities on wildlife and wildlife habitat. Wildlife Society Technical Review 07-2. The Wildlife Society, Bethesda, Maryland.

[269] Grindal, S. D., and R. M. Brigham. 1998. Short-term effects of small-scale habitat disturbance on activity by insectivorous bats. Journal of Wildlife Management 62: 996–1003.

[270] Grindal, S. D. 1996. Habitat use by bats in fragmented forests. Pages 260–272 in R. M. R. Barclay and R.M. Brigham, editors. Bats and Forest Symposium. British Columbia Ministry of Forestry, Victoria, British Columbia. Work Paper 23/1996.

[271] Verboom, B., A. M. Boonman, and H. J. G. A. Limpens. 1999. Acoustic perception of landscape elements by the pond bat (Myotis dasycneme). Journal of Zoology 248: 59–66.

[272] Verboom, B., and H. Huitema. 1997. The importance to linear landscape elements for the pipistrelle, Pipistrellus pipstrellus and the serotine bat, Eptesicus serotinus. Landscape

Ecology 12: 117–125.

Bat mortality has been associated with wind energy project operations, where bats can be killed or injured through collision with turbine blades or barotrauma. Large numbers of bat fatalities have occurred at some projects, particularly in the eastern United States.[273,274,275]

Although some roosting habitat and higher quality foraging habitat for bats has been documented in Tylerhorse Canyon, approximately 2 miles northwest of the project, the project itself lacks the topographic, physiographic, and habitat features to attract large numbers of bats transiting to other geographical areas, such as deep canyons and ridge systems, or areas with perennial water flow. In general, bat species prefer to forage over sites with woody plant coverage, near trees or water, as the presence of water increases the likelihood of insect abundance. Bats also prefer foraging in edge[276] and riparian areas because the open space can provide easier access to prey and allow for more maneuverability. These habitats are generally absent on the project. Water drainage within the project is limited to a network of ephemeral drainages; there are no perennial water sources within the project itself. In addition, the project contains few habitats that would serve as refuge or as stopover areas for migrating or resident bats, such as forests or riparian areas.

Over a year of acoustic data collected immediately adjacent to the project between October 2009 and 2010 resulted in a bat activity level of 0.66 bat pass per detector-night. This is comparable to the low activity rates (0.23 and 0.22 bat pass per detector-night in 2009/2010 and 2010/2011) recorded on the Alta East Wind Resource Area (AEWRA), located approximately 16 miles northeast of the project.[277] These rates, less than 1 bat pass per detector-night are appreciably lower than other bat activity estimates at projects throughout the United States, including 1.9, 2.2, 6.9, 23.7, 35.2, and 38.3 bat passes per detector-night documented during bat activity surveys at the Buffalo Ridge Wind Farm, MN;[278] Foote Creek Rim Wind Farm, WY;[279] Dry Lake Wind Farm, AZ;[280] Buffalo Mountain Wind Farm, TN;[281] Mount Storm Wind Farm, WV;[282] and Mountaineer Wind Farm, WV,[283] respectively. Many of the sites with the

[273] Fiedler, J. K. 2004. Assessment of bat mortality and activity at Buffalo Mountain wind facility, eastern Tennessee. Thesis, University of Tennessee, Knoxville, Tennessee, USA.

[274] Kerns, J., and P. Kerlinger. 2004. A study of bird and bat collision fatalities at the Mountaineer Wind Energy Center, Tucker County, West Virginia: annual report for 2003. Curry and Kerlinger, LLC, McLean, New Jersey, USA.

[275] Arnett, E. B., editor. 2005. Relationships between bats and wind turbines in Pennsylvania and West Virginia: an assessment of bat fatality search protocols, patterns of fatality, and behavioral interactions with wind turbines. A final report submitted to the Bats and Wind Energy Cooperative. Bat Conservation International, Austin, Texas, USA.

[276] *Edge areas* are in reference to edges and linear elements in landscapes, as well as habitat edges. A prime example of an edge area would be woodland edges, which are used extensively by bats.

[277] WEST, Inc. 2012. Technical Memorandum: Results of Bat Acoustic Surveys at the Proposed Alta East Wind Resource Area, Kern County, California. WEST, Inc: Cheyenne, WY.

[278] Johnson, G.D., M.K. Perlik, W.P. Erickson, and M.D. Strickland. 2004. Bat Activity, Composition and Collision Mortality at a Large Wind Plant in Minnesota. Wildlife Society Bulletin 32(4): 1278-1288.

[279] Gruver, J. 2002. Assessment of Bat Community Structure and Roosting Habitat Preferences for the Hoary Bat (*Lasiurus cinereus*) near Foote Creek Rim, Wyoming. M.S. Thesis. University of Wyoming, Laramie, Wyoming. 149 pp.

[280] Thompson, J., D. Solick, and K. Bay. 2011. Post-Construction Fatality Surveys for the Dry Lake Phase I Wind Project. Iberdrola Renewables: September 2009 - November 2010. Prepared for Iberdrola Renewables, Portland, Oregon. Prepared by Western Ecosystems Technology, Inc. (WEST), Cheyenne, Wyoming. February 10, 2011.

[281] Fiedler, J.K. 2004. Assessment of Bat Mortality and Activity at Buffalo Mountain Windfarm, Eastern Tennessee. M.S. Thesis. University of Tennessee, Knoxville, Tennessee. August, 2004. http://www.tva.gov/environment/bmw_report/bat_mortality_bmw.pdf

[282] Young, D.P. Jr., W.P. Erickson, K. Bay, S. Nomani, and W. Tidhar. 2009b. Mount Storm Wind Energy Facility, Phase 1 Post-Construction Avian and Bat Monitoring, July - October 2008. Prepared for NedPower Mount Storm,

highest bat activity have also experienced the highest recorded bat fatality rates, specifically Buffalo Mountain Wind Farm, Mount Storm Wind Farm, and Mountaineer Wind Farm.[284] Resident bat use, based on the results of directed surveys in the project vicinity, is expected to be low. Furthermore, bat migration through the project property is likely to be generally diffuse and of light volume.

As of 2007, of the 45 bat species found north of Mexico, a total of 11 species of bats had been reported as fatalities at wind energy projects. Based on a review of 21 postconstruction fatality studies conducted at 19 facilities in five United States regions and one Canadian province, estimates of bat fatalities ranged between 0.2 and 53.3 bat fatalities / MW, and between 0.1 and 69.6 bat fatalities / turbine.[285] Estimates of bat fatalities were highest at wind energy facilities located on forested ridges in the eastern United States (7 projects; 31.5 to 53.3 annual bat fatalities per MW). The Pacific Northwest region, including one project in California, had among the lowest fatality rates (5 projects; 0.8 to 2.5 bat fatalities / MW).[286] The rates for these 5 projects closely aligns with the tighter range of fatality rates documented at a range of projects in arid environments in the Western United States containing similar habitats as the project (Table 4.4.3-1, *Estimates of Mean Bat Fatalities per Turbine and per Megawatt at Wind Energy Projects in the Arid Western United States*), which averaged 1.90 bats/MW/year. This average, in turn, is similar to the 1.14 bats/MW reported for Johnson and Erickson's 2011 synthesis of fatality reports from 23 wind energy projects in the Columbia Plateau Ecoregion (CPE) of Washington and Oregon, containing approximately 4,000 MW of wind energy.[287]

Three of the most important unifying patterns regarding bat fatalities that emerged during the analysis of the 21 North American postconstruction fatality studies mentioned above are: (1) bat fatalities are heavily skewed toward migratory species and are dominated by lasiurine species in most studies; (2) midsummer through fall is consistently reported as the peak of bat fatalities from all studies in North America, which corresponds with the typical fall migration period; and (3) bat fatalities appear to be highest during periods of low wind speed.[288]

Of the fatalities reported within these 21 North American fatality studies, almost 75 percent of fatalities were composed of three species: foliage-roosting eastern red bats (*Lasiurus borealis*),

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LLC, Houston, Texas. Prepared by Western EcoSystems Technology (WEST), Inc., Cheyenne, Wyoming. February 17, 2009.

[283] Arnett, E.B., W.P. Erickson, J. Kerns, and J. Horn. 2005. Relationships between Bats and Wind Turbines in Pennsylvania and West Virginia: An Assessment of Fatality Search Protocols, Patterns of Fatality, and Behavioral Interactions with Wind Turbines. Final Report. Prepared for Bats and Wind Energy Cooperative, Bat Conservation International, Austin, Texas. June 2005.

[284] WEST, Inc. 2012. Technical Memorandum: Results of Bat Acoustic Surveys at the Proposed Alta East Wind Resource Area, Kern County, California. WEST, Inc: Cheyenne, WY

[285] Arnett, E.B., K. Brown, W.P. Erickson, J. Fiedler, T.H. Henry, G.D. Johnson, J. Kerns, R.R. Kolford, C.P. Nicholson, T. O'Connell, M. Piorkowski, and R. Tankersley Jr. 2008. "Patterns of Bat Fatalities at Wind Energy Facilities in North America." *Journal of Wildlife Management*, *72*: 61–78.

[286] Arnett, E.B., K. Brown, W.P. Erickson, J. Fiedler, T.H. Henry, G.D. Johnson, J. Kerns, R.R. Kolford, C.P. Nicholson, T. O'Connell, M. Piorkowski, and R. Tankersley Jr. 2008. "Patterns of Bat Fatalities at Wind Energy Facilities in North America." *Journal of Wildlife Management*, *72*: 61–78.

[287] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

[288] Arnett, E.B., K. Brown, W.P. Erickson, J. Fiedler, T.H. Henry, G.D. Johnson, J. Kerns, R.R. Kolford, C.P. Nicholson, T. O'Connell, M. Piorkowski, and R. Tankersley Jr. 2008. "Patterns of Bat Fatalities at Wind Energy Facilities in North America." *Journal of Wildlife Management*, *72*: 61–78.

hoary bats (*Lasiurus cinereus*), and tree cavity–dwelling silver-haired bats (*Lasionycteris noctivagans*).[289] Of these species, the hoary bat has a higher wind turbine impact mortality rate than all other species in the West.[290,291] In the six projects within the Pacific Northwest, species composition percentage ranged from 44.0 to 64.3 percent for hoary bats and 0.0 to 56.0 percent for silver-haired bats.[292] At the 23 wind energy projects in the CPE of Washington and Oregon, 556 bat fatalities were reported, of which 48.0 percent of fatalities were silver-haired bats and 46.4 percent of fatalities were hoary bats.[293] Remaining identified species made up only 2.0 percent of total recorded bat fatalities.

The data also show that bat fatalities are almost nonexistent during the breeding season and generally occur during migration and dispersal in late summer between July and September.[294,295] Higher mortality rates in fall migration, as compared to spring migration, were attributed to a lower migration concentration in spring because females leave earlier than males.[296] Migratory bat species may be more likely to be involved with collision mortality events because they fly higher in the air and in denser clusters when migrating.[297] This not only puts the bats at a height associated with the turbines' rotor swept area but, because bats migrate in groups, their ability to use echolocation is affected.[298] The evidence also shows that resident bats foraging or commuting between roosts do not make up the bulk of collision mortality.[299,300] This is based on impact distribution data among turbines and observed forage habitat characteristics. Since resident bats would have a defined flight corridor between roosts, they

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[289] Arnett, E.B., K. Brown, W.P. Erickson, J. Fiedler, T.H. Henry, G.D. Johnson, J. Kerns, R.R. Kolford, C.P. Nicholson, T. O'Connell, M. Piorkowski, and R. Tankersley Jr. 2008. "Patterns of Bat Fatalities at Wind Energy Facilities in North America." *Journal of Wildlife Management*, *72*: 61–78.

[290] Erickson, W., G. Johnson, D. Young, et al. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: Bonneville Power Administration, Portland, OR.

[291] Gruver, J.C. 2002. "Assessment of Bat Community Structure and Roosting Habitat Preferences of the Hoary Bat (Lasiurus cinereus) Near Foot Creek Rim, Wyoming." Master's thesis, Department of Zoology and Physiology, University of Wyoming, Laramie, WY.

[292] Arnett, E.B., K. Brown, W.P. Erickson, J. Fiedler, T.H. Henry, G.D. Johnson, J. Kerns, R.R. Kolford, C.P. Nicholson, T. O'Connell, M. Piorkowski, and R. Tankersley Jr. 2008. "Patterns of Bat Fatalities at Wind Energy Facilities in North America." *Journal of Wildlife Management*, *72*: 61–78.

[293] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

[294] Johnson, G.D., W.P. Erickson, D.A. Shepard, et al. 2002. *Bat Interactions with Wind Turbines at the Buffalo Ridge, Minnesota Wind Resource Area: 2001 Field Season*. Palo Alto, CA: Electric Power Research Institute.

[295] Gruver, J.C. 2002. "Assessment of Bat Community Structure and Roosting Habitat Preferences of the Hoary Bat (Lasiurus cinereus) Near Foot Creek Rim, Wyoming." Master's thesis, Department of Zoology and Physiology, University of Wyoming, Laramie, WY.

[296] Gruver, J.C. 2002. "Assessment of Bat Community Structure and Roosting Habitat Preferences of the Hoary Bat (Lasiurus cinereus) Near Foot Creek Rim, Wyoming." Master's thesis, Department of Zoology and Physiology, University of Wyoming, Laramie, WY.

[297] Harvey, M.J., J.S. Altenbach, and T.L. Best. 1999. *Bats of the United States*. Little Rock, AR: Arkansas Game and Fish Commission.

[298] Griffin, D.R. 1970. "Migrations of Homing Bats." In *Biology of Bats*. Volume 1. New York, NY: Academic Press.

[299] Crawford, R. L., and W. W. Baker. 1981. "Bats Killed at a North Florida Television Tower: A 25 Year Record." *Journal of Mammalogy*, *62*: 651–652.

[300] Johnson, G.D., D.P. Young, W.P. Erickson, et al. 2000. *Avian and Bat Mortality Associated with Initial Phase of the Foot Creek Rim Wind Power Project, Carbon County, Wyoming: November 3, 1998–October 31, 1999*. Technical Report Prepared for: SeaWest Energy Corporation, San Diego, CA, and Bureau of Land Management, Rawlins, WY.

should exhibit higher densities of fatalities in these corridors; but in a majority of the cases that were studied, there are no patterns; rather, there are no areas of appreciably higher densities in the distribution of fatalities.[301,302] In addition to flight corridor data, evidence from foraging behavior demonstrates that it is unlikely that fatalities would occur in resident bat populations.[303] Normally, bats do not forage at heights associated with turbine activity or in areas associated with wind turbine projects, since these areas generally are very flat and windy and have reduced insect populations. Rather, foraging locations are normally associated with areas that have less wind and more water.[304]

Finally, all studies that assessed the relationship between bats fatalities and weather patterns consistently found that fatalities appear to be highest during nights with low wind speed, when turbine blades were still moving.[305] At the Meyersdale, PA and Mountaineer, WY wind energy projects, 82 percent and 85 percent of all bat fatalities, respectively, were estimated to have occurred during nights with median wind speed of <6 m/s.[306] Surveys have also shown that fatalities increased immediately before and after passage of storm fronts.[307]

Due to their propensity to represent a high percentage of fatalities at other studied wind projects, two migratory, non-special-status species, hoary bats and silver-haired bats, would be expected to represent the majority of wind turbine–related bat fatalities from operation of the project. Hoary bats and silver-haired bats are widely distributed species that, in North America, are found within most of the United States and parts of Canada and Mexico.[308,309] As a result of directed bat surveys in the vicinity of the project, the hoary bat was determined to be present based on diagnostic recorded calls, while the silver-haired bat was determined to be potentially present, due to calls within this species frequency category (Q25).

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[301] Johnson, G.D., D.P. Young, W.P. Erickson, et al. 2000. *Wildlife Monitoring Studies: Seawest Wind Power Project, Carbon County, Wyoming: 1995-1999*. Technical Report Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: SeaWest Energy Corporation, San Diego, CA, and Bureau of Land Management, Rawlins, WY.

[302] Erickson, W., G. Johnson, D. Young, et al. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: Bonneville Power Administration, Portland, OR.

[303] Erickson, W.P., G.D. Johnson, and M.D. Strickland, et al. 2000. *Avian and Bat Mortality Associated with the Vansycle Wind Project, Umatilla County, Oregon: 1999 Study Year*. Technical Report Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: Umatilla County Department of Resource Services and Development, Pendleton, OR.

[304] Johnson, G.D., W.P. Erickson, D.A. Shepard, et al. 2002. *Bat Interactions with Wind Turbines at the Buffalo Ridge, Minnesota Wind Resource Area: 2001 Field Season*. Palo Alto, CA: Electric Power Research Institute.

[305] Arnett, E.B., K. Brown, W.P. Erickson, J. Fiedler, T.H. Henry, G.D. Johnson, J. Kerns, R.R. Kolford, C.P. Nicholson, T. O'Connell, M. Piorkowski, and R. Tankersley Jr. 2008. "Patterns of Bat Fatalities at Wind Energy Facilities in North America." *Journal of Wildlife Management*, *72*: 61–78.

[306] Arnett, E.B., K. Brown, W.P. Erickson, J. Fiedler, T.H. Henry, G.D. Johnson, J. Kerns, R.R. Kolford, C.P. Nicholson, T. O'Connell, M. Piorkowski, and R. Tankersley Jr. 2008. "Patterns of Bat Fatalities at Wind Energy Facilities in North America." *Journal of Wildlife Management*, *72*: 61–78.

[307] Arnett, E.B., K. Brown, W.P. Erickson, J. Fiedler, T.H. Henry, G.D. Johnson, J. Kerns, R.R. Kolford, C.P. Nicholson, T. O'Connell, M. Piorkowski, and R. Tankersley Jr. 2008. "Patterns of Bat Fatalities at Wind Energy Facilities in North America." *Journal of Wildlife Management*, *72*: 61–78.

[308] Bolster, Betsy, C. 2005. "Lasiurus cinereus Hoary Bat." Western Bat Working Group (WBWG) Species Accounts. Rapid City, ND: WBWG.

[309] Perkins, Mark. 2005. "Lasionycteris noctivagans Silver-haired Bat." Western Bat Working Group (WBWG) Species Accounts. Rapid City, ND: WBWG.

Based on the available information, larger, less maneuverable, migrating species are primarily associated with wind turbine mortality events. In addition, those species, most notably hoary and silver-haired bats in the western United States, migrating in large colonies in late fall, make up the majority of fatalities observed and recorded.[310,311] Although there have been limited quantifiable data about wind turbine / bat collision effects on bat populations, qualitative and circumstantial data suggest that turbine mortalities do not appreciably contribute to population declines,[312] at least in the West. Due to low bat passage rates on the project, combined with relatively low fatality rates experienced at wind energy projects in the western U.S., as opposed to the east, population level impacts to bat species as a result of construction and operation of the project are not expected.

4.4.4 Barotrauma

A large percentage of bat deaths at wind energy projects are not caused by actual collision with turbine blades, but caused by internal hemorrhaging consistent with trauma from the sudden drop in air pressure (barotrauma) at turbine blades.[313] Because bats can echolocate, they can typically avoid collision with objects; however, atmospheric pressure drops are not detectable by echolocation. Bat lungs are like balloons surrounded by capillaries. When outside pressure drops, their lungs can over expand, bursting the capillaries around them. A single study of bat fatalities at a wind energy project in southwestern Alberta, Canada, found that approximately 90 percent of bat fatalities showed signs of internal hemorrhaging consistent with barotrauma, whereas only half of the fatalities had injuries consistent with direct contact with turbine blades.[314]

4.5 IMPACTS TO SPECIAL-STATUS BAT SPECIES

It has been determined that construction and operation of the project may result in potential impacts to four sensitive bat species that could be present within the project vicinity. Individual assessment of species' collision risk with wind turbines, as well as indirect impacts from construction and operation of the project, are presented below in taxonomic order. Although the potential of incidental loss of resident and migratory sensitive bats through barotrauma or collision with operational wind turbines exists, the project would not be expected to adversely affect the survival and recovery in the wild of the 4 sensitive bat species, which are all resident species.

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[310] Erickson, W., G. Johnson, D. Young, et al. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: Bonneville Power Administration, Portland, OR.

[311] Johnson, G.D., D.P. Young, W.P. Erickson, et al. 2000. *Wildlife Monitoring Studies: SeaWest Wind Power Project, Carbon County, Wyoming: 1995-1999*. Technical Report Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: SeaWest Energy Corporation, San Diego, CA, and Bureau of Land Management, Rawlins, WY.

[312] Erickson, W., G. Johnson, D. Young, et al. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY. Prepared for: Bonneville Power Administration, Portland, OR.

[313] Baerwald, Erin F., Genevieve H. D'Amours, Brandon J. Klug, and Robert M.R. Barclay. 2008. "Barotrauma Is a Significant Cause of Bat Fatalities at Wind Turbines." *Current Biology*, *18*: 695–696.

[314] Baerwald, Erin F., Genevieve H. D'Amours, Brandon J. Klug, and Robert M.R. Barclay. 2008. "Barotrauma Is a Significant Cause of Bat Fatalities at Wind Turbines." *Current Biology*, *18*: 695–696.

4.5.1 Western Small-Footed Myotis

The western small-footed myotis is a BLM sensitive species and a commonly occurring resident bat of arid uplands in California. The western small-footed myotis occurs on the west and east sides of the Sierra Nevada Mountains and in Great Basin and desert habitats from Modoc to Kern and San Bernardino Counties. It occurs in a wide variety of habitats, primarily in relatively arid wooded and brushy uplands near water. This species is found from sea level to at least 8,900 feet. This bat seeks cover in caves, buildings, mines, crevices, and occasionally under bridges and under bark. Separate night roosts may be used and have been found in buildings and caves.[315]

The entire approximately 1,207-acre project provides potential suitable foraging habitat for the western small-footed myotis. No roost sites were identified as a result of the roost surveys conducted within the project. This species is listed as potentially present at the project, based on the results of the U.S. Forest Service (USFS) passive acoustic surveys in 2009–2010. Diagnostic calls of this species were not recorded, but calls within the 40k myotis group, which includes the western-small footed myotis, were.

No known publicly available fatality reports are available summarizing recent bat fatality rates or the species composition of fatalities in southern California; therefore collision risk for these species is analyzed by detailing the frequency of occurrence at two older WRAs within California where bats appear to only have been recorded incidentally during fatality monitoring, and at the CPE of Washington and Oregon, which contains habitats and species assemblages similar to Southern California. No western small-footed myotis bats were recorded as fatalities at either the Tehachapi or San Gorgonio WRAs. In the more extensively studied CPE of Washington and Oregon, no western small-footed myotis were documented, though a single unidentified myotis bat, making up 0.2 percent of the total 556 fatalities, was recorded.[316]

4.5.2 Yuma Myotis

The Yuma myotis is a BLM sensitive species and is a commonly occurring and widespread resident bat species in California. The species is found in a wide variety of habitats ranging from sea level to 11,000 feet, but it is uncommon to rare above 8,000 feet. Optimal habitats are open forests and woodlands with sources of water over which to feed. Maternity colonies of several thousand females and young of this species may be found in buildings, caves, mines, and under bridges.[317]

The entire approximately 1,207-acre project provides potential suitable foraging habitat for the Yuma myotis. No roost sites were identified as a result of the roost surveys conducted within the project. This species is listed as potentially present at the project, based on the results of the USFS passive acoustic surveys in 2009–2010. Diagnostic calls of this species were not recorded, but calls within the 50k myotis group, which includes the Yuma myotis, were.

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[315] Harris, J. 1984. “Small-footed Bat.” Prepared for: California Department of Fish and Game. Available at: http://www.sibr.com/mammals/M029.html

[316] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

[317] Harris, J. 1984. “Yuma Myotis.” Prepared for: California Department of Fish and Game. Available at: http://www.sibr.com/mammals/M023.html

No Yuma myotis bats were recorded as fatalities at either the Tehachapi or San Gorgonio WRAs, but bats appeared to have been recorded only incidentally during the course of these mortality studies. In the more extensively studied CPE of Washington and Oregon, no western small-footed myotis were documented, though a single unidentified myotis bat, making up 0.2 percent of the total 556 fatalities, was recorded.[318]

4.5.3 Pallid Bat

The pallid bat is a California species of special concern and a BLM sensitive species. The pallid bat is a locally common resident species of low elevations in California. It occurs throughout California, except for the high Sierra Nevada Mountains from Shasta County to Kern County and the northwestern corner of the State from Del Norte and western Siskiyou Counties to northern Mendocino County.[319] A wide variety of habitats are occupied by this species, including grasslands, shrublands, woodlands, and forests from sea level up through mixed conifer forests. The species is most common in open, dry habitats with rocky areas for roosting. The pallid bat is a year-long resident in most of its range. Day roosts of pallid bats are in caves, crevices, mines, and occasionally in hollow trees and buildings. Night roosts may be in more open sites, such as porches and open buildings. Few hibernation sites are known, but pallid bats are likely to use rock crevices and mines.[320]

The entire approximately 1,207-acre proposed project property provides potential suitable foraging habitat for the pallid bat. No roost sites were identified as a result of the roost surveys conducted within the project; however, the pallid bat was determined to be present as a result of diagnostic calls recorded during 2009–2010 USFS passive acoustic surveys and during active surveys on the adjacent Manzana Project in 2005.

No pallid bats were recorded as fatalities at either the Tehachapi or San Gorgonio WRAs, but bats appeared to have been recorded only incidentally during the course of these mortality studies. In the more extensively studied CPE of Washington and Oregon, no pallid bats were documented in Johnson and Erickson's 2011 synthesis of fatality reports from 23 wind energy projects.[321]

[318] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

[319] Harris, J. 1984. "Pallid Bat." Prepared for: California Department of Fish and Game. Available at: http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2349

[320] Harris, J. 1984. "Pallid Bat." Prepared for: California Department of Fish and Game. Available at: http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2349

[321] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

4.5.4 Western Mastiff

The western mastiff bat, also known as the western bonneted bat, is a California species of special concern and a BLM sensitive species. It is an uncommon resident species in the southeastern San Joaquin Valley and the Coastal ranges from Monterey County southward through southern California, and from the coast eastward to the Colorado Desert. It occurs in a variety of open, semiarid to arid habitats, including conifer and deciduous woodlands, coastal scrub, annual and perennial grasslands, palm oases, chaparral, desert scrub, and urban environments. Western mastiff bats roost in cliff faces, high buildings, trees, and tunnels and require vertical faces to drop from in order to achieve flight.[322]

The entire approximately 1,207-acre proposed project property provides potential suitable foraging habitat for the western mastiff bat. No roost sites were identified as a result of the roost surveys conducted within the project; however, the pallid bat was determined to be present as a result of diagnostic calls recorded during 2009–2010 USFS passive acoustic surveys.

No western mastiff bats were recorded as fatalities at either the Tehachapi or San Gorgonio WRAs, but bats appeared to have been recorded only incidentally during the course of these mortality studies. In the more extensively studied CPE of Washington and Oregon, no western mastiff bats were documented in Johnson and Erickson's 2011 synthesis of fatality reports from 23 wind energy projects.[323]

[322] Ahlborn, G. 1984. "Pallid Bat." Prepared for: California Department of Fish and Game. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2357

[323] Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: WEST, Inc., Cheyenne, WY.

TABLE 4.4.3-1
ESTIMATES OF MEAN BAT FATALITIES PER TURBINE AND PER MEGAWATT AT WIND ENERGY PROJECTS IN THE ARID WESTERN UNITED STATES

Wind Energy Project and Location	Survey Years	Habitat	Estimated Mean Bat Fatality / Turbine/Year	Estimated Mean Bat Fatality / MW/Year	Reference
Alite, CA	2009–2010	Shrub/scrub grassland	n.d.	0.24	Chatfield, A., W.P. Erickson, and K. Bay. 2010. Final Report: Avian and Bat Fatality Study at the Alite Wind-Energy Facility, Kern County, California. Final Report: June 15, 2009-June 15, 2010. Prepared by Western Ecosystems Technology, Inc. (WEST), Cheyenne, Wyoming. Prepared for CH2M Hill, Oakland, CA.
Biglow Canyon Phase I, OR	2008	Dryland agriculture, Conservation Reserve Program (CRP) grassland, shrub-steppe	3.29	1.99	Jeffrey, J.D., K. Bay, W.P. Erickson, M. Sonneberg, J. Baker, M. Kesterke, J.R. Boehrs, and A. Palochak. 29 April 2009. *Portland General Electric Biglow Canyon Wind Farm Phase I Post-Construction Avian and Bat Monitoring First Annual Report, Sherman County, Oregon. January 2008 - December 2008*. Technical report prepared for Portland General Electric Company, Portland, OR. Prepared by Western EcoSystems Technology (WEST) Inc., Cheyenne, WY.
Biglow Canyon Phase II, OR	2010–2011	Dryland agriculture, CRP grassland, shrub-steppe	1.32	0.57	Enk, T., K. Bay, M. Sonnenberg, and J.R. Boehrs. 2012. *Year 2 Post-Construction Avian and Bat Monitoring Report, Biglow Canyon Wind Farm Phase II, Sherman County, Oregon. September 13, 2010 – September 15, 2011*. Technical report prepared for Portland General Electric, Portland, OR. Prepared by WEST, Cheyenne, WY.
Biglow Canyon Phase III, OR	2010–2011	Dryland agriculture, CRP grassland, shrub-steppe	n.d.	0.22	Enk, T., K. Bay, M. Sonnenberg, and J.R. Boehrs. 2012. *Draft Year 1 Avian and Bat Monitoring Report, Biglow Canyon Wind Farm - Phase III, Sherman County, Oregon, September 13, 2010 – September 9, 2011*. Technical report prepared for Portland General Electric Company, Portland, OR. Prepared by WEST, Cheyenne, WY.
Buena Vista, CA	2008–2009	Grassland, grazeland, sagebrush chaparral	n.d.	n.d.[2]	Insignia 2009. *2008/2009 Annual Report for the Buena Vista Avian and Bat Monitoring Project*. Report prepared for Contra Costa County. Insignia 540 Bryant Street Suite 200, Palo Alto, CA 94301.
Dillon, CA	2008–2009	Desert scrub	2.17	2.17	Chatfield, A., W. Erickson, and K. Bay. 2009. Avian and Bat Fatality Study, Dillon Wind-Energy Facility, Riverside County, California. Final Report: March 26, 2008 – March 26, 2009. Prepared for Iberdrola Renewables, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. June 3, 2009.
Dry Lake, AZ	2009–2010	Desert scrub and grazeland	9.01	4.29	Thompson, J., D. Solick, and K.Bay. 2011. Post-construction Fatality Surveys for the Dry Lake Phase I Wind Project, Iberdrola Renewables: September 2009-November 2010. Prepared for Iberdrola Renewables, Portland, Oregon. Prepared by Western Ecosystems Technology, Inc. (WEST), Cheyenne, Wyoming. February 10, 2011.
Elkhorn Valley, OR	2008	Dryland agriculture and grazeland	2.07	1.26	Jeffrey, J.D., W.P. Erickson, K. Bay, M. Sonneberg, J. Baker, J.R. Boehrs, and A. Palochak. 2009. *Horizon Wind Energy, Elkhorn Valley Wind Project, Post-Construction Avian and Bat Monitoring, First Annual Report, January-December 2008*. Technical report prepared for Telocaset Wind Power Partners, a subsidiary of Horizon Wind Energy, Portland, OR. Prepared by WEST, Cheyenne, WY.
Foote Creek Rim, Phase I	1999–2002	Mixed grass prairie, sagebrush shrubland	1.34	n.d.	Young, D.P. Jr., W.P. Erickson, R.E. Good, M.D. Strickland, and G.D. Johnson. 2003. *Avian and Bat Mortality Associated with the Initial Phase of the Foote Creek Rim Windpower Project, Carbon County, Wyoming, Final Report, November 1998 - June 2002*. Prepared for Pacificorp, Inc. Portland, OR, SeaWest Windpower Inc. San Diego, CA, and Bureau of Land Management, Rawlins District Office, Rawlins, WY.
High Winds, CA	2003–2005	Agriculture, grassland	3.63	2.02	Kerlinger, P., R. Curry, L. Culp, A. Jain, C. Wilkerson, B. Fischer, and A. Hasch. 2006. Post-Construction Avian and Bat Fatality Monitoring for the High Winds Wind Power Project, Solano County, California: Two Year Report. Prepared for High Winds LLC, FPL Energy by Curry and Kerlinger, LLC. April 2006.
Hopkins Ridge, WA	2006	Agriculture, grassland	1.13	0.63	Young, D.P. Jr., W.P. Erickson, J. Jeffrey, and V.K. Poulton. 2007. *Puget Sound Energy Hopkins Ridge Wind Project Phase 1 Post-Construction Avian and Bat Monitoring First Annual Report, January - December 2006*. Technical report for Puget Sound Energy, Dayton, Washington and Hopkins Ridge Wind Project Technical Advisory Committee, Columbia County, WA. WEST, Cheyenne, WY.
Judith Gap, MT	2006–2007	Native Short-grass prairie, dryland agriculture, CRP grassland	13.4	8.9	TRC Environmental Corporation. January 2008. *Post-Construction Avian and Bat Fatality Monitoring and Grassland Bird Displacement Surveys at the Judith Gap Wind Energy Project, Wheatland County, Montana*. Prepared for Judith Gap Energy, LLC, Chicago, Illinois. TRC Environmental Corporation, Laramie, Wyoming. TRC Project 51883-01 (112416).
Judith Gap, MT	2009	Native Short-grass prairie, dryland agriculture, CRP grassland	7.2	4.80	Poulton, V., and W. Erickson. 2010. *Post-Construction Bat and Bird Fatality Study, Judith Gap Wind Farm, Wheatland County, Montana*. Prepared for: Judith Gap Energy LLC. Prepared by: Western EcoSystems Technology, Inc. (WEST), Cheyenne, WY.
Klondike I, OR	2001–2002	Dryland agriculture, grazeland, CRP grassland	1.16	0.77	Johnson, G.D., W.P. Erickson, and J. White. March 2003. *Avian and Bat Mortality during the First Year of Operation at the Klondike Phase I Wind Project, Sherman County, Oregon*. Technical report prepared for Northwestern Wind Power, Goldendale, Washington, by WEST, Cheyenne, WY.
Klondike II, OR	2007–2009	Dryland agriculture and grazeland	0.63	0.41	Northwest Wildlife Consultants, Inc. (NWC) and Western EcoSystems Technology, Inc. 17 July 2007. *Avian and Bat Monitoring Report for the Klondike II Wind Power Project. Sherman County, Oregon*. Prepared for PPM Energy, Portland, Oregon. Managed and conducted by NWC, Pendleton, OR. Analysis conducted by WEST, Cheyenne, WY.
Klondike III, OR[3]	2007–2009	Agriculture, Columbia Basin shrub-steppe	2.07	1.17	Gritski, R., S. Downes, and K. Kronner. [21 April 2010] Updated September 2010. *Klondike III (Phase 1) Wind Power Project Wildlife Monitoring: October 2007-October 2009*. Prepared for Iberdrola Renewables, Inc. (IRI), Portland, Oregon, for Klondike Wind Power III LLC. Prepared by Northwest Wildlife Consultants, Inc. (NWC), Pendleton, OR.

TABLE 4.4.3-1
ESTIMATES OF MEAN BAT FATALITIES PER TURBINE AND PER MEGAWATT AT WIND ENERGY PROJECTS IN THE ARID WESTERN UNITED STATES, *Continued*

Wind Energy Project and Location	Survey Years	Habitat	Estimated Mean Bat Fatality / Turbine/Year	Estimated Mean Bat Fatality / MW/Year	Reference
Nine Canyon, WA	2002–2003	Dryland agriculture, CRP grassland, grazed shrub-steppe	3.21	2.46	Erickson, W.P., K. Kronner, and R. Gritski. October 2003. *Nine Canyon Wind Power Project Avian and Bat Monitoring Report. September 2002 – August 2003*. Prepared for the Nine Canyon Technical Advisory Committee and Energy Northwest by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, and Northwest Wildlife Consultants (NWC), Pendleton, OR.
Stateline, OR/WA	2001–2003	Dryland agriculture, native grassland, CRP grassland, limited sagebrush	1.12	1.7	Erickson, W.P., J. Jeffrey, K. Kronner, and K. Bay. December 2004. *Stateline Wind Project Wildlife Monitoring Annual Report. July 2001 - December 2003*. Technical report peer-reviewed by and submitted to FPL Energy, the Oregon Energy Facility Siting Council, and the Stateline Technical Advisory Committee. WEST, Cheyenne, WY.
Stateline, OR/WA	2006	Dryland agriculture, native grassland, CRP grassland, limited sagebrush	0.63	0.95	Erickson, W.P., K. Kronner, and K.J. Bay. 2007. *Stateline 2 Wind Project Wildlife Monitoring Report, January - December 2006*. Technical report submitted to FPL Energy, the Oregon Energy Facility Siting Council, and the Stateline Technical Advisory Committee.
Vancycle, OR	1999	Dryland agriculture, grassland	0.74	1.12	Erickson, W.P., G.D. Johnson, M.D. Strickland, and K. Kronner. 2000. *Avian and Bat Mortality Associated with the Vansycle Wind Project, Umatilla County, Oregon*. Technical Report prepared by WEST, Inc., for Umatilla County Department of Resource Services and Development, Pendleton, OR.
Wild Horse, WA	2007	Mixed grass prairie	0.70	0.39	Erickson, W.P., J. Jeffrey, and V.K. Poulton. 2008. *Avian and Bat Monitoring: Year 1 Report. Puget Sound Energy Wild Horse Wind Project, Kittitas County, Washington*. Prepared for Puget Sound Energy, Ellensburg, Washington, by WEST, Cheyenne, WY.
Mean Bat Fatalities per Turbine and per Megawatt			**3.05**	**1.90**	

NOTE: [1] Project data listed above as "n.d." did not have publicly available data for that particular fatality parameter, or not enough information was available to facilitate conversion between MW/year and turbine/year. The mean calculated for each of the four parameters was only made with projects for which data was available for that parameter).
[2] Single Hoary bat found during monitoring, but no fatality estimation given.
[3] Multiple fatality estimates provided. Fatality estimates using Huso Estimator is presented here.

4.6 CONCLUSION

The analysis of the potential for project impacts to bird and bat species due to disturbance, displacement, habitat fragmentation, and collision was conducted by taxonomic group and in the case of special-status species, individually by species. No bird or bat species listed as threatened or endangered by the USFWS have been detected on the project footprint; nor are any known to historically occupy the project vicinity. In addition, there is no evidence that the project vicinity is used as a migration corridor, or that it contains unique features that would attract either bird or bat species. Although no population-level impacts to bird and bat species from the construction and operation of the project are anticipated, HW has taken a proactive approach to the avoidance and minimization of any potential impacts through the development of specific conservation measures, outlined in Section 5.

SECTION 5.0
AVOIDANCE AND MINIMIZATION MEASURES
TIER 4.0 AND 5.0 POST-CONSTRUCTION STUDIES

Key considerations in the analysis of environmental impacts from wind energy projects are the potential for impacts to resident and migratory avian and bat species. Despite efforts to site and design the project in an attempt to avoid and minimize impacts to avian and bat species, the potential still exists for conflicts to occur as a result of project construction and operation.

Mitigation and conservation measures have been developed to address impacts to bird and bat species caused by construction and operation of the project. Postconstruction monitoring has been designed to evaluate the project during operation to determine the scope of actual impacts. Adaptive management methodologies have been designed to use monitoring data to evaluate whether impacts are greater than predicted and, if at unacceptable levels, to implement additional measures, after coordination with Bureau of Land Management (BLM) and US Fish and Wildlife Service (USFWS), to address those impacts. This section corresponds to Tier 4 and 5 of the *Final Guidelines*[324] and approximates Stages 4 and 5 of the *ECP Guidance.*[325] If HW later applies for a programmatic eagle take permit as described in Section 1.0 of the BBCS, HW will submit an ECP that satisfies all the specific USFWS recommendations of an ECP as outlined in the *ECP Guidance*.

This Bird and Bat Conservation Strategy (BBCS) conservation approach builds on commitments developed through the environmental compliance process. Best management practices (BMPs) for siting, construction, and operation of wind energy projects on BLM-administered land have been stipulated under Instruction Memorandum (IM) No. 2009-043, which further clarifies the *BLM Wind Energy Development Policies and BMPs* (Appendix B, BLM Wind Energy Development Policies and Best Management Practices) provided in the Wind Energy Development Programmatic Environmental Impact Statement of 2005. HW has also proposed an array of additional mitigation measures aimed at further avoiding and mitigating impacts to avian and bat species, particularly golden eagle and condor, that may interact with the project. Specific mitigation measures to avoid avian and bat mortality will also be specified in the EIS prepared for the project by the BLM, though the Draft EIS has yet to be released and the content of those measures is currently unknown. The measures described in this BBCS will be updated based on the BLM required measures that will be described in the Draft EIS and subsequent Final EIS.

Many of the avoidance and minimization measures described below are similar to the advanced conservation practices (ACPs) described in the U.S. Fish and Wildlife Service's *ECP Guidance*.[326] This guidance defines ACPs as "scientifically supportable measures that are approved by the Service and represent the best available techniques to reduce eagle disturbance and ongoing mortalities to a level where remaining take is unavoidable." The measures described below will collectively serve to avoid and minimize general avian and bat

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[324] U.S. Fish and Wildlife Service Wind Turbine Guidelines Advisory Committee. 23 March 2012. *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines*. Available at: www.fws.gov/windenergy/docs/WEG_final.pdf

[325] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. *Eagle Conservation Plan Guidance*. Module 1—"Land-Based Wind Energy." Version 2. Arlington, VA

[326] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. *Eagle Conservation Plan Guidance*. Module 1—"Land-Based Wind Energy." Version 2. Arlington, VA

mortality and disturbance, but more specifically they will avoid and minimize golden eagle mortality and disturbance. Furthermore, the implementation of an adaptive management program will provide a blueprint for future management actions, including compensatory mitigation, should they be deemed necessary.

The following sections identify avoidance and minimization measures that have been or will be incorporated into sequential phases of project development, including: project design, construction, and operation. Subsequent sections provide further descriptions of the proposed post-construction monitoring studies, as well as further description of the Adaptive Management Plan.

5.1 AVOIDANCE AND MINIMIZATION MEASURES

5.1.1 BLM Wind Energy Development Policies and Best Management Practices

The project proponent will adhere to the BMPs as identified in the BLM Wind Energy Program Policies and Best Management Practices (Appendix B) during the design, construction, and operation phases of the project.

5.1.2 Applicant Proposed Avoidance and Minimization Measures

Applicant proposed measures applicable to avoiding and minimizing impacts to birds and bats during the design, construction, and operation phases of the project are summarized below.

5.1.2.1 General Measures for Bird and Bat Species

Project Design Avoidance and Minimization Measures

- *Use Existing Infrastructure*. In an effort to minimize environmental impacts, the project has been designed to use existing infrastructure and previously disturbed areas from the adjacent operating Manzana Wind Project and Pacific Wind Project to the extent practical, including roads, transmission lines and substations.

- *Avoid Drainage Crossing*s. In an effort to avoid impacts to riparian habitats that are normally associated with streams and ephemeral drainages, the project has been designed to use existing drainage crossings located in the adjacent Manzana and Pacific Wind Projects.

- *Minimize Perching or Nesting Opportunities*. To minimize perching or nesting opportunities for birds, the project will use tubular poles for any necessary overhead electrical poles and tubular towers for turbines.

- *Met Tower Design*. Permanent met towers will be free-standing and not contain guy wires. Bird diverters will be placed on all temporary met tower guy wires to minimize avian collision, per BLM-CA IM 2013-004.

- *Minimize Lighting***.** Measures will be taken to avoid/minimize the impact of light intrusion into adjacent native habitat. The BLM Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-

Administered Lands in the Western U.S. recommends the following:

- o Night lighting during construction would not occur to the maximum extent practicable;
- o Any night lighting during construction and operation would be selectively placed, shielded, and directed away from all areas of native habitat to the maximum extent practicable; and
- o All unnecessary lighting should be turned off at night to limit attracting migratory birds.

Construction Avoidance and Minimization Measures

- *Prevention of Erosion and Sedimentation.* Design measures such as straw waddles, silt fencing, aggregate materials, wetting compounds, and revegetation of native plant species will be implemented to decrease erosion and sedimentation.

- *Conduct Preconstruction Surveys.* Approved biologists will conduct pre-construction surveys for applicable biological resources in all construction impact areas and enact avoidance or minimization measures, such as buffers, to protect such resources from construction impacts.

- *Qualified Biologist.* A qualified biologist will regularly monitor construction activities to ensure construction is proceeding in compliance with HW proposed environmental mitigation measures as well as those measures required by the regulatory agencies.

- *Construction Environmental Training Program.* HW will develop an environmental training program for its construction contractors and personnel. The environmental training will cover the sensitive resources found on-site, flagging/fencing of exclusion areas, permit requirements, and other environmental issues. All construction site personnel will be required to attend the environmental training in conjunction with hazard and safety training prior to working on site.

- *Removal of Construction Materials.* At the completion of the project, all construction materials will be removed from the site.

- *Restriction to Existing Access Roads.* Except when not feasible due to physical or safety constraints, all project vehicle movement will be restricted to existing access roads and access roads constructed as a part of the project and determined and marked by the project proponent in advance of construction. Approval from a biological monitor will be obtained prior to any travel off of existing access roads.

- *Minimize Dust.* Implementation of active dust suppression measures during the construction period to minimize the creation of dust clouds; including, but not limited to: applying water at least once per day, or conduct watering as necessary to prevent visible dust emissions from exceeding 100 feet in length in any direction. Increase watering frequency to four times per day if winds exceed 25 mph. Non-toxic soil stabilizers may be utilized to control fugitive dust.

- *Restrict Vehicle Speeds*. Restrict construction vehicle speeds to 25 mph on unpaved roads. Project personnel and visitors will be instructed to drive at the recommended speed limit and be alert for wildlife, especially in low visibility conditions.

- *Implement Good Housekeeping Procedures.* Maintain construction site with good housekeeping procedures. Project personnel will ensure standing water and trash, which may attract nuisance wildlife, do not accumulate on the project during the construction phase of the project.

- *Avoid Increasing Prey Abundance*. The project proponent will implement construction protocols to avoid increasing ground-dwelling prey abundance on the project, including minimizing cutting into hill slopes to avoid sudden berms or cuts to prevent underburrowing, minimization of the creation of rock piles, and placement of gravel around turbine foundations to prevent underburrowing.

- *Ground Cover Replacement.* Replace ground cover in disturbed areas as soon as feasible.

- *Follow APLIC Guidelines.* It is anticipated that only overhead collector lines over streambed crossings will be implemented on the project; however, all power lines approved for construction by the BLM for the project will be constructed to the most current APLIC Guidelines.[327] The project proponent(s) shall conform to the latest practices to protect birds from electrocution and collision, including line markers spaced per APLIC Guidelines.

Operations Avoidance and Minimization Measures

- *Habitat Restoration.* HW will restore native vegetation in the affected work areas after construction. Restoration will include planting or seeding native plants that were present prior to the work and/or are compatible with existing vegetation near the work area.

- *Restrict Vehicle Speeds*. Restrict operations vehicle speeds to 25 mph on unpaved roads. Project personnel and visitors will be instructed to drive at the recommended speed limit and be alert for wildlife, especially in low visibility conditions.

- *Implement Good Housekeeping Procedures*. Maintain project site with good housekeeping procedures. Project personnel will ensure standing water and trash, which may attract nuisance wildlife, do not accumulate on the project during the operations phase of the project.

- *Operations and Decommissioning Monitoring Program.* A monitoring program would be implemented to ensure environmental conditions are monitored during

[327] Avian Power Line Interaction Committee (APLIC). 2012. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2012*. Washington, DC: Edison Electric Institute and APLIC; and Sacramento, CA: California Energy Commission.

the operation and decommissioning phases. The monitoring program would include adaptive management strategies to reflect improved technology or the need to adjust to a better understanding of the data during the actual impacts of the project.

- *Conduct Postconstruction Mortality Monitoring.* The project proponent will conduct postconstruction bird and bat mortality monitoring surveys in the first and second years following the initial operation of the project to demonstrate the level of incidental injury and mortality to populations of avian or bat species in the vicinity of the project site (see details below in 5.2.1, Postconstruction Mortality Monitoring).

- *Conduct Long-Term Postconstruction Mortality Monitoring.* Starting in the third year of project operation and continuing for the life of the project, the project proponent's operations staff shall conduct annual Long-Term Post-Construction Mortality Monitoring in conjunction with other project monitoring. (see details below in 5.2.2, Long-Term Postconstruction Mortality Monitoring).

5.*1.2.2* *Specific Measures for California Condor*

Project Design Avoidance and Minimization Measures

- *Condor Monitoring and Avoidance Plan.* The project proponent shall submit for review and approval a Condor Monitoring and Avoidance Plan that provides the details of a system that will detect and avoid condors in the project vicinity. The system currently being described is a Very High Frequency (VHF)–based Condor Monitoring System (ReCON) that has the capability to detect VHF-tagged condors at least 16 miles from the detection station. The system transmits an alert that prompts a response from project personnel when a VHF-tagged condor approaches within a 5-mile perimeter of project turbines. This system is augmented by human observation at a 2-mile perimeter of project turbines. The purpose of the plan is to outline the procedures and steps to be undertaken by the project proponent to implement focused curtailment of wind turbine generators if a California condor is detected within 2-mile perimeters of project turbines. An adaptive management plan will also be developed to ensure continued protection of condors if condor use patterns change such that the birds are more frequently entering either the 5-mile or 2-mile detection perimeter or if the Southern California flock is no longer marked with VHF transmitters.

Construction Avoidance and Minimization Measures

- *Implement Condor Monitoring and Avoidance Plan*. The Condor Monitoring and Avoidance Plan shall be implemented and demonstrated to be effective and fully operational prior to initiation of turbine testing and operations and shall remain fully operational during daytime hours, which includes 30 minutes prior to sunrise and 30 minutes after sunset.

Operations Avoidance and Minimization Measures

- *Continue to Implement Condor Monitoring and Avoidance Plan*. The Condor Monitoring and Avoidance Plan shall remain fully operational during daytime hours, which includes 30 minutes prior to sunrise and 30 minutes after sunset. The project proponent will be responsible for regular communication with and reporting to the BLM and USFWS on condor use of the project, as stipulated in the Condor Monitoring and Avoidance Plan, in order to apply adaptive management measures as needed.

- *Report California condor sightings.* All California condor sightings during operations will continue to be reported directly to the USFWS and BLM within 24 hours.

- *Response to Condor Mortality.* If a California Condor were struck by a turbine blade, the project shall immediately be confined to nighttime-only operations and reinitiation of formal section 7 consultation will occur.

5.*1.2.3* *Specific Measures for Golden Eagles*

Measures specifically designed to avoid and minimize impacts to golden eagles from construction and operation of the project are provided, based on those measures recommended in the *ECP Guidance*.[328] While included specifically for golden eagles, these measures would also benefit other bird and bat species on the project. Conversely, many of the applicant proposed measures for general bird and bat species would also provide benefit to golden eagles.

Project Design Avoidance and Minimization Measures

- *Maximize Use of Developed or Degraded Land.* Prioritize locating development on lands that provide minimal eagle use potential including highly developed and degraded sites.

- *Utilize Existing Infrastructure.* Utilize existing transmission corridors and roads.

- *Avoid Ridge Areas.* Set turbines back from ridge areas.

- *Avoid High Eagle Use Areas.* Site structures away from high eagle use areas and the flight zones between them.

- *Minimize the Use of Above-Ground Lines.* Bury power lines to reduce avian collision and electrocution. The project will minimize the use of above-ground transmission lines. The majority of the project will utilize underground collector lines and mark overhead lines per BLM per BLM-CA IM 2013-004 if applicable.

- *Minimize the Extent of the Road Network.*

- *Avoid Areas of Abundant Eagle Prey.* Avoid siting turbines in areas where eagle prey is abundant.

[328] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. *Eagle Conservation Plan Guidance*. Module 1—"Land-Based Wind Energy." Version 2. Arlington, VA

- *Avoid Water Resources.* Avoid areas with high concentrations of ponds, streams, or wetlands.

Construction Avoidance and Minimization Measures

- *Minimize Surface Disturbance*. Minimize the area and intensity of disturbances during pre-construction and construction periods.

Operations Avoidance and Minimization Measures

- *Dismantle Nonoperational Meteorological Towers.*

- *Minimize Attraction of Golden Eagle Prey Resources.* Maintain facilities and grounds in a manner that minimizes any potential impacts to eagles (e.g. minimize storage of equipment near turbines that may attract prey, avoid seeding forbs below turbines that may attract prey, etc.). Avoid practices that attract/enhance prey populations and opportunities for scavenging within the project area.

- *Reduce Vehicle Collision Risk.* Take actions to reduce vehicle collision risk to wildlife and remove carcasses from the project area (e.g. deer, livestock, etc.)

- *Implement No-Activity Buffers Surrounding Golden Eagle Nests.* As of 2013, there were no active golden eagle nests closer than 15 miles to the project. However, if eagle nests are discovered in the project vicinity, the Qualified Biologist may enact avoidance or minimization measures, such no-activity buffers for eagle nests that have a direct line of sight to the work area. Nest buffers for eagles may be adjusted to reflect existing conditions including ambient noise, topography, and species' disturbance tolerance with the approval of USFWS.

5.1.3 Bureau of Land Management Required Mitigation Measures

The measures described in this BBCS will be updated based on the BLM required measures that will be described in the Draft EIS and subsequent Final EIS.

5.2 POSTCONSTRUCTION STUDIES

The project proponent proposes to conduct postconstruction monitoring studies to estimate project impacts. These provisions incorporate aspects of Tier 4 and 5 of the *Final Guidelines*[329] and the *ECP Guidance.*[330] Further details on these surveys are presented below:

5.2.1 Postconstruction Mortality Monitoring

Qualified biologists will conduct postconstruction bird and bat mortality monitoring surveys to document actual fatalities associated with wind turbines and other project-related activities and facilities, such as meteorological towers and overhead electrical collector lines. The postconstruction mortality monitoring will be conducted in the 1st and 2nd years following the first delivery of power.

[329] U.S. Fish and Wildlife Service Wind Turbine Guidelines Advisory Committee. 23 March 2012. *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines*. Available at: www.fws.gov/windenergy/docs/WEG_final.pdf

[330] U.S. Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. *Eagle Conservation Plan Guidance*. Module 1—"Land-Based Wind Energy." Version 2. Arlington, VA

Monitoring Protocols

The primary objectives of the postconstruction monitoring are to estimate avian and bat mortality rates on the project and to determine whether the estimated mortality is lower, similar, or higher than the average mortality rates observed at other regional projects with similar habitat. Wind energy project fatality estimation is largely based on the number of carcasses found during carcass searches conducted under operating turbines. Monitoring protocols will be designed in accordance with the CEC's *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development* and the USFWS' *Final Guidelines*.[331,332] Both the probability that a carcass persists on-site long enough to be detected by searchers (carcass persistence) and the ability of searchers to detect carcasses (searcher efficiency) can lead to imperfect detection of carcasses during standardized searches. Therefore, this postconstruction monitoring will include (1) standardized carcass searches to monitor potential injuries or fatalities associated with wind energy project operation; (2) searcher efficiency trials to assess observer efficiency in finding carcasses; and (3) carcass removal trials to assess seasonal, site-specific carcass persistence time. Annual fatality rates will then be calculated by correcting for the bias (i.e., underestimation and overestimation) due to searcher efficiency and scavenging rates by using an equation that accounts for the number of turbines searched, the carcass persistence, and searcher efficiency.

Carcass Searches

Postconstruction monitoring will be undertaken for approximately 30 percent of the total number of turbines installed in the project, .as recommended by the USFWS *Final Guidelines*.[333] Specifically, based on the most intensive development scenario of up to 40 1.5 MW turbines, searches would be undertaken of 12 turbines per search period. Carcass searches will be conducted in 14 day intervals throughout the year. It is estimated that approximately 26 carcass searches will be conducted in each year of monitoring. Reconnaissance-level carcass searches will also be conducted at least monthly at any project meteorological towers and overhead collector lines.

To ensure representative sampling of the entire project and key local factors that might affect collision risk, a stratified random sample of turbines will be selected for use as carcass search plots, as recommended in the *Final Guidelines*.[334] Search turbines will remain constant over the course of the 3-year study, unless further guidance from the agencies is provided.

Carcass searches will be conducted within an appropriately sized circular plot with the turbine base at the center. Linear transects will be established within search plots approximately 6 to 10 m apart, adjusted as necessary for vegetation type and visibility. Searchers will walk along each

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[331] California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento.

[332] U.S. Fish and Wildlife Service Wind Turbine Guidelines Advisory Committee. 23 March 2012. *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines*. Available at: www.fws.gov/windenergy/docs/WEG_final.pdf

[333] U.S. Fish and Wildlife Service Wind Turbine Guidelines Advisory Committee. 23 March 2012. *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines*. Available at: www.fws.gov/windenergy/docs/WEG_final.pdf

[334] U.S. Fish and Wildlife Service Wind Turbine Guidelines Advisory Committee. 23 March 2012. *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines*. Available at: www.fws.gov/windenergy/docs/WEG_final.pdf

transect searching both sides out to 3 to 5 m for fatalities. Personnel trained and tested in proper search techniques will conduct the carcass searches. Carcass removal trials will be conducted at least once each season, as noted below, to document the length of time carcasses remain in the search area available to be found by searchers, and to subsequently determine the appropriate frequency of carcass searches within the search plots. The spatial location of each carcass find will be evaluated at the end of the first year of carcass searches to determine the appropriate size of the search plot to maximize searcher efficiency.

Data—including the time, date, weather conditions, plot number, searcher identity, and other pertinent information—will be collected for each carcass plot search and recorded on a standardized data sheet. Each carcass will be photographed and its location will be recorded with a sub-meter global position system (GPS). For each bird or bat carcass encountered, the following information will be recorded, to the extent possible:

1. Site
2. Date
3. Observer
4. Carcass identification number
5. Species
6. Sex
7. Age
8. Time
9. Condition category (intact, scavenged, or feather spot)
10. Description of injury(ies)
11. GPS location
12. Distance to nearest turbine
13. Bearing from nearest turbine
14. Whether closest turbine is mid- or end-of-row
15. Distance to plot center
16. Carcass description, including possible cause of death and other pertinent information
17. Estimated time of death (e.g., <1 day, 2 days)

The following condition descriptions will be used:

- **Intact**—a carcass that is completely intact, is not badly decomposed, and shows no sign of alteration by scavenger or predator
- **Scavenged**—an entire carcass, with signs of predator marks or scavenging, or a portion(s) of a carcass concentrated in one location (e.g., wings, legs, skeleton)
- **Feather spot**—10 or more feathers or 3 or more primaries concentrated in one location as a result of extended predation or scavenging

Fatalities attributed to the project may be discovered in three ways during the study: (1) by trained study personnel during formal standardized carcass searches; (2) incidentally by study personnel during other activities on the project, but within the formal search plots; or (3) incidentally by operations or maintenance personnel during project activities. All casualties located in the search plots will be included as fatalities, unless cause of death can be determined to be unrelated to the project. Fatalities discovered by operations or maintenance personnel will be covered in Section 5.4.3, Long-Term Post-construction Monitoring.

Searcher Efficiency Trials

Unannounced searcher efficiency trials will be conducted in the same areas where carcass searches occur. Searcher efficiency trials will occur periodically during each season. Seasons are delineated as follows: winter (December 1–February 28); spring (March 1–May 31); summer (June 1–August 31); and fall (September 1–November 30). Bird and bat carcasses will be placed randomly beneath wind turbines scheduled for search before dawn on the day of the turbine search or late the evening before. This trial will determine searcher efficiency rates that take into account all searchers, as well as variability between bats and birds. Two size classes of birds will be used: (1) small (warblers and thrushes), which will also be used to approximate bats; and (2) large (hawks and waterfowl). Avian carcasses to be used in the searcher efficiency trials will include road- and window-killed birds, game farm birds, and bats previously killed by turbines in the project, as well as carcasses obtained from depredation and control programs operated or permitted by the appropriate state or federal agencies.

The direction and distance of carcass placement from turbines will be randomly selected for each carcass prior to the searcher efficiency trial. The number and locations of carcasses (direction and distance from the nearest turbine) will be plotted on a map of the project. Carcasses will be placed by the tester at each location and left in the position in which they fall (carcasses will be dropped from waist height). Test birds and bats will be discreetly marked so that they can be identified as test birds on recovery. Reasonable efforts will be made to conduct blind tests so that searchers do not know they are being tested. The number of carcasses placed prior to the trial (i.e., the number of carcasses available for detection) will be verified soon after the trial by the personnel in charge of carcass distribution. All trial carcasses will subsequently be removed and used for carcass removal trials.

Carcass Removal Trials

The objective of a carcass removal study is to determine the proportion of carcasses remaining after a search interval before being removed from the study area by scavengers. This proportion will be used to adjust for removal bias when estimating the total number of carcasses present. The carcass removal rates will be used to evaluate and inform the ongoing frequency of subsequent carcass searches.

Carcass removal trials will be conducted periodically during each season, as defined above. Carcass removal trials will be held outside, but in close proximity, to the sampled turbine search plots so that planted carcasses are not confused with project-related fatalities.

Carcasses will be checked daily for each of the first 4 days after placement, and afterward on day 7, day 10, day 14, day 21, and day 30. At each check of the carcass, presence/absence as well as body condition (e.g., lightly scavenged, heavily scavenged) will be recorded. At the end of 30 days, any remaining birds and feathers will be removed.

Large and small birds will be examined independently when calculating carcass removal rates.

Fatality Estimates

It has long been recognized that there are biases associated with carcass removal by scavengers and the varying ability of searchers to detect available carcasses when estimating bird and bat fatality rates at wind energy projects; therefore, the estimation of avian and bat fatalities will be calculated using the actual number of carcasses found on carcass search plots, the detection probability (i.e., searcher efficiency and scavenger removal), and the ratio of searched turbines to the total number of turbines.

There have been numerous methods employed to estimate mortality at wind energy projects.[335,336,337,338,339,340] All estimators attempt to incorporate carcass removal rates and searcher efficiency; however, these estimator formulas can be biased by the search interval relative to the carcass removal time. Based on current research into these estimators, if the average carcass removal time is longer than the average search interval, both the Shoenfeld[341] or Huso[342] estimator is appropriate to use and results in comparable estimates.[343] Sapphos Environmental, Inc. proposes to use the Huso estimator to estimate fatality rates of birds and bats; however, based on the results of the carcass removal trials in comparison to the average search interval, the calculation method may be changed slightly or comparisons made with one or more other estimators.

Fatality estimates will be calculated for the following categories:

- All species collectively
- Individual bird species
- Bats (all species collectively)
- Individual bat species

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[335] Orloff, S. and A. Flannery. 1992. Wind Turbine Effects on Avian Activity, Habitat Use, and Mortality in Altamont Pass and Solano County Wind Resource Areas, 1989-1991. Final Report P700-92-001 to Alameda, Contra Costa, and Solano Counties, and the California Energy Commission, Sacramento, California, by Biosystems Analysis, Inc., Tiburon, California. March 1992

[336] Johnson, G.D., W.P. Erickson, and J. White. 2003. Avian and Bat Mortality During the First Year of Operation at the Klondike Phase I Wind Project, Sherman County, Oregon. March 2003. Technical report prepared for Northwestern Wind Power, Goldendale, Washington, by Western EcoSystems Technology (WEST), Inc., Cheyenne, Wyoming.

[337] Fiedler, J.K., T.H. Henry, R.D. Tankersley, and C.P. Nicholson. 2007. Results of Bat and Bird Mortality Monitoring at the Expanded Buffalo Mountain Windfarm, 2005. Tennessee Valley Authority, Knoxville, Tennessee. https://www.tva.gov/environment/bmw_report/results.pdf

[338] Huso, M. 2009. Comparing the Accuracy and Precision of Three Different Estimators of Bird and Bat Fatality and Examining the Influence of Searcher Efficiency, Average Carcass Persistence and Search Interval on These. Schwartz, S.S., ed. Proceedings of the NWCC Wind Wildlife Research Meeting VII, Milwaukee, Wisconsin. Prepared for the Wildlife Workgroup of the National Wind Coordinating Collaborative by RESOLVE, Inc., Washington, D.C. October 28-29, 2008. 116 pp.

[339] Erickson, W.P., J. Jeffrey, K. Kronner, and K. Bay. 2004. Stateline Wind Project Wildlife Monitoring Final Report: July 2001-December 2003. Technical report for and peer-reviewed by FPL Energy, Stateline Technical Advisory Committee, and the Oregon Energy Facility Siting Council, by Western EcoSystems Technology (WEST), Inc., Cheyenne, Wyoming, and Walla Walla, Washington, and Northwest Wildlife Consultants (NWC), Pendleton, Oregon. December 2004.

[340] Erickson, W.P., M.D. Strickland, G.D. Johnson, and J.W. Kern. 2000b. Examples of Statistical Methods to Assess Risk of Impacts to Birds from Windplants. Proceedings of the National Avian-Wind Power Planning Meeting III. National Wind Coordinating Collaborative (NWCC), c/o RESOLVE, Inc.,Washington, D.C.

[341] Shoenfeld, P. 2004. Suggestions Regarding Avian Mortality Extrapolation. Technical memo provided to FPL Energy. West Virginia Highlands Conservancy, HC70, Box 553, Davis, West Virginia, 26260.

[342] Huso, M.M.P. 2010. An Estimator of Mortality from Observed Carcasses. Environmetrics 21 (3): 318-329.

[343] Strickland, M.D., E.B. Arnett, W.P. Erickson, D.H. Johnson, G.D. Johnson, M.L., Morrison, J.A. Shaffer, and W. Warren-Hicks. 2011. Comprehensive Guide to Studying Wind Energy/Wildlife Interactions. Prepared for the National Wind Coordinating Collaborative, Washington, D.C.,USA.

- Raptors (all species collectively)
- Waterfowl (all species collectively)

- Passerines (all species collectively)
- Nocturnal migrants (all species collectively)

An approximate fatality rate per turbine and per MW will be calculated on the basis of carcass recoveries, scavenger proportions, and searcher efficiency.

Reporting

The project proponent will present the results of the monitoring in an annual report, in conjunction with appropriate agency guidance, documenting the results of each year's monitoring efforts. The report will be submitted to BLM and USFWS. The mortality analysis will, at minimum, consider the following four factors:

- Number of annual avian and bat mortalities per turbine
- Disproportionate representation of a particular species
- Comparison to existing data on wind farm mortality
- Comparison to existing data on wind farm mortality from the Tehachapi Wind Resource area and the western United States

5.2.2 Long-Term Postconstruction Monitoring

Starting in Year 3 of project operation and continuing for the life of the project, the project proponent's operations staff shall conduct annual Long-Term Post-Construction Mortality Monitoring, focused on golden eagle and California condor mortality, in conjunction with other project monitoring. The project proponent will conduct life-of-project standardized surveys using operations personnel that will systematically monitor and report avian and bat fatalities to assess long-term operational impacts of the project, particularly for golden eagle and California condor. Carcasses of both species are very large and should persist in the environment for a considerable time; thus, carcass scavenging and searcher efficiency trials are unnecessary for this species, and postconstruction monitoring can be conducted at infrequent intervals, approximately every 28 days.

The project proponent will designate an Environmental Coordinator (EC) from the onsite operations staff to act as the on-site environmental representative for wildlife issues and implementation at the project. The EC would be trained in bird and bat identification, reporting, and other procedures to comply with state and federal permits. The EC would coordinate the collection of all federally listed endangered or threatened species with USFWS.

Long-term post-construction monitoring will consist of Turbine Checks, Incidental Observations, and Wildlife Handling and Reporting and is summarized below.

Turbine Checks

Turbine checks will be conducted by operations personnel during regularly scheduled Spill Prevention Count-measures and Control (SPCC) monitoring. On a monthly basis, SPCC permit holders will conduct SPCC checks of each turbine. These personnel will be cross-trained in the recognition and recording of avian and bat carcasses so that personnel can concurrently conduct checks for bird and bat carcasses around the base of each turbine.

Personnel will conduct a visual check for bird and bat carcasses within a 10-20 meter radius circular plot around the turbine, focused particularly on the gravel pad surrounding the turbine base. Personnel will fill out a specialized form documenting each turbine check and the presence of any bird or bat carcass. Personnel will flag the location of the carcass, and report the carcass immediately to the onsite EC. The EC will subsequently visit the site to confirm the discovery, fill out an Incidental Wildlife Reporting Form, and appropriately report the incident to the Wildlife Mortality Reporting Program. Personnel will not handle or transport any birds or bats unless specifically permitted and trained.

Incidental Observations

Any carcasses discovered outside of the survey area and/or survey time period by project biologists, operations, or maintenance personnel will be recorded, photographed, and reported to the project biologists and EC, even if it is not believed to have been caused by interaction with project elements, such as wind turbines or electrical poles. If the fatality is on the standardized carcass search plot during the first two years of operation, it will be recorded by a permitted biologist, reported to the EC and included in the fatality estimation. If it is outside of a search plot, but during the first two years of operations, it will be recorded, photographed, and reported by a permitted biologist and reported to the EC These fatalities will not be included in the fatality estimation, but will be included in the annual summary report. Finally, if a carcass is discovered during regular operations and maintenance activities subsequent to the end of the first two years of operations, the EC will be notified and appropriately record and report the incident as described above for Turbine Checks.

Any fatality to a federally listed species will be reported to USFWS within 24 hours. No fatalities of a state or federally listed species will be collected until USFWS can be contacted for handling instructions. Any fatality found will be documented in an Incidental Wildlife Reporting Form. Operations personnel will not handle injured or dead wildlife unless they have been property trained and permitted.

If a potentially injured bird or bat is found, it should first be quietly observed to determine if it is in fact injured. Some raptors may occasionally walk on the ground in pursuit of prey, or “mantle” their wings when covering a captured prey item. These behaviors can make the wings appear injured or broken. Operations personnel should immediately contact a project biologist or the EC when an injury is confirmed. Personnel should report species (if known), condition, behavior, and location and subsequently fill out an Incidental Wildlife Reporting Form. The project biologist will work with a rehabilitation center to capture and transport the animal.

5.3 Adaptive Management Plan

This BBCS enumerates the steps taken by HW to design, site, construct, and operate the project in an environmentally sensitive manner, especially in its attempts to avoid and minimize impacts to birds and bats. Based on a multitude of data collected and analyzed historically, during pre-permitting studies for adjacent wind energy projects, and within the last 3 years on the project itself, it is not anticipated that the construction or operation of the project will result in population-level impacts to bird and bat species. However, as the body of knowledge on impacts to birds and bats from wind energy development is continually growing, pursuing an adaptive management strategy to adjust to new study methods, results of monitoring, new technology, and new behavioral information is crucial to ensuring that impacts are avoided and minimized to the greatest extent feasible. The adaptive management steps detailed in this section have been developed to proactively manage for unexpected potential impacts to birds and bats, the evidence of which may arise during postconstruction monitoring on the project.

If the actual levels of mortality of any species significantly exceed the average mortality rates observed at other regional wind energy projects in similar habitats and with similar species composition, adaptive management measures should be enacted. In particular, evidence of golden eagle or California condor fatalities will trigger immediate adaptive management steps, as detailed below. This BBCS presents a suite of possible actions from which an appropriate response, in coordination with BLM and the USFWS, can be selected to best address the specific conditions on the ground.

An annual report summarizing the results of the postconstruction mortality monitoring program will be provided to BLM and USFWS. The report will include: (1) the number and species of birds and bats found as fatalities; (2) the estimates of total fatalities for the project adjusted for carcass removal and searcher efficiency rates; (3) any incidental fatalities; and (4) a comparison with postconstruction mortality results at other national and western wind energy projects. After reviewing the report, the agencies will provide guidance to HW on whether additional years of post-construction monitoring studies are justified, or if species-specific mitigation is recommended based on observed fatality rates.

5.3.1 California Condor Adaptive Management

The implementation of a Condor Monitoring System on the project site, using both human observation and telemetric tracking, will allow the project proponent to proactively avoid potential California condor collisions with project WTGs through active condor monitoring and turbine curtailment. Due to the 30-year operational life of this project and the anticipation that the recovery program for the California Condor will continue to be successful, the risk of California Condor mortality associated with the wind facility could change over the life of the project. To offset this potential increased risk, the project proponent proposes an adaptive management strategy using reasonable and feasible measures that would reduce the risk of condor injury and/or mortality given changing conditions. Further description of these adaptive management steps is included in the Draft Condor Avoidance and Monitoring Plan.

5.3.2 Golden Eagle Adaptive Management

Because of the low use of golden eagles in the project vicinity and the distance between the project and the nearest occupied golden eagle nest, and with the assurance of avoidance and minimization measures listen herein, the results of the studies conducted in the project vicinity suggest that there is a low risk of golden eagle collision with project elements. Nonetheless, HW has outlined specific biological triggers that could indicate the need for additional adaptive management actions if take does occur (Table 5.3.2-1, *Golden Eagle Adaptive Management Triggers and Proposed Implementation of Advanced Conservation Practices*). Advanced Conservation Practices (ACPs) are defined in the Final Eagle Take Permit Regulations under 50 CFR 22.3 as “scientifically supportable measures that are approved by the Service and represent the best available techniques to reduce eagle disturbance and ongoing mortalities to a level where remaining take is unavoidable.”[344] In the event golden eagle mortality occurs as a direct result of project operation prior to the issuance of a take permit by USFWS, HW will meet

[344] U.S. Fish and Wildlife Service. 11 September 2009. “Eagle Permits; Take Necessary to Protect Interests in Particular Localities; Final Rules.” *Federal Register*, *74* (175): 46836–46879.

with the BLM and FWS to discuss the event and actions that may need to be taken, which may include implementing limitations on the operation of nearby turbines and/or other measures during hours when eagles are active on site. Such limitations and measures would apply until a take permit is issued, at which time the terms and conditions of that permit would control., Graduated adaptive management steps, which may include experimental Advanced Conservation Practices and compensatory mitigation, will be taken depending on the increasing level of eagle fatalities.

TABLE 5.3.2-1
GOLDEN EAGLE ADAPTIVE MANAGEMENT TRIGGERS AND PROPOSED IMPLEMENTATION OF ADVANCED CONSERVATION PRACTICES

Step	Trigger	Advanced Conservation Practices
BBCS	Agreement	• *Minimize Perching or Nesting Opportunities*. To minimize perching or nesting opportunities for birds, the project will use tubular poles for any necessary overhead electrical poles and tubular towers for turbines. • *Met Tower Design*. Permanent met towers will be free-standing and not contain guy wires. Bird diverters will be placed on all temporary met tower guy wires to minimize avian collision , per BLM-CA IM 2013-004 • *Minimize Lighting*. Measures will be taken to avoid/minimize the impact of light intrusion into adjacent native habitat. The BLM Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western U.S. recommends the following: o Night lighting during construction would not occur to the maximum extent practicable; o Any night lighting during construction and operation would be selectively placed, shielded, and directed away from all areas of native habitat to the maximum extent practicable; and o All unnecessary lighting should be turned off at night to limit attracting migratory birds. • *Qualified Biologist.* A qualified biologist will regularly monitor construction activities to ensure construction is proceeding in compliance with HW proposed environmental mitigation measures as well as those measures required by the regulatory agencies. • *Restrict Vehicle Speeds*. Restrict construction vehicle speeds to 25 mph on unpaved roads. Project personnel and visitors will be instructed to drive at the recommended speed limit and be alert for wildlife, especially in low visibility conditions. • *Avoid Increasing Prey Abundance*. The project proponent will implement construction protocols to avoid increasing ground-dwelling prey abundance on the project, including minimizing cutting into hill slopes to avoid sudden berms or cuts to prevent underburrowing, minimization of the creation of rock piles, and placement of gravel around turbine foundations to prevent underburrowing. • *Follow APLIC Guidelines.* It is anticipated that only overhead collector lines over streambed crossings will be implemented on the project; however, all power lines approved for construction by the BLM for the project will be constructed to the most current APLIC Guidelines.[345] The project proponent(s) shall conform to the latest practices to protect birds from electrocution and collision, including line markers spaced per APLIC Guidelines.. • *Habitat Restoration.* HW will restore native vegetation in the affected work areas after construction. Restoration will include planting or seeding native plants that were present prior to the work and/or are compatible with existing vegetation near the work area. • *Conduct Postconstruction Mortality Monitoring.* The project proponent will conduct postconstruction bird and bat mortality monitoring surveys in the first and second years following the initial operation of the project to demonstrate the level of incidental injury and mortality to populations of avian or bat species in the vicinity of the project site (see details below in 5.2.1, Postconstruction Mortality Monitoring). • *Conduct Long-Term Postconstruction Mortality Monitoring.* Starting in the third year of project operation and continuing for the life of the project, the project proponent's operations staff shall conduct annual Long-Term Post-Construction Mortality Monitoring in conjunction with other project monitoring. (see details below in 5.2.2, Long-Term Postconstruction Mortality Monitoring). • *Maximize Use of Developed or Degraded Land.* Prioritize locating development on lands that provide minimal eagle use potential including highly developed and degraded sites. • *Utilize Existing Infrastructure.* Utilize existing transmission corridors and roads. • *Avoid Ridge Areas.* Set turbines back from ridge areas. • *Avoid High Eagle Use Areas.* Site structures away from high eagle use areas and the flight zones between them. • *Minimize the Use of Above-Ground Lines.* Bury power lines to reduce avian collision and electrocution. The project will minimize the use of above-ground transmission lines. The majority of the project will utilize underground collector lines and mark overhead lines per BLM per BLM-CA IM 2013-004 if applicable. • *Minimize the Extent of the Road Network.*

[345] Avian Power Line Interaction Committee (APLIC). 2012. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2012*. Washington, DC: Edison Electric Institute and APLIC; and Sacramento, CA: California Energy Commission.

TABLE 5.3.2-1
GOLDEN EAGLE ADAPTIVE MANAGEMENT TRIGGERS AND PROPOSED IMPLEMENTATION OF ADVANCED CONSERVATION PRACTICES, *Continued*

Step	Trigger	Advanced Conservation Practices
		• *Avoid Areas of Abundant Eagle Prey.* Avoid siting turbines in areas where eagle prey is abundant. • *Avoid Water Resources.* Avoid areas with high concentrations of ponds, streams, or wetlands. • *Minimize Surface Disturbance*. Minimize the area and intensity of disturbances during pre-construction and construction periods. • *Dismantle Nonoperational Meteorological Towers.* • • *Minimize Attraction of Golden Eagle Prey Resources.* Maintain facilities and grounds in a manner that minimizes any potential impacts to eagles (e.g. minimize storage of equipment near turbines that may attract prey, avoid seeding forbs below turbines that may attract prey, etc.). Avoid practices that attract/enhance prey populations and opportunities for scavenging within the project area. • • *Reduce Vehicle Collision Risk.* Take actions to reduce vehicle collision risk to wildlife and remove carcasses from the project area (e.g. deer, livestock, etc.) • • *Implement No-Activity Buffers Surrounding Golden Eagle Nests.* As of 2013, there were no active golden eagle nests closer than 15 miles to the project. However, if eagle nests are discovered in the project vicinity, the Qualified Biologist may enact avoidance or minimization measures, such no-activity buffers for eagle nests that have a direct line of sight to the work area. Nest buffers for eagles may be adjusted to reflect existing conditions including ambient noise, topography, and species' disturbance tolerance with the approval of USFWS.
Step I	One eagle taken	In the event of a take of a golden eagle prior to the issuance of a take permit by USFWS, HW will meet with the BLM and FWS to discuss the event and actions that may need to be taken, which may include implementing limitations on the operation of nearby turbines and/or other measures during hours when eagles are active on site. Such limitations and measures would apply until a take permit is issued, at which time the terms and conditions of that permit would control. Absent an eagle take permit, the following steps outline Advanced Conservation Measures with each trigger.
Step II	Two eagles taken within any 12-month period or three eagles taken within a 5-year period	Intensify eagle monitoring studies, including flight path monitoring or telemetry, to define seasonal and diurnal flight patterns to inform development and/or implementation of advanced conservation practices (ACPs) and experimental ACPs. Initiate advanced conservation measures involving visual and/or auditory deterrence procedures, or latest technology and methodologies, to minimize the likelihood of future take. Consult with the applicable agencies on design of advanced conservation practices and how effectiveness will be evaluated.
Step III	Three eagles taken within any 12-month period or four eagles taken within any 5-year period	Biological monitors or approved advanced technology and methodologies will be employed on site during daylight hours. The method selected sill have the ability to curtail turbine(s) when an eagle(s)/large raptors approaches the rotor swept area (RSA). A sufficient number of qualified monitors or advanced technology devices will be stationed throughout he site, so as to provide unimpeded views of eagles/large raptors that may approach within one mile of any turbine. Additionally, monitors will report and remove carrion as it is encountered. HW, in coordination with the applicable agencies, will refine and evaluate the curtailment protocol utilizing data from monitoring efforts initiated in Step II.
Step IV	Four eagles taken within any 12-month period or five eagles taken within any 5-year period	Deploy radar system(s) or approved advanced technology designed to curtail turbine blade rotation as eagle(s)/large raptors approach RSA. HW, in coordination with the applicable agencies, will design and implement a protocol for determining the effectiveness of radar system(s).
Step V	Five eagles taken within any 24-month period or six eagles taken within the first 5 years of operation.	HW will initiate consultation with the applicable agencies to determine curtailment schedules based upon evaluation of data collected in previous steps. Options may include curtailment in 1) appropriate season; or 2) at identified problem turbines/strings; or 3) during certain portions of the day.
Step VI	Seven eagles taken within a five year period.	In consultation with the USFWS and BLM, determine other appropriate actions necessary to minimize and compensate for additional impacts to eagle populations.

Ahlborn, G. 1984. "Pallid Bat." Prepared for: California Department of Fish and Game. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2357

Allison, T.D. 2012. *Eagles and Wind Energy: Identifying Research Priorities*. White Paper, American Wind Wildlife Institute, Washington, DC.

Anderson, R.N., J.T. Neumann, W.R. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. *Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area*. Golden, CO: National Renewable Energy Laboratory, U.S. Department of Energy.

Anderson, R., N. Neumann, J. Tom, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. "Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area. Period of Performance: October 2, 1996 – May 27, 1998." Prepared for: National Renewable Energy Laboratory, Golden, CO.

Anderson, R.L., J. Tom, N. Neumann, and J.A. Cleckler. 2004. *Avian Monitoring and Risk Assessment at Tehachapi Pass Wind Resource Area, California*. Sacramento, CA: California Energy Commission.

Anderson, R., J. Tom, N. Neumann, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2005. "Avian Monitoring and Risk Assessment at the San Gorgonio Wind Resource Area. Phase I Field Work: March 3, 1997 – May 29, 1998, Phase II field Work: August 18, 1999- August 11, 2000." Prepared for: National Renewable Energy Laboratory, Golden, CO.

Arnett, E. B., ed. 2005. *Relationships between Bats and Wind Turbines in Pennsylvania and West Virginia: An Assessment of Bat Fatality Search Protocols, Patterns of Fatality, and Behavioral Interactions with Wind Turbines*. A final report submitted to: Bats and Wind Energy Cooperative, Bat Conservation International, Austin, TX.

Arnett, E.B., K. Brown, W.P. Erickson, J. Fiedler, T.H. Henry, G.D. Johnson, J. Kerns, R.R. Kolford, C.P. Nicholson, T. O'Connell, M. Piorkowski, and R. Tankersley Jr. 2008. "Patterns of Bat Fatalities at Wind Energy Facilities in North America." *Journal of Wildlife Management* 72:61–78.

Arnett, E.B., W.P. Erickson, J. Kerns, and J. Horn. 2005. *Relationships between Bats and Wind Turbines in Pennsylvania and West Virginia: An Assessment of Fatality Search Protocols, Patterns of Fatality, and Behavioral Interactions with Wind Turbines. Final Report*. Prepared for: Bats and Wind Energy Cooperative, Bat Conservation International, Austin, TX.

Arnett, E.B., D.B. Inkley, D.H. Johnson, R.P. Larkin, S. Manes, A.M. Manville, J.R. Mason, M.L. Morrison, M.D. Strickland, and R. Thresher. 2007. *Impacts of Wind Energy Facilities on Wildlife and Wildlife Habitat*. Wildlife Society Technical Review 07-2. Bethesda, MD: The Wildlife Society.

Avian Power Line Interaction Committee (APLIC). 2006. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. Washington, DC: Edison Electric Institute and APLIC; and Sacramento, CA: California Energy Commission.

Avian Power Line Interaction Committee (APLIC). 2012. *Reducing Avian Collisions with Power Lines: The State of the Art in 2012*. Washington, DC: Edison Electric Institute and APLIC.

Baerwald, Erin F., Genevieve H. D'Amours, Brandon J. Klug, and Robert M.R. Barclay. 2008. "Barotrauma Is a Significant Cause of Bat Fatalities at Wind Turbines." *Current Biology* 18:695–96.

Barrios, L., and A. Rodriguez. 2004. "Behavioural and Environmental Correlates of Soaring-Bird Mortality at On-Shore Wind Turbines." *Journal of Applied Ecology* 41:72–81.

Bechard, Marc J., and Josef K. Schmutz. 1995. "Ferruginous Hawk (Buteo regalis)." In *The Birds of North America Online*, ed. A. Poole, Ed. Ithaca, NY: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/172

Bloom, P.H. 15 October 2005. *Fall-Spring Raptor Migration and Winter Raptor Survey of the Proposed PdV Wind Energy Project, Kern County, California, 2004-2005*. Santa Ana, CA.

Bloom, P.H. 30 March 2006. *Fall 2005 Raptor Migration Study of the Proposed PdV Wind Energy Project, Kern County, California*. Santa Ana, CA.

Bloom, Peter H., and William S. Clark. 2001. "Molt and Sequence of Plumages of Golden Eagles and a Technique for In-Hand Ageing." *North American Bird Bander* 26 (3): 97–116.

Bolster, Betsy, C. 2005. "Lasiurus cinereus Hoary Bat." Western Bat Working Group (WBWG) Species Accounts. Rapid City, ND: WBWG.

Bull, Evelyn L. and Charles T. Collins. 2007. Vaux's Swift (Chaetura vauxi). In *The Birds of North America Online*, ed. A. Poole, Ed. Ithaca, NY: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/077

Bureau of Land Management. 2005. *Final Environmental Impact Report and Statement for the West Mojave Plan: A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment*. Volume 1. Available at: http://www.blm.gov/ca/st/en/fo/cdd/wemo.html

Bureau of Land Management. 2013. *Alta East Wind Project Plan Amendment and Record of Decision*. Ridgecrest, CA: Bureau of Land Management, Ridgecrest Field Office.

California Burrowing Owl Consortium. April 1993. *California Burrowing Owl Survey Protocol and Mitigation Guidelines*. Available at: http://www.dfg.ca.gov/wildlife/nongame/docs/boconsortium.pdf

California Department of Fish and Game. 2004. *Rarefind 2: A Database Application for the Use of the California Department of Fish and Game Natural Diversity Database*. Sacramento, CA.

California Department of Fish and Game. 2005. *Rarefind 3: A Database Application for the Use of the California Department of Fish and Game Natural Diversity Database*. Sacramento, CA.

California Department of Fish and Game. 2012. *Rarefind 4: A Database Application for the Use of the California Department of Fish and Game Natural Diversity Database*. Sacramento, CA.

California Department of Fish and Game. Accessed April 2010. *Natural Community Conservation Planning (NCCP)*. Available at: http://www.dfg.ca.gov/habcon/nccp/status.html

California Department of Fish and Game. 7 March 2012. *Staff Report on Burrowing Owl Mitigation*. Available at: http://www.dfg.ca.gov/wildlife/nongame/docs/BUOWStaffReport.pdf

California Department of Fish and Game, Biogeographic Data Branch, California Natural Diversity Database. January 2011. *Special Animals List*. Sacramento, CA.

California Energy Commission. 26 September 2007. *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development*. Final Committee Report. Prepared for: California Department of Fish and Game, Sacramento, CA.

California Energy Commission and California Department of Fish and Game. 2 June 2010. *Swainson's Hawk Survey Protocols, Impact Avoidance, and Minimization Measures for Renewable Energy Projects in the Antelope Valley of Los Angeles and Kern Counties, CA*. Sacramento, CA.

Chatfield, A., W. Erickson, and K. Bay. 3 June 2009. *Avian and Bat Fatality Study, Dillon Wind-Energy Facility, Riverside County, California. Final Report: March 26, 2008 – March 26, 2009*. Prepared for: Iberdrola Renewables, Portland, OR. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

Chatfield, A., W.P. Erickson, and K. Bay. 2010. *Final Report: Avian and Bat Fatality Study at the Alite Wind-Energy Facility, Kern County, California. Final Report: June 15, 2009-June 15, 2010*. Prepared for CH2M Hill, Oakland, CA. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

Clark, W.S. 2001. "Ageing Eagles at Hawk Watches: What Is Possible and What Is Not." In *Hawkwatching in the Americas*, ed. K.L. Bildstein and D. Klem Jr. North Wales, PA: Hawk Migration Association of America, pp. 143–48.

Clark, W.S., and B. Wheeler. 2001. *Peterson Field Guides: Hawks of North America*. 2nd ed. New York, NY: Houghton Mifflin.

Comrack, L., and R. Logsdon. 2008. *Status Review of the American Peregrine Falcon in California*. California Department of Fish and Game, Wildlife Branch, Nongame Wildlife Program Report 2008-06. Sacramento, CA: California Department of Fish and Game.

Corben, Chris. 16 January 2011. AnalookW. Version 3.8n. Brisbane, Australia: Titley Scientific.

Crawford, R. L., and W. W. Baker. 1981. "Bats Killed at a North Florida Television Tower: A 25 Year Record." *Journal of Mammalogy*, *62*: 651–652.

Curry & Kerlinger, LLC. 2009. *Avian Monitoring Study and Risk Assessment for the Shiloh III Wind Power Project, Solano County, California*. McLean, VA.

De Lucas, M., F.E.J. Guyonne, D.P. Whitfield, and M. Ferrer. 2008. “Collision Fatality of Raptors in Wind Farms Does Not Depend on Raptor Abundance.” *Journal of Applied Ecology*, *45*: 1695–1703.

Department of Fish and Game Resource Assessment. 2007. California Swainson’s Hawk Inventory: 2005-2006. University of California Davis Wildlife Health Center

Dixon, James B. 1937. “The Golden Eagle in San Diego County, California.” *The Condor* 39 (2): 49–56.

Dobkin, D. and S. Granholm. 2005. “Le Conte’s Thrasher.” Prepared for: California Department of Fish and Game. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2077&inline=1

Drewitt, A.L. and R.H. W. Langston. 2006. Assessing the impacts of wind farms on birds. Ibis 148: 29-42.

Dudek. 2009. *Tehachapi Upland Multiple Species Habitat Conservation Plan*. Prepared for: Tejon Ranchcorp. Prepared by: Dudek, Encinitas, CA. Available at: http://www.fws.gov/ventura/endangered/habitat_conservation_planning/hcp/docs/draft/TehachapiUpland/04_Section4_CaliforniaCondor.pdf

Enk, T., K. Bay, M. Sonnenberg, and J.R. Boehrs. 2012. *Draft Year 1 Avian and Bat Monitoring Report, Biglow Canyon Wind Farm - Phase III, Sherman County, Oregon, September 13, 2010 – September 9, 2011*. Technical report prepared for: Portland General Electric Company, Portland, OR. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

Erickson, W.P., J. Jeffrey, K. Kronner, and K. Bay. 2004. *Stateline Wind Project Wildlife Monitoring Final Report, July 2001 – December 2003*. Prepared for: FPL Energy, the Oregon Energy Facility Siting Council, and the State Technical Advisory Committee. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

Erickson, W.P., J. Jeffrey, and V.K. Poulton. 2008. *Avian and Bat Monitoring: Year 1 Report*. *Puget Sound Energy Wild Horse Wind Project, Kittitas County, Washington*. Prepared for: Puget Sound Energy, Ellensburg, WA. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

Erickson, W., G.D. Johnson, M.D. Strickland, D. P. Young, K. J. Sernka, and R. E. Good. 2001. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States*. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY. Prepared for: National Wind Coordinating Committee, Washington, DC.

Erickson, W.P., G.D. Johnson, M.D. Strickland, and K. Kronner. 2000. *Avian and Bat Mortality Associated with the Vansycle Wind Project, Umatilla County, Oregon*. Prepared for: Umatilla County Department of Resource Services and Development, Pendleton, OR. Technical report prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

Erickson, W. P., G. D. Johnson, D. Young, D. Strickland, R. Good, M. Bourassa, K. Bay, and K. Sernka. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Prepared for: Bonneville Power Administration, Portland, OR. Prepared by: Western EcoSystems Technology, Inc., Cheyenne, WY.

Erickson, W.P., K. Kronner, and K.J. Bay. 2007. *Stateline 2 Wind Project Wildlife Monitoring Report, January - December 2006*. Technical report submitted to: FPL Energy, the Oregon Energy Facility Siting Council, and the Stateline Technical Advisory Committee. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

Erickson, W.P., K. Kronner, and R. Gritski. October 2003. *Nine Canyon Wind Power Project Avian and Bat Monitoring Report*. *September 2002 – August 2003*. Prepared for: Nine Canyon Technical Advisory Committee and Energy Northwest. Prepared by: Western EcoSystems Technology, Inc. (WEST), Cheyenne, WY, and Northwest Wildlife Consultants (NWC), Pendleton, OR.

Erickson, W.P., E. Lack, M. Bourassa, K. Sernka, and K. Kronner. October 2001. *Wildlife Baseline Study for the Nine Canyon Wind Project. Final Report May 2000–October 2001*. Prepared for: Energy Northwest, Richland, WA.

Erickson, W.P., M.D. Strickland, G.D. Johnson, and J.W. Kern. 2000. “Examples of Statistical Methods to Assess Risk of Impacts to Birds from Windplants.” In *Proceedings of the National Avian-Wind Power Planning Meeting III*. Washington, DC: National Wind Coordinating Collaborative (NWCC), c/o RESOLVE, Inc.

Fiedler, J.K. 2004. Assessment of Bat Mortality and Activity at Buffalo Mountain Windfarm, Eastern Tennessee. M.S. Thesis. University of Tennessee, Knoxville, Tennessee. August, 2004. http://www.tva.gov/environment/bmw_report/bat_mortality_bmw.pdf

Fiedler, J.K., T.H. Henry, R.D. Tankersley, and C.P. Nicholson. 2007. *Results of Bat and Bird Mortality Monitoring at the Expanded Buffalo Mountain Windfarm, 2005*. Knoxville, TN: Tennessee Valley Authority. Available at: https://www.tva.gov/environment/bmw_report/results.pdf

Garrett, K. and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society, Los Angeles, CA.

Griffin, D.R. 1970. “Migrations of Homing Bats.” In *Biology of Bats*. Volume 1. New York, NY: Academic Press.

Grindal, S. D. 1996. Habitat use by bats in fragmented forests. Pages 260–272 in R. M. R. Barclay and R.M. Brigham, editors. Bats and Forest Symposium. British Columbia Ministry of Forestry, Victoria, British Columbia. Work Paper 23/1996.

Grindal, S. D., and R. M. Brigham. 1998. Short-term effects of small-scale habitat disturbance on activity by insectivorous bats. Journal of Wildlife Management 62: 996–1003.

Gritski, R., S. Downes, and K. Kronner. [21 April 2010] Updated September 2010. *Klondike III (Phase 1) Wind Power Project Wildlife Monitoring: October 2007-October 2009*. Prepared for: Iberdrola Renewables, Inc. (IRI), Portland, OR, for Klondike Wind Power III LLC. Prepared by: Northwest Wildlife Consultants, Inc. (NWC), Pendleton, OR.

Gritski, B., K. Kronner, and S. Downes. December 2008. *Leaning Juniper Wind Power Project, 2006 − 2008*. Wildlife Monitoring Final Report. Prepared for: PacifiCorp Energy, Portland, OR. Prepared by: Northwest Wildlife Consultants, Inc., Pendleton, OR.

Gruver, J.C. 2002. “Assessment of Bat Community Structure and Roosting Habitat Preferences of the Hoary Bat (Lasiurus cinereus) Near Foot Creek Rim, Wyoming.” Master’s thesis, Department of Zoology and Physiology, University of Wyoming, Laramie, WY.

Harness, R.E. and K.R. Wilson. 2001. Electric-utility Structures Associated with Raptor Electrocutions in Rural Areas. Wildlife Society Bulletin 29: 612-623.

Harris, J. 1984. “Pallid Bat.” Prepared for: California Department of Fish and Game. Available at: http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2349

Harris, J. 1984. “Small-footed Bat.” Prepared for: California Department of Fish and Game. Available at: http://www.sibr.com/mammals/M029.html

Harris, J. 1984. “Yuma Myotis.” Prepared for: California Department of Fish and Game. Available at: http://www.sibr.com/mammals/M023.html

Harvey, M.J., J.S. Altenbach, and T.L. Best. 1999. *Bats of the United States*. Little Rock, AR: Arkansas Game and Fish Commission.

Heindel, M.T. 2000. *Birds of Eastern Kern County*. Available at: http://fog.ccsf.cc.ca.us/~jmorlan/

Hickman, J.C., ed. 1993. *The Jepson Manual: Higher Plants of California*. Berkeley, CA: University of California Press.

Holland, Robert F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Sacramento, CA: California Department of Fish and Game.

Horn, J. W., E. B. Arnett, & T. H. Kunz. 2008. Behavioral Responses of Bats to Operating Wind Turbines. *Journal of Wildlife Management*. 72: 123–132.

Howell, J.A., and J. Noone. 1992. *Examination of Avian Use and Monitoring at a US Windpower Wind Energy Development Site, Montezuma Hills, Solano County, California*. Prepared for: Solano County Department of Environmental Management, Fairfield, CA.

Hunt, W.G. 2002. *Golden Eagles in a Perilous Landscape*. *Predicting the Effects of Mitigation for Wind Turbine Bladestrike Mortality*. California Energy Commission (CEC) Consultant Report P500-02-043F. Prepared for: CEC, Public Interest Energy Research (PIER), Sacramento, CA. Prepared by: University of California, Santa Cruz.

Huso, M. 2009. “Comparing the Accuracy and Precision of Three Different Estimators of Bird and Bat Fatality and Examining the Influence of Searcher Efficiency, Average Carcass Persistence and Search Interval on These.” In *Proceedings of the NWCC Wind Wildlife Research Meeting VII, Milwaukee, Wisconsin, October 28–29, 2008*, ed. S.S. Schwartz. Prepared for: Wildlife Workgroup of the National Wind Coordinating Collaborative. Prepared by: RESOLVE, Inc., Washington, DC.

Huso, M.M.P. 2010. “An Estimator of Mortality from Observed Carcasses.” *Environmetrics* 21

(3): 318–29.

Insignia 2009. *2008/2009 Annual Report for the Buena Vista Avian and Bat Monitoring Project*. Report prepared for: Contra Costa County. Palo Alto, CA.

Janss, G.F.E. 2000. Avian Mortality from Power Lines: A Morphologic Approach of a Species-Specific Mortality. Biological Conservation. 95: 353-359.

Jeffrey, J.D., W.P. Erickson, K. Bay, M. Sonneberg, J. Baker, J.R. Boehrs, and A. Palochak. 2009. *Horizon Wind Energy, Elkhorn Valley Wind Project, Post-Construction Avian and Bat Monitoring, First Annual Report, January-December 2008*. Technical report prepared for: Telocaset Wind Power Partners, a subsidiary of Horizon Wind Energy, Portland, OR. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

Jeffrey, J.D., K. Bay, W.P. Erickson, M. Sonneberg, J. Baker, M. Kesterke, J.R. Boehrs, and A. Palochak. 29 April 2009. *Portland General Electric Biglow Canyon Wind Farm Phase I Post-Construction Avian and Bat Monitoring First Annual Report, Sherman County, Oregon*. *January 2008 - December 2008*. Technical report prepared for: Portland General Electric Company, Portland, OR. Prepared by: Western EcoSystems Technology (WEST) Inc., Cheyenne, WY.

Johnson, G.D., and W.P. Erickson. 2011. *Avian, Bat and Habitat Cumulative Impacts Associated with Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon*. Prepared for: Klickitat County Planning Department, WA. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

Johnson, G.D., W.P. Erickson, K. Bay, and K. Kronner. May 2002. *Baseline Ecological Studies for the Klondike Wind Project, Sherman County, Oregon*. Final report prepared for: Northwestern Wind Power, Goldendale, WA. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY, and Northwest Wildlife Consultants, Inc. (NWC), Pendleton, OR.

Johnson, G.D., W.P. Erickson, D.A. Shepard, et al. 2002. *Bat Interactions with Wind Turbines at the Buffalo Ridge, Minnesota Wind Resource Area: 2001 Field Season*. Palo Alto, CA: Electric Power Research Institute.

Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, and D.A. Shepherd. 2000. *Avian Monitoring Studies at the Buffalo Ridge, Minnesota Wind Resource Area: Results of a 4-year Study*. Prepared for: Northern States Power Company, Minneapolis, MN. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

Johnson, G.D., W.P. Erickson, and J. White. 2003. *Avian and Bat Mortality During the First Year of Operation at the Klondike Phase I Wind Project, Sherman County, Oregon*. Technical report prepared for: Northwestern Wind Power, Goldendale, WA. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

Johnson, G. D., W. P. Erickson, J. White, and R. McKinney. 2003. *Avian and Bat Mortality During the First Year of Operation at the Klondike Phase I Wind Project, Sherman County, OR*. Prepared for: Northwestern Wind Power, Goldendale, WA. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

Johnson, G.D., M.K. Perlik, W.P. Erickson, and M.D. Strickland. 2004. Bat Activity, Composition and Collision Mortality at a Large Wind Plant in Minnesota. Wildlife Society Bulletin 32(4): 1278-1288.

Johnson, G.D., D.P. Young Jr., C.E. Derby, W.P. Erickson, M.D. Strickland, and J.W. Kern. 2000. *Wildlife Monitoring Studies, SeaWest Windpower Plant, Carbon County, Wyoming, 1995-1999*. Prepared for: SeaWest Energy Corporation and Bureau of Land Management. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

Johnson, G.D., D.P. Young, W.P. Erickson, C.E. Derby, M.D. Strickland, and R.E. Good. August 2000. *Wildlife Monitoring Studies, Seawest Windpower Plant, Carbon County, Wyoming, 1995-1999*. Final report prepared for: SeaWest Energy Corporation, San Diego, CA, and the Bureau of Land Management, Rawlins, WY. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

Johnson, G.D., D.P. Young, W.P. Erickson, et al. 2000. *Avian and Bat Mortality Associated with Initial Phase of the Foot Creek Rim Wind Power Project, Carbon County, Wyoming: November 3, 1998–October 31, 1999*. Technical Report Prepared for: SeaWest Energy Corporation, San Diego, CA, and Bureau of Land Management, Rawlins, WY.

Johnson, D.H. 2001. Habitat fragmentation effects on birds in grasslands and wetlands: a critique of our knowledge. Great Plains Research 11: 211-231.

Keeley, B.W., and M.D. Tuttle. 1999. Bats in American Bridges. Bat Conservation International. Resoure Publication No. 4. 40 pp. Available online at: http://www.batcon.org/pdfs/bridges/BatsBridges2.pdf

Kerlinger, P., L. Culp, and R. Curry. 2005. *Post-Construction Avian Monitoring Study for the High Winds Wind Power Project, Solano County, California*. *Year One Report*. Prepared for: High Winds, LLC, and FPL Energy. Prepared by: Curry and Kerlinger, LLC, McLean, VA.

Kerlinger, P., R. Curry, L. Culp, A. Jain, C. Wilkerson, B. Fischer, and A. Hasch. April 2006. *Post-Construction Avian and Bat Fatality Monitoring for the High Winds Wind Power Project, Solano County, California: Two Year Report*. Prepared for High Winds LLC, FPL Energy. Prepared by: Curry and Kerlinger, LLC, McLean, VA.

Kern County. [15 July 2004] Amended 13 March 2007. *Kern County General Plan, Land Use, Conservation and Open Space Element*. Bakersfield, CA. Available at: http://www.co.kern.ca.us/planning/pdfs/kcgp/KCGPChp1LandUse.pdf

Kern County. September 2007. *PdV Wind Energy Project Environmental Impact Report*. Prepared by: Kern County Planning Department, Bakersfield, CA.

Kern County. June 2009. *Tejon Mountain Village Environmental Impact Report*. Prepared by: Kern County Planning Department, Bakersfield, CA.

Kern County. October 2009. *Alta-Oak Creek Mojave Project Environmental Impact Report*. Prepared by: Kern County Planning Department, Bakersfield, CA, with technical assistance by Aspen Environmental Group, Agoura Hills, CA.

Kern County. January 2010. *Soledad Mountain Project Supplemental Environmental Impact Report*. Prepared by: Kern County Planning Department, Bakersfield, CA.

Kern County. August 2011. *Alta Infill II Wind Energy Project Supplemental Environmental Impact Report*. Prepared by: Kern County Planning and Community Development Department, Bakersfield, CA, with technical assistance from Aspen Environmental Group, Agoura Hills, CA.

Kern County. October 2011. *Morgan Hills Wind Energy Project Environmental Impact Report*. Prepared by: Kern County Planning and Community Development Department, Bakersfield, CA.

Kern County. January 2013. *Plan Amendment and Environmental Impact Statement/Environmental Impact Report for the Alta East Wind Project*. Prepared by: Kern County Planning and Community Development Department, Bakersfield, CA, and U.S. Department of the Interior, Bureau of Land Management, California Desert District Office, Moreno Valley, CA.

Kerns, J., and P. Kerlinger. 2004. A study of bird and bat collision fatalities at the Mountaineer Wind Energy Center, Tucker County, West Virginia: annual report for 2003. Curry and Kerlinger, LLC, McLean, New Jersey, USA.

Kochert, M.N., K. Steenhof, C.L. Mcintyre, and E.H. Craig. 2002. "Golden Eagle (*Aquila chrysaetos*)." In *The Birds of North America Online*, ed. A. Poole. Ithaca, NY: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/684

Koford, C.B. 1953. *The California Condor*. National Audubon Society Research Report Number 4. Washington, DC: National Audubon Society.

Kronner, K., B. Gritski, J. Baker, V. Marr, G.D. Johnson, and K. Bay. November 2005. *Wildlife Baseline Study for the Leaning Juniper Wind Power Project, Gilliam County, Oregon*. Prepared for: PPM Energy, Portland, OR, and CH2MHILL, Portland, OR. Prepared by: Northwest Wildlife Consultants, Inc., Pendleton, OR, and Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

Kronner, K., B. Gritski, Z. Ruhlen, and T. Ruhlen. 2007. "Leaning Juniper Phase I Wind Power Project, 2006-2007: Wildlife Monitoring Annual Report." Unpublished report prepared by: Northwest Wildlife Consultants, Inc., Pendleton, OR. Prepared for: PacifiCorp Energy, Portland, OR.

Kunz, T.H., E.B. Arnett, W.P. Erickson, A.R. Hoar, G.D. Johnson, R.P. Larkin, M.D. Strickland, R.W. Thresher, and M.D. Tuttle. 2007 Ecological Impacts of Wind Energy Development on Bats: Questions, Research Needs, and Hypotheses. Frontiers in Ecological Environments 5:315-324.

Lehman, R.N. 2011. Raptor electrocution on power lines: current issues and outlook. Wildlife Society Bulletin: 29(3): 804-813.

Madders, M., and D.P. Whitfield. 2006. "Upland Raptors and the Assessment of Wind Farm Impacts." *Ibis*, *148*: 43–56.

McCaffery, B.J., and C. McIntyre. 2005. "Disparities between Results and Conclusions: Do Golden Eagles Warrant Special Concern Based on Migration Counts in the Western United States?" *Condor*, *107*: 469–473.

Mendez, Irena, Sapphos Environmental, Inc., Pasadena, CA. 22 June 2006. Letter to Mr. Aaron Allen, U.S. Army Corps of Engineers, Ventura, CA. Subject: Determination of Non-Jurisdiction for Proposed PdV Wind Energy Project in Southern Kern County.

Meretsky, V.J., and N.F.R. Snyder. 1992. "Range Use and Movement of California Condors." *Condor* 94:313–35.

Munz, P. 1974. *A Flora of Southern California*. Berkeley, CA: University of California Press.

National Audubon Society. Updated June 2012. "Important Bird Areas Program." Available at: http://web4.audubon.org/bird/iba/

National Audubon Society. Accessed May 2013. "Antelope Valley (Lancaster) Site Profile Report." Available at: http://netapp.audubon.org/iba/Reports/270

National Wild Coordination Collaborative. 2010. Wind Turbine Interactions with Birds, Bats, and their Habitats: A Summary of Research Results and Priority Questions. Available at: http://www1.eere.energy.gov/wind/pdfs/birds_and_bats_fact_sheet.pdf

Nielson, R.M., L. McManus, T. Rintz, and L.L. McDonald. 2012. A survey of golden eagles (*Aquila chrysaetos*) in the western U.S.: 2012 Annual Report. A report for the U.S. Fish & Wildlife Service. WEST, Inc., Laramie, Wyoming.

Noguera, J.C., I. Pérez, and E. Mínguez. 2010. "Impact of Terrestrial Wind Farms on Diurnal Raptors: Developing a Spatial Vulnerability Index and Potential Vulnerability Maps." *Ardeola*, *57*: 41–53.

Northwest Wildlife Consultants, Inc. (NWC), and Western EcoSystems Technology, Inc. 17 July 2007. *Avian and Bat Monitoring Report for the Klondike II Wind Power Project*. *Sherman County, Oregon*. Prepared for: PPM Energy, Portland, OR. Managed and conducted by: NWC, Pendleton, OR. Analysis conducted by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

Orloff, S., and A. Flannery. 1992. *Wind Turbine Effects on Avian Activity, Habitat Use, and Mortality in Altamont Pass and Solano County Wind Resource Areas, 1989-1991*. Final Report P700-92-001 to Alameda, Contra Costa, and Solano Counties, and the California Energy Commission, Sacramento, California. Prepared by: Biosystems Analysis, Inc., Tiburon, CA.

Pagel, J.E., D.M. Whittington, and G.T. Allen. 2010. *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance*. Arlington, VA: U.S. Fish and Wildlife Service, Division of Migratory Bird Management.

Perkins, Mark. 2005. "Lasionycteris noctivagans Silver-haired Bat." Western Bat Working Group (WBWG) Species Accounts. Rapid City, ND: WBWG.

Poulin, Ray, L. Danielle Todd, E.A. Haug, B.A. Millsap, and M.S. Martell. 2011. “Burrowing Owl (Athene cunicularia).” In *The Birds of North America Online*, ed. A. Poole. Ithaca, NY: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/061

Poulton, V., and W. Erickson. 2010. *Post-Construction Bat and Bird Fatality Study, Judith Gap Wind Farm, Wheatland County, Montana*. Prepared for: Judith Gap Energy LLC. Prepared by: Western EcoSystems Technology, Inc. (WEST), Cheyenne, WY.

Powlesland, R.G. 2009. *Impacts of Wind Farms on Birds: A Review*. Science for Conservation: Volume 289. Wellington, New Zealand: Department of Conservation.

Rideout, B.A., I. Stalis, R. Papendick, A. Pessier, B. Puschner, M. Finkelstein, D.R. Smith, M. Johnson, M. Mace, R. Stroud, C. Stringfield, K. Orr, J. Zuba, M. Wallace, and J. Grantham. 2012. “Patterns of Mortality in Free-ranging California Condors (*Gymnogyps Californianus*).” *Journal of Wildlife Diseases* 48: 95–112.

Rusz, P.J., Prince, H.H., Rusz, R.D., Dawson, G.A., 1986. Bird collisions with transmission lines near power plant cooling pond. Wildlife Society Bulletin 14: 441-444.

Sapphos Environmental, Inc. 25 August 2006. *PdV Wind Energy Project Biological Resources Technical Report*. Prepared for: enXco Development Corporation, San Ramon, CA. Pasadena, CA.

Sapphos Environmental, Inc. 17 October 2008. Memorandum for the Record No. 6. Subject: Results of 2008 Avian Spring Migration Surveys at the Proposed Pacific Wind Energy Project, Kern County, California. Prepared for: enXco Development Corporation, San Ramon, CA. Pasadena, CA.

Sapphos Environmental, Inc. 22 October 2008. Memorandum for the Record No. 8. Subject: Results of 2008 Avian Summer Season Surveys at the Proposed Pacific Wind Energy Project, Kern County, California. Prepared for: enXco Development Corporation, San Ramon, CA. Pasadena, CA.

Sapphos Environmental, Inc. 14 January 2009. Memorandum for the Record No. 13. Subject: Results of 2008 Avian Autumn Surveys at the Proposed Pacific Wind Energy Project, Kern County, California. Prepared for: enXco Development Corporation, San Ramon, CA. Pasadena, CA.

Sapphos Environmental, Inc. 7 December 2009. *Pacific Wind Energy Project Biological Resources Technical Report*. Prepared for: enXco Development Corporation, San Ramon, CA. Pasadena, CA.

Sapphos Environmental, Inc. 30 March 2012. Memorandum for the Record No. 11. Subject: Results of 2011–2012 Winter Bird Use and Burrowing Owl Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: enXco Development Corporation, San Ramon, CA. Pasadena, CA.

Sapphos Environmental, Inc. 24 July 2012. Memorandum for the Record No. 1. Subject: Results of 2012 Spring Bird Use Surveys and Special-Status Plant Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: Iberdrola Renewables, LLC, Portland, OR. Pasadena, CA.

Sapphos Environmental, Inc. 11 March 2013. Memorandum for the Record No. 2. Subject: Results of 2012 Summer Bird Use Surveys and Summer Burrowing Owl Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: Iberdrola Renewables, LLC, Portland, OR. Pasadena, CA.

Sapphos Environmental, Inc. 12 March 2013. Memorandum for the Record No. 3. Subject: Results of 2012 Fall Bird Use Surveys at the Tylerhorse Wind Energy Project, Kern County, California. Prepared for: Iberdrola Renewables, LLC, Portland, OR. Pasadena, CA.

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

Shoenfeld, P. 2004. *Suggestions Regarding Avian Mortality Extrapolation*. Technical memo prepared for: FPL Energy. Prepared by: West Virginia Highlands Conservancy, Davis, WV.

Shuford, W.D., and T. Gardali, eds. 2008. “California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California.” In *Studies of Western Birds 1*. Camarillo, CA: Western Field Ornithologists; and Sacramento, CA: California Department of Fish and Game.

Sibley, D.A. 2000. *The Sibley Guide to Birds*. New York, NY: Knopf.

Small, A. 1994. *California Birds: Their Status and Distribution*. Vista, CA: Ibis, p. 74.

Smallwood, K.S., C.G. Thelander, M.L. Morrison, and L.M. Rugge. 2007. “Burrowing Owl Mortality in the Altamont Pass Wind Resource Area.” *Journal of Wildlife Management*, *71*: 1513–1524.

Snyder, N.F., and J. Schmitt. 2002. “California Condor (*Gymnogyps califorianus*).” In *The Birds of North America*. Philadelphia, PA.

Stoms, D.M., F.W. Davis, C.B. Cogan, M.O. Painho, B.W. Duncan, J. Scepan, and J.M. Scott. 1993. “Geographic Analysis of California Condor Sighting Data.” *Conservation Biology* 7:148–59.

Strickland, M.D., E.B. Arnett, W.P. Erickson, D.H. Johnson, G.D. Johnson, M.L. Morrison, J.A. Schaffer, and W. Warren-Hicks. 2011. *Comprehensive Guide to Studying Wind Energy/Wildlife Interactions*. Prepared for: National Wind Coordinating Collaborative, Washington, DC.

Tellería, J.L. 2009. Overlap between wind power plants and Griffon Vultures Gyps fulvus in Spain. Bird Study 56(2): 268-271.

Thompson, J., D. Solick, and K. Bay. 2011. *Post-construction Fatality Surveys for the Dry Lake Phase I Wind Project, Iberdrola Renewables: September 2009-November 2010*. Prepared for Iberdrola Renewables, Portland, OR. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

TRC Environmental Corporation. January 2008. *Post-Construction Avian and Bat Fatality*

Monitoring and Grassland Bird Displacement Surveys at the Judith Gap Wind Energy Project, Wheatland County, Montana. Prepared for: Judith Gap Energy, LLC, Chicago, IL. Laramie, WY.

U.S. Army Corps of Engineers. January 1987. *Corp of Engineers Wetlands Delineation Manual*. Final Technical Report Y-87-1. Vicksburg, MS. Prepared by: Environmental Laboratory, U.S. Army Engineer Research and Development Center, Waterways Experiment Station, Vicksburg, MS.

U.S. Code. 30 April 2004. Title 16, Sections 668–668d: “Bald and Golden Eagle Protection Act.” Available at: http://www.fws.gov/le/pdffiles/bepa.pdf

U.S. Department of the Interior, Bureau of Land Management. 1980. *California Desert Conservation Area Plan*. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/cdd/cdcaplan.Par.15259.File.dat/CA_Desert_.pdf

U.S. Department of the Interior, Bureau of Land Management. 1980. *Final Environmental Impact Report and Statement for the West Mojave Plan*. Moreno Valley, CA: California Desert District. Available at: http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-1-Chapter1_Bookmarks.pdf

U.S. Department of the Interior, Bureau of Land Management. January 2005. *West Mojave Plan—A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment Final Environmental Impact Report and Statement*. Moreno Valley, CA. Available at: http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-1-Chapter1_Bookmarks.pdf

U.S. Fish and Wildlife Service. 1984. *California Condor Recovery Plan*. 2nd Revision. Portland, OR.

U.S. Fish and Wildlife Service. [August 1986] 1995. *National Wetlands Inventory Map, Tylerhorse Canyon, California*. Available at: http://www.fws.gov/wetlands/data/index.html

U.S. Fish and Wildlife Service. 1996. *California Condor Recovery Plan*. 3rd Revision. Portland, OR.

U.S. Fish and Wildlife Service. May 2007. *National Bald Eagle Management Guidelines*. Available at: http://www.fws.gov/pacific/eagle/NationalBaldEagleManagementGuidelines.pdf

U.S. Fish and Wildlife Service. 20 May 2008. “Authorizations under the Bald and Golden Eagle Protection Act for Take of Eagles. Final Rule.” *Federal Register* 73 (98): 29075–84.

U.S. Fish and Wildlife Service. May 2009. *Habitat Conservation Plans*. Region 8. Available at: http://ecos.fws.gov/conserv_plans/servlet/gov.doi.hcp.servlets.PlanReport?region=8&type=HCP&rtype=2&hcpUser=&view=report

U.S. Fish and Wildlife Service. 11 September 2009. “Eagle Permits; Take Necessary to Protect Interests in Particular Localities; Final Rules.” *Federal Register* 74 (175): 46836–79.

U.S. Fish and Wildlife Service. January 2011. *Draft Eagle Conservation Plan Guidance*. Available at: http://www.fws.gov/windenergy/docs/ECP_draft_guidance_2_10_final_clean_omb.pdf

U.S. Fish and Wildlife Service. 2013. Critical Habitat Portal. Available at: http://criticalhabitat.fws.gov/crithab/

U.S. Fish and Wildlife Service. n.d. *Bald Eagle Management Guidelines and Conservation Measures: Bald and Golden Eagle Protection Act*. Available at: http://www.fws.gov/midwest/Eagle/guidelines/bgepa.html

U.S. Fish and Wildlife Service, Division of Migratory Bird Management. August 2012. *Eagle Conservation Plan Guidance*. Module 1—“Land-Based Energy Technical Appendices.” Arlington, VA.

U.S. Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. *Eagle Conservation Plan Guidance*. Module 1—“Land-Based Wind Energy.” Version 2. Arlington, VA.

U.S. Fish and Wildlife Service Wind Turbine Guidelines Advisory Committee. 23 March 2012. *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines*. Available at: www.fws.gov/windenergy/docs/WEG_final.pdf

U.S. Supreme Court. 9 January 2001. Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers. No. 99-1178, 531 U.S. 159.

Verboom, B., A. M. Boonman, and H. J. G. A. Limpens. 1999. Acoustic perception of landscape elements by the pond bat (Myotis dasycneme). Journal of Zoology 248: 59–66.

Verboom, B., and H. Huitema. 1997. The importance to linear landscape elements for the pipistrelle, Pipistrellus pipstrellus and the serotine bat, Eptesicus serotinus. Landscape

Warkentin, I. G., N. S. Sodhi, R. H. M. Espie, Alan F. Poole, L. W. Oliphant and P. C. James. 2005. Merlin (Falco columbarius).” In *The Birds of North America Online*, ed. A. Poole, Ed. Ithaca, NY: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/044

Western EcoSystems Technology (WEST), Inc. 2005. “Exhibit A: Ecological Baseline Study at the Elkhorn Wind Power Project.” Draft final report prepared for: Zilkha Renewable Energy, LLC, Portland, OR. Cheyenne, WY.

Western EcoSystems Technology (WEST), Inc. 2006. *Diablo Winds Wildlife Monitoring Progress Report, March 2005 - February 2006*. Technical report submitted to: FPL Energy and Alameda County California. Cheyenne, WY.

Western EcoSystems Technology (WEST), Inc. 2008. *Diablo Winds Wildlife Monitoring Progress Report: March 2005 – February 2007*. Cheyenne, WY.

Western EcoSystems Technology (WEST), Inc. 2012. Technical Memorandum: Results of Bat Acoustic Surveys at the Proposed Alta East Wind Resource Area, Kern County, California. Cheyenne, WY.

Wilbur, S.R. 1978. *The California Condor, 1966–76: A Look at Its Past and Future*. U.S. Fish and Wildlife Service North American Fauna 72. Washington, DC: U.S. Department of the Interior.

Young, D.P., Jr., and W.P. Erickson. 4–7 June 2006. “Wildlife Issue Solutions: What Have Marine Radar Surveys Taught Us about Avian Risk Assessment?” Presented at the American Wind Energy Association Windpower 2006 Conference and Exhibition, Pittsburgh, PA.

Young, D.P., Jr., J.D. Jeffrey, K. Bay, and W.P. Erickson. 2009. *Puget Sound Energy, Hopkins Ridge Wind Project Phase 1, Post-Construction Avian and Bat Monitoring, Second Annual Report, January–December 2008*. Prepared for: Puget Sound Energy, Dayton, WA.

Young, D.P. Jr., W.P. Erickson, K. Bay, S. Nomani, and W. Tidhar. 2009. Mount Storm Wind Energy Facility, Phase 1 Post-Construction Avian and Bat Monitoring, July - October 2008. Prepared for NedPower Mount Storm, LLC, Houston, Texas. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY. February 17, 2009.

Young, D.P., Jr., W.P. Erickson, K. Bay, J. Jeffrey, E.G. Lack, R.E. Good, and H.H. Sawyer. April 2003. *Baseline Avian Studies for the Proposed Hopkins Ridge Wind Project, Columbia County, Washington. Final Report, March 2002–March 2003*. Prepared for: RES North America, LLC, Portland, OR. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

Young, D.P., Jr., W.P. Erickson, R.E. Good, M.D. Strickland, and G.D. Johnson. 2003. *Avian and Bat Mortality Associated with the Initial Phase of the Foote Creek Rim Windpower Project, Carbon County, Wyoming, Final Report, November 1998 - June 2002*. Prepared for: Pacificorp, Inc., Portland, OR, SeaWest Windpower Inc., San Diego, CA, and Bureau of Land Management, Rawlins District Office, Rawlins, WY.

Young, D.P., Jr., W.P. Erickson, J. Jeffrey, K. Bay, R.E. Good, and E.G. Lack. March 2003. *Avian and Sensitive Species Baseline Study Plan and Final Report*. *Eurus Combine Hills Turbine Ranch, Umatilla County, Oregon*. Prepared for: Eurus Energy America Corporation, San Diego, CA, and Aeropower Services, Inc., Portland, OR. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

Young, D.P. Jr., W.P. Erickson, J. Jeffrey, and V.K. Poulton. 2007. *Puget Sound Energy Hopkins Ridge Wind Project Phase 1 Post-Construction Avian and Bat Monitoring. First Annual Report, January-December 2006*. Prepared for: Puget Sound Energy, Dayton, WA, and Hopkins Ridge Wind Project Technical Advisory Committee, Columbia County, WA. Prepared by: Western EcoSystems Technology (WEST), Inc., Cheyenne, WY.

APPENDIX A
BIRD AND BAT COMPENDIUM

TABLE A1
BIRD AND BAT SPECIES OBSERVED WITHIN THE PROJECT

Family/Species	Special Status	Residency Status	Bird Detection by Survey Type		Bat Detection by Survey Type	
			Bird Use Count (BUC)	Reconnaissance Only	Diagnostic Call Recorded	Bat Call Frequency Category Detected*
BIRDS						
Odontophoridae – New World Quail						
Callipepla californica California quail		Year-round	X			
Accipitridae—Hawks, Eagles, Kites, and Harriers						
Circus cyaneus Northern harrier	SSC, WeMo	Year-round	X			
Buteo swainsoni Swainson's hawk	ST, WeMo	Migrant, breeding		X		
Buteo jamaicensis Red-tailed hawk		Year-round	X			
Buteo regalis Ferruginous hawk	WL, WeMo	Migrant, Winter		X		
Falconidae—Falcons						
Falco sparverius American kestrel		Year-round	X			
Falco columbarius Merlin	WL	Migrant, Winter	X			
Falco mexicanus Prairie falcon	WL	Year-round	X			
Columbidae – Pigeons and Doves						
Streptopelia decaocto Eurasian collared-dove		Year-round	X			
Zenaida macroura Mourning dove		Year-round	X			
Cuculidae—Cuckoos						
Geococcyx californianus Greater roadrunner		Year-round	X			
Strigidae – Owls						
Bubo virginianus Great horned Owl		Year-round		X		
Athena cunicularia Burrowing owl	SSC, WeMo	Year-round		X		
Caprimulgidae—Nightjars						
Chordeiles acutipennis Lesser nighthawk		Migrant, breeding		X		

TABLE A1
BIRD AND BAT SPECIES OBSERVED WITHIN THE PROJECT, *Continued*

Family/Species	Special Status	Residency Status	Bird Detection by Survey Type: Bird Use Count (BUC)	Bird Detection by Survey Type: Reconnaissance Only	Bat Detection by Survey Type: Diagnostic Call Recorded	Bat Detection by Survey Type: Bat Call Frequency Category Detected*
Apodidae—Swifts						
Aeronautes saxatalis White-throated swift		Year-round	X			
Trochilidae—Hummingbirds						
Calypte anna Anna's hummingbird		Year-round	X			
Picidae—Woodpeckers						
Picoides scalaris Ladder-backed woodpecker		Year-round	X			
Colaptes auratus Northern flicker		Year-round	X			
Tyrannidae—Tyrant flycatchers						
Sayornis saya Say's phoebe		Year-round	X			
Myiarchus cinerascens Ash-throated flycatcher		Migrant, breeding	X			
Tyrannus verticalis Western kingbird		Migrant, breeding		X		
Laniidae—Shrikes						
Lanius ludovicianus Loggerhead shrike	SSC, WeMo,	Year-round	X			
Corvidae—Jays and Crows						
Aphelocoma californica Western scrub-jay		Year-round	X			
Corvus corax Common raven		Year-round	X			
Alaudidae—Larks						
Eremophila alpestris Horned lark		Year-round	X			
Hirundinidae—Swallows						
Tachycineta bicolor Tree swallow		Migrant, winter		X		
Tachycineta thalassina Violet-green swallow		Migrant		X		
Stelgidopteryx serripennis Northern rough-winged swallow		Migrant, breeding	X			
Petrochelidon pyrrhonota Cliff swallow		Migrant		X		
Paridae—Chickadees and Titmice						

TABLE A1
BIRD AND BAT SPECIES OBSERVED WITHIN THE PROJECT, *Continued*

Family/Species	Special Status	Residency Status	Bird Detection by Survey Type: Bird Use Count (BUC)	Bird Detection by Survey Type: Reconnaissance Only	Bat Detection by Survey Type: Diagnostic Call Recorded	Bat Detection by Survey Type: Bat Call Frequency Category Detected*
Baeolophus inornatus Oak titmouse		Year-round		X		
Troglodytidae—Wrens						
Campylorhynchus brunneicapillus Cactus wren		Year-round	X			
Salpincted obsoletus Rock wren		Year-round	X			
Thryomanes bewickii Bewick's wren		Year-round	X			
Troglodytes aedon House wren		Year-round	X			
Polioptilidae – Gnatcatchers						
Polioptila caerulea Blue-gray gnatcatcher		Year-round	X			
Regulidae—Kinglets						
Regulus calendula Ruby-crowned kinglet		Migrant, winter	X			
Sylviidae—Old World Warblers						
Chamaea fasciata Wrentit		Year-round	X			
Turdidae—Thrushes						
Sialia Mexicana Western bluebird		Migrant, winter	X			
Sialia currucoides Mountain bluebird		Migrant, winter, or transient	X			
Mimidae—Thrashers						
Mimus polyglottos Northern mockingbird		Year-round	X			
Oreoscoptes montanus Sage thrasher		Migrant, Winter	X			
Sturnidae– Starlings and Allies						
Sturnus vulgaris European starling		Year-round	X			
Parulidae – Wood Warblers						
Geothylpis tolmiei MacGillivray's warbler		Migrant		X		
Setophaga coronata Yellow-rumped warbler		Migrant, winter	X			
Cardellina pusilla Wilson's warbler		Migrant		X		

TABLE A1
BIRD AND BAT SPECIES OBSERVED WITHIN THE PROJECT, *Continued*

Family/Species	Special Status	Residency Status	Bird Detection by Survey Type		Bat Detection by Survey Type	
			Bird Use Count (BUC)	Reconnaissance Only	Diagnostic Call Recorded	Bat Call Frequency Category Detected*
Emberizidae – Buntings and Sparrows						
Spizella passerine Chipping sparrow		Year-round	X			
Pooecetes gramineus Vesper sparrow		Migrant, winter		X		
Chondestes grammacus Lark sparrow		Year-round	X			
Amphispiza bilineata Black-throated sparrow		Migrant, breeding	X			
Amphispiza belli Sage sparrow		Year-round		X		
Passerculus sandwichensis Savannah sparrow		Migrant, winter	X			
Melospiza lincolnii Lincoln's sparrow		Migrant, winter	X			
Zonotrichia leucophrys White-crowned sparrow		Migrant, winter	X			
Junco hyemalis Dark-eyed junco		Migrant, winter	X			
Cardinalidae—Cardinals, Tanagers, Grosbeaks, and Buntings						
Piranga ludoviciana Western tanager		Migrant		X		
Passerina amoena Lazuli bunting		Migrant		X		
Icteridae – Blackbirds						
Sturnella neglecta Western meadowlark		Year-round	X			
Euphagus cyanocephalus Brewer's blackbird		Year-round	X			
Icterus parisorum Scott's oriole		Migrant, breeding	X			
Fringillidae – Finches						
Carpodacus mexicanus House finch		Year-round	X			
Spinus tristis American goldfinch		Migrant, winter	X			
BATS*						
Vespertilionidae–Vesper or Plain-nosed Bats						
Myotis californicus California myotis		Resident				X
Myotis ciliolabrum Western small-footed	BLM	Resident				X

TABLE A1
BIRD AND BAT SPECIES OBSERVED WITHIN THE PROJECT, *Continued*

Family/Species	Special Status	Residency Status	Bird Detection by Survey Type: Bird Use Count (BUC)	Bird Detection by Survey Type: Reconnaissance Only	Bat Detection by Survey Type: Diagnostic Call Recorded	Bat Detection by Survey Type: Bat Call Frequency Category Detected*
myotis						
Myotis yumanensis Yuma myotis	BLM	Resident				X
Myotis lucifugus Little brown bat		Migratory				X
Myotis volans Long-legged myotis		Resident				X
Lasionycteris noctivagans Silver haired bat		Migratory				X
Pipistrellus hesperus Western pipistrelle		Resident			X	
Eptesicus fuscus Big brown bat		Migratory			X	
Lasiurus cinereus Hoary bat		Migratory			X	
Antrozous pallidus Pallid bat	CSC, BLM	Resident			X	
Molossidae–Free-tailed Bats						
Tadarida brasiliensis Mexican free-tailed bat		Migratory			X	
Eumops perotis Western mastiff bat	CSC, BLM	Resident			X	

KEY:
BLM=Bureau of Land Management Sensitive Species
CSC = California Department of Fish and Wildlife Species of Special Concern
WL= California Department of Fish and Game Watch List
WeMo=Considered under the Bureau of Land Management's West Mojave Plan
ST=Listed as Threatened under the California Endangered Species Act
* Specific species identification is problematic with any type of acoustic detectors because certain species share similar acoustic signatures. A complete sequence of calls or a visual confirmation is required to identify these species with certainty. Therefore, bat species are typically identified by their frequency category, which may contain more than one bat species.

APPENDIX B
BLM WIND ENERGY PROGRAM POLICIES AND BEST MANAGEMENT PRACTICES (BMPs)

BLM WIND ENERGY PROGRAM
POLICIES AND BEST MANAGEMENT PRACTICES (BMPS)

The BLM has established a number of policies and BMPs, provided below, regarding the development of wind energy resources on BLM-administered public lands. The policies and BMPs are applicable to all wind energy development projects on BLM-administered public lands. The policies address the administration of wind energy development activities, and the BMPs identify required mitigation measures that will be incorporated into project-specific Plans of Development (PODs) and right-of-way (ROW) authorization stipulations. Additional mitigation measures will be applied to individual projects, in the form of stipulations in the ROW authorization as appropriate, to address site-specific and species-specific issues.

Policies

- The BLM will not issue ROW authorizations for wind energy development for areas in which wind energy development is incompatible with specific resource values. Specific lands excluded from wind energy site monitoring and testing and wind energy development include designated areas that are part of the National Landscape Conservation System (NLCS) (e.g., Wilderness Areas, Wilderness Study Areas, National Monuments, National Conservation Areas[1], Wild and Scenic Rivers, and National Historic and Scenic Trails). Additional areas may be excluded from wind energy development based on resource impacts that cannot be mitigated and/or conflict with existing and multiple-use activities or land use plans. Areas of Critical Environmental Concern (ACEC) are not universally excluded from wind energy site monitoring and testing or wind energy development, but will be managed consistent with the management prescriptions for the individual ACEC.

- To the extent possible, wind energy projects shall be developed in a manner that will not prevent other land uses, including minerals extraction, livestock grazing, recreational use, and other ROW uses.

- Entities seeking to develop a wind energy project on BLM-administered lands shall consult with appropriate Federal, State, and local agencies regarding specific projects as early in the planning process as appropriate to ensure that all potential construction, operation, and decommissioning issues and concerns are identified and adequately addressed.

- The BLM will initiate government-to-government consultation with Indian tribal governments whose interests might be directly and substantially affected

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[1] Wind energy development is permitted in one NCA, the California Desert Conservation Area (CDCA), in accordance with the provisions of the *California Desert Conservation Area Plan 1980, as Amended*.

by activities on BLM-administered lands as early in the planning process as appropriate to ensure that construction, operation, and decommissioning issues and concerns are identified and adequately addressed.

- Entities seeking to develop a wind energy project on BLM-administered lands shall consult with the U.S. Department of Defense (DOD), in conjunction with BLM Washington Office and Field Office staff, regarding the location of wind power projects and turbine siting as early in the planning process as appropriate. This consultation shall occur concurrently at both the installation/field level and the Pentagon/BLM Washington Office level. The consultation process is outlined in an interagency protocol agreement.

- The BLM will consult with the U.S. Fish and Wildlife Service (USFWS) as required by Section 7 of the Endangered Species Act of 1973 (ESA). The specific consultation requirements will be determined on a project-by-project basis.

- The BLM will consult with the State Historic Preservation Office (SHPO) as required by Section 106 of the National Historic Preservation Act of 1966 (NHPA). The specific consultation requirements will be determined on a project-by-project basis. If programmatic section 106 consultations have been conducted and are adequate to cover a proposed project, additional consultation may not be needed.

- Existing land use plans will be amended, as appropriate, to (1) adopt provisions of the BLM's Wind Energy Development Program, (2) identify land considered available for wind energy development, and (3) identify land that will not be available for wind energy development.

- The level of environmental analysis to be required under the National Environmental Policy Act (NEPA) for individual wind power projects will be determined at the field office level. For many projects, it may be determined that a tiered environmental assessment (EA) is appropriate in lieu of an Environmental Impact Statement (EIS). To the extent that the Programmatic EIS (PEIS) addresses anticipated issues and concerns associated with an individual project, including potential cumulative impacts, the BLM will tier based on the decisions embedded in the PEIS and limit the scope of additional project-specific NEPA analyses. The site-specific NEPA analyses will include analyses of project site configuration and micrositing considerations, monitoring program requirements, and appropriate mitigation measures. In particular, the mitigation measures discussed in chapter 5 of the PEIS may be consulted in determining site-specific requirements. Public involvement will be incorporated into all wind energy development projects to ensure that all concerns and issues are identified and adequately addressed. In general, the scope of the NEPA analyses will be limited to the proposed action on BLM-administered public lands; however, if access to proposed development on adjacent non-BLM-administered lands is entirely dependent on obtaining ROW access across BLM-administered public lands and there are no alternatives to that access, the NEPA analysis for the proposed ROW may need to assess the environmental effects from that proposed development. The BLM's analyses of ROW access projects may tier based on the PEIS to the extent that the proposed project falls within the scope of the PEIS analyses.

- Site-specific environmental analyses will tier from the PEIS and identify and assess any cumulative impacts that are beyond the scope of the cumulative impacts addressed in the PEIS.

- The Categorical Exclusion (CX) applicable to the issuance of short-term ROWs or land use authorizations may be applicable to some site monitoring and testing activities. The relevant CX, established in the BLM NEPA Handbook, H-1790-1, Appendix 4, Section E. 19 (January 30, 2008), encompasses "issuance of short-term (3 years or less) rights-of-way or land use authorizations for such uses as storage sites, apiary sites, and construction sites where the proposal includes rehabilitation to restore the land to its natural or original condition." The CX for "nondestructive data collection, inventory, study, research, and monitoring activities" may also be applicable to wind energy site testing and monitoring activities.

- The BLM will require financial bonds for all wind energy development projects on BLM-administered public lands to ensure compliance with the terms and conditions of the rights-of-way authorization and the requirements of applicable regulatory requirements, including reclamation costs. The amount of the required bond will be determined during the rights-of-way authorization process on the basis of site-specific and project-specific factors. A minimum bond will be required for site monitoring and testing authorizations.

- Entities seeking to develop a wind energy project on BLM-administered public lands shall develop a project-specific Plan of Development (POD) that incorporates all BMPs and, as appropriate, the requirements of other existing and relevant BLM mitigation guidance, including the BLM's offsite mitigation guidance. Additional mitigation measures will be incorporated into the POD and into the ROW authorization as project stipulations, as needed, to address site-specific and species-specific issues. The POD will include a site plan showing the locations of turbines, roads, power lines, other infrastructure, and other areas of short- and long-term disturbance.

- The BLM will incorporate management goals and objectives specific to habitat conservation for species of concern (e.g., sage-grouse, raptors, bats), as appropriate, into the POD for proposed wind energy projects.

- The BLM will consider the visual resource values of the public lands involved in proposed wind energy development projects, consistent with BLM Visual Resource Management (VRM) policies and guidance. The BLM will work with the ROW applicant to incorporate visual design considerations into the planning and design of the project to minimize potential visual impacts of the proposal and to meet the VRM objectives of the area.

- Operators of wind power facilities on BLM-administered public lands shall consult with the BLM and other appropriate Federal, State, and local agencies regarding any planned upgrades or changes to the wind facility design or operation. Proposed changes of this nature may require additional environmental analysis and/or revision of the POD.

- The BLM's Wind Energy Development Program will incorporate adaptive management strategies to ensure that potential adverse impacts of wind energy development are avoided if possible, minimized, or mitigated to acceptable levels. The programmatic policies and BMPs will be updated and revised as new data regarding the impacts of wind power projects become available. At the project-level, operators will be required to develop monitoring programs to evaluate the environmental conditions at the site through all phases of development, establish metrics against which monitoring observations can be measured, identify potential mitigation measures, and establish protocols for incorporating monitoring observations and additional mitigation measures into standard operating procedures and project-specific stipulations.

Best Management Practices (BMPs)

The following BMPs will be adopted as required elements of project-specific PODs and/or as ROW authorization stipulations. They are categorized by development activity: site monitoring and testing, development of the POD, construction, operation, and decommissioning. The BMPs for development of the POD identify required elements of the POD needed to address potential impacts associated with subsequent phases of development.

1. Site Monitoring and Testing

- The area disturbed by installation of meteorological towers (i.e., footprint) shall be kept to a minimum.

- Existing roads shall be used to the maximum extent feasible. If new roads are necessary, they shall be designed and constructed to the appropriate BLM road design standards.

- Meteorological towers shall be located to avoid sensitive habitats or areas where ecological resources known to be sensitive to human activities (e.g., prairie grouse) are present. Installation of towers shall be scheduled to avoid disruption of wildlife reproductive activities or other important behaviors, and shall be consistent with sage grouse management strategies.

- Guy wires on permanent meteorological towers shall be avoided, however, may be necessary on temporary meteorological towers installed during site monitoring and testing. If guy wires are necessary, the meteorological towers shall be periodically inspected to determine whether permanent markers (bird flight diverters) attached to the guy wires are necessary to increase visibility.

- Meteorological towers installed for site monitoring and testing shall be inspected periodically (at least every 6 months) for structural integrity.

- A study design strategy shall be required for any environmental studies initiated or baseline data collected during the site testing and monitoring period. The operator shall submit the study design strategy to the BLM authorized officer for review.

2. Plan of Development Preparation

General

- The BLM and operators shall contact appropriate agencies, property owners, and other stakeholders early in the planning process to identify potentially sensitive land uses and issues, rules that govern wind energy development locally, and land use concerns specific to the region.

- Available information describing the environmental and sociocultural conditions in the vicinity of the proposed project shall be collected and reviewed as needed to predict potential impacts of the project.

- The Federal Aviation Administration (FAA)-required notice of proposed construction shall be made as early as possible to identify any required air safety measures.

- To plan for efficient use of the land, necessary infrastructure requirements shall be consolidated wherever possible, and current transmission and market access shall be evaluated carefully.

- The project shall be planned to utilize existing roads and utility corridors to the maximum extent feasible and to minimize the number and length/size of new roads, lay-down areas, and borrow areas.

- A monitoring program shall be developed to ensure that environmental conditions are monitored during the construction, operation, and decommissioning phases. The monitoring program requirements, including adaptive management strategies, shall be established at the project level to ensure that potential adverse impacts of wind energy development are mitigated. The monitoring program shall identify the monitoring requirements for each environmental resource present at the site, establish metrics against which monitoring observations can be measured, identify potential mitigation measures, and establish protocols for incorporating monitoring observations and additional mitigation measures into standard operating procedures and BMPs.

- "Good housekeeping" procedures shall be developed to ensure that during operation the site will be kept clean of debris, garbage, fugitive trash or waste, and graffiti; to prohibit scrap heaps and dumps; and to minimize storage yards.

Wildlife and Other Ecological Resources

- Operators shall review existing information on species and habitats in the vicinity of the project area to identify potential concerns.

- Operators shall conduct surveys for Federal and/or State-protected species and other species of concern (including priority wildlife and special status plant and animal species) within the project area and design the project to avoid, minimize, or mitigate impacts to these resources.

- Operators shall identify important, sensitive, or unique habitats in the vicinity of the project and design the project to avoid, minimize, or mitigate impacts to these habitats (e.g., locate the turbines, roads, and ancillary facilities in the least environmentally sensitive areas; i.e., away from riparian habitats, streams, wetlands, drainages, or critical wildlife habitats).

- The BLM will prohibit the disturbance of any population of federally listed plant species under the Endangered Species Act.

- Operators shall evaluate avian and bat use of the project area and design the project to minimize or mitigate the potential for bird and bat strikes (e.g., development shall not occur in riparian habitats and wetlands). Avian and bat use surveys consistent with current methodologies and standards shall be conducted; the amount and extent of ecological baseline data required shall be determined on a project basis.

- Turbines shall be configured to avoid landscape features known to attract raptors if site studies show that placing turbines there would pose a significant risk to raptors.

- Operators shall determine the presence of bat colonies and avoid placing turbines near known bat hibernation, breeding, and maternity/nursery colonies; in known migration corridors; or in known flight paths between colonies and feeding areas.

- Operators shall determine the presence of active raptor nests (i.e., raptor nests used during the breeding season) and design the project to provide for spatial buffers and timing restrictions for surface disturbing activities. Measures to reduce raptor use at a project site (e.g., minimize road cuts, maintain either no vegetation or plant species that are unattractive to raptors around the turbines) shall also be identified.

- A habitat restoration plan shall be developed to avoid, minimize, or mitigate negative impacts on vulnerable wildlife while maintaining or enhancing habitat values for other species. The plan shall identify reclamation, soil stabilization, and erosion reduction measures that shall be implemented to ensure that all temporary use areas are restored. The plan shall require that restoration occur as soon as possible after completion of activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.

- Procedures shall be developed to mitigate potential impacts to special status species and other priority wildlife species. Such measures may include avoidance, relocation of project facilities or lay-down areas, and/or relocation of biota.

- Facilities shall be designed to discourage their use as perching or nesting substrates by birds. For example, power lines and poles shall be configured to minimize raptor electrocutions and discourage raptor and raven nesting and perching.

Visual Resources

- The public shall be involved and informed about the visual site design elements of the proposed wind energy facilities. Possible approaches include conducting public forums for disseminating information, offering organized tours of operating wind developments, and using computer and visualization simulations in public presentations.

- Visual resource management (VRM) considerations shall take place early in the project planning phase in accordance with BLM VRM manual and handbooks. Operators shall utilize digital terrain mapping tools at a landscape/viewshed scale for site planning and design, visual impact analysis, and visual impact mitigation planning and design. Visual mitigation planning and design shall be performed through field assessments, applied GPS technology, photo documentation, use of computer-aided design and development software, and visual simulations to reflect a full range of visual resource best management practices. The digital terrain mapping tools shall be at a resolution and contour interval suitable for site design and accurate placement of proposed developments into the digital viewshed. Visual simulations shall be prepared and evaluated in accordance with BLM Handbook H-8432-1, or other agency requirements, to create spatially accurate depictions of the appearance of proposed facilities. Simulations shall depict proposed project facilities from Key Observation Points and other visual resource sensitive locations.

- Turbine arrays and turbine design shall be integrated with the surrounding landscape. Design elements to be addressed include visual uniformity, use of tubular towers, proportion and color of turbines, nonreflective paints, and prohibition of commercial messages on turbines.

- Other site design elements shall be integrated with the surrounding landscape. Elements to address include minimizing the profile of the ancillary structures, burial of cables, prohibition of commercial symbols, and lighting. Regarding lighting, efforts shall be made to minimize the need for and amount of lighting on ancillary structures.

Roads

- An access road siting and management plan shall be prepared incorporating existing BLM standards regarding road design, construction, and maintenance such as those described in the BLM 9113 Manual and the *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development* (revised 2007).

Ground Transportation

- A transportation plan shall be developed, particularly for the transport of turbine components, main assembly cranes, and other large pieces of equipment. The plan shall consider specific object sizes, weights, origin, destination, and unique handling requirements and shall evaluate alternative transportation approaches. In addition, the process to be used to comply with unique state requirements and to obtain all necessary permits shall be clearly identified.

- A traffic management plan shall be prepared for the site access roads to ensure that no hazards would result from increased truck traffic and that traffic flow would not be adversely impacted. This plan shall incorporate measures such as informational signs, flaggers when equipment may result in blocked throughways, and traffic cones to identify any necessary changes in temporary lane configuration.

Noise

- Proponents of a wind energy development project shall take measurements to assess the existing background noise levels at a given site and compare them to the anticipated noise levels associated with the proposed project.

Noxious Weeds and Pesticides

- Operators shall develop a plan for control of noxious weeds and invasive species, which could occur as a result of new surface disturbance activities at the site. The plan shall address monitoring, education of personnel on weed identification, the manner in which weeds spread, and methods for treating infestations. The use of certified weed-free mulch and certified weed-free seed shall be required. If trucks and construction equipment are arriving from locations with known invasive vegetation problems, a controlled inspection and cleaning area shall be established to visually inspect construction equipment arriving at the project area and to remove and collect seeds that may be adhering to tires and other equipment surfaces.

- If pesticides are used on the site, an integrated pest management plan shall be developed to ensure that applications will be conducted within the framework of BLM and DOI policies and entail only the use of EPA-registered pesticides. Pesticide use shall be limited to nonpersistent, immobile pesticides and shall only be applied in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications. Any applications of herbicides will be subject to BLM herbicide treatment standard operating procedures. Only herbicides on the list of approved herbicide formulations (updated annually) will be used on public lands.

Cultural/Historic Resources

- The BLM will consult with Indian tribal governments early in the planning process to identify issues regarding the proposed wind energy development, including issues related to the presence of cultural properties, access rights, disruption to traditional cultural practices, and impacts to visual resources important to the tribe(s).

- The presence of archaeological sites and historic properties in the area of potential effect shall be determined on the basis of a records search of recorded sites and properties in the area and/or, depending on the extent and reliability of existing information, an archaeological survey. Archaeological sites and historic properties present in the area of potential effect shall be reviewed to determine whether they meet the criteria of eligibility for listing on the *National Register of Historic Places* (NRHP).

- When any right-of-way application includes remnants of a National Historic Trail, is located within the viewshed of a National Historic Trail's designated centerline, or includes or is within the viewshed of a trail eligible for listing on the NRHP, the operator shall evaluate the potential visual impacts to the trail associated with the proposed project and identify appropriate mitigation measures for inclusion as stipulations in the POD.

- If cultural resources are present at the site, or if areas with a high potential to contain cultural material have been identified, a cultural resources management plan (CRMP) shall be developed. This plan shall address mitigation activities to be taken for cultural resources found at the site. Avoidance of the area is always the preferred mitigation option. Other mitigation options include archaeological survey and excavation, and monitoring. If an area exhibits a high potential, but no artifacts were observed during an archaeological survey, monitoring by a qualified archaeologist may be required during all excavation and earthmoving in the high-potential area. A report shall be prepared documenting these activities. The CRMP also shall (1) establish a monitoring program, (2) identify measures to prevent potential looting/vandalism or erosion impacts, and (3) address the education of workers and the public to make them aware of the consequences of unauthorized collection of artifacts and destruction of property on public land.

Paleontological Resources

- Operators shall determine whether paleontological resources exist in a project area on the basis of the sedimentary context of the area, a records search for past paleontological finds in the area, and/or, depending on the extent of existing information, a paleontological survey.

- If paleontological resources are present at the site, or if areas with a high potential to contain paleontological material have been identified, a paleontological resources management plan shall be developed. This plan shall include a mitigation plan for collection of the fossils; mitigation may include avoidance, removal of fossils, or monitoring. If an area exhibits a high potential but no fossils were observed during survey, monitoring by a qualified paleontologist may be required during all excavation and earthmoving in the sensitive area. A report shall be prepared documenting these activities. The paleontological resources management plan also shall (1) establish a monitoring program, (2) identify measures to prevent potential looting/vandalism or erosion impacts, and (3) address the education of workers and the public to make them aware of the consequences of unauthorized collection of fossils on public land.

Hazardous Materials and Waste Management

- Operators shall develop a hazardous materials management plan addressing storage, use, transportation, and disposal of each hazardous material anticipated to be used at the site. The plan shall identify all hazardous materials that would be used, stored, or transported at the site. It shall establish inspection procedures, storage requirements, storage quantity limits, inventory control, nonhazardous product substitutes, and disposition of excess materials. The plan shall also identify requirements for notices to Federal and local emergency response authorities and include emergency response plans.

- Operators shall develop a waste management plan identifying the waste streams that are expected to be generated at the site and addressing hazardous waste determination procedures, waste storage locations, waste-specific management and disposal requirements, inspection procedures, and waste minimization procedures. This plan shall address all solid and liquid wastes that may be generated at the site.

- Operators shall develop a spill prevention and response plan identifying where hazardous materials and wastes are stored on site, spill prevention measures to be implemented, training requirements, appropriate spill response actions for each material or waste, the locations of spill response kits on site, a procedure for ensuring that the spill response kits are adequately stocked at all times, and procedures for making timely notifications to authorities.

Storm Water

- Operators shall develop a storm water management plan for the site to ensure compliance with applicable regulations and prevent offsite migration of contaminated storm water or increased soil erosion.

Human Health and Safety

- A safety assessment shall be conducted to describe potential safety issues and the means that would be taken to mitigate them, including issues such as site access, construction, safe work practices, security, heavy equipment transportation, traffic management, emergency procedures, and fire control.

- A health and safety program shall be developed to protect both workers and the general public during construction, operation, and decommissioning of a wind energy project. Regarding occupational health and safety, the program shall identify all applicable Federal and State occupational safety standards; establish safe work practices for each task (e.g., requirements for personal protective equipment and safety harnesses; Occupational Safety and Health Administration (OSHA) standard practices for safe use of explosives and blasting agents; and measures for reducing occupational electric and magnetic fields (EMF) exposures); establish fire safety evacuation procedures; and define safety performance standards (e.g., electrical system standards and lightning protection standards). The program shall include a training program to identify hazard training requirements for workers for each task and establish procedures for providing required training to all workers. Documentation of training and a mechanism for reporting serious accidents to appropriate agencies shall be established.

- Regarding public health and safety, the health and safety program shall establish a safety zone or setback for wind turbine generators from residences and occupied buildings, roads, rights-of-ways, and other public access areas that is sufficient to prevent accidents resulting from the operation of wind turbine generators. It shall identify requirements for temporary fencing around staging areas, storage yards, and excavations during construction or decommissioning activities. It shall also identify measures to be taken during the operation phase to limit public access to hazardous facilities (e.g., permanent fencing installed only around electrical substations, and turbine tower access doors locked).

- Operators shall consult with local planning authorities regarding increased traffic during the construction phase, including an assessment of the number of vehicles per day, their size, and type. Specific issues of concern (e.g., location of school bus routes and stops) shall be identified and addressed in the traffic management plan.

- If operation of the wind turbines is expected to cause significant adverse impacts to nearby residences and occupied buildings from shadow flicker, low-frequency sound, or EMF, site-specific recommendations for addressing these concerns shall be incorporated into the project design (e.g., establishing a sufficient setback from turbines).

- The project shall be planned to minimize electromagnetic interference (EMI) (e.g., impacts to radar, microwave, television, and radio transmissions) and comply with Federal Communications Commission (FCC) regulations. Signal strength studies shall be conducted when proposed locations have the potential to impact transmissions. Potential interference with public safety communication systems (e.g., radio traffic related to emergency activities) shall be avoided.

- The project shall be planned to comply with Federal Aviation Administration (FAA) regulations, including lighting regulations, and to avoid potential safety issues associated with proximity to airports, military bases or training areas, or landing strips.

- Operators shall develop a fire management strategy to implement measures to minimize the potential for a human-caused fire and respond to natural fire situations.

3. Construction

General

- All control and mitigation measures established for the project in the POD and the resource-specific management plans that are part of the POD shall be maintained and implemented throughout the construction phase, as appropriate.

- The area disturbed by construction and operation of a wind energy development project (i.e., footprint) shall be kept to a minimum.

- The number and size/length of roads, temporary fences, lay-down areas, and borrow areas shall be minimized.

- Topsoil from all excavations and construction activities shall be salvaged and reapplied during reclamation.

- All areas of disturbed soil shall be reclaimed using weed-free native grasses, forbs, and shrubs. Reclamation activities shall be undertaken as early as possible on disturbed areas.

- All electrical collector lines shall be buried in a manner that minimizes additional surface disturbance (e.g., along roads or other paths of surface disturbance). Overhead lines may be used in cases where burial of lines would result in further habitat disturbance.

- Operators shall identify unstable slopes and local factors that can induce slope instability (such as groundwater conditions, precipitation, earthquake activities, slope angles, and the dip angles of geologic strata). Operators also shall avoid creating excessive slopes during excavation and blasting operations. Special construction techniques shall be used where applicable in areas of steep slopes, erodible soil, and stream channel crossings.

- Erosion controls that comply with county, State, and Federal standards shall be applied. Practices such as jute netting, silt fences, and check dams shall be applied near disturbed areas.

Wildlife

- Timing restrictions for construction activities may be implemented to minimize impacts to wildlife.

- In accordance with the habitat restoration plan, restoration shall be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.

- All construction employees shall be instructed to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship and nesting) seasons. In addition, pets shall not be permitted on site during construction.

Visual Resources

- Operators shall reduce visual impacts during construction by clearly delineating construction boundaries and minimizing areas of surface disturbance; preserving vegetation to the greatest extent possible; utilizing undulating surface disturbance edges; stripping, salvaging and replacing topsoil; contoured grading; controlling erosion; using dust suppression techniques; and restoring exposed soils as closely as possible to their original contour and vegetation.

Roads

- Existing roads shall be used, but only if in safe and environmentally sound locations. If new roads are necessary, they shall be designed and constructed to the appropriate BLM road design standards and be no higher than necessary to accommodate their intended functions (e.g., traffic volume and weight of vehicles). Excessive grades on roads, road embankments, ditches, and drainages shall be avoided, especially in areas with erodible soils. Special construction techniques shall be used, where applicable. Abandoned roads and roads that are no longer needed shall be recontoured and revegetated.

- Access roads and on-site roads shall be surfaced with aggregate materials, wherever appropriate.

- Access roads shall be located to follow natural contours and minimize side hill cuts.

- Roads shall be located away from drainage bottoms and avoid wetlands, if practicable.

- Roads shall be designed so that changes to surface water runoff are avoided and erosion is not initiated.

- Access roads shall be located to minimize stream crossings. All structures crossing streams shall be located and constructed so that they do not decrease channel stability or increase water velocity. Operators shall obtain all applicable Federal and State permits.

- Existing drainage systems shall not be altered, especially in sensitive areas such as erodible soils or steep slopes. Potential soil erosion shall be controlled at culvert outlets with appropriate structures. Catch basins, roadway ditches, and culverts shall be cleaned and maintained regularly.

Ground Transportation

- Project personnel and contractors shall be instructed and required to adhere to speed limits commensurate with road types, traffic volumes, vehicle types, and site-specific conditions, to ensure safe and efficient traffic flow and to reduce wildlife collisions and disturbance and airborne dust.

- Traffic shall be restricted to the roads developed for the project. Use of other unimproved roads shall be restricted to emergency situations.

- Signs shall be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. To minimize impacts on local commuters, consideration shall be given to limiting construction vehicles traveling on public roadways during the morning and late afternoon commute time. Consideration shall also be given to opportunities for busing of construction workers to the job site to reduce traffic volumes.

Air Emissions

- Dust abatement techniques shall be used on unpaved, unvegetated surfaces to minimize airborne dust.

- Speed limits (e.g., 25 mph [40 km/h]) shall be posted and enforced to reduce airborne fugitive dust.

- Construction materials and stockpiled soils shall be covered if they are a source of fugitive dust.

- Dust abatement techniques shall be used before and during surface clearing, excavation, or blasting activities.

Excavation and Blasting Activities

- Operators shall gain a clear understanding of the local hydrogeology. Areas of groundwater discharge and recharge and their potential relationships with surface water bodies shall be identified.

- Operators shall avoid creating hydrologic conduits between two aquifers during foundation excavation and other activities.

- Foundations and trenches shall be backfilled with originally excavated material as much as possible. Excess excavation materials shall be disposed of only in approved areas or, if suitable, stockpiled for use in reclamation activities.

- Borrow material shall be obtained only from authorized and permitted sites. Existing sites shall be used in preference to new sites.

- Explosives shall be used only within specified times and at specified distances from sensitive wildlife or streams and lakes, as established by the BLM or other Federal and State agencies.

Noise

- Noisy construction activities (including blasting) shall be limited to the least noise-sensitive times of day (i.e., daylight hours only or specified times) and weekdays.

- All equipment shall have sound-control devices no less effective than those provided on the original equipment. All construction equipment used shall be adequately muffled and maintained.

- All stationary construction equipment (i.e., compressors and generators) shall be located as far as practicable from nearby residences.

- If blasting or other noisy activities are required during the construction period, nearby residents shall be notified in advance.

Cultural and Paleontological Resources

- Unexpected discovery of cultural or paleontological resources during construction shall be brought to the attention of the responsible BLM authorized officer immediately. Work shall be halted in the vicinity of the find to avoid further disturbance to the resources while they are being evaluated and appropriate mitigation measures are being developed.

Hazardous Materials and Waste Management

- Secondary containment shall be provided for all onsite hazardous materials and waste storage, including fuel. In particular, fuel storage (for construction vehicles and equipment) shall be a temporary activity occurring only for as long as is needed to support construction activities.

- Wastes shall be properly containerized and removed periodically for disposal at appropriate offsite-permitted disposal facilities.

- In the event of an accidental release of hazardous materials to the environment, the operator shall document the event, including a root cause analysis, appropriate corrective actions taken, and a characterization of the resulting environmental or health and safety impacts. Documentation of the event shall be provided to the BLM authorized officer and other Federal and State agencies, as required.

- Any wastewater generated in association with temporary, portable sanitary facilities shall be periodically removed by a licensed hauler and introduced into an existing municipal sewage treatment facility. Temporary, portable sanitary facilities provided for construction crews shall be adequate to support expected onsite personnel and shall be removed at completion of construction activities.

Public Health and Safety

- Temporary fencing shall be installed around staging areas, storage yards, and excavations during construction to limit public access.

4. Operation

General

- All control and mitigation measures established for the project in the POD and the resource-specific management plans that are part of the POD shall be maintained and implemented throughout the operational phase, as appropriate. These control and mitigation measures shall be reviewed and revised, as needed, to address changing conditions or requirements at the site throughout the operational phase. This adaptive management approach will help ensure that impacts from operations are kept to a minimum.

- Inoperative turbines shall be repaired, replaced, or removed in a timely manner. Requirements to do so shall be incorporated into the due diligence provisions of the rights-of-way authorization. Operators will be required to demonstrate due diligence in the repair, replacement, or removal of turbines; failure to do so may result in termination of the right-of-way authorization.

Wildlife

- Employees, contractors, and site visitors shall be instructed to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship and nesting) seasons. In addition, any pets shall be controlled to avoid harassment and disturbance of wildlife.

- Observations of potential wildlife impacts, including wildlife mortality, shall be reported to the BLM authorized officer immediately.

Visual Resources

- Operators shall monitor and maintain visual mitigation measures for the approved project in accordance with a visual monitoring and compliance plan. The operator shall maintain revegetated surfaces until a self-sustaining stand of vegetation is reestablished and visually adapted to the undisturbed surrounding vegetation. No new disturbance shall be created during operations without completion of a VRM analysis and approval by the authorized officer.

Ground Transportation

- Ongoing ground transportation planning shall be conducted to evaluate road use, minimize traffic volume, and ensure that roads are maintained adequately to minimize associated impacts.

Monitoring Program

- Site monitoring protocols defined in the POD shall be implemented. These will incorporate monitoring program observations and additional mitigation measures into standard operating procedures and BMPs to minimize future environmental impacts.

- Results of monitoring program efforts shall be provided to the BLM authorized officer.

Public Health and Safety

- Permanent fencing shall be installed and maintained around electrical substations, and turbine tower access doors shall be locked to limit public access.

- In the event an installed wind energy development project results in electromagnetic interference (EMI), the operator shall work with the owner of the impacted communications system to resolve the problem. Additional warning information may also need to be conveyed to aircraft with onboard radar systems so that echoes from wind turbines can be quickly recognized.

5. Decommissioning

General

- Prior to the termination of the right-of-way authorization, a decommissioning plan shall be developed and approved by the BLM. The decommissioning plan shall include a site reclamation plan and monitoring program.

- All management plans, BMPs, and stipulations developed for the construction phase shall be applied to similar activities during the decommissioning phase.

- All turbines and ancillary structures shall be removed from the site.

- Topsoil from all decommissioning activities shall be salvaged and reapplied during final reclamation.

- All areas of disturbed soil shall be reclaimed using weed-free native shrubs, grasses, and forbs.

- The vegetation cover, composition, and diversity shall be restored to values commensurate with the ecological setting.

APPENDIX D
Cultural Resources Technical Report

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TYLERHORSE WIND ENERGY PROJECT
CULTURAL RESOURCES TECHNICAL REPORT

Prepared for:

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Heartland Wind LLC / Iberdrola Renewables, LLC
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April 12, 2013

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EXECUTIVE SUMMARY

This Cultural Resources Technical Report documents that it is feasible, through project design and placement of project features, to avoid significant impacts from construction, operation, and maintenance of the proposed Tylerhorse Wind Energy Project (project) to cultural resources as a result of the investigations that were undertaken:

- One prehistoric cultural resource was reidentified in the project area. Although this archeological site is within the project area's boundaries and area of potential effect (APE), it not located within the project's direct impact zone (DIZ).

- Six archaeological sites were identified in the project area. Although all six are within the project's APE, none are located within the project's direct impact zone.

- One prehistoric site, TY-Site-3, is recommended eligible to the National Register of Historic Places (NRHP) under Criterion D. The remaining six sites are recommended not eligible for the NRHP.

- Five isolated artifacts (isolates) were identified in the project area. Isolates lack the contextual integrity necessary to meet the criteria for NRHP eligibility, and therefore do not require avoidance or mitigation.

- Consultation between the Bureau of Land Management and four Tribal communities in eastern Kern County has resulted in the understanding that there are no sensitive Native American sites, locations, or features in the project area.

- Consultation with the Native American Heritage Commission has determined that there are no recorded Sacred Sites within the project's APE, and there were no probable sites identified as a result of field investigations.

- There are no formal cemeteries located within the project area.

This Cultural Resources Technical Report documents a Class I inventory that addresses the entirety of the 1,207-acre project area (i.e., the project's APE) plus a 1-mile buffer and a Class III survey characterizing 100 percent of the project area. The 354.1-acre DIZ for the proposed project includes all areas that will be subjected to direct effects, plus a 100-foot buffer around the area of direct impacts. The project is located within Township 10 North, Range 15 West, all of Section 24, the North one-half of Section 26, and the South one-half of the Southeast one-quarter of Section 28, San Bernardino Meridian, in the unincorporated area of Kern County.

SECTION 1.0
INTRODUCTION

This Cultural Resources Technical Report was prepared to characterize the proposed project area with respect to cultural resources, related plans of development, and regulatory statutes and guidelines. The project would require land modifications to accommodate construction, operation, and maintenance of up to 40 wind turbine generators capable of generating up to 1.5 to 3 megawatts (MW) per turbine, with an anticipated total of up to 60 MW. The entire proposed project area of approximately 1,207 acres is located on Bureau of Land Management (BLM)–administered lands in Kern County, California, that have the required physical and wind dynamics capable of supporting the development of wind energy. The project is considered an undertaking under Section 106 of the National Historic Preservation Act (NHPA) of 1966 (36 Code of Federal Regulations [CFR] 800.16(y)). The area of potential effect (APE) for the proposed undertaking is the entire 1,207-acre project area. The direct impact zone (DIZ) is defined as those portions of the project area that are likely to be physically affected by ground disturbance associated with the proposed undertaking, plus a 100-foot buffer around the area of direct impacts. The DIZ for the project is an approximately 354.1-acre area.

Acting in its capacity as the lead agency under the NHPA, the BLM would need to take the environmental impacts of the project into consideration as part of its decision-making process. The BLM requires sufficient field data with regard to the location of potentially significant cultural resources to be able to make a determination of effects of the undertaking on cultural resources under NHPA and to make a determination regarding the appropriate level of environmental compliance documentation pursuant to the National Environmental Policy Act (NEPA). The cultural investigation of the project area was undertaken on behalf of the project applicant, Heartland Wind LLC, a wholly owned subsidiary of Iberdrola Renewables, LLC. The investigation was performed by Sapphos Environmental, Inc. (Appendix A, *Resumes*), under the supervision of Mr. Clarus Backes, principal scientist, in consultation with the BLM field office in Ridgecrest, California (Mr. Donald Storm, archaeologist).

1.1 GOAL OF THE PROJECT

The purpose of the project is to develop renewable energy, consistent with the goals established by the State of California legislature. California has a rapidly growing demand for electricity, and wind energy is one of the most suitable renewable energy sources available to meet the California Renewable Portfolio Standard (RPS). Legislation enacting the California RPS (Senate Bill [SB] 1078) was signed into law in September 2004.[1] This legislation requires retail sellers of electricity to purchase 20 percent of their electricity from renewable sources by 2017. Renewable sources include biomass, solar thermal, photovoltaics, wind, geothermal, fuel cells using renewable fuels, small hydropower of 30 MW or less, digester gas, landfill gas, ocean wave, ocean thermal, and tidal current. Pursuant to the California RPS, retail sellers of electricity are required to increase their procurement of eligible renewable energy resources by at least 1 percent per year so that 20 percent of their retail sales are procured from eligible renewable energy resources by 2017.

[1] Database of State Incentives for Renewable Energy. 26 January 2006. "Renewables Portfolio Standard." Available at: http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=CA25R&state=CA&CurrentPageID=1&RE=1&EE=0

The California Energy Commission (CEC), in collaboration with the California Public Utilities Commission, has initiated a proceeding to implement the State RPS Program. Pursuant to SB 1078, the CEC must achieve the following objectives:

- Certify eligible renewable resources that meet criteria contained in the bill;
- Design and implement a tracking and verification system to ensure that renewable energy output is counted only once for the purpose of the RPS and for verifying retail product claims in California or other states; and
- Allocate and award supplemental energy payments as specified in SB 1038 to eligible renewable energy resources to cover above-market costs of renewable energy.[2]

According to the CEC, Kern County wind resources have the potential to be an important source of the renewable energy required to meet the projections stated in the RPS.[3] In addition, the Kern County General Plan Energy Element states that the wind energy development in the Tehachapi Mountains is one of California's largest, responsible for approximately 40 percent of the state's total wind-generated power.[4]

The U.S. Department of Energy identifies the Tehachapi Pass in its *Wind Energy Resource Atlas of the United States* as a good candidate for wind energy development.[5] The project area has been determined to be a highly suitable location for a wind energy facility for the following reasons:

- There is sufficient wind resource to support the project based on data collected from on-site meteorological instrumentation.

- There is access to electrical power lines that can transport the wind energy produced by the project to local and regional energy markets.

- There are large tracts of open agricultural lands ideal for wind energy development that would allow for existing land uses—including grazing, pasture, feed crop production, and rural residential uses—to continue in place.

- There are existing roads that provide access throughout much of the project area.

- Kern County has developed a comprehensive Wind Energy Ordinance.

- There are no apparent environmental constraints that could not be resolved with the implementation of appropriate avoidance and minimization measures.

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[2] Database of State Incentives for Renewable Energy. 26 January 2006. "Renewables Portfolio Standard." Available at: http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=CA25R&state=CA&CurrentPageID=1&RE=1&EE=0

[3] California Energy Commission. 2003. *Renewable Resources Development Report*. Sacramento, CA: Media and Public Communications Office.

[4] Kern County Planning Department. 15 June 2004. "Energy Element." In *Kern County General Plan*, Chapter 5. Bakersfield, CA. Available at: http://www.co.kern.ca.us/planning/pdfs/kcgp/KCGPChp5Energy.pdf

[5] U.S. Department of Energy. 1986. *Wind Energy Resource Atlas of the United States*. Washington, DC.

1.2 PURPOSE OF THE CULTURAL RESOURCES TECHNICAL REPORT

This Cultural Resources Technical Report was prepared to characterize the cultural resources that would potentially be affected by construction, operation, and maintenance of the proposed project. As such, the document presents data and information to be used by the BLM in making a determination of effects to cultural resources resulting from the proposed project and will provide the substantial evidence required with respect to cultural resources for environmental documentation under NHPA and NEPA.

1.3 INTENDED AUDIENCE

This Cultural Resources Technical Report summarizes the results of investigations for consideration by the project applicant, cooperating agencies, and Native American tribes. The information contained in this report has been an integral part of the project-planning process effort to avoid and minimize adverse effects to cultural resources to the maximum extent practicable while attaining the objectives of the project. This report summarizes the coordination and consultation that has been undertaken by the BLM with the Native American Heritage Commission and Native American representatives and documents the coordination and informal consultation that has been undertaken with the BLM, the Kern County Planning and Community Development Department, and the Natural History Museum of Los Angeles County. In addition, preparation of this report encompassed data obtained from the Southern San Joaquin Valley Information Center (SSJVIC) at California State University, Bakersfield, one of eleven independent centers operated under contract to the Office of Historic Preservation, California Department of Parks and Recreation, for the purpose of maintaining the federally and state-mandated California Historic Resources Inventory.[6]

The location data for the archaeological resources will not be circulated for public review. To protect the sites from unauthorized excavation, looting, and/or vandalism, the locations of known archaeological resources will be kept confidential beyond what is necessary. Information concerning the nature and location of archaeological resources is protected under the Archaeological Resources Protection Act (16 U.S.C. 470 hh) and other statutes. Records in the information centers are exempt from the California Public Records Act (Government Code Section 6250 *et seq.*). Government Code Section 6254.10 states,

> Nothing in this chapter requires disclosure of records that relate to archaeological site information and reports maintained by, or in the possession of, the Department of Parks and Recreation, the State Historical Resources Commission, the State Lands Commission, the Native American Heritage Commission, another state agency, or a local agency, including the records that the agency obtains through a consultation process between a California Native American tribe and a state or local agency.

Government Code Section 6254(r) explicitly authorizes public agencies to withhold information from the public relating to "Native American graves, cemeteries, and sacred places maintained by the Native American Heritage Commission." Due to the sensitive nature of cultural resources described herein, this report is confidential and meant for the exclusive use of the BLM and other trustee and responsible agencies related to planning, installation, operation, maintenance, and management of the project.

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[6] Records searches at the SSVIC undertaken in association with the Manzana (formerly PdV) Wind Energy Project encompassed the Tylerhorse Wind Energy Project.

1.4 SCOPE OF THE PROJECT

The analysis of cultural resources consists of a summary of the regulatory framework of Section 106 of the NHPA of 1966, as amended (16 U.S.C. 40 *et seq.*), which guides the decision-making process with respect to historic properties, a description of the methods employed to support the characterization and evaluation of cultural resources within the project area, the results for baseline conditions for cultural resources, the potential for the project to affect cultural resources, and, if appropriate, opportunities to avoid and minimize the potential effects of the project. The scope of the impact analysis considers the potential for the project to result in direct, indirect, or cumulative impacts on cultural resources caused by construction and/or operation of the project.

1.5 SOURCES OF RELEVANT INFORMATION

Information used in the preparation of this Cultural Resources Technical Report was derived from a Class I literature review, including published and gray literature; informal consultation with cooperating agencies; Class III field surveys of the entire 1,207-acre project area; and spatial analysis based on geographic information systems data. The documentation of the field investigations included the completions of California Department of Parks and Recreation (DPR) Historic Resources Inventory forms, DPR 523 series (Appendix B, *DPR 523A Forms*). Sources of relevant information are cited in footnotes and compiled in Section 6, *References*.

1.6 WORKING DEFINITIONS

There are a number of technical terms used in the characterization of baseline conditions and assessment of the potential for the project to affect cultural resources.

Proposed project area / Area of potential effect (APE) is the area to which the project proponent has applied for a Type III wind development right-of-way grant for the construction, maintenance, operation and termination of up to 40 wind turbines. The proposed project area measures approximately 1,207 acres and is located on BLM-administered lands in Kern County, California. Not all portions of the project area will ultimately be used for the construction, operation, and maintenance of the project.

Cultural resources study area includes areas evaluated for the presence of previously recorded prehistoric and historic resources through record searches, agency consultation, and archival research. The project cultural resources study area measures approximately 9,727.2 acres and consists of the entirety of the 1,207-acre project area plus a 1-mile buffer.

Direct impact zone (DIZ) measures 354.1 acres and consists of areas that will be subjected to direct effects, such as direct ground disturbance associated with the construction, operation, and maintenance of up to 40 wind turbines, access roads, and a 34.5-kilovolt (kV) underground electrical collection system. The DIZ also includes a 100-foot buffer around the areas of direct ground disturbance that will account for incidental effects such as dust, erosion caused by grading, accidental vehicular traffic, and so forth.

Archaeological site is defined by the National Register of Historic Places (NRHP) as the place or places where the remnants of a past culture survive in a physical context that allows for the interpretation of these remains. Archaeological remains usually take the form of artifacts (e.g., fragments of tools, vestiges of utilitarian or nonutilitarian objects), features (e.g., remnants of walls, cooking hearths, or midden deposits), and ecological evidence (e.g., pollen remaining from plants that were in the area when the activities occurred).[7] Prehistoric archaeological sites represent the material remains of Native American groups and their activities. These sites are generally thought to date to the period before European contact but, in some cases, may contain evidence of trade contact with Europeans. Historic archaeological sites reflect the activities of nonnative populations during the Historic period.

Historic period is defined as the period that begins with the arrival of the first nonnative population and thus varies by area. Most Southern California archaeologists use AD 1782 as the date to mark the beginning of the Historic period, following the beginning of the Spanish colonization of inland California.

Isolate is defined as an isolated artifact or small group of artifacts that appear to reflect a single event, loci, or activity. It may lack identifiable context but has the potential to add important information about a region, culture, or person. Isolates do not require avoidance or mitigation under NHPA because they lack contextual integrity and, therefore, are unlikely to meet the criteria for inclusion in the NRHP.

Native American sacred site is defined as an area that has been, and often continues to be, of religious significance to Native American peoples, such as an area where religious ceremonies are practiced or an area that is central to their origins as a people.

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[7] U.S. Department of the Interior, National Park Service. 2000. *National Register Bulletin: Guidelines for Evaluating and Registering Archeological Properties*. Available at: http://www.cr.nps.gov/nr/publications/bulletins/arch/

2.1 PROJECT LOCATION

Heartland Wind LLC proposes to develop the project, a commercial wind-generating facility located on BLM-administered lands in Kern County, California (Figure 2.1-1, *Regional Vicinity Map*). The proposed project's footprint, or DIZ, would consist of approximately 354.1 acres (0.5 square mile) located within 3 block areas of the larger right-of-way project area, or APE, of approximately 1,207 acres (1.9 square miles). The project area is situated about 37 miles north of the City of Santa Clarita (in the County of Los Angeles, California) and roughly 43 miles southeast of the City of Bakersfield (in Kern County) in the south-central portion of the unincorporated area of Kern County, California. Access to the project area is from the corner of Rosamond Boulevard and 170th Street, then along access roads constructed for the adjacent Manzana (formerly PdV) Wind Energy Project (Figure 2.1-2, *Local Vicinity Map*). The proposed project area is located on the Tylerhorse Canyon USGS 7.5-minute quadrangle (Figure 2.1-3, *Topographic Map with USGS 7.5-Minute Quadrangle Index*).[8] The legal description of the project area location includes Township 10 North, Range 15 West, San Bernardino Meridian, Sections 24, the North half of Section 26, and the South half of the Southeast quarter of Section 26. The elevation ranges from 3,480 feet above mean sea level (amsl) up to 3,960 feet amsl.

The 354.1-acre DIZ addressed in this study consists of these areas of direct effect associated with the construction, operation, and maintenance of the proposed project, plus a 100-foot buffer around the areas of direct ground disturbance that will account for incidental effects such as dust, erosion caused by grading, accidental vehicular traffic, and so forth (Figure 2.1-4, *Direct Impact Zone*).

2.2 EXISTING CONDITIONS

The proposed project area is located at the southern base of the Tehachapi Mountains and is characterized by a gradually sloping plateau from northwest to southeast that is incised by a dense network of dry desert washes. The proposed project area supports habitats containing native and nonnative species typical of the upper Mojave Desert and lower reaches of the Tehachapi Mountains, including California Juniper Woodland (*Juniperus californica*), Joshua Tree Woodland (*Yucca brevifolia*), California buckwheat scrub (*Fasciculatum*), Mormon tea scrub (*Ephedra viridis*), and wild grasses. The soil is a tan color, consisting of sandy/silt texture, with round and angular cobbles, situated among rocks and boulders of various sizes and types. Disturbance to the habitats from livestock grazing, off-road vehicle (ORV) use, and mining ranges from moderate to substantial. There is no developed roadway system within the proposed project area; however, there is an existing, rather dense network of two-track dirt roads and single ORV tracks that have been used historically to support ORV use and ranch operations. No paved roads exist within the proposed project area. The proposed project area is primarily undeveloped.

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[8] U.S. Geological Survey. [1965] Revised 1995. *7.5-minute Series Tylerhorse Canyon, CA, Topographic Quadrangle*. Reston, VA.

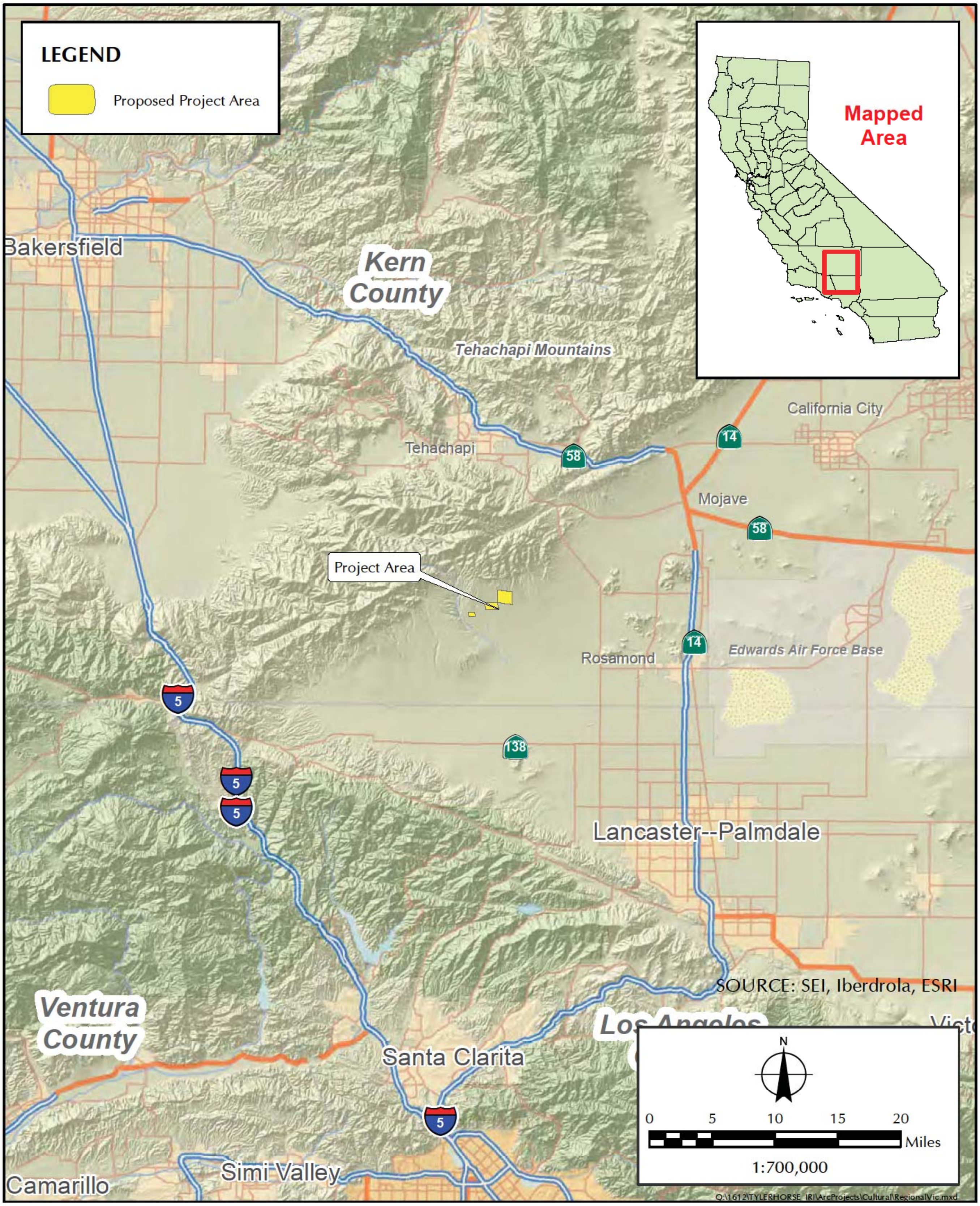
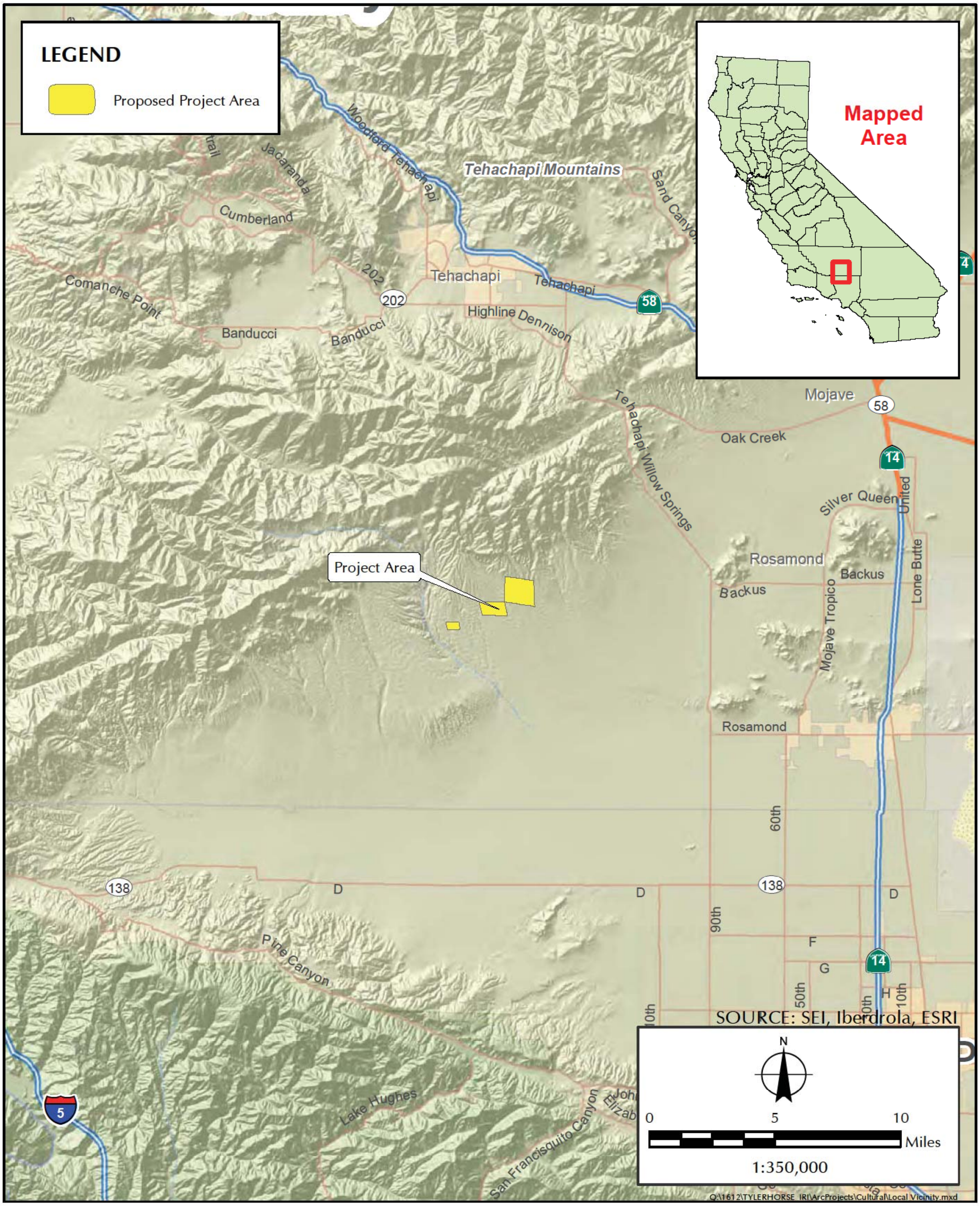


FIGURE 2.1-1
Regional Vicinity Map



IBERDROLA RENEWABLES

FIGURE 2.1-2
Local Vicinity Map

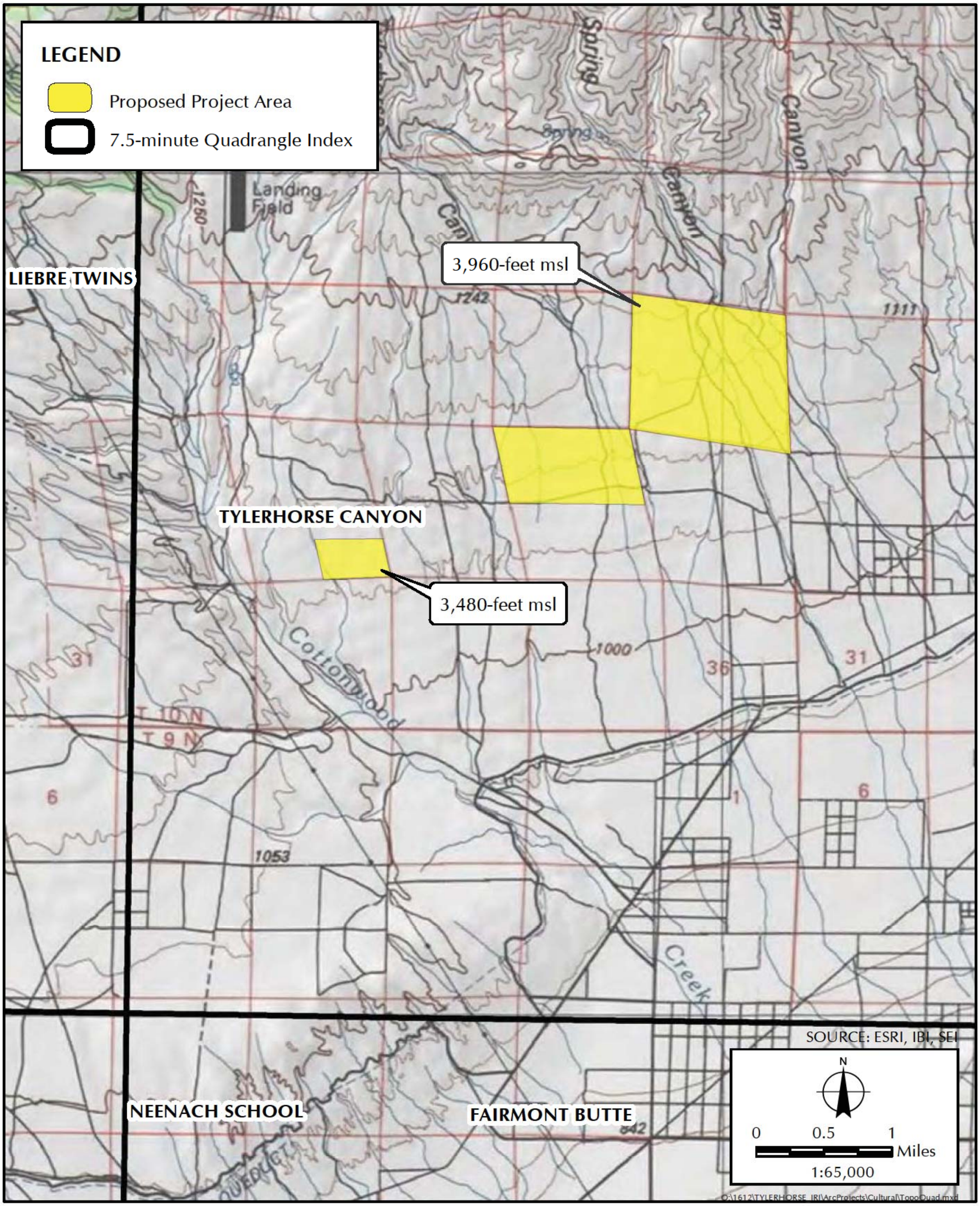
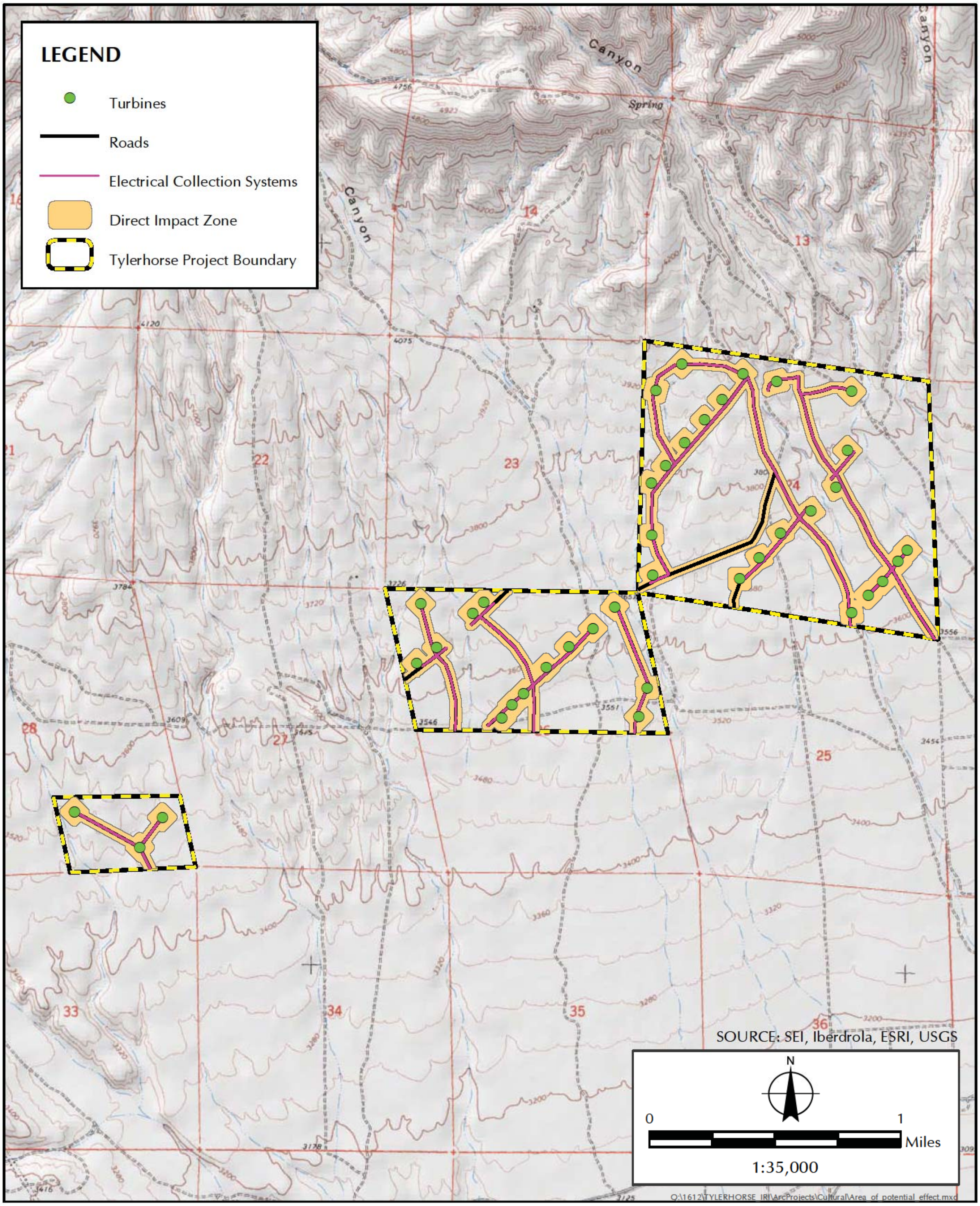


FIGURE 2.1-3

Topographic Map with USGS 7.5-minute Quadrangle Index



IBERDROLA RENEWABLES

FIGURE 2.1-4

Direct Impact Zone

2.3 PROJECT ELEMENTS

The proposed project involves the construction and use of up to 40 wind turbines that would generate up to 60 MW of power in total, as well as a 34.5-kV underground electrical collection system linking each turbine to an off-site substation previously permitted by Kern County. Although the existing roads would be used to the greatest extent practicable, approximately 6.73 miles of new unpaved roads would be constructed to serve as access roads from the existing road network to the turbines and associated facilities in addition to the installation of underground electrical and fiber optic lines alongside the roads.

2.3.1 Wind Turbine Generators

The project would include up to 40 wind turbine generators for a total installed capacity of up to approximately 60 MW. Depending on the final number of each type of wind turbine selected, fewer turbines may be installed.

The wind turbine generators would be arranged in parallel arrays (turbine strings) running north-northeast to south-southwest. Spacing of the wind turbines along the arrays would be based on the final turbine selection. In general, the turbines are spaced 2.5 to 3 rotor diameters apart side-to-side and 6 to 8 rotor diameters between downwind turbine strings. The project would use three-bladed wind turbine generators, each ranging from 1.5 MW to 3.0 MW (generator nameplate capacity).

Wind turbines consist of three primary components: a tubular steel tower, rotor blades, and a nacelle. Basic components of the wind turbine generators are described as follows.

2.3.1.1 Tower Structures

The towers that support the wind turbine generators would be tapered monopoles. The towers are assembled at each turbine pad site from three or four prefabricated sections (base; middle, lower-middle, or top-middle; and top). The wind turbine towers would be up to approximately 350 feet high at hub height, and wind turbine rotors would be up to approximately 300 feet in diameter, for a maximum total height from tower base to blade tip of up to approximately 500 feet. The 15- to 18-foot-diameter wind turbine towers would be mounted on concrete foundations approximately 50 feet in diameter and would each occupy an approximately 80-foot-diameter graveled pad.

2.3.1.2 Rotor Blades

Wind turbine generators are powered by three fiberglass epoxy or polyester resin blades connected to a central rotor hub. Wind creates lift on the blades, causing the rotor hub to rotate. This rotation is transferred to a gearbox where the speed of rotation is increased to the speed required for the attached electric generator that is housed in the nacelle. The rotor blades typically turn at approximately 20 revolutions per minute (rpm) or less.

2.3.1.3 Nacelle

The nacelle houses equipment such as the gearbox, the electrical generators, and various pieces of control equipment, and supports the turbine blades and hub. A yaw system is mounted between the nacelle and the top of the tower on which the nacelle resides. The yaw system is composed of a bearing surface for directional rotation of the turbine and a drive system consisting of a drive motor(s) to keep the turbine pointed into the wind to maximize energy capture. A wind vane and anemometer are mounted at the rear of the nacelle to signal the controller with wind speed and direction information.

Safety and emergency systems are incorporated into the design of the wind turbines to ensure safe and reliable operation, including multiple braking systems; automatic shutdown system; automatic, manual, and remote turbine controls; tower-access safety systems; and lightning protection. Some turbines would include aviation warning lights, as required by the Federal Aviation Administration (FAA). The number of turbines with lights and the lighting pattern of the turbines would be determined in consultation with the FAA.

2.3.2 Electrical Collection System

A transformer at each wind turbine tower would transform the power generated at approximately 690 volts (V) to 34.5 kV for delivery to the off-site substation (depending on turbine manufacturer, the transformer could be housed in the nacelle and or the tower base; typically, the transformer is outside the tower at the base of the turbine). The steel transformer box housing the transformer circuitry, if outside the tower or nacelle, would be mounted on a fiberglass or concrete pad or vault located at the base of each turbine tower. The transformer box would be approximately 7 feet by 8 feet, with the concrete pad or foundation approximately 6 to 10 inches thick. The transformers would be connected to underground power cables (collector lines), which would be installed between turbines to collect power generated by the individual wind turbines. The electrical collection system would consist primarily of medium-voltage, high-density, insulated underground cables that would connect to the off-site substation.

2.3.3 Site Access

Access to the project site would be from the corner of Rosamond Boulevard and along 170th Street west of the town of Rosamond, then along access roads constructed for the Manzana (formerly PdV) Wind Energy Project. While existing roads would be used when possible, new unpaved turbine connector roads would be constructed to serve as access roads across the project site to turbines located within the project site. These turbine connector roads would be tangential to the permanent wind tower pads and would have a permanent travel width of 16 feet and a road base or gravel surface. The permanent road width would be 36 feet, with 10 feet on either side, to be reseeded but retained for future use, as needed. Final service road alignments would depend on the final placement of wind turbines and on the results of the environmental report documenting the results of field investigations, including topography and any other site-specific details to be incorporated into the final design.

2.3.4 Supervisory Control and Data Acquisition System and Fiber Optic Communications

A Supervisory Control and Data Acquisition (SCADA) system would be installed at the project site to collect operating and performance data from each wind turbine to provide for remote operation of the project from the off-site Operations and Maintenance (O&M) facility. The wind turbines would be linked to a central computer in the off-site O&M building by a fiber optic network. The fiber optic cables used for SCADA communication would be placed in the same trenches used for the project's 34-kV electrical collection system.

2.3.5 Site Safety and Security

Warning signs will be posted along the access roads informing the public of construction activities and recommending that the public not enter the site. For areas where public safety risks could exist and site personnel would not be available to control public access (such as excavated foundation holes and electrical collection system trenches), warning signs and temporary fences will be erected. Other areas determined to be hazardous or where issues of security or theft are of concern may also be fenced in coordination with the BLM. Temporary fencing around unfinished turbine bases, excavations, and other hazards will typically be a high-visibility plastic mesh. Security guards, cameras, and/or additional fencing may also be used if necessary to protect public health and safety and project facilities.

The project area would be fenced. Primary security measures for the wind turbines include the following:

- Posting warning and/or no trespassing signage on fences, electrical equipment, and system entrances as necessary

- Keeping all tower access doors and ports locked at all times

- Making outside ladders or other climbing apparatus inaccessible within 15 feet of the ground

The gearboxes located within each tower's nacelle require no additional security. The step-up transformers at the individual wind turbine sites will have pad-locked and wrench-locked cabinets to prevent access to the level gauges and valves. Outside lighting of the wind turbines (beyond FAA requirements) is impractical due to their remote location.

2.3.6 Transportation Management

Equipment and material hauling will be performed to prevent damage to areas outside the project and to minimize interference with normal uses of lands crossed. To this end, a Transportation Management Plan will be developed to address issues specific to transporting turbine components, main assembly cranes, and other large pieces of equipment, such as trucks, loaders, various-sized bulldozers, shovels and backhoes, welding rigs, generators, and compressors.

The Transportation Management Plan will describe regional and local access routes and affected roadways, traffic volumes, pavement conditions, and traffic attenuation measures. The plan will explain travel routes for construction materials, current and predicted traffic volumes for access routes during construction, and Best Management Practices for handling traffic along transit routes to the construction sites. The Transportation Management Plan will also identify the process for complying with any state requirements and obtaining necessary permits.

2.3.7 Traffic Management

A separate Traffic Management Plan will be developed that focuses on traffic and circulation primarily within and in the immediate vicinity of the project to minimize potential hazards from increased truck traffic and worker traffic and to minimize impacts to traffic flow in the vicinity of the project. The Traffic Management Plan will provide project-specific information on traffic and circulation in the project site, truck traffic volumes, traffic situations, areas of congestion, special traffic concerns, and specific traffic management measures, including informational signs, flaggers when equipment blocks throughways, and traffic cones to identify any temporary changes in lane configuration. However, this area is a remote area of the unincorporated area of Kern County; it is anticipated that the project would present minimal traffic circulation impacts.

2.3.8 Aviation Safety

The FAA requires aircraft warning markings on all structures taller than 200 feet. The project's wind turbine towers would be more than 200 feet in height and, therefore, would trigger FAA review. Once the project layout is finalized, a Project Lighting Plan would be developed using guidance from FAA Technical Note: Developing Obstruction Lighting Standards for Wind Turbine Farms.[9] Aviation warnings for a wind energy project include medium-intensity red strobe warning lights placed on the nacelles of the turbines on each end of a turbine string, as well as on every third or fourth turbine. Once the exact marking plan is developed, it will be submitted to the FAA for review.

The project applicant will submit a Notice of Proposed Construction or Alteration (Form 7460.1) to the FAA for each tower to ensure compliance with FAA regulations (including lighting regulations) and to avoid potential safety issues associated with air navigation. Upon review, the FAA would issue a determinative notice assessing the hazard potential of the project. The FAA would also identify when notification of actual construction is required. A determination of no hazard is anticipated for the project based on the issuance of determinations of no hazard for other similarly situated projects.

2.3.9 Grounding

Every wind turbine foundation will have grounding equipment to discharge electrical energy into the earth when the wind turbine builds up an electrical charge by being struck by lightning or equipment malfunction. The equipment may consist of a copper-cable grounding mat cast in place when the base is constructed or some other grounding method specified by the turbine manufacturer and electrical design code.

[9] Federal Aviation Administration. November 2005. *FAA Technical Note: Developing Obstruction Lighting Standards for Wind Turbine Farms*. Federal Aviation Administration.

SECTION 3.0
REGULATORY FRAMEWORK

This section identifies the federal statutes, ordinances, or policies that govern the conservation and protection of cultural resources that must be considered during the decision-making process for projects that have the potential to affect cultural resources. Land use decisions made by the BLM are governed by several statutes and regulations, most importantly the Federal Land Policy and Management Act of 1976 (FLPMA; 43 U.S.C. 1701 *et seq.*), regulations in 43 CFR 1600 *et seq.*, NEPA, and regulations established by the Council on Environmental Quality (40 CFR 1500–1508).[10] The BLM has developed manuals and handbooks, most recently the Land Use Planning Handbook BLM Handbook H-1601-1, that provide guidance for land use plans and decisions.[11]

3.1 FEDERAL

3.1.1 National Historic Preservation Act of 1966[12]

Enacted in 1966 and amended most recently in 2006, the NHPA declared a national policy of historic preservation and instituted a multifaceted program, administered by the Secretary of the Interior, to encourage the achievement of preservation goals at the federal, state, and local levels. The NHPA authorized the expansion and maintenance of the NRHP, established the position of State Historic Preservation Officer (SHPO) and provided for the designation of State Review Boards, set up a mechanism to certify local governments to carry out the purposes of the NHRA, assisted Native American tribes to preserve their cultural heritage, and created the Advisory Council on Historic Preservation (ACHP). Its implementing regulations, 36 CFR 800, are described below as Section 106.

3.1.1.1 Section 106

Section 106 of the NHPA states that federal agencies with direct or indirect jurisdiction over federally funded, assisted, or licensed undertakings must take into account the effect of the undertaking on any historic property that is included in or eligible for inclusion in the NRHP and that the ACHP must be afforded an opportunity to comment, through a process outlined in the ACHP regulations at 36 CFR Part 800, on such undertakings. The Section 106 process involves identification of significant historic resources within an APE; determination if the undertaking will cause an adverse effect on historic resources; and resolution of those adverse effects through execution of a Memorandum of Agreement or Programmatic Agreement. In addition to the ACHP, the SHPO, federally recognized Native American Tribes, and applicants for federal permits/leases/funds participate in the process with the federal agency. Other interested members of the public—including individuals, organizations, and state-recognized Native American Tribes—are provided with opportunities to participate in the process.

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[10] Bureau of Land Management. 11 March 2005. *Land Use Planning Handbook BLM Handbook H-1601-1*. Introduction, p. 1. Available at: http://www.blm.gov/nhp/200/wo210/landuse_hb.pdf

[11] Bureau of Land Management. 11 March 2005. *Land Use Planning Handbook BLM Handbook H-1601-1*. Available at: http://www.blm.gov/nhp/200/wo210/landuse_hb.pdf

[12] *United States Code*, 16 USC 470.

3.1.1.2 National Register of Historic Places

The NRHP was established by the NHPA of 1966 as

> an authoritative guide to be used by federal, state, and local governments, private groups, and citizens to identify the Nation's cultural resources and to indicate what properties (sites, districts, objects, buildings, and structures) should be considered for protection from destruction or impairment.[13]

The NRHP recognizes properties that are significant at the national, state, and local levels. The register was established and is maintained by the Secretary of the Interior. To be eligible for listing in the NRHP, a resource must be significant in American history, architecture, archaeology, engineering, or culture. Districts, sites, buildings, structures, and objects of potential significance must also possess integrity of location, design, setting, materials, workmanship, feeling, and association. Anyone can recommend a historic property for listing to the National Register, but it is the federal agency responsible for an undertaking that makes the determination of eligibility. A property is eligible for the NRHP if it is significant under one or more of the following criteria:[14]

Criterion A: It is associated with events that have made a significant contribution to the broad patterns of our history.

Criterion B: It is associated with the lives of persons who are significant in our past.

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

Criterion D: It has yielded, or may be likely to yield, information important in prehistory or history.

Cemeteries, birthplaces, or graves of historic figures; properties owned by religious institutions or used for religious purposes; structures that have been moved from their original locations; reconstructed historic buildings; and properties that are primarily commemorative in nature are not considered eligible for the NRHP unless they satisfy certain conditions. In general, a resource must be at least 50 years old to be considered for the NRHP, unless it satisfies a standard of exceptional importance.[15]

3.1.2 Federal Land Policy and Management Act of 1976

Legislation establishes public land policy and guidelines for the administration, management, protection, development, and enhancement of public lands. Regulations under FLPMA (43 USC 1701 *et seq.*) established the procedures that the BLM follows in managing public lands. Elements

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[13] *Code of Federal Regulations*, 36 CFR 60.2.

[14] *Code of Federal Regulations*, 36 CFR 60.4.

[15] U.S. Department of the Interior, National Park Service. 2002. "How to Apply the National Register Criteria for Evaluation." *National Register Bulletin 15*.

of FLPMA that could apply to energy development activities are the Federal Land Transaction Facilitation Act (43 USC 2301 *et seq.*) and the Federal Land Exchange Facilitation Act (43 USC 1716), which address land sales, disposals, and exchanges. Although FLPMA addresses the management of public lands, not tribal lands, the BLM must comply with FLPMA regulations when it is involved in reviewing and approving energy development activities on tribal lands.

3.1.3 43 CFR 1600 *Et Seq.*

The purpose of this subpart is to establish in regulations a process for the development, approval, maintenance, amendment, and revision of resource management plans and the use of existing plans for public lands administered by the BLM.

3.1.4 Land Use Planning Handbook BLM Handbook H-601-1

With regard to cultural resources, the handbook requires the identification of cultural resources, recognition of potential conflicts with proposed uses, and categorization according to six uses: scientific use, conservation for future use, traditional use, public use, experimental use, and discharged from management. Each use implies a different management approach and desired outcome. Consistency with the NHPA is required, including the provisions for consultation with the SHPO and tribal leaders.

3.1.5 National Environmental Policy Act BLM Handbook H-1790-1

The BLM's regulations regarding NEPA are set forth in the National Environmental Policy Act BLM Handbook H-1790-1.[16] Treatment of cultural resources by the BLM is detailed in its Manual Series 8100, *et seq*.[17] The BLM Manual addresses the scope of the agency's responsibilities with respect to cultural resources under several statutes, executive orders, and agreements:

- Antiquities Act of 1906
- Historic Sites Act
- Reservoir Salvage Act
- Archaeological and Historic Preservation Act
- NHPA
- Executive Order 11593
- American Indian Religious Freedom Act
- Archaeological Resources Protection Act
- Native American Graves Protection and Repatriation Act
- National Trails System Act
- Executive Order 13007
- Executive Order 13287
- National Programmatic Agreement among the BLM, the ACHP, and the National Conference of SHPOs

[16] Bureau of Land Management. 25 October 1988. *National Environmental Policy Act BLM Handbook H-1790-1*. Available at: http://www.blm.gov/nhp/efoia/wo/handbook/h1790-1.pdf

[17] Bureau of Land Management. 3 December 2004. *Manual Series 8100*. Available at: www.blm.gov

3.1.6 West Mojave Plan

The proposed project area falls within the area covered by the BLM West Mojave Plan, whose conservation program applies to both public and private lands.[18] The proposed project would pursue compliance with the goals and implementation policies set forth in the Plan. The Plan is an amendment to the California Desert Conservation Area (CDCA) Plan, which recognizes the importance of paleontological, prehistoric, and historic resources and places of cultural and religious value to Native Americans. In addition to its responsibilities under applicable federal laws and regulations, the Plan identifies six specific planning and management goals related to cultural resources:

- Conduct an inventory of cultural resources to the fullest extent possible to expand knowledge of these resources
- Protect and preserve to the greatest extent possible representative samples of these resources
- Give full consideration to these resources during land use planning and management decisions
- Manage to maintain and enhance resource values
- Ensure that the BLM's activities avoid inadvertent damage to cultural resources
- Achieve proper data recovery where adverse impacts cannot be avoided

The CDCA Plan also states that Native American values will be considered in all CDCA land use and management decisions.[19]

3.1.7 Native American Graves Protection and Repatriation Act of 1990

The Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) sets provisions for the intentional removal and inadvertent discovery of human remains and other cultural items from federal and tribal lands. It clarifies the ownership of human remains and sets forth a process for repatriation of human remains and associated funerary objects and sacred religious objects to the Native American groups claiming to be lineal descendants or culturally affiliated with the remains or objects. It requires any federally funded institution housing Native American remains or artifacts to compile an inventory of all cultural items within the museum or with its agency and to provide a summary to any Native American tribe claiming affiliation.

[18] Bureau of Land Management. January 2005. *West Mojave Plan—A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment Final Environmental Impact Report and Statement*. Vol. 1, Sec. 1.1.1, p. 1-1. Moreno Valley, CA. Available at: http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-1-Chapter1_Bookmarks.pdf

[19] Bureau of Land Management. January 2005. *West Mojave Plan—A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment Final Environmental Impact Report and Statement*. Vol. 1, Sec. 3.7.3, p. 293. Moreno Valley, CA. Available at: http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-1-Chapter1_Bookmarks.pdf

SECTION 4.0
METHODS

This section describes the methods employed in the characterization and evaluation of cultural resources at the proposed project site. The study methods were designed to provide the substantial evidence required to address the scope of analysis recommended in the BLM Manual 8110 related to cultural resources, including prehistoric and historic resources and Native American sacred sites and traditional cultural properties.

4.1 PREHISTORIC AND HISTORIC RESOURCES

4.1.1 Class I Literature Review

Records searches were conducted at the SSJVIC, housed at California State University, Bakersfield, in November 2004[20] and April 2005[21] to determine if the proposed project may have the potential to adversely affect prehistoric and historic resources. Record search results were subsequently updated on December 13, 2011. The records searches encompassed the cultural resources study area consisting of the entire potential wind energy project property of 1,207 acres plus a 1-mile buffer. The purpose of the review was to (1) identify archaeological sites and isolates previously documented in the project area and within 1 mile of project area boundaries; (2) determine which portions of the project area may have been previously surveyed, when those surveys took place, and how the surveys were conducted; and (3) ascertain the potential for archaeological resources to be found in the project area. This search also included a review of the appropriate USGS topographic maps on which archaeological sites are plotted, archaeological site records, and data from previous surveys and research reports. In addition, the State of California Historic Resource Inventory Database, listings in the NRHP, California Register of Historical Resources, California Historical Landmarks, and California Points of Historical Interest were examined to ascertain the presence of designated, evaluated, and/or historic-era resources within the proposed project areas. Finally, the Class I Inventory included research involving published and unpublished literature to collect prehistoric, historic, and ethnographic data pertaining to the history of human uses of land and resources within the project area.

Coordination with BLM archaeologist Mr. Donald J. Storm was undertaken to determine if the BLM had information regarding any additional cultural resources that may be located within the cultural resources study area. The BLM record search provided no additional data beyond those resulting from the SSJVIC record search.

4.1.2 Class III Intensive Field Surveys

Sapphos Environmental, Inc. conducted Class III intensive field surveys in accordance with the supplemental instructions provided by the BLM and the SHPO (Appendix C, *BLM and SHPO Correspondence*) and within the guidelines of the BLM Manual 8110, section 210.

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[20] Sapphos Environmental, Inc. 12 November 2004. Memorandum for the Record No. 10. Project No. 1378-002. Pasadena, CA.

[21] Sapphos Environmental, Inc. 15 April 2005. Memorandum for the Record No. 11. Project No. 1378-002. Pasadena, CA.

Class III surveys are full-coverage surveys intended to completely assess the presence of cultural resources within the area surveyed. Class III surveys were conducted on the entire 1,207-acre APE, which included the project's 354.1-acre DIZ plus an additional 852.9 acres outside of the DIZ (Figure 4.1.2-1, *Areas Surveyed*); these additional areas were surveyed to provide flexibility in project design by allowing project elements to be slightly realigned without triggering the need for additional cultural surveys.

Field surveys were conducted in two sessions. The first session, consisting of a total of 6 days, was conducted from November 30 to December 5, 2011. Additional surveys were conducted in three rotations, for a total of 5 days, from February 11 to February 25, 2013. Surveys were conducted by Sapphos Environmental, Inc. archaeologists under BLM Cultural Use Permit CA-10-37.

4.1.2.1 Field Methods

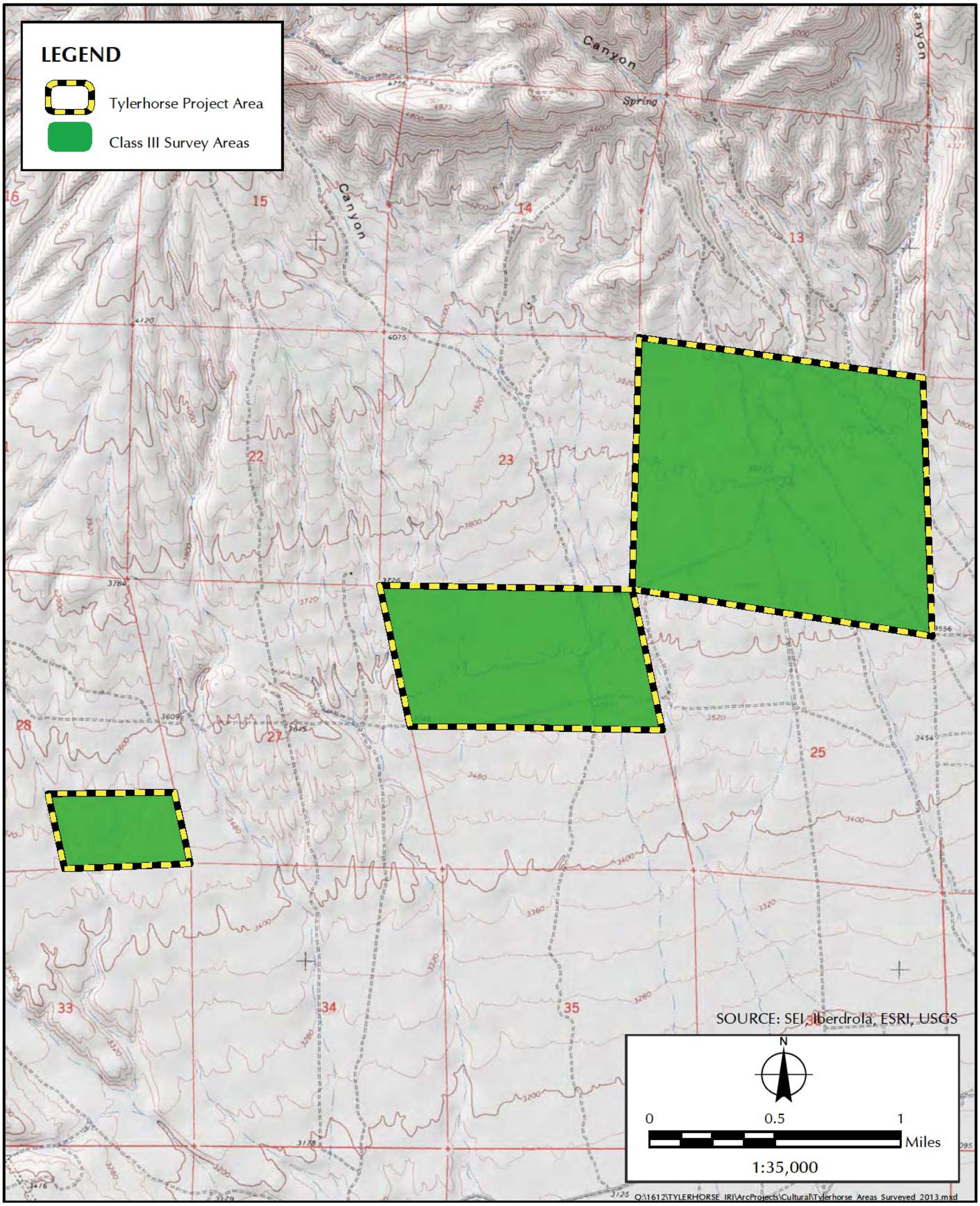
The Class III intensive survey consisted of the systematic survey of the proposed project's 354.1-acre DIZ and an additional 852.9 acres outside of the DIZ. In accordance with the requirements of a Class III intensive survey, these areas were surveyed on foot with field investigation teams composed of two to three persons, spaced at 15- to 20-meter intervals, depending on terrain type and ground visibility. Survey areas were located in the field with global positioning system (GPS) receivers. Roads were used to access survey areas by vehicle. If the road did not extend to the limits of the survey area, the crew walked the remaining distance. No vehicles were used outside paved, dirt, or gravel roads.

If archaeological materials were encountered, the crew examined the area closely and temporarily marked any artifacts with pin flags to determine the extent of the cultural deposit (site or isolate). Field mapping of cultural resources was supported by an Ashtech Mobile Mapper 100 handheld GPS device with sub-meter accuracy. Sites and isolates were given field numbers using the prefix "TY-." All resources encountered were recorded on DPR site record forms, sketch-mapped and photographed, and their locations mapped on the appropriate UGSG quadrangles using GPS receivers, and map and compass, as necessary. Elevations were determined from USGS maps. Collection was limited to at-risk artifacts. All DPR forms will be submitted to the SSJVIC for assignment of primary numbers and permanent trinomial designations.

4.1.3 Agency Coordination

Coordination with the BLM and resource agencies was undertaken to further evaluate the potential presence of cultural resources.

In the early planning phases of the proposed project, the project applicant considered the potential use of lands managed by the BLM. The project applicant determined that it was feasible to develop the wind energy project exclusive of BLM parcels. However, informal consultation was undertaken with the BLM at that time to review the scope of the cultural resources that have the potential to occur in the proposed project area and field methods to be used in assessing the presence or absence of these resources. Coordination with the BLM continued throughout the current phase of project planning in the form of emails and phone conversations with Mr. Donald J. Storm, archaeologist at the BLM Ridgecrest Field Office. Mr. Storm provided Sapphos Environmental, Inc. with current information regarding site conditions, agency expectations, and tribal consultation efforts undertaken by the BLM.



IBERDROLA RENEWABLES

FIGURE 4.1.2-1
Areas Surveyed

4.2 NATIVE AMERICAN SACRED SITES AND HUMAN REMAINS

The initial consultation and collaboration outreach regarding this undertaking was conducted by the BLM in June 2009. Formal invitation letters were submitted to the Kern Valley Indian Council, the Tubatulabals of the Kern Valley, the Nuui Cunni Interpretative Center, and the Monache Inter-Tribal Council. These organizations are the acknowledged leaders of the Tribal communities of eastern Kern County. The communities were invited to apprise the BLM of any comments or concerns regarding this proposal, which was referred to at that time as the PdV/Manzana Project. A suggested date for the submission of any comments was offered for early August 2009, but nothing was received by the BLM.

During January 2011 a second letter was sent to these Tribal organizations informing them that enXco Development Corporation of San Ramon, California, had submitted a Type III application (CACA-051561) to BLM requesting authorization to erect up to 34 wind turbines on 1,200 acres of BLM-managed public lands. A copy of the initial cultural resources field survey report was also provided to them. An invitation was extended in the letter to these Tribal groups to alert BLM as to whether any cultural resources or Traditional Cultural Properties important to them would be affected by the undertaking. A suggested date for the submission of any comments to BLM was offered for mid-March 2011, but nothing was received at that time by the BLM.

A third set of invitation letters was provided to these Tribal organizations in early April 2013. The focus of these letters was to apprise the Tribal communities to the specific details of the proposed Tylerhorse Wind Energy Project, and again ask if any cultural resources or Traditional Cultural Properties important to them would be affected by the proposed undertaking. A copy of the updated cultural resources survey was also provided to them. A suggested date for the submission of any comments to BLM was offered for mid-May 2013, but nothing has yet been received by the BLM.

In summary, the BLM has received no follow-up to requests for consultation or collaboration from the local California Indian Tribal communities of eastern Kern County regarding the project, and no areas of Tribal significance has been identified or are known to occur within the project's APE.

4.3 CONSISTENCY WITH FEDERAL MANAGEMENT PLANS

4.3.1 West Mojave Plan

The proposed project will entail the use of lands administered by the BLM for installation of met mast towers to support development of alternative energy, which is consistent with West Mojave management plan goals for management of land for multiple uses. In addition, the installation of these towers to support development of alternative energy is consistent with West Mojave plans for energy conservation. Moreover, the proposed project will avoid sensitive cultural resources and, therefore, is consistent with the goals for conservation of such resources as specified in the West Mojave Plan.

In accordance with the CDCA Plan, Native American values were considered during land use planning and management decisions.[22]

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[22] Bureau of Land Management. January 2005. *West Mojave Plan—A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment Final Environmental Impact Report and Statement*. Vol. 1, Sec. 3.7.3, p. 293. Available at: http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-1-Chapter1_Bookmarks.pdf

SECTION 5.0
RESULTS

This section provides the characterization and evaluation of the potential for the proposed project to affect cultural resources within the proposed project's APE. The results described in this section provide the substantial evidence required to address the BLM scope of analysis, required pursuant to the NEPA and the NHPA, related to prehistoric resources, historic resources, Native American sacred sites, and human remains. Although both prehistoric and historic period resources in the proposed project area are considered to be archaeological sites, for clarity of presentation and analysis, the data have been organized chronologically, with prehistoric period context and resources described in relation to archaeological resources, and historic period context and resources described in relation to historic resources. Characterization of both prehistoric and historic archaeological resources, as well as Native American sacred sites, follows these background sections.

5.1 PREVIOUS CULTURAL RESOURCES SURVEYS

The results of the records search conducted at the SSJVIC indicate that portions of project area have been surveyed for archaeological resources. Prior to the current effort, one archaeological investigation had been conducted within the proposed project area and within 1 mile of the proposed project area (Table 5.1-1, *Previous Surveys within One Mile of the Project Area*).

TABLE 5.1-1
PREVIOUS SURVEYS WITHIN ONE MILE OF THE PROJECT AREA

Report No.	Year	Report Title	Authors
KE 02321	1999	Cultural Resources Assessment of Township 10 North, Range 15 West, Sections 10, 11, 14, 15, and 35, Kern County, California	Christopher D. Dore, Ph.D., R.P.A.

5.1.1 Prehistoric and Ethnographic Context

5.1.1.1 Prehistoric Context

Archaeological sequences for the Great Basin and Mojave Desert are grouped into Late Pleistocene and Early, Middle, and Late Holocene time frames, with period and phase definitions varying by region. Two separate sets of period names are in common use. One of the period names has been broadly applied to the Mojave Desert (Table 5.1.1.1-1, *Regional Chronology*), while the other is derived from studies in the Owens Valley and is not discussed here. However, the prehistoric chronology for the region is being refined on a continuing basis, with new discoveries and improvements in the accuracy of dating techniques.

TABLE 5.1.1.1-1
REGIONAL CHRONOLOGY

Epoch	Mojave Desert Region	Dates
Late Pleistocene	Paleo-Indian Period	12,000 to 10,000 BP
Early Holocene	Lake Mojave Period	Circa 10,000 to 7,000 BP
Middle Holocene	Pinto Period	Circa 7,000 to 4,000 BP
Late Holocene	Gypsum Period	Circa 4,000/3,500 to 1,500 BP
	Rose Spring Period	Circa 1,500 to 1,000/600 BP
	Late Prehistoric Period	Circa 1,000 BP to Contact AD 1770

NOTE: a. This date is subject to dispute among archaeologists.

Pre-Paleo-Indian Period, Circa 12,000 BP

Throughout North America, the earliest Pleistocene archaeological sites, which may be earlier than 12,000 years BP, are often referred to as pre-Clovis and are viewed as controversial by many archaeologists because of the lack of dateable contexts and the accuracy of some of the dated materials. One of the most thorough studies on this time period is Emma Lou Davis's 1978 study of Pleistocene Lake China, Ridgecrest, in eastern California.[23]

Paleo-Indian Period, Circa 12,000 BP to 10,000 BP

The subsequent Paleo-Indian period (also known as Clovis Period) is recognized throughout the west by the presence of Clovis-style fluted projectile points and associated artifacts. Recent calibrations of these radiocarbon dates suggest that fluted points may be up to 2,000 years older than previously thought, with a range of about 13,000 to 11,000 calendar years BP. Although many fluted points have been found in the Great Basin and Mojave Desert, none of these have been recovered in dateable contexts.[24] Davis identified several sites associated with the shoreline at Pleistocene Lake China that contained Clovis points.[25] These have recently been relocated and investigated by Basgall.[26] In the vicinity of the proposed project area, Clovis-like points have been reported in the Antelope Valley and the adjacent mountains.[27,28] Clovis points have been interpreted as tools used for hunting the Pleistocene megafauna with which they are associated at sites in the southwestern United States.

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[23] Davis, E.L. 1978. "The Ancient Californians: Rancholabrean Hunters of the Mohave Lakes Country." *Science Series, 29*. Los Angeles, CA: Natural History Museum.

[24] Dillon, B.D. 2002. "California Paleo-Indian: Lack of Evidence, or Evidence of Lack?" In *Essays in California Archaeology: A Memorial to Franklin Fenega*, ed. W.J. Wallace and F.A. Riddell. Berkeley, CA: University of California Publications, pp. 110–128.

[25] Davis, E.L. 1978. "The Ancient Californians: Rancholabrean Hunters of the Mohave Lakes Country." *Science Series, 29*. Los Angeles, CA: Natural History Museum.

[26] Basgall, M. 2003. "Revisiting the Late-Pleistocene/Early-Holocene, Archaeology of Pleistocene Lake China and the CRBR Locality." *Current Research in the Pleistocene,* 20: 3–5.

[27] Earle, D., and Associates. 1997. *Ethnohistoric Overview of the Edwards Air Force Base Region and the Western Mojave Desert*. Palmdale, CA, p. 54. Prepared for: AFFTC/EMXR, Edwards Air Force Base, CA.

[28] Sutton, M.Q., and P. Wilke. 1984. "New Observations on a Clovis Point from the Central Mojave Desert, CA." *Journal of California and Great Basin Anthropology*, 6(1): 113–115.

Lake Mojave Period, Circa 10,000 BP to 7,000 BP

The quantity of archaeological remains in the western United States increases at the beginning of the Holocene period, about 11,000 years BP. Sites from the Early Holocene are found along the shorelines of Pleistocene dry lakes and are characterized by the occurrence of large stemmed and concave base projectile points, as well as other distinctive flaked stone tools. The point types that are associated with this period are known as Lake Mojave and Silver Lake projectile points, named for the dry lakes where they were first found.[29] Lake Mojave sites are rare in the Mojave Desert,[30] but at least five sites on Edwards Air Force Base with Lake Mojave period points were reported.[31]

Pinto Period, Circa 7,000 BP to 4,000 BP

With the onset of the Middle Holocene, the climate became dryer and hotter throughout the deserts of the western United States. Under these conditions, the subsistence focus most likely shifted away from lakeshores and toward upland resources. The Middle Holocene is characterized by the appearance of Pinto series projectile points,[32] as well as points that are similar to the Gatecliff series that has been defined for the central Great Basin.

Pinto series projectile points are smaller than Lake Mojave points, and their name derives from the Pinto Basin, where they were first defined.[33] The period is not well defined because of a paucity of chronometric data and disagreement on the definition and dating of the Pinto series.[34]

Gypsum Period, Circa 4,000/3,500 BP to 1,500 BP

About 4,000 years ago, climatic conditions shifted again, this time to the cooler, moister conditions characterizing the Late Holocene. An increase in population, trade, and social complexity occurred with the more favorable climate conditions. There was an increase in the use of seeds, which is indicated by the presence of milling stones; however, hunting of a variety of fauna, including mountain sheep, remained an important part of the economy. There is evidence of larger settlements early in the Late Holocene. This period is characterized by the replacement of Pinto points with Gypsum and Elko series projectile points. In the Owens Valley region, at approximately the same time period, Pinto points were replaced by Humboldt and Elko series projectile points.

[29] Campbell, E.W.C., W.H. Campbell, E. Antevs, C.E. Amsden, J.A. Barbieri, and F.D. Bode. 1937. *The Archaeology of Pleistocene Lake Mojave*. Southwest Museum, Paper No. 9. Los Angeles, CA.

[30] Sutton, M.Q. 1987. "Some Aspects of Kitanemuk Prehistory." In *Prehistory of the Antelope Valley, California: An Overview*. Occasional Paper No. 1. Lancaster, CA: Antelope Valley Archaeological Society, p. 229.

[31] Earle, D., and Associates. 1997. *Ethnohistoric Overview of the Edwards Air Force Base Region and the Western Mojave Desert*. Palmdale, CA, p. 54. Prepared for: AFFTC/EMXR, Edwards Air Force Base, CA.

[32] Sutton, M.Q. 1996. "The Current Status of Archaeological Research in the Mojave Desert." *Journal of California and Great Basin Anthropology*, *18*(2): 231.

[33] Campbell, E.W.C., and W.H. Campbell. 1935. *The Pinto Basin Site*. Southwest Museum, Paper No. 9. Los Angeles, CA.

[34] Warren, C.N. 2002. "Time, Form, and Variability: Lake Mojave and Pinto Periods in Mojave Desert Prehistory." In *Essays in California Archaeology: A Memorial to Franklin Fenenga*, ed. W.J. Wallace and F.A. Riddell. Berkeley, CA: University of California Archaeological Research Facility, pp. 129–141.

Several well-known sites contain components from this time period. These include the Rose Spring site (CA-INY-372)[35] and the Coso Junction Ranch site (CA-INY-2284)[36] in the Rose Valley.

Rose Spring Period, Circa 1,500 to 1,000/600 BP

Throughout the Great Basin, about 1,500 years ago, Elko and other dart-size points were replaced with Rose Spring and Eastgate projectile points, often grouped together under the label "Rosegate."[37] This occurrence, which correlates with the introduction of the bow and arrow around AD 500,[38] may also mark the beginning of the Numic expansion, which most researchers believe emanated from southeastern California. The appearance of Rose Spring series projectile points marks the beginning of the Rose Spring period in the Mojave Desert.[39,40] Major villages and numerous other sites dating to this time period have been recorded in eastern California. Many of these contain bedrock milling features and portable milling stones.

Late Prehistoric Period, Circa 1,000 BP, to Historic Contact, Circa AD 1770

The final time period is known as the Late Prehistoric in the Mojave Desert. The period began about 1,000 BP and lasted until historic contact. Desert side-notched and Cottonwood series projectile points replaced the larger points from the previous period, and pottery first appeared in the form of Owens Valley brown ware. During this period, trade networks increased along the Mojave River and over the San Gabriel Mountains. Earle et al. suggest that groups from the Antelope Valley served as intermediaries among populations located in peripheral areas.[41]

5.1.1.2 Ethnographic Context

The proposed project area is located at the transition between the Tehachapi Mountains and the western Mojave Desert, an area that has been inhabited by various Native American groups such as the Kawaiisu, Chemehuevi, Tataviam, Kitanemuk, Vanyume, and Serrano.[42] Two main groups, the Kawaiisu and the Kitanemuk, occupied the proposed project area.

The Kawaiisu were hunters and gatherers who left the Mojave Desert to inhabit the Tehachapi Mountains and southern Sierra Nevada region. Their migration is linked to the Numic expansion,

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[35] Lanning, E.P. 1963. "Archaeology of the Rose Spring Site INY-372." *American Archaeology and Ethnology*, *49*(3): 237–336. Berkeley, CA: University of California Publications.

[36] Allen, M. 1986. "The Effects of Bow and Arrow Technology on Lithic Production and Exchange Systems: A Test Case Using Debitage Analysis. " M.A. thesis, Department of Anthropology, University of California, Los Angeles.

[37] Thomas, D.H. 1981. "How to Classify the Projectile Points from Monitor Valley, Nevada." *Journal of California and Great Basin Anthropology, 3*(1): 7–43.

[38] Yohe, R.M. 1998. "The Introduction of the Bow and Arrow and Lithic Resource Use at Rose Spring (CA-INY-372)." *Journal of California and Great Basin Anthropology, 20*: 26–52.

[39] Lanning, E.P. 1963. "Archaeology of the Rose Spring Site INY-372." *American Archaeology and Ethnology*, *49*(3): 237–336. Berkeley, CA: University of California Publications.

[40] Yohe, R.M. 1998. "The Introduction of the Bow and Arrow and Lithic Resource Use at Rose Spring (CA-INY-372)." *Journal of California and Great Basin Anthropology, 20*: 26–52.

[41] Earle, D., and Associates. 1997. *Ethnohistoric Overview of the Edwards Air Force Base Region and the Western Mojave Desert.* Palmdale, CA, p. 54. Prepared for: AFFTC/EMXR, Edwards Air Force Base, CA.

[42] Kroeber, A. 1925. "Handbook of the Indians of California." *Bureau of American Ethnology Bulletin,* 78: 612–613. Washington, DC: Smithsonian Institution Press.

during which speakers of the Numic branch of the Uto-Aztecan language family moved north from Southern California into the Great Basin. The Kawaiisu were organized into small, nonsedentary bands that traveled seasonally, following the available resources. After migrating, the Kawaiisu modified their subsistence practices and adopted the consumption of acorn as a staple, with other desert plants playing a minor role in their diet.[43] Berries and greens of different types were also part of their diet, as well as local seeds such as wild rice, chia, sunflower, and buckwheat, which are still available in the region. Salt was also important in their diet and was collected from the Kohen Lake, 30 miles from the Tomo-Kahni area, or from Proctor Lake in the Tehachapi Valley when water levels at Kohen Lake were low.[44] Basket making was also a tradition among the Kawaiisu, who developed a particular type of coiled basket that is not found in the Great Basin or elsewhere in California.[45]

Raw material for tool making such as chert was likely obtained from areas near Red Rock Canyon, while obsidian was acquired through trade with groups from the Coso Volcanic Field (east of the Sierra Nevada). The Kawaiisu were involved in long-distance exchange, which was facilitated by their geographic position between the San Joaquin Valley and the Great Basin groups.[46]

The Kawaiisu are also known for their polychromatic rock art. A famous Kawaiisu rock art site exhibiting many pictographic elements is Teddy Bear Cave (CA-KER-508), located along the western edge of Sand Canyon approximately 12 miles northeast of Tehachapi and the proposed project area. Teddy Bear Cave is one of the sites within Nettle Spring, an archaeological site complex that also includes CA-KER-230 (a habitation site). Teddy Bear Cave is characterized by several rock features in the form of rock rings, over 400 bedrock mortars, and rock art.[47] Sutton reports that the Kawaiisu believed that their people and the world were created at the location of this site.[48]

The Kitanemuk inhabited the Tehachapi Mountains at the northwestern edge of the Antelope Valley. The Kitanemuk have been referred to as the main inhabitants of the Antelope Valley, but they are nonetheless one of the least known groups in California.[49,50] The Kitanemuk culture shared more similarities with southern coastal groups such as the Chumash than with the Great Basin groups.[51] They spoke a Serrano language (a language of the Takic branch of the Uto-Aztecan family) that was spoken by groups living as far as Yucca Valley and Twentynine Palms.

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[43] Zigmond, M. 1986. "Kawaiisu." In *Handbook of North American Indians*, ed. W.L. D'Azevedo. Vol. 11, Great Basin. Washington, DC: Smithsonian Institution Press, p. 398.

[44] Tomo-Kahni State Historic Park. 2005. Web site. Available at http:// www.bakersfield.org/tkpark/kawaiisu.htm

[45] Zigmond, M. 1986. "Kawaiisu." In *Handbook of North American Indians*, ed. W.L. D'Azevedo. Vol. 11, Great Basin. Washington, DC: Smithsonian Institution Press, p. 399.

[46] Zigmond, M. 1986. "Kawaiisu." In *Handbook of North American Indians*, ed. W.L. D'Azevedo. Vol. 11, Great Basin. Washington, DC: Smithsonian Institution Press, p. 399.

[47] Sutton, M.Q. 2001. "Excavations at Teddy Bear Cave (CA-KER-508), Tomo-Kahni State Park, Southern Sierra Nevada, California." *Pacific Coast Archaeological Society*, *37*(1): 1–26.

[48] Sutton, M.Q. 2001. "Excavations at Teddy Bear Cave (CA-KER-508), Tomo-Kahni State Park, Southern Sierra Nevada, California." *Pacific Coast Archaeological Society*, *37*(1): 1–26.

[49] Sutton, M.Q. 1979. "Some Thoughts of the Prehistory of the Antelope Valley." Paper presented at the 1979 Annual Meeting of the Society for California Archaeology, San Luis Obispo, CA.

[50] Sutton, M.Q. 1987. "Some Aspects of Kitanemuk Prehistory." In *Prehistory of the Antelope Valley, California: An Overview*. Occasional Paper No. 1. Lancaster, CA: Antelope Valley Archaeological Society.

[51] Blackburn, T.C., and L.J. Bean. 1978. "Kitanemuk." In *Handbook of North American Indians,* ed. W. L. D'Azevedo.

The Kitanemuk lived in permanent village sites that functioned as year-round base camps. During the spring, summer, and fall months, gathering expeditions were sent to satellite villages or temporary camps in pursuit of available seasonal resources.[52]

Modern-day descendants of the Kawaiisu and the Kitanemuk continue to live in Bakersfield and in the rural communities of Kern County.

5.1.2 Resource Characterization

5.1.2.1 Previously Recorded Prehistoric Resources

The results of the Class I literature review indicate that six prehistoric cultural resources have previously been recorded within the cultural resources study area. Five of the six prehistoric resources fall within the 1-mile radius around the project area (Figure 5.1.2.1-1, *Cultural Resources within the Cultural Resources Study Area*). One previously recorded archaeological site (CA-KER-1906) is located within the proposed project area (Table 5.1.2.1-1, *Previously Recorded Prehistoric Archaeological Resources within One Mile of the Project Area*; Figure 5.1.2.1-1; and Appendix B). CA-KER-1906 is described below.

TABLE 5.1.2.1-1
PREVIOUSLY RECORDED PREHISTORIC ARCHAEOLOGICAL RESOURCES WITHIN ONE MILE OF THE PROJECT AREA

Primary Number	Trinomial	Description	Within Proposed Project Area	Within 1 Mile of Project Area
P-15-000752	CA-KER-752	Small midden		×
P-15-001198	CA-KER-1198	Single mortar cup in a decomposed granite outcrop		×
P-15-001195	CA-KER-1195	Two bedrock mortars		×
P-15-001193	CA-KER-1193	Small pictograph and bedrock mortar		×
P-15-000273	CA-KER-273	Pictograph, bedrock mortars; occupation site		×
P-15-001906	CA-KER-1906	Two mortars worked into a single granite boulder; milling station	×	

Vol. 8. Washington, DC: Smithsonian Institution Press, p. 564.

[52] Earle, D., and Associates. 1997. *Ethnohistoric Overview of the Edwards Air Force Base Region and the Western Mojave Desert*. Palmdale, CA, p. 10. Prepared for: AFFTC/EMXR, Edwards Air Force Base, CA.

Figure 5.1.2.1-1, *Cultural Resources within the Cultural Resources Study Area* (Removed for Public Disclosure)

CA-KER-1906

Site CA-KER-1906 was originally recorded in 1984 by BLM archaeologist J. Oxendine and was described as two shallow mortars on a single boulder, with a possible pestle adjacent to the boulder.[53] Sapphos Environmental, Inc. located site CA-KER-1906 (Image 5.1.2.1-1, *Site CA-KER-1906*) within the proposed project area during the Class III survey, and rerecorded the site on a DPR 523 form (Appendix B). The boulder and mortars appeared as described by Oxendine, but Sapphos Environmental, Inc. archaeologists did not locate the pestle.

Image 5.1.2.1-1, *Site CA-KER-1906*

Although this site is located in the proposed project area, it is not located within the project's DIZ.

[53] Oxendine, J., Bureau of Land Management. 1984. Primary Record for Archeological Site CA-KER-1906.

5.1.2.2 Newly Recorded Prehistoric Resources

The results of the Class III field surveys resulted in the recording of five new prehistoric resources (Table 5.1.2.2-1, *Newly Recorded Prehistoric Archaeological Resources)*. All five resources are located within the project area (the APE), although none are located within the project footprint itself (the DIZ).

TABLE 5.1.2.2-1
NEWLY RECORDED PREHISTORIC ARCHAEOLOGICAL RESOURCES

Primary	Description	Within APE	Within DIZ
TY-Site-1	Single rhyolite boulder with eight observed milling surfaces	×	
TY-Site-2	Two granitic boulders with four observed milling surfaces on each boulder	×	
TY-Site-3	Milling station composed of multiple boulders and milling surfaces; three projectile points; one granitic mano; an associated flake scatter with two loci	×	
TY-Site-4	Large granitic boulder with one observed milling surface	×	
TY-Isolate-1	Single chert projectile point	×	

TY-Site-1

TY-Site-1 is composed of a single rhyolite boulder measuring 2.19 meters by 2.15 meters featuring eight observed milling surfaces, all bedrock mortars (Image 5.1.2.2-1, *TY-Site-1*; Figure 5.1.2.2-1, *TY-Site-1 Bedrock Mortar Detail*). The bedrock mortars range from 5.5 centimeters (cm) to 17 cm in depth and are a mix of saucer, conical, and ovular in shape (Table 5.1.2.2-2, *TY-Site-1 Milling Surfaces*). The boulder is set in an alluvial slope and located approximately 30 meters east of an ephemeral wash. The boulder has 100 percent exposure and is tilted approximately 7 to 10 degrees to the south-southeast. Nearby flora includes juniper (*Juniperus* spp.), Joshua Tree (*Yucca brevifolia*), Mormon Tea (*Ephedra* sp.), and various desert grasses. No artifacts were observed in the vicinity of the boulder.

Figure 5.1.2.2-1, *TY-Site-1 Bedrock Mortar Detail* (Removed for Public Disclosure)

Image 5.1.2.2-1, *TY-Site-1*

TABLE 5.1.2.2-2
TY-SITE-1 MILLING SURFACES

Feature #	Milling Surface #	Length (cm)	Width (cm)	Depth (cm)	Remarks
A	1	13	13	5.5	Saucer mortar partially filled with soil, sand, and grass roots
A	2	15.5	15.5	10	Conical mortar filled with less than 2 cm of soil, pebbles, and grass roots
A	3	17	17	16	Conical mortar partially filled with grass roots, windblown plant material, rat pellets, rabbit pellets, desiccated Juniper seeds, and compact soil
A	4	13.5	13.5	5	Saucer mortar partially filled with soil and loose sand
A	5	12	12	6	Saucer mortar partially filled with soil and loose sand
A	6	11	11	11	Conical mortar partially filled with soil and loose sand
A	7	14	14	11	Conical mortar partially filled with desiccated Juniper seeds, rat pellets, rabbit pellets, windblown leaves, and compact soil
A	8	15	11	7	Oval mortar partially filled with loose soil

At the request of BLM archaeologist Mr. Donald Storm, Sapphos Environmental, Inc. initiated subsurface testing at TY-Site-1 to ascertain the presence of buried cultural materials associated with the bedrock mortar. Sapphos archaeologists Karl Holland, A.J. White, and Barry Brillantes completed five shovel test pits (STPs) in the immediate vicinity of TY-Site-1 (Figure 5.1.2.2-2, *TY-Site-1 Limited Subsurface Testing*). Each STP measured 30 cm in diameter and was excavated in 10-cm levels to a depth of 50 cm. All excavated soils from the STPs were screened by level through a 1/8-inch (3-millimeter) wire mesh screen. No cultural materials were encountered during the subsurface testing.

Figure 5.1.2.2-2, *TY-Site-1 Limited Subsurface Testing* (Removed for Public Disclosure)

TY-Site-2

TY-Site-2 measures 5 meters (east-west) by 4 meters (north-south) and is composed of two granitic boulders with four observed milling surfaces on each boulder (Figure 5.1.2.2-3 *TY-Site-2 Map*; Table 5.1.2.2-3, *TY-Site-2 Bedrock Features*; Image 5.1.2.2-2, *TY-Site-2, Feature A*; Image 5.1.2.2-3, *TY-Site-2, Feature B*). The boulders, located two meters apart, are set in an alluvial slope and are tilted approximately 12 degrees to the southwest. The boulders are fully exposed. The site is located approximately 12 meters east of an ephemeral wash. Nearby flora includes juniper, Joshua Tree, Mormon Tea, and various desert grasses. No artifacts were observed in the vicinity of the mortars.

Figure 5.1.2.2-3, *TY-Site-2 Map* (Removed for Public Disclosure)

TABLE 5.1.2.2-3
TY-SITE-2 BEDROCK FEATURES

Feature	Length (cm)	Width (cm)	Height (cm)	Bedrock Type and Condition
A	200	158	22	Flat granite, good condition
B	82	60	24	Irregular surface. Granite, good condition


Image 5.1.2.2-2, *TY-Site-2, Feature A*

Image 5.1.2.2-3, *TY-Site-2, Feature B*

Each of the two features contains four milling surfaces, all bedrock mortars (Table 5.1.2.2-4, *TY-Site-2 Milling Surfaces*).

TABLE 5.1.2.2-4
TY-SITE-2 MILLING SURFACES

Feature #	Milling Surface #	Length (cm)	Width (cm)	Depth (cm)	Remarks
A	1	10	10	1	Saucer mortar in crevice of boulder, no contents
A	2	19	19	9	Saucer mortar, no contents
A	3	14	14	4	Saucer mortar, no contents
A	4	7	7	1	Saucer mortar, very incipient, no contents
B	1	2.5	2.5	1	Saucer mortar, weathered, no contents
B	2	7	7	2	Saucer mortar , no contents
B	3	10	10	4	Oval mortar partially in crevice of boulder, no contents
B	4	5	5	1.5	Saucer mortar, incipient, no contents

TY-Site-3

TY-Site-3 is a prehistoric site composed of a bedrock milling station, associated lithic scatter, and several artifacts (Figure 5.1.2.2-4, *TY-Site-3 Map*). It measures 156 meters (east-west) and 108 meters (north-south). The site is set primarily on a terrace with a southeast aspect that overlooks an ephemeral wash.

Figure 5.1.2.2-4, *TY-Site-3 Map* (Removed for Public Disclosure)

The lithic scatter is organized into one large scatter and two loci of relatively higher flaked stone concentrations. Locus I is located northwest of and on the same “shelf” as the milling station. Locus II is located further to the northwest on an alluvial hill. A relatively lower concentration of flakes can be found distributed throughout the site boundary.

Identified artifacts include a rhyolite biface, an obsidian projectile point, a basalt project point, a rhyolite core, a rhyolite projectile point and a mano. The artifacts are primarily concentrated around Locus I.

Feature 1, Milling Station

The milling station comprises five granitic boulders (Features A–E) with multiple milling surfaces (Table 5.1.2.2-5, *TY-Site-3 Bedrock Features*; Figure 5.1.2.2-5, *TY-Site-3, Bedrock Features, Plan View*; Images 5.1.2.2-4 through 5.1.2.2-8, *TY-Site-3, Feature A–E*). The bedrock mortars are situated on the western bank and overlooking an ephemeral wash.

TABLE 5.1.2.2-5
TY-SITE-3 BEDROCK FEATURES

Feature	Length (cm)	Width (cm)	Height (cm)	Bedrock Type and Condition
A	117	78	55	Flat granite, good condition
B	188	115	45	Tilt 10° to north. Granite, good condition
C	130	85	10	Tilt 10° to southeast. Granite, good condition
D	290	165	45	Tilt 5° to east. Granite, some weathering
E	168	145	45	Flat, granite, good condition

Figure 5.1.2.2-5, *TY-Site-3, Bedrock Features, Plan View* (Removed for Public Disclosure)

Image 5.1.2.2-4, *TY-Site-3, Feature A*

Image 5.1.2.2-5, *TY-Site-3, Feature B*

Image 5.1.2.2-6, *TY-Site-3, Feature C*

Image 5.1.2.2-7, *TY-Site-3, Feature D*

Image 5.1.2.2-8, *TY-Site-3, Feature E*

A total of 21 milling surfaces were observed on the five bedrock features (Table 5.1.2.2-6 *TY-Site-3 Milling Surfaces).* All of the recorded milling surfaces are bedrock mortars; these range from barely visible, incipient saucer mortars to deep (>10 cm), well-formed conical mortars. No pestles or other portable milling equipment was observed on-site.

TABLE 5.1.2.2-6
TY-SITE-3 MILLING SURFACES

Feature #	Milling Surface #	Length (cm)	Width (cm)	Depth (cm)	Remarks
A	1	14	13	4.8	Conical mortar with no contents
B	1	15	13	1.5	Incipient saucer mortar surrounded by slick, no contents
C	1	13	13	2.7	Incipient saucer mortar surrounded by slick, no contents
C	2	17	15	8.8	Conical mortar, no contents
D	1	13	13	2.5	Saucer mortar, no contents
D	2	14	15	3.0	Saucer mortar, no contents
D	3	18	18	11.5	Conical mortar surrounded by slick, no contents
D	4	16	14	4.5	Conical mortar, no contents
D	5	16	16	9.0	Conical mortar, no contents
D	6	13	15	5.0	Weathered conical mortar, no contents
D	7	17	16	7.6	Weathered conical mortar, no contents
D	8	15	15	8.6	Conical mortar with the margin spalled off, no contents
D	9	7	7	0.8	Incipient saucer mortar surrounded by slick, no contents
D	10	18	17	11.6	Conical mortar surrounded by slick, no contents
D	11	11	10	1.6	Incipient conical mortar, no contents
D	12	13	11	5.3	Oval mortar in crevice of boulder, no contents
E	1	7	5	0.5	Saucer mortar, very incipient, no contents
E	2	13	12	2.8	Incipient saucer mortar weathered, no contents
E	3	13	9	1.5	Incipient saucer mortar, no contents
E	4	17	16	8.9	Conical mortar surrounded by slick, no contents
E	5	6	6	<0.5	Very incipient saucer mortar, no contents

Lithic Scatter

A large lithic scatter composed primarily of debitage is located in the area to the northwest of the bedrock mortars. One hundred four pieces of debitage were observed and recorded during the present effort; these have been divided into two loci of a relatively high flake density compared to the surrounding distribution (Table 5.1.2.2-7, *TY-Site-3 Debitage by Location and Material Type*). Locus 1 measures approximately 30 meters (east-west) by 55 meters (north-south) and is located roughly 30 meters to the northwest of the bedrock milling station at roughly the same elevation. Thirty-four pieces of debitage, or approximately 44 percent of the debitage observed on-site, was recorded within Locus 1. Locus 2 measures approximately 50 meters (east west) by 25 meters (north-south) and is set upon an alluvial hill 80 meters to the northwest. It contains approximately 14 pieces of debitage, or 17 percent of the debitage observed on-site. Another 30 pieces of debitage were observed outside of the mapped boundaries of Loci 1 and 2.

TABLE 5.1.2.2-7
TY-SITE-3 DEBITAGE BY LOCATION AND MATERIAL TYPE

Location	Rhyolite	Chert	Obsidian	Total	Percentage
Locus I	34	7	5	46	44%
Locus II	14	4	0	18	17%
Outside loci boundaries	30	7	3	40	39%
Total	78	18	8	104	
Percentage	75%	17%	8%		

Flaked- and Ground-Stone Tools

Several flaked- and ground-stone tools were recorded within the TY-Site-3 boundary.

Artifact 1 is a rhyolite bifacial scraper or early stage biface, heavily weathered (Image 5.1.2.2-9, *TY-Site-3, Artifact 1, Rhyolite Bifacial Scraper)*. It measures 4.1 cm in length, 2.7 cm in width, and 1.2 cm in thickness. The biface appears broken at the distal end.

Image 5.1.2.2-9, *TY-Site-3, Artifact 1, Rhyolite Bifacial Scraper*

Artifact 2 is an obsidian projectile point (Image 5.1.2.2-10, *TY-Site-3, Artifact 2, Obsidian Projectile Point*). The point is diamond shaped with a biconvex transverse cross-section and measures 4.1 cm in total length, 2.7 cm at maximum width, and 1.2 cm in maximum thickness. There appears to be some bifacial edge retouching with pronounced serration on one side. The proximal end appears to be partially broken off.

Image 5.1.2.2-10, *TY-Site-3, Artifact 2, Obsidian Projectile Point*

Artifact 3 is a rhyolite core containing roughly 5 percent cortex. It measures 8.1 cm in length, 4.0 cm in width, and 2.5 cm in thickness.

Artifact 4 is a basalt projectile point base and midsection fragment (Image 5.1.2.2-11, *TY-Site-3, Artifact 4, Basalt Projectile Point*). The point measures 3 cm in total length, 2.3 cm at maximum width, and 1.1 cm in maximum thickness. The point is triangular in cross-section, with a concave base and no shoulders, and the distal end has been broken. The concave base and lanceolate shape are consistent with a Humboldt concave-base type, although the point's overall thickness and rough percussion flaking suggest that it may be a preform. Dates ranging from 4,000 BP to 1,400 BP or later have been assigned to Humboldt points in California and the western Great Basin.[54]


Image 5.1.2.2-11, *TY-Site-3, Artifact 4, Basalt Projectile Point*

[54] Justice, Noel D. 2002. *Stone Age Spear and Arrow Points of California and the Great Basin*. Bloomington, IN: Indiana University Press, p. 156.

Artifact 5 is a round granite unifacial unshaped cobble mano with a single surface. It measures 9.8 cm in length, 8.4 cm in width, and 5.5 cm in thickness.

Artifact 6 is a rhyolite project point tip fragment (Image 5.1.2.2-12, *TY-Site-3, Artifact 6, Rhyolite Projectile Point Tip Fragment*). The point is snapped at the center and missing the proximal half. The tip is triangular and has been unifacially retouched. The point measures 1.9 cm at maximum length, 1.4 cm at maximum width, and 0.1 cm at maximum thickness. No other diagnostic information is present on the point.

Image 5.1.2.2-12, *TY-Site-3, Artifact 6, Rhyolite Projectile Point Tip Fragment*

TY-Site-4

TY-Site-4 is composed of a single granitic boulder with one observed milling surface (Figure 5.1.2.2-6, *TY-Site-4 Map*; Image 5.1.2.2-13, *TY-Site-4*). The boulder is a large, coarse granitic boulder measuring 267 cm in length, 243 cm in width, and 112 cm in height. The milling surface is a saucer-shaped bedrock mortar with a diameter of 13 cm and a depth of 1.5 cm. No materials were observed in the milling surface. The boulder is set in an alluvial slope with 100 percent exposure, is tilted approximately 3 degrees to the south-southeast, and is located approximately 16 meters west of a small ephemeral wash. Nearby flora includes juniper, Joshua Tree, Mormon Tea, and various desert grasses.

Figure 5.1.2.2-6, *TY-Site-4 Map* (Removed for Public Disclosure)


Image 5.1.2.2-13, *TY-Site-4*

TY-Isolate-1

TY-Isolate-1 consists of a single projectile point (Image 5.1.2.2-14, *TY-Isolate-1, Chert Projectile Point*), found in a gently sloping area of sparse creosote and scrub bushes. The lanceolate point is of white chert with a concave base. The point has a maximum length of 5.8 cm, is 5.5 cm long from tip to base center, 2.5 cm in maximum width, 2.0 cm in base width, and has maximum thickness of 0.5 cm. The point's maximum width and thickness are found towards its distal end. The point is slightly curved in profile. It is not fluted, although the concave base has been thinned with a series of short pressure flakes. No basal grinding is evident. No other artifacts were found in the vicinity of TY-Isolate-1.

The point may be an example of the Black Rock Concave Base type originally described by Clewlow[55] and more recently discussed in detail by Justice.[56] This type has been attributed to the

[55] Clewlow, William C. 1968. "Surface Archaeology in the Black Rock Desert, Nevada" in *Reports of the University of California Archaeological Survey No. 73: Papers on the Archaeology of Western Great Basin*. Berkeley: University of California

[56] Justice, Noel D. 2002. Stone Age Spear and Arrow Points of California and the Great Basin. Bloomington, Indiana.

period 7,000–9,000 BP; however, it may have appeared as early as 13,000 BP and most likely overlapped temporally with fluted technologies such as Clovis and Folsom. Clewlow and Justice note that most points of this type are made of a variety of chert, as is this isolate. The point displays other attributes of the Black Rock Concave Base type, such as short basal thinning scars, excurvate lateral margins that contract towards the base, and a thin, flat profile. Of the Black Rock Concave Base points analyzed by Clewlow (and used by Clewlow to define the type), the average maximum length was 6.3 cm, the average maximum width was 2.4 cm, and the average maximum thickness was 0.4 cm.[57] TY-Isolate-1 is very similar in size—this isolate is only slightly larger than the average width and thickness of Clewlow's sample and displays the characteristic thin profile of Black Rock Concave Base points.

Alternatively, the point bears some resemblance to the Humboldt Concave Base type. Like the Black Rock Concave Base type, Humboldt Concave Base points are lanceolate-shaped with triangular concave bases. However, points assigned as Humboldts have a wide range of basal widths, typically do not display short basal thinning scars, and are generally biconvex and thicker in profile, unlike this isolate.

Regionally, Black Rock Concave Base points have been found throughout the western Great Basin, but are most common in Nevada.[58] If this point is an example of the Black Rock type, it would represent the southwesternmost extent of the type's distribution and could be one of the older artifacts found to date in the Antelope Valley area.

Image 5.1.2.2-14, *TY-Isolate-1, Chert Projectile Point*

[57] Clewlow, William C. 1968. "Surface Archaeology in the Black Rock Desert, Nevada" in *Reports of the University of California Archaeological Survey No. 73: Papers on the Archaeology of Western Great Basin*. Berkeley: University of California. P. 15.

[58] Justice, Noel D. 2002. Stone Age Spear and Arrow Points of California and the Great Basin. Bloomington, Indiana.

Due to the possible antiquity and rarity of TY-Isolate-1, Sapphos Environmental, Inc. archaeologists conducted limited subsurface testing to determine whether buried cultural materials were associated with the projectile point. A total of five STPs were placed in the vicinity of TY-Isolate-1. One STP was placed directly where the projectile point was located, and the four remaining STPs were placed 5 meters from the projectile point in each cardinal direction (Figure 5.1.2.2-7, *TY-Isolate-1 Limited Subsurface Testing*). Each STP measured 30 cm in diameter and was excavated in 10-cm levels to a minimum depth of 30 cm. All excavated soils from the STPs were screened by level through a 1/8-inch (3-millimeter) wire mesh screen.

Figure 5.1.2.2-7, *TY-Isolate-1 Limited Subsurface Testing* (Removed for Public View)

The STPs revealed no evidence of subsurface cultural deposits at the location of the isolate or in the immediate vicinity. Given the lack of subsurface materials and the lack of any artifacts on the surface, other than the projectile point itself, it is assumed that TY-Isolate-1 is an isolated find that is not associated with a larger cultural deposit.

At the request of Mr. Donald Storm of the BLM's Ridgecrest field office, TY-Isolate-1 was collected and is currently curated at the Maturango Museum in Ridgecrest, California.

5.2 HISTORIC RESOURCES

5.2.1 Historic-Period Context

5.2.1.1 Ethnohistory

After the Spanish began colonizing coastal California in 1769, Native American groups were subject to social and cultural changes, including the establishment of the Spanish mission system throughout the state and the introduction of new diseases, which spread rapidly and decimated the native population.[59] In 1776, Francisco Garces is reported to have explored the area near the Tehachapi Mountains when crossing the Oak Creek Pass, traveling from San Joaquin Valley to Mojave. Historic accounts also indicate that Garces left traces of his visit at Willow Springs (near Rosamond) and on Castle Butte (near California City).[60]

Native American groups were greatly reduced and had been incorporated in the Spanish-American economy by the 1930s. They were grouped into three major categories: residents of Hispanic ranchos, day laborers who lived around missions and towns, and those who remained in the interior rancherias,[61] adopting a more traditional way of life.[62] The decimation of the Native American population increased rapidly during the smallpox epidemics of 1863 and 1870.[63]

Between 1821 and 1846, the western Mojave Desert remained outside the Hispanic settlement and stock-raising frontier. The closest Hispanic settlement was the Rancho San Francisquito in the Santa Clarita–Newhall area, approximately 20 miles south of Antelope Valley. In 1853, a U.S. Army survey party was sent to search for possible railway routes that would connect the San Joaquin and Antelope Valleys. Earle et al. mention the lack of evidence of permanent settlements but note evidence of camping by native stock raiders near modern Rosamond.[64] During the early 1850s,

[59] Earle, D., and Associates. 1997. *Ethnohistoric Overview of the Edwards Air Force Base Region and the Western Mojave Desert*. Palmdale, CA, p. 42. Prepared for: AFFTC/EMXR, Edwards Air Force Base, CA.

[60] Mojave's History. 2005. Web site. Available at: www.mojave.ca.us/history_IL.htm.

[61] The Spaniards coined the term *Rancheria* to refer to small areas of land set aside around Native American settlements, specifically in California. "Some rancherias developed from small communities of Indians formed on the outskirts of American settlements who were fleeing Americans or avoiding removal to the reservations." Available at: http://infodome.sdsu.edu/research/guides/calindians/calinddictqs.shtml

[62] Earle, D., and Associates. 1997. *Ethnohistoric Overview of the Edwards Air Force Base Region and the Western Mojave Desert*. Palmdale, CA, p. 46. Prepared for: AFFTC/EMXR, Edwards Air Force Base, CA.

[63] Earle, D., and Associates. 1997. *Ethnohistoric Overview of the Edwards Air Force Base Region and the Western Mojave Desert*. Palmdale, CA, p. 54. Prepared for: AFFTC/EMXR, Edwards Air Force Base, CA.

[64] Earle, D., K. Lark, C.J. Parker, M. Ronning, and J. Underwood. 1998. *Cultural Resources Overview and Management Plan for Edwards Air Force Base, California: Vol. 2, Overview of Historic Cultural Resources*. Prepared by Computer Sciences Corporation, Edwards Flight Test Center, Edwards Air Force Base, CA, p. 6.

Native American populations were caught in an environment of violence between the Numic desert raiders and the Hispanic and American graziers, miners, and adventurers. This forced the populations to relocate into reservations and move deeper into Sierra Nevada.[65]

5.2.1.2 Euro-American Era

From 1853 to 1863, the San Joaquin Valley, the Tehachapi Mountains, and the western Antelope Valley (all of which were originally considered remote areas) became centers of gold and silver mining. Mining towns such as Randsburg, Calico, and Oro Grande were established during this period. Rosamond, Barstow, and Mojave became suppliers for mining operations.[66] The development of a system of communication for the transportation of goods and passengers (stagecoach route) contributed to the interaction of the desert towns and the main points of commerce. The first stagecoaches began operation in California in 1849 with two lines; one ran between San Francisco and San Jose, and the other ran from Sacramento to towns on the American River.[67] In Kern County, the first stage line began operation soon after Fort Tejon was established in 1854.[68] The stagecoach route closest to the proposed project area went from El Monte and Los Angeles all the way to Tehachapi or the San Joaquin Valley. The route crossed San Fernando Pass (also known as Beals' Cut) through San Francisquito Canyon, where there was a way station for the travelers. The journey continued to Elizabeth Lake where another station was located. At this point, the stagecoach route split to the north and to the east. Travelers heading to Tehachapi took the north route, which continued north to Willow Springs (about 8 miles east of the proposed project area). Willow Springs was an important way station for the travelers and had been used by Native Americans before the stagecoach routes, the pioneers, and the teamsters took advantage of it.[69,70,71] (Today, what remains of the Willow Springs station is part of an adobe wall and the spring itself.) The route continued to the Oak Creek Station and crossed the Oak Creek Pass to Tehachapi.[72] Travelers going to the San Joaquin Valley continued to the west from Elizabeth Lake over the Tejon Pass, following the south edge of the Antelope Valley, all the way to the San Joaquin Valley.[73]

The construction of the Southern Pacific Railway across Antelope Valley began in the mid-1800s and was completed in 1876. After 1875, the use of the railroad system and the closing of the mines forced the stage lines in Kern County to come to an end, but small lines continued to transport passengers up to 1912.[74] However, an influx of people moved to the area when government-

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[65] Earle, D., and Associates. 1997. *Ethnohistoric Overview of the Edwards Air Force Base Region and the Western Mojave Desert*. Palmdale, CA, p. 50. Prepared for: AFFTC/EMXR, Edwards Air Force Base, CA.

[66] Earle, D., K. Lark, C.J. Parker, M. Ronning, and J. Underwood. 1998. *Cultural Resources Overview and Management Plan for Edwards Air Force Base, California: Vol. 2, Overview of Historic Cultural Resources*. Prepared by Computer Sciences Corporation, Edwards Flight Test Center, Edwards Air Force Base, CA, p. 8.

[67] Beck, Warren, and Ynez Haase. 1974. *Historical Atlas of California*. Norman, OK: University of Oklahoma Press, p. 51.

[68] Burmeister, Eugene. 1977. *The Golden Empire: Kern County, California*. Beverly Hills, CA: Autograph Press, p. 70.

[69] Barras, Judy. 1976. *The Long Road to Tehachapi*. Tehachapi, CA: The Tehachapi Heritage League, p. 22.

[70] Cowan, Jerrie, Tehachapi Museum, Tehachapi, CA. 20 July 2006. Telephone conversation with Natasha Tabares, Sapphos Environmental, Inc., Pasadena, CA.

[71] Grossard, Gloria. 1997. "Paths of the Pioneers: A Tehachapi Heritage League Field Trip." In *The Tehachapi Museum Newsletter*. Tehachapi, CA. Contact: The Tehachapi Museum, 310 South Green Street, Tehachapi, CA.

[72] Barras, Judy. 1976. *The Long Road to Tehachapi*. Tehachapi, CA: The Tehachapi Heritage League, pp. 21–25.

[73] Barras, Judy. 1976. *The Long Road to Tehachapi*. Tehachapi, CA: The Tehachapi Heritage League, pp. 21–25.

[74] Burmeister, Eugene. 1977. *The Golden Empire: Kern County, California*. Beverly Hills, CA: Autograph Press.

owned land was offered for homesteading. Between 1880 and 1920, climatic conditions changed dramatically between wet and drought years. Only those colonies with enough water supplies for human consumption and irrigation survived, while the others failed.[75] By the 1930s, there were more than 80 towns in the Antelope Valley, most of them located along the railroads.[76] The importance of gold mining operations ended around 1942 because of the War Production Board issuance of Limitation Order L-208, which classified gold mines as nonessential for the war.[77]

The military arrived in the western Mojave Desert in 1928, when the dry lakebed near Muroc became an area for general aviation practices. In 1942, the facility was named Army Air Base, Muroc Lake, which later became Muroc Air Force Base in 1948. In 1949, the base was renamed Edwards Air Force Base.[78]

The historic occupation of the proposed project area is directly linked to the history of the nearest town, Rosamond. The Southern Pacific Railroad set tracks there in 1876 and owned the town until 1887. The company sold several lots, and homesteaders began to populate the town. Among these homesteaders was Charles A. Graves, an African American who moved to the town in 1882 and became "one of the first successful cattlemen and miners of the desert area."[79] Graves became the first postmaster at Rosamond from 1898 to 1903 and donated land to install the first school in 1907.[80,81] The economic development of Rosamond was associated with sheep and cattle raising in the late 1800s; and by 1920, agriculture also became productive in the area, with crops including alfalfa, cotton, potatoes, onion, carrots, and corn.[82]

5.2.2 Resource Characterization

5.2.2.1 Previously Recorded Historic-Period Resources

The results of the Class I literature review indicate that no historic-period archaeological resources have previously been recorded within the project area boundaries, although 18 historic-period archaeological sites have been recoded within a 1-mile radius of the project area (Table 5.2.2.1-1, *Previously Recorded Historic Archaeological Sites within One Mile of the Project Area*; and Figure 5.1.2.1-1). The majority of these previously recorded resources are low rock mounds of unknown

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[75] Taşkıran, A., A. Graham, K.T. Doyle, J. Titus, and D.S. Komporlides. 1997. *The Evaluation of Site CA-LAN-863, South Rogers Lake Area, Edwards Air Force Base, California*. Prepared for U.S. Army Corps of Engineers, Sacramento, CA, and the Air Force Flight Test Center, Environmental Management Office, Edwards Air Force Base, CA, pp. 3–11.

[76] Taşkıran, A., A. Graham, K.T. Doyle, J. Titus, and D.S. Komporlides. 1997. *The Evaluation of Site CA-LAN-863, South Rogers Lake Area, Edwards Air Force Base, California*. Prepared for U.S. Army Corps of Engineers, Sacramento, CA, and the Air Force Flight Test Center, Environmental Management Office, Edwards Air Force Base, CA, pp. 3–13.

[77] Taşkıran, A., A. Graham, K.T. Doyle, J. Titus, and D.S. Komporlides. 1997. *The Evaluation of Site CA-LAN-863, South Rogers Lake Area, Edwards Air Force Base, California*. Prepared for U.S. Army Corps of Engineers, Sacramento, CA, and the Air Force Flight Test Center, Environmental Management Office, Edwards Air Force Base, CA, pp. 3–15.

[78] Greenwood, R.S., and M. McIntyre. 1980. *Cultural Resources Overview for Edwards Air Force Base*. Pacific Palisades, CA: Greenwood and Associates.

[79] Kern Centennial Committee. 1966. *Kern County Centennial Almanac, 1866–1966*. Bakersfield, CA: Kern County Centennial Observance Committee, p. 42.

[80] Kern Centennial Committee. 1966. *Kern County Centennial Almanac, 1866–1966*. Bakersfield, CA: Kern County Centennial Observance Committee, p. 82.

[81] Burmeister, Eugene. 1977. *The Golden Empire: Kern County, California*. Beverly Hills, CA: Autograph Press, p. 128.

[82] Burmeister, Eugene. 1977. *The Golden Empire: Kern County, California*. Beverly Hills, CA: Autograph Press, p. 128.

function that were recorded by Sapphos Environmental, Inc. in 2006 during surveys for an adjacent wind project.[83]

TABLE 5.2.2.1-1
PREVIOUSLY RECORDED HISTORIC ARCHAEOLOGICAL SITES WITHIN ONE MILE OF THE PROJECT AREA

Primary Number	Trinomial	Description	Within Project Area	Within 1 Mile of Project Area
P-15-012227	CA-KER-6929H	Rock feature of indeterminate age and function		×
P-15-012229	CA-KER-6930H	Rock feature of indeterminate age and function		×
P-15-012231	CA-KER-6932H	Linear Rock Feature		×
P-15-012238	CA-KER-6934H	Rock feature of indeterminate age and function		×
P-15-012239	CA-KER-6935H	Homestead foundation and historic debris		×
P-15-012249	CA-KER-6939H	Rock feature of indeterminate age and function		×
P-15-012251	CA-KER-6940H	Rock feature of indeterminate age and function		×
P-15-012252	CA-KER-6941H	Rock feature of indeterminate age and function		×
P-15-012253	CA-KER-6942H	Rock feature of indeterminate age and function		×
P-15-012254	CA-KER-6943H	Rock feature of indeterminate age and function		×
P-15-012263	CA-KER-6944H	Two linear rock features		×
P-15-012265	CA-KER-6945H	Rock feature of indeterminate age and function		×
P-15-012266	CA-KER-6946H	Rock feature of indeterminate age and function		×
P-15-012267	CA-KER-6947H	Rock feature of indeterminate age and function		×
P-15-012268	CA-KER-6948H	Historic debris scatter		×
P-15-012270	CA-KER-6949H	Historic rock ring		×
P-15-012272	CA-KER-6950H	Rock feature of indeterminate age and function		×
P-15-012273	CA-KER-6951H	Rock feature of indeterminate age and function		×

[83] Sapphos Environmental, Inc. 15 December 2009. *Pacific Wind Energy Project Cultural Resources Technical Report*. Prepared for: enXco Development Corporation. Pasadena, CA.

5.2.2.2 *Newly Recorded Historic-Period Resources*

The results of the Class III field surveys resulted in the recording of two historic sites and four historic isolates (Table 5.2.2.2-1, *Newly Recorded Historic Archaeological Resources*).

TABLE 5.2.2.2-1
NEWLY RECORDED HISTORIC ARCHAEOLOGICAL RESOURCES

Primary	Description	Within APE	Within DIZ
TY-Site-5	Refuse scatter composed of cans and glass fragments	×	
TY-Site-6	Debris scatter composed of barrel hoops, glass fragments, metal brackets, milled lumber, porcelain fragments and cans	×	
TY-Isolate-2	Standard Oil metal axle grease lid and milled wood fragments	×	
TY-Isolate-3	"Boyco" hand-soldered canteen	×	
TY-Isolate-4	Historic rock ring with charcoal, metal fragments and amethyst glass fragment	×	
TY-Isolate-5	Hand soldered lard pail	×	

TY-Site-5

TY-Site-5 is a late-historic-period refuse scatter composed of one concentration (Figure 5.2.2.2-1, *TY-Site-5 Map*). The concentration contains 43 cans and 8 fragments of clear glass. Cans include 15 cone-top beverage cans, 5 large sanitary cans, 7 smaller sanitary cans, 3 round cans with internal friction lids and 3 rectangular cans. Partial labels include the logos "MINUTE MAID CORP," "MJB COFFEE," "...MIDWAY INC," and "Cantrell & Cochrane//Root Beer."

Figure 5.2.2.2-1, *TY-Site-5 Map* (Removed for Public Disclosure)

Based upon the cone-top beverage cans and label information, the site likely dates from 1935 to 1955.[84] The homogeneity of the assemblage suggests that the site represents a single-episode trash dump.

TY-Site-6

TY-Site-6 is a historic debris scatter composed of one sparse artifact concentration (Figure 5.2.2.2-2, *TY-Site-6 Map*). The concentration contains 23 fragments of milled lumber in various sizes; 12 small circular metal washer tacks; four barrel hoops; 20 brown glass fragments; 10 amethyst glass fragments; five clear glass fragments; three decorated porcelain fragments; one rectangular whetstone fragment; one metal shovel blade fragment embossed "RODGERS"; one sanitary can; one hole-in-top, punched opened can; and two steel brackets that appear to be from a folding cot.

[84] Miller, George. 2000. "Telling Time for Archaeologists." *Northeast Historical Archaeology*, *29*:1–22.

Figure 5.2.2.2-2, *TY-Site-6 Map* (Removed for Public Disclosure)

The presence of amethyst glass indicates a date range of approximately 1880 to 1920.[85] The variety of materials present in the assemblage, including household goods, food containers, hardware, tools, and milled lumber, suggests that this site may represent a historic-period campsite.

TY-Isolate-2

The isolate consists of a single galvanized metal bucket lid embossed with "MICA AXLE GREASE\\TRADE [IMAGE OF WAGON WHEEL] MARK\\STANDARD OIL CO.\\ (INCORPORATED)" and measuring 12 inches in diameter. Approximately 20 cut sheet metal scraps with rivet holes with varying dimensions are located 20 feet north of the bucket lid.

Mica Axle Grease was utilized primarily as grease for wagon wheels, with the discontinuation of this brand coinciding with the breakup of Standard Oil in 1911.[86]

The fragments of scrap metal may have been a part of a discarded wagon. No traces of milled wood were found in the area.

TY-Isolate-3

TY-Isolate-3 is a round, hand soldered canteen measuring 10 inches in diameter and 3 inches in thickness with a 1½-inch diameter screw cap and appears hand-soldered. A bullet hole is present on the body. The cap is embossed with the logo "BOYCO."

Boyco is the abbreviated name for the Pinney and Boyle Manufacturing Company of Los Angeles, California. The company was formed by Charles L. Pinney and Willis J. Boyle in 1899 and produced sheet metal goods such as canteens, luggage carriers, garbage cans, and ovens.[87] No firm date could be ascertained on the closure of the company; however, the Boyco name appears to have disappeared by the 1950s.[88]

TY-Isolate-4

TY-Isolate-4 is a small historic rock ring and debris scatter composed of a single concentration of metal fragments, one amethyst glass fragment, and a tobacco tin fragment, and is set in a small ephemeral wash. A rock ring is located 28 feet east of the artifact concentration and is composed of 30 local angular rocks. The rock ring measures 105 inches (east-west) and 157 inches (north-south) on the outside diameters. Charcoal is present within the ring and small fragments of milled wood are present within the ring and toward the concentration. The rock ring appears to have been recently utilized.

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[85] Lockhart, Bill. 2006. "The Color Purple: Dating Solarized Amethyst Container Glass." *Historical Archaeology*, *40*(2):45–56.

[86] Folsom, Burton. 1988. *John D. Rockefeller and the Oil Industry*. Available at: http://www.fee.org/the_freeman/detail/john-d-rockefeller-and-the-oil-industry

[87] Guinn, James Miller. 1915. *A History of California and an Extended History of Los Angeles and Environs, Also Containing Biographies of Well-known Citizens of the Past and Present*. n.p., Vol. III. pp. 899–900.

[88] Boyco Canteens and Carriers. 1 May 1920. Advertisement for Boyco, in "The Mohave County Miner and Our Mineral Wealth," 5. Available at: http://chroniclingamerica.loc.gov/lccn/sn96060547/1920-05-01/ed-1/seq-6.pdf

TY-Isolate-5

TY-Isolate-5 is a hand-soldered rusted steel pail measuring 7½ inches in diameter and 6½ inches tall. Remnants of a soldered handle are visible on the sides of the pail and the external friction lid is missing. The face is embossed "ARMOUR PACKING Co.//CHOICE FAMILY LARD//KANSAS CITY, MO."

The Armour Packing Company of Kansas City was started in 1884 by Simeon B. Armour, Alexander W. Armour, and Phillip Armour and produced a variety of cattle and hog products.[89] The company changed their name to Armour and Company in 1910. Consequently, TY-Isolate-5 was produced sometime between 1884 and 1910.

5.3 NATIVE AMERICAN SACRED SITES AND HUMAN REMAINS

As stated in Section 4.2, the BLM has received no follow-up to requests for consultation or collaboration from the local California Indian Tribal communities of eastern Kern County regarding the project, and no areas of Tribal significance has been identified or are known to occur within the project's APE.

5.4 ELIGIBILITY AND POTENTIAL EFFECTS

5.4.1 Eligibility of Prehistoric and Historic Archaeological Resources

The Class III survey resulted in the redocumentation of one previously recorded prehistoric site (CA-KER-1906) and the documentation of four new prehistoric sites (TY-Site-1, TY-Site-2, TY-Site-3, and TY-Site-4), one new prehistoric isolate (TY-Isolate-1), two new historic-period sites (TY-Site-5 and TY-Site-6), and three historic-period isolates (TY-Isolate-2, TY-Isolate-3, TY-Isolate-4, and TY-Isolate 5). Recommendations of NRHP eligibility and potential for effects to each resource are provided in Table 5.4.1-1, *NRHP Eligibility Recommendations and Potential for Effects to Resources*, and described below.

[89] "Meat Packing Gave City Large Industry." 24 November 1985. *The Kansas City Kansan*, P2A.

TABLE 5.4.1-1
NRHP ELIGIBILITY RECOMMENDATIONS AND POTENTIAL FOR EFFECTS TO RESOURCES

Resource	Period	NRHP Eligibility Recommendation	Potential for Effects
CA-KER-1906	Prehistoric	Not eligible	None
TY-Site-1	Prehistoric	Not eligible	None
TY-Site-2	Prehistoric	Not eligible	None
TY-Site-3	Prehistoric	Potentially eligible	None
TY-Site-4	Prehistoric	Not eligible	None
TY-Site-5	Historic	Not eligible	None
TY-Site-6	Historic	Not eligible	None
TY-Isolate-1	Prehistoric	Not eligible	None
TY-Isolate-2	Historic	Not eligible	None
TY-Isolate-3	Historic	Not eligible	None
TY-Isolate-4	Historic	Not eligible	None
TY-Isolate-5	Historic	Not eligible	None

CA-KER-1906

This site is an isolated bedrock milling station that is not associated with other features or surface artifacts. The site was recorded in full detail during the current effort, and as an isolated archaeological feature it has little data potential beyond that documented during its recordation. Thus, site CA-KER-1906 is recommended to be not eligible for the NRHP under Criterion D.

TY-Site-1

This site is an isolated bedrock milling station that is not associated with other features or surface artifacts. The site was recorded in full detail during the current effort, and as an isolated archaeological feature it has little data potential beyond that documented during its recordation. Thus, site TY-Site-1 is recommended to be not eligible for the NRHP under Criterion D.

TY-Site-2

This site is an isolated bedrock milling station that is not associated with other features or surface artifacts. The site was recorded in full detail during the current effort, and as an isolated archaeological feature it has little data potential beyond that documented during its recordation. Thus, site TY-Site-2 is recommended to be not eligible for the NRHP under Criterion D.

TY-Site-3

This site consists of multiple bedrock milling stations, portable ground-stone tools, a lithic scatter consisting of multiple loci, and several flaked stone tools, including at least one temporally diagnostic projectile point type. As such, the site appears to represent multiple activity areas and relatively intensive prehistoric use, and thus has good potential to provide scientifically important information. Although no subsurface testing was conducted during the present effort, the lack of surface disturbances and presence of intact, discrete loci suggest that the site has good potential for containing subsurface deposits. Thus, site TY-Site-3 is recommended potentially eligible for the NRHP under Criterion D, and should be treated as eligible with respect to the proposed project and any additional, future undertakings. The site is currently outside of the proposed project's footprint, or DIZ. However, should the proposed project be redesigned so that TY-Site-3 falls within the revised DIZ, a formal determination of NRHP eligibility, including subsurface testing, intensive mapping, and laboratory analysis, should be conducted.

TY-Site-4

This site is an isolated bedrock milling station that is not associated with other features or surface artifacts. The site was recorded in full detail during the current effort, and as an isolated archaeological feature it has little data potential beyond that documented during its recordation. Thus, site TY-Site-4 is recommended to be not eligible for the NRHP under Criterion D.

TY-Site-5

This site is a small collection of late historic cans and glass likely deposited in a single event. The site appears limited to surface deposits as there is no indication of purposeful earthmoving activities (e.g., trash pits or privies) that would have buried additional features or artifacts, and therefore it has little data potential beyond that documented during its recordation. Thus, site TY-Site-5 is recommended to be not eligible for the NRHP under Criterion D.

TY-Site-6

This site is a small collection of historic debris likely associated with a small, temporary campsite. The site appears limited to surface deposits as there is no indication of purposeful earthmoving activities that would have buried additional features or artifacts, and therefore it has little data potential beyond that documented during its recordation. Thus, site TY-Site-6 is recommended to be not eligible for the NRHP under Criterion D.

TY-Isolate-1

Due to the possible antiquity and rarity of TY-Isolate-1, Sapphos Environmental, Inc. archaeologists conducted limited subsurface testing to determine whether buried cultural materials were associated with the projectile point. Subsurface testing did not reveal any additional cultural deposits and the isolate was collected for curation. Consequently, due to the lack of any associated cultural materials and because the isolate's data potential has been fulfilled through collection, TY-Isolate-1 is not recommended eligible for inclusion in the NRHP under Criterion D.

TY-Isolate-2, TY-Isolate-3, TY-Isolate-4, and TY-Isolate-5

These are all historic-period isolates that lack contextual integrity and are not associated with any other cultural materials. The isolates therefore lack the contextual integrity necessary to meet the criteria for NRHP eligibility, and therefore do not require avoidance or mitigation under Section 106 of the NHPA.

5.4.2 Potential Effects on Prehistoric and Historic Archaeological Resources

The Cultural Resource Class III intensive field survey documents that construction, operation, and maintenance of the array scenario for wind energy development at the proposed project site would result in DIZ for the proposed project that totals 354.1 acres in size, including direct ground disturbances plus a 100-foot buffer.

This cultural resources assessment found that no prehistoric or historic archeological resources are located within the proposed project's DIZ (Table 5.4.1-1; Figure 5.4.2-1, *Cultural Resources in Relation to Project Elements*). The Class III survey resulted in the location of four new prehistoric sites and two new historic sites. Although these resources were found within the project area and are within the project's APE, they do not lie within the DIZ, and therefore there is no potential for the proposed project to affect these archaeological sites. One prehistoric isolate and four historic isolates were also documented during the current effort. All of these isolates are located outside of the DIZ; furthermore, isolates lack the contextual integrity necessary to meet the criteria for NRHP eligibility, and therefore do not require avoidance or mitigation under Section 106 of the NHPA.

5.5 CULTURAL RESOURCES CONSERVATION MEASURES

5.5.1 Historic Property Treatment Plan

It is recommended that a Historic Property Treatment Plan (HPTP) be created for the project. The HPTP specifies procedures to be followed prior to and during construction activities conducted in support of the project to ensure that substantial adverse impacts to cultural resources are avoided or appropriately mitigated. The HPTP should provide a procedural framework for the following management measures:

- Procedures for initial and ongoing briefing of construction supervisors and workers regarding cultural resources
- Plan for avoidance and protection of cultural resources that are eligible or potentially eligible for inclusion in the NRHP
- Subsurface and evaluative testing plan guidelines for any sites located within 100 feet of ground disturbance to determine site extent, potential adverse impacts, and eligibility for listing in the NRHP
- Data recovery plan guidelines for any sites found eligible for listing in the NRHP
- Curation procedures for archaeological collections, final reports, field notes, and other documentation
- Unanticipated discovery protocol to be followed in the event that archaeological resources are identified during excavation
- Procedures to be followed in the event of discovery of human remains
- Documentation of coordination with the Native American Heritage Commission (NAHC) and tribes and individuals recommended by the NAHC

Figure 5.4.2-1, *Cultural Resources in Relation to Project Elements* (Removed for Public Disclosure)

5.5.2 Unanticipated Discovery Protocol

The HPTP should describe procedures through which, if unanticipated or unrecorded cultural resources are encountered during project implementation, all ground-disturbing activity in the vicinity of the find should be halted and the BLM archaeologist should be notified to ensure compliance with relevant state and federal laws and regulations and to evaluate the discovery and recommend subsequent courses of action.

No known prehistoric or historic-period archaeological resources are currently at risk from the proposed project. The project area can generally be considered of low to moderate cultural sensitivity (Figure 5.5.2-1, *Area of Moderate Cultural Sensitivity*). The prehistoric archaeological sites located within the area of moderate sensitivity are all bedrock milling stations, with one featuring projectile points and a lithic scatter. These sites are generally representative of food-processing activities and were an important aspect to the seasonal resource procurement patterns of native populations. Project construction and operations crews should be made aware of the higher likelihood of encountering unanticipated or unrecorded cultural resources in this moderate sensitivity area.

If an archaeological site would be directly or indirectly affected by ground disturbances, an evaluation would be necessary to determine the site's significance. Sites that are found to meet the NRHP criteria may require data recovery or other mitigation prior to the beginning of grading or other construction activities.

5.5.3 Human Remains

The discovery of human remains is always a possibility during an undertaking. If such an event did occur, NAGPRA (25 USC 3001–3013) would apply for a discovery on federal lands. A NAGPRA discovery does not necessarily solely entail human remains; it can include associated or unassociated funerary objects, sacred objects, and cultural patrimony per 25 USC 3001 Section 2(3).

According to the provisions of NAGPRA, all work in the immediate vicinity of the discovery must cease, and any necessary steps to ensure the integrity of the immediate area must be taken. The BLM archaeologist would be immediately notified. The BLM as a managing agency would be responsible for compliance with NAGPRA. NAGPRA requires federal agencies, such as the BLM, to cease activity around the discovery, protect the items, and provide notice to Native American Tribes with an interest in the items and determine final disposition of these items, including, if required, repatriation (25 USC 3002[a] and [d]; 25 USC 3005).

5.5.4 Archaeological Construction Monitoring

If the DIZ for the proposed project is modified and archaeological sites are found to be within 100 feet of the proposed limits of grading, it is recommended that archaeological construction monitoring be required. If unanticipated prehistoric or historic-period cultural resources are encountered, all ground-disturbing activity in the vicinity of the find should be halted and the BLM should be notified to ensure compliance with relevant state and federal laws and regulations and to evaluate the discovery and recommend subsequent courses of action.

Figure 5.5.2-1, *Area of Moderate Cultural Sensitivity* (Removed for Public Disclosure)

5.6 CONSISTENCY WITH WEST MOJAVE PLAN

The proposed project is consistent with the six relevant planning and management goals articulated in the BLM West Mojave Plan, whose conservation program applies to both public and private lands.[90] As a component of the project description, the proposed project would pursue compliance with the goals and implementation policies set forth in the Plan. The Plan is an amendment to the CDCA Plan, which recognizes the importance of paleontological, prehistoric, and historic resources and places of cultural and religious value to Native Americans. In addition to its responsibilities under applicable federal laws and regulations, the plan's goals related to cultural resources include the following:

- An inventory of cultural resources within the DIZ was conducted.
- The wind turbines and associated infrastructure were sited to avoid all cultural resources within the DIZ.
- Full consideration was given to avoidance and conservation of prehistoric and historic resources during land use planning and management decisions.
- The project has been designed in a manner that facilitates maintenance and management of resource values.
- The project has been designed to ensure that issuance of right-of-way permit would avoid inadvertent damage to cultural resources.
- The project provides for salvage, documentation, and repository of any unanticipated paleontological, prehistoric, or historic potentially significant resources encountered during construction of the proposed project.

[90] Bureau of Land Management. May 2003. *Draft Environmental Impact Report and Statement for the West Move Plan*. Vol. 1, Sec. 1.1.1, p. 1-1. Moreno Valley, CA.

5.7 SUMMARY

The study described in this Cultural Resources Technical Report was intended to characterize the proposed project area with respect to cultural resources and related plans of development. The APE for this undertaking is defined as the entire 1,207-acre project area. The project footprint, or DIZ, measures 354.1 acres. The current effort included a Class I inventory addressing the entirety of the 1,207-acre APE plus a 1-mile buffer, and a Class III survey of 100 percent of the APE.

As a result of these efforts, one previously recorded archaeological site was redocumented, and six new archaeological sites and five isolated artifacts were identified and documented. All of these resources are located within the 1,207-acre APE, but outside of the 354.1-acre DIZ. One prehistoric site, TY-Site-3, is recommended eligible to the NRHP under Criterion D based upon surface findings. The remaining six sites and five isolates are recommended not eligible for the NRHP.

The project design analyzed in this report avoids all cultural resources, and therefore no historic properties will be affected by implementation of the proposed project. It is recommended that an HPTP be created for the project to ensure that substantial adverse impacts to cultural resources are avoided or appropriately mitigated.

Allen, M. 1986. "The Effects of Bow and Arrow Technology on Lithic Production and Exchange Systems: A Test Case Using Debitage Analysis. " M.A. thesis, Department of Anthropology, University of California, Los Angeles.

Barras, Judy. 1976. *The Long Road to Tehachapi*. Tehachapi, CA: The Tehachapi Heritage League.

Basgall, M. 2003. "Revisiting the Late-Pleistocene/Early-Holocene, Archaeology of Pleistocene Lake China and the CRBR Locality." *Current Research in the Pleistocene, 20*: 3–5.

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

Blackburn, T.C., and L.J. Bean. 1978. "Kitanemuk." In *Handbook of North American Indians*, Vol. 8, ed. W. L. D'Azevedo. Washington, DC: Smithsonian Institution Press.

Boyco Canteens and Carriers. 1 May 1920. Advertisement for Boyco, in "The Mohave County Miner and Our Mineral Wealth," 5. Available at: http://chroniclingamerica.loc.gov/lccn/sn96060547/1920-05-01/ed-1/seq-6.pdf

Bureau of Land Management. 25 October 1988. *National Environmental Policy Act BLM Handbook H-1790-1*. Available at: http://www.blm.gov/nhp/efoia/wo/handbook/h1790-1.pdf

Bureau of Land Management. May 2003. *Draft Environmental Impact Report and Statement for the West Move Plan*. Vol. 1, Sec. 1.1.1, p. 1-1. Moreno Valley, CA.

Bureau of Land Management. 3 December 2004. *Manual Series 8100*. Available at: www.blm.gov

Bureau of Land Management. January 2005. *West Mojave Plan—A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment Final Environmental Impact Report and Statement*. Vol. 1, Sec. 1.1.1, p. 1-1. Moreno Valley, CA. Available at: http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-1-Chapter1_Bookmarks.pdf

Bureau of Land Management. 11 March 2005. *Land Use Planning Handbook BLM Handbook H-1601-1*. Available at: http://www.blm.gov/nhp/200/wo210/landuse_hb.pdf

Burmeister, Eugene. 1977. *The Golden Empire: Kern County, California*. Beverly Hills, CA: Autograph Press.

California Energy Commission. 2003. *Renewable Resources Development Report*. Sacramento, CA: Media and Public Communications Office.

Campbell, E.W.C., and W.H. Campbell. 1935. *The Pinto Basin Site*. Southwest Museum, Paper No. 9. Los Angeles, CA.

Campbell, E.W.C., W.H. Campbell, E. Antevs, C.E. Amsden, J.A. Barbieri, and F.D. Bode. 1937. *The Archaeology of Pleistocene Lake Mojave*. Southwest Museum, Paper No. 9. Los Angeles, CA.

Clewlow, William C. 1968. "Surface Archaeology in the Black Rock Desert, Nevada" in *Reports of the University of California Archaeological Survey No. 73: Papers on the Archaeology of Western Great Basin*. Berkeley: University of California

Code of Federal Regulations, 36 CFR 60.2, 60.4.

Cowan, Jerrie, Tehachapi Museum, Tehachapi, CA. 20 July 2006. Telephone conversation with Natasha Tabares, Sapphos Environmental, Inc., Pasadena, CA.

Database of State Incentives for Renewable Energy. 26 January 2006. "Renewables Portfolio Standard." Available at: http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=CA25R&state=CA&CurrentPageID=1&RE=1&EE=0

Davis, E.L. 1978. "The Ancient Californians: Rancholabrean Hunters of the Mohave Lakes Country." *Science Series, 29*. Los Angeles, CA: Natural History Museum.

Dillon, B.D. 2002. "California Paleo-Indian: Lack of Evidence, or Evidence of Lack?" In *Essays in California Archaeology: A Memorial to Franklin Fenega*, ed. W.J. Wallace and F.A. Riddell. Berkeley, CA: University of California Publications, pp. 110–128.

Earle, D., and Associates. 1997. *Ethnohistoric Overview of the Edwards Air Force Base Region and the Western Mojave Desert*. Palmdale, CA, p. 54. Prepared for: AFFTC/EMXR, Edwards Air Force Base, CA.

Earle, D., K. Lark, C.J. Parker, M. Ronning, and J. Underwood. 1998. *Cultural Resources Overview and Management Plan for Edwards Air Force Base, California: Vol. 2, Overview of Historic Cultural Resources*. Prepared by Computer Sciences Corporation, Edwards Flight Test Center, Edwards Air Force Base, CA, p. 6.

Federal Aviation Administration. November 2005. *FAA Technical Note: Developing Obstruction Lighting Standards for Wind Turbine Farms*. Federal Aviation Administration.

Folsom, Burton. 1988. *John D. Rockefeller and the Oil Industry*. Available at: http://www.fee.org/the_freeman/detail/john-d-rockefeller-and-the-oil-industry

Four Directions Institute. 2004. Web site. Available at: http://www.fourdir.org/

Greenwood, R.S., and M. McIntyre. 1980. *Cultural Resources Overview for Edwards Air Force Base*. Pacific Palisades, CA: Greenwood and Associates.

Grossard, Gloria. 1997. "Paths of the Pioneers: A Tehachapi Heritage League Field Trip." In *The Tehachapi Museum Newsletter*. Tehachapi, CA. Contact: The Tehachapi Museum, 310 South Green Street, Tehachapi, CA.

Guinn, James Miller. 1915. *A History of California and an Extended History of Los Angeles and Environs, Also Containing Biographies of Well-known Citizens of the Past and Present*. n.p., Vol. III. pp. 899–900.

Justice, Noel D. 2002. *Stone Age Spear and Arrow Points of California and the Great Basin*. Bloomington, IN: Indiana University Press, p. 156.

Kern Centennial Committee. 1966. *Kern County Centennial Almanac, 1866–1966*. Bakersfield, CA: Kern County Centennial Observance Committee, p. 42.

Kern County Planning Department. 15 June 2004. "Energy Element." In *Kern County General Plan*, Chapter 5. Bakersfield, CA. Available at: http://www.co.kern.ca.us/planning/pdfs/kcgp/KCGPChp5Energy.pdf

Kroeber, A. 1925. "Handbook of the Indians of California." *Bureau of American Ethnology Bulletin,* 78: 612–613. Washington, DC: Smithsonian Institution Press.

Lanning, E.P. 1963. "Archaeology of the Rose Spring Site INY-372." *American Archaeology and Ethnology*, *49*(3): 237–336. Berkeley, CA: University of California Publications.

Lockhart, Bill. 2006. "The Color Purple: Dating Solarized Amethyst Container Glass." *Historical Archaeology*, *40*(2):45–56.

"Meat Packing Gave City Large Industry." 24 November 1985. *The Kansas City Kansan*, P2A.

Miller, George. 2000. "Telling Time for Archaeologists." *Northeast Historical Archaeology*, *29*:1–22.

Mojave's History. 2005. Web site. Available at: www.mojave.ca.us/history_IL.htm.

Oxendine, J., Bureau of Land Management. 1984. Primary Record for Archeological Site CA-KER-1906.

Sapphos Environmental, Inc. 12 November 2004. Memorandum for the Record No. 10. Project No. 1378-002. Pasadena, CA.

Sapphos Environmental, Inc. 15 April 2005. Memorandum for the Record No. 11. Project No. 1378-002. Pasadena, CA.

Sapphos Environmental, Inc. 15 December 2009. *Pacific Wind Energy Project Cultural Resources Technical Report*. Prepared for: enXco Development Corporation. Pasadena, CA.

Sutton, M.Q. 1979. "Some Thoughts of the Prehistory of the Antelope Valley." Paper presented at the 1979 Annual Meeting of the Society for California Archaeology, San Luis Obispo, CA.

Sutton, M.Q. 1987. "Some Aspects of Kitanemuk Prehistory." In *Prehistory of the Antelope Valley, California: An Overview*. Occasional Paper No. 1. Lancaster, CA: Antelope Valley Archaeological Society, p. 229.

Sutton, M.Q. 1996. "The Current Status of Archaeological Research in the Mojave Desert." *Journal of California and Great Basin Anthropology*, *18*(2): 231.

Sutton, M.Q. 2001. "Excavations at Teddy Bear Cave (CA-KER-508), Tomo-Kahni State Park, Southern Sierra Nevada, California." *Pacific Coast Archaeological Society*, *37*(1): 1–26.

Sutton, M.Q., and P. Wilke. 1984. "New Observations on a Clovis Point from the Central Mojave Desert, CA." *Journal of California and Great Basin Anthropology*, 6(1): 113–115.

Taşkıran, A., A. Graham, K.T. Doyle, J. Titus, and D.S. Komporlides. 1997. *The Evaluation of Site CA-LAN-863, South Rogers Lake Area, Edwards Air Force Base, California*. Prepared for U.S. Army Corps of Engineers, Sacramento, CA, and the Air Force Flight Test Center, Environmental Management Office, Edwards Air Force Base, CA, pp. 3–11.

Thomas, D.H. 1981. "How to Classify the Projectile Points from Monitor Valley, Nevada." *Journal of California and Great Basin Anthropology, 3*(1): 7–43.

Tomo-Kahni State Historic Park. 2005. Web site. Available at http://www.bakersfield.org/tkpark/kawaiisu.htm

U.S. Department of Energy. 1986. *Wind Energy Resource Atlas of the United States*. Washington, DC.

U.S. Department of the Interior, National Park Service. 2000. *National Register Bulletin: Guidelines for Evaluating and Registering Archeological Properties*. Available at: http://www.cr.nps.gov/nr/publications/bulletins/arch/

U.S. Department of the Interior, National Park Service. 2002. "How to Apply the National Register Criteria for Evaluation." *National Register Bulletin 15*.

U.S. Geological Survey. [1965] Revised 1995. *7.5-minute Series Tylerhorse Canyon, CA, Topographic Quadrangle*. Reston, VA.

United States Code, 16 USC 470.

Warren, C.N. 2002. "Time, Form, and Variability: Lake Mojave and Pinto Periods in Mojave Desert Prehistory." In *Essays in California Archaeology: A Memorial to Franklin Fenenga*, ed. W.J. Wallace and F.A. Riddell. Berkeley, CA: University of California Archaeological Research Facility, pp. 129–141.

Yohe, R.M. 1998. "The Introduction of the Bow and Arrow and Lithic Resource Use at Rose Spring (CA-INY-372)." *Journal of California and Great Basin Anthropology, 20*: 26–52.

Zigmond, M. 1986. "Kawaiisu." In *Handbook of North American Indians*, ed. W.L. D'Azevedo. Vol. 11, Great Basin. Washington, DC: Smithsonian Institution Press, p. 398.

APPENDIX A
RESUMES

Clarus J. Backes, Jr., MA, RPA

MA, Anthropology, California State University, Long Beach, 2009

BA (magna cum laude), Anthropology, emphasis in Archaeology and Linguistics, California State University, Los Angeles, 2005

Registered Professional Archaeologist (ID No. 1673640)

Certified Archaeological Consultant, County of Riverside, California (Certification No. 247)

Archaeological Resources Manager

- *Archaeological resources surveys, evaluations and data recovery*
- *Archaeological resources impact analyses in support of NEPA and CEQA, and Section 106 of the NHPA*
- *Preparation of prehistoric and historic archaeological reports and treatment plans*
- *Laboratory analyses of archaeological materials*

Years of Experience: 13

Relevant Experience:

- *Manzana Wind Energy Project*
- *Catalina Alternative Energy Project*
- *Avalon Wind Energy Project*
- *2008 Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plan*
- *Phase I Archaeological Survey of the Vasquez Rocks Natural Area Park*
- *Black Lava Butte Wind Energy Site Testing*

Mr. Clarus Backes, a professional archaeologist and archaeological resources manager for Sapphos Environmental, Inc., has 13 years of experience and has supervised numerous projects in California in support of compliance with the California Environmental Quality Act (CEQA), the National Environmental Policy Act (NEPA), and Sections 106 and 110 of the National Historic Preservation Act (NHPA). He has participated in a wide range of projects involving archaeological survey, testing, data recovery, monitoring, laboratory analysis, and the development of mitigation and treatment plans, and has over 10 years of experience in a decision-making capacity on cultural resources projects in California. His training and background meet the U.S. Secretary of the Interior's Professional Qualifications Standards for prehistoric and historic archaeology.

Mr. Backes specializes in the prehistoric archaeology of Southern California. His research interests include hunter-gatherer subsistence and technology; archaeological applications of evolutionary theory; rock art technology, including pigment manufacture and exchange; and the application of physical science techniques to archaeological questions.

Mr. Backes's current research includes compositional and provenance analysis of pigments, ceramics, obsidian, and other archaeological materials via laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS). This research is conducted in association with the Institute for Integrated Research on Materials, Environment and Society (IIRMES) at California State University, Long Beach (CSULB), and supports several ongoing North American and Mesoamerican archaeological projects.

Mr. Backes also specializes in rock art recording and analysis, including in situ and laboratory pigment compositional analyses. He has conducted detailed, high-resolution baseline conditions assessments at numerous rock art sites in Southern California using analog and digital formats, ultraviolet and infrared photography, and digital enhancement. He has also pioneered techniques for ultraviolet fluorescence analysis of damaged pictograph sites. He regularly conducts rock art research in the western Mojave Desert, at China Lake Naval Air Weapons Station, and as part of the University of California, Los Angeles (UCLA), Little Lake Rock Art Digital Conservation Project.

Mr. Backes is a member of the Society for American Archaeology (SAA), Society for California Archaeology (SCA), and the American Rock Art Research Association (ARARA). He has authored or coauthored numerous professional reports, peer reviewed publications and monographs, and routinely presents papers at professional meetings.

Karl P. Holland, MA

Master of Arts, Archaeology, University College, London, 2009

Bachelor of Arts, Anthropology, California State University, Long Beach, 2007

Archaeological Resources Coordinator

- *Phase I archaeological surveys*
- *Implementation of study design consistent with project objectives*
- *Research design*
- *Data recording and interpretation*
- *Native American coordination*
- *NAGPRA compliance*

Years of Experience: 3

Relevant Experience:

- *Polynesian prehistory/ background knowledge*
- *Maritime archaeology experience*
- *Polynesian artifact analysis and interpretation*

Mr. Karl Holland, project archaeologist (archaeological resources coordinator) at Sapphos Environmental, Inc., has more than two years of experience in the field of archaeology, including Native American coordination, project management, pedestrian surveys, site eligibility testing, excavation/data recovery, artifact analysis, and laboratory analysis. Mr. Holland has worked closely with Native American monitors to perform quality assurance checks, as well as prepare human remains for repatriation.

As an archaeological resources coordinator, Mr. Holland has undertaken and contributed to work efforts for prehistoric and historic archaeology in Los Angeles County, the Mojave Desert, and Shasta County pursuant to the California Environmental Quality Act (CEQA) and Section 106 of the National Historic Preservation Act (NHPA). He has authored cultural analyses for environmental compliance documents, such as Initial Studies and Cultural Resources Technical Reports, and has compiled California Department of Parks and Recreation (DPR) site records. His qualifications meet the Secretary of the Interior's Professional Qualifications Standards in archaeology as a project archaeologist for both prehistoric and historic cultural remains.

Mr. Holland participated in an archaeological field school during his undergraduate studies at California State University, Long Beach, in the Isles of Scilly, United Kingdom. During this field school, he participated in underwater surveys, artifact and feature recordation, and utilization of specialized nautical/intertidal geographic information systems (GIS) software.

As an undergraduate intern at the University of Missouri–Research Reactor (MURR), Mr. Holland spent two months conducting INAA research and assisting the team with sample preparation. Throughout the internship, he was collecting data for a ceramic sourcing study of Late Postclassic and historic pottery sherds collected from Chiapas, Mexico, and presented at the 73rd Annual Meeting of the Society of American Archaeology in 2008.

For his master's thesis, Mr. Holland built a classification system for Polynesian Lapita pottery motifs utilizing published and unpublished material concerning Lapita Polynesian prehistory. The classification system was designed to provide insight on interactions between prehistoric Polynesian island culture groups through the use of phylogenetic analysis. This form of analysis is used to map both temporal and spatial relationships between island groups to determine cultural relatedness between groups.

Stacey De Shazo

Master of Arts
Historic Preservation, Savannah College of Art and Design (in progress)

Bachelor of Arts,
Anthropology/Archaeology, California State University, San Francisco, 1994

Registration/Certification

- *Project Management Certification, CH2MHill, 2009*
- *Cultural Side of NEPA Compliance Certification, 2008*
- *Section 106 Compliance Certification, 2007*
- *CFR 29, 30, 36, 49 Certification, 2005*
- CEQA and RCRA Certifications, 2005

Archaeologist / Senior Cultural Resources Coordinator

- *Cultural Resource analysis in support of CEQA, NEPA, and Section 106*
- *Archaeological principal investigator*
- *Project management of archaeological studies*
- *Phase/Class I, II, and III archaeological investigations*
- *Prehistoric and historic laboratory analysis*
- *Coordination with Native American Heritage Commission*
- *Archaeological monitoring*
- *Archaeological record search*
- *Rock art analysis*
- *Ethnographic research*
- *Historic Preservation, HABS, and HAERS documentation*

Years of Experience: 12

Ms. Stacey De Shazo, archaeologist (senior cultural resources coordinator) for Sapphos Environmental, Inc., has more than 12 years of experience in project management, environmental compliance, archaeological survey, excavation, monitoring, laboratory analysis, and documentation. Her qualifications meet the Secretary of the Interior's Professional Qualifications Standards in Archaeology.

As a senior cultural resources coordinator, Ms. De Shazo has managed and contributed to work efforts for prehistoric and historic archaeology throughout California pursuant to the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA. She is experienced with State Historic Preservation Office (SHPO) standards and completion of Department of Parks and Recreation (DPR) state resource forms, report writing, SHPO research, mapping, photography, and project management. She has participated in intensive surface survey work and site testing throughout Oregon, Washington, California, Alaska, and Arizona, where she has conducted site recordings of prehistoric and historic sites. She is experienced in, project design, mitigation, and evaluation while meeting client expectations. She has an understanding of and experience in all aspects of cultural resources management, including historic preservation, architectural history, archaeology, Native American consultations, and traditional cultural properties.

As a project manager and field director, Ms. De Shazo has managed field crews in intensive pedestrian surveys, excavations, and laboratory analyses. She has authored cultural and environmental compliance documents, such as Initial Studies, Environmental Impact Reports, Environmental Assessments, and Cultural Resources Technical Reports. She has successfully coordinated with a variety of lead and regulatory agencies, including the Bureau of Land Management (BLM), U.S. Army Corps of Engineers (USACE), Federal Energy Regulatory Commission (FERC), Federal Aviation Administration (FAA) Department of Defense DOD, Department of Energy (DOE), and the U.S. Fish and Wildlife Services (USFAW).

Ms. De Shazo's research interests include California prehistory, the impacts of natural disasters on cultural resources and rehabilitation of brownfield sites in urban development. Ms. De Shazo is currently heading a 3,600-acre cultural resources survey in Shasta County and providing senior field support on a class III survey in Lassen County. Ms. De Shazo's professional experience includes serving as project manager for a NAGPRA project in Northern California for the repatriation of unassociated burial items; as project manager for the Skamania County, Wind River Cultural Resource Survey within Columbia River Gorge National Scenic Area; and as field director and project manager for the cultural resources survey of the South Waterfront Greenway Project, Portland. In addition, she worked as a research assistant with University of California, Santa Barbara, and participated in construction monitoring projects and department of transportation projects throughout California. Ms. De Shazo has participated in a large-scale historic preservation project of a 150-year-old farmhouse in Germany and conducted Phase II and Phase III survey work at the Legion of Honor, in San Francisco, assisting in the recovery of coffin burials from a historic potter's field at the Golden Gate Cemetery, which involved extensive detailed osteologic investigation of individuals from the mid-19th century.

APPENDIX B
DPR 523A FORMS
(REMOVED FOR PUBLIC DISCLOSURE)

APPENDIX C
BLM AND SHPO CORRESPONDENCE
(FORTHCOMING)

APPENDIX E

Noise Technical Report

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Final

Noise Technical Report
Tylerhorse Wind Energy Project

Prepared for

Heartland Wind, LLC

August 2012

Prepared by

CH2MHILL

Contents

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Acronyms and Abbreviations

BLM	U.S. Bureau of Land Management
dB	decibels
dBA	decibels (A-weighted scale)
DNL	day-night sound level
EPA	U.S. Environmental Protection Agency
Hz	hertz
HW	Heartland Wind LLC
kV	kilovolt
kVA	kilovolt amperes
L_{dn}	day-night sound level
L_{eq}	equivalent sound pressure level
LORS	laws, ordinances, regulations and standards
MW	megawatt
O&M	operation and maintenance
Project	Tylerhorse Wind Energy Project
RCNM	Roadway Construction Noise Model
TWRA	Tehachapi Wind Resource Area
WE	Wind Energy
WTG	Wind Turbine Generator

Executive Summary

This report presents an assessment of potential noise effects related to the construction and operation of the Tylerhorse Wind Energy Project (Project). Although the final design for the Project will depend on several factors, including the stipulations in the final U.S. Bureau of Land Management (BLM) Right-of-Way (ROW) Grant, environmental constraints, final turbine selection, and optimization of the layout to maximize generation, this technical report analyzes the maximum turbine layout consisting of up to 40 wind turbine generators (WTGs) and the maximum sound power level, and thus represents the maximum-impact scenario.

The Project is being developed by Heartland Wind LLC (HW), a wholly owned subsidiary of Iberdrola Renewables, LLC, and is solely located on land managed by the BLM within Kern County, California. The Project is within the Tehachapi Wind Resource Area (TWRA), a region recognized by the U.S. Department of Energy as having high wind energy resources. Project components include the construction of up to 40 WTGs, a 34.5 kilovolt (kV) electrical collection system linking each turbine to an existing offsite substation approved by Kern County, access roads, supervisory control and data acquisition (SCADA) system and fiber optic communications, and fencing.

Potential noise-sensitive receptors within the Project vicinity include several potential residential structures that are scattered throughout the proposed Project Study Area (see Figure 1-1, Regional Map and Study Area Boundary). The Study Area encompasses the land on which the proposed Project will be constructed, operated, and decommissioned as well as an approximately 2 mile buffer area surrounding turbines on BLM lands. The maximum turbine layout and Study Area assessed in this technical report present a maximum-impact scenario for purposes of fully disclosing and assessing the potential environmental impacts of the proposed Project. The final design for the Project will depend on the stipulations in the final BLM ROW Grant, environmental constraints, final turbine selection, and optimization of the layout to maximize generation.

The Project will prepare an acoustical analysis of the final layout with the selected turbine to document that a Project sound level of 45 dBA is not expected to be routinely exceeded at occupied residences that have not entered into agreements with the owner.

The Project will incorporate the following measures to ensure a less than significant impact:

- Reduce potential Project noise levels through selection of final turbines (using a quieter turbine), changing the locations of WTGs, or modifying the operations of the wind turbines.
- Obtain easements or agreements from neighboring property owners.
- Establish a Noise Complaint Resolution Process.

SECTION 1

Introduction

The Tylerhorse Wind Energy Project (Project) will consist of wind turbine generators (WTGs) located on approximately 1,200 acres of land (see Figure 1-1, Regional Map and Study Area Boundary). The Project Study Area is located within the Tehachapi Wind Resource Area (TWRA), a region recognized by the U.S. Department of Energy as having high wind energy resources. The TWRA is a 232,198-acre area that contains many existing and reasonably foreseeable future wind power projects. The TWRA is located at the southern end of the San Joaquin Valley, extending into the Mojave Desert and encompassing diverse landscapes with elevations ranging from approximately 2,500 feet to 8,000 feet above mean sea level. The TWRA is designated to accommodate various projects to generate up to approximately 4,500 megawatts (MW) of new wind generation (Kern County, 2011).

This report presents an assessment of potential noise effects related to the Project. The noise impact analysis is focused on the receptors that could be affected by the sound levels associated with construction and operation. The Project is adjacent to two approved wind energy projects under construction: the Manzana (formerly PdV) Wind Energy Project (Manzana Project) and the Pacific Wind Energy Project. Eight other renewable energy projects in various stages of planning, development, and construction are located within the surrounding area (15-mile radius) (Sapphos Environmental, Inc., 2012). Other developments in the area include Los Angeles Department of Water and Power Aqueducts 1 and 2 and regional electrical transmission line corridors. The surrounding area is used for grazing and does not contain any residences, but there are several rural residences within the vicinity.

Section 2 of this report includes a description of the Project. Section 3 discusses the fundamentals of acoustics. Section 4 presents applicable laws, ordinances, regulations, and standards. Section 5 describes the affected environment, including existing noise levels and potential noise-sensitive receptors. Section 6 provides an environmental analysis of the construction and operation of the wind farm and associated facilities, including cumulative effects. Section 7 discusses conceptual mitigation measures. The residential survey is provided in Appendix A.

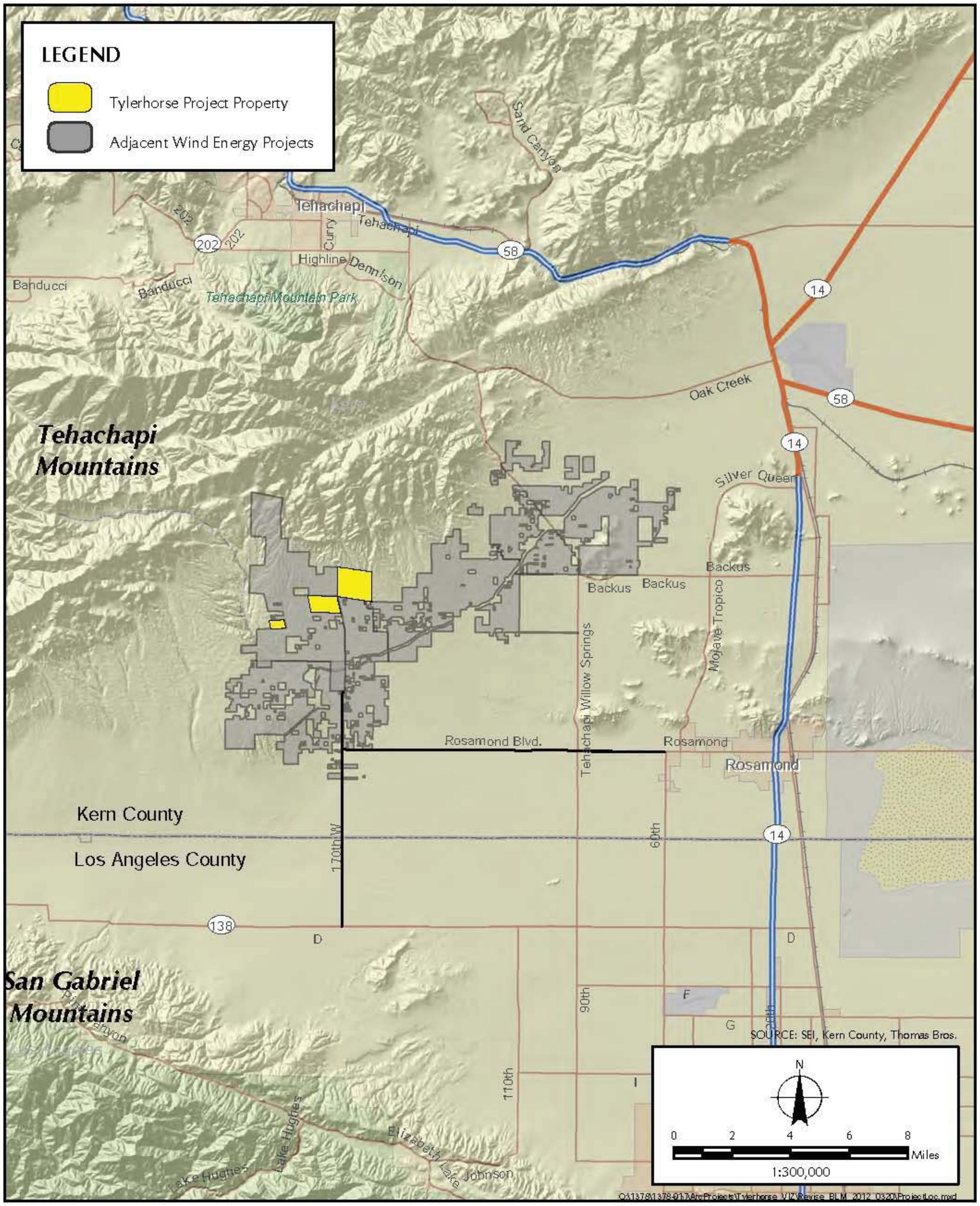

FIGURE 1-1
Regional Map and Study Area Boundary
Source: Tylerhorse Wind Energy Project Visual Resources Technical Appendix (Sapphos Environmental Incorporated, May 2012)

SECTION 2

General Project Description

The Project is located on approximately 1,200 acres of U.S. Bureau of Land Management (BLM) administered land located in the southern portion of the unincorporated area of Kern County, California, approximately 15 miles west of California State Highway 14 (Antelope Valley Freeway), 12.5 miles south of California State Highway 58 (Blue State Memorial Highway), and 8 miles north of State Route 138 (West Avenue D). The Project is located immediately adjacent to the Manzana (formerly PdV) Project approved by the Kern County Board of Supervisors on July 29, 2008, that is controlled by Iberdrola Renewables, LLC, on adjacent private lands; and the approved Pacific Wind Energy Project. In addition, the approved Catalina Renewable Energy Project, which includes wind and solar elements, is located approximately 7 miles to the east (Figure 2-1).

The Project will consist of up to 40 WTGs, which are expected to be between 1.5 to 3.0 MW each. The Project will use the neighboring Manzana Project's existing operations and maintenance (O&M) facility, staging and refueling areas, and concrete batch plant.

The Project will transmit electrical power to the electrical grid by interconnecting the Project to the already constructed private collector station located within the adjacent approved Manzana Project, which is in turn connected to the Southern California Edison (SCE) Whirlwind Substation. The principal components of the Project include up to 40 WTGs, a 34.5 kV electrical collection system linking each turbine to an existing offsite substation approved by Kern County, access roads, supervisory control and data acquisition (SCADA) system and fiber optic communications, and fencing.

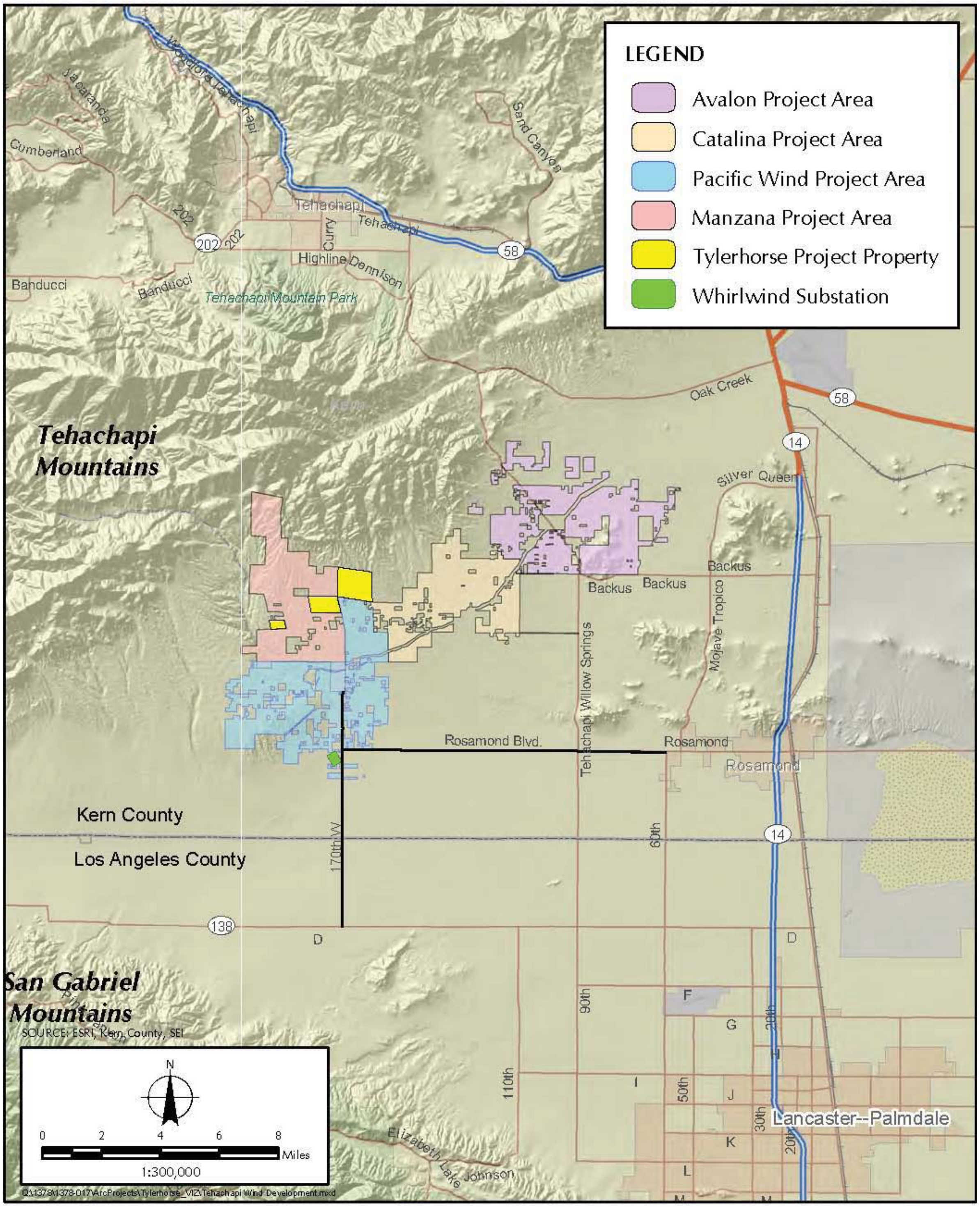

FIGURE 2-1
Tehachapi Wind Energy Development
Source: Tylerhorse Wind Energy Project Visual Resources Technical Appendix (Sapphos Environmental Incorporated, May 2012)

SECTION 3

Fundamentals of Acoustics

Acoustics is the study of sound, and noise is defined as unwanted sound. Airborne sound is a rapid fluctuation or oscillation of air pressure above and below atmospheric pressure creating a sound wave. Acoustical terms used in this section are summarized in Table 3-1.

The most common metric is the overall A-weighted sound level measurement that has been adopted by regulatory bodies worldwide. The A-weighting network measures sound in a similar fashion to the way in which a person perceives or hears sound. In this way, it generally provides a good measure for evaluating acceptable and unacceptable sound levels.

A-weighted sound levels are typically measured or presented as equivalent sound pressure level (L_{eq}), which is defined as the average noise level, on an equal energy basis for a stated period of time, and is commonly used to measure steady-state sound or noise that is usually dominant. Statistical methods are used to capture the dynamics of a changing acoustical environment. Statistical measurements are typically denoted by $L_{xx,}$ where xx represents the percentile of time the sound level is exceeded. For example, L_{90} is a measurement that represents the noise level that is exceeded during 90 percent of the measurement period. Similarly, L_{10} represents the noise level exceeded for 10 percent of the measurement period.

Some metrics used in determining the impact of environmental noise consider the differences in response that people have to daytime and nighttime noise levels. During the nighttime, exterior background noises are generally lower than the daytime levels. However, most household noise also decreases at night and exterior noise becomes more noticeable. Furthermore, most people sleep at night and are sensitive to intrusive noises. To account for human sensitivity to nighttime noise levels, the day-night sound level (L_{dn} or DNL) was developed. L_{dn} is a noise index that accounts for the greater annoyance of noise during the nighttime hours.

L_{dn} values are calculated by averaging hourly L_{eq} sound levels for a 24-hour period, and apply a weighting factor to nighttime L_{eq} values. The weighting factor, which reflects the increased sensitivity to noise during nighttime hours, is added to each hourly L_{eq} sound level before the 24-hour L_{dn} is calculated. For the purposes of assessing noise, the 24-hour day is divided into two time periods, with the following weightings:

- Daytime: 7 a.m. to 10 p.m. (15 hours): weighting factor of 0 decibels (dB)
- Nighttime: 10 p.m. to 7 a.m. (9 hours): weighting factor of 10 dB

TABLE 3-1
Definitions of Acoustical Terms

Term	Definition
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise or sound at a given location. The ambient level is typically defined by the L_{eq} level.
Background Noise Level	The underlying ever-present lower level noise that remains in the absence of intrusive or intermittent sounds. Distant sources, such as traffic, typically make up the background. The background level is generally defined by the L_{90} percentile noise level.
Octave Band (or 1/1 Octave Band)	A frequency range with an upper limit that is twice the value of the lower limit of the range. Octave bands are typically identified by their center frequency.
1/3 Octave Band	A narrower range of frequencies than included in a full 1/1 octave band. Each full octave band is divided into three 1/3 octave bands.
Frequency	The number of times per second at which the sound pressure disturbance oscillates between positive and negative values relative to atmospheric. The frequency is measured in cycles per second, or hertz (Hz).
Decibel (dB)	The decibel (dB) is the basic unit used to describe sound levels, including both sound pressure levels and sound power levels. The decibel is defined as 10 times the logarithm (to the base 10) of a ratio of a measured or calculated value to a reference value.
Sound Power Level (PWL)	A measure of the acoustic power emitted by a sound source. The sound power level (PWL) is defined as $10 \times Log\left(\frac{W}{W_0}\right)$, where W is the sound power emitted by the source (watts) and W_0 is the reference sound power (10^{-12} watt).
Sound Pressure Level (SPL)	A measure of the acoustic pressure at a specific location. The sound pressure level (SPL) is defined as $10 \times Log\left(\frac{p^2}{p_{ref}^2}\right)$, where p is the root mean square (rms) sound pressure being measured and pref is the reference rms sound pressure (2 x 10^{-5} newtons per square meter).
A-Weighted Sound Pressure Level (dBA)	The sound level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted 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 generally correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless stated otherwise.
Equivalent Noise Level (L_{eq})	The average A-weighted noise level, on an equal energy basis, during the measurement period.
Percentile (or Statistical) Noise Level (L_n)	The noise level exceeded during n percent of the measurement period, where n is a number between 0 and 100 (e.g., L_{90}).
Day-Night Noise Level (L_{dn} or DNL)	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels from 10:00 p.m. to 7:00 a.m.

The two time periods are then averaged to compute the overall L_{dn} value. For a continuous noise source, the L_{dn} value is easily computed by adding 6.4 dB to the overall 24-hour noise level (L_{eq}). For example, if the expected continuous noise level from the power plant were 60.0 dBA, the resulting L_{dn} from the plant would be 66.4 dBA.

The effects of noise on people can be listed in three general categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction
- Interference with activities such as speech, sleep, and learning
- Physiological effects such as startling and hearing loss

In most cases, environmental noise produces effects in the first two categories only. However, workers in industrial plants may experience noise effects in the last category. Table 3-2 provides the relative A-weighted noise levels of common sounds measured in the environment and in industry for various sound levels.

TABLE 3-2
Typical Sound Levels Measured in the Environment and Industry

Noise Source at a Given Distance	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Impression
Shotgun (at shooter's ear)	140	Carrier flight deck	Painfully loud
Civil defense siren (100 feet)	130		
Jet takeoff (200 feet)	120		Threshold of pain
Loud rock music	110	Rock music concert	
Pile driver (50 feet)	100		Very loud
Ambulance siren (100 feet)	90	Boiler room	
Pneumatic drill (50 feet)	80	Noisy restaurant	
Busy traffic; hair dryer	70		Moderately loud
Normal conversation (5 feet)	60	Data processing center	
Light traffic (100 feet); rainfall	50	Private business office	
Bird calls (distant)	40	Average living room library	Quiet
Soft whisper (5 feet); rustling leaves	30	Quiet bedroom	
	20	Recording studio	
Normal breathing	10		Threshold of hearing

Source: Beranek, 1998.

There are several mechanisms by which noise levels decrease as the distance between noise source and receptor increases. These include:

- Geometrical divergence
- Atmospheric absorption
- Ground effects
- Screening due to terrain or structures

These noise-reduction effects generally increase as the frequency of the noise increases.

SECTION 4

Regulatory Framework

4.1 Bureau of Land Management Programmatic Environmental Impact Statement

The BLM is the federal agency charged with managing federal public lands and is responsible for the development of wind energy resources on BLM-administered lands. The BLM prepared a Programmatic Environmental Impact Statement (EIS) in accordance with the requirements of the National Environmental Policy Act to establish a "Wind Energy Development Program." Several key findings/statements relevant to assessing noise impacts of a wind project are cited below:

- At many wind energy project sites on BLM-administered lands, large fluctuations in broadband noise are common, and even a 10-dB increase would be unlikely to cause an adverse community response.
- For a typical rural environment, background noise is expected to be approximately 40 dB(A) during the day and 30 dB(A) at night (Harris, 1979), or about 35 dB(A) as DNL (Miller, 2002).
- The U.S. Environmental Protection Agency (EPA) guideline recommends a day-night sound level (L_{dn}) of 55 dB(A) to protect the public from the effect of broadband environmental noise in typically quiet outdoor and residential areas (EPA, 1974). This level is not a regulatory goal but is "intentionally conservative to protect the most sensitive portion of the American population" with "an additional margin of safety."
- Geometric spreading only, results in a sound pressure level of 58 to 62 dB(A) at a distance of 50 meters (164 feet) from the turbine, which is about the same level as conversational speech at a 1-meter (3-foot) distance.
- To estimate combined noise levels from multiple turbines, the sound pressure level from each turbine should be estimated and summed.
- Noise generated by turbines, substations, transmission lines, and maintenance activities during the operational phase would approach typical background levels for rural areas at distances of 2,000 feet (600 meters) or less and, therefore, would not be expected to result in cumulative impacts to local residents.

The above provides guidance on how BLM assesses the potential noise impacts from individual projects.

4.2 Kern County

While Kern County does not have jurisdiction of the Project, the following discussion is provided for completeness and reference. Table 4-1 summarizes the Kern County laws, ordinances, regulations, and standards (LORS) that apply to noise.

TABLE 4-1
Applicable Laws, Ordinances, Regulations, and Standards for Noise

LORS	Purpose
California Government Code Section 65302	Requires local government to prepare plans that contain noise provisions.
Kern County General Plan	Requires Kern County to ensure proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise sensitive land uses to exterior noise above certain limits.
Kern County Municipal Code	Establishes typical hours during which construction activities are permitted.
Kern County Zoning Ordinance	For projects located within the Wind Energy (WE) Combining District, Chapter 19.64 establishes the distance between project's exterior boundary and sensitive receptors at which an acoustical analysis is required. It also sets the acoustical criteria (noise limits) the project must comply with, the criteria to determine those limits, and how to proceed in the event that noise levels exceed the acoustical criteria.

Kern County's General Plan (Noise Element) establishes limits for noise levels in noise-sensitive areas, which include residential areas, schools, convalescent and acute care hospitals, parks and recreation areas, and churches (Kern County, 2009).The Noise Element includes implementation measures that are to be carried out by Kern County. Measure F of the Noise Element states that Kern County will require proposed commercial and industrial uses or operations to be designed or arranged so that they will not subject residential or other noise-sensitive land uses to exterior noise levels in excess of 65 dBA L_{dn} and interior noise levels in excess of 45 dBA L_{dn}. An L_{dn} of 65 dBA is equivalent to 65 dBA during the day and 55 dBA during the night or, for a continuously and constant noise source is equivalent to 59 dBA over a 24 hour period. The Kern County Municipal Code and Zoning Ordinance are summarized in Appendix B.

SECTION 5

Potentially Affected Environment

Current noise levels within most of the Project area are expected to be typical of undeveloped land with scattered rural residences. The Project is located mostly on undeveloped land bordering several wind energy facilities in construction. The Project is located immediately adjacent to the Manzana Project approved by the Kern County Board of Supervisors on July 29, 2008, that is controlled by Iberdrola Renewables, LLC, on adjacent private lands; and the approved Pacific Wind Energy Project (Figure 2-1). Both projects are in construction and should be operational in early 2013. In addition, the approved Catalina Renewable Energy Project, which includes wind and solar elements, is located approximately 7 miles to the east. There are also many approved or operating wind projects in the TWRA as shown in Figure 5-1. No other significant noise sources have been identified other than a few lightly traveled roads that run through the Project area and the existing Manzana Project.

According to results of studies presented by the BLM in the document *Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States*, in a typical rural environment the "background noise is expected to be approximately 40 dBA during the day and 30 dBA at night" (BLM, 2005). Furthermore, according to information on noise levels presented by EPA, background noise levels are generally near 35 dBA L_{dn} in wilderness areas, near 40 dBA L_{dn} in rural residential areas, and near 44 to 45 dBA L_{dn} in agricultural cropland (EPA, 1978).

Based on the referenced information, existing background noise levels in the vicinity of the Project Study Area are reasonably expected to be approximately 40 dBA or less. In addition, it should be noted that wind-induced noise and operations of existing turbines may result in these levels being exceeded periodically.

As noted previously, there are several scattered rural residences and other structures within the Project vicinity. These are evaluated in the following section and more thoroughly identified in Appendix A.

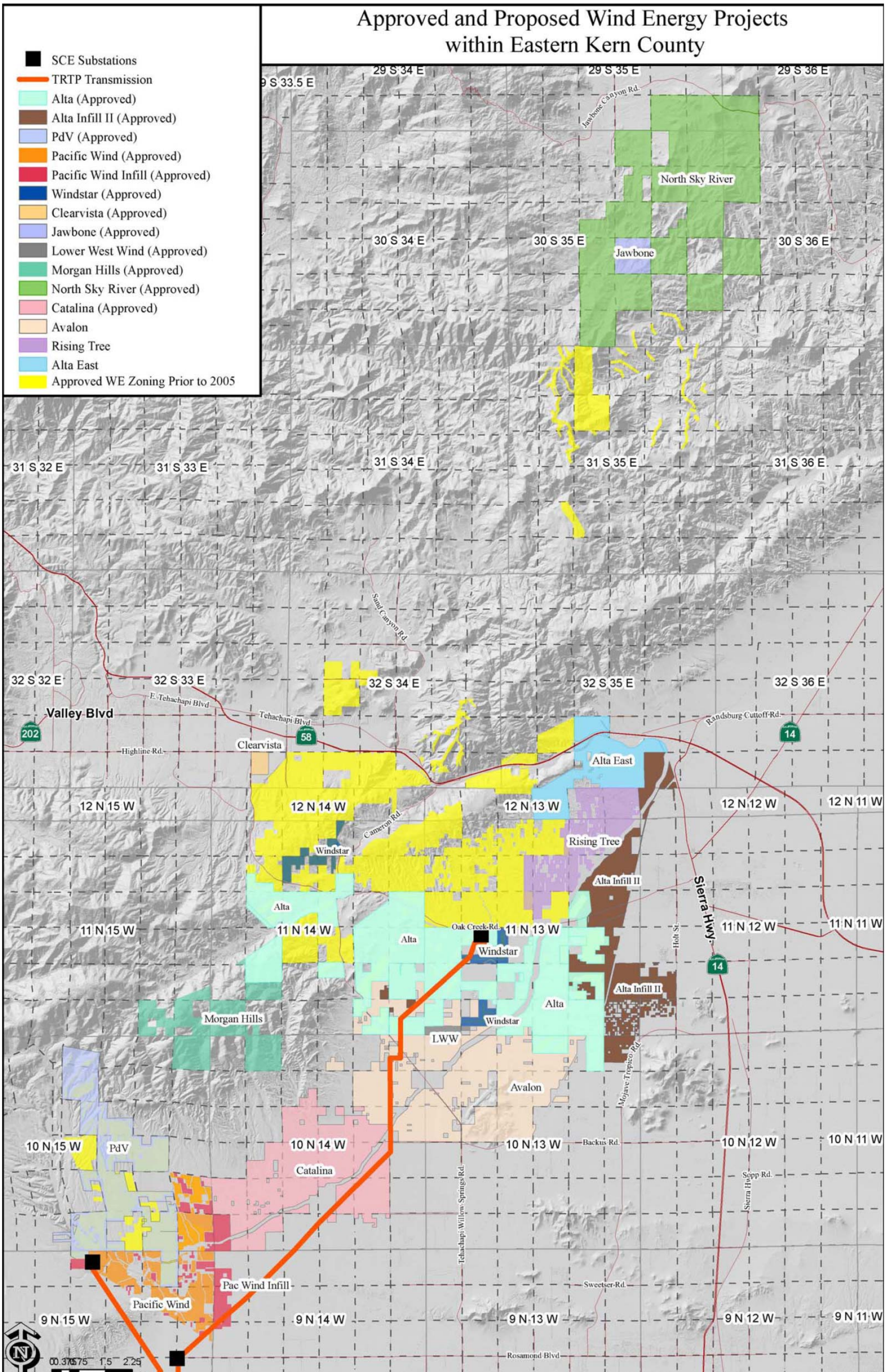

FIGURE 5-1

Approved and Proposed Wind Energy Projects within Eastern Kern County

Courtesy of Kern County Planning Department

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SECTION 6

Noise Impact Analysis

6.1 Construction Noise

Construction activities are expected to be typical of comparable large construction projects but of more limited duration and scale than the Manzana Project on adjacent private lands and the approved Pacific Wind Energy Project (Figure 2-1), which are currently in construction. The noise level will vary during the construction period, depending upon the construction phase and types of equipment in use.

The Federal Highway Administration Roadway Construction Noise Model (RCNM) represents the most complete and current assessment of noise from operation of heavy equipment. This data set was developed from the Central Artery/Tunnel (known as the Big Dig) project in Boston, Massachusetts, which began in the early 1990s and is the largest urban construction project ever conducted in the United States. The equipment evaluated in the RCNM is similar to that expected to be used in construction. As such, the RCNM database of measured noise levels at 50 feet and the predicted levels at 2,500 feet are presented in Table 6-1. The predicted levels are conservative because the only attenuating mechanism considered was divergence of the sound waves in open air (where a 6-dB reduction per doubling of distance is applied).

TABLE 6-1
Summary of Construction Equipment Noise Levels (dBA)

Equipment	Impact Device	Measured L_{max} (at 50 feet)	Predicted L_{max} (at 2,500 feet)
Auger Drill Rig	No	84	51
Backhoe	No	78	45
Boring Jack Power Unit	No	83	50
Clam Shovel (dropping)	Yes	87	54
Compactor (ground)	No	83	50
Compressor (air)	No	78	45
Concrete Mixer Truck	No	79	46
Concrete Pump Truck	No	81	48
Concrete Saw	No	90	57
Crane	No	81	48
Dozer	No	82	49
Drill Rig Truck	No	79	46
Drum Mixer	No	80	47
Dump Truck	No	76	43
Excavator	No	81	48
Front-End Loader	No	79	46
Generator	No	81	48
Generator (less than 25 kVA)	No	73	40

TABLE 6-1
Summary of Construction Equipment Noise Levels (dBA)

Equipment	Impact Device	Measured L_{max} (at 50 feet)	Predicted L_{max} (at 2,500 feet)
14-H Load Grader/Gradall	No	83	50
Grapple (on backhoe)	No	87	54
Heavy Truck (Water/Line/Flatbed)	No	74	41
Horizontal-Boring Hydraulic Jack	No	82	49
Impact Pile Driver	Yes	101	68
Jackhammer	Yes	89	56
Man Lift/Forklift	No	75	42
Mounted Impact Hammer (hoe ram)	Yes	90	57
Pavement Scarifier	No	90	57
Paver	No	77	44
Pickup Truck	No	75	42
Pneumatic Tools	No	85	52
Pumps	No	81	48
Rivit Buster/chipping gun	Yes	79	46
Rock Drill	No	81	48
Roller	No	80	47
Scraper	No	85	52
Shears (on backhoe)	No	96	63
Slurry Plant	No	78	45
Trencher/Slurry Trencher	No	80	47
Vacuum Excavator (Vac-truck)	No	85	52
Vacuum Street Sweeper	No	82	49
Vibrating Hopper	No	87	54
Vibratory Concrete Mixer	No	80	47
Vibratory Pile Driver	No	101	68
Welder/Torch	No	74	41

L_{max} = maximum A-weighted sound level.

kVA = kilovolt amperes.

Table 6-1 indicates the range in noise levels that might be realized from various pieces of construction equipment. Most equipment is within 75 to 85 dBA at a reference distance of 50 feet.

The BLM Programmatic EIS also reports noise levels for typical construction equipment that would likely be used at a wind turbine project (BLM, 2005). The BLM construction noise levels are presented in Table 6-2.

TABLE 6-2
Noise Levels at Various Distances from Typical Construction Equipment

Construction Equipment	Noise Level L_{eq} at Distances [dB(A)]					
	50 ft	250 ft	500 ft	1,000 ft	2,500 ft	5,000 ft
Bulldozer	85	71	65	59	51	45
Concrete mixer	85	71	65	59	51	45
Concrete pump	82	68	62	56	48	42
Crane, derrick	88	74	68	62	54	48
Crane, mobile	83	69	63	57	49	43
Front-end loader	85	71	65	59	51	45
Generator	81	67	61	55	47	41
Grader	85	71	65	59	51	45
Shovel	82	72	62	56	48	42
Truck	88	74	68	62	54	48

As noted previously, the maximum turbine layout indicates turbines may be within approximately 1,200 feet of potentially habitable residential structures. In the event such distances were realized in the final design, the expected construction noise level for turbine related activities would generally range between 52 and 62 dBA. Although such levels are expected to be noticeable, they will be limited in duration as construction progresses from one portion of the Project to another. Noisy construction activities would also be limited to daytime hours to the extent feasible.

The BLM Programmatic EIS also summarizes potential noise levels that would occur from heavy truck traffic, as shown in Table 6-3 (BLM, 2005).

TABLE 6-3
Noise Levels at Various Distances from Heavy Trucks

Hourly Vehicle Traffic	Noise Level $L_{eq(1\text{-}h)}$ at Distances (dBA)					
	50 feet	250 feet	500 feet	1,000 feet	2,500 feet	5,000 feet
1	51	44	41	38	34	31
10	61	54	51	48	44	41
50	68	61	58	55	51	48
100	71	64	61	58	54	51

dBA = decibels (A-weighted)

6.2 Maintenance and Decommissioning

Regular maintenance activities would include periodic site visits to wind turbines, communication cables, transmission lines, substations, and auxiliary structures. These activities would involve light- or medium-duty vehicle traffic (typically licensed for use on public roads) with relatively low noise levels. Infrequent but potential noise-generating activities could include road maintenance work with heavy equipment, as well as repair of wind turbines, or auxiliary equipment. The anticipated levels of noise from maintenance activities would be less than those associated with construction activities.

In general, noise impacts from decommissioning activities would be similar to those associated with construction activities. However, it is anticipated that decommissioning activities would be of shorter duration.

6.3 Operational Noise

A noise model of the Project was developed using a sound power level of 112 dBA, representative of the loudest turbine considered for this Project. The representative data were used as typical source input in the noise model, and noise emissions from the Project were calculated at nearby noise-sensitive receptors of potential concern. The noise levels represent the anticipated maximum steady-state level from the Project operating at rated capacity.

Standard acoustical engineering methods were used in the noise analysis. The sound propagation factors used in the model have been adopted from ISO 9613-2, *Acoustics – Attenuation of Sound during Propagation Outdoors – Part 2: General Method of Calculation* (ISO, 1996). The sound power levels representing the standard performance of the WTGs are assigned based on data supplied by the manufacturer. Using these sound power levels as a basis, the model calculates the sound pressure level that would occur after losses from distance, air absorption, ground effects, and screening are considered. The ISO 9613-2 model is based on an omni-directional downwind condition. That is, the noise prediction algorithms assume every point at which sound level is calculated is downwind of all turbines simultaneously. While this is physically impossible, the ISO 9613-2 model has been widely and successfully used to develop acoustical models for wind energy and other facilities. When receivers are located in an actual upwind or crosswind condition, lower sound levels may be expected. This analysis focuses on the more conservative downwind condition, consistent with ISO 9613-2.

Table 6-4 identifies the predicted A-weighted sound pressure levels from the Project at each identified structure. Potential residential structures were identified by Sapphos Environmental Inc. and correspondence with the Kern County Tax Assessor's office as described in Appendix A. The predictions are based on all WTGs operating at their maximum sound power level (PWL) of 112 dBA simultaneously.

The highest predicted Project noise level from the maximum turbine layout at a potential residential structure is predicted to be 52 dBA. Two potential residences are predicted to be greater than the Kern County Wind Energy Combining District exterior limit of 45 dBA (refer to Appendix B), but none are anticipated to exceed the County's General Plan requirement of an L_{dn} of 65 dBA (or 55 dBA during the night).

TABLE 6-4
Summary of Predicted Operational Sound Pressure Levels (dBA)
Maximum Turbine Layout

Structure ID	Predicted Sound Level, dBA (Based on Turbine PWL 112 dBA)
1	40
2	40
3	41
4	43
5	47
6	42
7	41
8	33
9	33
10	33
11	33
12	32
13	33
14	33
15	45
16	40
17	40
18	33
19	33
20	34
21	43
22	43
23	34
24	34
25	35
26	35
27	34
28	35
29	44
30	52
31	49
32	50
33	50
34	56
35	58
36	59
37	41
38	41
39	41
40	41

6.4 Cumulative Impacts

Although noise levels are additive, the noise level at any particular location is dominated by the loudest (typically the closest) source. More distant sources have a diminishing effect on receptor levels. In the event two noise sources are equal in level, the combined sum results in a 3-dBA increase, which is generally considered the threshold of a perceptible increase when comparing similar sound sources. It is therefore unlikely that a cumulative impact would substantially exceed a direct impact.

The evaluation of the potential for cumulative impacts to ambient noise levels at sensitive receptors, potential residences, took into consideration the combined effects of the operation of the Project with the Manzana Project (Operational Date, October 2012) and the Pacific Wind Energy Project (Operational Date, August 2012). As a result of that analysis, it was determined that the combined effects of the Project and the existing operations of the Manzana Project and Pacific Wind Energy Project would not increase the noise level at a residence by more than 3 dBA above the level predicted for either the Project or the simultaneous operation of the existing projects. A 3-dBA increase is the threshold of perceptible level of change; therefore, the Project would not be expected to result in significant adverse impacts to ambient noise levels at sensitive noise receptors located within 1 mile of the Project.

SECTION 7

Mitigation Measures

The applicant proposed construction mitigation measures and operational mitigation measures are described below.

7.1 Construction Mitigation Measures

The Project proposes to implement the following measures to ensure that any potential noise impacts of the facility are minimized.

7.1.1 Construction Hours

Noisy construction activities will be prohibited within 1,000 feet of residences between 9:00 p.m. and 6:00 a.m. on weekdays and between 9:00 p.m. and 8:00 a.m. on weekends. In the event night construction near residences is required, the Project will notify residents and develop a construction noise mitigation plan that details mitigation measures such as temporary noise walls and enhanced exhaust silencers.

7.1.2 Vehicle and Equipment Operation

Haul trucks and other engine-powered equipment shall be provided with adequate mufflers. Haul trucks shall be operated in accordance with posted speed limits. Use of truck engine exhaust brakes shall be limited to emergencies.

7.1.3 Maintenance of Construction Equipment

Construction contractors shall be required to ensure that construction equipment is well tuned and maintained according to the manufacturer's specifications, and that the standard noise reduction devices on the equipment are in good working order. If stationary construction equipment (i.e., compressors and generators) is anticipated, the equipment shall be required to be located as far as practicable from nearby residences.

7.1.4 Resident Notification

The Project shall notify residences within 1 mile of any unusually loud construction activities, including the use of helicopters, blasting or pile driving, at least 1 week prior to their scheduled occurrence.

7.2 Operational Mitigation Measures

7.2.1 Project Design and Turbine Selection Process

The Project will prepare an acoustical analysis of the final layout with the selected turbine to document that a Project sound level of 45 dBA is not expected to be routinely exceeded at occupied residences that have not entered into agreements with the owner.

The following measures are available to reduce or minimize the potential effects of sound emissions from the Project:

- Reduce potential Project noise levels through selection of final turbines (using a quieter turbine), changing the locations of WTGs, or modifying the operations of the wind turbines.
- Obtain easements or agreements from neighboring property owners.
- Establish a Noise Complaint Resolution Process.

7.2.2 Complaint Resolution Process

The Project owner shall document, investigate, evaluate, and attempt to resolve legitimate project-related noise complaints. The Project owner or authorized agent shall document the complainants name and address, date, time, and nature of the noise complaint. The owner shall document actions taken to evaluate and resolve the complaint.

SECTION 8

References

Beranek, L.L. 1998. *Noise and Vibration Control.* Institute of Noise Control Engineering. McGraw Hill.

Harris, C.M. (editor). 1979. *Handbook of Noise Control*. 2nd ed., McGraw-Hill Book Company, New York, New York.

International Organization for Standardization (ISO). 1996. 9613-2, *Acoustics – Attenuation of Sound during Propagation Outdoors – Part 2: General Method of Calculation.*

Kern County. 2009. *Kern County General Plan. Noise Element*. Available at website: www.co.kern.ca.us/planning/pdfs/kcgp/kcgpchapter3.pdf. Accessed October 25, 2010.

Kern County. 2011. *Kern County Renewable Energy Projects.* Prepared by Kern County Planning Department. Available at website: http://www.co.kern.ca.us/planning/renewable_energy.asp

Miller, N.P. 2002. "Transportation Noise and Recreational Lands," in *InterNoise 2002*, The 2002 International Congress and Exposition on Noise Control Engineering, August 19–21, Dearborn, Michigan.

Sapphos Environmental, Inc. 2012. *Tylerhorse Wind Energy Project Visual Resources Technical Appendix*. Prepared for enXco Development Corporation. May 2012.

U.S. Bureau of Land Management (BLM). 2005. *Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States.* U.S. Department of the Interior. June 24. Available online at http://windeis.anl.gov/eis/index.cfm

U.S. Environmental Protection Agency (EPA). 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* EPA-550/9-74-004, Washington, D.C., March.

U.S. Environmental Protection Agency (EPA). 1978. *Protective Noise Levels, Condensed Version of EPA Levels Document.*

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Appendix A
Residential Survey

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APPENDIX A

Structure and Residential Survey

Methods

Iberdrola Renewables, LLC (IR) GIS staff directed a desktop review and field verification of residences within approximately 2 miles of the Tylerhorse Wind Energy Project (Project) turbines proposed BLM ROW boundary in June 2012.

A desktop review was performed to locate potential residences within approximately 2 miles of turbines on BLM lands ("Study Area"). The desktop review is based on the following data: 2012 Kern County GIS tax lot data and ownership data; the Kern County Tax Assessor Recorder website, which provides property characteristics (Building or No Building) under the Property Profile—Property Details available online at http://assessor.co.kern.ca.us/propertysearch/index.php; combination of the National Agriculture Imagery Program (NAIP) imagery flown in 2010; and previous land owner consultation. There were thirty six (36) potential residences located within the Study Area.

On June 20 and 21, 2012, a biologist from Sapphos Environmental, Inc., (Sapphos) drove on public roads and property leased to IR for the Manzana Project within the Study Area to verify the status of the thirty six (36) structures that had been identified as potential residences. Sapphos staff used hard copy maps, a hand held GPS, and a camera to review the structures. Photographs were taken of as many of the structures in the vicinity of the Project as possible. Some residences were omitted in deference to no-trespassing signs and resident wishes. June 20 and 21, 2012, were clear days and visibility was determined to be approximately 1 mile over flat terrain.

As a third verification step, the compiled information was reviewed by both White Wolf Land Service and the Kern County Assessor's Office.

Results and Conclusions

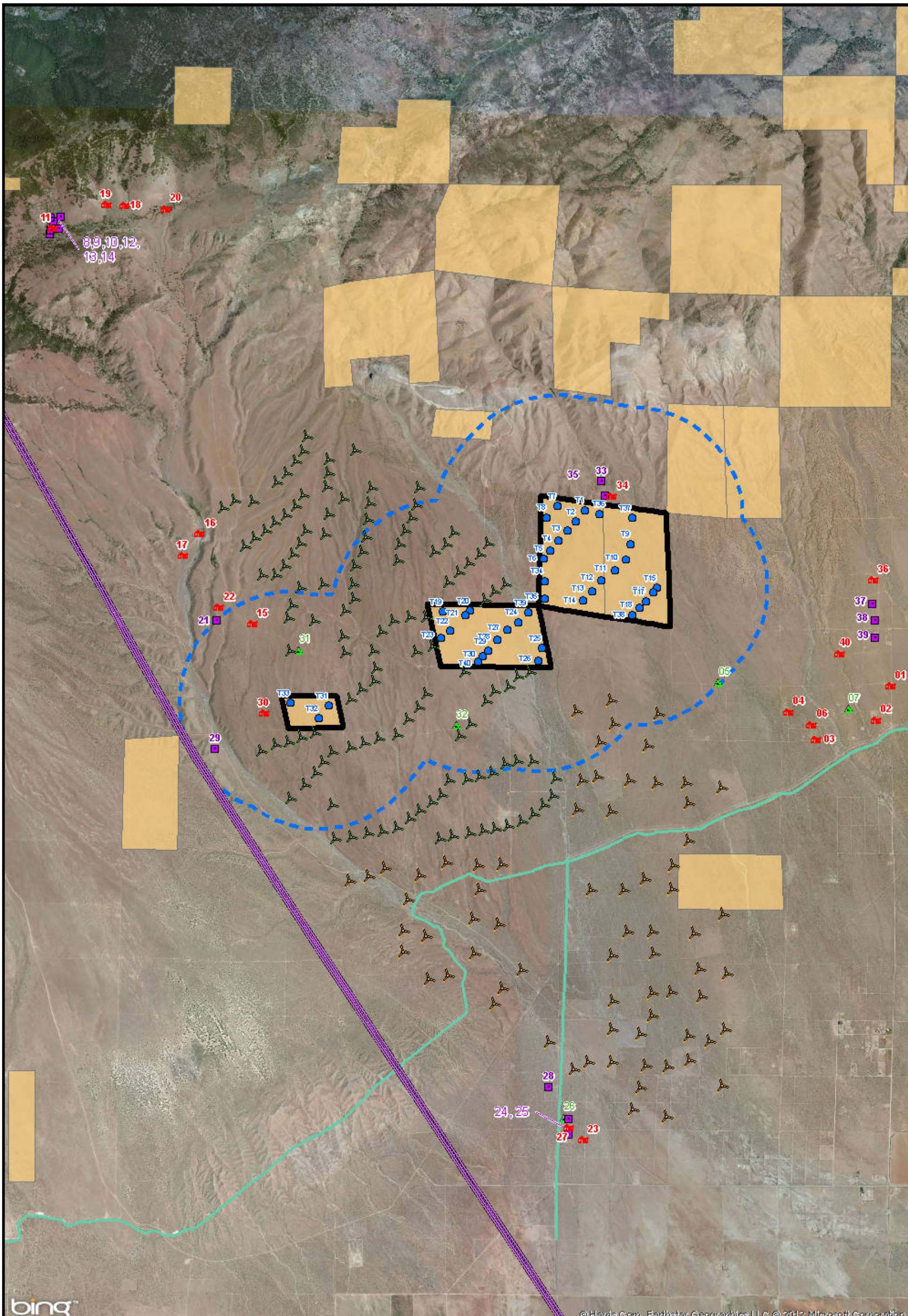
Based on the Sapphos field visit and correspondence with the tax assessor, nineteen (19) of the thirty six (36) potential residences identified from the desktop review have been labeled as a "Potential Residences," four (4) have been labeled as "Other Structures" (indicating that it is not a residence), and thirteen (13) as "Unknown Other Structures"(indicating that residential use has not been definitively ruled out).

Of the thirty six (36) potential residences identified from the desktop review, Sapphos was able to collect photos of twelve (12) structures to assist in classifying the structure; twenty two (22) locations were inaccessible. Of those twelve (12) photographed structures, seven (7) were identified as "Potential Residences" and three (3) were identified as outbuildings and classified as "Other Structures" and one (1) was identified as "Unknown Other Structures" indicating that residential use could not be ruled out based on the available information.

In addition to those seven (7) potential residences identified and photographed by Sapphos, the tax assessor's office indicated that ten (10) of the structures that were inaccessible to Sapphos have some sort of living space on record, such as a single family residence or mobile home and are therefore classified as "Potential Residence." Thirteen (13) of the originally identified thirty six (36) structures were classified as "Unknown Other Structures." These "Unknown Other Structures" were inaccessible to Sapphos, photos were inconclusive, or the tax assessor indicated that there is nothing on record; however, the aerial photography indicated a structure is present and one could not conclusively determine if the structure was an unoccupied building or an unrecorded residence/living space.

Based on additional review of updated aerial photography four (4) other potential residences were identified on the outskirts of the Study Area. The sites (numbered 37 through 40 in Figure A-1 and Table A-1) have not been field verified, but the tax assessor's office indicated there is nothing on record for them. On the basis of aerial photography, however, one (1) of these structures has been identified as a "Potential Residence." The remaining three are classified as "Unknown Other Structure."

Figure A-1 depicts structures that were verified as "Potential Residence," "Other Structure," or "Other Unknown Structure." Figure A-1 also depicts the 1-mile Project buffer, consistent with what would be the Study Area for a project in Kern County subject to Chapter 19.64 of the Kern County Zoning Ordinance (refer to Appendix B). Table A-1 summarizes the desktop and field investigation results. Photographs from Sapphos field investigation are also provided. A copy of the correspondence with the Kern County Tax Assessor's Office is provided at the end of this appendix.



Legend

- Proposed Turbine
- Existing Wind Turbine - Manzana (formerly PdV)
- Existing Wind Turbine - Pacific Winds
- Potential Residence
- Unknown Other Structure
- Other Structure
- Existing Transmission Line
- Los Angeles Aquaduct
- Project Boundary
- 1-mile Buffer from Proposed Turbines
- BLM Land

N

0 0.5 1 1.5 2

Miles

Figure A-1

Inventory of Structures within Study Area

Tylerhorse Wind Project

IBERDROLA RENEWABLES

Path: Z:\Projects\CA\PdV Wind Project\MapDocuments\Report Figures\BLM Noise\Figure A-1 - Inventory of Structures within Study Area.mxd Modified Date: 8/22/2012

TABLE A-1

Summary of Desktop and Field Study Results for the Tylerhorse Wind Energy Project

GIS Home Data			GIS Property Data		Kern County Assessor Property Profile					
		Closest				Assessor Opinion	Sapphos Photos		IBR Aerial Check	Predicted Sound Level, dBA
Structure ID	StructureType	Turbine Id	TaxlotID	Owner	Property Characteristics	Residence or Not?	Photo Taken?	Notes	Checked in July, 2012	(Based on PWL 112 dBA)
1	Potential Residence	15	47522018	HANNAH MELVIN W	Building	yes	Not Accessible			39.6
2	Potential Residence	15	47523032	GARLIN PHYLLIS E TRUST	No Building	yes	Not Accessible			39.7
3	Potential Residence	17	47521015	HENDERSON DANIELLE	Building	yes	Photo Taken	Potential Residence		41.2
4	Potential Residence	17	47520004	ADAMS GEORGE ET AL	Building	yes	Photo Taken	Trailer/Potential Residence	Point does not fall on home based on latest aerials. Surrounded by 10+ buildings so I'm not sure which is the "residence"	42.8
5	Potential Residence	17	47503116	GODWIN BILL R	No Building	yes	Photo Taken	Potential Residence		47
6	Potential Residence	17	47521018	WADDELL WAYNE D	No Building	yes	Photo Taken	Trailer?		41.7
7	Other Structure	15	475220406	SHOOK ALAN C & GARY L	No Building	nothing on record	Photo Taken	Outbuilding?	Point does not fall on home based on latest aerials. 3 structures (one to NW, one to SE, and one to NE) between 500-700ft away. Can't tell if any of them are residences	40.7
8	Unknown Other Structure	33	47616307	GATEWAY TRIANGLE PROPERTIES	No Building	nothing on record	Not Accessible			32.5
9	Unknown Other Structure	33	47615306	GATEWAY TRIANGLE PROPERTIES	No Building	nothing on record	Not Accessible			32.7
10	Unknown Other Structure	33	47617307	GATEWAY TRIANGLE PROPERTIES	No BUilding	nothing on record	Not Accessible			32.6
11	Potential Residence	33	47617311	LESTER RALPH M	Building	yes	Not Accessible			32.5
12	Unknown Other Structure	33	47617316	STONE WILLIAM B ET AL	No Building	nothing on record	Not Accessible			32.4
13	Unknown Other Structure	33	47617303	GATEWAY TRIANGLE PROPERTIES	No Building	nothing on record	Not Accessible			32.5
14	Unknown Other Structure	33	47617307	GATEWAY TRIANGLE PROPERTIES	No Building	nothing on record	Not Accessible			32.6
15	Potential Residence	33	47603044	MORALES ELAINE L	No Building	nothing on record	Photo Taken	Potential Residence	Appears to be a home	44.7
16	Potential Residence	33	47602020	CHATTERTON SALLIE LYNNE	No Building	yes	Not Accessible			40.3
17	Potential Residence	33	47602020	CHATTERTON SALLIE LYNNE	No Building	yes	Not Accessible			40.1
18	Potential Residence	19	47601024	LOTT TRAVIS CHARLES	No Building	yes	Not Accessible			33.4
19	Potential Residence	19	47601024	LOTT TRAVIS CHARLES	No Building	yes	Not Accessible			33.1
20	Potential Residence	19	47601025	GROSSMAN HELEN OCTAVIA REV TR	No Building	yes	Not Accessible			34.1
21	Unknown Other Structure	33	47603041	PURVIANCE DONALD L	No Building	nothing on record	Not Accessible			42.8
22	Potential Residence	33	47603041	PURVIANCE DONALD L	No Building	nothing on record	Photo Taken	Potential Residence	Appears to be a home	42.5
23	Potential Residence	26	26111308	SANCHEZ ISABEL	Building	yes	Photo Taken	Potential Residence		34
24	Unknown Other Structure	26	26111302	RASHKOVAN MIKHAIL & LILYA	No Building	nothing on record	Not Accessible			34.1
25	Unknown Other Structure	26	26111141	BERNAL EDWARD T	No Building	nothing on record	Not Accessible			34.5
26	Other Structure	26	26111140	TREJO ARTHUR	No Building	no	Not Accessible			34.6
27	Potential Residence	26	26111142	TREJO ARTHUR	No Building	yes	Not Accessible			34.3
28	Unknown Other Structure	26	26110211	OTT ANDREW J	No Building	nothing on record	Not Accessible			35.4
29	Unknown Other Structure	33	47603014	EDWARDS SAMMY L & LINDA D	No Building	nothing on record	Not Accessible			43.7
30	Potential Residence	33	47603043	CORDOVA WILLIAM & VIRGINIA C	Building	yes	Photo Taken	Potential Residence		52
31	Other Structure	33	47603025	Clemens, Rick	No Building	nothing on record	Photo Taken	Outbuilding		49
32	Other Structure	40	47611014	Redmond, Tim	No Building	nothing on record	Photo Taken	Trailer		50.4
33	Unknown Other Structure	36	476051347	SHORTZ MARVIN D	No Building	nothing on record	Not Accessible			
34	Potential Residence	36	47608001	DYER ADAM	No Building	nothing on record	Accessible, No Photo Taken	Potential Residence	Appears to be a home	
35	Unknown Other Structure	36	47608001	DYER ADAM	No Building	nothing on record	Photo Taken	Trailer?	Trailer?	
36	Potential Residence	15	47514004	NOLIND SCOTT B	No Building	Yes				
37	Unknown Other Structure	15	47514006	MC KEE GLENDA D	No Building	nothing on record				
38	Unknown Other Structure	15	47514009	SIZEMORE EUGENE & DORIS L	No Building	nothing on record				
39	Unknown Other Structure	15	47508231	BROWN FAMILY TRUST	No Building	nothing on record				
40	Potential Residence	15	47508230	GARRETT RALPH L	No Building	nothing on record				

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Structure 3—Potential Residence

Structure 4—Potential Residence (Photo 1)

Structure 4—Potential Residence (Photo 2)

Structure 5—Potential Residence (Photo 1)

Structure 5—Potential Residence (Photo 2)

Structure 6—Potential Residence (Photo 1)

Structure 6—Potential Residence (Photo 2)

Structure 7—Other Structure

Structure 15—Potential Residence

Structure 22—Potential Residence

Structure 23—Potential Residence (Photo 1)

Structure 23—Potential Residence (Photo 2)

Structure 23—Potential Residence (Photo 3)

Structure 30—Potential Residence (Photo 1)

Structure 30—Potential Residence (Photo 2)

Structure 31—Other Structure (Photo 1)

Structure 31—Other Structure (Photo 2)
Previously referred to as Structure 7

Structure 31—Other Structure (Photo 3)

Structure 32—Other Structure (Photo 1)

Structure 32—Other Structure (Photo 2)

Structure 32—Other Structure (Photo 3)

Structure 35—Unknown Other Structure

Iberdrola Communication with Office of Kern County Assessor - Recorder

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From: DANIEL WEINHEIMER [mailto:weinheimerd@co.kern.ca.us]
Sent: Thursday, June 28, 2012 4:44 PM
To: Hoffbuhr, Tyler
Subject: Re: Structures in Question

Mr. Hoffbuhr,

Attached to this e-mail is the list of APN's previously sent with a small note next to each about their status. I need to emphasize that this information is NOT official. This is only to the best of my knowledge. As you can see from the list, there are numerous properties that appear to have improvements on them, but do not have any supporting information on our records. Technically, they are called 'escapes'. It has been my personal experience that there are many properties throughout the desert area that have these 'escapes'.

A small side note: I used Google Earth to get the latest most up-to-date aerial photographs available of this area. These photos are time-stamped as of 7/15/2011.

The APN's marked with 'yes' indicate that the property does in fact have some sort of living space structure such as a single family residence or a mobile home.
The APN's marked with 'nothing on record' indicate that there is a **possibility** that a living space structure is on the property, but at the moment I am unsure.
The APN marked with 'no' indicates that there is not a living space structure on the property as of 7/15/2011.

If you have any further questions or concerns please give me a call.

Sincerely,

Daniel Weinheimer
Appraiser II
Office of Kern County Assessor - Recorder
1115 Truxtun Avenue
Bakersfield, CA 93301

phone 661-868-3245
fax 661-868-3303

APN	Status
47522018	yes
47523032	yes
47521015	yes
47520004	yes
47503116	yes
47521018	yes
475220406	nothing on record
47616307	nothing on record
47615306	nothing on record
47617307	nothing on record
47617311	yes
47617316	nothing on record
47617303	nothing on record
47617307	nothing on record
47603044	nothing on record
47602020	yes
47601024	yes
47601025	yes
47603041	nothing on record
26111308	yes
26111302	nothing on record
26111141	nothing on record
26111140	no
26111142	yes
26110211	nothing on record
47603014	nothing on record
47603043	yes
47603025	nothing on record
47611014	nothing on record

From: DANIEL WEINHEIMER [mailto:weinheimerd@co.kern.ca.us]
Sent: Monday, July 23, 2012 10:19 AM
To: Hoffbuhr, Tyler
Subject: RE: Structures in Question

Mr. Hoffbuhr,

Those two APN's you have given me have no living improvements on the record. Again, that does NOT necessarily mean that there are no improvements on those properties. It may be that the owners of these properties have built escaped improvements.

Daniel Weinheimer
Appraiser II
Office of Kern County Assessor - Recorder
1115 Truxtun Avenue
Bakersfield, CA 93301

phone 661-868-3245
fax 661-868-3303

>>> "Hoffbuhr, Tyler" <Tyler.Hoffbuhr@iberdrolaren.com> 7/19/2012 9:52 AM >>>

Daniel,

I am hoping you can check two more properties for any occupied structures. Here are the APN number for the property in question.

476051347

476080015

Thanks,

IBERDROLA RENEWABLES

Tyler Hoffbuhr, GISP
Manager, GIS

Iberdrola Renewables, LLC
Engineering & Construction Services
Mobile: (503) 956–0315; Fax (775) 313–9806
Tyler.Hoffbuhr@IberdrolaRen.com

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From: DANIEL WEINHEIMER [mailto:weinheimerd@co.kern.ca.us]
Sent: Monday, August 06, 2012 10:18 AM
To: Hoffbuhr, Tyler
Subject: RE: Structures in Question

Mr. Hoffbuhr,

All the properties, except for one, do not have any living improvements on their respective records. Again, there could very well be living improvements actually on the properties, but currently the records do not indicate that is so.

I can confirm that 475-140-04 as of 7/15/2011 does not have any living improvements.

Daniel Weinheimer
Appraiser II
Office of Kern County Assessor - Recorder
1115 Truxtun Avenue
Bakersfield, CA 93301

phone 661-868-3245
fax 661-868-3303

>>> "Hoffbuhr, Tyler" <Tyler.Hoffbuhr@iberdrolaren.com> 7/31/2012 2:41 PM >>>
Daniel,
Can you please check 5 more properties for (legal) residences/structures? Here are the APN numbers.

APN
47508230
47508231
47514004
47514006
47514009

Thanks,

IBERDROLA
RENEWABLES

Tyler Hoffbuhr, GISP
Manager, GIS
Iberdrola Renewables, LLC
Engineering & Construction Services
Mobile: (503) 956–0315; Fax (775) 313–9806
Tyler.Hoffbuhr@IberdrolaRen.com

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Sent: Monday, July 23, 2012 10:19 AM
To: Hoffbuhr, Tyler
Subject: RE: Structures in Question

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Daniel Weinheimer
Appraiser II
Office of Kern County Assessor - Recorder
1115 Truxtun Avenue
Bakersfield, CA 93301

phone 661-868-3245
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Thanks,

IBERDROLA RENEWABLES

Tyler Hoffbuhr, GISP
Manager, GIS
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Appendix B
Kern County Municipal Code and Zoning Ordinance

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APPENDIX B

Kern County Municipal Code and Zoning Ordinance

Kern County Municipal Code

Chapter 8.36 .020, Prohibited Sounds, of the Kern County Municipal Code prohibits construction noise between 9:00 p.m. and 6:00 a.m. on weekdays and 9:00 p.m. and 8:00 a.m. on weekends, which is audible to a person with average hearing faculties or capacity at a distance of 150 feet from the construction site, when the construction site is within 1,000 feet of an occupied residential dwelling except as provided below:

- The resource management director or his designated representative may for good cause exempt some construction work for a limited time.
- Emergency work is exempt from this section.

Kern County Zoning Ordinance—Wind Energy Combining District

Chapter 19.64, Wind Energy (WE) Combining District, of the Kern County Zoning Ordinance (Section 19.64.140 "Development Standards and Conditions," Subsection J) establishes standards for projects located within the WE district. This project is located solely on lands under the jurisdiction of the BLM and is therefore not within the WE Combing District. The noise portions of the WE Combing District requirements are summarized in this section for completeness.

Chapter 19.64 establishes the distance between a project's exterior boundary and sensitive receptors, at which an acoustical analysis is required, the acoustical criteria (noise limits) that the project must comply with, the criteria to determine those limits, and how to proceed in the event that noise levels exceed the acoustical criteria. The main contents applicable to the Project are discussed below.

Where a residence, school, church, public library, or other sensitive or highly sensitive land use (as identified in the Noise Element of the County General Plan) is located within 1 mile in a prevailing downwind direction or within 0.5 mile in any other direction of a project's exterior boundary, an acoustical analysis shall be prepared by a qualified acoustical consultant prior to the issuance of any building permit. The consultant and the resulting report shall be subject to review and approval by the Kern County Health Department. The report shall address any potential impacts on sensitive or highly sensitive land uses.

In addition, the acoustical report shall demonstrate that the proposed development shall comply with the following criteria:

- Audible noise due to wind turbine operations shall not be created that causes the exterior noise level to exceed 45 dBA for more than 5 minutes out of any 1-hour period ($L_{8.3}$) or to exceed 50 dBA for any period when measured within 50 feet of any existing residence, school, hospital, church, or public library.

- Low-frequency noise or infrasound from wind turbine operations shall not be created to a level that causes the exterior noise levels to exceed the limits in Table B-1, when measured within 50 feet of any existing residence, school, hospital, church, or public library.

- In the event audible noise due to wind turbine operations contains a steady pure tone, such as a whine, screech, or hum, the standards for audible noise set forth in the two previous paragraphs of this subsection shall be reduced by 5 dBA. A pure tone is defined to exist if the one-third octave band sound pressure level in the band, including the tone, exceeds the arithmetic average of the sound pressure levels of the two contiguous one-third octave bands by 5 dBA for center frequencies of 500 hertz (Hz) and above, by 8 dBA for center frequencies between 160 Hz and 400 Hz, or by 15 dBA for center frequencies less than or equal to 125 Hz.

- In the event the audible noise due to wind turbine operations contains repetitive impulsive sounds, the standards for audible noise set forth in the first two paragraphs of this subsection shall be reduced by 5 dBA.

TABLE B-1
Low Frequency and Infrasound Limits

Third Octave Band Center Frequency (Hz)	Sound Pressure Level (dB)
2 to 1	70 (each band)
20	68
25	67
31.5	65
40	62
50	60
63	57
80	55
100	52
125	50

- In the event the audible noise due to wind turbine operations contains both a pure tone and repetitive impulsive sounds, the standards for audible noise set forth above shall be reduced by a total of 5 dBA.

- In the event the ambient noise level (exclusive of the development in question) exceeds one of the standards given above, the applicable standard shall be adjusted to equal the ambient noise level. For audible noise, the ambient noise level shall be expressed in terms of the highest whole number sound pressure level in dBA that is exceeded for no more than 5 minutes per hour ($L_{8.3}$). For low-frequency noise or infrasound, the ambient noise level shall be expressed in terms of the equivalent level (L_{eq}) for the one-third-octave band in question, rounded to the nearest whole decibel. Ambient noise levels shall be measured within 50 feet of potentially affected existing residences, schools, hospitals, churches, or public libraries. Ambient noise level measurement techniques shall employ all practical means of reducing the effects of wind-generated noise at the microphone. Ambient noise level measurements may be performed when wind velocities at the proposed project site are sufficient to allow wind turbine operation, provided that the wind velocity does not exceed 30 miles per hour at the ambient noise measurement location.

- Any noise level falling between two whole decibels shall be the lower of the two.
- In the event that noise levels, resulting from a proposed development, exceed the criteria listed above, a waiver to said levels may be granted by the Planning Director, provided that the following has been accomplished:
  - Written consent from the affected property owners has been obtained stating that they are aware of the proposed development and the noise limitations imposed by this code, and that consent is granted to allow noise levels to exceed the maximum limits allowed.
  - A permanent noise impact easement has been recorded in the County Hall of Records, which describes the benefitted and burdened properties and which advises all subsequent owners of the burdened property that noise levels in excess of those permitted by this code may exist on or at the burdened property.

APPENDIX F

Paleontological Resources Assessment

Paleontological Resources Assessment for the Blythe Solar Power Project, Riverside County, California

Prepared for

AECOM Environment

On behalf of:

Solar Millennium, LLC

and

Chevron Energy Solutions

Prepared by

SWCA Environmental Consultants
Pasadena Office
August 2009

**PALEONTOLOGICAL RESOURCES ASSESSMENT FOR THE BLYTHE SOLAR POWER PROJECT
RIVERSIDE COUNTY, CALIFORNIA**

SWCA PROJECT NUMBER 15415

SUBMITTED TO:
AECOM Environment
1220 Avenida Acaso
Camarillo, California 93012

SUBMITTED BY:
SWCA Environmental Consultants
625 Fair Oaks Avenue, Suite 190
South Pasadena, California 91030

Jessica DeBusk

Jessica L. DeBusk, SWCA Project Manager – Paleontology

Cara Corsetti

Cara Corsetti, Qualified Paleontologist and SWCA Program Director – Paleontology

PROJECT SUMMARY

PURPOSE AND SCOPE

SWCA Environmental Consultants was retained by AECOM Environment to conduct paleontological resources management services for the Blythe Solar Power Project (BSPP or Project) located north of I-10 approximately 8 miles west of Blythe in Riverside County, California. Solar Millennium, LLC and Chevron Energy Solutions (Applicants) propose to develop a nominal 500 megawatt (MW) solar thermal electric generating facility on public lands managed by the Bureau of Land Management (BLM). The BSPP comes under the jurisdiction of both the California Energy Commission (CEC) and BLM and the two agencies are conducting a joint review of the Project. The paleontological studies documented in this report are intended to support CEC compliance with the requirements of the California Environmental Quality Act (CEQA) and BLM's compliance with the National Environmental Policy Act (NEPA); a combined CEQA/NEPA document will be prepared jointly by the two agencies.

The Project will require a 500 kV transmission line to interconnect its electrical output with the regional transmission system, but the route of this transmission line has not yet been finalized. For that reason no paleontological investigation of a transmission route for the BSPP has been performed yet. When the route is finalized, the necessary paleontological investigation and impact assessment will be performed and the results reported to the regulatory agencies and other stakeholders.

The paleontological resources scope of services included (1) a comprehensive museum records search and literature review, (2) a paleontological field survey, and (3) preparation of this technical report of findings that includes recommended mitigation measures.

DATES OF INVESTIGATION

The museum records searches were performed between May 7 and June 17, 2009. The paleontological reconnaissance survey of the proposed project site was performed June 2 through June 20, 2009. This technical report was completed in August 2009.

RESULTS OF THE INVESTIGATION

According to geologic mapping by Jennings (1967) and Stone (2006), the BSPP project site is mostly underlain by Quaternary to Tertiary age alluvial and fluvial deposits ranging from Pliocene (greater than 10,000 years before present [BP]), Pleistocene (1.8 million years old [Ma] to 10,000 years before present [BP]) and Holocene (10,000 years BP to Recent) in age (Figure 2). In addition, a small outcropping of the McCoy Mountains Formation, Cretaceous in age, occurs in the far southwestern portion of the project site. Museum collections records maintained by the Natural History Museum of Los Angeles County (LACM), the San Bernardino County Museum (SBCM), and the Colorado Desert District Stout Research Center (CDDSRC) indicate that no previously recorded fossil localities exist within the plant site boundaries nor have any fossil localities been previously recorded within one mile of these boundaries. However, numerous vertebrate fossil localities have been recorded throughout the region within the same or similar sedimentary deposits that occur within the Project boundaries.

No significant fossils were discovered during the field survey; however, a total of thirty-seven non-significant fossil occurrences and sixty-four non-significant fossil points yielding non-diagnostic fossils materials were recorded. The non-significant fossil occurrences consisted of petrified wood mostly likely transported in as lag deposits from nearby Jurassic and Cretaceous age units (McCoy Mountains Formation or equivalent). None of these specimens were collected. Of the thirty-seven non-significant fossil points discovered, the vast majority yielded turtle shell fragments that could not be placed in a taxonomic class any higher than the order Testudines (turtles). Approximately eight vertebrate specimens consisted of unidentifiable fragmented bone classified as Mammalian. Two invertebrate specimens, consisting of a crinoid and bivalve, were also documented and collected. All specimens were discovered *ex-situ* (removed from their original place of fossilization) as lag deposits occurring on top of alluvial sediments.

The combined results of the museum records searches, literature review, and field survey indicate that geologic units underlying the Project area have a paleontological sensitivity ranging from low to high. Therefore, construction of the BSPP may potentially result in an adverse impact to non-renewable fossil resources and will require implementation of paleontological resources mitigation measures to reduce such impacts to a less than significant level.

RECOMMENDATIONS

SWCA recommends that a qualified paleontologist be retained to design and implement a paleontological resources monitoring and mitigation plan (PRMMP) for regulatory agency approval and subsequent implementation during any ground disturbances related to the proposed Project. All significant fossils recovered during construction monitoring should be prepared, stabilized, identified, and permanently curated in an approved repository or museum such as the SBCM. As was the case for the investigation reported in this document, all future paleontological field work for the BSPP would require a Paleontological Resources Use Permit issued by the Bureau of Land Management (BLM) and Field Authorization issued by the local BLM Field Office.

DISPOSITION OF DATA

This report will be filed with AECOM Environment, the Applicants, the California Energy Commission, the BLM California State Office, and the SBCM. All vertebrate fossil specimens discovered during the course of the field survey will be transferred to the SBCM for permanent curation. A copy of the report will be retained at SWCA Environmental Consultants, along with maps, field notes, photographs, and all other records relating to the Project.

TABLE OF CONTENTS

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CONFIDENTIAL ATTACHMENTS

INTRODUCTION

This report presents the findings of a comprehensive literature review, museum records search, and pedestrian field survey conducted for the Blythe Solar Power Project (BSPP) located north of I-10 approximately 8 miles northwest of the City of Blythe, Riverside County, California. Solar Millennium, LLC and Chevron Energy Solutions (the Applicants) propose to develop a nominal 500 megawatt (MW) solar thermal electric generating facility on public lands managed by the BLM. The PSPP comes under the jurisdiction of both the CEC and BLM and the two agencies are conducting a joint review of the Project. This paleontological studies documented in this report are intended to support CEC compliance with the requirements of the CEQA and BLM's compliance with the NEPA; a combined CEQA/NEPA document will be prepared jointly by the two agencies.

The Project will require a 500 kV transmission line to interconnect its output with the regional transmission system, but the route of this transmission has not yet been finalized. For that reason no paleontological investigation of a transmission route for the PSPP has been performed to date. When the route is finalized, the necessary paleontological investigation and impact assessment will be performed and the results reported to the regulatory agencies and other stakeholders.

This study was performed to evaluate the paleontological sensitivity of the Project area and vicinity, assess potential Project-related impacts on paleontological resources, and provide recommendations for the management of paleontological resources. This study was conducted in accordance with the professional guidelines established by the Society of Vertebrate Paleontology (SVP) (1995) and paleontological guidelines set for by the BLM (2008). This study also satisfies the requirements set forth by the CEC (2000, 2007).

DEFINITION AND SIGNIFICANCE OF PALEONTOLOGICAL RESOURCES

Paleontology is a multidisciplinary science that combines elements of geology, biology, chemistry, and physics in an effort to understand the history of life on earth. Paleontological resources, or fossils, are the remains, imprints, or traces of once-living organisms preserved in rocks and sediments. These include mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains. The fossil record is the only evidence that life on earth has existed for more than 3.6 billion years. Fossils are considered nonrenewable resources because the organisms they represent no longer exist (Murphey and Daitch, 2007). Thus, once destroyed, a fossil can never be replaced. Fossils are an important scientific and educational resource because they are used to:

- Study the phylogenetic relationships between extinct organisms, as well as their relationships to modern groups.
- Elucidate the taphonomic, behavioral, temporal, and diagenetic pathways responsible for fossil preservation, including biases in the fossil record.
- Reconstruct ancient environments, climate change, and paleoecological relationships.
- Provide a measure of relative geologic dating, which forms the basis for biochronology and biostratigraphy, and which is an independent and supporting line of evidence for isotopic dating.
- Study the geographic distribution of organisms and tectonic movements of land masses and ocean basins through time.
- Study patterns and processes of evolution, extinction, and speciation.
- Identify past and potential future human-caused effects to global environments and climates (Murphey and Daitch, 2007).

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Fossils are classified as nonrenewable scientific resources and are protected by various laws, ordinances, regulations, and standards (LORS) across the country. The SVP (1995) has established professional standards for the assessment and mitigation of adverse impacts to paleontological resources. This paleontological assessment was conducted in accordance with the LORS that are applicable to paleontological resources within the Project area. These LORS are summarized in Table 1 and the following sections.

FEDERAL

Fossils are classified as non-renewable scientific resources and are protected by various laws, ordinances, regulations, and standards (LORS) across the country. Professional standards for the assessment and mitigation of adverse impacts on paleontological resources have been established by the Society of Vertebrate Paleontology (SVP) (1995, 1996). Federal protections for scientifically significant paleontological resources apply to projects if any construction or other related project impacts occur on federally owned or managed lands, involve the crossing of state lines, or are federally funded. Since the BSPP site is located entirely within federally managed land, then federal protections would apply to paleontological resources within the Project boundaries. Pertinent federal LORS are summarized below.

National Environmental Policy Act

The National Environmental Policy Act of 1969, as amended (Pub. L. 91-190, 42 USC 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258 § 4(b), Sept. 13, 1982). NEPA recognizes the continuing responsibility of the Federal Government to “preserve important historic, cultural, and natural aspects of our national heritage...” (Sec. 101 [42 USC § 4321]) (#382).

The goal of the NEPA process is to make informed, publicly supported decisions regarding environmental issues. Under NEPA, the Federal Government requires that:

a) all federal agencies consider the environmental impacts of proposed actions;

b) the public be informed of the potential environmental impacts of proposed actions; and

c) that the public be involved in planning and analysis relevant to actions that impact the environment.

Paleontological Resources Preservation Act

In March 2009, the Paleontological Resources Preservation Act (PRPA) was enacted as a result of the passage of the Omnibus Public Lands Management Act (OPLA) of 2009, Public Law 111-011. P.L. 111-011, Title VI, *Subtitle D. Paleontological Resources Preservation*. The PRPA sets forth regulations and provisions pertaining to paleontological resources on all federally administered lands. The PRPA affirms the authority of BLM policies already in place and is consistent with paleontological guidelines outlined in the Paleontology Resources Management Manual and Handbook H-8270-1 (BLM, revised 2008). As a result of the recent enactment of the PRPA, Federal agencies will begin developing appropriate plans for the management of paleontological resources and the implementation of the PRPA.

Federal Land Management and Policy Act

Federal Land Management and Policy Act of 1976 (43 USC 1712[c], 1732[b]); sec. 2, Federal Land Management and Policy Act of 1962 [30 USC 611]; Subpart 3631.0 et seq.), Federal Register Vol. 47, No. 159, 1982. The FLMPA does not refer specifically to fossils. However, "significant fossils" are understood and recognized in policy as scientific resources. Permits which authorize the collection of significant fossils for scientific purposes are issued under the authority of FLMPA.

Under FLMPA, federal agencies are charged to:

a) manage public lands in a manner that protects the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, archaeological, and water resources, and, where appropriate, preserve and protect certain public lands in their natural condition (Section 102[a][8] [11]);

b) periodically inventory public lands so that the data can be used to make informed land-use decisions (Section 102[a][2]); and

c) regulate the use and development of public lands and resources through easements, licenses, and permits (Section 302[b]).

American Antiquities Act of 1906 1 (6 USC 431 433)

Establishes a penalty for disturbing or excavating any historic or prehistoric ruin or monument or object of antiquity on federal lands as a maximum fine of $500 or 90 days in jail.

National Historic Preservation Act of 1966

Provides for the survey, recovery, and preservation of significant paleontological data when such data may be destroyed or lost due to a federal, federally licensed, or federally funded project. (Pub. L. 89 665; 80 Stat. 915, 16 U.S.C. 470 et seq.)

Code of Federal Regulations Title 43

Under the Code of Federal Regulations (CFR) Title 43, Section 8365.1-5, the collection of scientific resources, including vertebrate fossils, is prohibited without a permit. Except where prohibited, individuals are also authorized to collect some fossils for their personal use. The use of fossils found on federal lands for commercial purposes is also prohibited.

Department of the Interior Report- Fossils on Federal and Indian Lands

In 2000, the Secretary of the Interior submitted a report to Congress entitled "Assessment of Fossil Management on Federal and Indian Lands." This report was prepared with the assistance of eight federal agencies including the Bureau of Indian Affairs, the BLM, the Bureau of Reclamation, the United States Fish and Wildlife Service, the United States Forest Service (USFS), the National Park Service, the U.S. Geological Survey (USGS), and the Smithsonian Institution. The consulting agencies concluded that administrative and Congressional actions with respect to fossils should be governed by these seven basic principles:

a) Fossils on federal land are a part of America's heritage.

b) Most vertebrate fossils are rare.

c) Some invertebrate and plant fossils are rare.

d) Penalties for fossil theft should be strengthened.

e) Effective stewardship requires accurate information.

f) Federal fossil collections should be preserved and available for research and public education.

g) Federal fossil management should emphasize opportunities for public involvement.

STATE

With regard to paleontological resources, the CEC environmental review process under the Warren-Alquist Act is considered functionally equivalent to that of the California Environmental Quality Act (CEQA, Public Resources Code Sections 15000 et seq.). Guidelines for the Implementation of CEQA, as amended March 29, 1999 (Title 14, Chapter 3, California Code of Regulations: 15000 et seq.) define procedures, types of activities, persons, and public agencies required to comply with CEQA, and include as one of the questions to be answered in the Environmental Checklist (Section 15023, Appendix G, Section XIV, Part a) the following: "*Will the proposed project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?*"

Other state requirements for paleontological resources management are included in the Public Resources Code (Chapter 1.7), Section 5097.5 and 30244. These statutes prohibit the removal of any paleontological site or feature on public lands without permission of the jurisdictional agency, define the removal of paleontological sites or features as a misdemeanor, and require reasonable mitigation of adverse impacts to paleontological resources from developments on public (state) lands. These protections would apply to the proposed project only if the state or a state agency were to obtain ownership of project lands during the term of the project license.

LOCAL

Paleontological resources are addressed in the Multipurpose Open Space Element of the County of Riverside General Plan (adoption October 7, 2003). The following policies provide direction for paleontological resources:

> OS 19.8 "Whenever existing information indicated that a site proposed for development may contain biological, paleontological, or other scientific resources, a report shall be filed stating the extent and potential significance of the resources that may exist within the proposed development and appropriate measures through which the impacts of development may be mitigated."

> OS 19.9 "This policy requires that when existing information indicates that a site proposed for development may contain paleontological resources, a paleontologist shall monitor grading activities, with the authority to halt grading to collect uncovered paleontological resources, curate any resources collected with an appropriate repository, and file a report with the Planning Department documenting any paleontological resources that are found during the course of site grading."

> OS 19.10 "Transmit significant development applications subject to CEQA to the San Bernardino County Museum for review, comment, and/or preparation of recommended conditions of approval with regard to paleontological resources."

Table 1. Summary of Paleontological LORS Applicable to the Project

Jurisdiction	Pertinent Paleontological LORS
Federal	NEPA
	PRPA
	FLMPA
	American Antiquities Act of 1906
	National Historic Preservation Act of 1966
	Code of Federal Regulations Title 43
	Department of Interior-Fossils on Federal and Indian Lands
State	CEQA
County	Riverside County General Plan

PROFESSIONAL STANDARDS

The SVP has established standard guidelines (SVP, 1995) that outline professional protocols and practices for the conducting of paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, and specimen preparation, identification, analysis, and curation. Most practicing professional vertebrate paleontologists adhere closely to the SVP's assessment, mitigation, and monitoring requirements as specifically provided in its standard guidelines. Typically, state regulatory agencies with paleontological LORS accept and utilize the professional standards set forth by the SVP.

As defined by the SVP (1995:26), significant nonrenewable paleontological resources are defined as:

> …Fossils and fossiliferous deposits here restricted to vertebrate fossils and their taphonomic and associated environmental indicators. This definition excludes invertebrate or paleobotanical fossils except when present within a given vertebrate assemblage. Certain invertebrate and plant fossils may be defined as significant by a project paleontologist, local paleontologist, specialists, or special interest groups, or by lead agencies or local governments.

As defined by the SVP (1995:26), significant fossiliferous deposits are defined as:

> A rock unit or formation which contains significant nonrenewable paleontologic resources, here defined as comprising one or more identifiable vertebrate fossils, large or small, and any associated invertebrate and plant fossils, traces and other data that provide taphonomic, taxonomic, phylogenetic, ecologic, and stratigraphic information (ichnites and trace fossils generated by vertebrate animals, e.g., trackways, or nests and middens which provide datable material and climatic information). Paleontologic resources are considered to be older than recorded history and/or older than 5,000 years, BP [before present].

Based on the significance definitions of the SVP (1995), all identifiable vertebrate fossils are considered to have significant scientific value. This position is adhered to because vertebrate fossils are relatively uncommon, and only rarely will a fossil locality yield a statistically significant number of specimens of the same genus. Therefore, every vertebrate fossil found has the potential to provide significant new information on the taxon it represents, its paleoenvironment, and/or its distribution. Furthermore, all geologic units in which vertebrate fossils have previously been found are considered to have high sensitivity. Identifiable plant and invertebrate fossils are considered significant if found in association with vertebrate fossils or if defined as significant by project paleontologists, specialists, or local government agencies.

A geologic unit known to contain significant fossils is considered to be “sensitive” to adverse impacts if there is a high probability that earth-moving or ground-disturbing activities in that rock unit will either disturb or destroy fossil remains directly or indirectly. This definition of sensitivity differs fundamentally from that for archaeological resources as follows:

> It is extremely important to distinguish between archaeological and paleontological (fossil) resource sites when defining the sensitivity of rock units. The boundaries of archaeological sites define the areal extent of the resource. Paleontologic sites, however, indicate that the containing sedimentary rock unit or formation is fossiliferous. The limits of the entire rock formation, both areal and stratigraphic, therefore define the scope of the paleontologic potential in each case. [SVP, 1995]

Many archaeological sites contain features that are visually detectable on the surface. In contrast, fossils are contained within surficial sediments or bedrock and are therefore not observable or detectable unless exposed by erosion or human activity. Monitoring by experienced paleontologists greatly increases the probability that fossils will be discovered during ground-disturbing activities and that, if these remains are significant, successful mitigation and salvage efforts may be undertaken in order to prevent adverse impacts to these resources.

BUREAU OF LAND MANAGEMENT

The BLM manages fossils for their scientific, educational, and (where appropriate) recreational values. Scientifically significant fossils, such as vertebrates and noteworthy occurrences of invertebrates and plants, may be collected by qualified individuals who have obtained Paleontological Resources Use permits from the BLM. All fossils collected under these permits must be stored and preserved in approved repositories where they can be studied or displayed. Potential adverse impacts on significant fossils are assessed and mitigated to prevent damage or lessen negative effects on the resources. The BLM inventories and monitors paleontological resources on a case-by-case basis under the guidance of Handbook H-8270-1 (2008). When notice of a proposed land use is received, the pertinent Field Office determines whether significant resources may be impacted and whether a field survey and subsequent work are necessary.

Four objectives have been identified by the BLM for the management of paleontological resources on the lands it administers. These include (1) locating, evaluating, managing, and protecting paleontological resources; (2) facilitating appropriate scientific, educational, and recreational uses of paleontological resources; (3) ensuring that proposed land uses do not inadvertently damage or destroy important paleontological resources; and (4) fostering public awareness of the Nation’s rich paleontological heritage. The BLM considers vertebrate fossils to be scientifically significant, while invertebrate and plant fossils may be deemed scientifically significant on a case-by-case basis. Fossilized wood is considered a mineral resource, and may be collected or purchased under the Material Sales Act of 1947 (as amended), but cannot be obtained under the General Mining Law of 1872.

RESOURCE ASSESSMENT GUIDELINES

Paleontological resources are limited, nonrenewable resources of scientific, cultural, and educational value and are afforded protection under federal (National Environmental Policy Act, or NEPA), state (California Environmental Quality Act, or CEQA), and local (County of Riverside) laws and regulations. This study satisfies project requirements in accordance with CEQA (13 PRC, 2100 et seq.) and Public Resources Code Section 5097.5 (Stats 1965, c 1136, p. 2792). This analysis also complies with guidelines and significance criteria specified by the SVP (1995) and requirements set forth by the California Energy Commission (CEC) in Appendix B, Information Requirements for an Application of the CEC's Power Plant Site Certification Regulations (CEC, 2000).

Paleontological Sensitivity

Paleontological sensitivity is defined as the potential for a geologic unit to produce scientifically significant fossils. This is determined by rock type, past history of the geologic unit in producing significant fossils, and fossil localities recorded from that unit. Paleontological sensitivity is derived from the known fossil data collected from the entire geologic unit, not just from a specific survey. In its "Standard Guidelines for the Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources," the SVP (1995:23) defines three categories of paleontological sensitivity (potential) for sedimentary rock units: high, low, and undetermined:

- **High Potential.** Rock units from which vertebrate or significant invertebrate fossils or suites of plant fossils have been recovered and are considered to have a high potential for containing significant nonrenewable fossiliferous resources. These units include, but are not limited to, sedimentary formations and some volcanic formations that contain significant nonrenewable paleontologic resources anywhere within their geographical extent and sedimentary rock units temporally or lithologically suitable for the preservation of fossils. Sensitivity comprises both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, or botanical, and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, ecologic, or stratigraphic data. Areas that contain potentially datable organic remains older than Recent, including deposits associated with nests or middens, and areas that may contain new vertebrate deposits, traces, or trackways are also classified as significant.
- **Low Potential.** Reports in the paleontological literature or field surveys by a qualified vertebrate paleontologist may allow determination that some areas or units have low potentials for yielding significant fossils. Such units will be poorly represented by specimens in institutional collections.
- **Undetermined Potential.** Specific areas underlain by sedimentary rock units for which little information is available are considered to have undetermined fossiliferous potentials.

Note that highly metamorphosed rocks and granitic rock units generally do not yield fossils and therefore have low potential to yield significant nonrenewable fossiliferous resources.

In general terms, for geologic units with high potential, full-time monitoring typically is recommended during any project-related ground disturbance. For geologic units with low potential, protection or salvage efforts typically are not required. For geologic units with undetermined potential, field surveys by a qualified paleontologist are usually recommended to specifically determine the paleontologic potential of the rock units present within the study area.

PROJECT LOCATION AND DESCRIPTION

The BSPP project is located about 8 miles west of Blythe, north of I-10 in unincorporated Riverside County, California, entirely within public land (BLM right-of-way [ROW] No. CACA 48811). The project is mapped within sections 31-32 of Township 5 South, Range 22 East; sections 4-8 of Township 6 South, Range 22 East; and sections 1-5, and 8-15 of Township 6 South, Range 21 East on the McCoy Wash and McCoy Peak, CA 7.5-minute U.S. Geological Survey quadrangles.

Solar Millennium, LLC and Chevron Energy Solutions (the Applicants) are proposing to construct a commercial solar thermal electric power generating project, referred to as the BSPP. The Applicant seeks to lease 9,400 acres of Federal land administered by the Bureau of Land Management (BLM), within which the area disturbed by Project construction and operation would be about 5,950 acres. The Project will utilize solar parabolic trough technology to generate electricity. With this technology, arrays of parabolic mirrors collect heat energy from the sun and refocus the radiation on a receiver tube located at the focal point of the parabola. A heat transfer fluid (HTF) is heated to high temperature (750 °F) as it circulates through the receiver tubes. The heated HTF is then piped through a series of heat exchangers where it releases its stored heat to generate high pressure steam. The steam is then fed to a traditional steam turbine generator where electricity is produced.

The Project will have a nominal output of 1000 MW, produced by four adjacent, identical and independent 250 MW units. The four power generating facilities will share a main office building, a main warehouse/maintenance building, a parking lot, onsite access roads, two bioremediation areas for HTF-contaminated soil, and a central internal switchyard. Each unit will have its own solar field, comprised of piping loops arranged in parallel groups, and its own power block, centrally located within the solar field. Each power block will have its own HTF pumping and freeze protection system, solar steam generator; steam turbine generator; an air-cooled condenser for cooling, transmission lines and related electrical system; and auxiliary equipment, e.g., emergency generators. Two water treatment systems will be provided for the four power units, each system dedicated to two of the four power units. From the onsite switchyard, a common new 500 kV transmission line will interconnect with Southern California Edison's (SCE) Devers-Palos Verde line at SCE's Colorado River Substation south of U.S. Interstate I-10 and approximately 5 miles southwest of the BSPP site.

The Project will use a gas-fired boiler for quick startup (but not for power generation), and a gas-fired heater for HTF freeze protection. Natural gas will be supplied via a new gas pipeline constructed by the Southern California Gas Company that is expected to extend south approximately two miles south of the Project's southern boundary to tie in with an existing gas line about 1,800 feet south of I-10.

All thermal power plants require cooling, which historically has involved large quantities of cooling water. The BSPP will utilize an air cooled condenser (ACC) commonly referred to as "dry cooling", thereby dramatically reducing the amount of water needed by the facility. Water will be used principally for solar mirror washing, ancillary equipment heat rejection, feedwater makeup, dust suppression, firewater supply, and onsite domestic use. Total consumption for the four units is estimated at approximately 600 acre-feet annually, supplied by onsite wells.

Project construction is scheduled to begin in late 2010 on the first unit. The construction phase to complete all four units will have an expected duration of 68 months. Commercial operation of the first unit is expected to begin in early 2013 with the fourth unit being available for commercial operation in 2016.

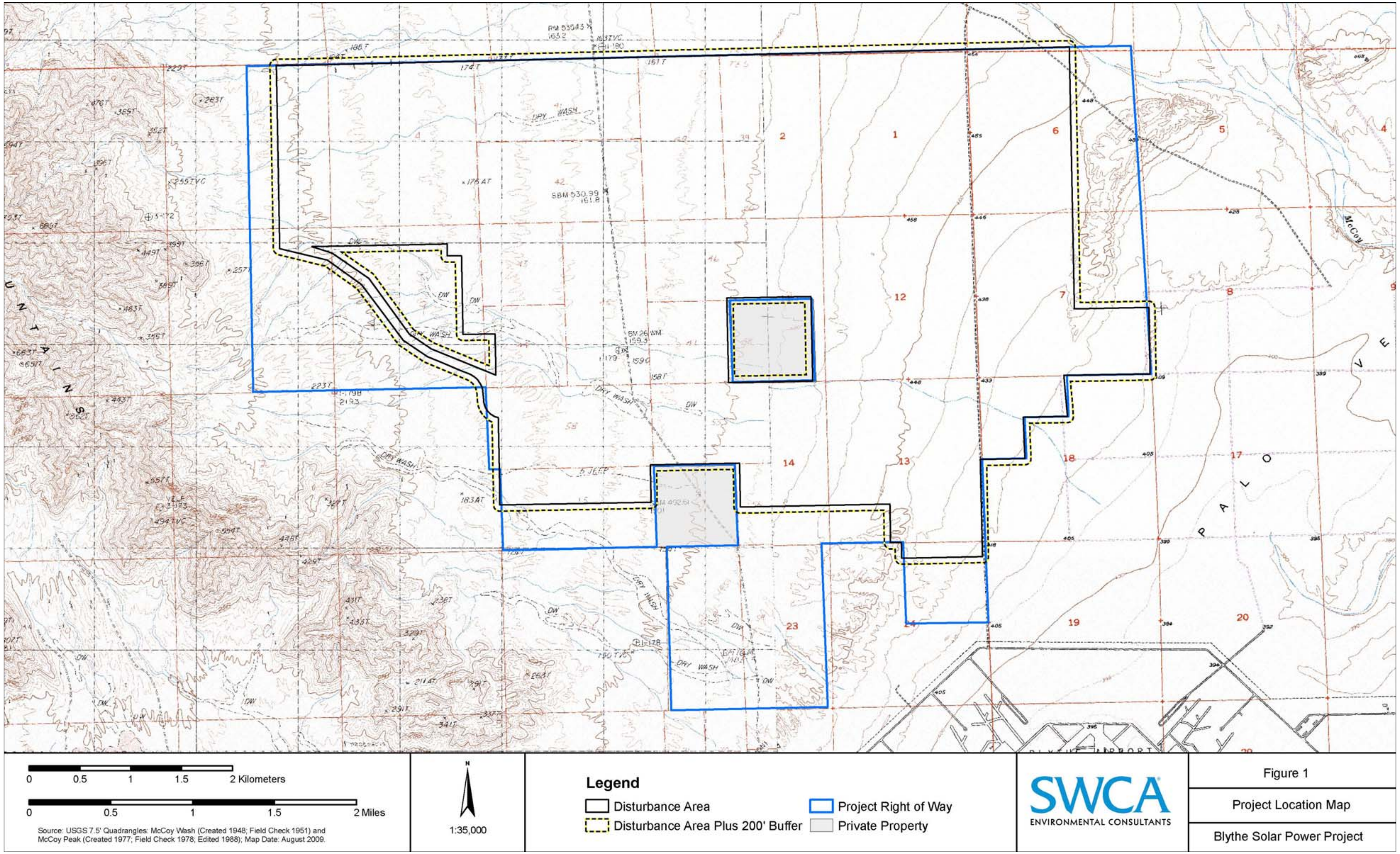

Figure 1. Project Location Map

PROJECT PERSONNEL

SWCA paleontologists Jessica DeBusk, B.S., Justin Strauss, M.S., Stephanie Lukowski, M.S., Peter Kloess, B.S., and Benjamin Borkan, B.S. (in progress) conducted fieldwork. Ms. DeBusk requested the museum records searches, managed field staff, and authored this technical report. Justin Strauss directed the field staff and contributed to the Analysis and Results section of this report. Paleontologists David Daitch, Ph.D. and Georgia Knauss, M.S. examined the fossil specimens for identification. GIS Specialists Chad Flynn and John Covert produced graphics. Technical Editor Michelle Trevino edited and formatted this report. Cara Corsetti, Qualified Paleontologist and SWCA Paleontology Program Director, served as Principal Investigator overseeing all paleontological work.

METHODS

Due to the nature of the fossil record, paleontologists cannot know either the quality or the quantity of fossils present in a given geologic unit prior to natural erosion or human-caused exposure. Therefore, in the absence of surface fossils, it is necessary to assess the sensitivity of rock units based on their known potential to produce scientifically significant fossils elsewhere within the same geologic unit (both within and outside of the study area) or a unit representative of the same depositional environment.

MUSEUM RECORDS SEARCH

For this project, museum records searches were performed by the Vertebrate Paleontology Section of the Natural History Museum of Los Angeles County (LACM), the Department of Earth Sciences at the San Bernardino County Museum (SBCM), and the Colorado Desert District Stout Research Center (CDDSRC). Museum collections records were searched for the purposes of determining whether there are any known fossil localities in or near the project site, identifying the geologic units present in the project area, and determining the paleontological sensitivity ratings of those geologic units in order to assess potential impacts to nonrenewable paleontological resources. Published and unpublished literature and geologic maps were reviewed, and mitigation measures specific to this project were developed in accordance with the SVP's professional standards and guidelines (1995).

Geologic units were assigned a paleontological sensitivity rating based on the museum records search, literature review, and field survey. For the area underlying the Project area, geologic maps (Figure 2) and paleontological sensitivity maps (Figure 3) were created.

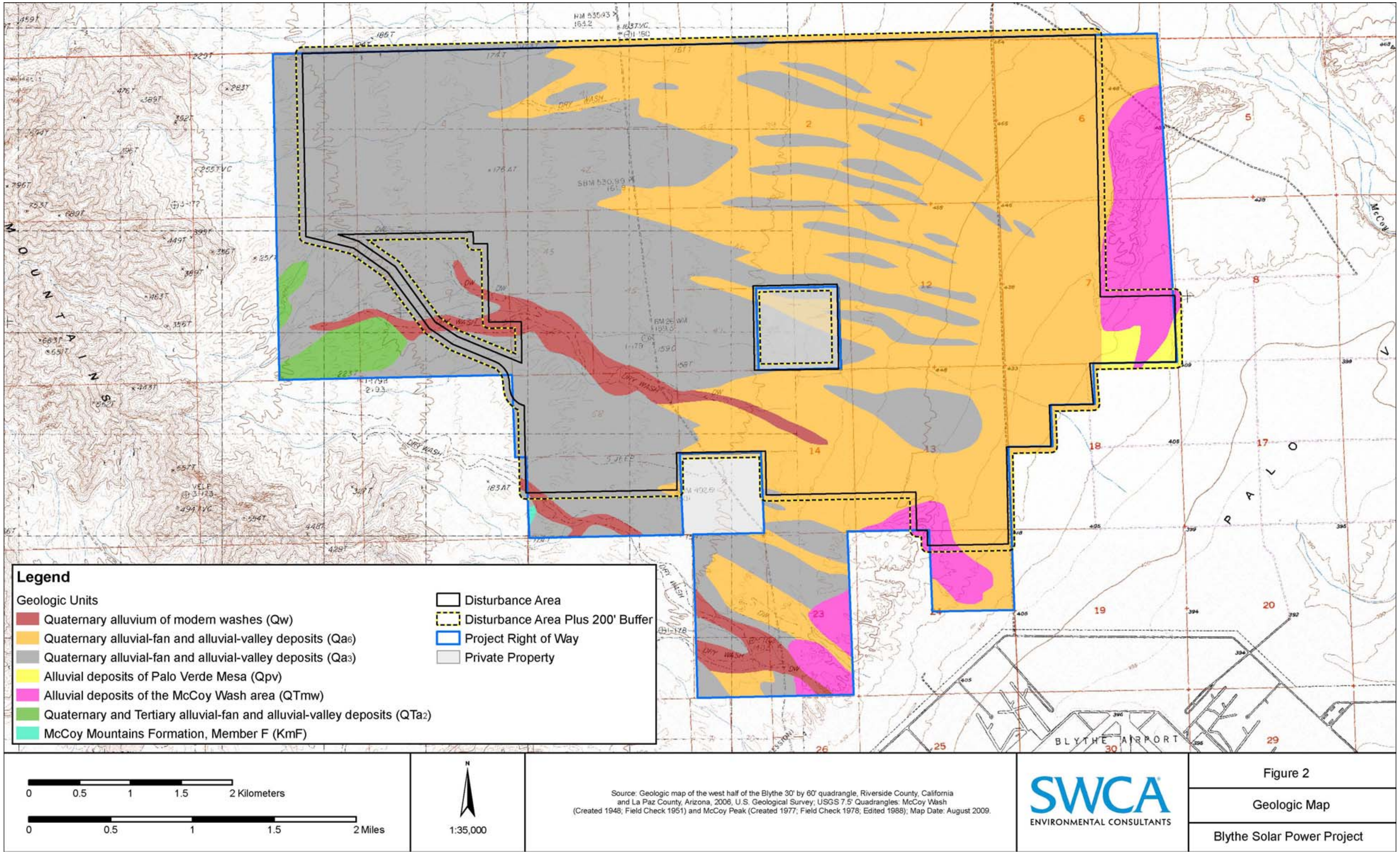

Figure 2. Geologic Map

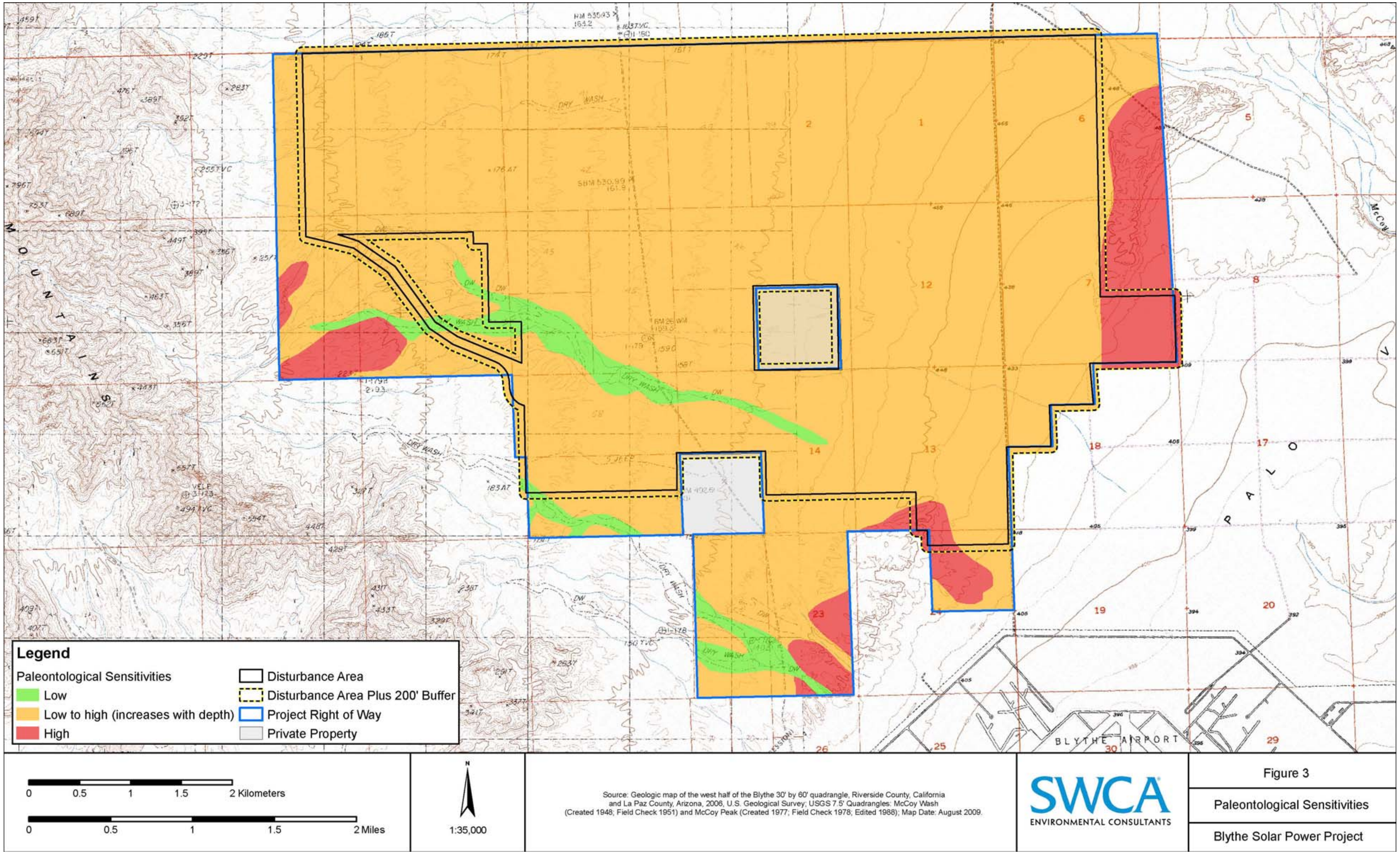

Figure 3. Paleontological Sensitivity Map

FIELD METHODS

A pedestrian reconnaissance survey of the Project area was performed between June 2 and June 20, 2009. The purpose of the fieldwork was to inspect the study area for surface fossils and exposures of potentially fossil-bearing geologic units and to determine areas in which fossil-bearing geologic units could be exposed during Project-related ground disturbances. For the purposes of this analysis, only the areas of disturbance, including a 200-foot buffer, were surveyed for paleontological resources (See Figure 1).

GEOLOGY AND PALEONTOLOGY

GEOLOGIC SETTING

California is naturally divided into the following twelve geomorphic provinces, each distinguished from one another by having unique topographic features and geologic formations: (1) the Sierra Nevada, (2) the Klamath Mountains, (3) the Cascade Range, (4) the Modoc Plateau, (5) the Basin and Range, (6) the Mojave Desert, (7) the Colorado Desert, (8) the Peninsular Ranges, (9) the Transverse Ranges, (10) the Coast Ranges, (11) the Great Valley, and (12) the Offshore area. The BSPP project site is located in the northeast corner of the Colorado Desert geomorphic province. The Colorado Desert is bounded to the east by the Colorado River, to the south by the international border, and to the west by the Peninsular Ranges. Norris and Webb (1976) define the northern border as the southern edge of the eastern Transverse Ranges and the San-Bernardino- Riverside county line.

The BSPP project site is located within the McCoy Wash area of the western Colorado River flood plain and in part on the Palo Verde Mesa. The McCoy Wash area is situated in a valley southwest of the Big Maria Mountains, southeast of the Little Maria Mountains, and northeast of the McCoy Mountains. (Stone, 2006; Jennings, 1967). The surrounding mountains reach as much as 3,000 feet or more above the valley floor, and about 3,350 feet above mean sea level (amsl) (Metzger, et al., 1973). The valley floor is dominated by Quaternary age alluvial and fluvial sediments derived form the surrounding mountain ranges or transported in by the nearby Colorado River.

SITE SPECIFIC GEOLOGY AND PALEONTOLOGY

The geology in the vicinity of the BSPP project site has been mapped by Jennings (1967) at a scale of 1:250,000 and Stone (2006) at a scale of 1:100,000. No larger scale maps (1:24,000) were available for this analysis. A review of these published maps indicate that the BSPP project site is mostly underlain by Quaternary to Tertiary age alluvial and fluvial deposits ranging from Pliocene (greater than 10,000 years before present [BP]), Pleistocene (1.8 million years old [Ma] to 10,000 years before present [BP]) and Holocene (10,000 years BP to Recent) in age (Figure 2 and Table 2). In addition, a small outcropping of the McCoy Mountains Formation, Cretaceous in age, occurs in the far southwestern portion of the project site. These geologic units, and their paleontological resource potential, are depicted in Figures 2 and 3 and discussed in more detail in the following sections.

McCoy Mountains Formation (Kmf)

The McCoy Mountains Formation mostly occurs to the southwest of the project site, and is outside of the proposed area of ground disturbance. This formation, Cretaceous and possibly Jurassic in age, is subdivided into Members A through L. A very small outcrop of Member F of this formation is present within the project boundaries and is mapped as “Kmf.” Member F, Cretaceous in age, is composed of light to medium-gray, fine to coarse grained arkosic sandstone and conglomerate interbedded with some light gray phyllitic shale. The total thickness of this member is 2,600 meters (Stone, 2006).

Stone (2006) reports that equivalent strata west of the BSPP area and in the vicinity of the Palen Mountains has yielded fragments of fossil wood of late Early Cretaceous age. No statement on the sensitivity of the unit was made in any of the record searches performed for this project and no previously recorded significant fossil specimens have been reported from this unit. However, the LACM did note that the older and younger Quaternary alluvial deposits within the area are likely derived from this formation. Under SVP (1995) criteria, this unit is considered to have a low paleontological sensitivity

Alluvial deposits of the McCoy Wash area (QTmw)

Alluvial deposits of the McCoy Wash area, mapped as “QTmw,” outcrop in both the eastern and the southern portion of the BSPP project area. This unit, Pleistocene and/or Pliocene in age, is composed of hill forming deposits of rounded river gravel and locally derived gravel. These broad hills reach 15 to 25 meters above Palo Verde Mesa in the vicinity of McCoy Wash and southeast of the McCoy Mountains. The surface gravels are underlain by brown, well-consolidated calcareous or gypsiferous sandstone (Stone, 2006).

Although no *in-situ* fossil resources were discovered from this geologic unit within the project area, it is considered highly likely to contain significant paleontological resources because of its age, subsurface lithologic composition, and proximity to the ancient Colorado River floodplain. Additionally, this unit is known to be equivalent in age to the nearby Arroyo Diablo Formation, which has a proven paleontological resource potential (Jefferson, 2009). Therefore, under SVP (1995) criteria, this geologic unit is considered to have a high paleontological sensitivity.

Alluvial deposits of Palo Verde Mesa (Qpv)

The Palo Verde Mesa is located immediately southeast of the BSPP area and alluvial deposits composing the mesa are present in the northeast portion of the Project site. Mapped as “Qpv” and dated as Pleistocene in age (1.2 million years ago [Ma] to 10,000 years BP) this unit consists of terrace forming unconsolidated to weakly consolidated sand, pebbly sand, silt and clay (Stone, 2006).

Although no *in-situ* fossil resources were discovered from this geologic unit within the Project area, numerous vertebrate localities have been reported from the same or similar units elsewhere in the eastern Mojave Desert, in Arizona, and in Sonora Mexico yielding scientifically significant remains of *Mammuthus* sp. (extinct mammoth) and several thousand other vertebrate fossils (Scott, 2009). Therefore, under SVP (1995) criteria this geologic unit is considered to have a high paleontological sensitivity.

Alluvial fan and alluvial valley deposits (Qa_6, Qa_3, QTa_2)

Various alluvial fan and alluvial valley deposits underlie the majority of the project area and consist of unconsolidated to weakly consolidated angular to subangular gravel and sand derived from the surrounding mountains. Older deposits are locally well consolidated. Stone (2006) divides these alluvial deposits into six units based on surficial and geomorphic characteristics. The center and eastern portions of the BSPP site is mostly underlain by the Holocene age Unit 6, mapped as “Qa_6,” consisting of mostly sand, pebbly sand, and sandy pebble-gravel locally overlain by eolian sand (Stone, 2006). Stone (2006) assigns this unit an age of 100 to 2,000 years BP. The Holocene and Pleistocene age Unit 3, mapped as “Qa_3”, is variously mapped in the center and western portion of the Project area. This unit consists of alluvial fan deposits composed of gravel and sand forming relatively dissected surfaces referred to as desert pavement. Stone (2006) assigns

Qa_3 an age ranging between 730,000 to 8,000 years BP. Finally, the oldest alluvial fan deposit within the project area, mapped as "QTa_2", occurs in the westernmost portion of the BSPP site. This unit, dated as at least 12,000 years BP or possibly as old as Miocene in age, consists of fine to coarse, poorly sorted gravel and sand that typically form high, narrow ridges extending away from local mountain fronts (Stone, 2006).

Although no *in-situ* fossil resources were discovered from this geologic unit within the Project area, several previously recorded vertebrate localities have been recorded from the same or similar deposits southwest and northwest of the Project area (McLeod, 2009). Whereas Qa6 is too young to contain fossilized material and is considered to have a low sensitivity at least at the surface, the older units Qa_3 and QTa_2 are considered as having high potential for containing significant fossil resources (McLeod, 2009; Scott, 2009) and under SVP (1995) criteria are considered to have a high paleontological sensitivity.

Quaternary alluvium of modern washes (Qw)

Quaternary alluvium of modern washes, mapped as "Qw," occurs in the northeast portion of the Project area within the McCoy Wash and in the west and southwest portion of the Project area in areas mapped as a "dry wash." Modern wash sediments, dated as Recent in age, consist of unconsolidated, angular to subangular gravelly sand derived from the surrounding higher elevations. These sediments are coarser grained toward the flanks of the surrounding mountains and become more fine grained grading toward younger alluvial sand and gravel (Stone, 2006).

Holocene-aged sediments often contain the remains of modern organisms, however they are too young to contain significant paleontological resources. In addition, coarser grained alluvial deposits are not likely to contain significant vertebrate fossils due to their nature of deposition; therefore, these sediments are determined to have a low paleontological sensitivity. However, paleontologically sensitive Pleistocene age alluvial and fluvial deposits may be encountered at depth, Thus, areas within the Project area mapped as "Qw" are considered to have a paleontological sensitivity ranging from low to high increasing with depth (i.e. age).

Table 2. Geologic Units Within the Blythe Solar Power Plant Project Area

Age	Geologic Unit	Map Abbreviation*	Typical Fossil Types	Paleontological Resource Potential (Sensitivity)
Holocene	Quaternary alluvium of modern washes	Qw[1], Qal[2]	None	Low
Holocene and Pleistocene	Alluvial-fan and alluvial-valley deposits	Qa_6[1], Qa_3[1]	Terrestrial Vertebrates	Low to High (increasing with depth)
Pleistocene	Alluvial deposits of Palo Verde Mesa	Qpv[1], Qal[2]	Terrestrial Vertebrates	High
Pleistocene and/or Pliocene	Alluvial deposits of the McCoy Wash area	QTmw[1], QP[2]	Terrestrial Vertebrates	High
Pleistocene to Miocene	Alluvial-fan and alluvial-valley deposits	QTa_2[1], Qc[2]	Terrestrial Vertebrates	High
Jurassic	McCoy Mountains Formation, Member F	Kmf[1], ms[2]	Fossil wood	Low

Table 2. Geologic Units Within the Blythe Solar Power Plant Project Area

Age	Geologic Unit	Map Abbreviation*	Typical Fossil Types	Paleontological Resource Potential (Sensitivity)

*Sources:
- [1]Stone, P. 2006. Geologic Map of the West Half of the Blythe 30' by 60' Quadrangle, Riverside County, California and La Paz County, Arizona.
- [2]Jennings, C.W. 1967. Geologic Map of California, Salton Sea Sheet. Scale 1:250,000. California Division of Mines and Geology.

ANALYSIS AND RESULTS

MUSEUM RECORDS SEARCH

A review of museum collections records at the LACM, SBCM, and CDDSRC confirmed that no fossil localities have been previously recorded within the BSPP disturbance area boundaries or within a one-mile radius. However, at least three vertebrate fossil localities have been previously recorded southwest of the Project area within the same or similar sediments (McLeod, 2009). LACM 5977, located just south of due west of the BSPP site north of I-10 and on the southwest side of Ford Dry Lake, yielded fossilized remains of Perognathus (pocket mouse). LACM (CIT) 208 and LACM 3414, located west-northwest of the proposed BSPP site between Eagle and Coxcomb Mountains, yielded fossilized remains of *Gopherus* (tortoise), *Equus* (horse), *Camelops* (camel) and *Tanupolama stevensi* (llama). The depth at which these localities were discovered was not reported by the LACM; however, the SBCM indicates that significant vertebrate fossil remains have often been discovered in this region from similar Pleistocene deposits at a depth of approximately five feet or more below the ground surface (Scott, 2009).

Table 3. Previously Recorded Fossil Localities in the Vicinity of the Project.

Geological Formation	*Museum Locality Number and Approximate Location	Taxon	Common Name
Quaternary Alluvium	LACM 5977; just south of due west of the southernmost portion of the project area north of I-10 and on the southwest side of Ford Dry Lake	*Perognathus*	Pocket mouse
Quaternary Alluvium (Pinto Formation)	LACM (CIT) 208 and LACM 3414; west-northwest of the project area between the Eagle Mountains and the Coxcomb Mountains	*Gopherus*	Tortoise
		Equus	Horse
		Camelops	Camel
		Tanupolama stevensi	Camel

*LACM = Natural History Museum of Los Angeles County
SBCM= San Bernardino County Museum

FIELD SURVEY

A comprehensive field survey of the project area was performed between June 2 and June 20, 2009. The entire project area was relatively flat and scarcely to moderately vegetated (Photograph 1). A transect survey of the entire study area was conducted using 25- to 50-meter intervals, with close examination of exposed cross-sections and drainages (Photograph 2). The interval width used in any given area was determined based on the expected abundance of fossil materials in each area, based upon the recommendations of the museum records searches performed prior to the field survey, inspection of geologic and aerial maps, and visual observations of ground surface visibility. Both a handheld Garmin Global Positioning System (GPS) unit and a Trimble GeoXT GPS unit were used to ensure complete coverage of the project area. Upon discovery of any fossil materials, the exact location of each fossil was recorded on the Trimble unit and pertinent information was recorded for each specimen, including notes on the material on which it was found and a brief description of the specimen. A set of photographs were also taken and if warranted, the fossil was then collected.

Photograph 1. View of typical ground visibility within the BSPP site.

Photograph 2. View of an alluvial deposit along a drainage within the BSPP site.

During the course of the paleontological survey within the BSPP site, a total of thirty-seven non-significant fossil occurrences yielding petrified wood and sixty-four non-significant fossil points yielding non-diagnostic vertebrate material were recorded. All specimens were discovered *ex situ* (removed from their original place of fossilization) as lag deposits transported and unknown distance and re-deposited on top of alluvial sediments. The petrified wood was mostly likely transported in as reworked deposits from nearby Jurassic and Cretaceous age units (McCoy Mountains Formation or equivalent). For the purposes of surface clearance, the vertebrate fossils were collected and examined by vertebrate paleontologists and subsequently determined to be unidentifiable beyond the classifications of Testudines (turtles) and Mammalian (mammals). No petrified wood was collected throughout the course of the survey.

All specimens were discovered *ex situ* as lag deposits transported an unknown distance and re-deposited on top of alluvial sediments. For this reason, and due to the lack of diagnostic characteristics, none of the paleontological resources discovered within Project site are considered scientifically significant. However, the presence of fossilized bone indicates that scientifically significant specimens could be discovered in situ at the subsurface.

Table 4. Newly Recorded Fossil Occurrences Within the BSPP Boundaries

Geologic Formation*	SWCA Field Number	Taxa and Description	Significance
Alluvial fan and alluvial valley deposits (Qa_3 and Qa_6)	090606-JJS-01	Testudines- 2 shell fragments	Non-significant
	090608-JJS-01	Testudines- 2 shell fragments	Non-significant
	090609-BPN-01	Testudines- 1 shell fragment	Non-significant
	090609-BPB-02	Testudines- 1 shell fragment	Non-significant
	090609-SML-01	Testudines- 1 shell fragment	Non-significant
	090609-SML-02	Testudines- 1 shell fragment	Non-significant
	090610-BPB-01	Testudines- 1 shell fragment	Non-significant

Table 4. Newly Recorded Fossil Occurrences Within the BSPP Boundaries

Geologic Formation*	SWCA Field Number	Taxa and Description	Significance
	090610-BPB-02	Mammalian- bone fragment, possible rib	Non-significant
	090610-BPB-03	Mammalian- bone fragment Testudines- 1 shell fragment	Non-significant
	090610-BPB-04	Testudines- 1 shell fragment	Non-significant
	090610-SML-01	Testudines - possible cervical vertebra	Non-significant
	090610-SML-02	Testudines- 2 shell fragments	Non-significant
	090610-SML-03	Testudines- 2 shell fragments	Non-significant
	090612-BPB-01	Testudines- 1 shell fragment	Non-significant
	090612-SML-01	Testudines- 1 shell fragment	Non-significant
	090616-BPB-01	Mammalian- bone fragment	Non-significant
	090616-BPB-02	Testudines- 1 shell fragment	Non-significant
	090616-BPB-03	Testudines- 1 shell fragment	Non-significant
	090616-BPB-04	Testudines- 1 shell fragment	Non-significant
	090616-BPB-05	Testudines- 1 shell fragment	Non-significant
	090616-JJS-01	Testudines- 1 shell fragment	Non-significant
	090616-SML-01	Testudines- 2 shell fragments	Non-significant
	090616-SML-02	Testudines- 1 shell fragment	Non-significant
	090616-SML-03	Testudines- 2 shell fragments	Non-significant
	090616-SML-04	Testudines- 2 shell fragments	Non-significant
	090616-SML-05	Testudines- 1 shell fragment	Non-significant
	090616-SML-06	Testudines- 1 shell fragment	Non-significant
	090616-SML-07	Testudines- 1 shell fragment	Non-significant
	090617-BPB-01	Testudines- 1 shell fragment	Non-significant
	090617-BPB-02	Testudines- 1 shell fragment	Non-significant
	090617-BPB-03	Testudines- 1 shell fragment	Non-significant
	090617-SML-01	Testudines- 1 shell fragment	Non-significant
	090617-SML-02	Testudines- 1 shell fragment	Non-significant
	090617-SML-03	Testudines- 1 shell fragment	Non-significant
	090618-BPB-01	Testudines- 1 shell fragment	Non-significant
	090618-BPB-02	Mammalia- limb bone fragment?	Non-significant
	090618-BPB-03	Testudines- 1 shell fragment	Non-significant
	090618-BPB-04	Testudines- 1 shell fragment	Non-significant
	090618-JJS-01	Testudines- 1 shell fragment	Non-significant
	090618-JJS-02	Mammalia- limb bone fragment?	Non-significant
	090618-JJS-03	Testudines- 1 shell fragment	Non-significant
	090618-JLD-01	Testudines- 1 shell fragment	Non-significant
	090618-SML-01	Testudines- 1 shell fragment	Non-significant
	090618-SML-02	Testudines- 1 shell fragment	Non-significant
	090618-SML-03	Testudines- 1 shell fragment	Non-significant

Table 4. Newly Recorded Fossil Occurrences Within the BSPP Boundaries

Geologic Formation*	SWCA Field Number	Taxa and Description	Significance
	090620-BPB-01	Testudines- 1 shell fragment	Non-significant
	090620-BPB-02	Testudines- 1 shell fragment	Non-significant
	090620-BPB-03	Testudines- 2 shell fragments	Non-significant
	090620-BPB-04	Testudines- 2 shell fragments	Non-significant
	090620-BPB-05	Testudines- 1 shell fragment	Non-significant
	090520-JJS-01	Testudines- 1 shell fragment	Non-significant
	090620-JJS-02	Mammalia – distal femur fragment?	Non-significant
	090620-JJS-03	Testudines- 1 shell fragment	Non-significant
	090620-JJS-04	Testudines- 2 shell fragments	Non-significant
	090620-JJS-05	Testudines- 1 shell fragment	Non-significant
	090620-JJS-06	Testudines- 1 shell fragment	Non-significant
	090620-SML-01	Testudines- 1 shell fragment	Non-significant
	090620-SML-02	Testudines- 1 shell fragment	Non-significant
	090620-SML-03	Testudines- 1 shell fragment	Non-significant
	090620-SML-04	Testudines- 4 shell fragments, 1 Mammalia bone fragment	Non-significant
	090620-SML-05	Testudines- 1 shell fragment	Non-significant
	090620-SML-06	Testudines- 2 shell fragments	Non-significant
	090620-SML-07	Testudines- 1 shell fragment	Non-significant

*Float

NON-SIGNIFICANT FOSSIL OCCURRENCES

Thirty-seven non-significant fossil occurrences were discovered within the Project area. A fossil specimen is designated a non-significant fossil occurrence (NFO) when it can be determined in the field that the specimen contains no significant paleontological information, but whose presence may still potentially be used to determine the possibility of discovering or perhaps even locating significant fossil remains within a given area in the future. Therefore, while the specimen itself does not need to be collected, its presence and exact location is still worth recording.

Petrified Wood

All but two of the NFOs recorded during the course of the field survey consisted of one or more petrified wood fragments. None of these fragments were found to posses any unique features that could be used to identify them beyond the generic classification of "fossilized wood." These petrified wood fragments ranged in size from small (between 1 and 5 cm long) to very large (greater than 20 cm long), with the majority being of moderate size (between 5 and 10 cm long) (Photograph 3). Four of the NFOs discovered were recorded as "NFO Lines". NFO lines were recorded when the abundance of petrified wood within a given area was so great that recording each individual piece of wood as a single NFO point would have been inefficient and uninformative. Along the largest of the four NFO lines, F3-090617-17 (Confidential Attachment A), over one hundred pieces of petrified wood were noted, ranging in size from

Photograph 3. Petrified wood, F3-090617-14

very small to very large and were spaced approximately ten to twenty feet apart. The three smaller NFO lines, F3-090617-09, F3-090617-13, and F3-090617-15 contained between twenty and fifty specimens of petrified wood each, also ranging in size from small to very large, and also spaced between ten and twenty feet apart, although the number of larger specimens of petrified wood in each NFO line decreased eastward within the lines and northward between the lines.

All of the petrified wood discovered was found *ex-situ*, removed from its original place of fossilization by the natural processes of erosion. Because of this, it is difficult to determine the true source of the petrified wood. However, it has been noted by Stone (2006) that within the Palen Mountains, petrified wood has been found in Cretaceous strata that are equivalent to the McCoy Mountains Formation found immediately west and southwest of the project area. While it would be difficult to prove that the McCoy Mountains Formation is the source of the petrified wood within the Project site, it does seem to be the most likely source for such fossil materials. The finding that the larger specimens of petrified wood are seen with less frequency moving northeast through the site seems to support this hypothesis.

Invertebrates

Two invertebrate specimens were recorded as NFO points. F3-090618-09 consists of a fragmentary bivalve shell impression (Photograph 5), and F3-090618-18 consists of a small fragment of a crinoid stem (Photograph 6). Neither specimen possesses any distinguishing characteristics to identify them beyond the basic classifications of bivalve and crinoid. Both of these specimens were found on top of cobble terrace deposits (QTmw) along the eastern edge of the project area (Confidential Appendix B), likely having been transported far from their original source along with the other rock fragments that make up the cobble terrace when they were originally deposited by the Colorado River (Stone 2006). Because these specimens possessed no diagnostic characteristics and were likely transported far from their original source location, they were not considered to have high paleontological significance and thus were not collected.

Photograph 4. Fossil bivalve, F3-090618-09

Photograph 5. Fossil crinoid, F3-090618-18

FOSSIL OCCURRENCE POINTS

A total of sixty-four fossil occurrence points (i.e. localities) were recorded within the project area. The discovery of a fossil specimen is recorded as a fossil "point or "locality" when the significance of the specimen can not be determined in the field, and further evaluation is warranted. Because no vertebrate remains had been previously noted within the project area or within the immediate surroundings of the

Project area, it was determined at the start of the project that any vertebrate remains discovered should be considered as potentially significant.

Vertebrates

As previously discussed, vertebrate remains have been previously discovered within the immediate vicinity of the)Project area, but not within the Project area itself. Because all vertebrate remains are considered by the BLM to be of potential significance and because none have been previously recorded within the Project site or within a one-mile radius, all vertebrate remains discovered during the field survey were collected. Of the 62 vertebrate fossil specimens discovered, 55 were determined to belong to the order Testudines, more commonly referred to as turtles. It is likely that all of these specimens belong to the family of Testudinidae, the land tortoises; however, it is difficult to be certain with most of the specimens as they lack any diagnostic characteristics required to make this distinction. These specimens typically consisted of shell and plastron fragments, usually between 2 and 3 square cm in size, although several shell fragments were much larger than this. A single cervical (neck) vertebra was discovered (090610-SML-01), the only non-shell turtle materials recovered during the field survey. The remaining eight vertebrate fossils discovered have been identified as mammalian and include a rib fragment, an ungula (terminal toe bone), a distal femur fragment, and several limb bone fragments. Unfortunately, none of the mammal bone fragments discovered possess any features that can be used to identify the specimens beyond the classification of Mammalian.

All of the vertebrate fossil remains discovered were found *ex-situ*, removed from their original place of fossilization, and resting on top of alluvial deposits. Additionally, nearly all of the specimens were found on Holocene-aged, young alluvial-fan and alluvial valley deposits (Qa_6). While it is difficult to determine the exact origin of these fossil remains, it is suspected that they are originated from the surrounding and/or underlying Plio-Pleistocene and Pleistocene sediments, such as the alluvial deposits of the McCoy Wash area (QTmw) (see Figure 2), sediments that have been recognized by the LACM, SBCM and CDDSRC as potentially highly fossiliferous.

CONCLUSIONS

All specimens were discovered *ex-situ* as lag deposits transported an unknown distance and re-deposited on top of alluvial sediments. For this reason, and due to the lack of diagnostic characteristics, none of the paleontological resources discovered within Project site are considered scientifically significant. However, the presence of fossilized bone indicates that scientifically significant specimens could be discovered *in situ* at the subsurface. The destruction of fossils as a result of human-caused ground disturbance has a significant cumulative impact, as it makes biological records of ancient life permanently unavailable for study by scientists. Implementation of proper mitigation measures can, however, reduce the impacts to the paleontological resources to below the level of significance. Construction of the project has the potential to result in the destruction of sub-surface paleontological resources via breakage and crushing related to ground-disturbing activities during grading for the proposed solar field, power block, drainage channels, and access road. Ground disturbance and terrain modification, expected to disturb 8,300,000 cubic yards of sediments, has the potential to adversely affect an unknown quantity of fossils that may occur on or underneath the surface in areas containing paleontologically sensitive geologic units. Although no significant paleontological resources were identified within the Project area during the course of the field survey, the entire Project area is underlain by geologic sediments determined to have a high paleontological sensitivity either at the surface or at a potentially shallow depth (5 feet or less below ground surface) (Figure 3).

All ground-disturbing activities in areas determined to have a high sensitivity (see Figure 3) shall be monitored on a full-time basis because of their high paleontological sensitivity. All ground disturbances in areas determined to have a “low to high” sensitivity (see Figure 3) at depths of 5 feet or greater shall also be monitored on a full-time basis. All ground disturbing activities less than 5 feet in depth shall be “spot-checked” by paleontological monitors.

Shallow excavations related to the development of the proposed plant site in areas immediately underlain by Holocene age alluvium are unlikely to result in adverse impacts to significant paleontological resources as these sediments are determined to have a “low” sensitivity at the surface. However, deeper excavations (5 feet or greater) within this unit may have an adverse impact to paleontological resources unless proper mitigation measures are implemented. Any excavations within Pleistocene and/or Pliocene age units throughout the project area may result in adverse impacts to paleontological resources unless proper mitigation measures are implemented.

Using information from published geologic maps and the results of the paleontology study of the PSP project site, the locations of the paleontologically sensitive geologic units underlying the proposed project area were identified and are depicted in Figure 3.

RECOMMENDED MITIGATION MEASURES

Ground-disturbing activities in the BSPP project area may result in adverse impacts to significant paleontological resources unless proper mitigation measures are implemented. Implementation of proper mitigation measures can, however, reduce the impacts to the paleontological resources to below the level of significance.

The following mitigation measures have been developed to reduce the potential adverse impacts on paleontological resources to a less than significant level. The measures are based on the SVP standard guidelines (1995) and meet the requirements of CEQA. These mitigation measures have been used throughout California and have been demonstrated to be successful in protecting paleontological resources while allowing timely completion of construction projects in paleontologically sensitive areas.

PRE-CONSTRUCTION PHASE

A. Prior to the start of any project related construction (defined as construction related vegetation clearing, ground disturbance and preparation, and site excavation activities), the project owner shall ensure that the designed paleontological resource specialist approved by the CPM is available for field activities and prepared to implement the conditions of certification. The designated paleontological resource specialist shall be responsible for implementing all the paleontological conditions of certification and for using qualified personnel to assist in this work.

B. Prior to the start of construction, a Paleontological Resource Monitoring and Mitigation Plan drafted by the designated paleontological resource specialist shall be submitted to the CPM for approval. The plan shall identify general and specific measures to minimize potential impacts to sensitive paleontological resources. The project paleontological resource specialist shall implement the Paleontological Resource Monitoring and Mitigation Plan as needed.

The Paleontological Resource Monitoring and Mitigation plan shall include, but not be limited to, the following elements and measures.

- A discussion of the sequence of project-related tasks, such as any preconstruction surveys, fieldwork, flagging or staking; construction monitoring; mapping and data recovery; fossil preparation and recovery; identification and inventory; preparation of final reports; and transmittal of materials for curation;

- Identification of the person(s) expected to assist with each of the tasks identified within this condition, and a discussion of the mitigation team leadership and organizational structure, and the interrelationship of tasks and responsibilities;

- Where monitoring of project construction activities is deemed necessary, the extent of the areas where monitoring is to occur and a schedule for the monitoring.

- An explanation that the designated Paleontological Resource Specialist shall have the authority to halt or redirect construction in the immediate vicinity of a vertebrate fossil find until the significance of the find can be determined;

- A discussion of the equipment and supplies necessary for the recovery of fossil materials and any specialized equipment needed to prepare, remove, load, transport, and analyze large-sized fossils or extensive fossil deposits;

- Inventory, preparation and delivery for curation info a retrievable storage collection in a public repository or museum, which meets the Society of Vertebrate Paleontology standards and requirements for the curation of paleontological resources; and

- Identification of the intuition that has agreed to receive any data and fossil materials recovered during project-related monitoring and mitigation work, discussion of any requirements of specifications for materials delivered for curation and how they will be met, and the name and phone number of the contact person at the institution.

C. Prior to the start of construction, the Paleontological Resource Specialist shall prepare a staff training program for review and approval by the CPM. Prior to and throughout the project and as needed, the paleontological resource specialist shall conduct training for the project owner, project managers, construction supervisors, equipment operators and all new employees in accordance with the CPM approved training plan. Contractor briefings will also be videotaped and used for education for new employees.

The paleontological training program shall address the potential to encounter paleontological resources in the field, the sensitivity and importance of these resources, and the legal obligations to preserve and protect such resources. The training program shall also include the set of reporting procedures that workers are to follow if paleontological resources are encountered during project activities. The training program shall be presented by the designated Paleontological Resource Specialist and may be combined with other training programs prepared for cultural and biological resources, hazardous materials or any other areas of interests or concerns.

CONSTRUCTION PHASE

D. The designated paleontological resource specialist or paleontological monitor shall be present at all times he or she deems appropriate to monitor construction-related grading, excavation, trenching, and/or augering in areas with a significant potential for fossil-bearing sediments to occur. All ground-disturbing activities in areas determined to have a high sensitivity (See Figure 3) shall be monitored on a full-time basis because of their high paleontological sensitivity. All ground disturbances in areas determined to have a “low to high” sensitivity (see Figure 3) at depths of 5 feet or greater shall also be monitored on a full-time basis. All ground disturbing activities less than 5 feet in depth shall be “spot-checked” by paleontological monitors. The frequency of the spot checks shall be determined by the Paleontological Specialist and will be based on factors such as the extent of ground disturbance and the location of those disturbances in relation to paleontologically sensitive sediments. Paleontological monitoring will include inspection of exposed rock units and collection of matrix to be testing for the presence of microscopic fossils. Paleontological monitors will have authority to temporarily divert excavations or drilling away from exposed fossils in order to efficiently and professionally recover the fossil specimens and collect associated data.

POST-CONSTRUCTION PHASE

E. The project owner, through the designated paleontological resource specialist, shall ensure recovery, preparation for analysis, analysis, identification and inventory, the preparation for curation, and the delivery for curation of all significant paleontological resource materials encountered and collected during the monitoring, data recovery, mapping, and mitigation activities related to the project.

F. The project owner shall ensure preparation of a Paleontological Resources Report by the designated paleontological resource specialist. The Paleontological Resources Report shall be completed following the analysis of the recovered fossil materials and related information. The project owner shall submit the paleontological report to the CPM for approval. The report shall include, but not be limited to, a description and inventory list of recovered fossil materials; a map showing the location of paleontological resources found in the field; determinations of sensitivity and significance; and a statement by the paleontological resource specialist that project impacts to paleontological resources have been mitigated.

REFERENCES

Bureau of Land Management, 2008 (revised). Paleontology Resources Management Manual and Handbook H-8270-1, 38p.

California Energy Commission, 2000, Energy Facility Licensing Process: Developers Guide of Practices and Procedures. Staff Report, 67 p.

California Energy Commission (CEC), 2007, Complete Text of the California Energy Commission's Proposed Amendments to the Power Plant Siting Regulations. Commission Report, 49 p.

County of Riverside. 2003. County of Riverside General Plan. Adopted October 7, 2003.

Jennings, C.W., 1967, Geologic map of California: Salton Sea Sheet. Scale: 1:250,000. California Division of Mines and Geology.

McLeod, S.A., 2009, Unpublished paleontological specimen and locality data. Natural History Museum of Los Angeles County, Los Angeles, California, 2 p.

Metzger, D.G., Loeltz, O.J., and B. Irelna. 1973. Geohydrology of the Parker-Blythe-Cibola Area, Arizona and California: Water Resources of Lower Colorado River-Salton Sea Area. U.S. Geological Survey Professional Paper 486-G.

Murphey, P.C., and Daitch, D., 2007, Paleontological overview of oil shale and tar sands areas in Colorado, Utah and Wyoming: U.S. Department of Energy, Argonne National Laboratory Report Prepared for the U.S. Department of Interior Bureau of Land Management, 468 p. and 6 maps (scale 1:500,000).

Norris, R.M. and R.W. Webb, 1976, Geology of California, second edition. John Wiley & Sons, New York, p. 277–300.

Scott, E., 2009, Unpublished paleontological specimen and locality data. San Bernardino County Museum, Redlands, California, 2p.

Society of Vertebrate Paleontology (SVP), 1995, Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources: Standard Guidelines. Society of Vertebrate Paleontology News Bulletin. v. 163, p. 22–27.

Stone, P. 2006. Geologic Map of the West Half of the Blythe 30' by 60' Quadrangle, Riverside County, California and La Paz County, Arizona. U.S. Geological Survey Scientific Investigations Map 2922. Scale: 1:100,000.

Confidential Attachment A:
Non-Significant Fossil Occurrences

Confidential Attachment B:
Fossil Occurrence Points

Confidential Attachment C:
Paleontological Locality Forms

Confidential Documents will be submitted under separate cover

APPENDIX G
Visual Resources Technical Appendix

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Tylerhorse Wind Energy Project
Visual Resources Technical Appendix

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SECTION 1.0
INTRODUCTION

1.1 PURPOSE AND SCOPE

This Visual Resources Technical Appendix was undertaken by Sapphos Environmental, Inc. for enXco Development Corporation and Heartland Wind Development, LLC, a wholly owned subsidiary of Iberdrola Renewables, LLC (Applicant), in support of the proposed Tylerhorse Wind Energy Project (project). The purpose of the Visual Resources Technical Appendix is to provide the characterization of baseline resources and visuals of the project. The characterization of baseline resources will serve as the basis for analyzing the potential impacts to visual character or visual quality. This Visual Resources Technical Appendix provides baseline data completed by the Applicant's consultant, in consultation with the Ridgecrest Field Office of the Bureau of Land Management (BLM). The scope of this Visual Resources Technical Appendix was prepared to characterize the visual resources that would potentially be affected by construction, operation, and decommissioning of the project. Acting in its capacity as a lead agency under the National Environmental Policy Act (NEPA), the BLM would need to determine the potential for the project to result in significant impacts, consider mitigation measures and alternatives capable of avoiding or minimizing significant impacts, and take the environmental effects of the proposed action into consideration as part of its decision-making process. The visual character and quality at the project were evaluated using the Visual Resource Contrast Rating Manual, Visual Resources Inventory, and Visual Resource Management Manual to determine the extent of project impacts.[1,2,3]

This technical study identifies and evaluates key visual resources in the project area and determines the degree of visual impacts that could occur from the project on the existing landscape and built environment. This technical study evaluates potential aesthetic impacts associated with the project, provides a graphic visualization of the proposed wind turbines and the surface viewsheds from selected points within and near the approximately 1,207-acre project property, proposes mitigation measures to reduce significant impacts to visual resources, and documents the levels of significance after implementation of mitigation measures, as necessary.

Preliminary regional information on scenic quality and visual sensitivity was provided by the BLM for public lands. Site-specific data records from BLM-approved key observation points (KOPs) were prepared by the Applicant's consultant. This Visual Resources Technical Appendix was prepared based on information provided by the BLM California Desert District Office, including KOP locations and other visual resources technical appendices examples. Consistent with the guidelines presented in the BLM NEPA Handbook,[4] the description of the present condition of the affected environment is based on the visual character at the time that preparation of the Environmental Impact Statement (EIS) was initiated, taking into account past and ongoing actions that contribute to

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[1] Bureau of Land Management. n.d. *Visual Resources Inventory*. Manual H-8410-1. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8410.html

[2] Bureau of Land Management. n.d. *Visual Resources Management*. Manual 8400. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8400.html

[3] Bureau of Land Management. n.d. *Visual Resource Contrast Rating*. Manual 8431. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8431.html

[4] U.S. Department of the Interior, Bureau of Land Management. January 2008. National Environmental Policy Act. Handbook H-1790-1. Washington, DC: Bureau of Land Management, National Environmental Policy Act Program, Section 6.7.1. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.24487.File.dat/h1790-1-2008-1.pdf

the existing conditions for visual resources. Of particular importance for the project site are the two wind energy projects approved for development on properties that are immediately adjacent to the Tylerhorse Project: the Manzana Wind Energy Project and the Pacific Wind Energy Project (Figure 1.1-1, *Tehachapi Wind Energy Development*). Construction of the Manzana Wind Energy Project was initiated in January 2011, and construction of the Pacific Wind Energy Project was initiated in September 2011. The Visual Resources Technical Appendix comprises four sections: Introduction, Project Description, Methods, and Results.

The Introduction describes the purpose, scope of the investigation, sources of relevant information, and methods of this Visual Resources Technical Appendix. The Project Description describes the construction, operation, and decommissioning of the project. The Methods section explains the technical approach of this Visual Resources Technical Appendix utilizing the BLM's Visual Resources Contrast Rating and Visual Resources Management methodology. Finally, the Results section provides the Visual Resource Inventory Summary. The Visual Resource Inventory Summary contains information regarding the existing visual characteristics of the project property and surrounding area. The Visual Resource Inventory Summary contains KOPs that were selected in coordination with the BLM California Desert District Office to evaluate the current status of the visual resources.[5]

1.2 BLM WEST MOJAVE PLAN

The project falls within the area covered by the BLM West Mojave Plan, a conservation plan whose conservation program applies to both public and private lands.[6] The BLM evaluates projects for compliance with the goals and implementation policies set forth in the BLM West Mojave Plan. Therefore, the BLM West Mojave Plan was considered in this analysis.

1.3 TERMS AND CONCEPTS

The visibility analysis is designed to evaluate the visual impacts of the project property on potential viewers of the project. The following terms and concepts are used in the discussion to describe and assess the aesthetics setting and impacts from the project on BLM-administered land:[7]

- **Color:** The hue (e.g., red, brown) and value (e.g., light, dark) of the light reflected by objects in the visual landscape.

- **Contrast:** The opposition or unlikeness of different forms, lines, colors, or textures in a landscape.

- **Cultural modification:** Any human-caused change in the land form, water form, or vegetation, or addition of a structure that creates a visual contrast in the basic elements (form, line, color, and texture) of the naturalistic character of a landscape.

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[5] Schiffer-Burdett, JoAnn, Bureau of Land Management, California Desert District Office, Ridgecrest, CA. 7 March 2012. Email correspondence with Laura Kaufman and Roland Ok, Sapphos Environmental, Inc., Pasadena, CA.

[6] Bureau of Land Management. January 2005. *West Mojave Plan—A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment Final Environmental Impact Report and Statement*. Volume 1. Moreno Valley, CA: U.S. Department of the Interior, Section 1.1.1, page 1-1. Available at: http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-1-Chapter1_Bookmarks.pdf

[7] Bureau of Land Management. n.d. *Visual Resources Inventory*. Manual H-8410-1. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8410.html

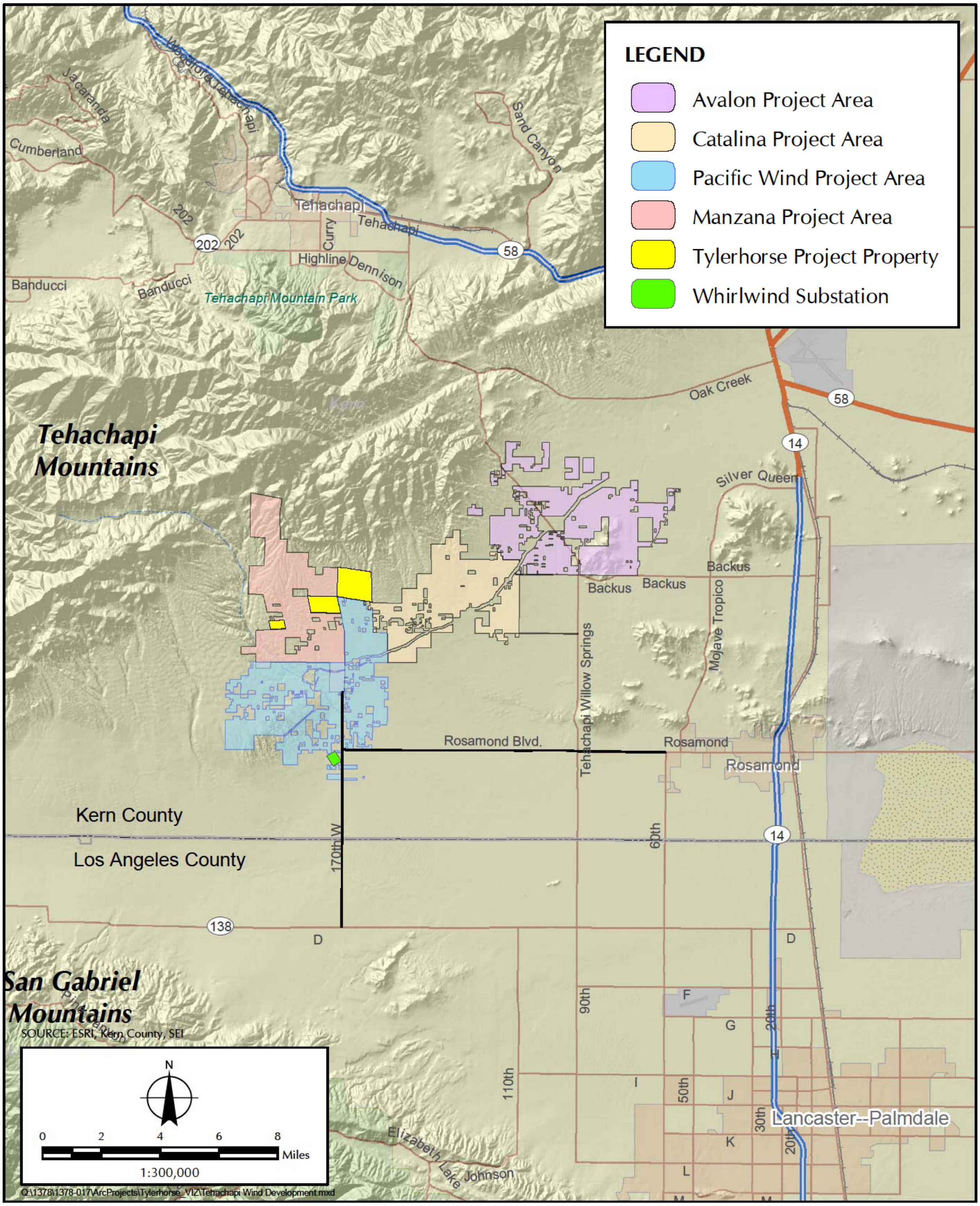

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FIGURE 1.1-1
Tehachapi Wind Energy Development

- **Form:** The visual mass, bulk, or shape of an object or objects in the visual landscape that appear unified. This element of visual character is usually the strongest.

- **Key Observation Point (KOP):** One or a series of points on a travel route or at a use area or potential use area where the view of a management activity (project) would be the most revealing.

- **Line:** The well-defined edges of shapes or masses created in the visual landscape by horizons, silhouettes, or human-made features. This element of visual character is usually the second strongest.

- **Texture:** The apparent surface coarseness of the visual landscape caused by the aggregation or density of surface features and vegetation (e.g., fine, medium, coarse). This element of visual character is usually the least dominant.

- **Viewshed:** The landscape that can be directly seen under favorable atmospheric conditions, from a viewpoint or along a transportation corridor.

- **Visual (sensitive) receptor:** Any scenic vista, scenic highway, residence, or public recreational area located within the project viewshed that provides people with views of a site.

SECTION 2.0
PROJECT DESCRIPTION

2.1 PROJECT AREA

The project property consists of approximately 1,207 acres (slightly less than 2 square miles) of BLM-administered land located in the southern portion of the unincorporated area of Kern County, California (Figure 2.1-1, *Regional Vicinity Map*). The project property is located approximately 15 miles west of California State Highway 14 (Antelope Valley Freeway), 12.5 miles south of California State Highway 58 (Blue State Memorial Highway), and 8 miles north of State Route 138 (West Avenue D) in southern Kern County, California. The project property is located south and southeast of Tehachapi Mountains and is approximately 11 miles southeast of the City of Tehachapi, Kern County, and approximately 11 miles northwest of the unincorporated community of Rosamond, California. Edwards Air Force Base is located approximately 29 miles east of the project property (Figure 2.1-2, *Local Vicinity Map*). The project is located immediately adjacent to the Manzana Wind Energy Project (Manzana Project) approved by the Kern County Board of Supervisors on July 29, 2008, that is controlled by Iberdrola Renewables, LLC on adjacent private lands; and the approved Pacific Wind Energy Project (Figure 2.1-2). In addition, the approved Catalina Renewable Energy Project, which includes wind and solar elements, is located approximately 7 miles to the east.

The project property is within the U.S. Geological Survey (USGS) 7.5-minute series, Tylerhorse Canyon topographic quadrangle and consists of three separate parcels[1] (Figure 2.1-3, *Topographic Map with USGS 7.5-minute Quadrangle Index*). The project property is located within Township 10 North, Range 15 West, and consists of all of Section 24, the northern half of Section 26, and the eastern quarter of the southern half of Section 28. The project property ranges in elevation from 3,480 feet to 3,960 feet above mean sea level at the southernmost and northernmost corners of the project boundary parcels.

Access to the project site would be from the corner of Rosamond Boulevard and 170th Street, located 15 miles west of the unincorporated community of Rosamond, by way of private access roads constructed for Manzana Project. While existing roads would be used when possible, new unpaved turbine connector roads would be constructed to serve as access roads across the project site to turbines located within the project site (Figure 2.1-4, *Conceptual Site Plan*). These turbine connector roads would be tangential to the permanent wind tower pads and would have a permanent travel width of 16 feet and a road base or gravel surface. While the permanent travel width of the road would by 16 feet, the total width of the road would be 50 feet when accounting for the temporary width of 17 feet on each side, which would be reseeded but retained for future use, as needed. Approximately 9.25 miles of new roads would be constructed for construction and operation of the project.

[1] U.S. Geological Survey. 1965. *7.5-minute Series, Tylerhorse Canyon, California, Topographic Quadrangle*. Scale 1:24,000. Reston, VA.

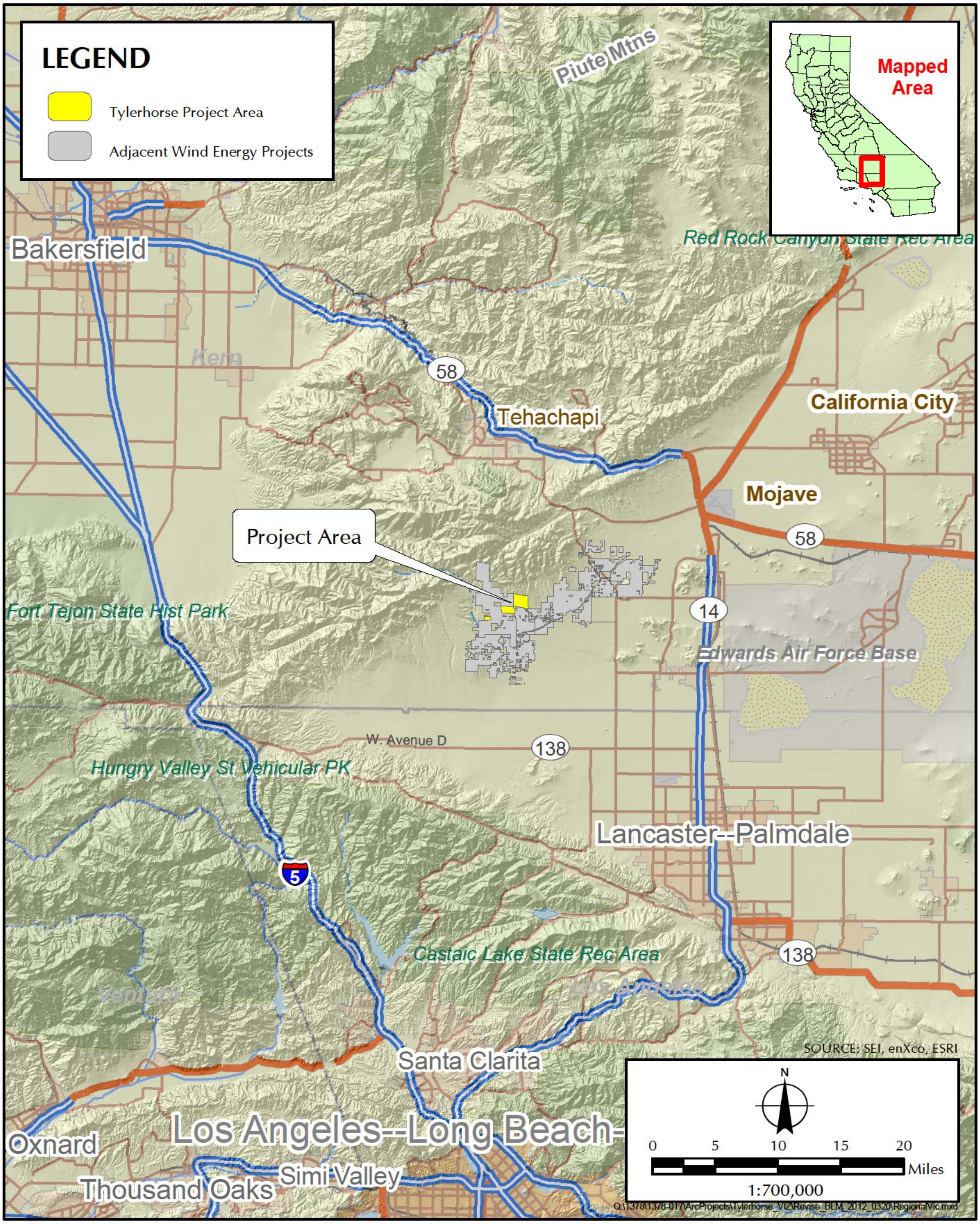

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FIGURE 2.1-1
Regional Vicinity Map

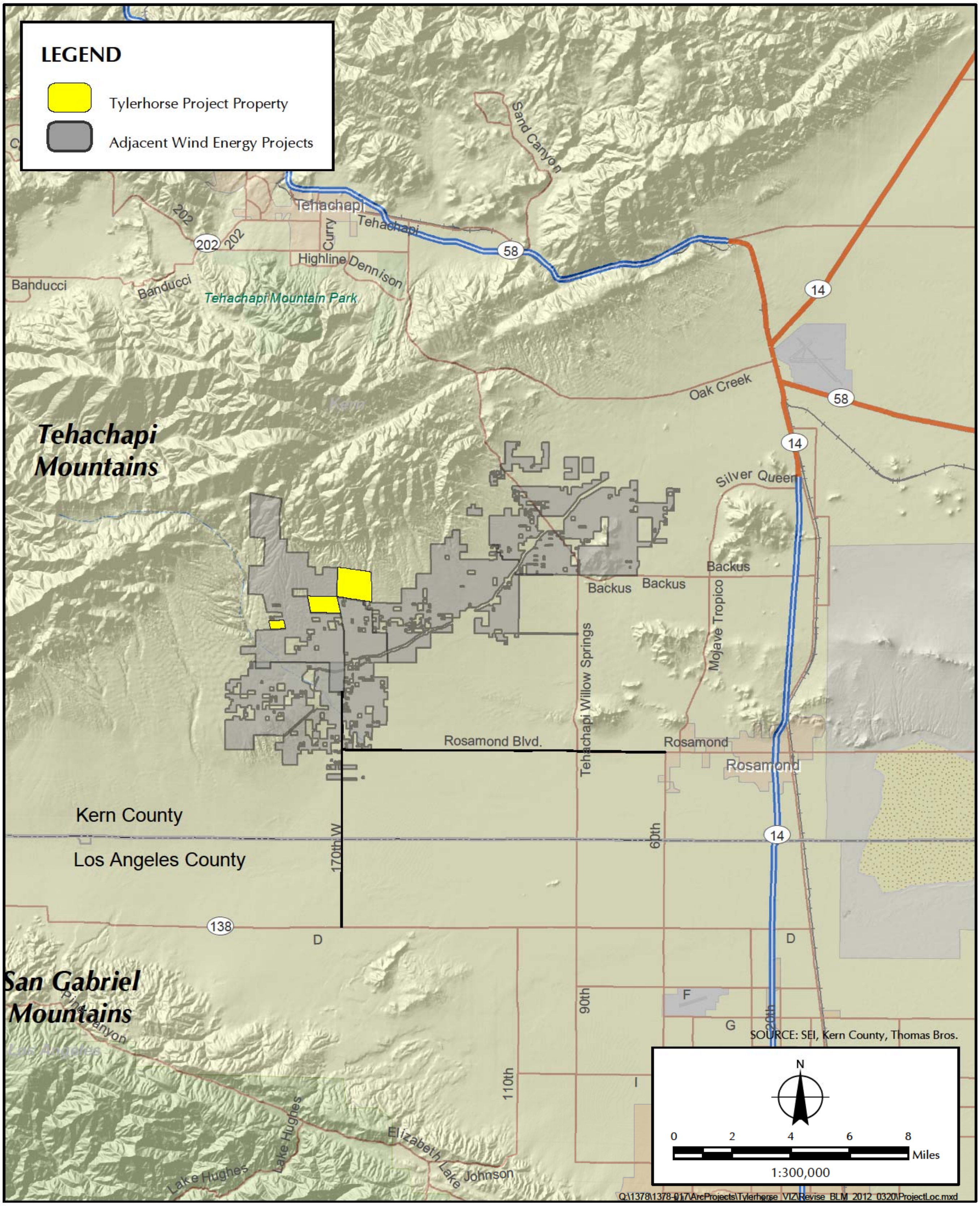

FIGURE 2.1-2
Local Vicinity Map

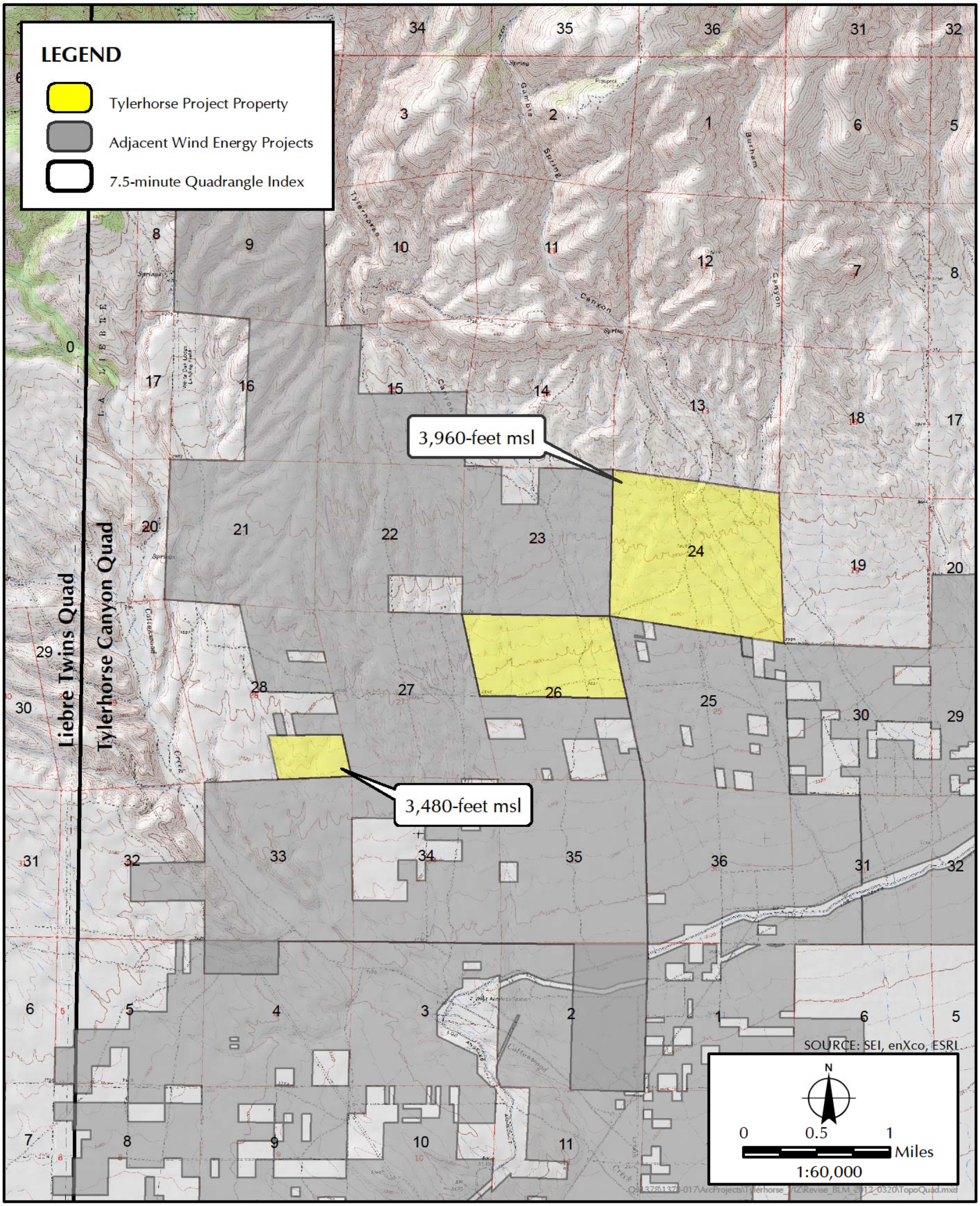

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FIGURE 2.1-3
Topographic Map with USGS 7.5-minute Quadrangle Index

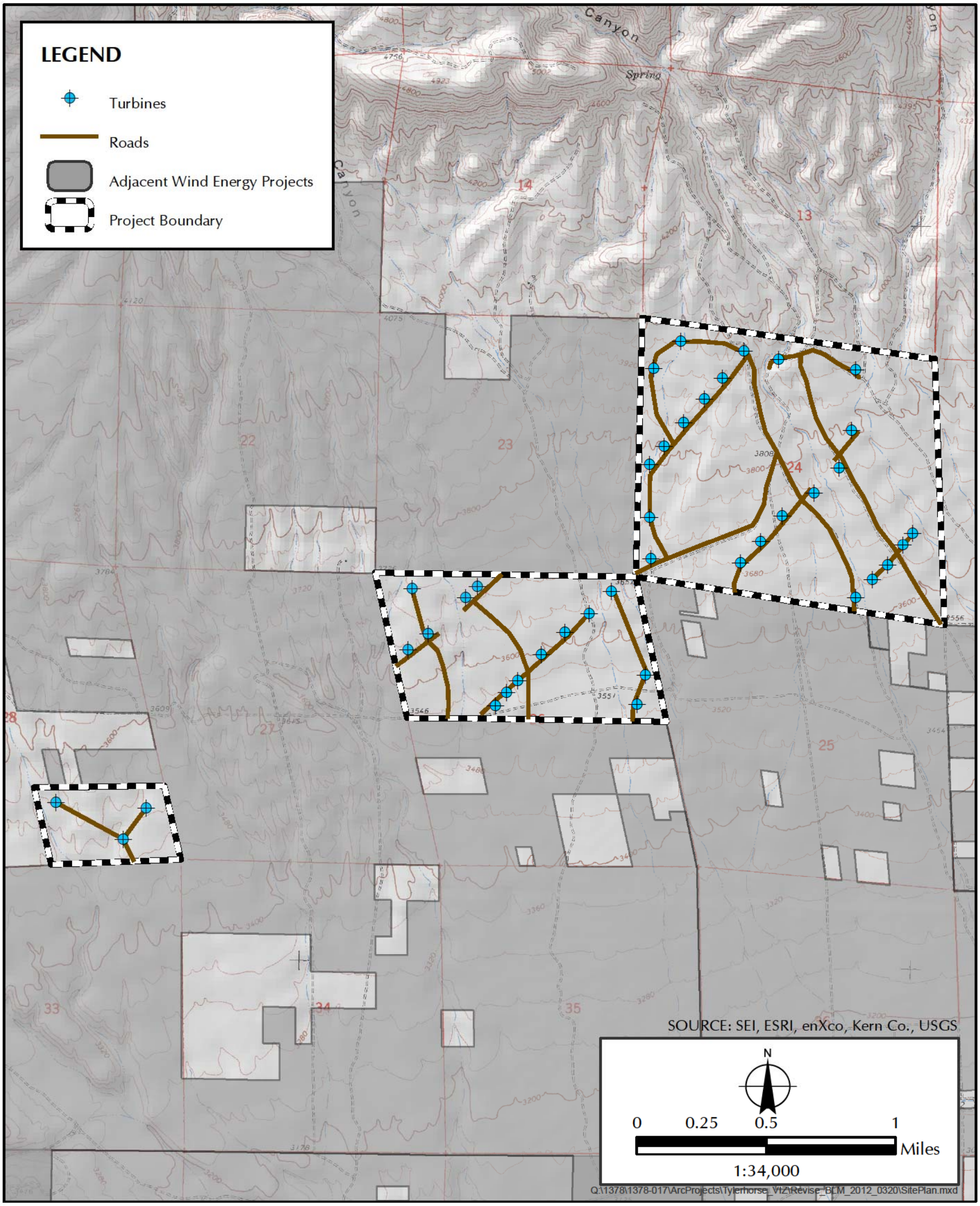

FIGURE 2.1-4

Conceptual Site Plan

2.2 CONSTRUCTION SCHEDULE AND PROJECT COMPONENTS

The Applicant anticipates constructing the project in a single phase. If the project is approved and receives all the necessary permits, construction is anticipated to begin after permit acquisition. The project would consist of up to 40 wind turbine generators (WTGs) of 1.5 to 3.0 megawatts (MW), with an anticipated total generating capacity of up to 60 MW. The project would occupy slightly less than 2 square miles, consisting of 1,207 acres of BLM-administered lands. The project would use the ancillary facilities of the adjacent but separate Manzana Project approved by the Kern County Board of Supervisors on July 29, 2008. The Manzana Project is located on approximately 6,970 acres of adjacent private lands controlled by Iberdrola Renewables, Inc. (Figure 2.1-1). The Tylerhorse Project would use facilities that were constructed for the Manzana Project, including its previously approved operations and maintenance (O&M) facility, staging and refueling areas, concrete batch plant, access roads, and transverse lines.

No new substations would be built as part of the project. The electrical collection system would be primarily underground. If portions of the collector system are installed aboveground, they would be on 80-foot poles and significantly shorter than the turbine towers. Turbines would be more visible than any potential aboveground collector lines, and the visibility of aboveground collector lines would be less than the visibility of the turbines. Therefore, the analysis of the potential visibility of the project focuses on the wind turbines.

The principal components of the project include:

- Up to 40 wind turbines;
- A 34.5-kilovolt (kV) electrical collection system linking each turbine to off-site substations previously permitted by Kern County;
- An access road system avoiding any streambed crossings;
- Supervisory control and data acquisition (SCADA) system and fiber optic communications; and
- Fencing the exterior boundaries of portions of Sections 24, 26, and 28 of the project property.

Wind Turbines

Depending on the final number of each type of wind turbine selected, fewer wind turbines may be installed. The wind turbines would be arranged in parallel arrays (turbine strings) running generally from north-northeast to south-southwest (Figure 2.1-4). Spacing of the wind turbines along the arrays would be based on the final turbine selection. In general, the wind turbines are spaced 2.5 to 3.0 rotor diameters apart side-to-side with 6 to 8 rotor diameters between downwind turbine strings. Some turbines would include aviation warning lights, as required by the Federal Aviation Administration (FAA). The number of turbines with lights and the lighting pattern of the turbines would be determined in consultation with the FAA. The project would use three-bladed wind turbines, each ranging from 1.5 to 3.0 MW (generator nameplate capacity). The diameter of the circle swept by the wind turbine blades would be no more than 370 feet, resulting in a total rotor-swept area of no more than 4,241,840 square feet. The Applicant is considering using wind turbines manufactured by Vestas, Siemens, Re-Power, Suzlon, Gamesa, and GE Energy. The turbine specifications of Vestas and GE Energy, which are two of the six wind turbine models being considered, are summarized in Table 2.2-1, *Wind Turbine Specifications*.

TABLE 2.2-1
WIND TURBINE SPECIFICATIONS

Manufacturer	Model	Capacity (MW)	Rotor Diameter (feet)	Hub Height (feet)	Maximum Height from Tower Base to Blade Tip (feet)
Vestas	112–3.0 MW	3	367	275	460
GE	SLE	1.5	253	262	389

Tower Structures

A hub height of 262 to 275 feet and a maximum height of 389 to 460 feet were used as the basis of the analysis (Table 2.2-1); however, the actual size of these towers may vary. The towers that support the WTGs would be tapered monopoles with a hub height of up to 350 feet that are assembled at each turbine pad site from three or four prefabricated sections (base; middle, lower-middle, or top-middle; and top). The wind turbine rotors would be up to approximately 370 feet in diameter. The maximum total height from tower base to blade tip would be 500 feet. Typically, the 15- to 18-foot-diameter wind turbine towers would be mounted on concrete foundations approximately 50 feet in diameter and would each occupy an approximately 80-foot-diameter graveled pad. The size of the concrete foundations and graveled pad may vary depending on the size of the WTG and its tower structure. Construction of larger WTGs would require a larger foundation and larger graveled pad and would not exceed the 300- by 300-foot work area. Assuming that the tower structures would require the maximum 300- by 300-foot work area, the maximum amount of land that would be permanently occupied by 40 wind turbine pads would be approximately 82.6 acres.

Rotor Blades

WTGs are powered by three fiberglass epoxy or polyester resin blades connected to a central rotor hub. Wind creates lift on the blades, causing the rotor hub to rotate. This rotation is transferred to a gearbox where the speed of rotation is increased to the speed required for the attached electric generator that is housed in the nacelle. The rotor blades typically turn at approximately 20 revolutions per minute (rpm) or less. Generally, larger WTGs have slower-rotating blades, but the specific rpm values depend on aerodynamic design and vary across machines. The diameter of the circle swept by the blades would be no more than 370 feet.

Wind Turbine Tower Work Area / Crane Pad Preparation

Wind turbine construction would involve a permanently disturbed 300- by 300-foot work area at each wind turbine site for delivery, laydown, and assembly of turbine components. A WTG with energy output of 1.5 to 3.0 MW would occupy an approximately 55- by 40-foot permanent gravel surface over a caliche pad within the work area. WTGs with an energy output of 3.0 MW would require a larger gravel pad surface, but they would not exceed the 300- by 300-foot work area.

In conjunction with access road construction, a 65- by 55-foot crane pad would be established at each wind turbine site. The purpose of the crane pad is to provide enough space for a large assembly crane to safely install the tower sections, nacelle, and blades. The crane pad would be leveled and would have a gravel or caliche surface. When construction is complete, the crane pad would be retained for O&M functions.

Tower pads and crane pads would require clearing and leveling for permanent use. The remaining area within the temporary work area would generally not require clearing or grading except as required by local topographic or vegetation conditions. These work areas are expected to experience only moderate disturbance from overland truck travel and turbine equipment set-up.

Wind Turbine Tower Foundations

Each proposed wind turbine would be supported by a steel-reinforced concrete foundation. There are several proposed wind tower foundations. For each of these designs, it is assumed that the portion of the tower that would be below ground could measure up to approximately 50 by 50 feet. The foundation would extend approximately 1 foot above the ground surface. The foundation design would be selected based on site-specific conditions identified and assessed during geotechnical studies for the project and based on the design engineer's requirements.

Wind Turbine Tower Assembly

Following construction of the wind turbine foundation, the wind turbine tower and the nacelle rotor unit would be assembled and erected at each wind turbine site. The staging areas for assembly would be within the designated temporary work area. Towers are expected to arrive on-site in sections and to be welded or bolted together. Towers would be assembled from four approximately 40-foot-long sections, followed by placement of the turbine nacelle and blades. Depending on the manufacturer, the nacelles could contain a preassembled drive train, or the nacelle and drive train could be lifted into place in sections. The rotor and blades would be installed individually after the nacelle has been installed on top of the tower.

Preassembly of major subsystems generally allows for complete erection of the tower, turbine, and rotor within 3 to 5 days (not including foundation installation, connection to the electrical collection system, or turbine testing and energizing). It is anticipated that very small amounts of paints, lubricants, and grease would be used during wind turbine tower installation.

Transformers

It is anticipated the pad-mounted transformers would be located at the base of each turbine tower. Depending on turbine manufacturer, alternatively, the transformer could be housed in the nacelle. For transformers located at the base of the turbine, the steel-transformer box housing the transformer circuitry would be mounted on a pad or vault made of fiberglass or concrete. The transformer box would be approximately 7 by 8 feet, with the concrete pad or foundation approximately 6 to 10 inches thick.

3.1 METHODS FOR CHARACTERIZING VISUAL RESOURCES

The visual resources technical approach utilizes the BLM's Visual Resource Contrast Rating (VRCR) system for BLM-administered public lands. This evaluation method utilizes field analysis, photo-documentation, viewshed mapping, and visual simulation techniques.

The factors considered for visual resources included (1) scenic quality of the project site and vicinity; (2) available visual access and visibility, frequency, and duration that the landscape is viewed; (3) viewing conditions and how the project would dominate the view of the observer; (4) resulting contrast (form, line, color, and texture) of the project; (5) the extent to which the project would block views of the existing landscape features; and (6) the level of public interest in the existing landscape characteristics and concern over potential changes.

Visual simulations were used to produce simulations of implementation of the project, as seen from several KOPs that were selected by BLM.[1]

3.1.1 BLM Visual Resources Management (VRM)

As part of its resource planning efforts, the BLM conducts an inventory and analysis of scenic values on the public lands it administers to establish objectives for the management of activities that may affect visual resources located on those lands. Activities that occur on BLM-administered property are subject to the management objectives related to designated VRM methodology and the VRCR system. The VRM and VRCR system involves inventorying scenic values and establishing management objectives for those values through the resource management planning process, and then evaluating proposed activities to determine whether those projects would conform to the management objectives.[2] This process helps to ensure that the actions taken on the public lands today will benefit the landscape and adjacent communities in the future. Proposed changes to public lands are evaluated based on BLM's Visual Resource Management Manual[3] and Visual Resource Contrast Rating Manual.[4] The VRM system evaluates visual resources on BLM lands by classifying scenic quality, viewer sensitivity, and distance into one of four categories (Class I, II, III, or IV), with Class I having the highest visual sensitivity and Class IV having the least sensitivity.[5]

Class I is assigned to those areas where a management decision has been made previously to maintain a natural landscape. This includes areas such as national wilderness areas, the wild section of national wild and scenic rivers, and other congressionally and administratively designated areas where decisions have been made to preserve a natural landscape. Classes II, III,

[1] Schiffer-Burdett, JoAnn, Bureau of Land Management, California Desert District Office, Ridgecrest, CA. 7 March 2012. Email correspondence with Laura Kaufman and Roland Ok, Sapphos Environmental, Inc., Pasadena, CA.

[2] Bureau of Land Management. n.d. *Visual Resources Management*. Manual 8400. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8400.html

[3] Bureau of Land Management. n.d. *Visual Resources Management*. Manual 8400. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8400.html

[4] Bureau of Land Management. n.d. *Visual Resource Contrast Rating*. Manual 8431. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8431.html

[5] Bureau of Land Management. n.d. *VRM System*. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/vrmsys.html

and IV are assigned based on a combination of scenic quality, sensitivity level, and distance zones.[6] The BLM has specified objectives for each class:

- Class I Objective: The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.

- Class II Objective: The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

- Class III Objective: The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

- Class IV Objectives: The objective of this class is to provide for management activities that require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.[7]

VRM classifications are designated through BLM land use plans and resource management plans; however, if VRM classifications are not established for an area, then the local BLM office will establish an interim VRM classification on a project-by-project basis. The project property does not currently have a VRM classification. The inventory stage, which is the first stage of the BLM's VRM system, involves identifying the visual resources of an area and assigning them to inventory classes using BLM's Visual Resource Inventory process.[8] A Draft Visual Resource Inventory, BLM Ridgecrest, California Field Office has been prepared and was used in this analysis.[9] The process involves rating the visual appeal of a tract of land, measuring public concern for scenic quality, and determining whether the tract of land is visible from travel routes or observation points.[10] Therefore, a Visual Resources Inventory Summary was included in this technical appendix.

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[6] Bureau of Land Management. n.d. *Visual Resources Inventory*. Manual H-8410-1. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8410.html

[7] Bureau of Land Management. n.d. *Visual Resources Inventory*. Manual H-8410-1. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8410.html

[8] A section of the project property, occupied by the Cactus Gold Mines Company, is zoned as Mineral and Petroleum. The area designated as State and Federal Land within the Mineral and Petroleum area are portions of the Cactus Gold Mines Company lands leased from the BLM.

[9] U.S. Department of the Interior, Bureau of Land Management, Ridgecrest Field Office. February 2012. *Draft Visual Resource Inventory, BLM Ridgecrest, California Field Office*. Prepared by Otak, Inc. Ridgecrest, CA.

[10] Bureau of Land Management. n.d. *Visual Resources Inventory*. Manual H-8410-1. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8410.html

3.1.1.1 The BLM's VRM VRCR System Approach

The BLM's VRM classification rating policy contains three primary elements:

- **Determining Resource Values:** The primary means to establish visual resource values is through a Visual Resource Inventory (VRI) that results in the assignment of one of four VRI Classes (I to IV). VRI Class I is reserved for special congressional designations or administrative decisions such as Wilderness Areas, visually sensitive ACECs, or Wild and Scenic Rivers, etc. VRI Classes II through IV are determined through a systematic process that documents the landscape's scenic quality, public sensitivity and visibility. Rating units for each of the three factors are mapped individually, evaluated, and then combined through an overlayering analysis. The factors contributing to the VRI Class determination are described below.

    - Scenic quality
    - Sensitivity
    - Distance zones
    - Visual contrast ratings

    These factors are then analyzed to determine the applicable VRI Class. VRI Classes are informational in nature and provide the baseline for existing conditions. They do not establish management direction and should not be used as a basis for constraining or encouraging surface disturbing activities.

- **Establishing Management Objectives:** VRM Classes are determined through careful consideration of VRI summary (visual values), land use and demands, and the resource allocations and/or management decisions made in the applicable land use plan for a given area. VRM Class designations set the level of visual change to the landscape that may be permitted for any surface-disturbing activity. The objective of VRM Class I is to preserve the character of the landscape, whereas VRM Class IV provides for activities that require major modification to the landscape. VRI Classes are not intended to automatically become VRM Class designations. VRM Classes may be different from the VRI Classes assigned during the inventory, as the former should reflect a balance between the protection of visual values and other resource use needs. For example, an area with a VRI Class II designation may be assigned a VRM Class IV designation, based on its overriding value for mineral resource extraction or its designation as a utility corridor.

- **Evaluating Conformance:** Finally, proposed plans of development are evaluated for conformance to the VRM Class objectives through the use of the Visual Resource Contrast Rating process set forth within BLM Handbook H-8431-1.

3.2 VRI ASSUMPTIONS AND DEFINITIONS

VRI determination is based on an assessment of four factors: scenic quality, sensitivity, distance zones, and visual contrast ratings. KOPs were selected by BLM for use as locations from which to assess the project's impacts with regard to these four factors.

The project area for visual resources is defined by the on-site landscapes directly affected by the various components of the project and the surrounding off-site area from which the project may be visible. A viewshed is defined as a surface area visible from a particular location or a linear location (a road or trail). Based on review of other similar projects, the project area for the proposed wind turbines are defined to encompass slightly less than 2 square miles of the project facilities. The height of the turbines (up to 460 feet), combined with their light color, blade movement, and night-lighting requirements, create visibility potential for these structures to background distances of 15 miles. Viewshed maps, prepared by the Applicant's consultants, are enclosed in this report.

3.2.1 KOPs

KOPs are representative viewpoints for project visual impacts and mitigation measures. KOPs were generally selected to be representative of the most critical locations from which the proposed project would be seen. The KOPs and their locations for the proposed project were selected by BLM (see Figure 4.2.1-1, *Location of Existing and Proposed Key Observation Point Index Map*).[11]

3.2.2 Scenic Quality

Scenic quality is defined as "a measure of the visual appeal of a tract of land."[12] The highest scenic quality ratings are assigned to landscapes that have the most variety and most harmonious composition in relation to the natural landscape. Scenic quality can be used to describe the existing conditions, the standard for management, or the desired future conditions. For this analysis, the BLM's VRM resource inventory method was used, which allows the various landscape elements that make up scenic quality to be quantified and rated, with a minimum of ambiguity or subjectivity. In the BLM's visual resource inventory process, lands are given an A, B, or C rating based on the apparent scenic quality, which is determined using seven key factors (landscape features): landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. These landscape features were rated numerically on a comparative basis with similar features within the viewshed, and a total score of scenic quality was tabulated. A total of 32 points is possible according to the rating scheme. View scores are:

- 19 points or more (Class A): Exceptional or an overall very high scenic quality rating, defined as rare, or unique;[13]

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[11] Schiffer-Burdett, JoAnn, Bureau of Land Management, California Desert District Office, Ridgecrest, CA. 7 March 2012. Email correspondence with Laura Kaufman and Roland Ok, Sapphos Environmental, Inc., Pasadena, CA.

[12] Bureau of Land Management. n.d. *Visual Resources Inventory*. Manual H-8410-1. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8410.html

[13] A very high scenic quality rating can be composed of any mixture of the elements ratings listed above. For example, a project may receive a high scenic quality rating if the landform is deemed to be a 5 (high), there is substantial amount of water (lake, streams) present, and the vegetation is unique and rare; whereas another site might receive a high scenic quality rating because of the cultural modification, the scarcity of the view, and the color palette within the view.

- 12–18 points (Class B): Representative scenic quality and an overall high level of scenic quality rating, defined as landscapes that have visual qualities typically seen; and

- 11 points or fewer (Class C): Common or undistinctive and average to low scenic quality rating, defined as landscapes lacking visual diversity or features.

These ratings are delineated on a basis of like physiographic characteristics; similar visual patterns, such as texture, color, and variety; and areas that have similar impacts from human-made modifications.[14] The rating system of each of the seven categories (landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications) is given on a scale of 0 to 5, where a 0 rating is the lowest (or least impact) and a 5 rating is the highest. The view scores constitute one of the elements used by the BLM to assist in determining the VRI index or classification. Under BLM methodology (for unclassified BLM-administered lands), scenic quality is determined by the score and/or ratings the project receives when evaluated by the criteria on BLM Form 8400-1, Scenic Quality Field Inventory form, that is completed for each KOP; and Form 8400-5, Scenic Quality Rating Summary form, that summarizes the findings in each Form 8400-1.

3.2.3 Sensitivity

The sensitivity level is a measure of public sensitivity toward the scenic value of an area. The sensitivity level within the project area was determined following methods described in BLM Manual H-8410.[15] Sensitivity levels are a measure of public concern for scenic quality. Public lands are assigned high, medium, or low sensitivity levels by analyzing the various indicators of public concern. Following BLM's methodology, the components below were evaluated and given a ranking of high to low:

- Type of User: Visual sensitivity will vary with the type of users. Recreational sightseers may be highly sensitive to any changes in visual quality, whereas workers who pass through the area on a regular basis may not be as sensitive to change.

- Amount of Use: Areas seen by and used by large numbers of people are potentially more sensitive. Protection of visual values usually becomes more important as the number of viewers increases.

- Public Interest: The visual quality of an area may be of concern to local, state, or national groups. Indicators of this concern are usually expressed in public meetings, letters, newspaper or magazine articles, newsletters, land-use plans, and so forth. Public controversy created in response to proposed activities that would change the landscape character should also be considered.

- Adjacent Land Use: The interrelationship with land uses in adjacent lands can affect the visual sensitivity of an area. For example, an area within the viewshed of a residential area may be very sensitive, whereas an area surrounded by commercially developed lands may not be visually sensitive.

[14] Bureau of Land Management. n.d. *Visual Resources Inventory*. Manual H-8410-1. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8410.html

[15] Bureau of Land Management. n.d. *Visual Resources Inventory*. Manual H-8410-1. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8410.html

- Special Management Areas: Management objectives for special areas such as Natural Areas, Wilderness Areas or Wilderness Study Areas, Wild and Scenic Rivers, Scenic Roads or Trails, and Areas of Critical Environmental Concern (ACECs) frequently require special consideration for the protection of visual values. This does not necessarily mean that these areas are scenic but, rather, that one of the management objectives may be to preserve the natural landscape setting. The management objectives for these areas may be used as a basis for assigning sensitivity levels.[16]

As noted in BLM Manual 8410, "There is no standard procedure for delineating Sensitivity Level Rating Units (SLRUs). The boundaries will depend on the factor that is driving the sensitivity consideration."[17] Sensitivity levels range from medium/low to high/medium and are summarized in the BLM Form 8400-6, Sensitivity Level Rating Summary form. For the purposes of determining VRM classifications, the higher overall rating of sensitivity level is used to calculate the appropriate classification.

3.2.4 Distance Zones

The BLM has subdivided landscapes into three distance categories, or zones, based on relative visibility from travel routes or observation points. The three zones are: foreground-middleground, background, and seldom seen. The foreground-middleground (fm) zone includes areas seen from highways, rivers, or other viewing locations, which are up to 3 to 5 miles away. Areas beyond the foreground-middleground zone and usually less than 15 miles away are in the background (bg) zone. Areas not seen as foreground-middleground or background (i.e., largely hidden from view) are in the seldom-seen (ss) zone.[18] Distance zones are typically delineated based on visibility, not a uniformly applied buffer. The height of the turbines (up to 460 feet), combined with their light color, blade movement, and night-lighting requirements create visibility potential for these structures to background distances of 15 miles.

3.2.5 Visual Contrast Ratings

The basic philosophy underlying the visual contrast system is: the degree to which an activity affects the visual quality of a landscape depends on the visual contrast created between a project and the existing landscape.[19] The contrast can be measured by comparing the project features with the major features in the existing landscape. The basic design elements of form, line, color, and texture are used to make this comparison and to describe the visual contrast created by the project. This assessment process provides a means for determining visual impacts and for identifying measures to mitigate these impacts.

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[16] Bureau of Land Management. n.d. *Visual Resources Inventory*. Manual H-8410-1. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8410.html

[17] Bureau of Land Management. n.d. *Visual Resources Inventory*. Manual H-8410-1. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8410.html

[18] Bureau of Land Management. n.d. *Visual Resources Inventory*. Manual H-8410-1. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8410.html

[19] Bureau of Land Management. n.d. *Visual Resource Contrast Rating*. Manual 8431. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8431.html

The visual contrast can be measured by comparing the project features with the major features in the existing landscape (Table 3.2.5-1, *BLM Degree of Contrast Criteria*). Each of the four categories was analyzed using a four-factor scale: strong, moderate, weak, or none on the BLM Form 8400-4, Visual Contrast Rating Worksheet (Appendix B, *Form 8400-4 Forms*).

TABLE 3.2.5-1
BLM DEGREE OF CONTRAST CRITERIA

Degree of Contrast	Definition
None	The element contrast is not visible or perceived.
Weak	The element contrast can be seen but does not attract attention.
Moderate	The element contrast begins to attract attention and begins to dominate the characteristic landscape.
Strong	The element contrast demands attention, will not be overlooked, and is dominant in the landscape.

SOURCE: Bureau of Land Management. n.d. *Visual Resource Contrast Rating*. Manual 8431. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8431.html

3.2.6 Visual Simulations

A geographic information systems analysis is performed to identify the change in the visual character and quality of the landscape with implementation of the project. This analysis includes modeling that takes into account the height of the turbines and the local and regional terrain. This analysis determines what portions of the project property are in visible range from the combined viewsheds of KOPs within and surrounding the project property. This analysis includes a graphic representation of those areas of the project that would be visible from the combined viewsheds of the KOPs.

SECTION 4.0
RESULTS

This Visual Resource Inventory (VRI) Summary provides information regarding the existing visual characteristics of the project property and surrounding area. BLM visual resource methodologies (Section 3.0) were used to determine the consistency of the project with any federal, state, regional, and local laws governing the regulations of aesthetic resources, including scenic resources, scenic highways, visual character, and light and glare, specifically the methodologies in the BLM's VRM policy and VRCR system. This VRI Summary contains KOPs that were selected in coordination with the BLM California Desert District Office to evaluate the current status of the visual resources.[1]

4.1 BASELINE

The project property consists of three separate parcels. Although scenic vistas are not explicitly identified in the Kern County General Plan, the largely undeveloped open space within the project area—in addition to the Tehachapi Mountains, approximately 3 miles to the north and west; the Antelope Valley California Poppy Reserve (a state Natural Reserve), approximately 7 miles to the southeast; and the Angeles National Forest, approximately 9 miles to the south—constitute visual resources and recreational spaces within the regional vicinity.

There are no officially designated scenic highways within Kern County. The nearest officially designated state scenic highway, State Route (SR) 2, also known as the Angeles Crest Highway, is located over 40 miles from the project property in Los Angeles County. The project property is not visible from SR 2. However, SR 14, also known as the Antelope Valley Freeway, traverses Kern County approximately 15 miles east of the project property. The California Scenic Highway System has identified SR 14 as an "eligible state scenic highway."[2] SR 14 north of its intersection with SR 58 has been identified as an eligible state scenic highway.

There are ten (10) renewable energy projects located within a fifteen (15) mile radius of the proposed project. The proposed project is located directly northwest of the approved and undergoing construction Catalina Renewable Energy Project, directly east of the approved and undergoing construction Manzana (formerly PdV) Wind Energy Project, and directly north of the approved and undergoing construction Pacific Wind Energy Project. Additionally, the proposed project is located two (2) miles from the approved but not constructed Morgan Hill Wind Energy Project, 5.9 miles from the approved and undergoing construction Alta Wind Energy Project, 6.8 miles from the approved and undergoing construction Cameron Ridge Wind Energy Project, 8.2 miles from the approved and completed Windstar Wind Energy Project, 10.9 miles from the proposed but not approved Rising Tree Wind Farm Project, 11 miles from the proposed but not approved Alta East Wind Project, and 11.3 miles from the approved and undergoing construction Alta Infill II Wind Energy Project.

The project property consists mostly of vacant natural open space used for grazing with varying topography consisting of gentle slopes and rolling hills. It does not contain any residences. The

[1] Schiffer-Burdett, JoAnn, Bureau of Land Management, California Desert District Office, Ridgecrest, CA. 7 March 2012. Email correspondence with Laura Kaufman and Roland Ok, Sapphos Environmental, Inc., Pasadena, CA.

[2] California Department of Transportation. 1 May 2006. *The California Scenic Highway System: A List of Eligible (E) and Officially Designated (OD) Routes (by Route)*. Sacramento, CA. Available at: http://www.dot.ca.gov/hq/LandArch/scenic/schwy1.html

project property is composed of gently sloping terrain with elevations that range from roughly 3,480 feet to approximately 3,960 feet above mean sea level (MSL). The existing visual character of the area consists of largely undeveloped desert land. Similar wind energy developments to those proposed on the project property are visible from portions of the property and from surrounding areas. Vegetation is sparse and consists of scattered brush, grasses, and small trees. The project property supports five plant communities: Mojave Desert Wash Scrub, Mojave Mixed Woody Scrub, Mojavean Juniper Woodland and Scrub, Joshua Tree Woodland, and Non-native Grassland. No BLM sensitive plant species are known to occur in the project property.

The project property is uninhabited, and there are currently no sources of nighttime lights. Therefore, within the project property no structures exist that would constitute a significant source of light or glare. Additionally, viewers of the project property may include rural residents in the vicinity of the project property and recreational users (most notably users of the PCT) that would be within the Zone of Visual Influence (ZVI) for the project. The project property is visible from the Pacific Crest Trail (PCT), which is located adjacent to the project property (one of the three parcels). The PCT is designated as a National Scenic Trail according to the National Trail Systems Act.[3] The majority of the PCT is in remote and undeveloped areas; therefore, users of the PCT are considered to be moderately sensitive to the degradation of visual resources along the trail.

As previously stated, the PCT, a National Scenic Trail, is designated as a scenic resource in the Kern County General Plan. The PCT stretches approximately 2,650 miles from Mexico to Canada through California, Oregon, and Washington, passing through a variety of environments ranging from pristine wilderness areas to more developed areas. Each year, in fact, an average of 300 hikers (given this level of visitors, the view from this location would be classified as a low-sensitivity view under BLM methodology) attempt to cover the full length of the PCT (thru-riders are more rare but increasing in number). Thousands of other hikers and equestrians enjoy this national treasure each year, some traveling only a few miles in the course of a day hike.[4] The Southern California section of the PCT is approximately 700 miles long. Viewsheds from the PCT in the region include views of the desert floor, including portions of the project property (consisting of three separate parcels) to the west, east, and southeast; the Tehachapi Mountains to the north; the Antelope Valley California Poppy Reserve to the southwest; and the San Gabriel Mountains to the south. There are no public trails or recreational corridors other than the PCT in the vicinity of the project property.

The project property's western parcel is located adjacent to the PCT's western side; the second parcel at its closest point is located approximately 1 mile east from the PCT; and the third parcel is located to the east of the PCT, approximately 2 miles away at its closet point. Therefore, the proposed property would be in the foreground of the PCT.

4.2 BLM VISUAL RESOURCES INVENTORY

The BLM VRI and VRCR were based on an assessment of scenic quality, sensitivity, distance zones, and visual contrast ratings. KOPs[5] and the Draft Visual Resource Inventory, BLM Ridgecrest, California Field Office[6] were used for the project to assess these factors.

[3] U.S. Department of Interior, National Parks Service. Amended 2004. *National Trails System Act*. Washington, DC. Available at: http://www.nps.gov/nts/legislation.html
[4] Pacific Crest Trail Association. Pacific Crest Trail: National Scenic Crest Trail. Trail Overview. Accessed 18 January 2012. Available at: http://www.pcta.org/about_trail/overview.asp

[5] Selection of the KOPs was coordinated with the BLM California Desert District Office. All KOP locations were approved before the site visit and photo documentation occurred.

4.2.1 Key Observation Points

KOPs were located based on their usefulness in evaluating existing landscapes and potential impacts on visual resources with various levels of sensitivity, in different terrain, and from various vantage points. Visual simulations were prepared from KOPs that were selected[7] at the most critical viewpoints, as determined by the BLM office.[8] BLM selected the KOPs to represent typical views of the project property from various directions and to find potential areas of most viewer sensitivity. These KOPs were used to evaluate potential sensitive viewpoints, potential scenic resources, and recreational resources. These observational points represent the views from PCT users and adjacent areas within the project vicinity. Geographic information system (GIS) coordinates where each existing condition photograph was taken were recorded (Table 4.2.1-1, *Key Observation Points*; and Figure 4.2.1-1, *Location of Existing and Proposed Key Observation Point Index Map*). Type and amount of use and level of public access of KOPs are reflected in BLM Form 8400-6 (Appendix C, *BLM 8400-6 Forms*). Three KOPs were used for the analysis of scenic quality, visual contrast, and sensitivity (Figure 4.2.1-1).

TABLE 4.2.1-1
KEY OBSERVATION POINTS

KOP ID	GIS Coordinate X	GIS Coordinate Y	Distance from Project Area	Landscape Character
Key Observation Point 1	392315.6	3858640.6	14.4 miles southeast	A point KOP from the Rosamond City Center; representing a public gathering place; where the proposed project would occupy the background
Key Observation Point 2	375543.1	3858696.2	5.9 miles southeast	A linear KOP along Rosamond Road between 90th W. Street and 170th W. Street in Willow Springs Vicinity; representing a public road; where the proposed project would occupy the middleground
Key Observation Point 3	365466.8	3867167.8	1.1 miles east	A point KOP from the PCT at the Manzana Project on Kern County land; representing viewers on the PCT; where the proposed project would occupy the foreground

KEY: GIS = geographic information system

[6] U.S. Department of the Interior, Bureau of Land Management, Ridgecrest Field Office. February 2012. *Draft Visual Resource Inventory, BLM Ridgecrest, California Field Office*. Prepared by Otak, Inc. Ridgecrest, CA.

[7] Selection of the KOPs was coordinated with the BLM California Desert District Office. All KOP locations were approved before the site visit and photo documentation occurred.

[8] Schiffer-Burdett, JoAnn, Bureau of Land Management, California Desert District Office, Ridgecrest, CA. 7 March 2012. Email correspondence with Laura Kaufman and Roland Ok, Sapphos Environmental, Inc., Pasadena, CA.

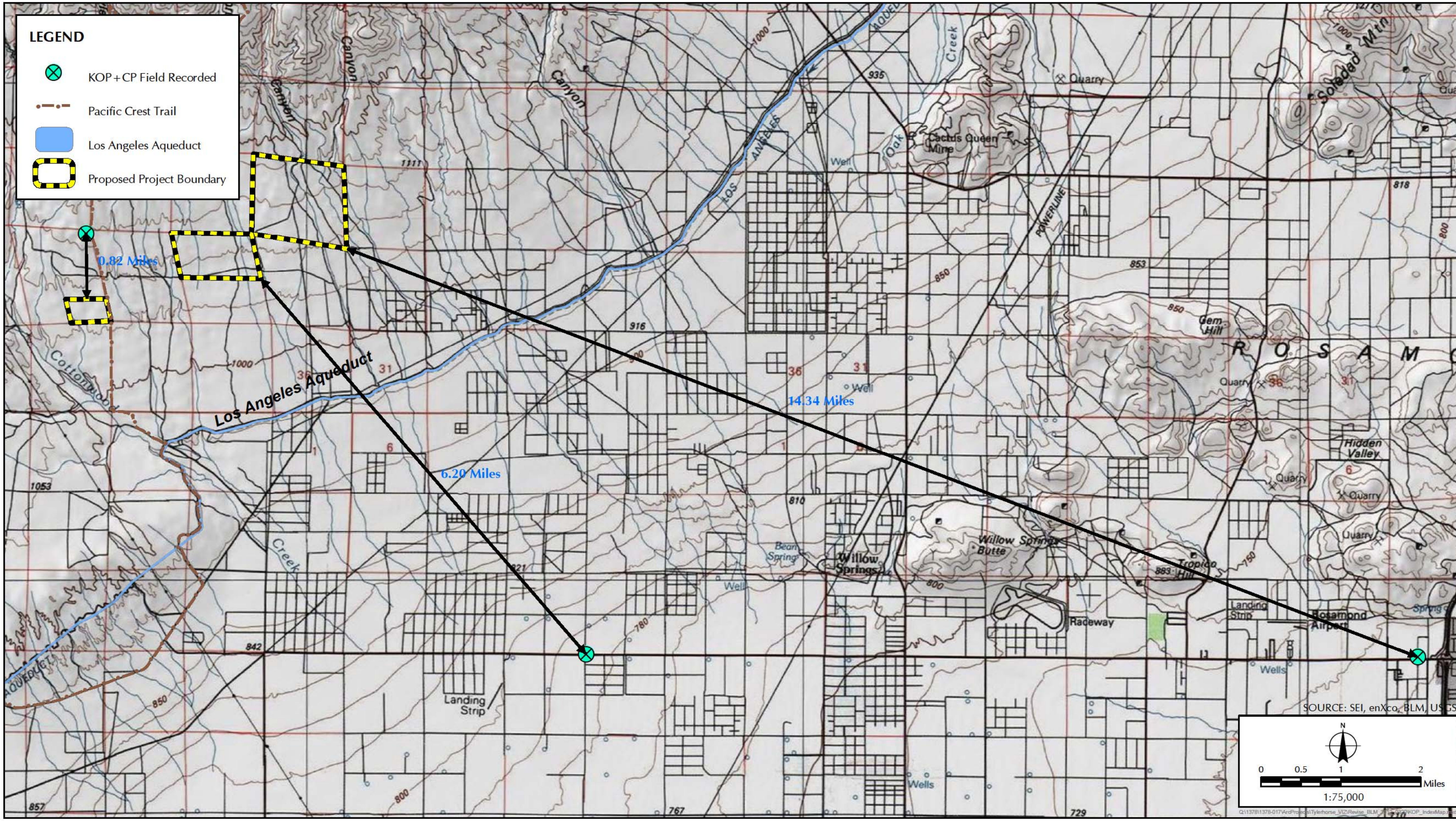

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FIGURE 4.2.1-1

Location of Existing and Proposed Key Observation Point Index Map

Existing Visual Setting

Photographs were taken at each KOP inventory location as part of the visual impact assessment process, to identify the existing visual setting.

Consistent with the guidelines presented in the BLM NEPA Handbook,[9] the description of the present condition of the affected environment is based on the visual character at the time that preparation of the Environmental Impact Statement (EIS) was initiated, taking into account past and ongoing actions that contribute to the existing conditions for visual resources. Of particular importance for the project site are the two wind energy projects approved for development on properties that are immediately adjacent to the Tylerhorse Project: the Manzana Wind Energy Project and the Pacific Wind Energy Project Construction of the Manzana Wind Energy Project was initiated in January 2011, and construction of the Pacific Wind Energy Project was initiated in September 2011.

The NOI for the proposed project was published on July 15, 2011. At the time of the NOI, construction of surrounding wind energy projects had not been initiated. Since the NOI was published, construction of surrounding wind energy projects has begun. Therefore, in coordination and guidance from BLM, [10] the KOPs were photographed after the NOI distribution date and during the construction of surrounding wind energy projects in order to analyze the most accurate existing conditions, which facilitates the NEPA process and gives the public a more accurate rendering of the potential future look of the landscape.[11] Therefore, the KOP photographs show the existing conditions with wind turbines from the surrounding wind energy projects that were approved but not in construction at the time the NOI was released for public review. Photographs of the NOI conditions, from various points in the project area are provided for additional context (Figure 4.2.1-2, *General Condition 1* and 4.2.1-3, *General Condition 2*).

Key Observation Point 1

This KOP illustrates some diversity in the landscape. Vegetation is low, sparse, simple, and indistinct under BLM definitions (Figure 4.2.1-4, *Key Observation Point 1*). The landform can be characterized as large, low flat valley bottom. The background provides a distant view of the mountains with clustered, moderately sloped hilltops. The foreground shows a low road, vertical power poles, and developed, human-made structures.

Key Observation Point 2

This KOP provides a view of a paved road and human-made structures in the foreground, relatively flat land with moderately dense vegetation in the middleground and wind turbines and mountains in the background (Figure 4.2.1-5, *Key Observation Point 2*). The features of this KOP are smooth and angular with colors varying from the rusty brown of the landform, green of the vegetation, and gray, off-white of the wind turbines.

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[9] U.S. Department of the Interior, Bureau of Land Management. January 2008. National Environmental Policy Act. Handbook H-1790-1. Washington, DC: Bureau of Land Management, National Environmental Policy Act Program, Section 6.7.1. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.24487.File.dat/h1790-1-2008-1.pdf

[10] Schiffer-Burdett, JoAnn, Bureau of Land Management, California Desert District Office, Ridgecrest, CA. 7 March 2012. Email correspondence with Laura Kaufman and Roland Ok, Sapphos Environmental, Inc., Pasadena, CA.

[11] Lee, David and Ferretti, Ken, Sapphos Environmental, Inc., Pasadena, CA. 13 March 2012.

FIGURE 4.2.1-2
General Condition 1

FIGURE 4.2.1-3
General Condition 2

Existing Visual Setting


Visual Simulation

FIGURE 4.2.1-4
Key Observation Point 1

Existing Visual Setting

Visual Simulation

FIGURE 4.2.1-5
Key Observation Point 2

Key Observation Point 3

This KOP illustrates flat land with minimal vertical relief in the foreground, middleground, and in the background (Figure 4.2.1-6, *Key Observation Point 3*). The vegetation is low and scattered, consisting of desert scrub and creosotes. Turbines from surrounding projects are clearly visible in the foreground. A dirt path/road can be viewed in the foreground. This view is very representative of typical landscapes found in this subregion of Kern County.

Visual Simulation

A GIS Zone of Visual Influence (ZVI) analysis was performed using ESRI ArcGIS Spatial Analyst software and a terrain model utilizing 10-meter digital elevation model (DEM) data to determine the extent of the visibility of the wind turbines for the conceptual turbine layouts. In determining the ZVI, the model takes into account the height of the turbines and the local and regional terrain. The viewshed analysis determined what portions of the project property were within a visible range from the combined viewsheds of three key observation points within and surrounding the project property. The analysis includes a graphic representation of those areas of the project that would be visible from the combined viewsheds of the key observation points.

Visual resources surveys of the project property were conducted in order to understand the existing visual resources in the vicinity of the project. BLM protocol forms and worksheets were completed for the project to determine the level of contrast the project would have on the existing visual resources. Then, based on the classification of the visual resources for the project property, it was determined whether the visual resources management objectives for the project property were met.

An interdisciplinary team of visual resource management practitioners from Sapphos Environmental, Inc. conducted a collaborative analysis of the landscape's scenic quality using a quantitative method adapted from the BLM's visual resource management methodology.[12,13,14] Photo documentation was conducted to document the existing conditions and provide a visual simulation of the project in operation from the three observation points. The KOPs have been analyzed as representations of the project area from potential areas of viewer sensitivity. Therefore, the ratings that are designated for the KOPs are also ratings designated for the project area. Visual simulations were then prepared for the three KOPs.

Key Observation Point 1

The visual simulation for KOP 1 depicts the addition of wind turbines from project implementation (Figure 4.2.1-4) where no turbines were visible before. The wind turbines from the proposed project would be visible in the distance but smaller than (and partially obscured by) the vegetation and other structures in the foreground from this vantage point in the background as it is less than 15 miles northwest of the vantage point. The project components are smaller than the structures and development that are in the foreground.

[12] BLM's visual resource management methodology is based on the BLM's Manual 8400—*Visual Resources Management* and BLM Manual 8431—*Visual Resource Contrast Rating* and the instructions found within each document.

[13] Bureau of Land Management. n.d. *Visual Resources Management*. Manual 8400. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8400.html

[14] Bureau of Land Management. n.d. *Visual Resource Contrast Rating*. Manual 8431. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8431.html

Existing Visual Setting

Visual Simulation

FIGURE 4.2.1-6
Key Observation Point 3

Key Observation Point 2

The project would be visible from this vantage point in the middleground. With project implementation, approximately 12 turbines from the project would appear to be added intermixed with the already existing turbines from the surrounding projects in the middleground of this view (Figure 4.2.1-5). Over 100 existing turbines are visible from KOP 2 without the project. The existing wind turbines are from surrounding projects that have already been constructed or are currently under construction.

Key Observation Point 3

The visual simulation depicts the addition of the project features, with approximately eight additional wind turbines from the project visible on the left side of the photograph, among the existing turbines from surrounding projects (Figure 4.2.1-6). The project would be visible from this vantage point in the foreground as it is less than two (2) miles west of the vantage point. The project components are visible but mixed with the already constructed turbines in the foreground.

4.2.2 Scenic Quality

Under BLM methodology (for unclassified BLM-administered lands), scenic quality is determined by the score and or ratings the project receives when evaluated by the criteria on BLM Form 8400-1. Photographs were taken at each KOP. The scenic quality of landforms, water, vegetation, and structure at each location was then assessed in terms of texture, color, form, and line. Each location was then ranked using seven factors, including: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modification (Appendix A, *BLM 8400-1 and BLM 8400-5 Forms*).

The BLM visual resource management process offers guidance regarding the fact that landscapes with low scenic quality need not be scrutinized as extensively as those that exhibit high scenic variety.

Scenic Quality Rating Units

The Scenic Quality Rating Units (SQRU) are defined in the BLM Scenic Quality Field Inventory, Form 8400-1 (Appendix A, *BLM 8400-1 and BLM 8400-5 Forms*) and BLM Scenic Quality Rating Summary, Form 8400-5 analysis (Appendix A and Table 4.2.2-1, *Scenic Quality Rating*), which were prepared to classify the scenic quality of each KOP prior to project implementation.[15] The values in Table 4.2.2-1 were provided by BLM and are from a Draft VRI provided by the consulting firm of Otak, Inc., under the direction of BLM. The scenic quality of an area is a measure of the visual appeal of a tract of land. In the BLM Visual Resource Inventory process, public lands are given an A, B, or C rating based on the apparent scenic quality,[16] with A being of highest scenic value, as determined by an evaluation of the seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. The KOPs used on each BLM form are representative of the project area as a whole due to the homogeneity of the landscape of the area

[15] U.S. Department of the Interior, Bureau of Land Management, Ridgecrest Field Office. February 2012. *Draft Visual Resource Inventory, BLM Ridgecrest, California Field Office*. Prepared by: Otak, Inc. Ridgecrest, CA.

[16] Bureau of Land Management. n.d. *Visual Resources Inventory*. Manual H-8410-1. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8410.html

in which the project is located. Therefore, the SQRUs given to each KOP are the ratings given to the project area prior to implementation of the project.

TABLE 4.2.2-1
SCENIC QUALITY RATING

Location	Landform	Vegetation	Water	Color	Adjacent Scenery	Scarcity	Cultural Modification	Total Score	Scenic Quality Rating
KOP 1	2.5	1.5	0	2.5	2	2	-2	8.5	C
KOP 2	2.5	1.5	0	2.5	2	2	-0.5	10	C
KOP 3	1.5	1.5	0	1	2	2	0	8	C

KEY: KOP = key observation point
SOURCE: U.S. Department of the Interior, Bureau of Land Management, Ridgecrest Field Office. February 2012. *Draft Visual Resource Inventory, BLM Ridgecrest, California Field Office*. Prepared by Otak, Inc., Ridgecrest, CA.

4.2.3 Sensitivity

Under BLM methodology (for unclassified BLM-administered lands), sensitivity is determined by the score and or ratings the project receives when evaluated by the criteria on BLM Form 8400-6 and from a Draft Visual Resource Inventory (VRI) provided by the consulting firm of Otak, Inc. Photographs were taken at each KOP. Sensitivity was evaluated on several levels (Appendix C, *BLM 8400-6 Forms*). [17] Sensitivity levels range from medium/low to high/medium.

For the purposes of VRI, the higher overall rating of sensitivity level is used to calculate the appropriate classification. BLM Form 8400-6 (Appendix C, *BLM 8400-6 Forms*) was used to determine sensitivity levels for the project area. The KOPs used on the BLM form are representative of the project area as a whole due to the homogeneity of the landscape in the project area. Therefore, the Sensitivity Level Rating Units (SLRUs) given to each KOP are the ratings given to the project area (Table 4.2.3-1, *Sensitivity Level Rating*), displays the sensitivity levels near the project, as determined by this analysis.

TABLE 4.2.3-1
SENSITIVITY LEVEL RATING

Location	Type of Users	Amount of Use	Public Interest	Adjacent Land Uses	Special Area Sensitivity	Other Factors	Overall Rating
KOP 1	M	L	L	M	NP	NP	L
KOP 2	M	L	L	M	NP	NP	L
KOP 3	M	L	L	M	NP	NP	L

KEY: KOP = key observation point; NP = Not Present; L = Low; M = Medium
SOURCE: U.S. Department of the Interior, Bureau of Land Management, Ridgecrest Field Office. February 2012. *Draft Visual Resource Inventory, BLM Ridgecrest, California Field Office*. Prepared by Otak, Inc. Ridgecrest, CA.

[17] U.S. Department of the Interior, Bureau of Land Management, Ridgecrest Field Office. February 2012. *Draft Visual Resource Inventory, BLM Ridgecrest, California Field Office*. Prepared by Otak, Inc. Ridgecrest, CA.

4.2.4 Distance Zones

Distance zones are typically delineated based on visibility, not a uniformly applied buffer. However, due to the homogeneity of the project area's landscape and the homogeneity of the surrounding landscape overall, the distance zones were delineated in 1-mile increments. Additionally, the KOPs used for the project are representative of the project area because of the similar landscape. Therefore, the distance zones assigned to each KOP are the distance zones assigned to the project area.

4.2.5 Visual Contrast

Under BLM methodology (for unclassified BLM-administered lands), visual contrast is determined by the score and or ratings the project receives when evaluated by the criteria on BLM Form 8400-4. Photographs were taken at each KOP. Visual contrast ratings were defined based on the four categories described in Section 3.0, *Method* (see Table 3.2.5-1, *BLM Degree of Contrast Criteria*).

Visual contrast rating forms were used to evaluate several factors (Appendix B, *BLM 8400-4 Forms*). The visual contrast rating forms describe the existing landscape character and visual sensitivity at each KOP; document the project and alternative facilities and actions that would be viewed at each KOP; and estimate the degree of change in line, form, color, and texture of the project.

Various BLM protocol forms and worksheets were completed for the project to determine the level of contrast the project would have on the existing visual resources (Appendix B). The visual contrast of landforms/water, vegetation, and structures at each location were then assessed in terms of texture, color, form, and line. Each KOP location was then evaluated examining the existing conditions and the proposed activity displayed in the visual simulation (Table 4.2.5-1, *Visual Contrast Rating Worksheet*).

TABLE 4.2.5-1
VISUAL CONTRAST RATING WORKSHEET

	Land/Water Body				Vegetation				Structures			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
KOP 1												
Form			X			X					X	
Line			X				X				X	
Color			X				X				X	
Texture		X				X				X		
KOP 2												
Form			X			X				X		
Line		X					X			X		
Color			X			X					X	
Texture		X					X				X	
KOP 3												
Form			X				X			X		
Line			X				X			X		
Color			X				X			X		
Texture			X				X			X		

KEY: KOP = key observation point

4.3 VISUAL RESOURCE INVENTORY SUMMARY

The VRI is determined in a spatial context by combining overlays for scenic quality, sensitivity levels, distance zones, and visual contrast ratings, or by using a tabular matrix. Visual simulations were conducted so that a visual comparison could be made to existing conditions. The results of the VRI are presented in Table 4.3-1, *Visual Resource Inventory Summary*.

TABLE 4.3-1
VISUAL RESOURCE INVENTORY SUMMARY

Key Observation Point (KOP) Number and Description	Scenic Quality Rating	Visual Sensitivity	Distance Zones
KOP 1: A point KOP from the Rosamond City Center	C	Low, considering minor local land use, operational turbines on lands adjacent to project area, no special area sensitivity, and no other factors.	Background. Barely visible and within 15 miles of the Rosamond City Center. Barely visible behind developed structures.
KOP 2: A linear KOP along Rosamond Road between 90th W. Street and 170th W. Street in Willow Springs Vicinity	C	Low, considering minor local land use, operational turbines on lands adjacent to project area, no special area sensitivity, and no other factors.	Middleground. Less visible and within 6 miles of Rosamond Road. Less visible mixed with constructed wind turbines from surrounding projects.
KOP 3: A point KOP from the PCT at Manzana Project on Kern County land	C	Low, considering minor local land use, operational turbines on lands adjacent to project area, no special area sensitivity, and no other factors.	Foreground. Visible and within 2 miles of the PCT.

SOURCE: U.S. Department of the Interior, Bureau of Land Management, Ridgecrest Field Office. February 2012. *Draft Visual Resource Inventory, BLM Ridgecrest, California Field Office*. Prepared by Otak, Inc. Ridgecrest, CA.

Bureau of Land Management. January 2005. *West Mojave Plan—A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment Final Environmental Impact Report and Statement*. Volume 1. Moreno Valley, CA: U.S. Department of the Interior, Section 1.1.1, page 1-1. Available at: http://www.blm.gov/ca/pdfs/cdd_pdfs/wemo_pdfs/plan/wemo/Vol-1-Chapter1_Bookmarks.pdf

Bureau of Land Management. n.d. *Visual Resource Contrast Rating*. Manual 8431. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8431.html

Bureau of Land Management. n.d. *Visual Resources Inventory*. Manual H-8410-1. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8410.html

Bureau of Land Management. n.d. *Visual Resources Management*. Manual 8400. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/8400.html

Bureau of Land Management. n.d. *VRM System*. Washington, DC: U.S. Department of the Interior. Available at: http://www.blm.gov/nstc/VRM/vrmsys.html

California Department of Transportation. 1 May 2006. *The California Scenic Highway System: A List of Eligible (E) and Officially Designated (OD) Routes (by Route)*. Sacramento, CA. Available at: http://www.dot.ca.gov/hq/LandArch/scenic/schwy1.html

Pacific Crest Trail Association. Accessed 18 January 2012. Pacific Crest Trail: National Scenic Crest Trail. Trail Overview. Available at: http://www.pcta.org/about_trail/overview.asp

Schiffer-Burdett, JoAnn, Bureau of Land Management, California Desert District Office, Ridgecrest, CA. 7 March 2012. Email correspondence with Laura Kaufman and Roland Ok, Sapphos Environmental, Inc., Pasadena, CA.

U.S. Department of the Interior, Bureau of Land Management. January 2008. National Environmental Policy Act. Handbook H-1790-1. Washington, DC: Bureau of Land Management, National Environmental Policy Act Program, Section 6.7.1. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.24487.File.dat/h1790-1-2008-1.pdf

U.S. Department of the Interior, Bureau of Land Management, Ridgecrest Field Office. February 2012. *Draft Visual Resource Inventory, BLM Ridgecrest, California Field Office*. Prepared by Otak, Inc. Ridgecrest, CA.

U.S. Department of the Interior, National Parks Service. Amended 2004. *National Trails System Act*. Washington, DC. Available at: http://www.nps.gov/nts/legislation.html

U.S. Geological Survey. 1965. *7.5-minute Series, Tylerhorse Canyon, California, Topographic Quadrangle*. Scale 1:24,000. Reston, VA.

APPENDIX A
BLM 8400-1 AND 8400-5 FORMS

Form 8400-1
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SCENIC QUALITY FIELD INVENTORY

Date 3/20/12

District

Resource Area

Scenic quality rating unit

1. Evaluators (names)

Leanna Guillermo

2. LANDSCAPE CHARACTER (Feature)

	a. LANDFORM/WATER	b. VEGETATION	c. STRUCTURE (General)
FORM	Large, low, flat valley bottom; clustered rolling tops	Low, simple, indistinct desert scrub	Low road, vertical power poles, developed structures, vertical uniform fencing
LINE	Horizontal floor, moderately sloped hilltops	Weak, indistinct, follows landform	Straight roads, vertical power poles, vertical uniform fencing, geometric structures
COLOR	Rusty brown, reddish, tan, gray, orange	Muted tan-gray desert scrub	Various dark-gray roads, contrasting grays and browns
TEXTURE	Smooth bases, subtle texture	Sparse, stippled, random	Smooth, contrasting, uniform

3. Narrative

A series of rolling, small hills. Colors vary from rusty brown to gray. Features are smooth and uniform. Typical development is present.

4. SCORE (Circle Appropriate Level)*

	HIGH	MEDIUM	LOW	EXPLANATION OR RATIONALE
a. Landform	5	3 2.5	1	Low but interesting within valley
b. Vegetation	5	3	1 1.5	Minimal diversity
c. Water	5	3	0	Not noticeable
d. Color	5	3 2.5	1	Some interesting variety and intensity
e. Adjacent Scenery	5	3 2	0	Minimal influence
f. Scarcity	5+	3 2	1	Commonly seen
g. Cultural Modification	2	0 2	-4	Development detracts
TOTALS	+	+	= 8.5	

SCENIC QUALITY CLASSIFICATION

☐ A 19 or more

☐ B – 12–18

☒ C – 11 or less

(Instructions on reverse)

INSTRUCTIONS

Following are the instructions for completing the form. The numbers correspond with the item numbers on the form.

1. **Evaluators.** List the names of the persons involved in the rating.
2. **Landscape Character.** Briefly describe the major features and elements in the landscape. Refer to illustrations 4, 5, 6, and 7 of the BLM Handbook I-8431-1 for guidelines on the terminology to be used to describe the elements.
3. **Narrative.** Briefly describe the general character of the landscape as it relates to the immediate surroundings and to similar landscape features within the physiographic province.
4. **Scores.** Rate the scenic quality using the criteria and guidelines in the BLM Handbook I-8410-1 Section II. Record the scores by circling the appropriate numbers. If the rating more appropriately falls between the listed numbers, write in the desired number and circle it. For example, if the desired number for "color" falls between 3 and 5, write in the number 4 and circle it. Explain any unusual factors affecting a rating under the "explanation and rationale" column. If more space is needed, continue the explanation on this page. After the ratings are completed total the scores and check the appropriate classification block.

U.S. Government Printing Office: [illegible]

Form 8400-1
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SCENIC QUALITY FIELD INVENTORY

Date 3/20/12

District

Resource Area

Scenic quality rating unit

1. Evaluators *(names)*

Leanna Guillermo

2. LANDSCAPE CHARACTER *(Feature)*

	a. LANDFORM/WATER	b. VEGETATION	c. STRUCTURE *(General)*
FORM	Large, low, flat valley bottom; clustered rolling tops	Rounded, indistinct desert scrub; simple	Low roads; vertical power poles; vertical wind towers; clustered, small development
LINE	Angular floor, moderately sloped hilltops	Indistinct, follows landform, vertical desert scrub	Straight roads, vertical power poles, vertical small development, vertical wind towers
COLOR	Rusty brown, tan, gray, green	Indistinct, green desert scrub	Monotone, orange, browns
TEXTURE	Smooth bases, subtle texture	Medium to coarse, crumpled	Smooth, contrasting, clumped

3. Narrative

Vast, open valley bottom with rolling hills. Colors vary from rusty brown, tan, and gray to monotone, orange, and green. Features are smooth and angular. Valley has typical development in addition to wind turbines.

4. SCORE *(Circle Appropriate Level)**

	HIGH	MEDIUM	LOW	EXPLANATION OR RATIONALE
a. Landform	5	3 2.5	1	Low but interesting within valley
b. Vegetation	5	3 1.5	1	Minimal diversity
c. Water	5	3	0	Not noticeable
d. Color	5	3 2.5	1	Some interesting variety and intensity
e. Adjacent Scenery	5	3 2	0	Minimal influence
f. Scarcity	5+	3 2	1	Commonly seen
g. Cultural Modification	2	0.5	-4	Development detracts
TOTALS	+	+	= 10	

SCENIC QUALITY CLASSIFICATION

☐ A 19 or more

☐ B – 12–18

☒ C – 11 or less

(Instructions on reverse)

INSTRUCTIONS

Following are the instructions for completing the form. The numbers correspond with the item numbers on the form.

1. **Evaluators.** List the names of the persons involved in the rating.
2. **Landscape Character.** Briefly describe the major features and elements in the landscape. Refer to illustrations 4, 5, 6, and 7 of the BLM Handbook 1-8431-1 for guidelines on the terminology to be used to describe the elements.
3. **Narrative.** Briefly describe the general character of the landscape as it relates to the immediate surroundings and to similar landscape features within the physiographic province.
4. **Scores.** Rate the scenic quality using the criteria and guidelines in the BLM Handbook 1-8410-1 Section II. Record the scores by circling the appropriate numbers. If the rating more appropriately falls between the listed numbers, write in the desired number and circle it. For example, if the desired number for "color" falls between 3 and 5, write in the number 4 and circle it. Explain any unusual factors affecting a rating under the "explanation and rationale" column. If more space is needed, continue the explanation on this page. After the ratings are completed total the scores and check the appropriate classification block.

U.S. Government Printing Office: [illegible]

Form 8400-1
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SCENIC QUALITY FIELD INVENTORY

Date 3/20/12

District

Resource Area

Scenic quality rating unit

1. Evaluators *(names)*

Leanna Guillermo

2. LANDSCAPE CHARACTER *(Feature)*

	a. LANDFORM/WATER	b. VEGETATION	c. STRUCTURE *(General)*
FORM	Large, low, flat valley bottom; small, clustered buttes	Low, indistinct desert scrub	Undeveloped, low road; vertical, geometric existing turbines from surrounding projects
LINE	Horizontal floor, simple	Indistinct, follows landform	Straight, undeveloped road; vertical, geometric existing turbines from surrounding projects
COLOR	Buff, sand, reddish, browns	Green creosote, tan desert scrub	Tan, undeveloped road; grey,off-white existing turbines from surrounding projects
TEXTURE	Smooth, fine, subtle texture	Stippled, random, patchy in some areas	Stippled undeveloped road; coarse, existing turbines from surrounding projects

3. Narrative

Vast open valley with small, clustered side buttes. Typical desert scrub with green and tan color. An undeveloped road is present but little development in valley.

4. SCORE *(Circle Appropriate Level)**

	HIGH	MEDIUM	LOW	EXPLANATION OR RATIONALE
a. Landform	5	3	1.5	Low, flat valley
b. Vegetation	5	3	1.5	Minimal diversity
c. Water	5	3	0	Not noticeable
d. Color	5	3	1	Little variety
e. Adjacent Scenery	5	3 2	0	Minimal influence
f. Scarcity	5+	3 2	1	Commonly seen
g. Cultural Modification	2	0	-4	Little development
TOTALS	+	+	= 8	

SCENIC QUALITY CLASSIFICATION

☐ A 19 or more

☐ B – 12–18

☒ C – 11 or less

(Instructions on reverse)

INSTRUCTIONS

Following are the instructions for completing the form. The numbers correspond with the item numbers on the form.

1. **Evaluators.** List the names of the persons involved in the rating.
2. **Landscape Character.** Briefly describe the major features and elements in the landscape. Refer to illustrations 4, 5, 6, and 7 of the BLM Handbook 1-8431-1 for guidelines on the terminology to be used to describe the elements.
3. **Narrative.** Briefly describe the general character of the landscape as it relates to the immediate surroundings and to similar landscape features within the physiographic province.
4. **Scores.** Rate the scenic quality using the criteria and guidelines in the BLM Handbook 1-8410-1 Section II. Record the scores by circling the appropriate numbers. If the rating more appropriately falls between the listed numbers, write in the desired number and circle it. For example, if the desired number for "color" falls between 3 and 5, write in the number 4 and circle it. Explain any unusual factors affecting a rating under the "explanation and rationale" column. If more space is needed, continue the explanation on this page. After the ratings are completed total the scores and check the appropriate classification block.

U.S. Government Printing Office: [illegible]

Form 8400-5
(May 1984)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SCENIC QUALITY RATING SUMMARY

Date 3/20/12

District

Resource Area

1. Evaluators (*names*)

Leanna Guillermo

SCENIC QUALITY RATING UNITS (1)	Landform (2)	Vegetation (3)	Water (4)	Color (5)	Adjacent Scenery (6)	Scarcity (7)	Cultural Modification (8)	Total Score (9)	Scenic Quality Rating (10)	EXPLANATION (11)
KOP 1	2.5	1.5	0	2.5	2	2	-2	8.5	C	A series of small hills that dot the landscape in the valleys with typical development
KOP 2	2.5	1.5	0	2.5	2	2	-0.5	10	C	Vast, open valley with mild rolling hills and slopes; existing turbines and minimal typical development present
KOP 3	1.5	1.5	0	1	2	2	0	8	C	Vast, open valley with existing turbines from surrounding projects present

INSTRUCTIONS

Form is used in conjunction with the Scenic Quality Inventory and Evaluation Chart.

APPENDIX B
BLM 8400-4 FORMS

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 3/20/12

District

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name	4. Location	5. Location Sketch
Tylerhorse Wind Energy Project	Township ________	The proposed project site is within the U.S. Geological Survey (USGS) 7.5-minute series Tylerhorse Canyon topographic quadrangle and consists of three separate parcels. The proposed project is located within Township 10 North, Range 15 West, within portions of Sections 24, 26, 28.
2. Key Observation Point: KOP #1	Range ________	
3. VRM Class	Section ________	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Hills and rolling slopes in background	Low, simple desert scrub	Low road; vertical, developed structures
LINE	Horizontal floor, moderately sloped hilltops	Weak, indistinct	Straight, vertical, geometric
COLOR	Rusty brown, reddish, tan, gray, orange	Muted tan-gray	Grays and browns
TEXTURE	Smooth, subtle	Sparse, random	Smooth, contrasting

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Hills and rolling slopes in background	Low, simple desert scrub	Low road, vertical, geometric
LINE	Horizontal floor, moderately sloped hilltops	Weak, indistinct	Vertical, angular
COLOR	Rusty brown, reddish, tan, gray, orange	Muted tan-gray	Light gray, off-white
TEXTURE	Smooth, subtle	Sparse, random	Coarse

SECTION D. CONTRAST RATING ■ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONSTRAST

FEATURES	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
ELEMENTS	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form			X			X					X	
Line			X				X				X	
Color			X				X				X	
Texture		X				X				X		

2. Does project design meet visual resource management objectives? ■ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended? ☐ Yes ■ No (Explain on reverse side)

Evaluator's Names	Date
Leanna Guillermo	
David Lee	
Kenneth Ferretti	

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 3/20/12

District

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name
Tylerhorse Wind Energy Project

2. Key Observation Point
KOP #2

3. VRM Class

4. Location

Township ____________

Range ____________

Section ____________

5. Location Sketch
The proposed project property is within the U.S. Geological Survey (USGS) 7.5-minute series Tylerhorse Canyon topographic quadrangle, and consists of three separate parcels. The proposed project is located within Township 10 North, Range 15 West, within portions of Sections 24, 26, 28.

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Large, low, flat valley bottom; rolling tops	Rounded, indistinct desert scrub	Low roads, vertical power poles, vertical wind towers, clustered small development
LINE	Angular, moderately sloped	Indistinct, vertical	Straight, vertical
COLOR	Rusty brown, tan, gray, green	Indistinct, green	Gray, off-white, orange, brown
TEXTURE	Smooth, subtle	Medium to course, clumped	Smooth, contrasting, clumped

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Large, low, flat valley bottom, rolling tops	Rounded, indistinct desert scrub	Low roads, vertical power poles, clustered small development, vertical wind towers
LINE	Angular, moderately sloped	Indistinct, vertical	Vertical, angular
COLOR	Rusty brown, tan, gray, green	Indistinct, green	Gray, off-white
TEXTURE	Smooth, subtle	Medium to course, clumped	Coarse

SECTION D. CONTRAST RATING ■ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONSTRAST

	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
ELEMENTS	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form			X			X				X		
Line		X					X			X		
Color			X			X					X	
Texture		X				X					X	

2. Does project design meet visual resource management objectives? ■ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended? ☐ Yes ■ No (Explain on reverse side)

Evaluator's Names | Date

Leanna Guillermo
David Lee
Kenneth Ferretti

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 3/20/12

District

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name
Tylerhorse Wind Energy Project

2. Key Observation Point
KOP #3

3. VRM Class

4. Location

Township ____________

Range ____________

Section ____________

5. Location Sketch
The proposed project property is within the U.S. Geological Survey 7.5-minute series Tylerhorse Canyon topographic quadrangle, and consists of three separate parcels. The proposed project is located within Township 10 North, Range 15 West, within portions of Sections 24, 26, 28.

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Large, low, flat valley bottom; small clustered side buttes	Low, indistinct desert scrub	Undeveloped, low road; vertical, geometric existing turbines from surrounding projects
LINE	Horizontal, simple	Indistinct	Straight; vertical, geometric existing turbines from surrounding projects
COLOR	Buff, sand, reddish browns	Green, tan	Tan; grey, off-white existing turbines from surrounding projects
TEXTURE	Smooth, fine, subtle	Stippled, random, patchy	Stippled; coarse existing turbines from surrounding projects

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Large, low, flat valley bottom; small clustered side buttes	Low, indistinct desert scrub	Vertical, geometric
LINE	Horizontal, simple	Indistinct	Vertical, angular
COLOR	Buff, sand, reddish browns	Green, tan	Grey, off-white
TEXTURE	Smooth, fine, subtle	Stippled, random, patchy	Coarse

SECTION D. CONTRAST RATING ■ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONSTRAST

DEGREE OF CONSTRAST	FEATURES: LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS: Form			X				X			X		
Line			X				X			X		
Color			X				X			X		
Texture			X				X			X		

2. Does project design meet visual resource management objectives? ■ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended? ☐ Yes ■ No (Explain on reverse side)

Evaluator's Names | Date

Leanna Guillermo
David Lee
Kenneth Ferretti

Form 8400-6
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SENSITIVITY LEVEL RATING SHEET

Date 3/20/12

District

Resource Area

1. Evaluators *(names)*

Leanna Guillermo

SENSITIVITY LEVEL RATING UNIT (1)	Type of User (2)	Amount of Use (3)	Public Interest (4)	Adjacent Land Uses (5)	Special Areas (6)	Other Factors (7)	Overall Rating (8)	EXPLANATION (9)
KOP 1	M	L	L	M	NP	NP	L	Landscape is heavily impacted by wind turbines and supporting uses.
KOP 2	M	L	L	M	NP	NP	L	Landscape is heavily impacted by wind turbines and supporting uses.
KOP 3	M	L	L	M	NP	NP	L	Landscape is heavily impacted by wind turbines and supporting uses.

(Instructions on reverse)

APPENDIX H

Air Quality Impact Technical Report

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TYLERHORSE WIND ENERGY PROJECT

Air Quality Impact Technical Report

Prepared for:

Heartland Wind LLC
1125 NW Couch Street, Suite 700
Portland, Oregon 97209

Prepared by:

Sapphos Environmental, Inc.
430 North Halstead Street
Pasadena, California 91107

March 2014

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SECTION ES
EXECUTIVE SUMMARY

This Air Quality Impact Technical Report undertaken in support of the proposed Tylerhorse Wind Energy Project (proposed project) concluded that a potentially significant impact to air quality would occur as a result of construction of the proposed project; however, beneficial impacts to air quality and greenhouse gas (GHG) emissions would be expected to result due to implementation of the proposed project. This technical report addresses a proposed project property of approximately 1,207 acres located in the south-central portion of the unincorporated area of Kern County, California. The proposed project property is bordered by the Tehachapi Mountains to the northwest and is approximately 11 miles southeast of the City of Tehachapi, Kern County, and approximately 8 miles northwest of the unincorporated community of Rosamond, California. The proposed project property is located within the Eastern Kern Air Pollution Control District (EKAPCD) portion of the Mojave Desert Air Basin (MDAB).

This report was prepared to address air quality issues identified as requiring further analysis to define significance levels of air quality impacts pursuant to the National Environmental Policy Act (NEPA). Development of the proposed project would entail the development of up to 60 megawatts (MW) of wind power. Construction of the proposed project would last approximately 4 months.

The main conclusions of this report are as follows:

- Construction of the proposed project would generate short-term emissions of criteria pollutants. Particulates would be generated from excavation and site grading, and exhaust emissions would be generated from construction equipment and vehicular trips to and from the proposed project property. The daily and annual emissions of volatile organic compounds (VOCs) and the annual emissions of nitrogen oxides (NO_x) associated with the proposed project's construction activities are anticipated to be below the EKAPCD construction emission thresholds of significance and, as such, would be expected to result in a less than significant impact to air quality during construction. However, the daily emissions of NO_x contributed by the proposed project's construction activities are anticipated to be above the EKAPCD thresholds of significance and, as such, would be expected to result in a potentially significant impact to air quality. With incorporation of mitigation measures, impacts related to annual NO_x emissions during construction would be reduced to below the EKAPCD annual threshold of significance.

- Operation of the proposed project would result in emissions of criteria pollutants due to maintenance activities and vehicular trips to and from the proposed project property. The emissions of VOCs, NO_x, and PM_{10} associated with the proposed project's operational activities are anticipated to be below the EKAPCD daily thresholds of significance, and, as such, would be expected to result in a less than significant impact to air quality during operation of the proposed project.

- The annual unmitigated estimated nonattainment air pollutant emissions are below the de minimis levels set forth by in the General Conformity Rule, and therefore the proposed project would not be expected to be subject to a conformity determination.

- Air quality impacts to sensitive receptors as a result of construction and operation of the proposed project would be expected to be below the level of significance.

- Carbon monoxide concentrations generated by vehicle trips during operation of the proposed project at sensitive receptors in the vicinity of the proposed project would be expected to be below the level of significance.

- Toxic air contaminant emissions associated with construction and operation of the proposed project at sensitive receptors in the proposed project property would be expected to be below the level of significance.

- Odor impacts associated with the proposed project would be expected to be below the level of significance.

- The proposed project would be consistent with the Kern County 1993 Air Quality Attainment Plan.

- The proposed project's construction and operational phases would not be expected to result in inconsistency with federal, state, or regional regulations on GHG emissions, and the proposed project's cumulative impact on global climate change would be expected to be below the level of significance. Operation of the proposed project as a producer of renewable energy would be expected to reduce GHG emissions by displacing fossil fuel energy sources.

- Implementation of mitigation measures Air-1 and Air-2 is recommended to reduce annual fugitive dust emissions to below the level of significance.

- Implementation of mitigation measure Air-2 is recommended to reduce annual NO_x emissions to below the level of significance.

- Air quality impacts related to VOCs, NO_x, and PM_{10} emissions during construction would result in a potentially significant cumulative impacts when considering the proposed project in conjunction with related past, present, or reasonably foreseeable, probable future projects.

In conclusion, the proposed project would not be subject to a conformity determination. Construction-related air quality impacts would be reduced to below the level of significance through the implementation of mitigation measures, with the exception of cumulative impacts related to VOCs, NO_x, and PM_{10} emissions; these impacts would be reduced to the maximum extent possible through mitigation but would remain significant unavoidable impacts. Direct operational impacts would be below the level of significance. In addition, the proposed project's production of renewable energy would create long-term benefits on reducing GHG emissions through use of renewable energy source during operation of the proposed project.

SECTION 1.0
INTRODUCTION

1.1 PURPOSE AND SCOPE

This Air Quality Impact Technical Report was undertaken by Sapphos Environmental, Inc. for Heartland Wind LLC (Heartland), a wholly owned subsidiary of Iberdrola Renewables, LLC, in support of the proposed Tylerhorse Wind Energy Project (proposed project). This report evaluates potential air quality impacts associated with the proposed project, proposes measures to mitigate any potentially significant impacts to air quality caused by implementation of the proposed project, and documents the findings of the levels of significance after mitigation, where recommended. The Air Quality Impact Technical Report focuses on all phases (that is, construction, operation, and maintenance) of the proposed project, as well as the proposed project's potential cumulative impacts and impacts related to greenhouse gas (GHG) emissions.

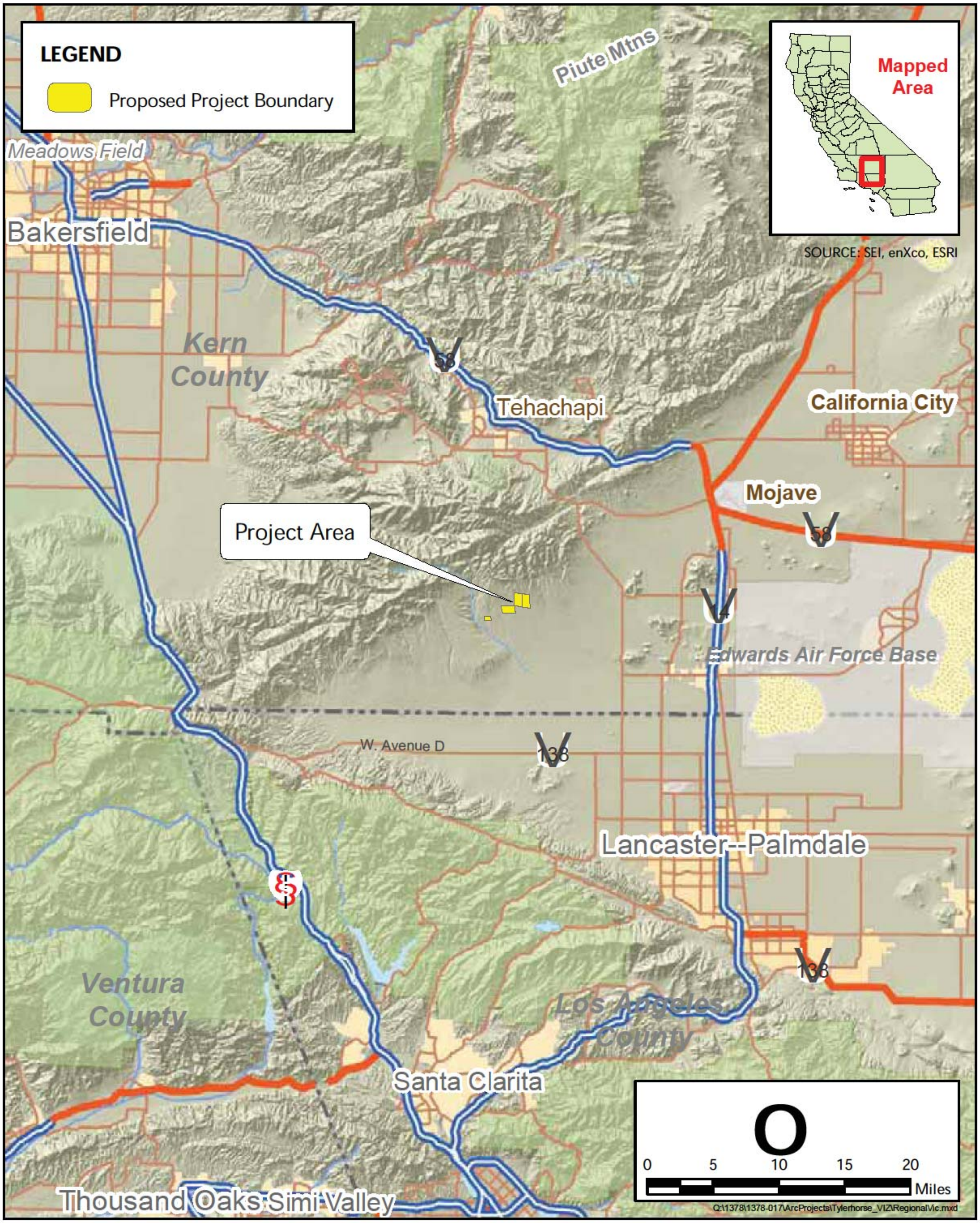
1.2 PROJECT LOCATION

The proposed project property consists of three separate parcels that total approximately 1,207 acres (slightly less than 2 square miles) of Bureau of Land Management (BLM)–administered land located in the southern portion of the unincorporated area of Kern County (Figure 1.2-1, *Regional Vicinity Map*). The proposed project is located approximately 15 miles west of California State Highway 14 (Antelope Valley Freeway), 12.5 miles south of California State Highway 58 (Blue State Memorial Highway), and 8 miles north of State Route 138 (West Avenue D) in southern Kern County, California. The proposed project property is bordered by the Tehachapi Mountains to the northwest and is approximately 11 miles southeast of the City of Tehachapi, Kern County, and approximately 8 miles northwest of the unincorporated community of Rosamond, California (Figure 1.2-2, *Local Vicinity Map*). Edwards Air Force Base is located approximately 29 miles east of the proposed project property.

The proposed project is generally accessed from the corner of Rosamond Boulevard and north along 170th Street West, then along access roads entitled for the adjacent Manzana (formerly PdV) Wind Energy Project (Manzana Project), Pacific Wind Energy Project (Pacific Wind Project), and Catalina Renewable Energy Project (Catalina Project), separate projects previously approved by the Kern County Board of Supervisors. While existing roads would be used to the greatest extent possible, new unpaved roads would be constructed to serve as access roads across the proposed project property to access wind turbine generators (WTGs) located within the proposed project property.

Topography

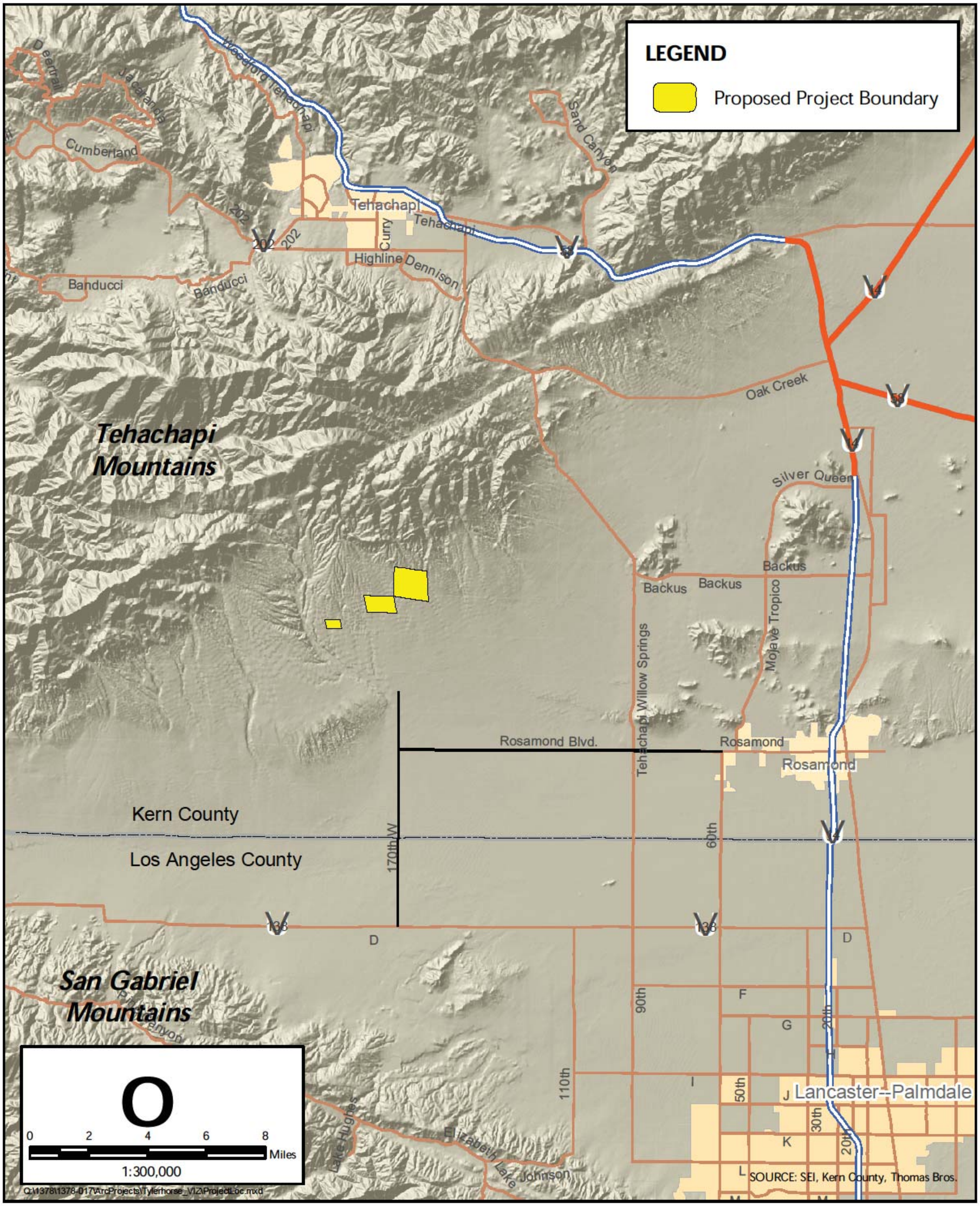
The proposed project property is within the U.S. Geological Survey (USGS) 7.5-minute series, Tylerhorse Canyon, California, topographic quadrangle (Figure 1.2-3, *Topographic Map with USGS 7.5-Minute Quadrangle Index*). The proposed project property ranges in elevation from 3,480 feet to 3,960 feet above mean sea level at the southeastern parcel and northwestern parcel of the project property boundaries.



IBERDROLA RENEWABLES

FIGURE 1.2-1

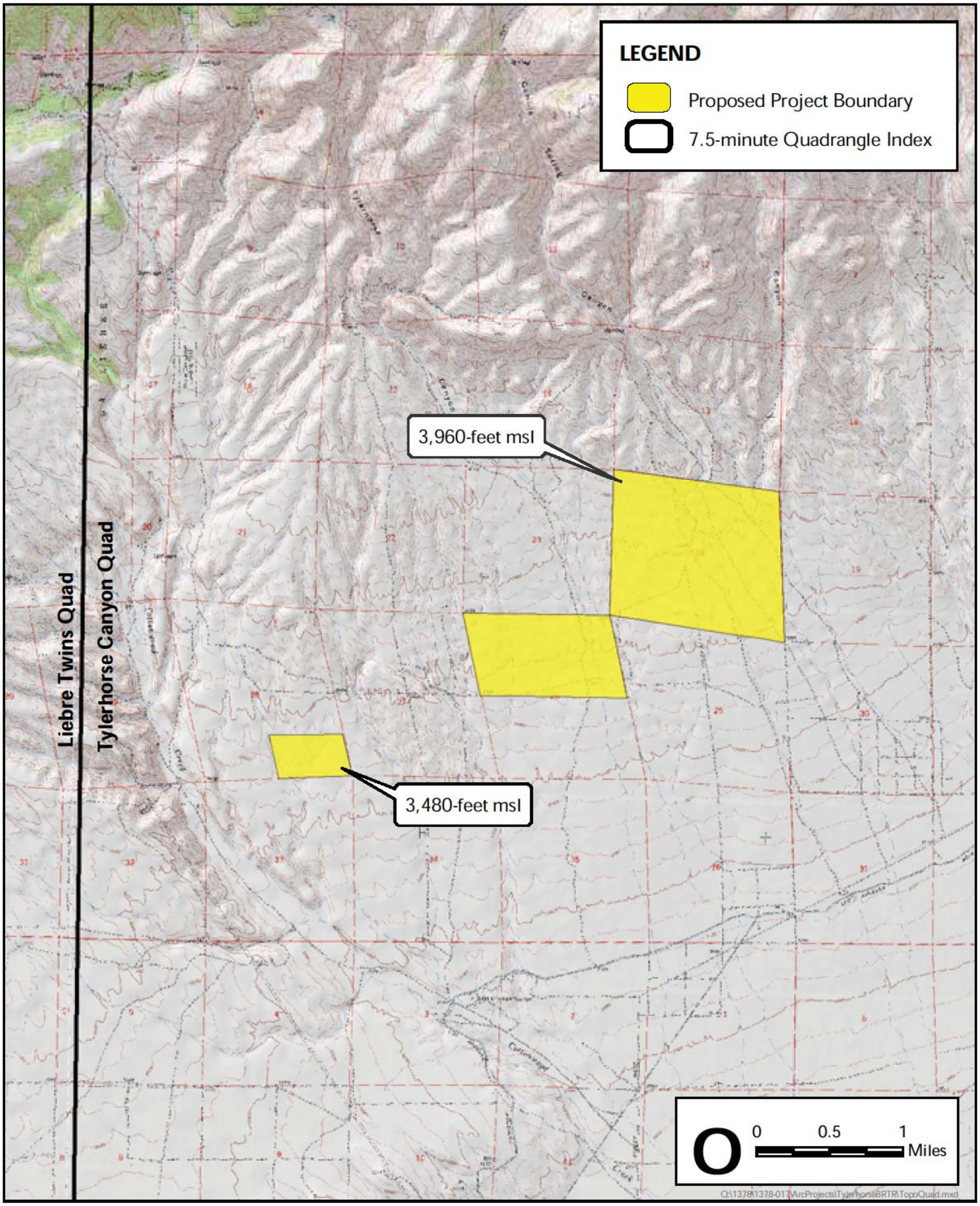
Regional Vicinity Map



IBERDROLA RENEWABLES

FIGURE 1.2-2

Local Vicinity Map



IBERDROLA RENEWABLES

FIGURE 1.2-3

Topographic Map with USGS 7.5-minute Quadrangle Index

1.3 PROJECT DESCRIPTION

Project Elements

The proposed project would consist of up to 40 WTGs with a generating capacity of 1.5 to 3.0 megawatts (MW) per turbine, with an anticipated total generating capacity of up to 60 MW. To employ economies of scale and reduce environmental impacts, the proposed project would use the ancillary facilities entitled for the adjacent Manzana Project, Pacific Wind Project, and Catalina Project. Such facilities include the Manzana Project's previously approved operations and maintenance (O&M) facility, collector substation, and 220-kilovolt (kV) transmission line, as well as staging areas, refueling areas, and concrete batch plant approved for these projects. Access to the proposed project would be from roads on adjacent private parcels entitled for the Manzana Project, Pacific Wind Project, and Catalina Project, located adjacent to the project site.

Electrical power from the proposed project would connect to a substation located on the Manzana Project, which would in turn be interconnected to Southern California Edison's Whirlwind Substation (Tehachapi Renewable Transmission Project [TRTP] Substation 5) by means of a 220-kV overhead transmission line. A portion of the proposed project may also connect to the Whirlwind Substation through the adjacent, approved Pacific Wind Project.

The principal components of the proposed project include:

- Up to 40 WTGs
- A 34.5-kV underground electrical collection system linking each turbine to an off-site substation previously permitted by Kern County
- An access road system avoiding any streambed crossings
- Supervisory control and data acquisition (SCADA) system and fiber optic communications

Construction Scenario

The overall construction period is estimated to be approximately 4 months. Materials would be brought to the actual turbine site pad for staging, or to material storage and/or laydown yards located in the adjacent entitled Manzana and Pacific Wind Projects. Although many of the trucks bringing the wind turbine components to the project property would be oversized (extra-long for wind turbine blade and tower transport and heavy-load for wind turbine nacelles), it is anticipated that no major road improvements would be needed to accommodate delivery and construction traffic along the public roads and highways. Equipment and material hauling would be performed in such a manner as to prevent damage to areas outside the project property and to minimize interference with normal uses of lands crossed.

A Traffic Management Plan will be developed that focuses on traffic and circulation primarily within and in the immediate vicinity of the project in order to minimize potential hazards from increased truck traffic and worker traffic and to minimize impacts to traffic flow in the vicinity of the project.

Clearing would be required in some areas to allow for movement of construction traffic, operation of construction machinery, and placement of excavated materials within the project property during construction. Clearing, grading, and other disturbance of soil and vegetation would be limited to the minimum area required for construction. Operation of the proposed project would require approximately 8 to 12 full-time employees that would operate from O&M facilities constructed on the adjacent entitled Manzana and/or Pacific Wind Projects. The operations work force would include an on-site facility manager, administrative support, SCADA instrument and wind turbine technicians, and other operations and maintenance personnel.

All applicable local, state, and federal requirements and best management practices (BMPs) would be incorporated into the construction activities for the proposed project. Construction equipment would be turned off when not in use. The construction contractor would ensure that all construction and grading equipment is properly maintained. All vehicles and compressors would use exhaust mufflers and engine enclosure covers (as designed by the manufacturer) at all times. A list of the type and quantity of equipment that would potentially be used in construction is presented in Table 1.3-1, *Anticipated Construction Equipment*.

TABLE 1.3-1
ANTICIPATED CONSTRUCTION EQUIPMENT

Construction Phase	Estimated Average Number of Vehicles on Site Daily during Construction
Roads	
Bulldozer	2
Motor Grader	1
Electrical	
Cable Spool Truck	2
Concrete Truck	3
Boom Truck	2
Fork Truck to Offload Spools	2
Man-lift Bucket	2
Rock Trencher	2
Materials Transportation Truck	8
Winch Truck	3
Wind Turbine Assembly and Erection	
Boom Truck	4
Fork-lift	4
Rough Terrain Crane	3
Materials Transportation Truck	20
Truck-mounted Crane	4
Project Cleanup	
Dump Truck	2
Front-end Loader	2
Motor Grader	2
Materials/Waste Transportation Truck	3
Daily Construction Traffic	
Full Size Pickups, Fed Ex, UPS, and Other Delivery Trucks Daily	150

NOTE: * Site Labor provides the number of laborers, not the number of trips. Therefore, these values are not added to the values of total trips, total by month, or average trips per day.

Operation and Maintenance

The anticipated operational equipment that would be used for operation and maintenance activities is based on equipment scenario and phasing information provided by Heartland (Table 1.3-2, *Anticipated Operational Equipment)*. The equipment would be anticipated to operate for a maximum of 4 to 8 days each year, based on a worst-case scenario of failure of approximately 10 percent of turbines and assuming the maximum number of turbines that could be used for the project (40 turbines).

TABLE 1.3-2
ANTICIPATED OPERATIONAL EQUIPMENT

Type of Equipment or Vehicle	Approximate Quantities	Maximum Number of Hours of Operation in One Day	Approximate Number of Days in Operation per Year
Large cranes	1	10	4
Medium cranes	1	10	8
Air compressors	2	4	4
Grader	1	8	8
Generator sets	2	4	4
Welder	1	2	8

Upon completion of all construction activities, the project applicant would ensure that the facility is properly operated and maintained. The project applicant would develop an operation and maintenance protocol to be implemented throughout the life of the proposed project. The protocol would specify routine turbine maintenance and operation, which typically adheres to the maintenance program developed by the turbine manufacturer. Operation and maintenance personnel would conduct maintenance activities for each wind turbine as required by the routine schedule provided by the turbine supplier or as required to keep the equipment in operation. On average, each turbine would require 40 to 50 hours of scheduled mechanical and electrical maintenance per year. Routine maintenance may include, but is not limited to, replacing lubricating fluids, checking parts for wear and replacing as required, and recording data from data recording chips in anemometers (devices for measuring wind speed). Operation and maintenance personnel would also inspect access roads, crane pads, and trenched areas regularly and maintain them to ensure minimal erosion.

The Kern County General Plan Safety element outlines a protocol that would ensure proper maintenance of the proposed project property.[1] These measures include identifying access and evacuation routes at the proposed project property, clearing dry vegetative cover, limiting potential fuel sources, and designing firebreaks (by at minimum adhering to the established setback distances). The proposed project would implement all relevant safety measures into the operation and maintenance of the proposed project to ensure the safety of the employees, visitors, and residents within the vicinity of the proposed project property.[2]

[1] Kern County. 15 June 2004 (Amended 13 March 2007). *Kern County General Plan, Safety Element*. Bakersfield, CA. Available at: http://www.co.kern.ca.us/planning/pdfs/kcgp/KCGPChp4Safety.pdf

[2] Kern County. November 2005. *Multi-Hazard Mitigation Plan*. Available at: http://www.kerncountyfire.org/pdf/Kern_County_LHMP.pdf

SECTION 2.0
AIR QUALITY ANALYSIS

The air quality analysis provided in this section evaluates the air quality impact level of significance associated with the construction, operation, and maintenance activities of the proposed Tylerhorse Wind Energy Project (proposed project). The analysis contained herein focuses on greenhouse gas (GHG) emissions and criteria pollutants designated by the federal Clean Air Act (CAA). Relevant regulatory framework is used to determine the consistency of the proposed project with federal and state laws that govern the regulation of air quality and to determine the level of significance of the proposed project impacts to air quality. Although state and local laws do not apply to the proposed federal action, they provide context for determining what effects the proposed action would have on air quality. Mitigation measures are subsequently provided to reduce air quality impacts identified to be potentially significant. The information used in this analysis is based on a review of relevant literature and technical reports (see Section 3.0, *References*, for a list of reference materials consulted). The conclusion of this analysis is supported by relevant climate data (Appendix A, *Wind and Climate Data*) and air quality modeling results (Appendix B, *URBEMIS Output for the Proposed Project*).

2.1 POLLUTANTS AND THEIR EFFECTS

Criteria air pollutants are defined as pollutants that are hazardous to human health and are regulated by federal and state ambient air quality standards or criteria for outdoor concentrations. The federal and state standards have been set at levels above which concentrations would be harmful to human health and are designed to protect the most sensitive persons from illness or discomfort. Criteria pollutants of concern include carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM_{10} and $PM_{2.5}$), and lead (Pb). *Hazardous air pollutants* is a term used by the federal Clean Air Act that refers to a variety of pollutants generated or emitted by industrial production activities. Called *toxic air contaminants* (TACs) under the California Clean Air Act, 10 pollutants have been identified through ambient air quality data as posing the most substantial health risk in California. On April 2, 2007, the Supreme Court in *Massachusetts, et al. v. Environmental Protection Agency, et al.* ruled that the Clean Air Act gives the U.S. Environmental Protection Agency (USEPA) the authority to regulate emissions of GHGs, including carbon dioxide (CO_2); methane (CH_4); nitrous oxide (N_2O); and fluorinated gases, such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride,[1] thereby legitimizing GHGs as air pollutants under the Clean Air Act.

GHGs trap energy from the sun and help maintain the temperature of the Earth's surface, creating a process known as the greenhouse effect. The sun emits solar radiation and provides energy to Earth. Six percent of the solar radiation emitted by the sun is reflected back by the atmosphere surrounding the Earth, 20 percent is scattered and reflected by clouds, 19 percent is absorbed by the atmosphere and clouds, 4 percent is reflected back to the atmosphere by the Earth's surface, and 51 percent is absorbed by the Earth. GHGs such as CO_2 and CH_4 are naturally present in the atmosphere. The presence of these gases prevents outgoing infrared radiation from escaping the Earth's surface and lower atmosphere, allowing incoming solar radiation to be absorbed by living organisms on Earth. Without these GHGs, the earth would be too cold to be habitable; however, an excess of GHGs in the atmosphere can cause global climate change by raising the Earth's temperature, resulting in environmental consequences related to snowpack losses, flood hazards, sea-level rises, and fire hazards.

[1] U.S. Supreme Court. 2 April 2007. *Massachusetts, et al. v. Environmental Protection Agency, et al.* 549 U.S. 1438; 127 S. Ct. 1438. Washington, DC.

Global climate change results from a combination of three factors: (1) natural factors such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun; (2) natural processes within the Earth's climate system, such as changes in ocean circulation; and (3) anthropogenic activities, such as fossil fuel combustion, deforestation, reforestation, urbanization, and desertification, that change the composition of atmospheric gases. In its 2007 climate change synthesis report to policy makers, the Intergovernmental Panel on Climate Change (IPCC) concluded, "Global GHG emissions due to human activities have grown since pre-industrial times, with an increase of 70 percent between 1970 and 2004."[2] Therefore, significant attention is being given to the anthropogenic causes of the increased GHG emissions level. In the review of regulatory publications from the California Air Pollution Control Officers Association (CAPCOA),[3] the California Air Resources Board (CARB),[4] the California Attorney General,[5] and the Governor's Office of Planning and Research (OPR),[6] there is a consensus on the close association between fossil fuel combustion, in conjunction with other human activities, and GHG emissions. In California, GHG emissions are largely contributed by the transportation sector, which was responsible for 35 and 38 percent of 1990 and 2004 GHG emissions statewide, respectively. After transportation followed the electricity generation sector, which was responsible for 25 percent of statewide emissions in both 1990 and 2004; the industrial sector, which was responsible for 24 and 20 percent of statewide 1990 and 2004 GHG emissions; and the commercial sector, which was responsible for 3 percent of statewide emissions in both 1990 and 2004.[7]

A detailed description of the characteristics and effects of criteria pollutants and GHGs is provided in the following sections to contextualize the analysis. As recommended by the Kern County *Guidelines for Preparing an Air Quality Assessment for Use in Environmental Impact Reports*,[8] descriptions of TACs and Valley Fever are also included.

2.1.1 Carbon Monoxide

CO is a colorless, odorless gas formed by the incomplete combustion of fossil fuels. CO is emitted almost exclusively from motor vehicles, power plants, refineries, industrial boilers, ships, aircraft, and trains. In urban areas, automobile exhaust accounts for the majority of CO emissions. CO is a nonreactive air pollutant that dissipates relatively quickly; therefore, ambient CO concentrations generally follow the spatial and temporal distributions of vehicular traffic. CO concentrations are influenced by local meteorological conditions, including wind speed, topography, and atmospheric stability. CO produced by motor vehicle exhaust can be locally concentrated when surface-based

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[2] Intergovernmental Panel on Climate Change. Approved 12–17 November 2007. *Climate Change 2007: Synthesis Report, Summary for Policymakers*, p. 5. Valencia, Spain. Available at: http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

[3] California Air Pollution Control Officers Association. January 2008. *CEQA and Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act.* Sacramento, CA.

[4] California Air Resources Board. 24 October 2008. *Preliminary Draft Staff Proposal: Recommended Approaches for Setting Interim Significance Thresholds for Greenhouse Gases under the California Environmental Quality Act*. Available at: http://www.opr.ca.gov/ceqa/pdfs/Prelim_Draft_Staff_Proposal_10-24-08.pdf

[5] California Department of Justice, Office of the Attorney General. Updated 9 December 2008. *The California Environmental Quality Act Addressing Global Warming Impacts at the Local Agency Level*. Sacramento, CA.

[6] California Governor's Office of Planning and Research. 19 June 2008. *CEQA and Climate Change: Addressing Climate Change through California Environmental Quality Act (CEQA) Review*. Technical Advisory. Sacramento, CA.

[7] California Air Resources Board. 16 November 2007. *California 1990 Greenhouse Gas Emissions Level and 2020 Limit*. Sacramento, CA.

[8] Kern County. 1 December 2006. *Guidelines for Preparing an Air Quality Assessment for Use in Environmental Impact Reports*. Bakersfield, CA. Available at: http://www.co.kern.ca.us/planning/pdfs/AirQualityAssessmentPreparationGuidelines.pdf

temperature inversions are combined with calm atmospheric conditions, such as situations at dusk in urban areas between November and February.[9] The highest levels of CO typically occur during the colder months of the year when inversion conditions are more frequent. CO has a higher binding affinity to hemoglobin than oxygen (O_2), so it can replace O_2 in the blood and reduce the ability of blood to transport O_2 to vital organs. Low CO concentrations can cause fatigue in healthy persons and chest pain in persons with heart disease. At moderate concentrations, CO can cause angina, impaired vision, and reduced brain function. At high concentrations, CO can cause impaired vision and coordination, headaches, dizziness, confusion, and nausea. At very high concentrations, CO exposure can be fatal.

2.1.2 Reactive Organic Gases and Volatile Organic Compounds

Hydrocarbons are organic gases that are formed solely of hydrogen and carbon. There are several subsets of organic gases, including volatile organic compounds (VOCs) and reactive organic gases (ROGs). ROGs include all hydrocarbons except those exempted by CARB. Therefore, ROGs are a set of organic gases based on state rules and regulations. VOCs are similar to ROGs in that they include all organic gases except those exempted by federal law. The list of compounds exempt from the definition of a VOC is included by the Eastern Kern Air Pollution Control District (EKAPCD) and is presented in District Rule 102. Both VOCs and ROGs are emitted from incomplete combustion of hydrocarbons or other carbon-based fuels. Combustion engine exhaust, oil refineries, and oil-fueled power plants are the primary sources of hydrocarbons. Another source of hydrocarbons is evaporation from petroleum fuels, solvents, dry-cleaning solutions, and paint.

The primary health effects of hydrocarbons result from the formation of O_3 and its related health effects (see ozone health effects discussion below). High levels of hydrocarbons in the atmosphere can interfere with oxygen intake by reducing the amount of available oxygen through displacement. There are no separate federal or California ambient air quality standards for ROG. Carcinogenic forms of ROG are considered TACs. An example is benzene, which is a carcinogen. The health effects of individual ROGs are described in Section 2.1.16.

2.1.3 Ozone

O_3 is a colorless gas that is formed in the atmosphere when reactive organic gases, which include VOCs and nitrogen oxides (NO_x), react in the atmosphere in the presence of ultraviolet sunlight. The primary sources of VOCs and NO_x are automobile exhaust emissions and industrial emissions. Ideal conditions for O_3 formation occur during summer and early fall on days with low wind speeds or stagnant air, warm temperatures, and cloudless skies. O_3 is one of the main components of photochemical smog in urban areas. Health effects associated with exposure to O_3 include increased respiratory and cardiovascular disease; increased symptoms of respiratory illness such as cough, phlegm, and wheeze; decreased lung function; increased bronchodilator usage; and increased daily mortalities.

[9] Inversion is an atmospheric condition in which a layer of warm air traps cooler air near the surface of the earth, preventing the normal rising of surface air.

2.1.4 Nitrogen Dioxide

NO_2 is a highly reactive, brownish-red gas that plays a major role in the formation of ground-level O_3 and acid rain. NO_2 is produced in the atmosphere from the reaction of atmospheric oxygen (O_2) with nitric oxide (NO). NO_x collectively refers to both NO and NO_2. The main sources of NO_2 include fuel combustion in industry and motor vehicles. High concentrations of NO_2 can cause breathing difficulties and can result in a brownish-red cast to the atmosphere with reduced visibility. NO_2 is toxic to various animals and to humans because it can react with water to form nitric acid in the eyes, lungs, mucus membranes, and skin. Epidemiological studies have shown associations between NO_2 concentrations and chronic pulmonary fibrosis and daily mortalities from respiratory and cardiovascular causes. Some increase in bronchitis in children (2 and 3 years old) has also been observed at concentrations below 0.3 parts per million (ppm).

2.1.5 Sulfur Dioxide

SO_2 is a colorless, pungent gas formed primarily by the combustion of sulfur-containing fossil fuels. Generally, the highest levels of SO_2 are found near large industrial complexes where coal and oil are used in power plants and industries. In recent years, SO_2 concentrations have been reduced due to the increasingly stringent controls placed on stationary source emissions of SO_2 and limits on the sulfur content of fuels. SO_2 causes its irritant effects by stimulating nerves in the lining of the nose and throat and the lung's airways. This causes a reflex cough, irritation, and a feeling of chest tightness, which may lead to narrowing of the airways. Acute respiratory symptoms and diminished ventilator function in children can be caused by SO_2 emissions, which can also damage plants and erode metals.

2.1.6 Particulate Matter

PM consists of very small liquid and solid particles suspended in air, which can include smoke, soot, dust, salts, acids, and metals. Particulate matter can be formed when gases emitted from industries and motor vehicles undergo chemical reactions in the atmosphere. Fine particulate matter ($PM_{2.5}$) refers to particles that are 2.5 microns or less in diameter, which is roughly 1/28th the diameter of a human hair. PM_{10} refers to particles that are 10 microns or less in diameter, which is about 1/7th the thickness of a human hair. Primary sources of $PM_{2.5}$ emissions include fuel combustion from motor vehicles, power generation, industrial facilities, residential fireplaces, and wood stoves. In addition, $PM_{2.5}$ can be formed in the atmosphere from gases such as SO_2, NO_x, and VOCs. Major sources of PM_{10} include crushing or grinding operations; dust stirred up by vehicles traveling on roads; wood-burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires and brush/waste burning activities; industrial sources; windblown dust from open lands; and atmospheric chemical and photochemical reactions.

$PM_{2.5}$ and PM_{10} pose a greater health risk than larger-sized particles. When inhaled, small particles can penetrate the natural defenses of the human respiratory system and damage the respiratory tract. Elevated particulate levels have been strongly linked to premature deaths, hospital admissions, emergency room visits, and asthma attacks;[10] particulate matter inhalations can also significantly reduce development of lung function in children.[11] Components of particulate matter can include substances such as Pb, sulfates (SO_4), and nitrates, which can cause lung damage directly; and they can

[10] California Air Resources Board. November 2007. *Recent Research Findings: Health Effects of Particulate Matter and Ozone Air Pollution, November 2007*. Available at: http://www.arb.ca.gov/research/health/fs/pm_ozone-fs.pdf

[11] California Air Resources Board. November 2007. *Recent Research Findings: Health Effects of Particulate Matter and Ozone Air Pollution, November 2007*. Available at: http://www.arb.ca.gov/research/health/fs/pm_ozone-fs.pdf

be absorbed into the bloodstream and cause damage elsewhere in the body. Moreover, these substances can transport absorbed gases, such as chlorides or ammonium, into the lungs and cause injury. PM_{10} tends to collect in the upper portion of the respiratory system, whereas $PM_{2.5}$ can penetrate deeper into the lungs and damage lung tissues. Suspended particulates also damage and discolor surfaces on which they settle and produce haze in the atmosphere that reduces regional visibility.

2.1.7 Lead

Pb in the atmosphere occurs as particulate matter. Main sources of Pb emissions include leaded gasoline, battery manufacture, paint, ink, ceramics, ammunition, and secondary Pb smelters. Prior to 1978, mobile emissions were the primary source of atmospheric Pb. After the phase-out of leaded gasoline between 1978 and 1987, secondary Pb smelters, battery recycling, and manufacturing facilities became Pb emission sources of greater concern. Prolonged exposure to atmospheric Pb poses a serious threat to human health, effects of which include gastrointestinal disturbances, anemia, kidney disease, and, in severe cases, neuromuscular and neurological dysfunction. Infants and young children are particularly sensitive even to very low levels of Pb, and such exposure could result in decrements in neurobehavioral performance, including intelligence quotient performance, psychomotor performance, reaction time, and growth.

2.1.8 Sulfates

Sulfates (SO_4^{2-}) are particulate products of combustion of sulfur-containing fossil fuels. When SO or SO_2 are exposed to oxygen they precipitate out into sulfates (SO_3 or SO_4). Data collected in Kern County identify levels of sulfates that are significantly less than the applicable health standards.

Sulfates are the fully oxidized ionic form of sulfur. Sulfates occur in combination with metal and/or hydrogen ions. In California, emissions of sulfur compounds occur primarily from the combustion of petroleum-derived fuels (that is, gasoline and diesel fuel) that contain sulfur. This sulfur is oxidized to sulfur dioxide (SO_2) during the combustion process and is subsequently converted to sulfate compounds in the atmosphere. The conversion of SO_2 to sulfates takes place relatively rapidly and completely in urban areas of California due to regional meteorological features. CARB's sulfates standard is designed to prevent aggravation of respiratory symptoms. Effects of sulfate exposure at levels above the standard include a decrease in ventilatory function, aggravation of asthmatic symptoms, and an increased risk of cardiopulmonary disease. Sulfates are particularly effective in degrading visibility, and, because they are usually acidic, can harm ecosystems and damage materials and property.[12]

2.1.9 Hydrogen Sulfide

Hydrogen sulfide (H_2S) is associated with geothermal activity, oil and gas production, refining, sewage treatment plants, and confined animal feeding operations.

Exposure to low concentrations of H_2S may irritate the eyes, nose, and throat. It may also cause difficulty in breathing for some asthmatics. Exposure to higher concentrations (above 100 ppm) of H_2S can cause olfactory fatigue, respiratory paralysis, and death. Brief exposures to high concentrations of H_2S (greater than 500 ppm) can cause a loss of consciousness. In most cases, the person appears to

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[12] California Air Resources Board. Updated 24 November 2009. "History of Sulfates Air Quality Standard." Web site. Available at: http://www.arb.ca.gov/research/aaqs/caaqs/sulf-1/sulf-1.htm

regain consciousness without any other effects. However, in many individuals, there may be permanent or long-term effects such as headaches, poor attention span, poor memory, and poor motor function. No health effects have been found in humans exposed to typical environmental concentrations of H_2S (0.00011 to 0.00033 ppm). Deaths due to inhaling large amounts of H_2S have been reported in a variety of different work settings, including sewers, animal processing plants, waste dumps, sludge plants, oil and gas well drilling sites, and tanks and cesspools.

2.1.10 Visibility-reducing Particles

This standard is a measure of visibility. Visibility is often characterized by "visual range" (VR). VR is the maximum distance at which a person can barely perceive a dark object. The ability to perceive an object is determined by the difference in contrast between the object and the background. A 2-percent contrast is considered barely perceptible, but typically, at least at 5-percent change in contrast is needed. The less water vapor, sea salt particulate, and pollutants there are in the air, the greater the VR. VRs of up to about 150 miles (240 kilometers) can occur in clean desert areas where there is very low relative humidity. In coastal regions, the occurrence of sea salt particulate and water vapor can significantly reduce the maximum VR that could occur. The CARB does not yet have a measurement method that is accurate or precise enough to designate areas in the state as being in attainment or non-attainment. The entire state is unclassified.

2.1.11 Vinyl Chloride

Vinyl chloride monomer is a sweet smelling, colorless gas at ambient temperature. Landfills, publicly owned treatment works, and polyvinyl chloride (PVC) production are the major identified sources of vinyl chloride emissions in California. PVC can be fabricated into several products, such as pipes, pipefittings, and plastics. In humans, epidemiological studies of occupationally exposed workers have linked vinyl chloride exposure to development of liver angiosarcoma, which is a rare cancer, and have suggested a relationship between exposure and cancers of the lung and brain. There are currently no adopted ambient air standards for vinyl chloride.

Acute exposure of humans to high levels of vinyl chloride via inhalation in humans has resulted in effects on the central nervous system, such as dizziness, drowsiness, headaches, and giddiness.

Vinyl chloride is reported to be slightly irritating to the eyes and respiratory tract in humans. Acute exposure to extremely high levels of vinyl chloride has caused loss of consciousness, irritatation to the lungs and kidneys, and inhibition of blood clotting in humans and cardiac arrhythmias in animals.

Tests involving acute exposure of mice to vinyl chloride have shown a high acute toxicity from inhalation exposure to the substance. Long-term exposure to vinyl chloride concentrations has been linked with chronic health effects:[13,14]

- Liver damage may result in humans from chronic exposure to vinyl chloride, through both inhalation and oral exposure.

- A small percentage of individuals occupationally exposed to high levels of vinyl chloride in air have developed a set of symptoms termed "vinyl chloride disease,"

[13] Agency for Toxic Substances and Disease Registry. Updated 2006. "Toxicological Profile for Vinyl Chloride."

[14] U.S. Environmental Protection Agency. Updated 6 November 2007. Technology Transfer Network Air Toxics Web Site: "Vinyl Chloride." Available at: http://www.epa.gov/ttn/atw/hlthef/vinylchl.html

which is characterized by Raynaud's phenomenon (fingers blanch and numbness and discomfort are experienced upon exposure to the cold), changes in the bones at the end of the fingers, joint and muscle pain, and scleroderma-like skin changes (thickening of the skin, decreased elasticity, and slight edema).

- Central nervous system effects (including dizziness, drowsiness, fatigue, headache, visual and/or hearing disturbances, memory loss, and sleep disturbances) as well as peripheral nervous system symptoms (peripheral neuropathy, tingling, numbness, weakness, and pain in fingers) have also been reported in workers exposed to vinyl chloride.

Several reproductive/developmental health effects from vinyl chloride exposure have been identified:[15,16]

- Several case reports suggest that male sexual performance may be affected by vinyl chloride. However, these studies are limited by lack of quantitative exposure information and possible co-occurring exposure to other chemicals.

- Several epidemiological studies have reported an association between vinyl chloride exposure in pregnant women and an increased incidence of birth defects, while other studies have not reported similar findings.

- Epidemiological studies have suggested an association between men occupationally exposed to vinyl chloride and miscarriages in their wives' pregnancies, although other studies have not supported these findings.

- Long-term exposure to vinyl chloride has also been identified as a cancer risk:

  - Inhaled vinyl chloride has been shown to increase the risk of a rare form of liver cancer (angiosarcoma of the liver) in humans.

  - Animal studies have shown that vinyl chloride, via inhalation, increases the incidence of angiosarcoma of the liver and cancer of the liver.

2.1.12 Carbon Dioxide

CO_2 is a colorless, odorless, and nonflammable gas that is the most abundant GHG in the Earth's atmosphere after water vapor. CO_2 enters the atmosphere through natural processes, such as respiration and forest fires, and through human activities such as the burning of fossil fuels (oils, natural gas, and coal) and solid waste, deforestation, and industrial processes. CO_2 absorbs terrestrial infrared radiation that would otherwise escape to space, and therefore plays an important role in atmospheric warming. CO_2 has an atmospheric lifetime of up to 200 years and, therefore, is a more important GHG than water vapor, which has an atmospheric residence time of only a few days. CO_2 provides the reference point for the global warming potential (GWP) of other gases; thus, the GWP of CO_2 is equal to 1. Global warming potential (GWP) is a relative measure of how much heat a greenhouse gas traps in the atmosphere.

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[15] Agency for Toxic Substances and Disease Registry. Updated 2006. "Toxicological Profile for Vinyl Chloride."

[16] U.S. Environmental Protection Agency. Updated 6 November 2007. Technology Transfer Network Air Toxics Web Site: "Vinyl Chloride." Available at: http://www.epa.gov/ttn/atw/hlthef/vinylchl.html

2.1.13 Methane

CH_4 is a principal component of natural gas and consists of a single carbon atom bonded to four hydrogen atoms. It is formed and released to the atmosphere by biological processes from livestock and other agricultural practices and by the decay of organic waste in anaerobic environments such as municipal solid waste landfills. CH_4 is also emitted during the production and transport of coal, natural gas, and oil. CH_4 is about 21 times more powerful at warming the atmosphere than CO_2 (a GWP of 21).

The chemical lifetime of CH_4 in the atmosphere is approximately 12 years. The relatively short atmospheric lifetime of CH_4, coupled with its potency as a GHG, makes it a candidate for mitigating global warming over the short term. CH_4 can be removed from the atmosphere by a variety of processes, such as the oxidation reaction with hydroxyl radicals (OH), microbial uptake in soils, and reaction with chlorine (Cl) atoms in the marine boundary layer.

2.1.14 Nitrous Oxide

N_2O is a clear, colorless gas with a slightly sweet odor. N_2O has a long atmospheric lifetime (approximately 120 years) and heat-trapping effects about 310 times more powerful than CO_2 on a per molecule basis (a GWP of 310). N_2O is produced by both natural and human-related sources. The primary anthropogenic sources of N_2O are agricultural soil management like soil cultivation practices, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuels, and production of adipic and nitric acids. The natural process of producing N_2O ranges from a wide variety of biological sources in soil and water, particularly microbial action in wet tropical forests.

2.1.15 Fluorinated Gases

Hydrofluorocarbons (HFCs), perfluorocarbons, and sulfur hexafluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes, including aluminum production, semiconductor manufacturing, electric power transmission, magnesium production and processing, and the production of HCFC-22. Fluorinated gases are being used as substitutes for ozone-depleting chlorofluorocarbons (CFCs). Fluorinated gases are typically emitted in small quantities; however, they have high GWPs of between 140 and 23,900.[17]

2.1.16 Toxic Air Contaminants

Hazardous air pollutants is a term used by the federal Clean Air Act that includes a variety of pollutants generated or emitted by industrial production activities. Called TACs under the California Clean Air Act, 10 pollutants have been identified through ambient air quality data as posing the most substantial health risk in California. Direct exposure to these pollutants has been shown to cause cancer, birth defects, damage to brain and nervous system and respiratory disorders. CARB provides emission inventories for only the larger air basins.

The Kern County portion of the Mojave Desert Air Basin (MDAB) shows the following tons per year (tpy) emissions for the year 2008 for the 10 TACs: acetaldehyde (180 tpy); benzene (106 tpy); 1,3-butadiene (59 tpy); carbon tetrachloride (0 tpy); chromium (hexavalent) (0 tpy); para-dichlorobenzene (6 tpy); formaldehyde (476 tpy); methylene chloride (15 tpy); perchloroethylene (16 tpy); and diesel

[17] California Climate Action Registry. January 2009. *California Climate Action Registry General Reporting Protocol, Version 3.1*. Los Angeles, CA.

particulate matter (495 tpy).[18] Approximately 80 percent of statewide acetaldehyde emissions are from mobile sources, with area sources such as residential wood combustion accounting for approximately 18 percent of total emissions. The primary sources of benzene in the state include mobile sources (87 percent) and stationary sources (12 percent). Approximately 46 percent of hexavalent chromium emissions are from stationary sources such as electrical generation, aircraft and parts manufacturing, and fabricated metal produce manufacturing. The majority of 1,3-butadiene emissions are generated from incomplete combustion of gasoline and diesel fuels. Approximately 53 percent of 1,3-butadiene emissions are from mobile sources and approximately 21 percent are from area sources such as agricultural waste burning and open burning. Emissions of carbon tetrachloride are all produced by stationary sources such as chemical and allied produce manufacturers and petroleum refineries. Most of the emissions of para-dichlorobenzene are from consumer products such as non-aerosol insect repellents and solid/gel air fresheners. Approximately 82 percent of formaldehyde emissions in California are from mobile sources, while 48 percent of methylene chloride emissions are from paint removers/strippers, automotive brake cleaners, and other consumer products. Perchloroethylene is produced primarily from stationary sources such as dry cleaning plants and manufacture of aircraft parts and fabricated metal parts. Emissions of diesel particulate matter are from mobile sources (98 percent) and stationary sources (1 percent).

TACs do not have ambient air quality standards. Since no safe levels of TACs can be determined, there are no air quality standards for TACs. Instead, TAC impacts are evaluated by calculating the health risks associated with a given exposure. The requirements of the Air Toxic "Hot Spots" Information and Assessment Act apply to facilities that use, produce, or emit toxic chemicals. Facilities that are subject to the toxic emission inventory requirements of the Act must prepare and submit toxic emission inventory plans and reports, and periodically update those reports. Of the Kern County portion of the MDAB, no facility in EKAPCD exceeds cancer risk of 10 in 1 million or a hazard index of 1.0, which is not considered significant by the standards of the Hot Spots program.[19]

2.1.16.1 Health Effects and Risks of Toxic Air Contaminants

2.1.16.1.1 Acetaldehyde

Acetaldehyde is classified as a federal hazardous air pollutant and as a California TAC. Acetaldehyde is a carcinogen that also causes chronic non-cancer toxicity in the respiratory system. Symptoms of chronic intoxication of acetaldehyde in humans resemble those of alcoholism.

The primary acute effect of inhalation exposure to acetaldehyde is irritation of the eyes, skin, and respiratory tract in humans. At higher exposure levels, erythema, coughing, pulmonary edema, and necrosis may also occur. Acute inhalation of acetaldehyde resulted in a depressed respiratory rate and elevated blood pressure in experimental animals. Tests involving acute exposure of rats, rabbits, and hamsters have demonstrated acetaldehyde to have low acute toxicity from inhalation and moderate acute toxicity from oral or dermal exposure.[20]

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[18] California Air Resources Board. 2009. *The California Almanac of Emissions and Air Quality–2009 Edition*. Available at: http://www.arb.ca.gov/aqd/almanac/almanac09/almanac09.htm

[19] Kern County Air Pollution Control District. 16 April 2007. *Annual AB 2588 Air Toxics Report*. Bakersfield, CA.

[20] U.S. Environmental Protection Agency. Revised January 2000. Technology Transfer Network Air Toxics Web Site: "Acetaldehyde." Available at: http://www.epa.gov/ttn/atw/hlthef/acetalde.html

2.1.16.1.2 Benzene

Benzene is highly carcinogenic and occurs throughout California. Benzene also has non-cancer–related health effects. Brief inhalation exposure to high concentrations can cause central nervous system depression. Acute effects include central nervous system symptoms of nausea, tremors, drowsiness, dizziness, headache, intoxication, and unconsciousness.[21]

Neurological symptoms of inhalation exposure to benzene include drowsiness, dizziness, headaches, and unconsciousness in humans. Ingestion of large amounts of benzene may result in vomiting, dizziness, and convulsions in humans. Exposure to benzene in liquid and vapor form may irritate the skin, eyes, and upper respiratory tract in humans. Redness and blisters may result from dermal exposure to benzene.

Chronic inhalation of certain levels of benzene causes blood disorders in humans; specifically, benzene affects bone marrow (the tissues that produce blood cells). Aplastic anemia, excessive bleeding, and damage to the immune system (by changes in blood levels of antibodies and loss of white blood cells) may develop. Increased incidence of leukemia (cancer of the tissues that form white blood cells) has been observed in humans who have been occupationally exposed to benzene.[22]

2.1.16.1.3 1,3-Butadiene

1,3-butadiene has been identified as a carcinogen in California. At very high levels, butadiene vapors cause neurological effects, such as blurred vision, fatigue, headache, and vertigo. Dermal exposure of humans to 1,3-butadiene causes a sensation of cold, followed by a burning sensation, which may lead to frostbite.[23]

One epidemiological study reported that chronic (long-term) exposure to 1,3-butadiene by inhalation resulted in an increase in cardiovascular diseases, such as rheumatic and arteriosclerotic heart diseases, while other human studies have reported effects on the blood. A large epidemiological study of synthetic rubber industry workers demonstrated a consistent association between 1,3-butadiene exposure and occurrence of leukemia. Several epidemiological studies of workers in styrenebutadiene rubber factories have shown an increased incidence of respiratory, bladder, stomach, and lymphato-hematopoietic cancers. However, these studies are not sufficient to determine a causal association between 1,3-butadiene exposure and cancer, due to possible exposure to other chemicals and other confounding factors.[24]

2.1.16.1.4 Carbon Tetrachloride

Carbon tetrachloride is a central nervous system depressant, which the USEPA has classified as a Group B2, a probable human carcinogen.[25]

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[21] U.S. Environmental Protection Agency. Revised January 2000. Technology Transfer Network Air Toxics Web Site: “Benzene.” Available at: http://www.epa.gov/ttn/atw/hlthef/benzene.html

[22] U.S. Environmental Protection Agency. Revised January 2000. Technology Transfer Network Air Toxics Web Site: “Benzene.” Available at: http://www.epa.gov/ttn/atw/hlthef/benzene.html

[23] U.S. Environmental Protection Agency. Revised March 2009. Technology Transfer Network Air Toxics Web Site: “1,3-butadiene.” Available at: http://www.epa.gov/ttn/atw/hlthef/butadien.html

[24] U.S. Environmental Protection Agency. Revised March 2009. Technology Transfer Network Air Toxics Web Site: “1,3-butadiene.” Available at: http://www.epa.gov/ttn/atw/hlthef/butadien.html

[25] U.S. Environmental Protection Agency. Revised January 2000. Technology Transfer Network Air Toxics Web Site: “Carbon Tetrachloride.” Available at: http://www.epa.gov/ttn/atw/hlthef/carbonte.html

Acute inhalation and oral exposures to high levels of carbon tetrachloride have been observed primarily to damage the liver (swollen, tender liver, changes in enzyme levels, and jaundice) and kidneys (nephritis, nephrosis, proteinurea) of humans. Depression of the central nervous system has also been reported. Symptoms of acute exposure in humans include headache, weakness, lethargy, nausea, and vomiting. Delayed pulmonary edema (fluid in lungs) has been observed in humans who have been exposed to high levels of carbon tetrachloride by inhalation and ingestion, but this is believed to be due to injury to the kidney rather than direct action of carbon tetrachloride on the lung. Chronic inhalation or oral exposure to carbon tetrachloride produces liver and kidney damage in humans and animals.[26]

2.1.16.1.5 Chromium, Hexavalent

In California, hexavalent chromium has been identified as a carcinogen. Epidemiological evidence suggests that exposure to inhaled hexavalent chromium may result in lung cancer.

The respiratory tract is the major target organ for chromium (VI) following inhalation exposure in humans. Other effects noted from acute inhalation exposure to very high concentrations of chromium (VI) include gastrointestinal and neurological effects, while dermal exposure causes skin burns in humans. Chronic inhalation exposure to chromium (VI) in humans results in effects on the respiratory tract, with perforations and ulcerations of the septum, bronchitis, decreased pulmonary function, pneumonia, asthma, and nasal itching and soreness reported. Chronic human exposure to high levels of chromium (VI) by inhalation or oral exposure may produce effects on the liver, kidney, gastrointestinal and immune systems, and possibly the blood.[27]

2.1.16.1.6 Para-dichlorobenzene

In California, para-dichlorobenzene has been identified as a carcinogen. Acute exposure to 1,4-dichlorobenzene via inhalation in humans results in irritation to the eyes, skin, and throat. In addition, long-term inhalation exposure may affect the liver, skin, and central nervous system in humans (for example, cerebellar ataxia, dysarthria, weakness in limbs, and hyporeflexia).[28]

2.1.16.1.7 Formaldehyde

The major toxic effects caused by acute formaldehyde exposure via inhalation are eye, nose, and throat irritation and effects on the nasal cavity. Other effects seen from exposure to high levels of formaldehyde in humans are coughing, wheezing, chest pains, and bronchitis. Chronic exposure to formaldehyde by inhalation in humans has been associated with respiratory symptoms and irritation of the eye, nose, and throat. Animal studies have reported effects on the nasal respiratory epithelium and lesions in the respiratory system from chronic inhalation exposure to formaldehyde.

Occupational studies have noted statistically significant associations between exposure to formaldehyde and increased incidence of lung and nasopharyngeal cancer. This evidence is considered to be "limited," rather than "sufficient," due to possible exposure to other agents that may

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[26] U.S. Environmental Protection Agency. Revised January 2000. Technology Transfer Network Air Toxics Web Site: "Carbon Tetrachloride." Available at: http://www.epa.gov/ttn/atw/hlthef/carbonte.html

[27] U.S. Environmental Protection Agency. Revised January 2000. Technology Transfer Network Air Toxics Web Site: "Chromium Compounds." Available at: http://www.epa.gov/ttn/atw/hlthef/chromium.html#ref1

[28] U.S.Environmental Protection Agency. Revised January 2000. Technology Transfer Network Air Toxics Web Site: "1,4-Dichlorobenzene (para-Dichlorobenzene)." Available at: http://www.epa.gov/ttn/atw/hlthef/dich-ben.html

have contributed to the excess cancers. USEPA considers formaldehyde to be a probable human carcinogen and has ranked it in USEPA's Group B1.[29] In California, formaldehyde has been identified as a carcinogen.

2.1.16.1.8 Methylene Chloride

Case studies of methylene chloride poisoning during paint stripping operations have demonstrated that inhalation exposure to extremely high levels of methylene chloride can be fatal to humans. Acute inhalation exposure to high levels of methylene chloride in humans has affected the central nervous system including decreased visual, auditory, and psychomotor functions, but these effects are reversible once exposure ceases. Methylene chloride also irritates the nose and throat at high concentrations. The major effects from chronic inhalation exposure to methylene chloride in humans are effects on the central nervous system, such as headaches, dizziness, nausea, and memory loss. In addition, chronic exposure can lead to bone marrow, hepatic, and renal toxicity. USEPA considers methylene chloride to be a probable human carcinogen and has ranked it in USEPA's Group B2.[30] The State of California considers methylene chloride to be a carcinogen.

2.1.16.1.9 Perchloroethylene

In California, perchloroethylene has been identified as a carcinogen. Perchloroethylene vapors are irritating to the eyes and respiratory tract. Following chronic exposure, workers have shown signs of liver toxicity, as well as kidney dysfunction, and neurological disorders.[31]

2.1.16.1.10 Diesel Particulate Matter

Diesel exhaust and many individual substances contained in it (including arsenic, benzene, formaldehyde, and nickel) have the potential to contribute to mutations in cells that can lead to cancer. Long-term exposure to diesel exhaust particles poses the highest cancer risk of any TAC evaluated by the California Office of Environmental Health Hazard Assessment (OEHHA). CARB estimates that about 70 percent of the cancer risk that the average Californian faces from breathing TACs stems from diesel exhaust particles.

In its comprehensive assessment of diesel exhaust, OEHHA analyzed more than 30 studies of people who worked around diesel equipment, including truck drivers, railroad workers, and equipment operators. The studies showed these workers were more likely than workers who were not exposed to diesel emissions to develop lung cancer. These studies provide strong evidence that long-term occupational exposure to diesel exhaust increases the risk of lung cancer. Using information from OEHHA's assessment, CARB estimates that diesel-particle levels measured in California's air in 2000 could cause 540 "excess" cancers (beyond what would occur if there were no diesel particles in the air) in a population of 1 million people over a 70-year lifetime.

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[29] U.S. Environmental Protection Agency. Revised January 2000. Technology Transfer Network Air Toxics Web Site: "Formaldehyde." Available at: http://www.epa.gov/ttn/atw/hlthef/formalde.html

[30] U.S. Environmental Protection Agency. Revised January 2000. Technology Transfer Network Air Toxics Web Site: "Methylene Chloride (Dichloromethane)." Available at: http://www.epa.gov/ttn/atw/hlthef/methylen.html

[31] U.S. Environmental Protection Agency. Revised January 2000. Technology Transfer Network Air Toxics Web Site: "Tetrachloroethylene (Perchloroethylene)." Available at: httphttp://www.epa.gov/ttn/atw/hlthef/tet-ethy.html

Other researchers and scientific organizations, including the National Institute for Occupational Safety and Health, have calculated similar cancer risks from diesel exhaust as those calculated by OEHHA and CARB.[32]

Exposure to diesel exhaust can have immediate health effects. Diesel exhaust can irritate the eyes, nose, throat and lungs, and it can cause coughs, headaches, lightheadedness, and nausea. In studies with human volunteers, diesel exhaust particles made people with allergies more susceptible to the materials to which they are allergic, such as dust and pollen. Exposure to diesel exhaust also causes inflammation in the lungs, which may aggravate chronic respiratory symptoms and increase the frequency or intensity of asthma attacks.

Diesel engines are a major source of fine-particle pollution. The elderly and people with emphysema, asthma, and chronic heart and lung disease are especially sensitive to fine-particle pollution. Numerous studies have linked elevated particle levels in the air to increased hospital admissions, emergency room visits, asthma attacks, and premature deaths among people suffering from respiratory problems. Because children's lungs and respiratory systems are still developing, they are also more susceptible than healthy adults to fine particles. Exposure to fine particles is associated with increased frequency of childhood illnesses and can reduce lung function in children. In California, diesel exhaust particles have been identified as carcinogens.

2.1.17 Valley Fever

Valley Fever is an infection caused by inhalation of *Coccidioides immitis* fungus spores, which grows in the soils of the southwestern United States. The fungus is prevalent in the soils of California's San Joaquin Valley, particularly in Kern County. The ecological factors that appear to be most conducive to survival and replication of the spores are high summer temperatures, mild winters, sparse rainfall, and alkaline, sandy soils. Based on skin test surveys, the incidence of Valley Fever is between 25,000 and 100,000 new infections per year, with 70 deaths annually in the United States. It is difficult to determine the exact number of primary pulmonary and disseminated (cases in which the spores spread throughout the body) cases contracted annually, since diagnosis and reporting of cases is incomplete. In Kern County, data from laboratory test reports indicate the occurrence of about 270 symptomatic infections per year, including 12 disseminated cases with an average of 5 deaths annually. At least 60 percent of Valley Fever cases are acquired symptomatically, with a positive result on a skin test being the only manifestation of infection. Forty percent of the infections become symptomatic with a disease spectrum ranging from mild influenza-like illness to a fulminating dissemination resulting in death.

Coccidioides immitis spores are found in the top few inches of soil, and the existence of the fungus in most soil areas is temporary. The fungus lives as a saprophyte in dry, alkaline soil. When weather and moisture conditions are favorable, the fungus "blooms" and forms many tiny spores that lie dormant in the soil until they are stirred up by wind, vehicles, excavation, or other ground-disturbing activities, and become airborne. Agricultural workers, construction workers, and other people who work outdoors and who are exposed to wind and dust are more likely to contract Valley Fever. Children and adults whose hobbies or sports activities expose them to wind and dust are also more likely to contract Valley Fever.

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[32] California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, and the American Lung Association. Accessed on 2 February 2010. "Health Effects of Diesel Exhaust." Web site. Available at: http://www.oehha.org/public_info/facts/dieselfacts.html

2.2 REGULATORY FRAMEWORK

This regulatory framework identifies the federal and state laws that govern the regulation of air quality and must be considered by Heartland Wind LLC regarding decisions on projects that involve construction, operation, or maintenance activities that would result in air emissions.

Responsibility for attaining and maintaining ambient air quality standards in California is divided between CARB and regional air pollution control or air quality management districts. Areas of control for the regional districts are set by CARB, which divides the state into air basins. These air basins are based largely on topography that limits air flow access, or by county boundaries. The proposed project property is located in Kern County, California, within the EKAPCD portion of the MDAB.

In October 2007, the CARB published a list of 44 early action measures to reduce GHG emissions in California.[33] This regulatory framework identifies state guidance on early GHG emissions reduction measures that warrants consideration by Heartland Wind LLC.

2.2.1 Federal

2.2.1.1 Clean Air Act

The federal Clean Air Act requires that federally supported activities conform to the State Implementation Plan (SIP), whose purpose is attainment and maintenance of the National Ambient Air Quality Standards (NAAQS). Section 176(c) of the Clean Air Act as amended in 1990, established the criteria and procedures by which the Federal Highway Administration (FHWA) (United States Code Title 23), the Federal Transit Administration,[34] and metropolitan planning organizations (MPOs) determine the conformity of federally funded or approved highway and transit plans, programs, and projects to SIPs. The provisions of the Code of Federal Regulations, Title 40, Parts 51 and 93, apply in all non-attainment and maintenance areas for transportation-related criteria pollutants for which the area is designated non-attainment or has a maintenance plan.[35]

The USEPA sets NAAQS. Existing national standards and state standards were considered in the evaluation of air quality impacts (Table 2.2.1.1-1, *Ambient Air Quality Standards)*. Primary standards are designed to protect public health, including sensitive individuals, such as children and the elderly, whereas secondary standards are designed to protect public welfare, such as visibility and crop or material damage. The Clean Air Act requires the USEPA to routinely review and update the NAAQS in accordance with the latest available scientific evidence. For example, the USEPA revoked the annual PM_{10} standard in 2006 due to a lack of evidence linking health problems to long-term exposure to PM_{10} emissions. The 1-hour standard for O_3 was revoked in 2005 in favor of a new 8-hour standard that is intended to better protect public health.

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33 California Air Resources Board. October 2007. *Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California Recommended for Board Consideration*. Available at: http://www.arb.ca.gov/cc/ccea/meetings/ea_final_report.pdf

34 U.S. Environmental Protection Agency. 26 September 1996. "Approval and Promulgation of Implementation Plans and Redesignation of Puget Sound, Washington for Air Quality Planning Purposes: Ozone." In *Federal Register*, Vol. 61, No. 188. Available at: http://yosemite.epa.gov/r10/airpage.nsf/283d45bd5bb068e68825650f0064cdc2/e1f3db8b006eff1a88256dcf007885c6/$FILE/61%20FR%2050438%20Seattle%20Tacoma%20Ozone%20MP.pdf

35 U.S. Environmental Protection Agency. 15 August 1997. *Transportation Conformity Rule Amendments: Flexibility and Streamlining*. Available at: http://www.epa.gov/USEPA-AIR/1997/August/Day-15/a20968.htm

TABLE 2.2.1.1-1
AMBIENT AIR QUALITY STANDARDS

Air Pollutant	National Primary	National Secondary	State Standard
Ozone (O_3)*	0.08 ppm, 8-hr avg. (1997) 0.075 ppm, 8-hr avg. (2008)	0.08 ppm, 8-hr avg. (1997) 0.075 ppm, 8-hr avg. (2008)	0.09 ppm, 1-hr avg. 0.07 ppm, 8-hr avg.
Carbon monoxide (CO)	9 ppm, 8-hr avg. 35 ppm, 1-hr avg.	None	9 ppm, 8-hr avg. 20 ppm, 1-hr avg.
Nitrogen dioxide (NO_2)	0.053 ppm, annual avg.	0.053 ppm, annual avg.	0.03 ppm, annual avg. 0.18 ppm, 1-hr avg.
Sulfur dioxide (SO_2)	0.03 ppm, annual avg. 0.14 ppm, 24-hr avg.	0.5 ppm, 3-hr avg.	0.25 ppm, 1-hr avg. 0.04 ppm, 24-hr avg.
Suspended particulate matter (PM_{10})	150 $\mu g/m^3$, 24-hr avg.	150 $\mu g/m^3$, 24-hr avg.	50 $\mu g/m^3$, 24-hr avg. 20 $\mu g/m^3$, annual avg.
Fine particulate matter ($PM_{2.5}$)	35 $\mu g/m^3$, 24-hr avg. 15 $\mu g/m^3$, annual avg.	35 $\mu g/m^3$, 24-hr avg. 15 $\mu g/m^3$, annual avg.	12 $\mu g/m^3$, annual avg.
Sulfates (SO_4)	—	—	25 $\mu g/m^3$, 24-hr avg.
Lead (Pb)	1.5 $\mu g/m^3$, calendar quarter 0.15 $\mu g/m^3$, rolling 3-month avg.	1.5 $\mu g/m^3$, calendar quarter 0.15 $\mu g/m^3$, rolling 3-month avg.	1.5 $\mu g/m^3$, 30-day avg.
Hydrogen sulfide (H_2S)	—	—	0.03 ppm, 1-hr avg.
Vinyl chloride	—	—	0.01 ppm, 24-hr avg.
Visibility-reducing particles	—	—	Extinction coefficient of 0.23 per kilometer; visibility of 10 miles or more (0.07–30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent (8-hr avg.)

KEY: ppm = parts per million by volume; hr = hour; avg. = average; $\mu g/m^3$ = micrograms per cubic meter
NOTE: * The 1997 standard of 0.08 ppm will remain in place for implementation purposes as USEPA undertakes rulemaking to address the transition to the 2008 ozone standard of 0.075 ppm.
SOURCES:
1. U.S. Environmental Protection Agency. Updated 14 July 2009. *National Ambient Air Quality Standards (NAAQS).* Available at: http://www.epa.gov/air/criteria.html
2. California Air Resources Board. Reviewed 24 November 2009. *California Ambient Air Quality Standards (CAAQS).* Available at: http://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm

The 1990 amendments to the Clean Air Act divide the nation into five categories of planning regions, based on the severity of the regions' pollution, and set new timetables for attaining the NAAQS. The categories range from marginal to extreme. Attainment deadlines are from 3 to 20 years, depending on the category. Eastern Kern County, in which the proposed project property is located, is designated as a federal-level Subpart 1 non-attainment area for the 8-hour O_3 standard. Eastern Kern County is also a moderate non-attainment area for the state-level 1-hour O_3 standard and a non-attainment area for the state-level PM_{10} standard, but is in attainment for the state-level standards for CO, NO_2, and Pb particulates.[36]

Section 182(e)(5) of the federal Clean Air Act allows the USEPA administrator to approve provisions of an attainment strategy in an extreme area that anticipates development of new control techniques or improvement of existing control technologies if the state has submitted enforceable commitments to develop and adopt contingency measures to be implemented if the anticipated technologies do not achieve planned reductions.

Non-attainment areas that are classified as “serious” or “worse” are required to revise their air quality management plans to include specific emission reduction strategies to meet interim milestones in implementing emission controls and improving air quality. The USEPA can withhold certain transportation funds from states that fail to comply with the planning requirements of the Clean Air Act. If a state fails to correct these planning deficiencies within two years of federal notification, the USEPA is required to develop a Federal Implementation Plan for the identified non-attainment area or areas.

General Conformity Rule

The EPA has authority over State Implementation Plan (SIP) general conformity in areas that do not meet federal air quality standards, and the federal land managers have review authority over any new projects that may affect federal Class I areas, as defined in 40 CFR, Part 51.166; 40 CFR, Part 51, Subpart W; and 40 CFR, Part 93, Subpart B: General Conformity. These regulations ensure that federal actions conform to state and local plans for attainment. As federal lead agency, the Bureau of Land Management (BLM) must complete a conformity determination for the proposed action before it can be approved. The General Conformity Rule prohibits federal agency approval of activities that conflict with an applicable implementation plan. When applicable, a program for mitigating effects must be developed.

The proposed action requires a right-of-way (ROW) across BLM lands, thus triggering the National Environmental Policy Act (NEPA) and the BLM’s involvement in the NEPA process. Additionally, the BLM is required to make a conformity determination for each pollutant where the total of direct and indirect emissions in a nonattainment or maintenance area caused by the BLM action would equal or exceed the applicability (*de minimis*) threshold. De minimis levels are the minimum thresholds for which a conformity determination must be performed for criteria pollutants (Table 2.2.1.1-2, *De Minimis Levels)*.

[36] Kern County Air Pollution Control District. 2008. *Kern County APCD Attainment Status.* Available at: http://www.kernair.org/general_information.htm

TABLE 2.2.1.1-2
DE MINIMIS LEVELS

Air Pollutant	Area Type	Unit (tons/year)
Ozone (VOC or NO_x)	Serious nonattainment	50
	Severe nonattainment	25
	Extreme nonattainment	10
	Other areas outside an ozone transport region	100
Ozone (NO_x)	Marginal and moderate nonattainment inside an ozone transport region	100
	Maintenance	100
Ozone (VOC)	Marginal and moderate nonattainment inside an ozone transport region	50
	Maintenance within an ozone transport region	50
	Maintenance outside an ozone transport region	100
Carbon monoxide, SO_2 and NO_2	All nonattainment and maintenance	100
PM_{10}	Serious nonattainment	70
	Moderate nonattainment and maintenance	100
Lead (Pb)	All nonattainment and maintenance	25

SOURCE:
U.S. Environmental Protection Agency. Updated 22 July 2011. *De Minimis Levels*. Available at: http://www.epa.gov/airquality/genconform/deminimis.html

The General Conformity Rule was designed to require federal agencies to ensure that proposed actions conform to the applicable SIP. General Conformity regulations apply only to direct and/or indirect emissions for a proposed action that occurs in areas designated as non-attainment or maintenance areas. The BLM is required to analyze emissions from the proposed action to determine if the General Conformity Rule applies. If the proposed action is subject to General Conformity, then the BLM would prepare a General Conformity Determination for public comment. The General Conformity Determination would outline the methodology by which emissions from the proposed action would conform to the SIP, such as:

- Showing emission increases are specifically identified and accounted for in the SIP;
- State agrees to include emission increases in the SIP;
- No new violations of NAAQS and/or no increase in frequency or severity of violations for areas without SIPs; and
- Emissions would be fully mitigated, offset, or there would be a similarly enforceable measure that reduces emissions so that there would be no net increase in emissions.[37]

The portion of the MDAB where the proposed action would occur is designated as a federal PM_{10} and ozone non-attainment area (Table 2.2.1.1-3, *Criteria Pollutants Federal Attainment Status in Mojave Deseart Air Basin*). The emissions of these pollutants would need to be analyzed for each corresponding non-attainment area/maintenance area to determine applicability to the General Conformity Rule.

[37] United States Environmental Protection Agency. 19 April 2011. *General Conformity Regulations*. Available at: http://epa.gov/ttncaaa1/genconformity.html

TABLE 2.2.1.1-3
CRITERIA POLLUTANTS FEDERAL ATTAINMENT STATUS IN MOJAVE DESERT AIR BASIN

Air Pollutants	Federal Attainment Status
1-hour Ozone (VOCs & NOx)	Serious nonattainment[1]
Ozone (8-hour)	Nonattainment
$PM_{2.5}$	Unclassified/attainment
PM_{10}	Nonattainment
NOx	Attainment
CO	Attainment
Lead	Attainment
All others	Attainment/unclassified

NOTE: [1] Attainment demonstration was considered by U.S. Environmental Protection Agency in Spring 2004. Monitoring data demonstrates attainment of NAAQS for the past three years.

SOURCES:

1. U.S. Environmental Protection Agency. Updated 30 August 2011*. The Green Book Nonattainment Areas for Criteria Pollutants*. Available at: http://www.epa.gov/oaqps001/greenbk/
2. Kern Council of Governments: San Joaquin Valley Transportation Planning Agencies. 18 September 2003. *Federal Clean Air Act Impacts on Transportation Funding: Sanctions, Lapses, and Freezes*. Bakersfield, CA.

BLM California Desert Conservation Area (CDCA) Plan

The CDCA Plan contains provisions and guidance for public land use management in the California Desert District under the BLM's jurisdiction. Since its first date of publication in 1980, the CDCA Plan has been amended in order to incorporate public concerns and congressional mandates in regards to the use of desert resources, such as the provisions of the California Desert Protection Act of 1994. The CDCA Plan also specifies that the Federal Land Policy and Management Act and the CAA of 1977, along with Executive Order 12088 of 1978, "Federal Compliance with Pollution Control Standards," require the BLM and other federal land-management agencies to preserve and protect air quality–related values on federal lands.

The CDCA Multiple Land Use Class Guidelines require that all land uses within the CDCA be managed to protect air quality and visibility, in accordance with the Class II objectives of Part C of the CAA Amendments, unless they are designated another class by the State of California as a result of the BLM air quality management plan recommendations. Additionally, the CDCA Plan considers air quality monitoring as a key parameter in programs established in the CDCA Plan elements related to wildlife and energy production and utility corridors, as well as one of the support requirements for implementation.

BLM West Mojave Plan

The West Mojave Plan is an amendment to the CDCA Plan that establishes strategies to conserve and protect sensitive species in the planning area, such as desert tortoise (*Gopherus agassizii*), Mohave ground squirrel (*Spermophilus mohavensis*), and other sensitive plants and animals. The West Mojave Plan identifies emissions of particulate matter of 10 microns in diameter or less (PM_{10}) as the most important air pollutant in the planning area.

Proposed Endangerment and Cause or Contribute Findings for GHG under the CAA

On April 2, 2007, in *Massachusetts v. EPA*, 549 U.S. 497, the Supreme Court found that greenhouse gases (GHGs) are air pollutants under the CAA. The Court held that the EPA must determine whether emissions of GHGs from new motor vehicles cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. In making these decisions, the EPA was required to follow the language of Section 202(a) of the CAA.

After a thorough examination of the scientific evidence on the causes and effects of current and future climate change, as well as other effects of GHGs, the EPA concluded that the science compellingly supports a positive endangerment finding for both public health and welfare. The EPA relied heavily upon the major findings and conclusions from recent assessments of the U.S. Climate Change Science Program and the Intergovernmental Panel on Climate Change. The EPA made this endangerment finding after considering both observed and projected future effects of climate change, key uncertainties, and the full range of risks and effects to public health and welfare occurring within the United States.

In response to this endangerment finding, the EPA issued a final rule on May 13, 2010 to apply Prevention of Significant Deterioration (PSD) requirements to new facilities whose carbon dioxide–equivalent emissions exceed 100,000 tons per year.[38] The GHG emissions for the proposed action are expected to fall below this amount. Moreover, GHG reductions will be realized by this proposed action. By displacing fossil fuel–based energy generation with renewable energy generation, GHG production will be avoided. See Section 4.1 for GHG emissions and reductions associated with the proposed action.

2.2.1.2 Mandatory Reporting of Greenhouse Gases Rule

On September 22, 2009, the EPA issued the Final Mandatory Reporting of Greenhouse Gases Rule. Under this rule, the EPA requires reporting of GHG emissions every year by suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities that emit more than 25,000 metric tons of carbon dioxide equivalent (CO_{2e}) emissions per year. CO_{2e} is a quantity that describes, for a given mixture and amount of greenhouse gas, the amount of CO_2 that would have the same GWP, when measured over a specified timescale (generally, 100 years). The gases covered by the proposed rule are CO_2, CH_4, N_2O, HFCs, perfluorinated compounds (PFCs), SF_6, and other fluorinated gases, including nitrogen trifluoride and hydrofluorinated ethers.[39] The proposed project would not be expected to trigger GHG reporting according to the rule; however, GHG emissions of the proposed project are quantified in subsection 2.6.4.2 below.

BLM Guidance on Greenhouse Gases

On September 14, 2009, Secretary of the Interior Ken Salazar issued Order No. 3289, addressing the impacts of climate change on domestic water, land, and other natural and cultural resources. The Order establishes an approach for increasing understanding of climate change and responding to potential climate change related impacts as relevant to the resources that the Department of the Interior

[38] U.S. Environmental Protection Agency. 3 June 2010. *Federal Register*, Volume 75, No. 106, "Final GHG Tailoring Rule." Available at http://www.gpo.gov/fdsys/pkg/FR-2010-06-03/pdf/2010-11974.pdf#page=1

[39] U.S. Environmental Protection Agency. Accessed 26 October 2009. Final Mandatory Reporting of Greenhouse Gases Rule. Available at: http://www.epa.gov/climatechange/emissions/downloads09/GHG-MRR-Full%20Version.pdf

(DOI) manages. The document specifically identifies potential impact areas including potential changes in flood risk and water supply, sea level rise, changes in wildlife and habitat populations and their migration patterns, new invasions of exotic species, and increased threat of wildland fire. The Order includes Climate Change Response Planning Requirements, which require each bureau and office within the DOI (including BLM) to consider and analyze potential climate change impacts when undertaking long-range planning exercises, setting priorities for scientific research and investigations, developing multiyear management plans, and making major decisions regarding potential use of resources under DOI's purview.

2.2.1.3 Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule

The USEPA recently mandated application of the Prevention of Significant Deterioration (PSD) requirements to facilities whose stationary-source CO_{2e} emissions exceed 75,000 metric tons per year. Beginning on January 2, 2011, this rule would only apply to sources that are currently subject to the PSD permitting program (that is, those that are newly-constructed or modified in a way that significantly increases emissions of a pollutant other than GHGs). Beginning on July 1, 2011, the rule will apply to new construction projects that emit least 100,000 metric tons of GHG per year, and to existing facilities that increase GHG emissions by at least 75,000 metric tons per year, even if they do not exceed the permitting thresholds for any other pollutant. The proposed project would not be expected to trigger PSD permitting as required by this regulation; nevertheless, GHG emissions of the proposed project are quantified in subsection 2.6.4.2 of this report.

2.2.1.4 National Environmental Policy Act Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions

On February 18, 2010, the White House Council on Environmental Quality (CEQ) released, for public review and comment, a draft Guidance Memorandum for Heads of Federal Departments and Agencies on the consideration of GHG emissions and climate change impacts as part of compliance with the NEPA.[40] All federal agency actions requiring NEPA review, except federal land and resource management activities, are covered by this Guidance. The draft Guidance provides formal guidance from CEQ to the federal agencies on the treatment of GHG emissions within NEPA: (1) the treatment of GHG emissions that may directly or indirectly result from a proposed federal action and (2) the analysis of potential climate change impacts upon a proposed federal action. In addition, the draft Guidance proposes several key elements for the examination of GHG emissions and climate change impacts:

- The initial scoping phase within the NEPA process should consider the extent of potential GHG emissions from the proposed action over the life of the project and the likely climate change impacts within the foreseeable future. For GHG emissions, this would include projecting direct GHG emissions from the proposed federal action on an annual basis.

- A "reference point" of 25,000 metric tons of direct CO_2-equivalent GHG emissions is proposed as an "indicator" to determine if a proposed federal action's anticipated GHG emissions warrant detailed consideration in a NEPA review. However, for indirect GHG emissions, there is no proposed reference point.

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[40] The White House Council on Environmental Quality. 18 February 2010. *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions*. Available at: http://www.whitehouse.gov/sites/default/files/microsites/ceq/20100218-nepa-consideration-effects-ghg-draft-guidance.pdf

- Detailed consideration of direct GHG emissions would entail (1) the quantification of cumulative GHG emissions over the life of the project; (2) discussion of measures to reduce GHG emissions, including consideration of reasonable alternatives; and (3) qualitative discussion of the link between such GHG emissions and climate change.

- For the review of climate change impacts, the potential for climate change is reflected in the foreseeable future baseline (i.e., projections of the future climate conditions under a "no action" situation), as well as in the analysis of the effects of the proposed action on such future climate conditions.

- The sensitivity, location, and timeframe of a proposed action should be considered in determining when climate change impacts would be subject to detailed consideration in the NEPA review. Climate change effects should be considered in the analysis of projects that are designed for long-term utility and located in areas considered vulnerable to specific effects of climate change within the proposed action's anticipated lifetime.

- In addition to including projections of future climate conditions within the baseline and alternatives analyses of proposed projects, CEQ underscores the need for agencies to consider adaptation measures and monitoring as elements of the federal agency action.

The draft Guidance includes cautions and limitations. Any analysis of GHG emissions and climate change impacts should be useful, relevant to the action under review, and limited to the consequences of actions over which the federal agency has control or authority. In addition, CEQ recognizes the limitations of climate change modeling and any application of global climate change models to regional, state, or localized analyses. CEQ recommends disclosure of the limitations and variability of any climate models used in the NEPA analysis and notes that global climate change models require downscaling and bias removal before use in any regional or local impact studies.

CEQ sought public comments on the draft Guidance. While largely directed toward developing further guidance on the treatment of GHG emissions for federal land and resource management actions, CEQ sought comments on the identification of any GHG emissions threshold amount for determination that the potential GHG emissions are "significant" under NEPA and whether a separate threshold should be set for determining whether GHG emissions have significant cumulative effects. CEQ finalized the Guidance in 2011.[41]

2.2.2 State

2.2.2.1 California Clean Air Act

The California Clean Air Act of 1988 requires all air pollution control districts in the state to aim to achieve and maintain state ambient air quality standards for O_3, CO, and NO_2 by the earliest practicable date and to develop plans and regulations specifying how the districts will meet this goal. There are no planning requirements for the state PM_{10} standard. The CARB, which became part of the California EPA in 1991, is responsible for meeting state requirements of the federal Clean Air Act,

[41] The White House Council on Environmental Quality. 21 January 2011. *NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions*. Available at: http://ceq.hss.doe.gov/current_developments/new_ceq_nepa_guidance.html

administrating the California Clean Air Act, and establishing the California Ambient Air Quality Standards (CAAQS). The California Clean Air Act, amended in 1992, requires all air districts in the state to endeavor to achieve and maintain the CAAQS. The CAAQS are generally stricter than national standards for the same pollutants, but there is no penalty for non-attainment. California has also established state standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles, for which there are no national standards (Table 2.2.1.1-1). On April 2, 2007, the Supreme Court ruled in *Massachusetts, et al. v. Environmental Protection Agency, et al.* (549 U.S. 1438; 127 S. Ct. 1438) that the federal Clean Air Act gives the USEPA the authority to regulate emissions of GHGs, including CO_2, CH_4, N_2O, and fluorinated gases, such as HFCs, PFCs, and SF_6,[42] thereby legitimizing GHGs as air pollutants under the federal Clean Air Act.

2.2.2.2 Assembly Bill 1493

On July 22, 2002, Governor Gray Davis signed Assembly Bill (AB) 1493, also known as the Pavley Regulations or the Clean Car Standards. AB 1493 required the state to develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of GHG emissions emitted by passenger vehicles and light-duty trucks. Subsequent regulations were adopted by CARB in September 2004.

The regulations were threatened by automaker lawsuits and were stalled by the USEPA's initial denial to allow California to implement GHG standards for passenger vehicles. The USEPA later granted California the authority to implement GHG emission reduction standards for new passenger cars, pic-up trucks, and sport utility vehicles on June 30, 2009. On September 24, 2009, the CARB adopted amendments to the Pavley regulations that reduce GHG emissions in new passenger vehicles from 2009 through 2016.

2.2.2.3 California Renewable Portfolio Standard Program

Senate Bill (SB) 1078 established California's Renewable Portfolio Standard (RPS) program in 2002. The RPS program requires electrical corporations and electric service providers to purchase a specified minimum percentage of electricity generated by eligible renewable energy resources. The bill requires the California Energy Commission to certify eligible renewable energy resources, to design and implement an accounting system to verify compliance with the RPS by retail sellers, and to allocate and award supplemental energy payments to cover above-market costs of renewable energy. Under SB 1078, each electrical corporation was required to increase its total procurement of eligible renewable energy resources by at least 1 percent per year so that 20 percent of its retail sales were procured from eligible renewable energy resources.

In 2006, SB 107 accelerated the RPS program by establishing a deadline of December 31, 2010, for achieving the goal of having 20 percent of total electricity sold to retail customers in California per year generated from eligible renewable energy resources.

The RPS goal was increased to 33 percent when Governor Schwarzenegger signed Executive Order S-14-08 in November 2008. Executive Order S-14-08 was later superseded by Executive Order S-21-09 on September 15, 2009. Executive Order S-21-09 directed the CARB to adopt regulations requiring 33 percent of electricity sold in the State come from renewable energy by 2020. On September 23, 2010, the CARB approved a Renewable Electricity Standard regulation.

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[42] U.S. Supreme Court. 2 April 2007. *Massachusetts, et al., v. Environmental Protection Agency, et al.* 549 U.S. 1438; 127 S. Ct. 1438. Washington, DC.

2.2.2.4 Executive Order S-3-05

On June 1, 2005, Governor Arnold Schwarzenegger signed Executive Order S-3-05. Recognizing that California is particularly vulnerable to the impacts of climate change, Executive Order S-3-05 establishes statewide climate change emission reduction targets to reduce $CO_{2equivalent}$ (CO_{2e}) to the 2000 level (473 million metric tons) by 2010, to the 1990 level (427 million metric tons of CO_{2e}) by 2020, and to 80 percent below the 1990 level (85 million metric tons of CO_{2e}) by 2050 (Table 2.2.2.4-1, *California Business-as-usual GHG Emissions and Targets*).[43,44] The executive order directs the California EPA Secretary to coordinate and oversee efforts from multiple agencies (that is, Secretary of the Business, Transportation, and Housing Agency; Secretary of the Department of Food and Agriculture; Secretary of the Resources Agency; Chairperson of the Air Resources Board; Chairperson of the Energy Commission; and President of the Public Utilities Commission) to reduce GHG emissions to achieve the target levels. In addition, the California EPA Secretary is responsible for submitting biannual reports to the governor and state legislature that outline (1) progress made toward reaching the emission targets, (2) impacts of global warming on California's resources, and (3) measures and adaptation plans to mitigate these impacts. To further ensure accomplishment of the targets, the California EPA Secretary created a Climate Action Team composed of representatives from the aforementioned agencies to implement global warming emission reduction programs and report on the progress made toward meeting the statewide GHG targets established in this executive order. In December 2005, the first report was released, which stated, "the climate change emission reduction targets [could] be met without adversely affecting the California economy," and "when all [the] strategies are implemented, those underway and those needed to meet the Governor's targets, the economy will benefit."[45]

TABLE 2.2.2.4-1
CALIFORNIA BUSINESS-AS-USUAL GHG EMISSIONS AND TARGETS

Emission Level	GHG Emissions (Million Metric Tons of $CO_{2Equivalent}$) 1990	2000	2010	2020	2050
Business-as-usual Emissions	427	473	532	596	762*
Target Emissions	—	—	473	427	85

NOTE: * Business-as-usual emissions reflect the projected emissions under a scenario without GHG control measures, where California would continue to emit GHGs at the same per capita rate. The CARB has not yet projected 2050 emissions under a business-as-usual scenario. Therefore, 2050 business-as-usual emissions were calculated assuming a linear increase of emissions from 1990 to 2050.

2.2.2.5 Assembly Bill 32: Global Warming Solutions Act of 2006

Signed by Governor Schwarzenegger in September 2006, AB 32, the Global Warming Solutions Act, requires a statewide commitment and effort to reduce GHG emissions to 1990 levels by 2020 (25 percent below business as usual).[46] This intended reduction in GHG emissions will be accomplished

[43] California Governor. 1 June 2005. Executive Order S-3-05. Sacramento, CA.

[44] California Climate Action Team. 3 April 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature.* Sacramento, CA.

[45] California Climate Action Team. 3 April 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature.* Sacramento, CA.

[46] California Air Resources Board. 2006. *Assembly Bill 32 California Climate Solutions Act of 2006*. Sacramento, CA. Available at: http://www.arb.ca.gov/cc/docs/ab32text.pdf

with an enforceable statewide cap on GHG emissions, which will be phased in starting in 2012. To effectively implement the limits, AB 32 requires CARB to develop appropriate regulations and establish a mandatory reporting system to track and monitor emissions levels from stationary sources.

This bill is the first statewide policy in the United States to mitigate GHG emissions and include penalties for noncompliance. Consistent with goals and targets set by other actions taking place at the regional and international levels, AB 32 sets precedence in inventorying and reducing GHG emissions. In passing AB 32, the state legislature has acknowledged that global warming and related effects of climate change are a significant environmental issue.

AB 32 required CARB to develop a scoping plan that would contain the main strategies California will use to reduce GHG emissions. The AB 32 Scoping Plan was approved by the CARB Board in December 2008. The AB 32 Scoping Plan identifies a cap-and-trade program as one of the strategies California will employ to reduce GHG emissions. CARB approved a cap-and-trade program on December 16, 2010, that will become effective in 2012. An initial cap will be implemented for the electrical sector and any large industrial source that emits more than 25,000 metric tons of CO_{2e} emissions per year. Over time, the cap will be reduced so that the program will apply to a broader range of facilities.

2.2.2.6 Executive Order S-20-06

On October 17, 2006, Governor Arnold Schwarzenegger signed Executive Order S-20-06, which calls for continued efforts and coordination among state agencies to implement GHG emission reduction policies, AB 32, and the Health and Safety Code (Division 25.5) through a market-based compliance program.[47] In addition, Executive Order S-20-06 requires the development of GHG reporting and reduction protocols and a multi-state registry through joint efforts among CARB, California EPA, and the California Climate Action Registry (CCAR). Executive Order S-20-06 directs the Secretary for Environmental Protection to coordinate with the Climate Action Team to plan incentives for market-based mechanisms that have the potential of reducing GHG emissions.[48]

2.2.2.7 California Senate Bill 97

Approved by Governor Arnold Schwarzenegger on August 24, 2007, SB 97 is designed to work in conjunction with the State California Environmental Quality Act (CEQA) Guidelines and AB 32. Pursuant to the State CEQA Guidelines, OPR is required to prepare and develop guidelines for implementation of CEQA by public agencies. AB 32 requires the CARB to monitor and regulate GHGs emission sources to reduce these emissions. In addition, "SB 97 requires OPR, by July 1, 2009, to prepare, develop, and transmit to the [CARB] guidelines for the feasible mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions, as required by CEQA, including, but not limited to, effects associated with transportation or energy consumption."[49] On April 13, 2009, OPR submitted proposed amendments to the State CEQA Guidelines to the Secretary for Natural Resources.[50] The Natural Resources Agency conducted a formal rulemaking in 2009, before certification and adoption of the amendments; the amendments became effective on March 18, 2010. In addition, OPR and

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[47] California Governor. 2006. Executive Order S-20-06. Sacramento, CA.

[48] California Governor. 2006. Executive Order S-20-06. Sacramento, CA.

[49] California Governor's Office of Planning and Research. 24 August 2007. Senate Bill No. 97, Chapter 185. Available at: http://www.opr.ca.gov/ceqa/pdfs/SB_97_bill_20070824_chaptered.pdf

[50] California Governor's Office of Planning and Research. April 2009. *CEQA Guidelines Sections Proposed to be Added or Amended*. Available at: http://www.opr.ca.gov/ceqa/pdfs/PA_CEQA_Guidelines.pdf

CARB are required to periodically update the guidelines with new information or criteria established by CARB pursuant to AB 32. SB 97 exempts transportation projects funded under the Highway Safety, Traffic Reduction, Air Quality and Port Security Bond Act of 2006, and projects funded under the Disaster Preparedness and Flood Prevention Bond Act of 200, but it would apply to any environmental documents, including an Environmental Impact Report, Negative Declaration, Mitigated Negative Declaration, or other documents required by CEQA that have not been certified or adopted by the CEQA lead agency by the date of the adoption of the regulations.

Revisions to Appendix G of the CEQA Guidelines (part of the amendments that became effective on March 18, 2010) recommend that projects be evaluated for the following impacts:

- Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?
- Would the project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Individual projects incrementally contribute to the potential for global climate change on a cumulative basis in concert with all other past, present, and probable future projects. While individual projects are unlikely to measurably affect global climate change, each of these projects incrementally contributes to the potential for global climate change on a cumulative basis, in concert with all other past, present, and probable future projects.

2.2.2.8 California Climate Action Registry

Established in 2001, the CCAR is a private nonprofit organization originally formed by the State of California. The CCAR serves as a voluntary GHG registry and led efforts to develop credible, accurate, and consistent GHG reporting standards and tools for businesses, government agencies, and nonprofit organizations to measure, monitor, and reduce GHG emissions. For instance, the CCAR General Reporting Protocol, Version 3.1, dated January 2009, provides the principles, approach, methodology, and procedures required for voluntary GHG emissions reporting by businesses, government agencies, and nonprofit organizations.

2.2.3 Regional

2.2.3.1 Eastern Kern Air Pollution Control District

As of March 20, 1991, the Kern County Air Pollution Control District, which was renamed EKAPCD in May 2010, was given authority over the southeast portion of Kern County (Figure 2.2.3.1-1, *EKAPCD Jurisdiction*). The EKAPCD, which regulates air quality within the proposed project property, has jurisdiction over an area of approximately 4,000 square miles and a population of approximately 120,000 located within unincorporated areas and three incorporated cities (Tehachapi, California City, and Ridgecrest). EKAPCD is responsible for monitoring air quality and for planning, implementing, and enforcing programs designed to attain and maintain federal and state ambient air quality standards in the district. In addition, EKAPCD is responsible for establishing stationary-source permitting requirements and for ensuring that new, modified, or related stationary sources do not create net emission increases.

On a regional level, EKAPCD and the Kern Council of Governments have responsibility under state law to prepare the Air Quality Attainment Plan, which contains all reasonable available control

LEGEND

EKAPCD Jurisdiction

SOURCE: California Environmental Protection Agency, Air Resources Board

IBERDROLA RENEWABLES

FIGURE 2.2.3.1-1
EKAPCD Jurisdiction

measures to meet state and federal requirements. When approved by CARB and the USEPA, the Air Quality Attainment Plan becomes part of the SIP.

The Kern County Air Quality Attainment Plan was prepared for air quality improvements to meet both state and federal Clean Air Act planning requirements for all areas in the EKAPCD. The Air Quality Attainment Plan was approved by CARB on February 18, 1993, and sets forth strategies for attaining the federal 8-hour O_3 air quality standard, and for meeting state standards at the earliest practicable date. The 2005 Progress Report updates the goals of the EKAPCD to reduce O_3 precursor emissions in conformance with the Air Quality Attainment Plan.[51]

The EKAPCD rules that were considered in this evaluation include, but are not limited to, the following:[52]

Rule 210.7 Federal General Conformity Rule

This rule adopts the provisions of 40 CFR, Chapter I, Subchapter C, Parts 6 and 51, related to the requirements for preparation, adoption, and submittal of implementation plans and procedures for implementing NEPA. This rule sets forth policy, criteria, and procedures for demonstrating and ensuring conformity of general federal actions in non-attainment and maintenance areas under the applicable implementation plan. Since the site would be located in a designated federal non-attainment area for ozone and PM_{10}, the BLM, as lead agency under NEPA, must make a conformity determination stating that the proposed action conforms to the applicable State Implementation Plan (SIP) before the action is taken.

Rule 401: Visible Emissions

This rule limits visible emissions by limiting discharge into the atmosphere of any air contaminant that has an opacity greater than a designated amount for a period or periods aggregating more than 3 minutes in any hour.

Rule 402: Fugitive Dust

This rule limits fugitive dust emissions from any construction activity so that the presence of such dust does not remain visible in the atmosphere beyond the property line of the emission source. Mitigation measures are provided to minimize fugitive dust emissions from construction activity. For construction projects disturbing 100 or more acres, a fugitive dust emissions control plan must be submitted to the Control Officer. The control plan must include a mitigation measure for each source of particulate matter in the proposed project property.

Rule 404.1: Particulate Matter: Concentration

This rule limits the amount of particulate matter discharged from any source in excess of listed concentrations.

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[51] Kern County Air Pollution Control District. 15 December 2005. *Annual California Clean Air Act Ozone Air Quality Attainment Plan Implementation Progress Report #9*. Available at: http://www.kernair.org/Documents/Reports/CCAANo9%20Rpt.pdf

[52] California Air Resources Board. 10 December 2008. *Kern County APCD List of Current Rules.* Available at: http://www.arb.ca.gov/drdb/ker/cur.htm

Rule 405: Particulate Matter: Emission Weight

This rule is similar to Rule 404.1, except that the particulate matter limits are listed as weights instead of concentrations.

Rule 409: Combustion Contaminants

This rule limits CO_2 emissions from the burning of fuel.

Rules 416: Open Fires

Rule 416 states that open outdoor fires, such as burning plant life for the purpose of clearing an area, are not allowed without a valid permit.

Rule 419: Nuisance

This rule limits the discharge of air contaminants or other material that cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public.

2.2.3.2 Kern County General Plan

The proposed project property is located within Kern County, and development in the area is governed by the policies, procedures, and standards set forth in the Kern County General Plan. The proposed project is considered a capital facility for Kern County; therefore, pursuant to OPR's guidelines for a general plan related to capital facilities, the proposed project must be consistent with the Kern County General Plan.[53] In addition, capital improvement programs are required to be reviewed annually to ensure their consistency with the Kern County General Plan.[54] The proposed project would be expected to be consistent with the air quality regulations of the Kern County General Plan, and would not be expected to result in a change to the population growth assumption used by the Kern Council of Governments for attainment planning. The Kern County General Plan has developed goals and policies for improving air quality in Kern County. The implementation measures that are relevant to the proposed project and that are capable of contributing toward prevention and mitigation of air pollution include the following:[55]

a. Pave dirt roads within the development
b. Pave outside storage areas
c. Provide additional low VOC-producing trees on landscape plans
d. Use alternative fuel fleet vehicles or hybrid vehicles
e. Use emission control devices on diesel equipment

[53] California Governor's Office of Planning and Research. October 2003. *General Plan Guidelines*. Available at: http://www.opr.ca.gov/planning/publications/General_Plan_Guidelines_2003.pdf

[54] California Governor's Office of Planning and Research. October 2003. *General Plan Guidelines*. Available at: http://www.opr.ca.gov/planning/publications/General_Plan_Guidelines_2003.pdf

[55] Kern County. 15 June 2005 (Amended 13 March 2007). *Kern County General Plan.* Bakersfield, CA. Available at: http://www.co.kern.ca.us/planning/pdfs/kcgp/KCGP.pdf

2.3 EXISTING CONDITIONS

2.3.1 Mojave Desert Air Basin

The proposed project property is located in the MDAB, which is composed of a 21,000-square-mile area encompassing the majority of San Bernardino County, the eastern portion of Kern County, the eastern portion of Riverside County, and the northeastern portion of Los Angeles County. The analysis of existing conditions related to air quality summarizes pollutant levels that exist prior to implementation of each component of the proposed project. All components of the proposed project are located within the MDAB; therefore, all air quality data and analysis are presented as an aggregate of the entire proposed project property.

The MDAB is composed of four air districts: the EKAPCD, the Antelope Valley Air Quality Management District, the Mojave Desert Air Quality Management District, and the eastern portion of the South Coast Air Quality Management District. The climate of the proposed project property (that is, the MDAB) is characterized by hot, dry summers; mild winters; infrequent rainfalls; moderate- to high-wind episodes; and low humidity. The majority of the MDAB is relatively rural and sparsely populated. The MDAB contains many mountain ranges interspersed with long, broad valleys that often contain dry lakes. The Sierra Nevada Mountains provide a natural barrier to the north, preventing cold air masses from Canada and Alaska from moving down into the MDAB. Prevailing winds in the MDAB are out of the west and southwest, caused by air masses pushed onshore in Southern California by differential heating and channeled inland through mountain passes. During the summer months, the MDAB is influenced by the Eastern Pacific High-Pressure Area (a semi-permanent feature of the general hemispheric circulation pattern), which inhibits cloud formation and encourages daytime solar heating. The San Gabriel and San Bernardino mountain ranges block the majority of cool, moist costal air from the south, so the MDAB experiences infrequent rainfalls.

2.3.2 Climatic Conditions

Average temperature and precipitation data within the proposed project property and the vicinity have been recorded at the Mojave Monitoring Station (located approximately 16 miles northeast of the proposed project property at latitude 35° 03' North, longitude 118° 10' West). From 1904 to 2010, the annual average temperature recorded in the proposed project property was 62.9 degrees Fahrenheit (°F), with an average winter (December, January, and February) temperature of approximately 46.8°F, and an average summer (June, July, and August) temperature of approximately 80.9°F (Appendix A). The annual average of total precipitation in the proposed project property is approximately 6 inches, which occurs mostly during the winter, and relatively infrequently during the summer (Appendix A). Precipitation averages approximately 3.3 inches during the winter (December, January, and February), approximately 1.3 inches during the spring (March, April, and May), approximately 1.0 inch during the fall (September, October, and November), and approximately 0.3 inch during the summer (June, July, and August) (Appendix A). The average wind speed within the proposed project property and its vicinity, as recorded at the Mojave Monitoring Station from 2002 to 2004, was approximately 10 miles per hour (MPH), originating predominantly from the northwest (Appendix A). Severe weather is uncommon in the MDAB, but strong easterly winds known as the Santa Ana winds can cause 38 to 63 MPH wind gusts below the passes and canyons. During the spring and summer months, air pollution is moved into the region through mountain passes or is lifted by the warm vertical currents produced by the heating of the mountain slopes. From the late summer through the winter months, due to the average lower wind speeds in the proposed project property and its vicinity, air contaminants do not readily disburse, thus trapping air pollutions in the area.

2.3.3 Emission Sources

The proposed project property currently contains few buildings, structures, and other built features. Air pollutants are emitted daily from the adjacent facilities by landscape maintenance equipment, space and water heating, and vehicle trips to and from the proposed project property. However, the main source of air pollutants in the proposed project property is carried in by air masses traveling from more polluted areas upwind.

2.3.4 Air Monitoring Stations

Eleven air monitoring stations serve the MDAB. The two closest monitoring stations to the proposed project property are the Mojave Monitoring Station, located approximately 16 miles northeast of the proposed project property at 923 Poole Street, Mojave, California, 93501, and the Lancaster–Division Street Monitoring Station, located approximately 25 miles southeast of the proposed project property at 43301 Division Street, Lancaster, California, 93535. Both stations measure particulate matter ($PM_{2.5}$ and PM_{10}) and O_3. In addition, the Lancaster–Division Street Monitoring Station measures CO and NO_2. The Mojave Monitoring Station is within the EKAPCD, whereas the Lancaster–Division Street Monitoring Station is within the Antelope Valley Air Pollution Control District. The nearest monitoring station that records measurements of SO_2 is the Victorville–Park Avenue Station, which is located approximately 69 miles southeast of the proposed project property at 14306 Park Avenue, Victorville, California, within the Mojave Desert Air Quality Management District. Ambient air quality data for the proposed project vicinity recorded at the Mojave, Lancaster–Division Street, and Victorville–Park Avenue Monitoring Stations from 2007 to 2009 indicates exceedances for the applicable state standards, or federal standards for O_3 and PM_{10} (Table 2.3.4-1, *Summary of 2007–2009 Ambient Air Quality Data in the Proposed Project Vicinity)*. Background CO concentration at the proposed project property is established because CO concentrations are typically used as an indicator of the conformity with CAAQS, and estimated changes in CO concentrations generally reflect operational air quality impacts associated with the proposed project. The highest reading of the CO concentrations over the past three years is defined by EKAPCD as the background level. A review of data from the Lancaster–Division Street Monitoring Station from the 2007 to 2009 period indicates that the average 1- and 8-hour background concentrations are approximately 1.3 and 2.5 ppm, respectively. These existing 1- and 8-hour background concentrations do not exceed the state CO standards of 20 ppm and 9 ppm, respectively.

TABLE 2.3.4-1
SUMMARY OF 2007–2009 AMBIENT AIR QUALITY DATA
IN THE PROJECT VICINITY

Pollutant	Pollutant Concentration and Standards	Averages and Exceedances		
		2007	2008	2009
Ozone (O_3)*	Maximum 1-hr concentration (ppm)	0.09	0.11	0.10
	Exceed 0.09 ppm (State 1-hr standard)?	No	Yes	Yes
	Maximum 8-hr concentration (ppm)	0.08	0.10	0.08
	Exceed 0.07 ppm (State 8-hr standard)?	Yes	Yes	Yes
Carbon monoxide (CO)**	Maximum 1-hr concentration (ppm)	2.5	2.2	1.8
	Exceed 20 ppm (State 1-hour standard)?	No	No	No
	Maximum 8-hr concentration (ppm)	1.3	1.0	1.2
	Exceed 9.0 ppm (State 8-hr standard)?	No	No	No
Nitrogen dioxide (NO_2)**	Maximum 1-hr concentration (ppm)	0.06	0.06	0.07
	Exceed 0.18 ppm (State 1-hr standard)?	No	No	No
	Annual concentration (ppm)	0.01	0.01	0.01
	Exceed 0.03 ppm (State annual standard)?	No	No	No
Suspended particulate matter (PM_{10})*	Maximum 24-hr concentration ($\mu g/m^3$)	73	154	68
	Exceed 50 $\mu g/m^3$ (State 24-hr standard)?	Yes	Yes	Yes
	Annual concentration ($\mu g/m^3$)	22	24	17
	Exceed 20 $\mu g/m^3$ (State annual standard)?	Yes	Yes	No
Fine particulate Matter ($PM_{2.5}$)*	Maximum 24-hr concentration ($\mu g/m^3$)	21.1	19.1	12.7
	Exceed 35 $\mu g/m^3$ (Federal 24-hr standard)?	No	No	No
	Annual concentration ($\mu g/m^3$)	6.3	6.7	5.2
	Exceed 12 $\mu g/m^3$ (State annual standard)?	No	No	No
Sulfur dioxide (SO_2)***	Maximum 1-hr concentration (ppm)	0.15	0.047	0.028
	Exceed 0.25 ppm (State 1-hr standard)?	No	No	No
	Maximum 24-hr concentration (ppm)	0.014	0.006	0.005
	Exceed 0.04 ppm (State 24-hr standard)?	No	No	No

NOTES:
* Data for O_3 and PM were taken from the Mojave Monitoring Station.
** Data for CO and NO_2 were taken from the Lancaster–Division Street Monitoring Station.
*** Data for SO_2 were taken from the Victorville–Park Avenue Monitoring Station.
SOURCE: U.S. Environmental Protection Agency. Accessed 9 November 2010. *Air Data: Access to Air Pollution Data.* Available at: http://www.epa.gov/oar/data/

2.3.5 Greenhouse Gas Emissions

In order to establish a reference point for future GHG emissions, CO_{2e} emissions have been projected based on an unregulated, business-as-usual, GHG emissions scenario that does not consider the reductions in GHG emissions required by Executive Order S-3-05 or AB 32. CARB has stated that California contributed 427 million metric tons of GHG emissions in CO_{2e} in 1990, and under a business-as-usual development scenario, will contribute approximately 596 million metric tons of CO_{2e} emissions in 2020, which presents a linear upward trend in California's total GHG emissions. To characterize the business-as-usual GHG emissions specifically for Kern County, information on population has been collected from the Kern Council of Governments. It has been projected that the population of Kern County will increase by approximately 1.9 percent from 2006 to 2030.[56] Using the current CO_{2e} emissions factor of 14 metric tons *per capita*,[57] Kern County would be responsible for the emission of approximately 12 million metric tons of CO_{2e} in 2010 and 17 million metric tons of CO_{2e} in 2030 under a business-as-usual emissions scenario (Table 2.3.5-1, *Characterization of Business-as-usual GHG Emissions for Kern County*).

TABLE 2.3.5-1
CHARACTERIZATION OF BUSINESS-AS-USUAL GHG EMISSIONS FOR KERN COUNTY

	Year					
	1990	**2000**	**2006**	**2010**	**2020**	**2030**
Population	543,477	661,653	779,869	845,600	1,010,800	1,208,200
CARB emission factor (metric tons of CO_{2e} *per capita*)	14	14	14	14	14	14
Annual GHG emissions for Kern County (million metric tons of CO_{2e})	7.6	9.3	10.9	11.8	14.2	16.9

SOURCE: Kern Council of Governments. 17 May 2007. *Final 2007 Destination 2030 Regional Transportation Plan.* Bakersfield, CA.

2.3.6 Sensitive Receptors

The proposed project property is located on approximately 1,207 acres of undeveloped and mostly vacant land in the foothills of the Tehachapi Mountains. Land uses that can be considered sensitive receptors include residences, schools, playgrounds, childcare centers, athletic facilities, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. Sensitive individuals with compromised immune systems, such as children and the elderly, may be exposed to emissions from the construction and operation of the proposed project. The greatest potential for exposure of sensitive receptors to air contaminants would occur during the temporary construction phase, when soil would be disturbed and equipment would be used for site grading, materials delivery, and building construction.

Potential exposure to emissions would vary substantially from day to day, depending on the amount of work being conducted, weather conditions, location of receptors, and exposure time. The construction-phase emissions in this analysis are estimated conservatively based on worst-case conditions, with maximum levels of construction activity occurring simultaneously within a short period of time. The nearest sensitive receptors, residential land uses, with the highest potential to be impacted by the proposed project include any single-family or multiple-family residences located in the surrounding community within 1 mile (5,280 feet) of the proposed project property.

[56] Kern Council of Governments. 17 May 2007. *Final 2007 Destination 2030 Regional Transportation Plan*. Bakersfield, CA.

[57] California Air Resources Board. 15 October 2008. *Climate Change Proposed Scoping Plan: A Framework for Change.* Available at: http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm

2.4 ASSESSMENT METHODS AND MODELS

The methodology to assess the proposed project's impacts on global climate change has not been developed by the EKAPCD or by state or federal agencies with jurisdiction over the proposed project area. Given the absence of an established methodology to evaluate global climate change impacts, the impacts were analyzed qualitatively by considering the proposed project's construction and operational scenarios, size, and location. To guide quantitative analysis of GHG emission impacts of projects, in January 2008, the California Air Pollution Control Officers Association provided public agencies with recommendations for modeling tools to evaluate public projects' potential impacts to global climate change.[58] Among the modeling tools recommended by the California Air Pollution Control Officers Association, two modeling tools (URBEMIS and EMFAC) are used in this analysis to quantify the proposed project's criteria pollutant emission levels and potential impacts to global climate change. In addition, GHG emission factors recommended by the CCAR were used to quantify the potential emissions of the proposed project and to evaluate the potential reduction in GHG emissions caused by operation of the proposed project for renewable energy production.

As discussed in Section 1.0, *Introduction*, the proposed project would entail the development of up to forty (40) 1.5- to 3-megawatt (MW) wind turbine generators (WTGs), for a total generating capacity of approximately 60 MW of wind energy.

2.4.1 URBEMIS Model

The CARB URBEMIS 2007, version 9.2.4, was used to estimate construction emissions from the grading, electrical trenching, construction of roads and pads, and installation of wind turbines. URBEMIS is a computer program that can be used to estimate emissions associated with land development projects in California such as residential neighborhoods, shopping centers, and office buildings; area sources such as gas appliances, wood stoves, fireplaces, and landscape maintenance equipment; and construction projects. The URBEMIS 2007 emissions model directly calculates $PM_{2.5}$ emissions and CO_2 emissions. However, the URBEMIS 2007 model does not calculate CH_4 and N_2O emissions; therefore, the GHG emissions calculated by URBEMIS are reported as CO_2 emissions, not CO_{2e} emissions. CO_2 emissions reported from URBEMIS in this EIR are essentially the same as CO_{2e} emissions because CH_4 and N_2O emissions from mobile sources are negligible in comparison to CO_2 emissions. URBEMIS 2007, version 9.2.4, was also used to analyze the proposed project's mobile and operational emissions, which would likely result from on-site maintenance. Because the proposed project property lacks an industrial component that would be considered a Pb emission source, the concentrations and emissions of Pb were not analyzed for the proposed project. The URBEMIS 2007 model was used for estimating construction and operational GHG emissions, and analysis of construction impacts to air quality is based on the construction scenario described in the project description of the Plan of Development for the proposed project and summarized in Section 1.0 of this report.

The proposed project would include a maximum of 60 MW of wind turbines on a small percentage of the approximately 1,207-acre proposed project property. The following factors were assumed in the technical analyses of air quality using the URBEMIS 2007, version 9.2.4, emission model:

1. Total construction would take a maximum of 4 months, from August 1, 2014, to December 31, 2014.

[58] California Air Pollution Control Officers Association. January 2008. *CEQA and Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act*. Sacramento, CA.

2. The activities undertaken within each month would be as follows:

Month 1:	Grading
Months 2–3:	Deliveries and electrical trenching
Months 2–4:	Installation of turbines
Month 4:	Final grading and clean-up

3. A maximum of 8 acres would be disturbed daily during grading.

4. There would be a total of 195.4 acres of ground disturbance (171.1 acres from temporary impacts and 24.3 acres from permanent impacts).

5. The operational winter temperature would be 50°F, and the operational summer temperature would be 85°F.

6. Default parameters, such as the horsepower and the operational duration, were used for all construction equipment anticipated to be used for the proposed project.

2.4.2 EMFAC 2007 Model

The CARB EMFAC 2007 model, version 2.3, was used to evaluate the proposed project's GHG emission level contributed by mobile sources, such as passenger cars and maintenance vehicles, based on the expected vehicle fleet mix, vehicle speeds, commute distances, and temperature conditions for the estimated start date of construction of the proposed project. The EMFAC 2007, version 2.3, which is embedded within the URBEMIS model, includes emission factors for CO_2 and criteria pollutants. Therefore, the transportation-related GHG emissions impacts generated by implementation of the proposed project were analyzed using the EMFAC 2007 model.

For a more detailed analysis of on-road trips, separate model runs in EMFAC 2007 were performed to analyze the mobile source emissions from equipment traveling to and from the proposed project property during construction and operation. It was assumed that water would be trucked from a location near Rosamond, approximately 21 miles away from the proposed project property, and all other deliveries would be trucked from near Palmdale, approximately 42 miles away from the proposed project property. To quantify emissions from on-road employee commute trips, it was assumed that 50 percent of the employees commuting to the site for construction activities would be traveling from Palmdale, 25 percent would be traveling from Bakersfield, and 25 percent would be traveling from Tehachapi. It is anticipated that most of these workers would carpool to the corner of Rosamond Boulevard and north along 170th Street West, then along access roads constructed for the Manzana project. Based on these assumptions, the average trip length would be approximately 36 miles. In addition, it was also assumed that each trip would travel a further 0.5 mile along unpaved roads.

The following additional assumptions were made in the technical analyses of air quality using the EMFAC 2007, version 2.3, model:

1. Consistent with the traffic study prepared for the proposed project, 477 average daily traffic (ADT) trips would be generated during construction.[59]

[59] Ruettgers and Schuler Civil Engineers. April 2011. *Traffic Study for the Tylerhorse Wind Energy Project*. Bakersfield, CA.

2. Consistent with the traffic study prepared for the proposed project, 24 average daily traffic (ADT) trips would be generated during operation and maintenance activities.[60]

3. The analysis year for construction- and operation-related mobile sources was set to 2014.

2.4.3 Greenhouse Gas Emissions and Potential Savings

Annual GHG emissions and potential savings associated with operation of the proposed project were quantified using GHG emission factors recommended in CCAR's General Reporting Protocol, version 3.1, dated January 2009.[61] The proposed project was assumed to have a generating capacity of up to 60 MW. Assuming that 100 percent of the electricity produced by the proposed project would replace electricity that would otherwise have been generated from conventional energy sources currently used in California, the potential GHG savings from operation of the proposed project were calculated by quantifying the GHG emissions that otherwise would have been generated in a no-project scenario.

2.5 SIGNIFICANCE CRITERIA

The air quality impacts from the proposed project can be separated into construction-related short-term impacts and operation-related long-term, permanent impacts. Both types of impacts may occur on a local or regional scale. The General Conformity Rule requires a conforminty determination for federal actions for each pollutant where the total of direct and indirect emissions in a nonattainment or maintenance earea caused by a federal action would equal or exceed the de minimis levels set forth in Table 2.2.1.1-2. In addition, Kern County has established emissions thresholds to evaluate air quality effects under the California CAA and CEQA:

a) Conflict with or obstruct implementation of the applicable air quality plan

b) Violate any air quality standard as adopted in (c)i, (c)ii, or as established by the USEPA or air district or contribute substantially to an existing or projected air quality violation

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the proposed project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)? Specifically, would implementation of the project exceed any of the following adopted thresholds:

   i. San Joaquin Valley Unified Air Pollution Control District:
   Operational and Area Sources
   Reactive Organic Gases (ROG) 10 short tons per year.
   Oxides of Nitrogen (NO_x) 10 short tons per year.
   Particulate Matter (PM_{10}) 15 short tons per year.

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[60] Ruettgers and Schuler Civil Engineers. April 2011. *Traffic Study for the Tylerhorse Wind Energy Project*. Bakersfield, CA.

[61] California Climate Action Registry. January 2009. *California Climate Action Registry General Reporting Protocol, Version 3.1*. Los Angeles, CA.

Stationary Sources as Determined by District Rules
Severe Non-attainment: 25 short tons per year.
Extreme Non-attainment: 10 short tons per year.

ii. Eastern Kern Air Pollution Control District
Operational and Area Sources
Reactive Organic Gases (ROG) 25 short tons per year.
Oxides of nitrogen (NO_x) 25 short tons per year.
Particulate Matter (PM_{10}) 15 short tons per year.
Stationary Sources as determined by District Rules
25 short tons per year.

d) Expose sensitive receptors to substantial pollutant concentrations?

e) Create objectionable odors affecting a substantial number of people?

f) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

g) Conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

2.5.1 Significance Thresholds

The proposed project site is located on BLM-administrated land, and the BLM is required to demonstrate that it would undertake, approve, permit, or support an action that would conform to the SIP. The portion of the MDAB where the proposed project would occur is designated as non-attainment for the 1-hour and the 8-hour ozone and the PM_{10} NAAQS pursuant to the provisions of the federal CAA. The proposed project would trigger a conformity determination if it does the following:

- Total direct and indirect ozone precusors, VOCs or NOx, emissions in extreme nonattainment area equal or exceed 10 tons per year (Table 2.2.1.1-2);

- Total direct and indirect ozone precusors, VOCs or NOx, emissions in severe nonattainment area equal or exceed 25 tons per year (Table 2.2.1.1-2);

- Total direct and indirect ozone precusors, VOCs or NOx, emissions in serious nonattainment area equal or exceed 50 tons per year (Table 2.2.1.1-2);

- Total direct and indirect ozone precusors, VOCs or NOx, emissions in other areas outside transportation region equal or exceed 100 tons per year (Table 2.2.1.1-2);

- Total direct and indirect PM_{10} emissions in serious nonattainment area equal or exceed 70 tons per year (Table 2.2.1.1-2); or

- Total direct and indirect PM_{10} emissions in moderate attainment and maintenance area equal or exceed 100 tons per year (Table 2.2.1.1-2)

The EKAPCD's CEQA Guidelines, as amended on July 1, 1999, and approved by the EKAPCD Board of Directors, recommends significance thresholds for eastern Kern County.[62] The EKAPCD emission thresholds apply to all federally regulated air pollutants, except Pb, CO, and SO_2, which are not exceeded in the MDAB. The proposed project would have a potentially significant impact if it does the following:

- Construction or operation activity emits more than 137 pounds per day or more of VOCs or NO_x (Table 2.5.1-1, *EKAPCD Emission Thresholds of Significance)*
- Construction or operation of the proposed project results in 25 short tons per year of NO_x or VOC emissions, or 15 short tons per year of PM_{10} emissions (Table 2.5.1-1)
- The proposed project causes or contributes to an exceedance of any California or NAAQS
- The proposed project exceeds the health risk public notification thresholds adopted by the EKAPCD Board of Directors
- The proposed project is not consistent with adopted federal or state Air Quality Attainment Plans
- The proposed project generates greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment
- The proposed project conflicts with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases
- The proposed project hinders attainment of the state's goals of reducing GHG emissions to 1990 levels by 2020
- The proposed project emits annual rates that equal or exceed 25,000 metric tons of CO_2 equivalence as a result of operations (EPA Mandatory Reporting of GHG Rule).

TABLE 2.5.1-1
EKAPCD EMISSION THRESHOLDS OF SIGNIFICANCE

Criteria Air Pollutant	Daily Significance Threshold (pounds per day)	Annual Significance Threshold (short tons per year)
VOCs	137	25
Nitrogen oxides (NO_x)	137	25
Particulates (PM_{10})	—	15

SOURCE: Kern County Air Pollution Control District. 1999. *Guidelines for Implementation of the California Environmental Quality Act (CEQA) of 1970 as Amended*. Bakersfield, CA.

CAPCOA has discussed several approaches to consider the potential cumulative significance of projects with respect to GHGs.[63] A zero-threshold approach can be considered based on the concept

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[62] Kern County Air Pollution Control District. 1999. *Guidelines for Implementation of the California Environmental Quality Act (CEQA) of 1970 as Amended*. Bakersfield, CA.

[63] California Air Pollution Control Officers Association. January 2008. *CEQA and Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act.* Sacramento, CA.

that climate change is a global phenomenon, and all GHG emissions generated throughout the Earth contribute to climate change. However, State CEQA Guidelines also recognize that there may be a point at which a project's contribution, although above zero, to the cumulative impact would not be considerable [State CEQA Guidelines, Section 15130 (a)]. Therefore, a threshold of greater than zero is considered more appropriate for the analysis of GHG emissions under CEQA. CAPCOA's summary of suggested thresholds for GHG emissions includes efficiency-based thresholds, quantitative emission limits, and limits on the size of projects (Table 2.5.1-2, *CAPCOA-suggested Thresholds for Greenhouse Gases*).

For the purposes of the analysis presented in this document, the suggested reporting threshold of 25,000 metric tons CO_{2e} per year will be used as a quantitative threshold to assist with determining significance. Thereporting threshold was selected because it corresponds to the threshold set by EPA for the Mandatory Reporting of GHG Rule.

TABLE 2.5.1-2
CAPCOA-SUGGESTED THRESHOLDS FOR GREENHOUSE GASES

	Suggested Threshold
Quantitative (900 tons)	Approximately 900 metric tons CO_{2e}/year for residential, office, and non-office commercial projects
Quantitative CARB reporting threshold / cap and trade	Report: 25,000 metric tons CO_{2e}/year Cap and trade: 10,000 metric tons CO_{2e}/year
Quantitative regulated inventory capture	Approximately 40,000 to 50,000 metric tons CO_{2e}/year
Unit-based threshold based on market capture	Commercial space > 50,000 square feet
Projects of statewide, regional, or areawide significance	Residential development > 500 units Shopping center/business establishment > 500,000 square feet Commercial office space > 250,000 square feet Industrial park > 600,000 square feet

SOURCE: California Air Pollution Control Officers Association. January 2008. *CEQA and Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act.* Sacramento, CA.

2.6 IMPACT ANALYSIS

This section analyzes the potential for the proposed project to have significant impacts to air quality and GHG emissions. Air quality impacts of a project generally fall into four major categories:

1. Construction impacts are temporary impacts, including airborne dust from grading, demolition, and dirt hauling and emissions of GHGs and criteria pollutants from heavy equipment, delivery and dirt hauling trucks, employee vehicles, and paints and coatings. Construction emissions vary substantially from day to day, depending on the construction activities and weather conditions.

2. Operational regional impacts are primarily emissions of GHGs and criteria pollutants from natural gas and electricity usage and vehicles traveling to and from a project site.

3. Operational local impacts are increases in pollutant concentrations, primarily CO, that result from traffic increases in the immediate vicinity of a project, as well as any toxic and odor emissions generated on-site.

4. Cumulative impacts are air quality and GHG changes that result from the incremental impact of the proposed project when added to other projects in the vicinity.

2.6.1 Construction Phase

Construction of the proposed project has the potential to create air quality and GHG emission impacts through the use of heavy-duty construction equipment and through vehicle trips generated from construction workers traveling to and from the proposed project property. Fugitive dust emissions would primarily result from site preparation (i.e., site excavation, trenching, and grading) activities; NO_x and GHG emissions would primarily result from delivery and hauling of construction materials and equipment, the use of heavy-duty construction equipment, and the construction workers' commute trips to and from the proposed project property. The assessment of construction air quality impacts considers each of these potential sources during each part of the construction phase. Although construction emissions can vary substantially from day to day, depending on the level of activity and the specific type of operation, and fugitive dust emissions can vary based on the prevailing weather conditions, the analysis considers a worst-case scenario with concurrent use of construction equipment to ensure that impacts are not underestimated.

2.6.1.1 Construction Scenario

The information contained in the construction scenario for the proposed project, as described in Section 1.0 of this report, was developed from empirical data for construction of comparable projects and was used in the assessment of potential construction impacts to air quality, ambient noise levels, and transportation.

2.6.2 Construction Impacts

During construction of the proposed project, there is a potential to create air quality impacts through the use of heavy-duty construction equipment and through vehicle trips generated from construction workers traveling to and from the proposed project property. Potential emission estimates from construction activities are based on emission factors and construction scenario information for development at the proposed project property. The total amount of construction, including duration and level of construction activity occurring at the proposed project property, would influence the estimated construction emissions and resulting potential impacts. Therefore, the emission forecasts are based on conservative assumptions about the construction scenario, with a large amount of construction activity occurring in a relatively short time frame. In addition, worker commute trips would vary throughout the construction period. This analysis used the highest estimated number of worker commute trips. Due to the conservative nature of these assumptions, actual emissions from construction of the proposed project would most likely be less than estimated emissions.

Construction emissions are expected to result from the following activities:

- Site grading and other construction activities during the construction phases to prepare installation of various project components
- Delivery and hauling of construction materials and equipment
- Fuel combustion by on-site construction equipment
- Construction worker commute trips

2.6.2.1 Construction Emissions

Daily regional construction emissions were estimated using the URBEMIS 2007 emissions model (Table 2.6.2.1-1, *Unmitigated Estimated Daily Regional Construction Emissions)*. Daily regional construction emissions associated with construction would not be expected to exceed the EKAPCD significance threshold for VOCs, but would be expected to exceed the EKAPCD significance threshold for NO_x.

TABLE 2.6.2.1-1
UNMITIGATED ESTIMATED DAILY REGIONAL CONSTRUCTION EMISSIONS

	Construction Emissions (Pounds/Day)					
Off-road Emission Sources	**VOCs**	**NOx**	**CO**	**SOx**	**$PM_{2.5}$**	**PM_{10}**
Mass site grading: roads and pads	44.28	350.99	204.94	0.03	47.96	175.91
Electrical trenching	10.32	86.47	49.76	0.01	3.19	3.50
Building construction: turbine installation	30.23	261.01	108.10	0.02	8.58	9.37
Fine site grading	25.26	190.77	122.90	0.01	42.73	170.17
Maximum Off-road Emissions	**44.28**	**350.99**	**204.94**	**0.03**	**47.96**	**175.91**
Mobile Sources	**VOCs**	**NO_x**	**CO**	**SO_x**	**$PM_{2.5}$**	**PM_{10}**
Delivery trucks and employee commutes	0.72	3.45	11.43	0.02	4.73	44.75
Maximum Regional Total	**45.00**	**354.44**	**216.37**	**0.05**	**52.69**	**220.66**
EKAPCD Daily Significance Threshold (lbs/day)*	137	137	N/A	N/A	N/A	N/A
Significant?	No	Yes	N/A	N/A	N/A	N/A

NOTE: * EKAPCD does not provide daily emission thresholds for CO, SO_x, $PM_{2.5}$, or PM_{10}.
SOURCE: Sapphos Environmental, Inc., URBEMIS Output for the proposed project; see Appendix B.

The annual regional construction emissions were estimated using the URBEMIS 2007 emissions model (Table 2.6.2.1-2, *Unmitigated Estimated Annual Regional Construction Emissions*). The annual regional construction emissions associated with construction would not be expected to exceed the EKAPCD significance threshold for VOCs, NO_x, or PM_{10}. It is important to note that the estimated emissions are likely to be higher than those actually produced by the proposed project due to the conservative assumptions used. For example, the on-site roads will be cleared, compacted, and topped with caliche (a hard sedimentary rock that contains calcium carbonate); a caliche road surface would be anticipated to produce less PM_{10} emissions than an unpaved and untreated road would produce.

TABLE 2.6.2.1-2
UNMITIGATED ESTIMATED ANNUAL REGIONAL CONSTRUCTION EMISSIONS

	Air Pollutant Emissions (Short Tons/Year)					
Emission Source	**VOCs**	**NO_x**	**CO**	**SO_x**	**$PM_{2.5}$**	**PM_{10}**
Maximum off-road construction emissions	1.53	12.57	6.49	0.00	1.22	4.05
Delivery trucks and employee commutes	0.14	0.68	2.00	0.00	0.86	8.17
Maximum Regional Total	**1.67**	**13.25**	**8.49**	**0.00**	**2.08**	**12.22**
EKAPCD Annual Significance Threshold (Short Tons/Year)*	25	25	N/A	N/A	N/A	15
Significant?	No	No	N/A	N/A	N/A	No

NOTE: * EKAPCD does not provide annual emission thresholds for CO, SO_x, or $PM_{2.5}$.
SOURCE: Sapphos Environmental, Inc., URBEMIS Output for the proposed project; see Appendix B.

2.6.2.2 Localized Construction Impacts

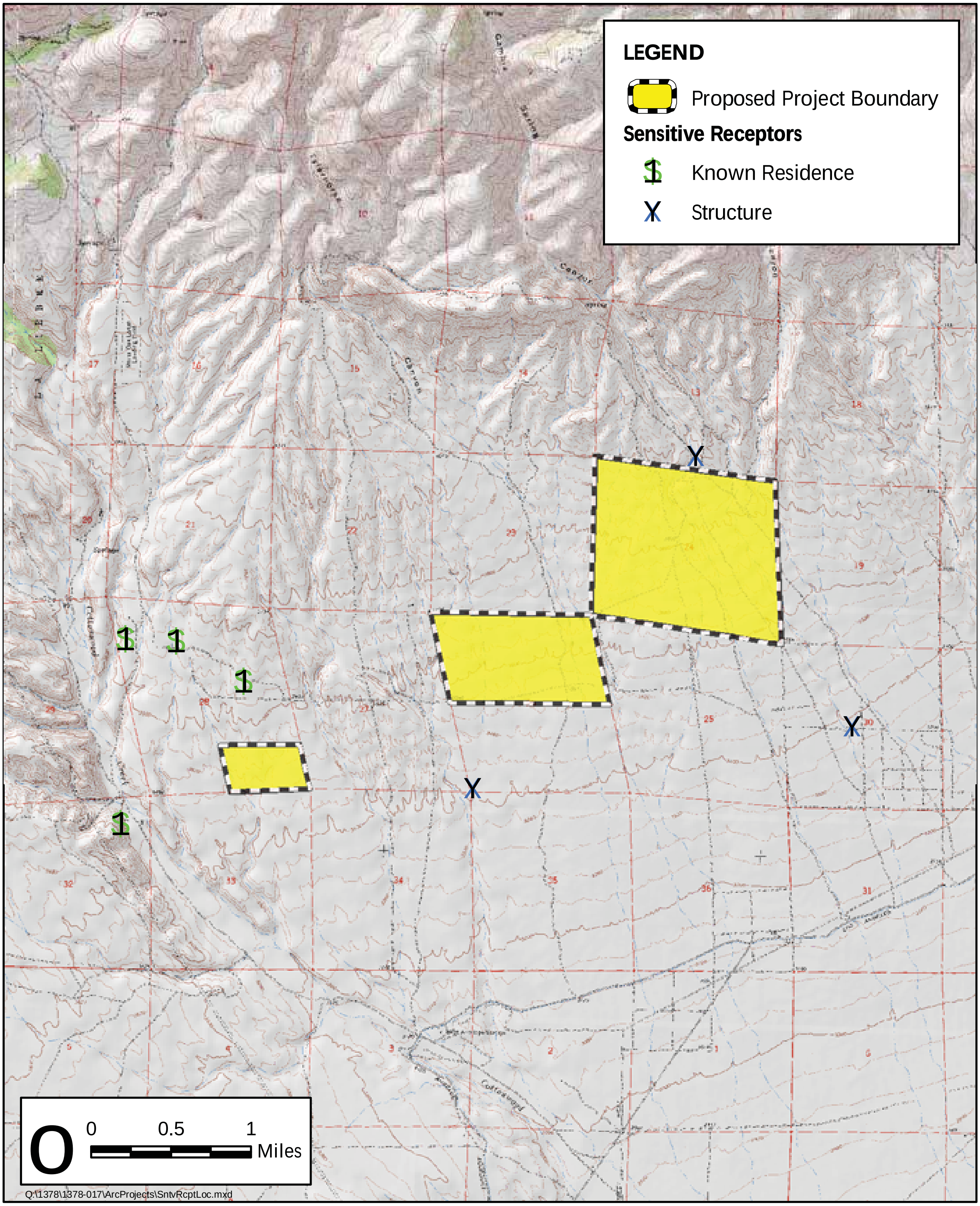
TAC impacts at the proposed project property can be attributed primarily to diesel particulate emissions associated with the use of heavy-duty equipment during construction, and have been analyzed using the standard health risk assessment methodology to determine individual cancer risk of a person continuously exposed to TACs over a 70-year lifetime. Due to the relatively short-term construction schedule of approximately 4 months and the small number of permanent residents living within the proposed project property, construction-related TAC emissions of the proposed project would be expected to be below the level of significance.

Odors at the proposed project property can be emitted from equipment exhaust, application of architectural coatings, and asphalt operation. However, since the project construction has a relatively short-term schedule, and since odors are normally localized and confined to the proposed project property, an odor nuisance is less likely to happen. The construction of the proposed project would use typical construction equipment, and odors at the proposed project property would be typical for most construction sites. In addition, construction of the proposed project would be required to comply with EKAPCD Rule 419; therefore, odor impacts from project construction would be expected to be below the level of significance.

Localized on-site (off-road) emissions are the maximum construction emissions due to off-road construction equipment and unpaved off-road travel by employees and delivery trucks (Table 2.6.2.1-1 and Table 2.6.2.1-2). Localized on-site (off-road) emissions for the proposed project would not exceed the EKAPCD significance thresholds for VOCs or PM, but would exceed the EKAPCD daily significance threshold for NO_x.

CO is considered a localized problem and requires additional analysis when a proposed project is likely to expose sensitive receptors to localized levels of CO concentrations from vehicles, which are known as CO “hotspots.” The maximum daily regional total CO emissions from construction of the proposed project is approximately 350.99 pounds/day (Table 2.6.2.1-1), and the maximum annual regional total CO emission from construction of the proposed project is approximately 11.53 short tons/year (Table 2.6.2.1-2). Construction of the proposed project would require the use of off-road construction equipment, delivery trucks, and vehicles for employee commutes. CO concentrations could be increased during the construction. However, due to a maximum of 4-month construction period, the potential increase in CO concentrations at sensitive receptor locations would be limited to these 4 months. Because EKAPCD does not provide daily or annual emission threshold for CO, it cannot be determined if localized construction CO emissions of the proposed project would exceed the level of significance.

Due to the short timeline of the proposed project construction and temporary nature of potential exposures to construction-related air emissions from the proposed project, off-site residents, including adults and children, would not be expected to be significantly affected by the proposed project. In addition, although off-site sensitive receptors would have a potentially longer exposure to the proposed project’s construction-related air emissions, the distance from the proposed project property would be expected to minimize potential impacts to below the level of significance. Based on April 1, 2008 Google Earth imagery, there are no residences within the proposed project site. However, there are four structures and three known residences within a 1-mile radius of the proposed project site boundary (proposed project study area), all of which could potentially be defined as sensitive receptors by the County (Figure 2.6.2.2-1, *Sensitive Receptor Locations*). The closest potential sensitive receptor is an unconfirmed residence located approximately 0.25 mile northeast from the nearest proposed turbine pad. Although PM_{10} emissions during construction would result in a temporary significant impact



IBERDROLA
RENEWABLES

FIGURE 2.6.2.2-1
Sensitive Receptor Locations

exceeding the significance threshold, this potential residence would not be impacted significantly due to the prevailing wind direction. Prevailing wind in the project area blows from the northwest, therefore, wind would blow dust associated with construction activities away from the nearest potential sensitive receptor. The nearest sensitive residences located to the west, downwind, of construction activities are more than 0.5 mile away from the nearest proposed turbine pads. Therefore, construction impacts at these sensitive receptors would be expected to be below the level of significance.

2.6.3 Operational Impacts

2.6.3.1 Operation and Maintenance Scenario

Long-term operational air emissions at the proposed project property are likely to result from mobile sources due to scheduled maintenance that would be conducted approximately every 6 months on each proposed wind turbine, and any necessary repairs. The proposed project would be expected to generate a maximum of 24 daily vehicle trips due to employee commutes.[64] Operational equipment emissions were calculated assuming a total of 8 days per year of equipment use, based on a worst-case scenario in which approximately 10 percent of proposed turbines fail, and assuming a maximum of forty (40) 1.5-MW turbines that could be used for the proposed project.

The URBEMIS 2007 emissions model was used to calculate emissions from operational equipment (Table 1.3-3). Mobile-source emissions due to employee commute trips were modeled using EMFAC 2007, version 2.3, embedded within the URBEMIS 2007 version 9.2.4 model.

2.6.3.2 Operational Regional Impacts

The proposed project would be anticipated to have potential impacts to air quality during operation, some of which would be offset by reduced emissions due to the proposed project's purpose to produce renewable energy to displace fossil fuel use. Operational emissions from both operational equipment and mobile sources were calculated based on a worst-case scenario of the maximum number of turbines that could be used for the project (forty 1.5-MW turbines) (Table 2.6.3.2-1, *Unmitigated Estimated Daily Operational Emissions)*. Daily operational emissions of VOCs and NO_x from the proposed project would not exceed EKAPCD thresholds. The emission models likely show results that may be higher than actual emissions because simultaneous operation of all equipment is a conservative assumption. In addition, the proposed project would be anticipated to prevent the emission of approximately 57 short tons of NO_x per year due to the displacement of fossil fuel use, which is equivalent to approximately 312 pounds of NO_x per day based on a generation capacity of 60 MW.[65] Even without the credit for the fossil fuel emissions that would be offset by implementation of the proposed project, daily emissions from operation and maintenance of the proposed project would be below the level of significance.

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[64] Ruettgers and Schuler Civil Engineers. April 2011. *Traffic Study for the Tylerhorse Wind Energy Project*. Bakersfield, CA.

[65] Assuming a capacity factor of 35 percent, each 1 MW of installed capacity would be able to generate 0.35 MW. Therefore, a 60-MW project would be able to generate 60 MW × 0.35 = 21 MW per hour. 21 MW/hour × 24 hours × 365 days = 183,960 MWh/year. Using the CAMX NO_x electricity generation factor of 0.62 lbs NO_x/MWh, a year's electricity generation would be responsible for the displacement of 0.62 lbs NO_x/MWh × 183,960 MWh/year × 1 short ton / 2,000 lbs = 57.03 short tons NO_x.

TABLE 2.6.3.2-1
UNMITIGATED ESTIMATED DAILY OPERATIONAL EMISSIONS

Emission Sources	Air Pollutants (Pounds/Day)					
	VOCs	NO_x	CO	SO_x	$PM_{2.5}$	PM_{10}
Operational equipment	3.65	28.85	14.24	0.00	1.10	1.20
Mobile Sources	0.61	3.09	7.25	0.01	5.45	25.36
Total Emissions	**4.26**	**31.94**	**21.49**	**0.01**	**6.55**	**26.56**
EKAPCD Threshold	137	137	—	—	—	—
Exceedance of Significance?	No	No	N/A	N/A	N/A	N/A

NOTE: EKAPCD does not provide daily emission thresholds for CO, SO_x, or PM.
SOURCE: Sapphos Environmental, Inc., URBEMIS output for the proposed project; see Appendix B.

The annual operational emissions of PM_{10} were also shown to be below the EKAPCD thresholds of significance for the proposed project (Table 2.6.3.2-2*, Unmitigated Estimated Annual Operational Emissions*). It is also important to note that the estimated emissions are likely to be higher than actual emissions from the proposed project due to the conservative assumptions used for emission modeling. For example, the model does not consider that the on-site roads for the proposed project will be cleared, compacted, and topped with caliche. Travel on a caliche road surface would be expected to produce less PM_{10} emissions than travel on an unpaved and untreated road would produce. Thus, the proposed project would not be anticipated to have significant impacts to air quality with respect to annual criteria pollutant emissions during operations.

TABLE 2.6.3.2-2
UNMITIGATED ESTIMATED ANNUAL OPERATIONAL EMISSIONS

Emission Sources	Air Pollutants (Tons/Year)					
	VOCs	NO_x	CO	SO_x	$PM_{2.5}$	PM_{10}
Operational equipment	0.01	0.12	0.06	0.00	0.00	0.00
Mobile Sources	0.08	0.40	0.94	0.00	0.71	3.30
Total Emissions	**0.09**	**0.52**	**1.00**	**0.00**	**0.71**	**3.30**
EKAPCD Threshold	25	25	—	—	—	15
Exceedance of Significance?	No	No	N/A	N/A	N/A	No

NOTES: EKAPCD does not provide annual emission thresholds for CO or SO_x.
Annual operational equipment emissions are calculated assuming 8 days of use per year.
Annual mobile-source emissions are calculated assuming 260 working days per year.
SOURCE: Sapphos Environmental, Inc., URBEMIS output for the proposed project; see Appendix B.

2.6.3.3 Local Operational Impacts

Carbon Monoxide

CO is considered a localized problem and requires additional analysis when a proposed project is likely to expose sensitive receptors to localized levels of CO concentrations from vehicles, which are known as CO "hotspots." Due to the low number of vehicle trips anticipated for the proposed project (24 per day), no significant increase in CO concentrations at sensitive receptor locations would be expected, and localized operational CO emissions would be below the level of significance.

Toxic Air Contaminants

TAC impacts at the proposed project property would result primarily from diesel particulate emissions associated with heavy-duty equipment operations. The operation of the proposed project would not generate a substantial number of heavy-duty equipment operations or daily truck trips. Delivery truck trips during project operation would be the primary contributor to the TAC level at the proposed project property. However, the number of heavy-duty delivery trucks accessing the proposed project property on a daily basis would be minimal, and the proposed project area is remote and largely unpopulated; therefore, TAC emissions would not occur in large concentrations in populated areas. In general, wind energy sites are not contributors of acute TAC impacts compared with other sources, such as manufacturing industries and automobile repair facilities, which are typical sources of acute and chronically hazardous TACs. Therefore, project operation–related TAC emissions would be below the level of significance and, consequently, the impact to human health would be below the level of significance.

Visibility-reducing Particles

The threshold for visibility under the CAAQS is correlated with the standard extinction coefficient of 0.23 per kilometer. Due to the fact that the proposed project's operation does not involve area-source emissions that would be expected to impair visibility, the impact of the proposed project to visibility would be below the level of significance**.**

Odor

Odor nuisances are typically associated with land uses and industrial operations, such as agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting, refineries, landfills, dairies, and fiberglass molding. Since the proposed project development includes wind turbines, and does not include any land uses or industrial operations typically associated with odor nuisance, odor impacts from the proposed project would be expected to be below the level of significance. Furthermore, although any on-site trash receptacles are potential sources of odors, they would be maintained and controlled in a manner that controls adverse odors and complies with EKAPCD Rule 419. Therefore, odor impacts from operation of the proposed project would be below the level of significance.

Daily operational emissions, TAC levels, visibility, and odor impacts would be expected to be below the level of significance. Therefore, the long-term exposure of sensitive receptors to the proposed project's operational NO_x emissions would be expected to be below the level of significance.

2.6.4 Conformity Determination

The potential for the proposed action to be subject to the conformity determination with the federal CAA and the NAAQS was analyzed. The General Conformity Rule requires the evaluation of the proposed action's emissions against the de minimis level for all nonattainment pollutants in order to determine if the proposed action would be subject to a conformity determination. The MDAB is designated as nonattainment for ozone and PM_{10} emissions; therefore the proposed action's annual unmitigated estimated construction and operational emissions were compared to the de minimis level for ozone precusors (VOCs or NOx) emissions and PM_{10} emissions (Table 2.6.4-1, *Conformity Determination*). It is unlikely the proposed action would be subject to a conformity determination.

TABLE 2.6.4-1
CONFORMITY DETERMINATION

Proposed Action	Annual Unmitigated Estimated Nonattainment Air Pollutants (Tons/Year)		
	Ozone		
	VOCs	NOx	PM_{10}
Construction	1.67	13.25	12.22
Operation	0.09	0.52	3.30
De Minimis Level[1]	10		70
Subject to Conformity Determination?[2]	No		No

NOTES:
1. The most stringent De Minimis Level for ozone, 10 tons/year in extreme nonattainment area, was selected.
2. Persuant to the General Conformity Rule, the De Minimis Level for ozone is the total emissions of ozone precursors (VOCs or NOx). If the total annual unmitigated estimated VOCs emissions are selected to determine the proposed project's subjectivity to a conformity determination, and if the most stringenet 10 tons/year in extreme nonattainment area for ozone is chosen as the applicability level, the proposed project would not be subject to a conformity determination. Even if the total annual unmitigated estimated NOx emissions are selected to determine the proposed project's subjectivity to a conformity determination, such a determination may still be unlikely if the De Mimis Level is 25 tons/year, 50 tons/year, or 100 tons/year in severe, serious, or other areas, respectively.

2.6.5 Greenhouse Gas Emissions

The proposed project's global climate change impacts were first analyzed qualitatively considering the proposed project's operational scenario, size, and location. To quantify the amount of GHG emissions contributed by construction and operation of the proposed project, the URBEMIS 2007 emissions model, the EMFAC 2007 model, and the CCAR's General Reporting Protocol were used. In addition, the role of the proposed project in reducing GHG emissions through the generation of renewable energy was analyzed based on the anticipated energy production that will be generated during its operational phase from 2013 to 2043. Based on the suggested thresholds proposed by CAPCOA,[66] the proposed project would be expected to have the potential to result in significant impacts related to global climate change if the proposed project conflicts with the goal of reducing California's GHG emissions to the 1990 levels (427 million metric tons CO_{2e}, which is equivalent to approximately 10 tons CO_{2e} *per capita*) by 2020 as required by AB 32, or emits more than 10,000 metric tons of CO_{2e} per year.

2.6.5.1 Qualitative Analysis of Greenhouse Gas Emission Impacts

The proposed project's incremental impact to GHG emissions would be potentially significant if the size, nature, or duration of the construction phase would emit a substantial amount of GHGs. The construction phase of the proposed project would take approximately 4 months to complete and would cover portions of the 1,207-acre proposed project property. During construction, heavy-duty equipment would be operated, which, together with the large area under construction, would be expected to produce significant GHG emissions. Therefore, the proposed project's construction phase would have the potential to result in substantial increases in GHG emissions, and a quantitative analysis is warranted.

During the operational phase, the proposed project's GHG emissions would be expected to be below the level of significance. As described in the project description (see Section 1.0), the proposed project

[66] California Air Pollution Control Officers Association. January 2008. *CEQA and Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act.* Sacramento, CA.

is intended to produce a maximum of 60 MW of electricity from wind energy turbines. Therefore, although the use of maintenance equipment for the proposed project would be expected to emit GHGs, the operational phase would be expected to result in a net decrease in regional GHG emissions due to the generation of renewable energy that is intended to reduce the use of fossil fuels for electricity generation. Operation of the proposed project would not be expected to have a significant detrimental impact upon GHG emissions, and would reduce GHG emissions in compliance with the goals of AB 32 by providing an additional source of renewable energy, which would reduce GHG emissions compared to a business-as-usual scenario.

2.6.5.2 Quantitative Analysis of Greenhouse Gas Emission Impacts

Based on emissions modeling, construction activities would result in a maximum of approximately 63,036.00 pounds per day of CO_2 emissions, or 10,443.23 metric tons per year, which is equivalent to 38,291.92 metric tons of $CO_{2equivalent}$ per year (Table 2.6.5.2-1, *CO_2 and $CO_{2equivalent}$ Emissions*). Operation of the proposed project would result in approximately 4,757.28 pounds per day of CO_2 emissions, which is equivalent to 788.14 metric tons of CO_2 emissions per year or 2,889.85 metric tons of $CO_{2equivalent}$ per year (Table 2.6.5.2-1). The operational GHG emissions can be attributed to mobile sources and use of operational equipment. The proposed project is expected to have a 30-year lifetime. It is anticipated that operation of the proposed project would result in approximately 86,695.50 metric tons of $CO_{2equivalent}$ over its lifetime.[67] However, as a potential producer of renewable energy, the proposed project would also be expected to prevent the emission of 60,422.6 metric tons of CO_2 per year or 221,550 metric tons of $CO_{2equivalent}$ per year that otherwise would be emitted as a result of electricity production from nonrenewable sources in a no-project scenario.[68] Since the proposed project is expected to have a 30-year lifetime, the proposed project would be expected to prevent approximately 6,646,500 metric tons of $CO_{2equivalent}$ over a 30-year period. Therefore, the overall impact of operation of the proposed project would be expected to have no negative net impact upon GHG emissions, would not trigger the reference point of 25,000 metric tons of direct $CO_{2equivalent}$ that would warrant detailed consideration in the NEPA review set forth in the draft Guidance by CEQ, would not exceed the CAPCOA cap-and-trade threshold of 10,000 metric tons per year, and would reduce GHG emissions in compliance with AB 32. Therefore, it is expected that the overall GHG emissions resulting from construction and operation of the proposed project would be consistent with CEQ's guidance and would be below the level of significance.

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[67] Operation of the proposed project is expected to result in approximately 86,695.50 metric tons of $CO_{2equivalent}$ (2,889.85 metric tons of $CO_{2equivalent}$ per year x 30 years).

[68] Assuming a capacity factor of 35 percent, each 1 MW of installed capacity would be able to generate 0.35 MW of electricity. Therefore, a 60-MW wind farm would be able to generate 60 MW x 0.35 = 21 MW per hour. Generation of 21 MW per hour x 24 hours per day x 365 days per year would yield approximately 183,960 MW per year. Using the CAMX CO_2 electricity generation factor of 724.12 lbs CO_2/MWh, a year's electricity generation would be responsible for the displacement of 724.12 lbs CO_2/MWh × 183,960 MWh/year × 1 metric ton / 2,204.623 lbs = 60,422.6 metric tons CO_2. The 60,422.6 metric tons of CO2 emissions per year equals to 221,550 metric tons of $CO_{2equivalent}$ per year.

TABLE 2.6.5.2-1
CO_2 and $CO_{2equivalent}$ EMISSIONS

Construction Emission Sources	CO_2 Emissions		$CO_{2equivalent}$ Emissions
	Pounds/Day	Metric Tons/Year[1,2]	Metric Tons/Year
Maximum Construction Emissions	**63,036.00**	**10,443.23**	**38,291.92**
Operational Emission Sources	**Pounds/Day**	**Metric Tons/Year**	**Metric Tons/Year**
Operational equipment	4,464.72	739.67	2,712.13
Mobile Sources	292.56	48.47	177.72
Maximum Operational Emissions	**4,757.28**	**788.14**	**2,889.85**
Maximum Total Emissions	**67,793.28**	**11,231.37**	**41,181.77**

NOTES:
1. Maximum annual construction emissions were calculated for the highest emissions year (2012).
2. Annual emissions for employee commutes and delivery trucks were based on 260 working days per year, with operational equipment operating for a maximum of 8 days per year.

2.6.6 Valley Fever

The state has not adopted thresholds of significance for Valley Fever; however, the likelihood of the occurrence of Valley Fever can be determined based on the proposed project location. The proposed project property is located to the west of Rosamond in the Mojave Desert area of eastern Kern County. The soil in the proposed project area consists of recent-age alluvial deposits, primarily derived from erosion of Pleistocene- to Pliocene-age non-marine fan and terrace deposits sourced from the southeastern flanks of the Tehachapi Mountains. This rock type would lead to similar soils based upon the similar mineralogical and consequent chemical content.[69]

The proposed project property is not underlain by the type of sediments that are known to contain Valley Fever spores. Considering that the proposed project will comply with EKAPCD Rule 402 dust control measures, the risk of contacting Valley Fever in connection with the proposed project is considered to be below the level of significance.

2.7 CUMULATIVE IMPACT ANALYSIS

2.7.1 Regional Impacts

There are three related projects within a 1-mile radius of the proposed project property: Manzana (formerly PdV) Wind Energy Project, Pacific Wind Energy Project, and the Catalina Renewable Energy Project. The construction phases for both the Manzana Wind Energy Project and the Pacific Wind Energy Project have been completed, whereas the Catalina Renewable Energy Project is still undergoing construction. The Manzana Wind Energy Project is located on a 7,049-acre property directly west of the proposed project property and included installation of up to 300 wind turbines to generate up to 300 MW of electricity. The Pacific Wind Energy Project is located on a 9,576-acre property directly south of the proposed project property, and included the installation of up to 151 wind turbines to generate up to 151 MW of electricity. The Catalina Renewable Energy Project is located to the east of the proposed project property and is approved to install 200 MW of wind energy and 150 MW of solar energy on portions of a 6,739-acre property.

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[69] U.S. Department of Agriculture. Accessed 18 February 2010. Soil Survey of Kern County California Southeastern Part. Kern County, California. Available at: http://websoilsurvey.nrcs.usda.gov/app/

Other proposed projects located within a 6-mile radius include the Avalon Wind Energy Project, the Southern California Edison Tehachapi Renewable Transmission (SCE TRTP) Project, the Alta–Oak Creek Mojave Project, the Antelope Valley Solar Development, the David Firestone Solar Project, the Mon-Wei Lin Solar Project, the Morgan Hills Wind Project, the Rosamond Solar Project by First Solar, and the Rosamond Solar Project by SGS. Of the related projects located within a 1-mile and 6-mile radius, the SCE TRTP Project, the Alta–Oak Creek Mojave Project, the Manzana Wind Energy Project, and the Pacific Wind Energy Project have completed their construction phases, and therefore only their operational emissions were included in the analysis. For all other related projects, both construction and operational emissions have been included for analysis.

Maximum cumulative impacts for VOCs, NO_X, and PM_{10} emissions resulting from construction of the proposed project and related projects would be expected to be significant and unavoidable for the worst-case scenario in which all projects are in construction during the same year (Table 2.7.1-1, *Cumulative Annual Construction Emissions*). Therefore, cumulative impacts due to construction of the proposed project, in conjunction with the related past, present, or reasonably foreseeable probable future projects, would be considered to be significant and unavoidable. This impact is temporary and is based on the conservative assumption that construction activities for multiple projects would take place concurrently.

TABLE 2.7.1-1
CUMULATIVE ANNUAL CONSTRUCTION EMISSIONS

Construction Phase	Construction Emissions (Tons/Year)					
	VOCs	NO_x	CO	SO_x	$PM_{2.5}$	PM_{10}
Proposed Project[1]	1.67	8.35	8.49	0.00	1.54	10.07
Avalon Wind Energy Project[2]	4.23	26.70	21.75	0.03	28.84	147.02
Catalina Renewable Energy Project[3]	10.28	64.51	54.82	0.07	22.48	137.65
Antelope Valley Solar Development[4]	1.44	17.18	5.65	0.01	2.66	10.34
Morgan Hills Wind Energy Project[5]	9.60	86.48	46.55	0.13	12.46	66.58
David Firestone[6]	0.34	5.19	23.96	0.00	0.06	0.12
Mon-Wei Lin[7]	3.55	20.78	23.67	0.00	1.14	5.75
Rosamond Solar by First Solar[8]	8.67	46.14	41.35	0.07	3.76	38.50
Rosamond Solar by SGS[9]	3.23	28.93	16.84	0.03	2.60	8.04
Maximum Annual Total	41.83	296.89	236.81	0.33	72.97	408.34
Annual Significance Threshold (Tons/Year)*	25	25	N/A	N/A	N/A	15
Significant?	Yes	Yes	N/A	N/A	N/A	Yes

NOTES:
* EKAPCD does not provide annual emission thresholds for CO, $PM_{2.5}$, or SO_x

SOURCES:
1. Sapphos Environmental, Inc., URBEMIS output for the proposed project; see Appendix B.
2. Kern County Planning and Community Development Department. April 2011. *Avalon Wind Energy Project Air Quality Impact Technical Report*. Bakersfield, CA.
3. Kern County Planning and Community Development Department. May 2011. *Catalina Renewable Energy Project Air Quality Impact Technical Report*. Table 2.7.1-1. Bakersfield, CA.
4. Kern County Planning and Community Development Department. June 2010. *Antelope Valley Solar Power Project Draft Air Quality Impact Report*. Bakersfield, CA.
5. Kern County Planning and Community Development Department. July 2011. *Morgan Hills Wind Energy Project Draft Environmental Impact Report*. Bakersfield, CA.
6. Emissions data extrapolated based on a per-MW rate derived from the High Desert Solar Project, which is comparable in size to the David Firestone Project.
7. Emissions data extrapolated based on a per-MW rate derived from the King Bird Solar Photovoltaic Project, which is comparable in size to the Mon-Wei Lin Project.
8. Kern County Planning and Community Development Department. December 2013. *Rosamond Solar Array Project Draft Environmental Impact Report*. Bakersfield, CA.
9. Kern County Planning and Community Development Department. May 2013. *Rosamond Solar Modification Project Addendum to the Environmental Impact Report*. Bakersfield, CA.

The mitigated operational emissions anticipated to result from the EKAPCD portion of the related projects within a 6-mile radius and the proposed project have been included in Table 2.7.1-2, *Cumulative Annual Operational Emissions*. Cumulative impacts to VOC and NO_X emissions resulting from implementation of the proposed project and related projects would be expected to be below the level of significance, even without considering the fossil fuel–related emissions displaced by the proposed project. Cumulative impacts related to PM_{10} emissions would be potentially significant, primarily as a result of the Alta–Oak Creek Mojave Project. However, the adopted Environmental Impact Report for the Alta–Oak Creek Mojave Project states that the production of renewable energy from this project would offset PM_{10} emissions by approximately 255.65 tons per year, and operational air quality impacts are considered to be below the level of significance.[72] Therefore, cumulative

[72] Kern County. August 2009. *Draft Environmental Impact Report for the Alta-Oak Creek Mojave Project*. Bakersfield, CA.

impacts due to operation of the proposed project, in conjunction with the related past, present, or reasonably foreseeable probable future projects, would be considered to be below the level of significance.

TABLE 2.7.1-2
CUMULATIVE ANNUAL OPERATIONAL EMISSIONS

Related Project	Air Pollutant Emissions (Tons/Year)					
	VOCs	NO_x	CO	SO_x	$PM_{2.5}$	PM_{10}
Proposed Project[1]	0.09	0.52	1.00	0.00	0.11**	0.84**
Avalon Wind Energy Project[2]	0.19	0.73	1.60	0.00	0.34**	3.02**
SCE TRTP Project[3]	0.06	0.42	0.25	0.00	0.23	0.67
Manzana Wind Energy Project[4]	0.7	2.3	4.5	0.00	0.8	6.8
Pacific Wind Energy Project[5]	0.80	4.07	3.95	0.00	0.79	5.23
Alta-Oak Creek Mojave Project[6]	0.31	0.35	2.99	0.00	3.38	15.96
Catalina Renewable Energy Project[7]	0.19	0.96	1.56	0.00	0.46	4.19
Rosamond Solar by First Solar[8]	0.10	0.09	0.93	0.00	0.01	0.01
Rosamond Solar by SGS[9]	1.66	0.04	0.24	0.01	0.01	0.02
Antelope Valley Solar Development[10]	0.01	0.01	0.08	0.00	0.00	0.01
David Firestone[11]	0.01	0.00	0.01	0.00	0.00	0.02
Mon-Wei Lin[12]	0.03	0.04	0.25	0.00	0.00	0.00
Morgan Hills Wind Energy Project[13]	0.97	1.52	1.92	0.03	1.02	7.97
Maximum Annual Total	5.12	11.05	19.28	0.04	6.70	40.88
Annual Significance Threshold (Tons/Year)*	25	25	N/A	N/A	N/A	15
Significant?	No	No	N/A	N/A	N/A	Yes

NOTES: * EKAPCD does not provide annual emission thresholds for CO, $PM_{2.5}$, or SO_x
** PM emissions assume limiting vehicle speeds on unpaved roads to 15 MPH.
SOURCES: 1. Sapphos Environmental, Inc., URBEMIS output for the proposed project; see Appendix B.
1. Sapphos Environmental, Inc., URBEMIS output for the proposed project; see Appendix B.
2. Kern County Planning and Community Development Department. April 2011. *Avalon Wind Energy Project Air Quality Impact Technical Report*. Bakersfield, CA.
3. Southern California Edison. October 2009. *Final Environmental Impact Report for the Tehachapi Renewable Transmission Project*. Prepared by: Aspen Environmental Group.
4. Kern County. September 2007. *Final Environmental Impact Report for the PdV Wind Energy Project*. Bakersfield, CA.
5. Kern County Planning and Community Development Department. June 2010. *Pacific Wind Energy Project Draft Environmental Impact Report*. Bakersfield, CA.
6. Kern County Planning and Community Development Department. August 2009. *Draft Environmental Impact Report for the Alta–Oak Creek Mojave Project*. Bakersfield, CA.
7. Kern County Planning and Community Development Department. May 2011. *Catalina Renewable Energy Project Air Quality Impact Technical Report*. Table 2.7.1-1. Bakersfield, CA.
8. Kern County Planning and Community Development Department. December 2013. *Rosamond Solar Array Project Draft Environmental Impact Report*. Bakersfield, CA.
9. Kern County Planning and Community Development Department. May 2013. *Rosamond Solar Modification Project Addendum to the Environmental Impact Report*. Bakersfield, CA.
10. Kern County Planning and Community Development Department. June 2010. *Antelope Valley Solar Power Project Draft Air Quality Impact Report*. Bakersfield, CA.
11. Emissions data extrapolated based on a per-MW rate derived from the High Desert Solar Project, which is comparable in size to the David Firestone Project.
12. Emissions data extrapolated based on a per-MW rate derived from the King Bird Solar Photovoltaic Project, which is comparable in size to the Mon-Wei Lin Project.
13. Kern County Planning and Community Development Department. July 2011. *Morgan Hills Wind Energy Project Draft Environmental Impact Report*. Bakersfield, CA.

2.7.2 Consistency with Existing Air Quality Attainment Plans

The proposed project would be expected to be consistent with the Kern County Air Quality Attainment Plan. The federal *Guideline on Air Quality Models* considers "nearby" sources to determine cumulative ambient impacts, where a "nearby" source is any source expected to cause a significant concentration gradient in the vicinity of the proposed new source.[73] *Vicinity* is defined as the "impact area," which is a circular area with a radius extending from the source to the most distant point where the model predicts an impact in excess of the significance threshold.[74] Under federal guidance, no additional modeling would be required if the maximum impacts do not exceed the significance threshold. The initial modeling indicated that, after incorporation of mitigation measures, operation and maintenance of the proposed project would not exceed the annual thresholds of significance; therefore, in accordance with New Source Review (NSR) regulations and PSD guidelines issued by USEPA, the proposed project would not conflict with or obstruct implementation of EKAPCD's Air Quality Attainment Plan, cause a violation of the standards, or impact the attainment status of EKAPCD. Therefore, the proposed project's contribution to cumulative impacts would be below the level of significance and less than cumulatively considerable.

2.7.3 Kern Council of Governments Conformity and Traffic Analysis Zones

Utilization of Kern Council of Governments (COG) data provides a framework for assistance in determining the cumulative significance of a project with respect to air quality emissions. Where a proposed project's emissions are found to be consistent with local and regional growth projections, that project is considered to be in conformance with air basin projections, and regional, state and federal emission budgets and air quality improvement goals.

The proposed project is located in traffic analysis zone (TAZ) 832, which is projected to have 96 jobs by the year 2025 (Table 2.7.3-1, *Traffic Analysis Zones Projected Job Growth)*. There are approximately 60 existing jobs in these TAZs, and the proposed project would be anticipated to generate 8 to 12 permanent jobs during operation. By the year 2025, the number of jobs, including existing jobs and jobs contributed by the proposed project, would be within the projections of the Kern Council of Governments (Table 2.7.3-1). However, more jobs may potentially be added, up to 96 based on the current land use.

TABLE 2.7.3-1
TRAFFIC ANALYSIS ZONES PROJECTED JOB GROWTH

Job Source	Projected Jobs 2006	Projected Jobs 2015	Projected Jobs 2025
Kern Council of Governments TAZ existing jobs	60	76	96
Jobs projected to be contributed by operation of the proposed project	—	12	12
Kern Council of Governments TAZ job projection	—	553	770
Total Existing and Projected Jobs	**60**	**72**	**72**

Source: Kern Council of Governments. February 2010. Traffic Analysis Zone Data. Bakersfield, CA.

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[73] U.S. Environmental Protection Agency. 2003. "Revision to the Guideline on Air Quality Models: Adoption of a Preferred Long Range Transport Model and Other Revisions." Available at: http://www.epa.gov/EPA-AIR/2003/April/Day-15/a8542.htm

[74] U.S. Environmental Protection Agency. 1998. "Air Quality Analysis for Prevention of Significant Deterioration (PSD)." Available at: http://www.epa.gov/scram001/guidance/mch/saq1.txt

The Kern County Air Quality Attainment Plan recognizes growth of the population and economy within the EKAPCD. The proposed project would be expected to displace emissions from conventionally generated energy, thus would mitigate emissions beyond what was anticipated by the Air Quality Attainment Plan, and would have no cumulative impact contribution. Therefore, this project when considered with all projects in the proximity transportation analysis zones, and in the context of the implementation plans to reach and maintain attainment, is considered to be below the level of significance.

2.7.4 Air Basin Emissions Reported by California Air Resources Board

As recommended by the Kern County *Guidelines for Preparing an Air Quality Assessment for Use in Environmental Impact Reports*, current (2008) and projected (2020) emission data for criteria pollutants within the MDAB and the Kern County portion of the MDAB was collected from CARB to assess cumulative air quality impacts (Table 2.7.4-1, *2008 Emissions for the Mojave Desert Air Basin*; Table 2.7.4-2, *2008 Emissions for the Kern County Portion of the Mojave Desert Air Basin*; Table 2.7.4-3, *2020 Projected Emissions for the Mojave Desert Air Basin*; and Table 2.7.4-4, *2020 Projected Emissions for the Kern County Portion of the Mojave Desert Air Basin*). A comparison of the current (2008) and projected (2020) emission data shows that total CO and NO_x emissions within the MDAB are projected to decrease over time due to increased controls on mobile-source emissions, while PM and SO_x emissions from stationary and area sources are projected to increase due to population and economic growth.

TABLE 2.7.4-1
2008 EMISSIONS FOR THE MOJAVE DESERT AIR BASIN

Emission Source	Annual Average (Tons/Day)					
	ROG	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Total stationary-source emissions	16.0 (12%)*	27.7 (5%)	78.8 (29%)	7.6 (78%)	46.2 (22%)	22.0 (36%)
Total area-wide–source emissions	15.8 (12%)	25.6 (5%)	2.2 (1%)	0.1 (1%)	141.5 (68%)	21.3 (34%)
Total mobile-source emissions	61.1 (46%)	378.3 (72%)	191.5 (70%)	1.2 (12%)	11.9 (6%)	10.5 (17%)
Total natural-source emissions	39.43 (30%)	94.95 (18%)	2.83 (1%)	0.87 (9%)	9.57 (5%)	8.12 (13%)
Total Emissions	**132.3**	**526.6**	**275.3**	**9.8**	**209.2**	**61.9**

NOTES: * Percentage values represent percent of total emissions of a given air pollutant.
SOURCE: California Air Resources Board. 2009. Almanac Emission Projection Data.

TABLE 2.7.4-2
2008 EMISSIONS FOR THE KERN COUNTY PORTION OF THE MOJAVE DESERT AIR BASIN

Emission Source	Annual Average (Tons/Day)					
	ROG	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Total stationary-source emissions	1.2 (3%)*	11.1 (8%)	20.3 (33%)	3.5 (81%)	6.4 (18%)	2.5 (19%)
Total area-wide source emissions	2.1 (5%)	3.9 (3%)	0.3 (0%)	0.0 (0%)	20.8 (58%)	3.3 (24%)
Total mobile-source emissions	11.3 (28%)	81.5 (59%)	38.9 (64%)	0.4 (9%)	4.4 (12%)	4.2 (31%)
Total natural-source emissions	25.2 (63%)	40.6 (30%)	1.3 (2%)	0.4 (9%)	4.1 (11%)	3.5 (26%)
Total Emissions	**39.8**	**137.1**	**60.8**	**4.3**	**35.7**	**13.5**

NOTES: * Percentage values represent percent of total emissions of a given air pollutant.
SOURCE: California Air Resources Board. 2009. Almanac Emission Projection Data.

TABLE 2.7.4-3
2020 PROJECTED EMISSIONS FOR THE MOJAVE DESERT AIR BASIN

Emission Source	Annual Average (Tons/Day)					
	ROG	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Total stationary-source emissions	19.3 (15%)*	34.1 (8%)	95.2 (46%)	9.0 (81%)	56.6 (25%)	27.4 (41%)
Total area-wide source emissions	20.0 (15%)	27.7 (6%)	2.3 (1%)	0.1 (1%)	152.6 (67%)	23.2 (35%)
Total mobile-source emissions	54.2 (41%)	275.5 (64%)	106.8 (52%)	1.2 (11%)	10.0 (4%)	8.4 (13%)
Total natural-source emissions	39.4 (30%)	94.9 (22%)	2.8 (1%)	0.9 (8%)	9.6 (4%)	8.1 (12%)
Total Emissions	**132.9**	**432.2**	**207.1**	**11.1**	**228.8**	**67.1**

NOTES: * Percentage values represent percent of total emissions of a given air pollutant.
SOURCE: California Air Resources Board. 2009. Almanac Emission Projection Data.

TABLE 2.7.4-4
2020 PROJECTED EMISSIONS FOR THE KERN COUNTY PORTION OF THE MOJAVE DESERT AIR BASIN

Emission Source	Annual Average (Tons/Day)					
	ROG	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Total stationary-source emissions	1.6 (4%)*	15.2 (13%)	28.3 (55%)	4.2 (84%)	8.7 (24%)	3.8 (27%)
Total area-wide–source emissions	2.2 (6%)	3.9 (3%)	0.3 (1%)	0.0 (0%)	19.7 (54%)	3.1 (22%)
Total mobile-source emissions	8.4 (22%)	54.6 (48%)	21.8 (42%)	0.4 (8%)	3.9 (11%)	3.6 (26%)
Total natural-source emissions	25.2 (67%)	40.6 (36%)	1.3 (3%)	0.4 (8%)	4.1 (11%)	3.5 (25%)
Total Emissions	**37.4**	**114.3**	**51.7**	**5**	**36.4**	**14**

NOTES: * Percentage values represent percent of total emissions of a given air pollutant.
SOURCE: California Air Resources Board. 2009. Almanac Emission Projection Data.

The operational emissions estimated for the proposed project were compared with the emissions of the entire MDAB and the Kern County portion of the MDAB to assess the proposed project's contribution to cumulative air quality impacts. The emission of all criteria pullutants due to operation of the proposed project would be less than 1 percent of the total emissions in the Kern County portion of the MDAB and the entire MDAB (Table 2.7.4-5, *2020 Emissions for the Proposed Project and the Mojave Desert Air Basin)*. This comparison indicates that the proposed project's contribution to cumulative impacts on the entire MDAB for all criteria pollutants would likely be below the level of significance. This analysis does not consider the emission displacement anticipated from operation of the proposed project as a provider of clean, renewable energy. Due to the fact that the energy generated by operation of the proposed project would be distributed throughout California, the fossil fuel emissions displaced by the proposed project would not be limited solely to the MDAB.

TABLE 2.7.4-5
2020 EMISSIONS FOR THE PROPOSED PROJECT AND THE MOJAVE DESERT AIR BASIN

Emission Area	Annual Average (Tons/Day)					
	ROG	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Proposed project*	0.005	0.023	0.023	0.000	0.028	0.004
Kern County portion of MDAB	37.4	114.3	51.7	5	36.4	14
Entire MDAB	132.9	432.2	207.1	11.1	228.8	67.1
Kern County percentage of MDAB	28%	26%	25%	45%	16%	21%
Proposed project percentage of Kern County portion of MDAB	0.001%	0.001%	0.005%	0.000%	0.005%	0.065%
Proposed project percentage of entire MDAB	0.000%	0.000%	0.001 %	0.000%	0.001%	0.013%

NOTES:
* Annual average (tons/day) for the proposed project was calculated by using the air pullutants emissions (tons/year) divided by 365 days/year.
SOURCES:
1. California Air Resources Board. 2009. Almanac Emission Projection Data.
2. Appendix B to this report.

2.8 MITIGATION MEASURES

All construction projects in eastern Kern County must comply with EKAPCD Rule 402 for fugitive dust. Amended on November 3, 2004, the Fugitive Dust Rule 402 requires actions to prevent, reduce, or mitigate emissions of particulate matter into the ambient air from anthropogenic activities capable of generating fugitive dust. The air quality mitigation measures described in this section are intended to reduce, prevent, or mitigate PM_{10} emissions from the construction phase of the proposed project in compliance with Rule 402, and to reduce the NO_x emissions from construction equipment. These mitigation measures shall be implemented for all areas of construction and maintenance activities, both on site and off site.

2.8.1 Air Quality

2.8.1.1 Measure Air-1

The applicant shall develop a Fugitive Dust Control Plan in compliance with Eastern Kern Air Pollution Control District Rule 402 to reduce PM_{10} and $PM_{2.5}$ emissions during construction. The Fugitive Dust Control Plan shall include:

a. Name(s), address(es), and phone number(s) of person(s) responsible for the preparation, submission, and implementation of the plan;
b. Description and location of operation(s);
c. Listing of all fugitive dust emissions sources included in the operation; and
d. Implementation of the following dust control measures shall be implemented:
    i. All material excavated or graded shall be sufficiently watered to prevent excessive dust. Watering shall occur as needed with complete coverage of disturbed areas. Watering shall occur three times per day on unpaved/untreated roads and on disturbed areas with active operations.
    ii. All clearing, grading, earth moving, and excavation activities shall cease during periods when dust plumes of 20 percent or greater opacity affect public roads or occupied structures.
    iii. All material transported off-site shall be either sufficiently watered or securely covered to prevent excessive dust.
    iv. If more than 5,000 cubic yards of fill material will be imported or exported from the site, then all haul trucks shall be required to exit the site via an access point where a gravel pad or grizzly has been installed.
    v. Areas disturbed by clearing, earth moving, or excavation activities shall be minimized at all times.
    vi. Stockpiles of dirt or other fine loose material shall be stabilized by watering or other appropriate method to prevent wind-blown fugitive dust.
    vii. Where acceptable to the fire department, weed control shall be accomplished by mowing instead of discing, thereby leaving the ground undisturbed and with a mulch covering.
    viii. All on-site unpaved roads and off-site unpaved access roads shall be effectively stabilized of dust emissions using water or chemical stabilizer/suppressant.
    ix. Traffic speeds on unpaved roads shall be limited to 15 miles per hour.

2.8.1.2 *Measure Air-2*

The applicant shall reduce exhaust emissions during construction and, in particular, emissions of NO_X, when using construction equipment and vehicles by implementing the following measures:

a. Prohibit the use of heavy equipment during first- or second-stage smog alerts and suspend all construction activities during second-stage smog alerts;
b. Maintain equipment engines in proper working order;
c. Limit the hours of operation of heavy-duty equipment and/or the amount of equipment in use to the extent feasible;
d. During all grading and construction activities, at least 10 percent of diesel engine–driven construction equipment on site shall be equipped with Tier 1 or Tier 2 as certified by the California Air Resources Board or with engines certified by the Eastern Kern County Air Pollution Control District to provide equivalent benefits or equipped with Tier 3 for all new diesel engine-driven construction equipment. At least 40 percent of the remaining diesel engine–driven construction equipment shall have diesel particulate filters and lean-NO_X catalysts (or equivalent control devices);
e. The owner/operator shall require that all diesel engines be shut off when not in use to reduce emissions from idling;
f. Require that trucks and vehicles in loading or unloading queues have their engines turned off when not in use; and
g. Equip any generators, compressors, or other stationary sources of emissions located within 100 feet of a residence or other sensitive receptor with a control system to reduce normal exhaust emissions.

2.8.2 Greenhouse Gas Emissions

Operation of the proposed project would not be expected to have any adverse impacts upon GHG emissions, and would reduce GHG emissions in compliance with the goals of AB 32. Therefore, no mitigation measures are required.

2.8.3 Level of Significance after Mitigation

An error associated with the construction-related fugitive dust mitigation measures for particulate matter has been identified in the URBEMIS model; thus, the only construction mitigation measures acceptable for use in URBEMIS are either watering or chemical suppressants.[75] Therefore, to assess the level of significance after mitigation, model runs were performed assuming that exposed surfaces would be watered three times per day. Mitigated mobile-source emissions were quantified by reducing speeds on unpaved roads to 15 miles per hour.

2.8.3.1 *Construction Emissions*

Implementation of mitigation measures Air-1 through Air-2 would ensure that daily fugitive dust emissions associated with construction would be reduced by at least 50 percent (Table 2.8.3.1-1, *Mitigated Estimated Daily Regional Construction Emissions*). Consequently, PM_{10} emissions would be

[75] South Coast Air Quality Management District. Accessed 16 February 2010. “Air Quality Modeling.” Web site. Available at: http://www.aqmd.gov/CEQA/models.html

remain below the annual EKAPCD thresholds of significance (Table 2.8.3.1-2, *Mitigated Estimated Annual Regional Construction Emissions*). Implementation of mitigation measure Air-2 would reduce NO_x emissions from construction equipment by up to 40 percent (Table 2.8.3.1-1 and Table 2.8.3.1-2). Consequently, NO_X emissions would be reduced to below the annual EKAPCD thresholds of significance. However, cumulative emissions of NO_x, PM, and VOCs would remain significant and unavoidable when considered in conjunction with construction of the related past, present, or reasonably foreseeable, probable future projects.

TABLE 2.8.3.1-1
MITIGATED ESTIMATED DAILY REGIONAL CONSTRUCTION EMISSIONS

Emission Source	Air Pollutant Emissions (Pounds/Day)					
	VOCs	NO_x	CO	SO_x	$PM_{2.5}$**	PM_{10}**
Off-road Emission Source						
Mass site grading: roads and pads	44.28	211.05	204.94	0.03	25.16	80.10
Electrical trenching	10.32	52.04	49.76	0.01	2.40	2.65
Building construction: turbine installation	30.23	158.92	108.10	0.02	6.50	7.11
Fine site grading	25.26	120.39	122.90	0.01	21.22	75.76
Maximum Off-road Emissions	**44.28**	**211.05**	**204.94**	**0.03**	**25.16**	**80.10**
Mobile Sources						
Delivery trucks and employee commutes	0.72	3.45	11.43	0.02	4.73	44.75
Maximum Regional Total	**45.00**	**214.50**	**216.37**	**0.05**	**29.89**	**124.85**
EKAPCD Daily Significance Threshold (Pounds/Day)*	**137**	**137**	**N/A**	**N/A**	**N/A**	**N/A**
Significant?	**No**	**Yes**	**N/A**	**N/A**	**N/A**	**N/A**

NOTES:
* EKAPCD does not provide daily emission thresholds for CO, SO_x, or PM.
** PM emissions assume compliance with EKAPCD Rule 402 by watering exposed surfaces three times daily and limiting vehicle speeds on unpaved roads to 15 MPH.
SOURCE: Sapphos Environmental, Inc., URBEMIS output for the proposed project; see Appendix B.

TABLE 2.8.3.1-2
MITIGATED ESTIMATED ANNUAL REGIONAL CONSTRUCTION EMISSIONS

Emission Source	Air Pollutant Emissions (Tons/Year)					
	VOCs	NO_x	CO	SO_x	$PM_{2.5}$**	PM_{10}**
Maximum emissions from construction	1.53	7.67	6.49	0.00	0.68	1.90
Delivery trucks and employee commutes	0.14	0.68	2.00	0.00	0.86	8.17
Maximum Regional Total	**1.67**	**8.35**	**8.49**	**0.00**	**1.54**	**10.07**
EKAPCD Annual Threshold (Tons/Year)*	**25**	**25**	**N/A**	**N/A**	**N/A**	**15**
Significant?	**No**	**No**	**N/A**	**N/A**	**N/A**	**No**

NOTES:* EKAPCD does not provide annual emission thresholds for CO, SO_x, or $PM_{2.5}$.
** PM emissions assume compliance with EKAPCD Rule 402 by watering exposed surfaces three times daily and limiting vehicle speeds on unpaved roads to 15 MPH.
SOURCE: Sapphos Environmental, Inc. URBEMIS output for the proposed project; see Appendix B.

2.8.3.2 Operational Emissions

Implementation of mitigation measure Air-2 would reduce NO_x emissions from operational equipment by up to 40 percent, and would ensure that operational NO_x emissions would remain below the level of significance (Table 2.8.3.2-1, *Mitigated Estimated Daily Operational Emissions*, and Table 2.8.3.2-2, *Mitigated Estimated Annual Operational Emissions*). Operational emissions of NO_X would also be offset by the production of clean, renewable energy by the proposed project that would displace fossil fuel use. Operational emissions of PM_{10} would remain below the level of significance with implementation of mitigation measure Air-7 (Table 2.8.3.2-2), and operational emissions would also remain below the level of significance.

TABLE 2.8.3.2-1
MITIGATED ESTIMATED DAILY OPERATIONAL EMISSIONS

Emission Source	Air Pollutant Emissions (Pounds/Day)					
	VOCs	NO_x	CO	SO_x	$PM_{2.5}$**	PM_{10}**
Operational equipment	3.65	28.85	14.24	0.00	1.10	1.20
Mobile Sources	0.61	3.09	7.25	0.01	0.81	6.43
Total Emissions	**4.26**	**31.94**	**21.49**	**0.01**	**1.91**	**7.63**
EKAPCD Threshold (Pounds/Day)*	137	137	—	—	—	—
Exceedance of Significance?	No	No	N/A	N/A	N/A	N/A

NOTES:
***** EKAPCD does not provide daily emission thresholds for CO, SO_x, or PM.
** PM emissions assume limiting vehicle speeds on unpaved roads to 15 MPH.
SOURCE: Sapphos Environmental, Inc., URBEMIS output for the proposed project; see Appendix B.

TABLE 2.8.3.2-2
MITIGATED ESTIMATED ANNUAL OPERATIONAL EMISSIONS

Emission Source	Air Pollutant Emissions (Tons/Year)					
	VOCs	NO_x	CO	SO_x	$PM_{2.5}$**	PM_{10}**
Operational equipment	0.01	0.12	0.06	0.00	0.00	0.00
Mobile Sources	0.08	0.40	0.94	0.00	0.11	0.84
Total Emissions	**0.09**	**0.52**	**1.00**	**0.00**	**0.11**	**0.84**
EKAPCD Threshold (Tons/Year)*	25	25	—	—	—	15
Exceedance of Significance?	No	No	N/A	N/A	N/A	No

NOTES:
***** EKAPCD does not provide annual emission thresholds for CO or SO_x.
** PM emissions assume limiting vehicle speeds on unpaved roads to 15 MPH.
SOURCE: Sapphos Environmental, Inc., URBEMIS output for the proposed project; see Appendix B.

Agency for Toxic Substances and Disease Registry. Updated 2006. "Toxicological Profile for Vinyl Chloride."

California Air Pollution Control Officers Association. January 2008. *CEQA and Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act.* Sacramento, CA.

California Air Resources Board. 2006. *Assembly Bill 32 California Climate Solutions Act of 2006*. Sacramento, CA. Available at: http://www.arb.ca.gov/cc/docs/ab32text.pdf

California Air Resources Board. October 2007. *Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California Recommended for Board Consideration*. Available at: http://www.arb.ca.gov/cc/ccea/meetings/ea_final_report.pdf

California Air Resources Board. November 2007. *Recent Research Findings: Health Effects of Particulate Matter and Ozone Air Pollution, November 2007*. Available at: http://www.arb.ca.gov/research/health/fs/pm_ozone-fs.pdf

California Air Resources Board. 16 November 2007. *California 1990 Greenhouse Gas Emissions Level and 2020 Limit*. Sacramento, CA.

California Air Resources Board. 15 October 2008. *Climate Change Proposed Scoping Plan: A Framework for Change.* Available at: http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm

California Air Resources Board. 24 October 2008. *Preliminary Draft Staff Proposal: Recommended Approaches for Setting Interim Significance Thresholds for Greenhouse Gases under the California Environmental Quality Act*. Available at: http://www.opr.ca.gov/ceqa/pdfs/Prelim_Draft_Staff_Proposal_10-24-08.pdf

California Air Resources Board. 10 December 2008. *Kern County APCD List of Current Rules.* Available at: http://www.arb.ca.gov/drdb/ker/cur.htm

California Air Resources Board. 2009. Almanac Emission Projection Data. Sacramento, CA.

California Air Resources Board. 2009. *The California Almanac of Emissions and Air Quality–2009 Edition*. Available at: http://www.arb.ca.gov/aqd/almanac/almanac09/almanac09.htm

California Air Resources Board. Reviewed 24 November 2009. *California Ambient Air Quality Standards (CAAQS).* Available at: http://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm

California Air Resources Board. Updated 24 November 2009. "History of Sulfates Air Quality Standard." Web site. Available at: http://www.arb.ca.gov/research/aaqs/caaqs/sulf-1/sulf-1.htm

California Climate Action Registry. January 2009. *California Climate Action Registry General Reporting Protocol, Version 3.1*. Los Angeles, CA.

California Climate Action Team. 3 April 2006. *Climate Action Team Report to Governor Schwarzenegger and the Legislature.* Sacramento, CA.

California Department of Justice, Office of the Attorney General. 21 May 2008. *The California Environmental Quality Act Addressing Global Warming Impacts at the Local Agency Level*. Sacramento, CA.

California Department of Justice, Office of the Attorney General. Updated 9 December 2008. *The California Environmental Quality Act Addressing Global Warming Impacts at the Local Agency Level*. Sacramento, CA.

California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, and the American Lung Association. Accessed on 2 February 2010. "Health Effects of Diesel Exhaust." Web site. Available at: http://www.oehha.org/public_info/facts/dieselfacts.html

California Governor. 1 June 2005. Executive Order S-3-05. Sacramento, CA.

California Governor. 2006. Executive Order S-20-06. Sacramento, CA.

California Governor's Office of Planning and Research. October 2003. *General Plan Guidelines*. Available at: http://www.opr.ca.gov/planning/publications/General_Plan_Guidelines_2003.pdf

California Governor's Office of Planning and Research. 24 August 2007. Senate Bill No. 97, Chapter 185. Available at: http://www.opr.ca.gov/ceqa/pdfs/SB_97_bill_20070824_chaptered.pdf

California Governor's Office of Planning and Research. 19 June 2008. *CEQA and Climate Change: Addressing Climate Change through California Environmental Quality Act (CEQA) Review*. Technical Advisory. Sacramento, CA.

California Governor's Office of Planning and Research. April 2009. *CEQA Guidelines Sections Proposed to be Added or Amended*. Available at: http://www.opr.ca.gov/ceqa/pdfs/PA_CEQA_Guidelines.pdf

California Stormwater Quality Association. January 2003. *California Storm Water Best Management Practice Handbooks: Construction*. Menlo Park, CA. Available at: http://www.cabmphandbooks.com/Construction.asp

enXco Development Corporation. January 2011. *Catalina Renewable Energy Project Air Quality Impact Technical Report*. Prepared by Sapphos Environmental, Inc. Pasadena, CA.

Gaddis, Trenton, Vulcan Materials Company. 10 February 2010. Telephone correspondence with Laura Watson, Sapphos Environmental, Inc., Pasadena, CA.

Intergovernmental Panel on Climate Change. Approved 12–17 November 2007. *Climate Change 2007: Synthesis Report, Summary for Policymakers*, p. 5. Valencia, Spain. Available at: http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

Kern Council of Governments: San Joaquin Valley Transportation Planning Agencies. 18 September 2003. *Federal Clean Air Act Impacts on Transportation Funding: Sanctions, Lapses, and Freezes*. Bakersfield, CA.

Kern County. 15 June 2005 (Amended 13 March 2007). *Kern County General Plan.* Bakersfield, CA. Available at: http://www.co.kern.ca.us/planning/pdfs/kcgp/KCGP.pdf

Kern County. 15 June 2004 (Amended 13 March 2007). *Kern County General Plan, Land Use, Open Space, and Conservation Element*. Bakersfield, CA. Available at: http://www.co.kern.ca.us/planning/pdfs/kcgp/KCGPChp1LandUse.pdf

Kern County. 15 June 2004 (Amended 13 March 2007). *Kern County General Plan, Safety Element*. Bakersfield, CA. Available at: http://www.co.kern.ca.us/planning/pdfs/kcgp/KCGPChp4Safety.pdf

Kern County. November 2005. *Multi-Hazard Mitigation Plan*. Available at: http://www.kerncountyfire.org/pdf/Kern_County_LHMP.pdf

Kern County. 1 December 2006. *Guidelines for Preparing an Air Quality Assessment for Use in Environmental Impact Reports*. Bakersfield, CA. Available at: http://www.co.kern.ca.us/planning/pdfs/AirQualityAssessmentPreparationGuidelines.pdf

Kern County. March 2009. Zoning Ordinance. Title 19, Chapter 19.64, "Wind Energy Combining District." Available at: http://www.co.kern.ca.us/planning/pdfs/KCZOMar09.pdf

Kern County. March 2009. Zoning Ordinance. Title 19, Chapter 19.64, "Wind Energy Combining District – Development Standards and Conditions." Available at: http://www.co.kern.ca.us/planning/pdfs/zo/zotoc.pdf

Kern County. August 2009. *Draft Environmental Impact Report for the Alta-Oak Creek Mojave Project*. Bakersfield, CA.

Kern County. June 2010. *Draft Environmental Impact Report for the Pacific Wind Energy Project*. Bakersfield, CA.

Kern Council of Governments. 17 May 2007. *Final 2007 Destination 2030 Regional Transportation Plan*. Bakersfield, CA.

Kern Council of Governments. February 2010. Traffic Analysis Zone Data. Bakersfield, CA.

Kern County Air Pollution Control District. 1999. *Guidelines for Implementation of the California Environmental Quality Act (CEQA) of 1970 as Amended*. Bakersfield, CA.

Kern County Air Pollution Control District. 15 December 2005. *Annual California Clean Air Act Ozone Air Quality Attainment Plan Implementation Progress Report #9*. Available at: http://www.kernair.org/Documents/Reports/CCAANo9%20Rpt.pdf

Kern County Air Pollution Control District. 16 April 2007. *Annual AB 2588 Air Toxics Report*. Bakersfield, CA.

Kern County Air Pollution Control District. 2008. *Kern County APCD Attainment Status.* Available at: http://www.kernair.org/general_information.htm

Kern County Planning and Community Development Department. August 2009. *Draft Environmental Impact Report for the Alta–Oak Creek Mojave Project.* Bakersfield, CA.

Kern County Planning and Community Development Department. June 2010. *Antelope Valley Solar Power Project Draft Air Quality Impact Report*. Bakersfield, CA.

Kern County Planning and Community Development Department. June 2010. *Pacific Wind Energy Project Draft Environmental Impact Report*. Bakersfield, CA.

Kern County Planning and Community Development Department. April 2011. *Avalon Wind Energy Project Air Quality Impact Technical Report*. Bakersfield, CA.

Kern County Planning and Community Development Department. May 2011. C*atalina Renewable Energy Project Air Quality Impact Technical Report*. Table 2.7.1-1. Bakersfield, CA.

Kern County Planning and Community Development Department. July 2011. *Morgan Hills Wind Energy Project Draft Environmental Impact Report*. Bakersfield, CA.

Kern County Planning and Community Development Department. May 2013. *Rosamond Solar Modification Project Addendum to the Environmental Impact Report*. Bakersfield, CA.

Kern County Planning and Community Development Department. December 2013. *Rosamond Solar Array Project Draft Environmental Impact Report*. Bakersfield, CA.

Ruettgers and Schuler Civil Engineers. April 2011. *Traffic Study for the Tylerhorse Wind Energy Project*. Bakersfield, CA.

South Coast Air Quality Management District. Accessed 16 February 2010. "Air Quality Modeling." Web site. Available at: http://www.aqmd.gov/CEQA/models.html

Southern California Edison. Accessed 14 May 2009. *Tehachapi Renewable Segments 4-11*. Available at: http://www.sce.com/PowerandEnvironment/Transmission/CurrentProjects/TRTP4-11/

Southern California Edison. October 2009. *Final Environmental Impact Report for the Tehachapi Renewable Transmission Project*. Prepared by: Aspen Environmental Group.

U.S. Department of Agriculture. Accessed 18 February 2010. Soil Survey of Kern County California Southeastern Part. Kern County, California. Available at: http://websoilsurvey.nrcs.usda.gov/app/

U.S. Environmental Protection Agency. 1995. "11.12 Concrete Batching." *AP 42, Fifth Edition, Volume I.* Available at: http://www.epa.gov/ttnchie1/ap42/

U.S. Environmental Protection Agency. 1995. "13.2.4 Aggregate Handling and Storage Piles." *AP-42, Fifth Edition, Volume I*. Available at: http://www.epa.gov/ttnchie1/ap42/

U.S. Environmental Protection Agency. 26 September 1996. "Approval and Promulgation of Implementation Plans and Redesignation of Puget Sound, Washington for Air Quality Planning Purposes: Ozone." In *Federal Register*, Vol. 61, No. 188. Available at: http://yosemite.epa.gov/r10/airpage.nsf/283d45bd5bb068e68825650f0064cdc2/e1f3db8b006eff1a88256dcf007885c6/$FILE/61%20FR%2050438%20Seattle%20Tacoma%20Ozone%20MP.pdf

U.S. Environmental Protection Agency. 15 August 1997. *Transportation Conformity Rule Amendments: Flexibility and Streamlining*. Available at: http://www.epa.gov/USEPA-AIR/1997/August/Day-15/a20968.htm

U.S. Environmental Protection Agency. 1998. "Air Quality Analysis for Prevention of Significant Deterioration (PSD)." Available at: http://www.epa.gov/scram001/guidance/mch/saq1.txt

U.S. Environmental Protection Agency. Revised January 2000. Technology Transfer Network Air Toxics Web Site: "Acetaldehyde." Available at: http://www.epa.gov/ttn/atw/hlthef/acetalde.html

U.S. Environmental Protection Agency. Revised January 2000. Technology Transfer Network Air Toxics Web Site: "Benzene." Available at: http://www.epa.gov/ttn/atw/hlthef/benzene.html

U.S. Environmental Protection Agency. Revised January 2000. Technology Transfer Network Air Toxics Web Site: "Carbon Tetrachloride." Available at: http://www.epa.gov/ttn/atw/hlthef/carbonte.html

U.S. Environmental Protection Agency. Revised January 2000. Technology Transfer Network Air Toxics Web Site: "Chromium Compounds." Available at: http://www.epa.gov/ttn/atw/hlthef/chromium.html#ref1

U.S. Environmental Protection Agency. Revised January 2000. Technology Transfer Network Air Toxics Web Site: "Formaldehyde." Available at: http://www.epa.gov/ttn/atw/hlthef/formalde.html

U.S. Environmental Protection Agency. Revised January 2000. Technology Transfer Network Air Toxics Web Site: "Methylene Chloride (Dichloromethane)." Available at: http://www.epa.gov/ttn/atw/hlthef/methylen.html

U.S. Environmental Protection Agency. Revised January 2000. Technology Transfer Network Air Toxics Web Site: "Tetrachloroethylene (Perchloroethylene)." Available at: httphttp://www.epa.gov/ttn/atw/hlthef/tet-ethy.html

U.S. Environmental Protection Agency. Revised January 2000. Technology Transfer Network Air Toxics Web Site: "1,4-Dichlorobenzene (para-Dichlorobenzene)." Available at: http://www.epa.gov/ttn/atw/hlthef/dich-ben.html

U.S. Environmental Protection Agency. 2003. "Revision to the Guideline on Air Quality Models: Adoption of a Preferred Long Range Transport Model and Other Revisions." Available at: http://www.epa.gov/EPA-AIR/2003/April/Day-15/a8542.htm

U.S. Environmental Protection Agency. Updated 6 November 2007. Technology Transfer Network Air Toxics Web Site: "Vinyl Chloride." Available at: http://www.epa.gov/ttn/atw/hlthef/vinylchl.html

U.S. Environmental Protection Agency. Revised March 2009. Technology Transfer Network Air Toxics Web Site: “1,3-butadiene.” Available at: http://www.epa.gov/ttn/atw/hlthef/butadien.html

U.S. Environmental Protection Agency. Updated 14 July 2009. *National Ambient Air Quality Standards (NAAQS).* Available at: http://www.epa.gov/air/criteria.html

U.S. Environmental Protection Agency. 19 April 2011. *General Conformity Regulations*. Available at: http://epa.gov/ttncaaa1/genconformity.html

U.S. Environmental Protection Agency. Updated 30 August 2011*. The Green Book Nonattainment Areas for Criteria Pollutants*. Available at: http://www.epa.gov/oaqps001/greenbk/

U.S. Supreme Court. 2 April 2007. *Massachusetts, et al. v. Environmental Protection Agency, et al.* 549 U.S. 1438; 127 S. Ct. 1438. Washington, DC.

The White House Council on Environmental Quality. 18 February 2010. *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions*. Available at: http://www.whitehouse.gov/sites/default/files/microsites/ceq/20100218-nepa-consideration-effects-ghg-draft-guidance.pdf

The White House Council on Environmental Quality. 21 January 2011. *NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions*. Available at: http://ceq.hss.doe.gov/current_developments/new_ceq_nepa_guidance.html

APPENDIX A
WIND AND CLIMATE DATA

MOJAVE, CALIFORNIA

Period of Record General Climate Summary - Precipitation

Station:(045756) MOJAVE														
From Year=1904 To Year=2010														
	Precipitation											Total Snowfall		
	Mean	High	Year	Low	Year	1 Day Max.		>= 0.01 in.	>= 0.10 in.	>= 0.50 in.	>= 1.00 in.	Mean	High	Year
	in.	in.	-	in.	-	in.	dd/yyyy or yyyymmdd	# Days	# Days	# Days	# Days	in.	in.	-
January	1.20	6.46	1995	0.00	1910	3.00	30/1915	4	2	1	0	0.8	9.5	1979
February	1.27	6.85	1998	0.00	1910	2.67	10/1978	4	2	1	0	0.4	11.0	1911
March	0.93	5.00	1912	0.00	1909	2.88	01/1983	3	2	1	0	0.2	3.5	1954
April	0.30	2.08	1965	0.00	1904	1.25	06/1906	2	1	0	0	0.0	0.5	1963
May	0.09	1.28	1977	0.00	1904	1.10	09/1977	1	0	0	0	0.0	0.0	1949
June	0.03	0.41	1963	0.00	1904	0.40	04/1984	0	0	0	0	0.0	0.0	1949
July	0.11	2.43	1984	0.00	1904	1.16	30/1984	0	0	0	0	0.0	0.0	1948
August	0.15	2.02	1983	0.00	1905	1.94	20/1995	1	0	0	0	0.0	0.0	1948
September	0.21	2.94	1976	0.00	1905	1.23	11/1976	1	1	0	0	0.0	0.0	1906
October	0.24	2.47	2004	0.00	1904	1.92	01/1981	1	1	0	0	0.0	0.0	1948
November	0.53	3.78	1967	0.00	1904	1.98	19/1967	2	1	0	0	0.1	6.5	1906
December	0.87	5.33	1943	0.00	1911	2.40	29/1965	3	2	1	0	0.2	7.0	2008
Annual	5.93	15.51	1983	0.85	1942	3.00	19150130	22	13	4	1	1.7	11.0	1962
Winter	3.33	11.68	1944	0.00	1912	3.00	19150130	11	7	2	1	1.4	11.0	1962
Spring	1.31	6.00	1912	0.00	1909	2.88	19830301	6	3	1	0	0.2	3.5	1954
Summer	0.30	3.12	1984	0.00	1907	1.94	19950820	1	1	0	0	0.0	0.0	1949
Fall	0.99	4.45	1967	0.00	1995	1.98	19671119	4	2	1	0	0.1	1.0	1952

Table updated on Oct 28, 2010
For monthly and annual means, thresholds, and sums:
Months with 5 or more missing days are not considered
Years with 1 or more missing months are not considered
Seasons are climatological not calendar seasons

Winter = Dec., Jan., and Feb. Spring = Mar., Apr., and May
Summer = Jun., Jul., and Aug. Fall = Sep., Oct., and Nov.

Western Regional Climate Center, wrcc@dri.edu

MOJAVE, CALIFORNIA

Period of Record General Climate Summary - Temperature

Station:(045756) MOJAVE

From Year=1904 To Year=2010

	Monthly Averages			Daily Extremes				Monthly Extremes				Max. Temp.		Min. Temp.	
	Max.	Min.	Mean	High	Date	Low	Date	Highest Mean	Year	Lowest Mean	Year	>= 90 F	<= 32 F	<= 32 F	<= 0 F
	F	F	F	F	dd/yyyy or yyyymmdd	F	dd/yyyy or yyyymmdd	F	-	F	-	# Days	# Days	# Days	# Days
January	57.8	34.2	46.2	82	26/1909	10	06/1913	62.9	1908	39.8	1979	0.0	0.0	13.3	0.0
February	61.2	37.1	49.3	90	28/1914	16	06/1989	58.5	1910	40.1	1912	0.0	0.0	7.3	0.0
March	64.7	41.0	52.8	89	31/1966	17	02/1971	61.6	1908	36.5	1912	0.0	0.0	3.4	0.0
April	71.3	46.3	59.0	99	18/1914	27	20/1972	68.5	1989	50.5	1975	0.6	0.0	0.5	0.0
May	79.9	55.1	67.5	104	28/2003	32	21/1908	80.2	1904	58.3	1977	5.4	0.0	0.0	0.0
June	89.9	63.8	76.9	112	26/1914	38	01/1967	82.9	1909	71.1	1908	17.2	0.0	0.0	0.0
July	97.7	69.8	83.5	117	23/1914	43	06/1979	95.7	1905	76.8	1912	27.7	0.0	0.0	0.0
August	96.4	68.0	82.3	118	05/1914	48	23/1909	90.8	1905	74.9	1909	26.9	0.0	0.0	0.0
September	89.0	60.3	74.8	110	03/1908	31	30/1909	82.7	1907	65.9	1911	16.6	0.0	0.0	0.0
October	78.5	50.3	64.4	100	03/1980	22	30/1971	77.1	1905	53.0	1911	3.5	0.0	0.5	0.0
November	65.7	40.2	53.0	96	03/1914	13	24/1979	66.3	1907	43.0	1911	0.1	0.0	5.3	0.0
December	57.2	32.9	45.0	79	06/1977	8	23/1990	52.2	1980	34.0	1911	0.0	0.1	15.3	0.0
Annual	75.8	49.9	62.9	118	19140805	8	19901223	64.2	2001	60.5	1971	98.0	0.1	45.8	0.0
Winter	58.7	34.7	46.8	90	19140228	8	19901223	51.2	1909	41.0	1979	0.0	0.1	36.0	0.0
Spring	72.0	47.5	59.8	104	20030528	17	19710302	65.3	1904	51.5	1912	6.0	0.0	3.9	0.0
Summer	94.6	67.2	80.9	118	19140805	38	19670601	87.9	1905	76.6	1983	71.8	0.0	0.0	0.0
Fall	77.7	50.3	64.1	110	19080903	13	19791124	74.1	1907	54.0	1911	20.2	0.0	5.8	0.0

Table updated on Oct 28, 2010
For monthly and annual means, thresholds, and sums:
Months with 5 or more missing days are not considered
Years with 1 or more missing months are not considered
Seasons are climatological not calendar seasons
Winter = Dec., Jan., and Feb. Spring = Mar., Apr., and May
Summer = Jun., Jul., and Aug. Fall = Sep., Oct., and Nov.

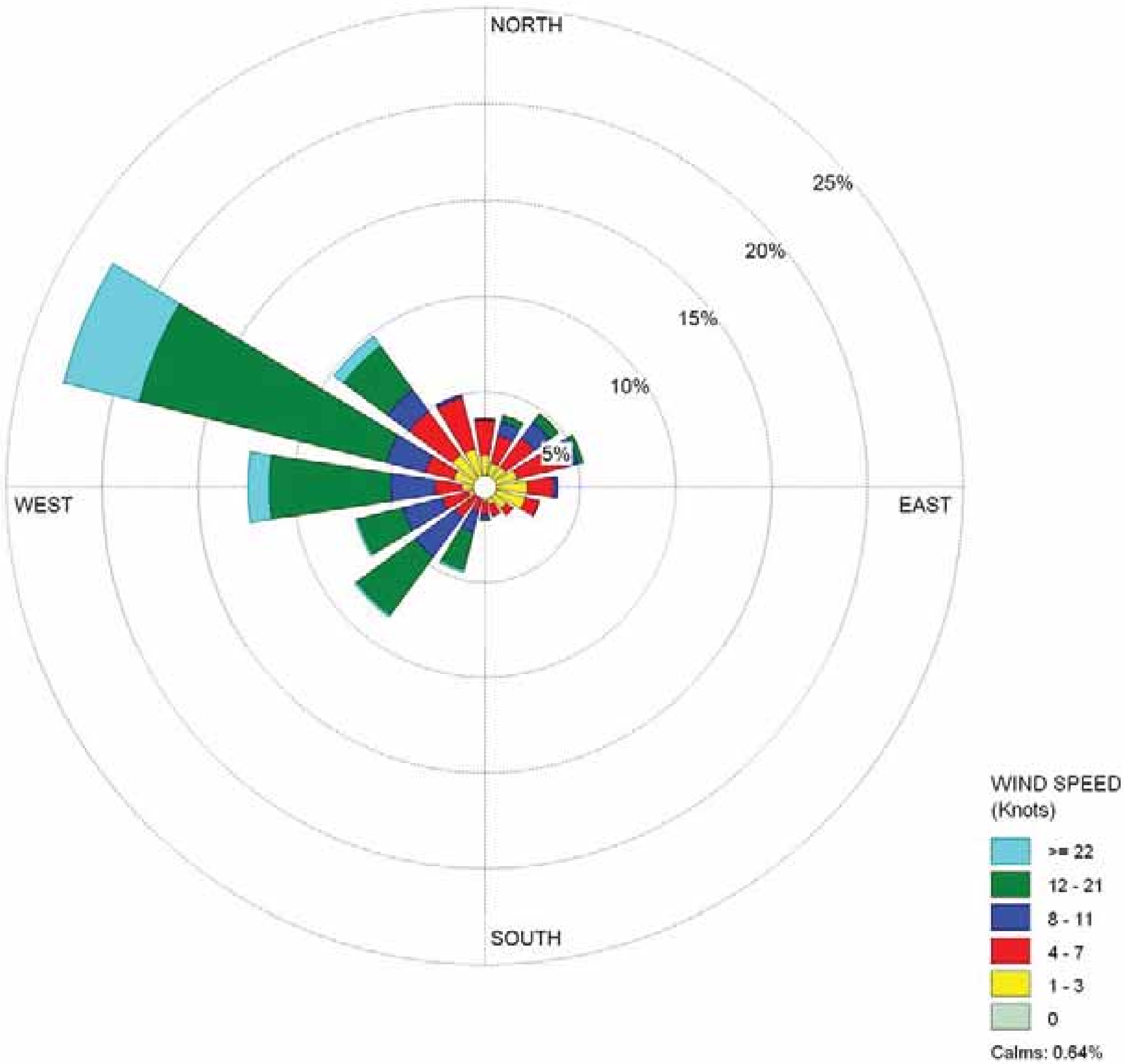
Western Regional Climate Center, wrcc@dri.edu

WIND ROSE PLOT:

Wind Rose for Mojave Meteorological Station

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD: **2002 2002 2003 2003 2004 2004** **Jan 1 - Dec 31** **00:00 - 23:00**	MODELER: **Sapphos Environmental, Inc.**	
	CALM WINDS: **0.64%**	TOTAL COUNT: **52463 hrs.**	
	AVG. WIND SPEED: **9.80 Knots**	DATE: **11/9/2010**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

APPENDIX B
URBEMIS OUTPUT FOR THE PROPOSED PROJECT

4/8/2014 11:32:23 AM

Urbemis 2007 Version 9.2.4

Combined Summer Emissions Reports (Pounds/Day)

File Name: C:\Users\afurman\Desktop\Tylerhorse\Tylerhorse 3.27.14.urb924

Project Name: Tylerhorse 3.27.14

Project Location: Kern County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

4/8/2014 11:32:23 AM

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2014 TOTALS (lbs/day unmitigated)	55.49	451.77	230.99	0.03	160.15	19.41	179.54	33.47	17.85	51.31	63,036.00
2014 TOTALS (lbs/day mitigated)	55.49	279.31	230.99	0.03	68.27	14.62	82.87	14.28	13.45	27.72	63,036.00

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)							

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	0.72	3.45	11.43	0.02	44.75	4.73	2,311.16
TOTALS (lbs/day, mitigated)	0.72	3.45	11.43	0.02	44.75	4.73	2,311.16
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	0.72	3.45	11.43	0.02	44.75	4.73	2,311.16

Both Area and Operational Mitigation must be turned on to get a combined mitigated total.

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

4/8/2014 11:32:23 AM

Time Slice 8/1/2014-8/29/2014 Active Days: 21	44.28	350.99	204.94	**0.03**	**160.15**	15.75	175.91	**33.47**	14.49	47.96	47,326.63
Mass Grading 08/01/2014-08/31/2014	44.28	350.99	204.94	0.03	160.15	15.75	175.91	33.47	14.49	47.96	47,326.63
Mass Grading Dust	0.00	0.00	0.00	0.00	160.00	0.00	160.00	33.41	0.00	33.41	0.00
Mass Grading Off Road Diesel	43.71	349.87	183.27	0.00	0.00	15.67	15.67	0.00	14.41	14.41	44,226.42
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.56	1.13	21.68	0.03	0.15	0.08	0.24	0.06	0.07	0.13	3,100.20
Time Slice 9/1/2014-9/30/2014 Active Days: 22	10.32	86.47	49.76	0.01	0.05	3.45	3.50	0.02	3.17	3.19	12,598.76
Trenching 09/01/2014-09/30/2014	10.32	86.47	49.76	0.01	0.05	3.45	3.50	0.02	3.17	3.19	12,598.76
Trenching Off Road Diesel	10.12	86.07	42.07	0.00	0.00	3.42	3.42	0.00	3.15	3.15	11,499.96
Trenching Worker Trips	0.20	0.40	7.68	0.01	0.05	0.03	0.08	0.02	0.03	0.04	1,098.81
Time Slice 10/1/2014-10/30/2014 Active Days: 22	25.26	190.77	122.90	0.01	160.07	10.10	170.17	33.44	9.29	42.73	23,649.18
Fine Grading 10/01/2014-10/31/2014	25.26	190.77	122.90	0.01	160.07	10.10	170.17	33.44	9.29	42.73	23,649.18
Fine Grading Dust	0.00	0.00	0.00	0.00	160.00	0.00	160.00	33.41	0.00	33.41	0.00
Fine Grading Off Road Diesel	25.01	190.27	113.29	0.00	0.00	10.06	10.06	0.00	9.26	9.26	22,275.68
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.25	0.50	9.60	0.01	0.07	0.04	0.11	0.02	0.03	0.06	1,373.51

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Time Slice 10/31/2014-10/31/2014 Active Days: 1	**55.49**	**451.77**	**230.99**	0.03	160.14	**19.41**	**179.54**	33.46	**17.85**	**51.31**	**63,036.00**
Building 10/31/2014-12/31/2014	30.23	261.01	108.10	0.02	0.07	9.31	9.37	0.02	8.56	8.58	39,386.81
Building Off Road Diesel	29.72	255.22	101.78	0.00	0.00	9.07	9.07	0.00	8.35	8.35	37,624.54
Building Vendor Trips	0.46	5.68	4.31	0.01	0.05	0.23	0.28	0.02	0.21	0.23	1,475.09
Building Worker Trips	0.05	0.10	2.01	0.00	0.01	0.01	0.02	0.01	0.01	0.01	287.18
Fine Grading 10/01/2014-10/31/2014	25.26	190.77	122.90	0.01	160.07	10.10	170.17	33.44	9.29	42.73	23,649.18
Fine Grading Dust	0.00	0.00	0.00	0.00	160.00	0.00	160.00	33.41	0.00	33.41	0.00
Fine Grading Off Road Diesel	25.01	190.27	113.29	0.00	0.00	10.06	10.06	0.00	9.26	9.26	22,275.68
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.25	0.50	9.60	0.01	0.07	0.04	0.11	0.02	0.03	0.06	1,373.51
Time Slice 11/3/2014-12/31/2014 Active Days: 43	30.23	261.01	108.10	0.02	0.07	9.31	9.37	0.02	8.56	8.58	39,386.81
Building 10/31/2014-12/31/2014	30.23	261.01	108.10	0.02	0.07	9.31	9.37	0.02	8.56	8.58	39,386.81
Building Off Road Diesel	29.72	255.22	101.78	0.00	0.00	9.07	9.07	0.00	8.35	8.35	37,624.54
Building Vendor Trips	0.46	5.68	4.31	0.01	0.05	0.23	0.28	0.02	0.21	0.23	1,475.09
Building Worker Trips	0.05	0.10	2.01	0.00	0.01	0.01	0.02	0.01	0.01	0.01	287.18

Phase Assumptions

Phase: Fine Grading 10/1/2014 - 10/31/2014 - Default Fine Site Grading Description

Total Acres Disturbed: 195.4

Maximum Daily Acreage Disturbed: 8

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

4 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

4/8/2014 11:32:23 AM

4 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

4 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day

4 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

3 Scrapers (313 hp) operating at a 0.72 load factor for 8 hours per day

12 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

4 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Mass Grading 8/1/2014 - 8/31/2014 - Default Paving Description

Total Acres Disturbed: 195.4

Maximum Daily Acreage Disturbed: 8

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

12 Dumpers/Tenders (16 hp) operating at a 0.38 load factor for 8 hours per day

8 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

4 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

10 Other Equipment (190 hp) operating at a 0.62 load factor for 8 hours per day

12 Rollers (95 hp) operating at a 0.56 load factor for 8 hours per day

12 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

20 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Trenching 9/1/2014 - 9/30/2014 - Default Building Construction Description

Off-Road Equipment:

8 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

8 Other General Industrial Equipment (238 hp) operating at a 0.51 load factor for 8 hours per day

8 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 0 hours per day

4 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

4/8/2014 11:32:23 AM

Phase: Building Construction 10/31/2014 - 12/31/2014 - Default Architectural Coating Description

Off-Road Equipment:

36 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day

3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

10 Other Equipment (190 hp) operating at a 0.62 load factor for 8 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

10 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
General light industry	0.72	3.45	11.43	0.02	44.75	4.73	2,311.16
TOTALS (lbs/day, unmitigated)	0.72	3.45	11.43	0.02	44.75	4.73	2,311.16

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2015 Temperature (F): 85 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

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Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
General light industry		51.80	acres	1.00	51.80	1,890.70
					51.80	1,890.70

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	39.6	0.3	99.4	0.3
Light Truck < 3750 lbs	12.0	0.8	94.2	5.0
Light Truck 3751-5750 lbs	20.4	0.5	99.5	0.0
Med Truck 5751-8500 lbs	12.0	0.8	99.2	0.0
Lite-Heavy Truck 8501-10,000 lbs	3.9	0.0	75.9	24.1
Lite-Heavy Truck 10,001-14,000 lbs	3.1	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	3.0	0.0	15.4	84.6
Heavy-Heavy Truck 33,001-60,000 lbs	6.0	0.0	2.1	97.9
Other Bus	0.0	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	0.0	50.0	50.0	0.0
School Bus	0.0	0.0	0.0	100.0
Motor Home	0.0	0.0	84.6	15.4

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4

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Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Rural Trip Length (miles)	16.8	7.1	7.9	36.5	36.5	36.5
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
General light industry				50.0	25.0	25.0

Operational Changes to Defaults

The urban/rural selection has been changed from Urban to Rural

Ambient winter temperature changed from 40 degrees F to 50 degrees F

The percentage of paved roads changed from 100% to 95%

The percentage of unpaved roads changed from 0% to 5%

Commercial-based commute rural trip length changed from 14.7 miles to 36.5 miles

Commercial-based non-work urban trip length changed from 7.35 miles to 7.4 miles

Commercial-based non-work rural trip length changed from 6.6 miles to 36.5 miles

Commercial-based customer urban trip length changed from 7.35 miles to 7.4 miles

Commercial-based customer rural trip length changed from 6.6 miles to 36.5 miles

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Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: C:\Users\afurman\Desktop\Tylerhorse\Tylerhorse 3.27.14.urb924

Project Name: Tylerhorse 3.27.14

Project Location: Kern County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

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Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2014 TOTALS (tons/year unmitigated)	1.53	12.57	6.49	0.00	3.52	0.52	4.05	0.74	0.48	1.22	1,773.99
2014 TOTALS (tons/year mitigated)	1.53	7.67	6.49	0.00	1.50	0.39	1.90	0.31	0.36	0.68	1,773.99
Percent Reduction	0.00	39.00	0.00	0.00	57.36	24.68	53.13	57.31	24.68	44.40	0.00

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)							

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.14	0.68	2.00	0.00	8.17	0.86	407.25
TOTALS (tons/year, mitigated)	0.14	0.68	2.00	0.00	8.17	0.86	407.25
Percent Reduction	0.00	0.00	0.00	NaN	0.00	0.00	0.00

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.14	0.68	2.00	0.00	8.17	0.86	407.25

Both Area and Operational Mitigation must be turned on to get a combined mitigated total.

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

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2014	1.53	12.57	6.49	0.00	3.52	0.52	4.05	0.74	0.48	1.22	1,773.99
Mass Grading 08/01/2014-08/31/2014	0.46	3.69	2.15	0.00	1.68	0.17	1.85	0.35	0.15	0.50	496.93
Mass Grading Dust	0.00	0.00	0.00	0.00	1.68	0.00	1.68	0.35	0.00	0.35	0.00
Mass Grading Off Road Diesel	0.46	3.67	1.92	0.00	0.00	0.16	0.16	0.00	0.15	0.15	464.38
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.01	0.01	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.55
Trenching 09/01/2014-09/30/2014	0.11	0.95	0.55	0.00	0.00	0.04	0.04	0.00	0.03	0.04	138.59
Trenching Off Road Diesel	0.11	0.95	0.46	0.00	0.00	0.04	0.04	0.00	0.03	0.03	126.50
Trenching Worker Trips	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.09
Fine Grading 10/01/2014-10/31/2014	0.29	2.19	1.41	0.00	1.84	0.12	1.96	0.38	0.11	0.49	271.97
Fine Grading Dust	0.00	0.00	0.00	0.00	1.84	0.00	1.84	0.38	0.00	0.38	0.00
Fine Grading Off Road Diesel	0.29	2.19	1.30	0.00	0.00	0.12	0.12	0.00	0.11	0.11	256.17
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.01	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.80
Building 10/31/2014-12/31/2014	0.67	5.74	2.38	0.00	0.00	0.20	0.21	0.00	0.19	0.19	866.51
Building Off Road Diesel	0.65	5.61	2.24	0.00	0.00	0.20	0.20	0.00	0.18	0.18	827.74
Building Vendor Trips	0.01	0.12	0.09	0.00	0.00	0.00	0.01	0.00	0.00	0.00	32.45
Building Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.32

<u>Phase Assumptions</u>

Phase: Fine Grading 10/1/2014 - 10/31/2014 - Default Fine Site Grading Description

Total Acres Disturbed: 195.4

Maximum Daily Acreage Disturbed: 8

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

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On Road Truck Travel (VMT): 0

Off-Road Equipment:

4 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

4 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

4 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day

4 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

3 Scrapers (313 hp) operating at a 0.72 load factor for 8 hours per day

12 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

4 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Mass Grading 8/1/2014 - 8/31/2014 - Default Paving Description

Total Acres Disturbed: 195.4

Maximum Daily Acreage Disturbed: 8

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

12 Dumpers/Tenders (16 hp) operating at a 0.38 load factor for 8 hours per day

8 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

4 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

10 Other Equipment (190 hp) operating at a 0.62 load factor for 8 hours per day

12 Rollers (95 hp) operating at a 0.56 load factor for 8 hours per day

12 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

20 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Trenching 9/1/2014 - 9/30/2014 - Default Building Construction Description

Off-Road Equipment:

8 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

8 Other General Industrial Equipment (238 hp) operating at a 0.51 load factor for 8 hours per day

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8 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 0 hours per day

4 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Building Construction 10/31/2014 - 12/31/2014 - Default Architectural Coating Description

Off-Road Equipment:

36 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day

3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

10 Other Equipment (190 hp) operating at a 0.62 load factor for 8 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

10 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
General light industry	0.14	0.68	2.00	0.00	8.17	0.86	407.25
TOTALS (tons/year, unmitigated)	0.14	0.68	2.00	0.00	8.17	0.86	407.25

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2015 Season: Annual

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Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
General light industry		51.80	acres	1.00	51.80	1,890.70
					51.80	1,890.70

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	39.6	0.3	99.4	0.3
Light Truck < 3750 lbs	12.0	0.8	94.2	5.0
Light Truck 3751-5750 lbs	20.4	0.5	99.5	0.0
Med Truck 5751-8500 lbs	12.0	0.8	99.2	0.0
Lite-Heavy Truck 8501-10,000 lbs	3.9	0.0	75.9	24.1
Lite-Heavy Truck 10,001-14,000 lbs	3.1	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	3.0	0.0	15.4	84.6
Heavy-Heavy Truck 33,001-60,000 lbs	6.0	0.0	2.1	97.9
Other Bus	0.0	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	0.0	50.0	50.0	0.0
School Bus	0.0	0.0	0.0	100.0
Motor Home	0.0	0.0	84.6	15.4

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Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	36.5	36.5	36.5
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
General light industry				50.0	25.0	25.0

Operational Changes to Defaults

The urban/rural selection has been changed from Urban to Rural

Ambient winter temperature changed from 40 degrees F to 50 degrees F

The percentage of paved roads changed from 100% to 95%

The percentage of unpaved roads changed from 0% to 5%

Commercial-based commute rural trip length changed from 14.7 miles to 36.5 miles

Commercial-based non-work urban trip length changed from 7.35 miles to 7.4 miles

Commercial-based non-work rural trip length changed from 6.6 miles to 36.5 miles

Commercial-based customer urban trip length changed from 7.35 miles to 7.4 miles

Commercial-based customer rural trip length changed from 6.6 miles to 36.5 miles

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Urbemis 2007 Version 9.2.4

Combined Summer Emissions Reports (Pounds/Day)

File Name: C:\Users\afurman\Desktop\Tylerhorse\Tylerhorse 3.27.14.urb924

Project Name: Tylerhorse 3.27.14

Project Location: Kern County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

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Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2014 TOTALS (lbs/day unmitigated)	55.49	451.77	230.99	0.03	160.15	19.41	179.54	33.47	17.85	51.31	63,036.00
2014 TOTALS (lbs/day mitigated)	55.49	279.31	230.99	0.03	68.27	14.62	82.87	14.28	13.45	27.72	63,036.00

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)							

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	0.72	3.45	11.43	0.02	44.75	4.73	2,311.16
TOTALS (lbs/day, mitigated)	0.72	3.45	11.43	0.02	44.75	4.73	2,311.16
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	0.72	3.45	11.43	0.02	44.75	4.73	2,311.16

Both Area and Operational Mitigation must be turned on to get a combined mitigated total.

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

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Time Slice 8/1/2014-8/29/2014 Active Days: 21	44.28	350.99	204.94	**0.03**	**160.15**	15.75	175.91	**33.47**	14.49	47.96	47,326.63
Mass Grading 08/01/2014-08/31/2014	44.28	350.99	204.94	0.03	160.15	15.75	175.91	33.47	14.49	47.96	47,326.63
Mass Grading Dust	0.00	0.00	0.00	0.00	160.00	0.00	160.00	33.41	0.00	33.41	0.00
Mass Grading Off Road Diesel	43.71	349.87	183.27	0.00	0.00	15.67	15.67	0.00	14.41	14.41	44,226.42
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.56	1.13	21.68	0.03	0.15	0.08	0.24	0.06	0.07	0.13	3,100.20
Time Slice 9/1/2014-9/30/2014 Active Days: 22	10.32	86.47	49.76	0.01	0.05	3.45	3.50	0.02	3.17	3.19	12,598.76
Trenching 09/01/2014-09/30/2014	10.32	86.47	49.76	0.01	0.05	3.45	3.50	0.02	3.17	3.19	12,598.76
Trenching Off Road Diesel	10.12	86.07	42.07	0.00	0.00	3.42	3.42	0.00	3.15	3.15	11,499.96
Trenching Worker Trips	0.20	0.40	7.68	0.01	0.05	0.03	0.08	0.02	0.03	0.04	1,098.81
Time Slice 10/1/2014-10/30/2014 Active Days: 22	25.26	190.77	122.90	0.01	160.07	10.10	170.17	33.44	9.29	42.73	23,649.18
Fine Grading 10/01/2014-10/31/2014	25.26	190.77	122.90	0.01	160.07	10.10	170.17	33.44	9.29	42.73	23,649.18
Fine Grading Dust	0.00	0.00	0.00	0.00	160.00	0.00	160.00	33.41	0.00	33.41	0.00
Fine Grading Off Road Diesel	25.01	190.27	113.29	0.00	0.00	10.06	10.06	0.00	9.26	9.26	22,275.68
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.25	0.50	9.60	0.01	0.07	0.04	0.11	0.02	0.03	0.06	1,373.51

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Time Slice 10/31/2014-10/31/2014 Active Days: 1	**55.49**	**451.77**	**230.99**	0.03	160.14	**19.41**	**179.54**	33.46	**17.85**	**51.31**	**63,036.00**
Building 10/31/2014-12/31/2014	30.23	261.01	108.10	0.02	0.07	9.31	9.37	0.02	8.56	8.58	39,386.81
Building Off Road Diesel	29.72	255.22	101.78	0.00	0.00	9.07	9.07	0.00	8.35	8.35	37,624.54
Building Vendor Trips	0.46	5.68	4.31	0.01	0.05	0.23	0.28	0.02	0.21	0.23	1,475.09
Building Worker Trips	0.05	0.10	2.01	0.00	0.01	0.01	0.02	0.01	0.01	0.01	287.18
Fine Grading 10/01/2014- 10/31/2014	25.26	190.77	122.90	0.01	160.07	10.10	170.17	33.44	9.29	42.73	23,649.18
Fine Grading Dust	0.00	0.00	0.00	0.00	160.00	0.00	160.00	33.41	0.00	33.41	0.00
Fine Grading Off Road Diesel	25.01	190.27	113.29	0.00	0.00	10.06	10.06	0.00	9.26	9.26	22,275.68
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.25	0.50	9.60	0.01	0.07	0.04	0.11	0.02	0.03	0.06	1,373.51
Time Slice 11/3/2014-12/31/2014 Active Days: 43	30.23	261.01	108.10	0.02	0.07	9.31	9.37	0.02	8.56	8.58	39,386.81
Building 10/31/2014-12/31/2014	30.23	261.01	108.10	0.02	0.07	9.31	9.37	0.02	8.56	8.58	39,386.81
Building Off Road Diesel	29.72	255.22	101.78	0.00	0.00	9.07	9.07	0.00	8.35	8.35	37,624.54
Building Vendor Trips	0.46	5.68	4.31	0.01	0.05	0.23	0.28	0.02	0.21	0.23	1,475.09
Building Worker Trips	0.05	0.10	2.01	0.00	0.01	0.01	0.02	0.01	0.01	0.01	287.18

Phase Assumptions

Phase: Fine Grading 10/1/2014 - 10/31/2014 - Default Fine Site Grading Description

Total Acres Disturbed: 195.4

Maximum Daily Acreage Disturbed: 8

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

4 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

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4 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

4 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day

4 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

3 Scrapers (313 hp) operating at a 0.72 load factor for 8 hours per day

12 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

4 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Mass Grading 8/1/2014 - 8/31/2014 - Default Paving Description

Total Acres Disturbed: 195.4

Maximum Daily Acreage Disturbed: 8

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

12 Dumpers/Tenders (16 hp) operating at a 0.38 load factor for 8 hours per day

8 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

4 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

10 Other Equipment (190 hp) operating at a 0.62 load factor for 8 hours per day

12 Rollers (95 hp) operating at a 0.56 load factor for 8 hours per day

12 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

20 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Trenching 9/1/2014 - 9/30/2014 - Default Building Construction Description

Off-Road Equipment:

8 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

8 Other General Industrial Equipment (238 hp) operating at a 0.51 load factor for 8 hours per day

8 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 0 hours per day

4 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

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Phase: Building Construction 10/31/2014 - 12/31/2014 - Default Architectural Coating Description

Off-Road Equipment:

36 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day

3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

10 Other Equipment (190 hp) operating at a 0.62 load factor for 8 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

10 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Construction Mitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Summer Pounds Per Day, Mitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
Time Slice 8/1/2014-8/29/2014 Active Days: 21	44.28	211.05	204.94	**0.03**	68.27	11.84	80.10	14.28	10.88	25.16	47,326.63
Mass Grading 08/01/2014-08/31/2014	44.28	211.05	204.94	0.03	68.27	11.84	80.10	14.28	10.88	25.16	47,326.63
Mass Grading Dust	0.00	0.00	0.00	0.00	68.11	0.00	68.11	14.22	0.00	14.22	0.00
Mass Grading Off Road Diesel	43.71	209.92	183.27	0.00	0.00	11.75	11.75	0.00	10.81	10.81	44,226.42
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.56	1.13	21.68	0.03	0.15	0.08	0.24	0.06	0.07	0.13	3,100.20
Time Slice 9/1/2014-9/30/2014 Active Days: 22	10.32	52.04	49.76	0.01	0.05	2.59	2.65	0.02	2.38	2.40	12,598.76
Trenching 09/01/2014-09/30/2014	10.32	52.04	49.76	0.01	0.05	2.59	2.65	0.02	2.38	2.40	12,598.76
Trenching Off Road Diesel	10.12	51.64	42.07	0.00	0.00	2.56	2.56	0.00	2.36	2.36	11,499.96
Trenching Worker Trips	0.20	0.40	7.68	0.01	0.05	0.03	0.08	0.02	0.03	0.04	1,098.81

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Time Slice 10/1/2014-10/30/2014 Active Days: 22	25.26	120.39	122.90	0.01	68.18	7.58	75.76	14.25	6.97	21.22	23,649.18
Fine Grading 10/01/2014-10/31/2014	25.26	120.39	122.90	0.01	68.18	7.58	75.76	14.25	6.97	21.22	23,649.18
Fine Grading Dust	0.00	0.00	0.00	0.00	68.11	0.00	68.11	14.22	0.00	14.22	0.00
Fine Grading Off Road Diesel	25.01	119.89	113.29	0.00	0.00	7.55	7.55	0.00	6.94	6.94	22,275.68
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.25	0.50	9.60	0.01	0.07	0.04	0.11	0.02	0.03	0.06	1,373.51
Time Slice 10/31/2014-10/31/2014 Active Days: 1	**55.49**	279.31	**230.99**	0.03	68.25	14.62	82.87	14.27	13.45	27.72	**63,036.00**
Building 10/31/2014-12/31/2014	30.23	158.92	108.10	0.02	0.07	7.04	7.11	0.02	6.47	6.50	39,386.81
Building Off Road Diesel	29.72	153.13	101.78	0.00	0.00	6.80	6.80	0.00	6.26	6.26	37,624.54
Building Vendor Trips	0.46	5.68	4.31	0.01	0.05	0.23	0.28	0.02	0.21	0.23	1,475.09
Building Worker Trips	0.05	0.10	2.01	0.00	0.01	0.01	0.02	0.01	0.01	0.01	287.18
Fine Grading 10/01/2014-10/31/2014	25.26	120.39	122.90	0.01	68.18	7.58	75.76	14.25	6.97	21.22	23,649.18
Fine Grading Dust	0.00	0.00	0.00	0.00	68.11	0.00	68.11	14.22	0.00	14.22	0.00
Fine Grading Off Road Diesel	25.01	119.89	113.29	0.00	0.00	7.55	7.55	0.00	6.94	6.94	22,275.68
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.25	0.50	9.60	0.01	0.07	0.04	0.11	0.02	0.03	0.06	1,373.51
Time Slice 11/3/2014-12/31/2014 Active Days: 43	30.23	158.92	108.10	0.02	0.07	7.04	7.11	0.02	6.47	6.50	39,386.81
Building 10/31/2014-12/31/2014	30.23	158.92	108.10	0.02	0.07	7.04	7.11	0.02	6.47	6.50	39,386.81
Building Off Road Diesel	29.72	153.13	101.78	0.00	0.00	6.80	6.80	0.00	6.26	6.26	37,624.54
Building Vendor Trips	0.46	5.68	4.31	0.01	0.05	0.23	0.28	0.02	0.21	0.23	1,475.09
Building Worker Trips	0.05	0.10	2.01	0.00	0.01	0.01	0.02	0.01	0.01	0.01	287.18

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Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Fine Grading 10/1/2014 - 10/31/2014 - Default Fine Site Grading Description

For Soil Stablizing Measures, the Water exposed surfaces 3x daily watering mitigation reduces emissions by:

PM10: 61% PM25: 61%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

PM10: 44% PM25: 44%

For Graders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Graders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rubber Tired Dozers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rubber Tired Dozers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Scrapers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Scrapers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Excavators, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Excavators, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Pavers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

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PM10: 25% PM25: 25%

For Pavers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

The following mitigation measures apply to Phase: Mass Grading 8/1/2014 - 8/31/2014 - Default Paving Description

For Soil Stablizing Measures, the Water exposed surfaces 3x daily watering mitigation reduces emissions by:

PM10: 61% PM25: 61%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

PM10: 44% PM25: 44%

For Graders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Graders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Excavators, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Excavators, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rubber Tired Dozers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rubber Tired Dozers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Dumpers/Tenders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

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For Dumpers/Tenders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rollers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rollers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

The following mitigation measures apply to Phase: Trenching 9/1/2014 - 9/30/2014 - Default Building Construction Description

For Excavators, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Excavators, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Other General Industrial Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other General Industrial Equipment, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

The following mitigation measures apply to Phase: Building Construction 10/31/2014 - 12/31/2014 - Default Architectural Coating Description

For Cranes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

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For Cranes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Forklifts, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Forklifts, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Welders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Welders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

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Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
General light industry	0.72	3.45	11.43	0.02	44.75	4.73	2,311.16
TOTALS (lbs/day, unmitigated)	0.72	3.45	11.43	0.02	44.75	4.73	2,311.16

Operational Mitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Summer Pounds Per Day, Mitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
General light industry	0.72	3.45	11.43	0.02	44.75	4.73	2,311.16
TOTALS (lbs/day, mitigated)	0.72	3.45	11.43	0.02	44.75	4.73	2,311.16

Operational Mitigation Options Selected

Residential Mitigation Measures

Nonresidential Mitigation Measures

Non-Residential Local-Serving Retail Mitigation

Percent Reduction in Trips is 0%

Inputs Selected:

The Presence of Local-Serving Retail checkbox was NOT selected.

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

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Analysis Year: 2015 Temperature (F): 85 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
General light industry		51.80	acres	1.00	51.80	1,890.70
					51.80	1,890.70

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	39.6	0.3	99.4	0.3
Light Truck < 3750 lbs	12.0	0.8	94.2	5.0
Light Truck 3751-5750 lbs	20.4	0.5	99.5	0.0
Med Truck 5751-8500 lbs	12.0	0.8	99.2	0.0
Lite-Heavy Truck 8501-10,000 lbs	3.9	0.0	75.9	24.1
Lite-Heavy Truck 10,001-14,000 lbs	3.1	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	3.0	0.0	15.4	84.6
Heavy-Heavy Truck 33,001-60,000 lbs	6.0	0.0	2.1	97.9
Other Bus	0.0	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	0.0	50.0	50.0	0.0
School Bus	0.0	0.0	0.0	100.0
Motor Home	0.0	0.0	84.6	15.4

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Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	36.5	36.5	36.5
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
General light industry				50.0	25.0	25.0

Operational Changes to Defaults

The urban/rural selection has been changed from Urban to Rural

Ambient winter temperature changed from 40 degrees F to 50 degrees F

The percentage of paved roads changed from 100% to 95%

The percentage of unpaved roads changed from 0% to 5%

Commercial-based commute rural trip length changed from 14.7 miles to 36.5 miles

Commercial-based non-work urban trip length changed from 7.35 miles to 7.4 miles

Commercial-based non-work rural trip length changed from 6.6 miles to 36.5 miles

Commercial-based customer urban trip length changed from 7.35 miles to 7.4 miles

Commercial-based customer rural trip length changed from 6.6 miles to 36.5 miles

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Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: C:\Users\afurman\Desktop\Tylerhorse\Tylerhorse 3.27.14.urb924

Project Name: Tylerhorse 3.27.14

Project Location: Kern County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

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Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2014 TOTALS (tons/year unmitigated)	1.53	12.57	6.49	0.00	3.52	0.52	4.05	0.74	0.48	1.22	1,773.99
2014 TOTALS (tons/year mitigated)	1.53	7.67	6.49	0.00	1.50	0.39	1.90	0.31	0.36	0.68	1,773.99
Percent Reduction	0.00	39.00	0.00	0.00	57.36	24.68	53.13	57.31	24.68	44.40	0.00

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)							

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.14	0.68	2.00	0.00	8.17	0.86	407.25
TOTALS (tons/year, mitigated)	0.14	0.68	2.00	0.00	8.17	0.86	407.25
Percent Reduction	0.00	0.00	0.00	NaN	0.00	0.00	0.00

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.14	0.68	2.00	0.00	8.17	0.86	407.25

Both Area and Operational Mitigation must be turned on to get a combined mitigated total.

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

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2014	1.53	12.57	6.49	0.00	3.52	0.52	4.05	0.74	0.48	1.22	1,773.99
Mass Grading 08/01/2014-08/31/2014	0.46	3.69	2.15	0.00	1.68	0.17	1.85	0.35	0.15	0.50	496.93
Mass Grading Dust	0.00	0.00	0.00	0.00	1.68	0.00	1.68	0.35	0.00	0.35	0.00
Mass Grading Off Road Diesel	0.46	3.67	1.92	0.00	0.00	0.16	0.16	0.00	0.15	0.15	464.38
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.01	0.01	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.55
Trenching 09/01/2014-09/30/2014	0.11	0.95	0.55	0.00	0.00	0.04	0.04	0.00	0.03	0.04	138.59
Trenching Off Road Diesel	0.11	0.95	0.46	0.00	0.00	0.04	0.04	0.00	0.03	0.03	126.50
Trenching Worker Trips	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.09
Fine Grading 10/01/2014-10/31/2014	0.29	2.19	1.41	0.00	1.84	0.12	1.96	0.38	0.11	0.49	271.97
Fine Grading Dust	0.00	0.00	0.00	0.00	1.84	0.00	1.84	0.38	0.00	0.38	0.00
Fine Grading Off Road Diesel	0.29	2.19	1.30	0.00	0.00	0.12	0.12	0.00	0.11	0.11	256.17
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.01	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.80
Building 10/31/2014-12/31/2014	0.67	5.74	2.38	0.00	0.00	0.20	0.21	0.00	0.19	0.19	866.51
Building Off Road Diesel	0.65	5.61	2.24	0.00	0.00	0.20	0.20	0.00	0.18	0.18	827.74
Building Vendor Trips	0.01	0.12	0.09	0.00	0.00	0.00	0.01	0.00	0.00	0.00	32.45
Building Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.32

Phase Assumptions

Phase: Fine Grading 10/1/2014 - 10/31/2014 - Default Fine Site Grading Description

Total Acres Disturbed: 195.4

Maximum Daily Acreage Disturbed: 8

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

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On Road Truck Travel (VMT): 0

Off-Road Equipment:

4 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

4 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

4 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day

4 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

3 Scrapers (313 hp) operating at a 0.72 load factor for 8 hours per day

12 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

4 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Mass Grading 8/1/2014 - 8/31/2014 - Default Paving Description

Total Acres Disturbed: 195.4

Maximum Daily Acreage Disturbed: 8

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

12 Dumpers/Tenders (16 hp) operating at a 0.38 load factor for 8 hours per day

8 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

4 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

10 Other Equipment (190 hp) operating at a 0.62 load factor for 8 hours per day

12 Rollers (95 hp) operating at a 0.56 load factor for 8 hours per day

12 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

20 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Trenching 9/1/2014 - 9/30/2014 - Default Building Construction Description

Off-Road Equipment:

8 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

8 Other General Industrial Equipment (238 hp) operating at a 0.51 load factor for 8 hours per day

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8 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 0 hours per day

4 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Building Construction 10/31/2014 - 12/31/2014 - Default Architectural Coating Description

Off-Road Equipment:

36 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day

3 Forklifts (145 hp) operating at a 0.3 load factor for 8 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

10 Other Equipment (190 hp) operating at a 0.62 load factor for 8 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

10 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Construction Mitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Mitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

2014	1.53	7.67	6.49	0.00	1.50	0.39	1.90	0.31	0.36	0.68	1,773.99
Mass Grading 08/01/2014-08/31/2014	0.46	2.22	2.15	0.00	0.72	0.12	0.84	0.15	0.11	0.26	496.93
Mass Grading Dust	0.00	0.00	0.00	0.00	0.72	0.00	0.72	0.15	0.00	0.15	0.00
Mass Grading Off Road Diesel	0.46	2.20	1.92	0.00	0.00	0.12	0.12	0.00	0.11	0.11	464.38
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.01	0.01	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.55
Trenching 09/01/2014-09/30/2014	0.11	0.57	0.55	0.00	0.00	0.03	0.03	0.00	0.03	0.03	138.59
Trenching Off Road Diesel	0.11	0.57	0.46	0.00	0.00	0.03	0.03	0.00	0.03	0.03	126.50
Trenching Worker Trips	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.09
Fine Grading 10/01/2014-10/31/2014	0.29	1.38	1.41	0.00	0.78	0.09	0.87	0.16	0.08	0.24	271.97
Fine Grading Dust	0.00	0.00	0.00	0.00	0.78	0.00	0.78	0.16	0.00	0.16	0.00
Fine Grading Off Road Diesel	0.29	1.38	1.30	0.00	0.00	0.09	0.09	0.00	0.08	0.08	256.17
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.01	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.80
Building 10/31/2014-12/31/2014	0.67	3.50	2.38	0.00	0.00	0.15	0.16	0.00	0.14	0.14	866.51
Building Off Road Diesel	0.65	3.37	2.24	0.00	0.00	0.15	0.15	0.00	0.14	0.14	827.74
Building Vendor Trips	0.01	0.12	0.09	0.00	0.00	0.00	0.01	0.00	0.00	0.00	32.45
Building Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.32

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Fine Grading 10/1/2014 - 10/31/2014 - Default Fine Site Grading Description

For Soil Stablizing Measures, the Water exposed surfaces 3x daily watering mitigation reduces emissions by:

PM10: 61% PM25: 61%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

PM10: 44% PM25: 44%

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For Graders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Graders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rubber Tired Dozers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rubber Tired Dozers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Scrapers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Scrapers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Excavators, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Excavators, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Pavers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Pavers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

The following mitigation measures apply to Phase: Mass Grading 8/1/2014 - 8/31/2014 - Default Paving Description

For Soil Stablizing Measures, the Water exposed surfaces 3x daily watering mitigation reduces emissions by:

PM10: 61% PM25: 61%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

PM10: 44% PM25: 44%

For Graders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Graders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Excavators, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Excavators, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rubber Tired Dozers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rubber Tired Dozers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Dumpers/Tenders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Dumpers/Tenders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rollers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

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PM10: 25% PM25: 25%

For Rollers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

The following mitigation measures apply to Phase: Trenching 9/1/2014 - 9/30/2014 - Default Building Construction Description

For Excavators, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Excavators, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Other General Industrial Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other General Industrial Equipment, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

The following mitigation measures apply to Phase: Building Construction 10/31/2014 - 12/31/2014 - Default Architectural Coating Description

For Cranes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Cranes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Forklifts, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Forklifts, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

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PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Welders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Welders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
General light industry	0.14	0.68	2.00	0.00	8.17	0.86	407.25
TOTALS (tons/year, unmitigated)	0.14	0.68	2.00	0.00	8.17	0.86	407.25

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Operational Mitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Mitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
General light industry	0.14	0.68	2.00	0.00	8.17	0.86	407.25
TOTALS (tons/year, mitigated)	0.14	0.68	2.00	0.00	8.17	0.86	407.25

Operational Mitigation Options Selected

Residential Mitigation Measures

Nonresidential Mitigation Measures

Non-Residential Local-Serving Retail Mitigation

Percent Reduction in Trips is 0%

Inputs Selected:

The Presence of Local-Serving Retail checkbox was NOT selected.

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2015 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
General light industry		51.80	acres	1.00	51.80	1,890.70
					51.80	1,890.70

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Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	39.6	0.3	99.4	0.3
Light Truck < 3750 lbs	12.0	0.8	94.2	5.0
Light Truck 3751-5750 lbs	20.4	0.5	99.5	0.0
Med Truck 5751-8500 lbs	12.0	0.8	99.2	0.0
Lite-Heavy Truck 8501-10,000 lbs	3.9	0.0	75.9	24.1
Lite-Heavy Truck 10,001-14,000 lbs	3.1	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	3.0	0.0	15.4	84.6
Heavy-Heavy Truck 33,001-60,000 lbs	6.0	0.0	2.1	97.9
Other Bus	0.0	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	0.0	50.0	50.0	0.0
School Bus	0.0	0.0	0.0	100.0
Motor Home	0.0	0.0	84.6	15.4

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	36.5	36.5	36.5
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
% of Trips - Commercial (by land use)						
General light industry				50.0	25.0	25.0

Operational Changes to Defaults

The urban/rural selection has been changed from Urban to Rural

Ambient winter temperature changed from 40 degrees F to 50 degrees F

The percentage of paved roads changed from 100% to 95%

The percentage of unpaved roads changed from 0% to 5%

Commercial-based commute rural trip length changed from 14.7 miles to 36.5 miles

Commercial-based non-work urban trip length changed from 7.35 miles to 7.4 miles

Commercial-based non-work rural trip length changed from 6.6 miles to 36.5 miles

Commercial-based customer urban trip length changed from 7.35 miles to 7.4 miles

Commercial-based customer rural trip length changed from 6.6 miles to 36.5 miles

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Urbemis 2007 Version 9.2.4

Detail Report for Summer Operational Unmitigated Emissions (Pounds/Day)

File Name: W:\PROJECTS\1378\1378-017\Documents_Tylerhorse\Air Quality\URBEMIS\Operation and On-Road Deliveries.urb924

Project Name: Operation

Project Location: Kern County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
General light industry	0.61	3.09	7.25	0.01	25.36	5.45	1,170.24
TOTALS (lbs/day, unmitigated)	0.61	3.09	7.25	0.01	25.36	5.45	1,170.24

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2012 Temperature (F): 85 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
General light industry		2.00	employees	12.00	24.00	876.00
					24.00	876.00

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	39.6	0.8	98.9	0.3
Light Truck < 3750 lbs	11.9	2.5	90.8	6.7

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Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Truck 3751-5750 lbs	20.4	1.0	98.5	0.5
Med Truck 5751-8500 lbs	12.0	0.8	99.2	0.0
Lite-Heavy Truck 8501-10,000 lbs	2.9	0.0	75.9	24.1
Lite-Heavy Truck 10,001-14,000 lbs	1.0	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.3	0.0	15.4	84.6
Heavy-Heavy Truck 33,001-60,000 lbs	10.9	0.0	0.0	100.0
Other Bus	0.0	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	0.0	59.1	40.9	0.0
School Bus	0.0	0.0	0.0	100.0
Motor Home	0.0	0.0	84.6	15.4

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	36.5	36.5	36.5
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
General light industry				50.0	25.0	25.0

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Operational Changes to Defaults

The urban/rural selection has been changed from Urban to Rural

Ambient winter temperature changed from 40 degrees F to 50 degrees F

The percentage of paved roads changed from 100% to 98.6%

The percentage of unpaved roads changed from 0% to 1.4%

Commercial-based commute rural trip length changed from 14.7 miles to 36.5 miles

Commercial-based non-work rural trip length changed from 6.6 miles to 36.5 miles

Commercial-based customer rural trip length changed from 6.6 miles to 36.5 miles

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Urbemis 2007 Version 9.2.4

Detail Report for Summer Operational Unmitigated Emissions (Pounds/Day)

File Name: W:\PROJECTS\1378\1378-017\Documents_Tylerhorse\Air Quality\URBEMIS\Operation and On-Road Deliveries.urb924

Project Name: Operation

Project Location: Kern County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
General light industry	0.61	3.09	7.25	0.01	6.43	0.81	1,170.24
TOTALS (lbs/day, unmitigated)	0.61	3.09	7.25	0.01	6.43	0.81	1,170.24

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2012 Temperature (F): 85 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
General light industry		2.00	employees	12.00	24.00	876.00
					24.00	876.00

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	39.6	0.8	98.9	0.3
Light Truck < 3750 lbs	11.9	2.5	90.8	6.7

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Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Truck 3751-5750 lbs	20.4	1.0	98.5	0.5
Med Truck 5751-8500 lbs	12.0	0.8	99.2	0.0
Lite-Heavy Truck 8501-10,000 lbs	2.9	0.0	75.9	24.1
Lite-Heavy Truck 10,001-14,000 lbs	1.0	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.3	0.0	15.4	84.6
Heavy-Heavy Truck 33,001-60,000 lbs	10.9	0.0	0.0	100.0
Other Bus	0.0	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	0.0	59.1	40.9	0.0
School Bus	0.0	0.0	0.0	100.0
Motor Home	0.0	0.0	84.6	15.4

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	36.5	36.5	36.5
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
General light industry				50.0	25.0	25.0

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Operational Changes to Defaults

The urban/rural selection has been changed from Urban to Rural

Ambient winter temperature changed from 40 degrees F to 50 degrees F

The percentage of paved roads changed from 100% to 98.6%

The percentage of unpaved roads changed from 0% to 1.4%

Commercial-based commute rural trip length changed from 14.7 miles to 36.5 miles

Commercial-based non-work rural trip length changed from 6.6 miles to 36.5 miles

Commercial-based customer rural trip length changed from 6.6 miles to 36.5 miles

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Urbemis 2007 Version 9.2.4

Detail Report for Summer Construction Unmitigated Emissions (Pounds/Day)

File Name: W:\PROJECTS\1378\1378-017\Documents_Tylerhorse\Air Quality\URBEMIS\Operation and On-Road Deliveries.urb924

Project Name: Operation

Project Location: Kern County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Time Slice 5/1/2014-5/30/2014 Active Days: 22	**3.65**	**28.85**	**14.24**	**0.00**	**0.00**	**1.20**	**1.20**	**0.00**	**1.10**	**1.10**	**4,464.72**
Building 05/01/2014-05/31/2014	3.65	28.85	14.24	0.00	0.00	1.20	1.20	0.00	1.10	1.10	4,464.72
Building Off Road Diesel	3.65	28.85	14.24	0.00	0.00	1.20	1.20	0.00	1.10	1.10	4,464.72
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Phase Assumptions

Phase: Building Construction 5/1/2014 - 5/31/2014 - Operation and Maintenance

Off-Road Equipment:

2 Air Compressors (10 hp) operating at a 0.48 load factor for 4 hours per day

1 Cranes (399 hp) operating at a 0.43 load factor for 10 hours per day

2 Generator Sets (50 hp) operating at a 0.74 load factor for 4 hours per day

1 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

1 Other Equipment (750 hp) operating at a 0.43 load factor for 10 hours per day

1 Welders (175 hp) operating at a 0.45 load factor for 2 hours per day

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Urbemis 2007 Version 9.2.4

Detail Report for Summer Construction Mitigated Emissions (Pounds/Day)

File Name: W:\PROJECTS\1378\1378-017\Documents_Tylerhorse\Air Quality\URBEMIS\Operation and On-Road Deliveries.urb924

Project Name: Operation

Project Location: Kern County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Summer Pounds Per Day, Mitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Time Slice 5/1/2014-5/30/2014 Active Days: 22	**3.65**	17.31	**14.24**	**0.00**	**0.00**	0.62	0.62	**0.00**	0.57	0.57	**4,464.72**
Building 05/01/2014-05/31/2014	3.65	17.31	14.24	0.00	0.00	0.62	0.62	0.00	0.57	0.57	4,464.72
Building Off Road Diesel	3.65	17.31	14.24	0.00	0.00	0.62	0.62	0.00	0.57	0.57	4,464.72
Building Vendor Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Building Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Building Construction 5/1/2014 - 5/31/2014 - Operation and Maintenance

For Cranes, the Diesel Particulate Filter (DPF) 2nd Tier mitigation reduces emissions by:

PM10: 50% PM25: 50%

For Cranes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Other Equipment, the Diesel Particulate Filter (DPF) 2nd Tier mitigation reduces emissions by:

PM10: 50% PM25: 50%

For Other Equipment, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Air Compressors, the Diesel Particulate Filter (DPF) 2nd Tier mitigation reduces emissions by:

PM10: 50% PM25: 50%

For Air Compressors, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Graders, the Diesel Particulate Filter (DPF) 2nd Tier mitigation reduces emissions by:

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PM10: 50% PM25: 50%

For Graders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Generator Sets, the Diesel Particulate Filter (DPF) 2nd Tier mitigation reduces emissions by:

PM10: 50% PM25: 50%

For Generator Sets, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Welders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

Phase Assumptions

Phase: Building Construction 5/1/2014 - 5/31/2014 - Operation and Maintenance

Off-Road Equipment:

2 Air Compressors (10 hp) operating at a 0.48 load factor for 4 hours per day

1 Cranes (399 hp) operating at a 0.43 load factor for 10 hours per day

2 Generator Sets (50 hp) operating at a 0.74 load factor for 4 hours per day

1 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day

1 Other Equipment (750 hp) operating at a 0.43 load factor for 10 hours per day

1 Welders (175 hp) operating at a 0.45 load factor for 2 hours per day

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Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: C:\Users\afurman\Desktop\Tylerhorse\Tylerhorse 3.27.14.urb924

Project Name: Tylerhorse 3.27.14

Project Location: Kern County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

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Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2014 TOTALS (tons/year unmitigated)	1.45	11.87	6.23	0.00	3.27	0.50	3.77	0.68	0.46	1.15	1,676.54
2014 TOTALS (tons/year mitigated)	1.45	7.24	6.23	0.00	1.39	0.38	1.77	0.29	0.35	0.64	1,676.54
Percent Reduction	0.00	38.98	0.00	0.00	57.35	24.66	52.99	57.30	24.67	44.13	0.00

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)							

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.14	0.68	2.00	0.00	8.17	0.86	407.25
TOTALS (tons/year, mitigated)	0.14	0.68	2.00	0.00	8.17	0.86	407.25
Percent Reduction	0.00	0.00	0.00	NaN	0.00	0.00	0.00

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.14	0.68	2.00	0.00	8.17	0.86	407.25

Both Area and Operational Mitigation must be turned on to get a combined mitigated total.

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

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2014	1.45	11.87	6.23	0.00	3.27	0.50	3.77	0.68	0.46	1.15	1,676.54
Mass Grading 08/01/2014-08/31/2014	0.43	3.41	2.01	0.00	1.56	0.15	1.71	0.33	0.14	0.47	462.10
Mass Grading Dust	0.00	0.00	0.00	0.00	1.56	0.00	1.56	0.33	0.00	0.33	0.00
Mass Grading Off Road Diesel	0.42	3.40	1.78	0.00	0.00	0.15	0.15	0.00	0.14	0.14	429.55
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.01	0.01	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.55
Trenching 09/01/2014-09/30/2014	0.14	1.10	0.69	0.00	0.00	0.05	0.05	0.00	0.05	0.05	155.75
Trenching Off Road Diesel	0.14	1.09	0.61	0.00	0.00	0.05	0.05	0.00	0.05	0.05	143.67
Trenching Worker Trips	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.09
Fine Grading 10/01/2014-10/31/2014	0.27	2.03	1.32	0.00	1.71	0.11	1.81	0.36	0.10	0.46	252.75
Fine Grading Dust	0.00	0.00	0.00	0.00	1.71	0.00	1.71	0.36	0.00	0.36	0.00
Fine Grading Off Road Diesel	0.27	2.02	1.21	0.00	0.00	0.11	0.11	0.00	0.10	0.10	236.96
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.01	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.80
Building 10/31/2014-12/31/2014	0.62	5.33	2.21	0.00	0.00	0.19	0.19	0.00	0.17	0.18	805.93
Building Off Road Diesel	0.61	5.20	2.07	0.00	0.00	0.18	0.18	0.00	0.17	0.17	767.16
Building Vendor Trips	0.01	0.12	0.09	0.00	0.00	0.00	0.01	0.00	0.00	0.00	32.45
Building Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.32

Phase Assumptions

Phase: Fine Grading 10/1/2014 - 10/31/2014 - Default Fine Site Grading Description

Total Acres Disturbed: 181.4

Maximum Daily Acreage Disturbed: 7.42

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

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On Road Truck Travel (VMT): 0

Off-Road Equipment:

4 Excavators (168 hp) operating at a 0.57 load factor for 7.4 hours per day

4 Graders (174 hp) operating at a 0.61 load factor for 7.4 hours per day

4 Pavers (100 hp) operating at a 0.62 load factor for 7.4 hours per day

4 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 7.4 hours per day

3 Scrapers (313 hp) operating at a 0.72 load factor for 7.4 hours per day

12 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7.4 hours per day

4 Water Trucks (189 hp) operating at a 0.5 load factor for 7.4 hours per day

Phase: Mass Grading 8/1/2014 - 8/31/2014 - Default Paving Description

Total Acres Disturbed: 181.4

Maximum Daily Acreage Disturbed: 7.42

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

12 Dumpers/Tenders (16 hp) operating at a 0.38 load factor for 7.4 hours per day

8 Excavators (168 hp) operating at a 0.57 load factor for 7.4 hours per day

4 Graders (174 hp) operating at a 0.61 load factor for 7.4 hours per day

10 Other Equipment (190 hp) operating at a 0.62 load factor for 7.4 hours per day

12 Rollers (95 hp) operating at a 0.56 load factor for 7.4 hours per day

12 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 7.4 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7.4 hours per day

20 Water Trucks (189 hp) operating at a 0.5 load factor for 7.4 hours per day

Phase: Trenching 9/1/2014 - 9/30/2014 - Default Building Construction Description

Off-Road Equipment:

8 Excavators (168 hp) operating at a 0.57 load factor for 7.4 hours per day

8 Other General Industrial Equipment (238 hp) operating at a 0.51 load factor for 7.4 hours per day

8 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7.4 hours per day

4 Water Trucks (189 hp) operating at a 0.5 load factor for 7.4 hours per day

Phase: Building Construction 10/31/2014 - 12/31/2014 - Default Architectural Coating Description

Off-Road Equipment:

36 Cranes (399 hp) operating at a 0.43 load factor for 6.5 hours per day

3 Forklifts (145 hp) operating at a 0.3 load factor for 7.4 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 7 hours per day

10 Other Equipment (190 hp) operating at a 0.62 load factor for 7.4 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 6.5 hours per day

1 Welders (45 hp) operating at a 0.45 load factor for 7 hours per day

10 Water Trucks (189 hp) operating at a 0.5 load factor for 7.4 hours per day

Construction Mitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Mitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

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2014	1.45	7.24	6.23	0.00	1.39	0.38	1.77	0.29	0.35	0.64	1,676.54
Mass Grading 08/01/2014-08/31/2014	0.43	2.05	2.01	0.00	0.66	0.12	0.78	0.14	0.11	0.24	462.10
Mass Grading Dust	0.00	0.00	0.00	0.00	0.66	0.00	0.66	0.14	0.00	0.14	0.00
Mass Grading Off Road Diesel	0.42	2.04	1.78	0.00	0.00	0.11	0.11	0.00	0.11	0.11	429.55
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.01	0.01	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.55
Trenching 09/01/2014-09/30/2014	0.14	0.66	0.69	0.00	0.00	0.04	0.04	0.00	0.04	0.04	155.75
Trenching Off Road Diesel	0.14	0.66	0.61	0.00	0.00	0.04	0.04	0.00	0.04	0.04	143.67
Trenching Worker Trips	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.09
Fine Grading 10/01/2014-10/31/2014	0.27	1.28	1.32	0.00	0.73	0.08	0.81	0.15	0.07	0.23	252.75
Fine Grading Dust	0.00	0.00	0.00	0.00	0.73	0.00	0.73	0.15	0.00	0.15	0.00
Fine Grading Off Road Diesel	0.27	1.28	1.21	0.00	0.00	0.08	0.08	0.00	0.07	0.07	236.96
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.01	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.80
Building 10/31/2014-12/31/2014	0.62	3.25	2.21	0.00	0.00	0.14	0.15	0.00	0.13	0.13	805.93
Building Off Road Diesel	0.61	3.12	2.07	0.00	0.00	0.14	0.14	0.00	0.13	0.13	767.16
Building Vendor Trips	0.01	0.12	0.09	0.00	0.00	0.00	0.01	0.00	0.00	0.00	32.45
Building Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.32

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Fine Grading 10/1/2014 - 10/31/2014 - Default Fine Site Grading Description

For Soil Stablizing Measures, the Water exposed surfaces 3x daily watering mitigation reduces emissions by:

PM10: 61% PM25: 61%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

PM10: 44% PM25: 44%

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For Graders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Graders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rubber Tired Dozers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rubber Tired Dozers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Scrapers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Scrapers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Excavators, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Excavators, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Pavers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Pavers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

The following mitigation measures apply to Phase: Mass Grading 8/1/2014 - 8/31/2014 - Default Paving Description

For Soil Stablizing Measures, the Water exposed surfaces 3x daily watering mitigation reduces emissions by:

PM10: 61% PM25: 61%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

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PM10: 44% PM25: 44%

For Graders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Graders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Excavators, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Excavators, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rubber Tired Dozers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rubber Tired Dozers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Dumpers/Tenders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Dumpers/Tenders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rollers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

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PM10: 25% PM25: 25%

For Rollers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

The following mitigation measures apply to Phase: Trenching 9/1/2014 - 9/30/2014 - Default Building Construction Description

For Excavators, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Excavators, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Other General Industrial Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other General Industrial Equipment, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

The following mitigation measures apply to Phase: Building Construction 10/31/2014 - 12/31/2014 - Default Architectural Coating Description

For Cranes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Cranes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Forklifts, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Forklifts, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

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PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Welders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Welders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
General light industry	0.14	0.68	2.00	0.00	8.17	0.86	407.25
TOTALS (tons/year, unmitigated)	0.14	0.68	2.00	0.00	8.17	0.86	407.25

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Operational Mitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Mitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
General light industry	0.14	0.68	2.00	0.00	8.17	0.86	407.25
TOTALS (tons/year, mitigated)	0.14	0.68	2.00	0.00	8.17	0.86	407.25

Operational Mitigation Options Selected

Residential Mitigation Measures

Nonresidential Mitigation Measures

Non-Residential Local-Serving Retail Mitigation

Percent Reduction in Trips is 0%

Inputs Selected:

The Presence of Local-Serving Retail checkbox was NOT selected.

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2015 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
General light industry		51.80	acres	1.00	51.80	1,890.70
					51.80	1,890.70

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Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	39.6	0.3	99.4	0.3
Light Truck < 3750 lbs	12.0	0.8	94.2	5.0
Light Truck 3751-5750 lbs	20.4	0.5	99.5	0.0
Med Truck 5751-8500 lbs	12.0	0.8	99.2	0.0
Lite-Heavy Truck 8501-10,000 lbs	3.9	0.0	75.9	24.1
Lite-Heavy Truck 10,001-14,000 lbs	3.1	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	3.0	0.0	15.4	84.6
Heavy-Heavy Truck 33,001-60,000 lbs	6.0	0.0	2.1	97.9
Other Bus	0.0	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	0.0	50.0	50.0	0.0
School Bus	0.0	0.0	0.0	100.0
Motor Home	0.0	0.0	84.6	15.4

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	36.5	36.5	36.5
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
% of Trips - Commercial (by land use)						
General light industry				50.0	25.0	25.0

Operational Changes to Defaults

The urban/rural selection has been changed from Urban to Rural

Ambient winter temperature changed from 40 degrees F to 50 degrees F

The percentage of paved roads changed from 100% to 95%

The percentage of unpaved roads changed from 0% to 5%

Commercial-based commute rural trip length changed from 14.7 miles to 36.5 miles

Commercial-based non-work urban trip length changed from 7.35 miles to 7.4 miles

Commercial-based non-work rural trip length changed from 6.6 miles to 36.5 miles

Commercial-based customer urban trip length changed from 7.35 miles to 7.4 miles

Commercial-based customer rural trip length changed from 6.6 miles to 36.5 miles

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Urbemis 2007 Version 9.2.4

Combined Summer Emissions Reports (Pounds/Day)

File Name: C:\Users\afurman\Desktop\Tylerhorse\Tylerhorse 3.27.14.urb924

Project Name: Tylerhorse 3.27.14

Project Location: Kern County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

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Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2014 TOTALS (lbs/day unmitigated)	51.41	418.82	214.95	0.03	148.55	17.98	166.52	31.05	16.54	47.58	58,611.73
2014 TOTALS (lbs/day mitigated)	51.41	259.11	214.95	0.03	63.33	13.55	76.86	13.25	12.46	25.71	58,611.73

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)							

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	0.72	3.45	11.43	0.02	44.75	4.73	2,311.16
TOTALS (lbs/day, mitigated)	0.72	3.45	11.43	0.02	44.75	4.73	2,311.16
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	0.72	3.45	11.43	0.02	44.75	4.73	2,311.16

Both Area and Operational Mitigation must be turned on to get a combined mitigated total.

Construction Unmitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2

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Time Slice 8/1/2014-8/29/2014 Active Days: 21	41.00	324.75	191.20	**0.03**	**148.55**	14.58	163.13	**31.05**	13.40	44.45	44,009.64
Mass Grading 08/01/2014-08/31/2014	41.00	324.75	191.20	0.03	148.55	14.58	163.13	31.05	13.40	44.45	44,009.64
Mass Grading Dust	0.00	0.00	0.00	0.00	148.40	0.00	148.40	30.99	0.00	30.99	0.00
Mass Grading Off Road Diesel	40.44	323.63	169.52	0.00	0.00	14.49	14.49	0.00	13.33	13.33	40,909.44
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.56	1.13	21.68	0.03	0.15	0.08	0.24	0.06	0.07	0.13	3,100.20
Time Slice 9/1/2014-9/30/2014 Active Days: 22	12.51	99.92	63.02	0.01	0.05	4.74	4.80	0.02	4.36	4.38	14,159.46
Trenching 09/01/2014-09/30/2014	12.51	99.92	63.02	0.01	0.05	4.74	4.80	0.02	4.36	4.38	14,159.46
Trenching Off Road Diesel	12.31	99.52	55.34	0.00	0.00	4.71	4.71	0.00	4.33	4.33	13,060.66
Trenching Worker Trips	0.20	0.40	7.68	0.01	0.05	0.03	0.08	0.02	0.03	0.04	1,098.81
Time Slice 10/1/2014-10/30/2014 Active Days: 22	23.39	176.50	114.40	0.01	148.47	9.34	157.81	31.02	8.59	39.61	21,978.51
Fine Grading 10/01/2014-10/31/2014	23.39	176.50	114.40	0.01	148.47	9.34	157.81	31.02	8.59	39.61	21,978.51
Fine Grading Dust	0.00	0.00	0.00	0.00	148.40	0.00	148.40	30.99	0.00	30.99	0.00
Fine Grading Off Road Diesel	23.14	176.00	104.80	0.00	0.00	9.31	9.31	0.00	8.56	8.56	20,605.00
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.25	0.50	9.60	0.01	0.07	0.04	0.11	0.02	0.03	0.06	1,373.51

Time Slice 10/31/2014-10/31/2014 Active Days: 1	**51.41**	**418.82**	**214.95**	0.03	148.54	**17.98**	**166.52**	31.04	**16.54**	**47.58**	**58,611.73**
Building 10/31/2014-12/31/2014	28.02	242.33	100.55	0.02	0.07	8.64	8.70	0.02	7.94	7.97	36,633.22
Building Off Road Diesel	27.51	236.54	94.24	0.00	0.00	8.40	8.40	0.00	7.73	7.73	34,870.94
Building Vendor Trips	0.46	5.68	4.31	0.01	0.05	0.23	0.28	0.02	0.21	0.23	1,475.09
Building Worker Trips	0.05	0.10	2.01	0.00	0.01	0.01	0.02	0.01	0.01	0.01	287.18
Fine Grading 10/01/2014- 10/31/2014	23.39	176.50	114.40	0.01	148.47	9.34	157.81	31.02	8.59	39.61	21,978.51
Fine Grading Dust	0.00	0.00	0.00	0.00	148.40	0.00	148.40	30.99	0.00	30.99	0.00
Fine Grading Off Road Diesel	23.14	176.00	104.80	0.00	0.00	9.31	9.31	0.00	8.56	8.56	20,605.00
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.25	0.50	9.60	0.01	0.07	0.04	0.11	0.02	0.03	0.06	1,373.51
Time Slice 11/3/2014-12/31/2014 Active Days: 43	28.02	242.33	100.55	0.02	0.07	8.64	8.70	0.02	7.94	7.97	36,633.22
Building 10/31/2014-12/31/2014	28.02	242.33	100.55	0.02	0.07	8.64	8.70	0.02	7.94	7.97	36,633.22
Building Off Road Diesel	27.51	236.54	94.24	0.00	0.00	8.40	8.40	0.00	7.73	7.73	34,870.94
Building Vendor Trips	0.46	5.68	4.31	0.01	0.05	0.23	0.28	0.02	0.21	0.23	1,475.09
Building Worker Trips	0.05	0.10	2.01	0.00	0.01	0.01	0.02	0.01	0.01	0.01	287.18

Phase Assumptions

Phase: Fine Grading 10/1/2014 - 10/31/2014 - Default Fine Site Grading Description

Total Acres Disturbed: 181.4

Maximum Daily Acreage Disturbed: 7.42

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

4 Excavators (168 hp) operating at a 0.57 load factor for 7.4 hours per day

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4 Graders (174 hp) operating at a 0.61 load factor for 7.4 hours per day

4 Pavers (100 hp) operating at a 0.62 load factor for 7.4 hours per day

4 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 7.4 hours per day

3 Scrapers (313 hp) operating at a 0.72 load factor for 7.4 hours per day

12 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7.4 hours per day

4 Water Trucks (189 hp) operating at a 0.5 load factor for 7.4 hours per day

Phase: Mass Grading 8/1/2014 - 8/31/2014 - Default Paving Description

Total Acres Disturbed: 181.4

Maximum Daily Acreage Disturbed: 7.42

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

12 Dumpers/Tenders (16 hp) operating at a 0.38 load factor for 7.4 hours per day

8 Excavators (168 hp) operating at a 0.57 load factor for 7.4 hours per day

4 Graders (174 hp) operating at a 0.61 load factor for 7.4 hours per day

10 Other Equipment (190 hp) operating at a 0.62 load factor for 7.4 hours per day

12 Rollers (95 hp) operating at a 0.56 load factor for 7.4 hours per day

12 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 7.4 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7.4 hours per day

20 Water Trucks (189 hp) operating at a 0.5 load factor for 7.4 hours per day

Phase: Trenching 9/1/2014 - 9/30/2014 - Default Building Construction Description

Off-Road Equipment:

8 Excavators (168 hp) operating at a 0.57 load factor for 7.4 hours per day

8 Other General Industrial Equipment (238 hp) operating at a 0.51 load factor for 7.4 hours per day

8 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7.4 hours per day

4 Water Trucks (189 hp) operating at a 0.5 load factor for 7.4 hours per day

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Phase: Building Construction 10/31/2014 - 12/31/2014 - Default Architectural Coating Description

Off-Road Equipment:

36 Cranes (399 hp) operating at a 0.43 load factor for 6.5 hours per day

3 Forklifts (145 hp) operating at a 0.3 load factor for 7.4 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 7 hours per day

10 Other Equipment (190 hp) operating at a 0.62 load factor for 7.4 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 6.5 hours per day

1 Welders (45 hp) operating at a 0.45 load factor for 7 hours per day

10 Water Trucks (189 hp) operating at a 0.5 load factor for 7.4 hours per day

Construction Mitigated Detail Report:

CONSTRUCTION EMISSION ESTIMATES Summer Pounds Per Day, Mitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
Time Slice 8/1/2014-8/29/2014 Active Days: 21	41.00	195.30	191.20	**0.03**	63.33	10.95	74.28	13.25	10.07	23.32	44,009.64
Mass Grading 08/01/2014-08/31/2014	41.00	195.30	191.20	0.03	63.33	10.95	74.28	13.25	10.07	23.32	44,009.64
Mass Grading Dust	0.00	0.00	0.00	0.00	63.17	0.00	63.17	13.19	0.00	13.19	0.00
Mass Grading Off Road Diesel	40.44	194.18	169.52	0.00	0.00	10.87	10.87	0.00	10.00	10.00	40,909.44
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.56	1.13	21.68	0.03	0.15	0.08	0.24	0.06	0.07	0.13	3,100.20
Time Slice 9/1/2014-9/30/2014 Active Days: 22	12.51	60.11	63.02	0.01	0.05	3.56	3.62	0.02	3.28	3.30	14,159.46
Trenching 09/01/2014-09/30/2014	12.51	60.11	63.02	0.01	0.05	3.56	3.62	0.02	3.28	3.30	14,159.46
Trenching Off Road Diesel	12.31	59.71	55.34	0.00	0.00	3.53	3.53	0.00	3.25	3.25	13,060.66
Trenching Worker Trips	0.20	0.40	7.68	0.01	0.05	0.03	0.08	0.02	0.03	0.04	1,098.81

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Time Slice 10/1/2014-10/30/2014 Active Days: 22	23.39	111.40	114.40	0.01	63.24	7.02	70.26	13.22	6.45	19.67	21,978.51
Fine Grading 10/01/2014-10/31/2014	23.39	111.40	114.40	0.01	63.24	7.02	70.26	13.22	6.45	19.67	21,978.51
Fine Grading Dust	0.00	0.00	0.00	0.00	63.17	0.00	63.17	13.19	0.00	13.19	0.00
Fine Grading Off Road Diesel	23.14	110.90	104.80	0.00	0.00	6.98	6.98	0.00	6.42	6.42	20,605.00
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.25	0.50	9.60	0.01	0.07	0.04	0.11	0.02	0.03	0.06	1,373.51
Time Slice 10/31/2014-10/31/2014 Active Days: 1	**51.41**	259.11	**214.95**	0.03	63.31	13.55	76.86	13.24	12.46	25.71	**58,611.73**
Building 10/31/2014-12/31/2014	28.02	147.71	100.55	0.02	0.07	6.54	6.60	0.02	6.01	6.04	36,633.22
Building Off Road Diesel	27.51	141.93	94.24	0.00	0.00	6.30	6.30	0.00	5.80	5.80	34,870.94
Building Vendor Trips	0.46	5.68	4.31	0.01	0.05	0.23	0.28	0.02	0.21	0.23	1,475.09
Building Worker Trips	0.05	0.10	2.01	0.00	0.01	0.01	0.02	0.01	0.01	0.01	287.18
Fine Grading 10/01/2014-10/31/2014	23.39	111.40	114.40	0.01	63.24	7.02	70.26	13.22	6.45	19.67	21,978.51
Fine Grading Dust	0.00	0.00	0.00	0.00	63.17	0.00	63.17	13.19	0.00	13.19	0.00
Fine Grading Off Road Diesel	23.14	110.90	104.80	0.00	0.00	6.98	6.98	0.00	6.42	6.42	20,605.00
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.25	0.50	9.60	0.01	0.07	0.04	0.11	0.02	0.03	0.06	1,373.51
Time Slice 11/3/2014-12/31/2014 Active Days: 43	28.02	147.71	100.55	0.02	0.07	6.54	6.60	0.02	6.01	6.04	36,633.22
Building 10/31/2014-12/31/2014	28.02	147.71	100.55	0.02	0.07	6.54	6.60	0.02	6.01	6.04	36,633.22
Building Off Road Diesel	27.51	141.93	94.24	0.00	0.00	6.30	6.30	0.00	5.80	5.80	34,870.94
Building Vendor Trips	0.46	5.68	4.31	0.01	0.05	0.23	0.28	0.02	0.21	0.23	1,475.09
Building Worker Trips	0.05	0.10	2.01	0.00	0.01	0.01	0.02	0.01	0.01	0.01	287.18

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Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Fine Grading 10/1/2014 - 10/31/2014 - Default Fine Site Grading Description

For Soil Stablizing Measures, the Water exposed surfaces 3x daily watering mitigation reduces emissions by:

PM10: 61% PM25: 61%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

PM10: 44% PM25: 44%

For Graders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Graders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rubber Tired Dozers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rubber Tired Dozers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Scrapers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Scrapers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Excavators, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Excavators, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Pavers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

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PM10: 25% PM25: 25%

For Pavers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

The following mitigation measures apply to Phase: Mass Grading 8/1/2014 - 8/31/2014 - Default Paving Description

For Soil Stablizing Measures, the Water exposed surfaces 3x daily watering mitigation reduces emissions by:

PM10: 61% PM25: 61%

For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:

PM10: 44% PM25: 44%

For Graders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Graders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Excavators, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Excavators, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rubber Tired Dozers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rubber Tired Dozers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Dumpers/Tenders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

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For Dumpers/Tenders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Rollers, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Rollers, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

The following mitigation measures apply to Phase: Trenching 9/1/2014 - 9/30/2014 - Default Building Construction Description

For Excavators, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Excavators, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Other General Industrial Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other General Industrial Equipment, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

The following mitigation measures apply to Phase: Building Construction 10/31/2014 - 12/31/2014 - Default Architectural Coating Description

For Cranes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

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For Cranes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Forklifts, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Forklifts, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Generator Sets, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Generator Sets, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Welders, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Welders, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Other Equipment, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Other Equipment, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

For Water Trucks, the Diesel Particulate Filter (DPF) 3rd Tier mitigation reduces emissions by:

PM10: 25% PM25: 25%

For Water Trucks, the Diesel Oxidation Catalyst 40% mitigation reduces emissions by:

NOX: 40%

APPENDIX I

Site Specific Plan for Fire Protection and Prevention

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Site Specific Plan

for

Fire Protection and Prevention

for the

Tylerhorse Wind Energy Project

February 16, 2011

Fire Protection and Prevention Plan
Table of Contents

XV. Attachments

A. Fire Risk Survey

B. Flammable and Combustible Materials Checklist

Fire Protection and Prevention Plan
for
Heartland Wind, LLC

I. INTRODUCTION

Heartland Wind, LLC (Heartland), a wholly owned subsidiary of Iberdrola Renewables, LLC, is involved with the erection of wind turbine generators in remote and sometimes isolated areas. Consequently, a probability that wild and agricultural land fires may be encountered is present. Additionally, fire hazards normally associated with the construction industry can be anticipated.

II. MANGEMENT OBJECTIVES

The objective of this Fire Protection and Prevention Plan is to eliminate the causes of fire, prevent loss of life and property by fire, and to comply with the Occupational Safety and Health Administration (OSHA) standard on fire prevention, 29 CFR 1926.24. Additionally, it provides employees and the public with information and guidelines that will assist them in recognizing, reporting, and controlling fire hazards.

III. HISTORY

The area within and immediately surrounding the wind farm lacks significant historical data relating to major wild or agricultural land fire incidents. The National Fire Incident Center does report wild land fire incidents within a 5-mile radius of the wind farm (10-year period). However, it can be anticipated that a probability exists that a wild land or agricultural fire may occur.

IV. RISKS IDENTIFICATION AND ASSESSMENT

The identification and assessment of fire hazards is outlined in Section VII of this plan. This Fire Prevention Plan serves to reduce the risk of fires at Heartland's Tylerhorse Wind Energy Project in the following ways:

A. Identifies materials that are potential fire hazards and their proper handling and storage procedures;
B. Distinguishes potential ignition sources and the proper control procedures of those materials;
C. Describes fire protection equipment and/or systems used to control fire hazards;
D. Identifies persons responsible for maintaining the equipment and systems installed to prevent or control ignition of fires;
E. Identifies persons responsible for the control and accumulation of flammable or combustible material;
F. Describes good housekeeping procedures necessary to ensure the control of accumulated flammable and combustible waste material and residues to avoid a fire emergency; and
G. Provides training to employees with regard to fire hazards to which they may be exposed.

V. ASSIGNMENT OF RESPONSIBILITY

Fire safety is everyone's responsibility. All employees should know how to prevent and respond to fires, and are responsible for adhering to company policy regarding fire emergencies.

A. Management

Management determines Heartland fire prevention and protection policies. Management will provide adequate controls to provide a safe workplace, and will provide adequate resources and training to its employees to encourage fire prevention and the safest possible response in the event of a fire emergency. In responding to fire emergencies, employees shall not fight fires beyond the incipient stage.

B. Plan Administrator

The Site Safety Coordinator shall manage the Fire Prevention Plan for Heartland and shall maintain all records pertaining to the plan. The Plan Administrator shall also:

1. Develop and administer the Heartland fire prevention training program.
2. Ensure that fire control equipment and systems are properly maintained.
3. Control fuel source hazards.
4. Conduct fire risk surveys (see Appendix A) and make recommendations.

C. Supervisors

Supervisors are responsible for ensuring that employees receive appropriate fire safety training, and for notifying the Site Safety Coordinator when changes in operation increase the risk of fire. Supervisors are also responsible for enforcing Heartland fire prevention and protection policies.

D. Employees

All employees shall:

1. Complete all required training before working without supervision.
2. Conduct operations safely to limit the risk of fire.
3. Report potential fire hazards to their supervisors.
4. Follow fire emergency procedures.

VI. RISK CONTROL

A. Good Housekeeping

To limit the risk of fires, employees shall take the following precautions:

1. Minimize the storage of combustible materials.
2. Make sure that all exit or evacuation routes are kept free of obstructions.
3. Dispose of combustible waste in accordance with all applicable laws and regulations.
4. Use and store flammable materials in areas away from ignition sources.
5. Keep incompatible (i.e., chemically reactive) substances away from each other.

6. Perform “hot work” (i.e., welding or working with an open flame or other ignition sources) in controlled areas. Hot work permits are required for all hot work.
7. Keep equipment in good working order (i.e., inspect electrical wiring and appliances regularly and keep motors and tools free of dust and grease).
8. Ensure that heating units are safeguarded.
9. Report all fuel or petroleum leaks immediately. The Site Mechanic shall ensure that all leaks are repaired immediately upon notification.
10. Repair and clean up flammable liquid leaks immediately.
11. Keep work areas free of combustible materials.
12. Do not rely on extension cords if wiring improvements are needed, and take care not to overload circuits with multiple pieces of equipment.
13. Turn off electrical equipment when not in use.

B. Maintenance

The Heartland site will also comply with requirements of the National Fire Protection Association (NFPA) codes for specific equipment. Only properly trained individuals shall perform maintenance work.

The following equipment is subject to the maintenance, inspection, and testing procedures:

1. Portable fire extinguishers;
2. Fire alarm systems;
3. Water trucks and associated equipment; and
4. Emergency backup systems and the equipment they support.

VII. TYPES OF RISK

The following sections address the major workplace fire risks at Heartland job sites and the procedures for controlling those risks.

A. Electrical Fire Hazards

Electrical system failures and the misuse of electrical equipment are leading causes of workplace fires. Fires can result from loose ground connections; wiring with frayed insulation; or overloaded fuses, circuits, motors, or outlets.

To prevent electrical fires, employees shall:

1. Make sure that worn wires are replaced.
2. Use only appropriately rated fuses.
3. Never use extension cords as substitutes for wiring improvements.
4. Use only approved extension cords [i.e., those with the Underwriters Laboratory (UL) or Factory Mutual (FM) label].
5. Check cords and equipment in hazardous locations where the risk of fire is especially high.
6. Check electrical equipment to ensure that it is either properly grounded or double insulated.

B. Portable Heaters

All portable heaters shall be approved by the Site Mechanic. Portable electric heaters shall have tip-over protection that automatically shuts off the unit when it is tipped over. There shall be adequate clearance between the heater and combustible furnishings or other materials at all times.

C. Office Fire Hazards

Fire risks are not limited to Heartland job sites. Fires in offices have become more likely because of the increased use of electrical equipment, such as computers and fax machines. To prevent office fires, employees shall:

1. Avoid overloading circuits with office equipment.
2. Turn off nonessential electrical equipment at the end of each workday.
3. Keep storage areas clear of rubbish.
4. Ensure that extension cords are not placed under carpets.
5. Ensure that trash and paper set aside for recycling is not allowed to accumulate.

D. Cutting, Welding, and Open Flame Work

Supervisors will ensure the following:

1. A job site evaluation for fire hazards is completed prior to work beginning.
2. A Hot Work Permit is obtained, and all requirements of the permit are observed.
3. Cutting and welding are done by authorized personnel in designated cutting and welding areas whenever possible.
4. Torches, regulators, pressure-reducing valves, and manifolds are UL listed or FM approved.
5. Oxygen-fuel gas systems are equipped with listed and/or approved backflow valves and pressure-relief devices.
6. Cutters, welders, and helpers are wearing eye protection and protective clothing as appropriate.
7. Cutting or welding is prohibited in areas where explosive atmospheres of gases, vapors, or dusts could develop from residues.
8. Small tanks, piping, or containers that cannot be entered are cleaned, purged, and tested before cutting or welding on them begins.
9. Fire watch has been established.

E. Flammable and Combustible Materials

The Site Safety Coordinator shall regularly evaluate the presence of combustible materials at all job site locations (see Appendix B).

Certain types of substances can ignite at relatively low temperatures or pose a risk of explosion if ignited. Such substances obviously require special care and handling.

1. **Class A combustibles.** These include common combustible materials (wood, paper, cloth, rubber, and plastics) that can act as fuel and are found in non-specialized areas such as offices.

To handle Class A combustibles safely:

a. Dispose of waste daily.
b. Keep trash in metal-lined receptacles with tight-fitting covers (metal wastebaskets that are emptied every day do not need to be covered).
c. Keep work areas clean and free of fuel paths that could allow a fire to spread.
d. Keep combustibles away from accidental ignition sources, such as hot plates, soldering irons, or other heat- or spark-producing devices.
e. Store paper stock in metal cabinets.
f. Store rags in metal bins with self-closing lids.
g. Do not order excessive amounts of combustibles.
h. Make frequent inspections to anticipate fires before they start.

Water, multi-purpose dry chemical (ABC), and Halon 1211 are approved fire extinguishing agents for Class A combustibles.

2. **Class B combustibles.** These include flammable and combustible liquids (oils, greases, tars, oil-based paints, and lacquers), flammable gases, and flammable aerosols.

To handle Class B combustibles safely:

- Use only approved pumps, taking suction from the top, to dispense liquids from tanks, drums, barrels, or similar containers (or use approved self-closing valves or faucets).
- Do not dispense Class B flammable liquids into containers unless the nozzle and container are electrically interconnected by contact or by a bonding wire. Either the tank or container must be grounded.
- Store, handle, and use Class B combustibles only in approved locations where vapors are prevented from reaching ignition sources such as heating or electric equipment, open flames, or mechanical or electric sparks.
- Do not use a flammable liquid as a cleaning agent inside a building or tool van (the only exception is in a closed machine approved for cleaning with flammable liquids).
- Do not use, handle, or store Class B combustibles near areas normally used as exits.
- Do not weld, cut, grind, or use unsafe electrical appliances or equipment near Class B combustibles.
- Do not generate heat, allow an open flame, or smoke near Class B combustibles.
- Know the location of and how to use the nearest portable fire extinguisher rated for Class B fire.
- Water should not be used to extinguish Class B fires caused by flammable liquids. Water can cause the burning liquid to spread, making the fire worse. To extinguish a fire caused by flammable liquids, exclude air around the burning liquid. The following fire-extinguishing agents are approved for Class B combustibles: carbon dioxide, multi-purpose dry chemical (ABC), Halon 1301, and Halon 1211.

F. Fuel Storage Refueling Area

Class B fuel storage shall be maintained per NFPA requirements and provide the following life safety appliances:

1. Each tank shall be grounded.
2. Secondary containment shall be designed and installed to accommodate the capacity of the largest tank contained within.
3. At least four 30-pound Class BC dry chemical fire extinguishers shall be maintained within immediate access to storage/refueling area.
4. "No smoking" signs shall be posted on each tank, and smoking shall be prohibited within 20 feet of the storage/refueling area.
5. NFPA/DOT placards designating the hazard and product contained within shall be posted on each tank.
6. All engines shall be shut off during refueling operations.
7. No portable electrical generators shall be operated with the storage area.

G. Timber, Grass, and Wild Lands

The wind farm job site contains timber, as well as grassland areas. Strong efforts on the part of everyone must be taken to prevent fire within these areas. All supervisors and employees are to ensure that:

1. All company pickup trucks shall be equipped with a first-aid kit, fire extinguisher, and shovel;
2. All pieces of equipment with an internal combustion engine are equipped with a fire extinguisher;
3. All vehicles equipped with catalytic converters are not parked or operated in crop or grasslands unless on a designated roadway.
4. When it is necessary to cross with or operate equipment on crop or grasslands, the travel route or place of operation shall be wetted down with a water truck, or otherwise rendered inert.
5. No hot work is to be performed upon or immediately adjacent to wild or grasslands unless specifically approved by the Site Manager and all precautions have been taken to ensure that the work zone has been rendered inert.

H. Smoking

Smoking is prohibited on all Heartland job sites unless within an enclosed vehicle. With approval of the Site Manager, certain outdoor areas may be designated as smoking areas.

I. Red Flag and Special Conditions

Upon issue of a Red Flag Warning by the Los Angeles / Oxnard Office of the National Weather Service (NWS), all job site work shall cease until such time as the warning has been lifted, or governmental authority has been granted to resume activities. In order to ensure compliance with this part, a NWS weather radio will be monitored on site at all times; additionally, the Site Safety Coordinator will monitor local fire emergency channels.

VIII. VALUES TO BE PROTECTED

In the event of a wildfire, life safety, environmental, project production, and infrastructure values would be affected. Additionally, the production use and economic value of industrial, farm, and pastureland would be severely impacted. Recreational use of these and adjacent lands would be also affected. The loss of vegetation may result in unnecessary storm water runoff, silting of waterways, and other related environmental and wildlife concerns.

IX. PROTECTION CAPABILITY

Protection capability and response times are limited to the following factors:

1. The project will be equipped with three water trucks, each with 4,000-gallon capacity. Each truck will be equipped with 50 feet of 0.25-inch fast-response hose with fog nozzles, and two top-mounted turret monitors, each capable of delivering 350 gallons per minute (GPM).

2. Additionally, each company pickup truck is equipped with first-aid kits, fire extinguishers, and shovels.

3. Estimated response time to a fire emergency would be 3 minutes minimum and 5 minutes maximum.

4. Heartland personnel are not trained firefighters and are not to fight fires beyond the incipient or initial stages. Personnel have been trained to summon professional help and evacuate to designated zones of safety.

5. Personnel have not been equipped with or trained in the use of professional firefighting equipment.

X. IMPLEMENTATION OF PLAN

In the event of a major fire incident, the 911 Emergency System will be activated and professional assistance summoned. Notification of the public will be through the 911 Emergency Center through channels outlined in the National Modular Incident Command System.

Reporting Emergencies:

In the event of fire, storm, flood, serious injury, or other emergency, the following personnel can be contacted:

Name	Title	Telephone Number
	Project Manager	
	Site Manager	
	Project Engineer	
	Field Engineer	
	Safety Coordinator	

Designated Fire/Emergency Responders:

Fire, Ambulance and all other emergencies will be coordinated through the Kern County Emergency Center listed below:

Kern County Sheriff	(800) 861-3110
California Highway Patrol	(661) 824-2408
Kern County Fire Service	(661) 824-4581 or (661) 822-5533
EMS Ambulance	(661) 758-3200 or (800) 861-3110
Cal/OSHA	(559) 445-5302 or (818) 901-5403

XI. WILD LAND FIRE SUPPRESSION

Should the need arise requiring the protection of personnel and property from wild land fires, the following guidelines should be used:

1. No employee shall fight a fire beyond the incipient stage and the arrival of professional fire suppression personnel. Further fire suppression efforts upon the part of the employee shall be voluntary and under the request and direction of the Fire Department Incident Commander.

2. Prior to the start of suppression efforts, an incident management system shall be established as outlined in the Crisis Management Plan. Leaders and roles shall be defined.

3. The establishment of fire lines and water suppression shall be confined to open grassland or sparsely vegetated areas.

4. The ideal fire line is to widen existing roads and wet down vegetation in advance of the fire.

5. The object of fire lines shall be to protect project property and personnel and to contain the fire.

6. When establishing fire lines with bulldozers, graders, or scrapers, sufficient distance shall be maintained between the equipment and the actual fire as to prevent being overrun by the fire.

7. When establishing wet fire lines ahead of fires, sufficient distance from the fire shall be maintained as to prevent being overrun by the fire.

8. Water trucks should be used to render an area inert (too wet to burn) ahead of the fire or around structures. The control of spot fires created by blowing embers would be another good use for water suppression provided that safe distance is maintained from the advancing fire.

9. Prior to using water trucks or equipment to establish fire lines, an anchor point and multiple escape routes shall be established.

10. Ground personnel shall not approach closer than 200 feet of any advancing fire.

11. Ground suppression shall be limited to groups no smaller than 5 personnel.

12. Prior to any ground approach to an advancing fire, clear and definite escape routes shall be established and maintained for quick evacuation of the area if necessary.

13. Direct communications shall be maintained between all equipment operators, truck drivers, ground personnel, and the incident command center; liaison personnel equipped with radios shall be assigned.

14. At no time are creosote thickets or heavily vegetated areas to be entered by ground personnel or operating equipment during a wild land fire.

XII. EVACUATION

<u>Escape and Evacuation Procedures:</u>

Dependent on the degree of the emergency, upon the emergency alarm and, if safe to do so, employees will evacuate to the below-designated assembly area, where the below-designated Supervisor(s)-Wardens shall account for all employees and determine if anyone still remains within the emergency scene.

The Primary Designated Assembly Area is designated as the laydown area adjacent to the main job-site trailer to be located near Rosamond Blvd and 170th, Rosamond, California.

Should a wild land fire occur, other locations maybe designated as secondary assembly areas.

<u>Routes for Evacuation:</u>

Dependent on the degree of emergency, weather, and/or localized site conditions, roadways as designated on the site map will be used for routes of evacuation. Terrain features favorable to swift evacuation maybe utilized in the event of a fast-moving wild fire. String roads will exit onto paved or graded public roadways and will be followed to the above-designated assembly area.

The following personnel are designated as evacuation wardens. Should an evacuation be necessary, they will ensure that all job sites are clear and all personnel are accounted for; foreman-level supervisors shall assist wardens in accounting for personnel.

Name	Title	Telephone Number
	Project Manager	
	Site Manager	
	Project Engineer	
	Field Engineer	
	Safety Coordinator	

XIII. TRAINING

Site Safety Coordinator and or Field Engineers shall present basic fire prevention training to all employees upon employment, and shall maintain documentation of the training, which includes:

1. Review of 29 CFR 1926.24, including how it can be accessed;

2. This Fire Prevention Plan, including how it can be accessed;
3. Good housekeeping practices;
4. Proper response and notification in the event of a fire;
5. Instruction on the use of portable fire extinguishers (as determined by company policy in the Emergency Action Plan); and
6. Recognition of potential fire hazards.

Supervisors shall train employees about the fire hazards associated with the specific materials and processes to which they are exposed, and will maintain documentation of the training. Employees will receive this training:

1. At their initial assignment;
2. Annually; and
3. When changes in work processes necessitate additional training.

XIV. PROGRAM REVIEW

The Site Safety Coordinator shall review this Fire Prevention Plan at least annually for necessary changes.

Appendix A

Fire Risk Survey.
Tylerhorse Wind Energy Project

Type of Fire Hazard	Location	Emergency Actions	Notify
Crop Fire			
Grass Fire			
Timber Fire			
Electrical Fire			
Petroleum Fire			
Combustibles Fire			

Completed by:____________________________ Date:___________________

Appendix B

Flammable and Combustible Materials Checklist

Use this checklist to evaluate compliance with OSHA standards on flammable and combustible materials:

□Yes □No	Are combustible scrap, debris, and waste materials such as oily rags stored in covered metal receptacles and removed from the job site promptly?
□Yes □No	Are approved containers and tanks used for the storage and handling of flammable and combustible liquids?
□Yes □No	Are all connections on drums and combustible liquid piping vapor- and liquid-tight?
□Yes □No	Are all flammable liquids kept in closed containers when not in use?
□Yes □No	Are metal drums of flammable liquids electrically grounded during dispensing?
□Yes □No	Do storage rooms for flammable and combustible liquids have appropriate ventilation systems?
□Yes □No	Are "no smoking" signs posted at refueling and storage tanks?
□Yes □No	Are all solvent wastes and flammable liquids kept in fire-resistant covered containers until they are removed from the job site?
□Yes □No	Is vacuuming used whenever possible rather than blowing or sweeping combustible dust?
□Yes □No	Are fuel gas cylinders and oxygen cylinders separated by distances or fire-resistant barriers while in storage?
□Yes □No	Are fire extinguishers appropriate for the materials in the areas where they are mounted?*
□Yes □No	Are appropriate fire extinguishers mounted within 75 feet of outside areas containing flammable liquids and within 10 feet of any inside storage area for such materials?*
□Yes □No	Are extinguishers free from obstruction or blockage?*
□Yes □No	Are all extinguishers serviced, maintained, and tagged at least once a year?*

□Yes □No Are all extinguishers fully charged and in their designated places?*

□Yes □No Where sprinkler systems are permanently installed, are the nozzle heads directed or arranged so that water will not be sprayed into operating electrical switchboards and equipment?

□Yes □No Are "no smoking" signs posted in areas where flammable or combustible materials are used or stored?

□Yes □No Are safety cans utilized for dispensing flammable or combustible liquids at the point of use?

□Yes □No Are all spills of flammable or combustible liquids cleaned up promptly?

□Yes □No Are storage tanks adequately vented to prevent the development of an excessive vacuum or pressure that could result from filling, emptying, or temperature changes?

*NOTE: Use of fire extinguishers is based on company policy regarding employee firefighting in your Emergency Action Plan and local fire code.)

Completed by: ________________________ Date: ____________________

APPENDIX J
Weed Management Plan

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WEED MANAGEMENT PLAN
FOR THE TYLERHORSE WIND ENERGY PROJECT

Prepared For:

Heartland Wind LLC
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Portland, Oregon 97209

Prepared By:

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430 North Halstead Street
Pasadena, California 91107

August 16, 2013

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FIGURES ***FOLLOWS PAGE***

SECTION 1.0
INTRODUCTION

1.1 OVERVIEW AND BACKGROUND

This Weed Management Plan (WMP) has been prepared in support of the Tylerhorse Wind Energy Project (project) by Heartland Wind LLC (Heartland). In accordance with the Bureau of Land Management's (BLM's) *Manual 9015: Integrated Weed Management*,[1] this WMP shall include instructions for the prevention, control, and management of invasive plant species during construction of the project. This WMP shall be submitted for review and approval by the BLM. Once the BLM approves this WMP, it will be implemented upon commencement of construction activities. The final report for this plan will be submitted after the construction phase of the project; however, monitoring and reporting will extend past the construction phase (see Section 8.0, *Monitoring*).

The project is located in an unincorporated area of south-central Kern County, California, south of the foothills of the Tehachapi Mountains (Figure 1.1-1, *Regional Vicinity Map*). The project is bordered by the Manzana (formerly PdV) Wind Energy Project and the Pacific Wind Energy Project. Major highways nearest to the project property include State Route (SR) 14 to the east, SR 58 to the south, and SR 138 to the north. The project property is located approximately 16 miles northwest of the unincorporated community of Rosamond, California (Figure 1.1-2, *Project Location Map*). The project site is within the U.S. Geological Survey (USGS) 7.5-minute series, Tylerhorse Canyon, topographic quadrangle (Figure 1.1-3, *Topographic Map with USGS 7.5-minute Quadrangle Index*).[2] The project includes all of Township 10N, Range 15W, Section 24; the northern half of Township 10N, Range 15W, Section 26; and the southeast eighth of Township 10N, Range 15W, Section 28. The project property ranges in elevation from 3,480 feet above mean sea level (MSL) to 3,960 feet above MSL.

The project consists of three separate parcels that total approximately 1,207 acres (slightly less than 2 square miles) of BLM-administered land. The project will consist of up to 40 wind turbine generators (WTGs) of 1.5 to 3 megawatts (MW) generating capacity per turbine, with an anticipated total generating capacity of up to 60 MW (Figure 1.1-4, *Conceptual Site Plan*). Related and supporting components include an underground 34.5-kilovolt (kV) electrical collection system to collect energy from the turbines and an interconnecting road network. The project will use ancillary facilities, including the operations and maintenance (O&M) facility, staging and refueling areas, and concrete batch plant facilities of the adjacent Manzana Wind Energy Project. The Manzana Wind Energy Project is a separate wind farm approved by the Kern County Board of Supervisors on July 29, 2008, that is controlled by Iberdrola Renewables, LLC. The Manzana Wind Energy Project is currently operational.

[1] Bureau of Land Management. 1992. *Manual 9015: Integrated Weed Management*. Available at: http://www.blm.gov/ca/st/en/prog/weeds/9015.html

[2] U.S. Geological Survey. 1965. *7.5-minute Series, Tylerhorse Canyon, California, Topographic Quadrangle*. Scale 1:24,000. Reston, VA.

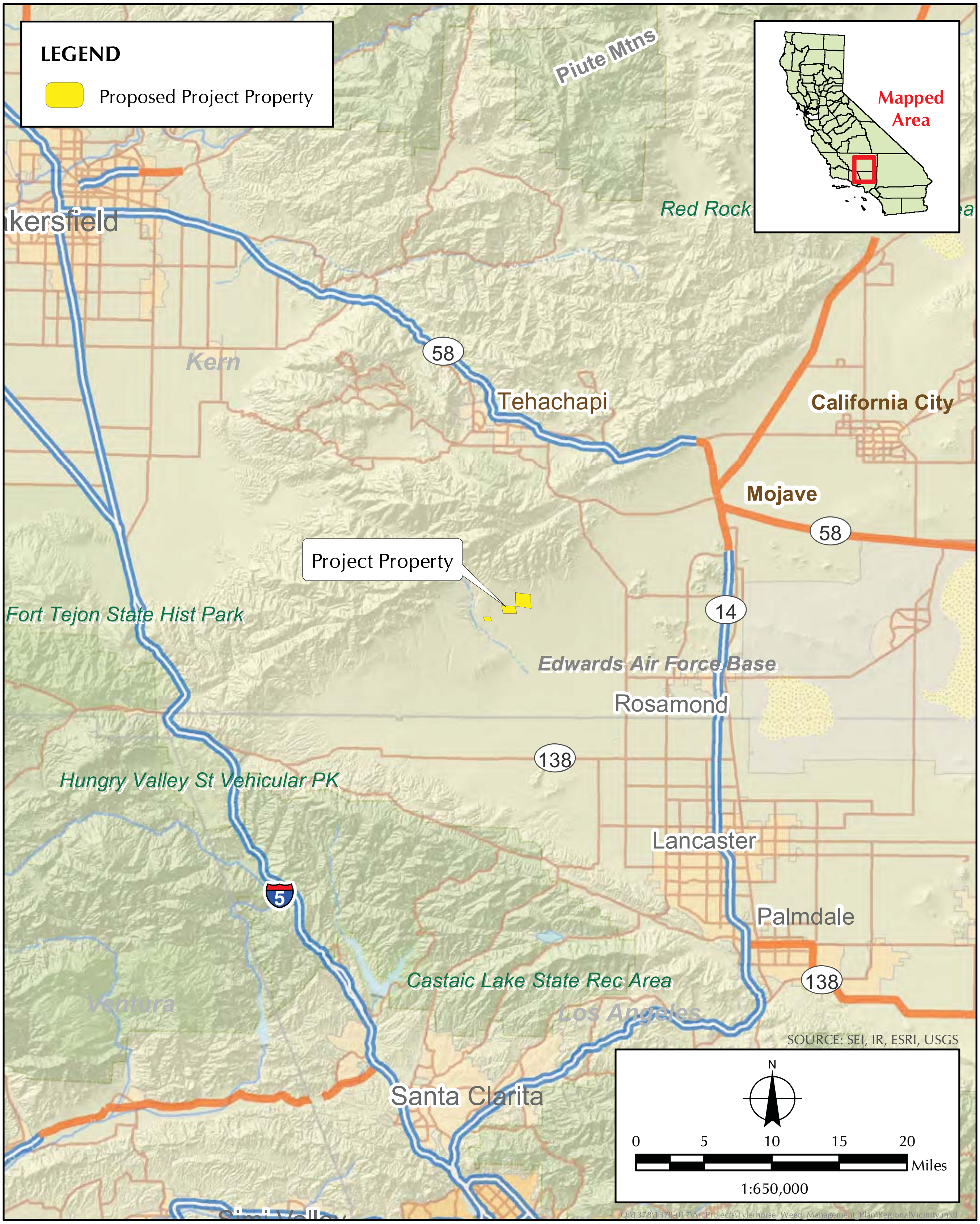

FIGURE 1.1-1
Regional Vicinity Map

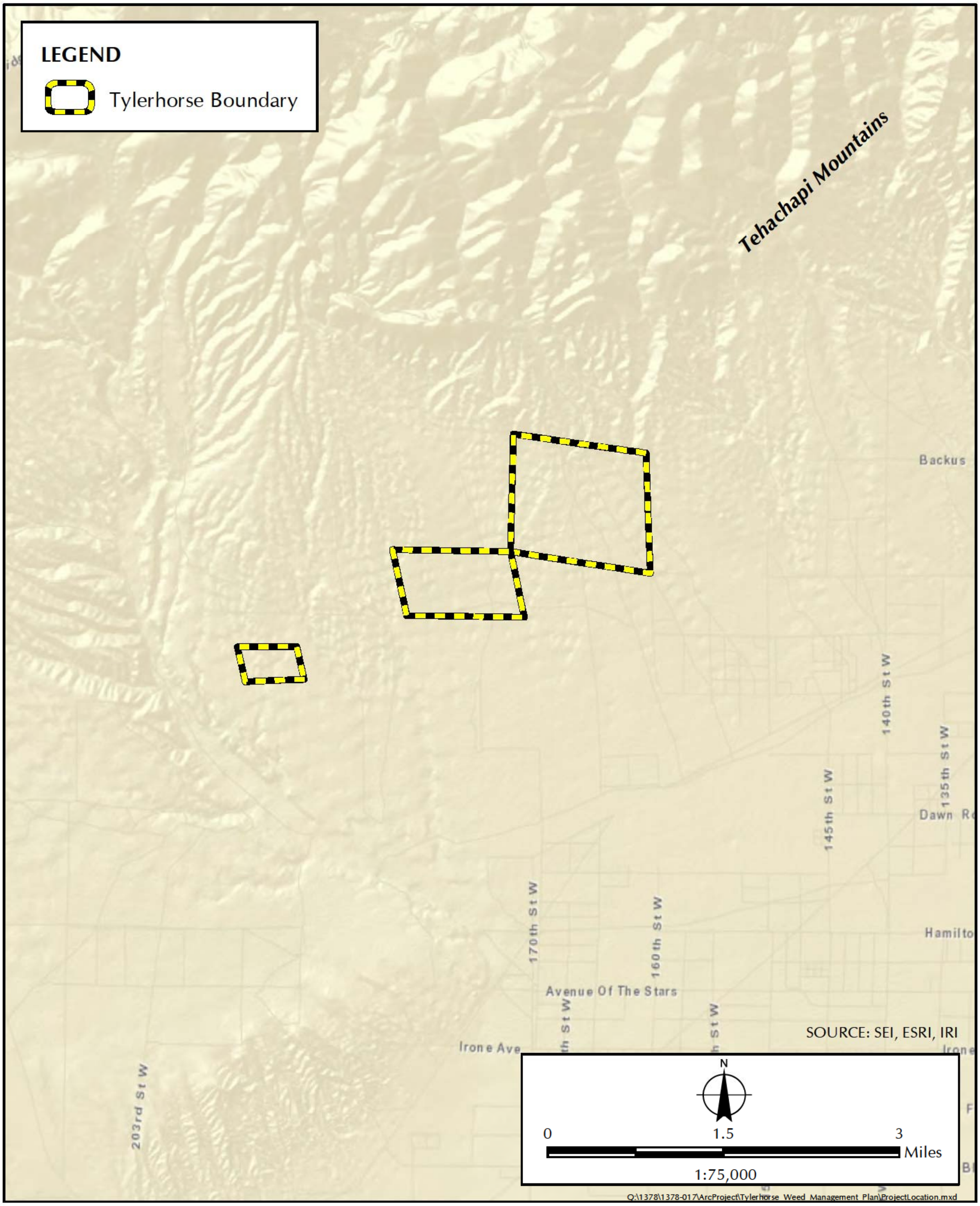

FIGURE 1.1-2

Project Location Map

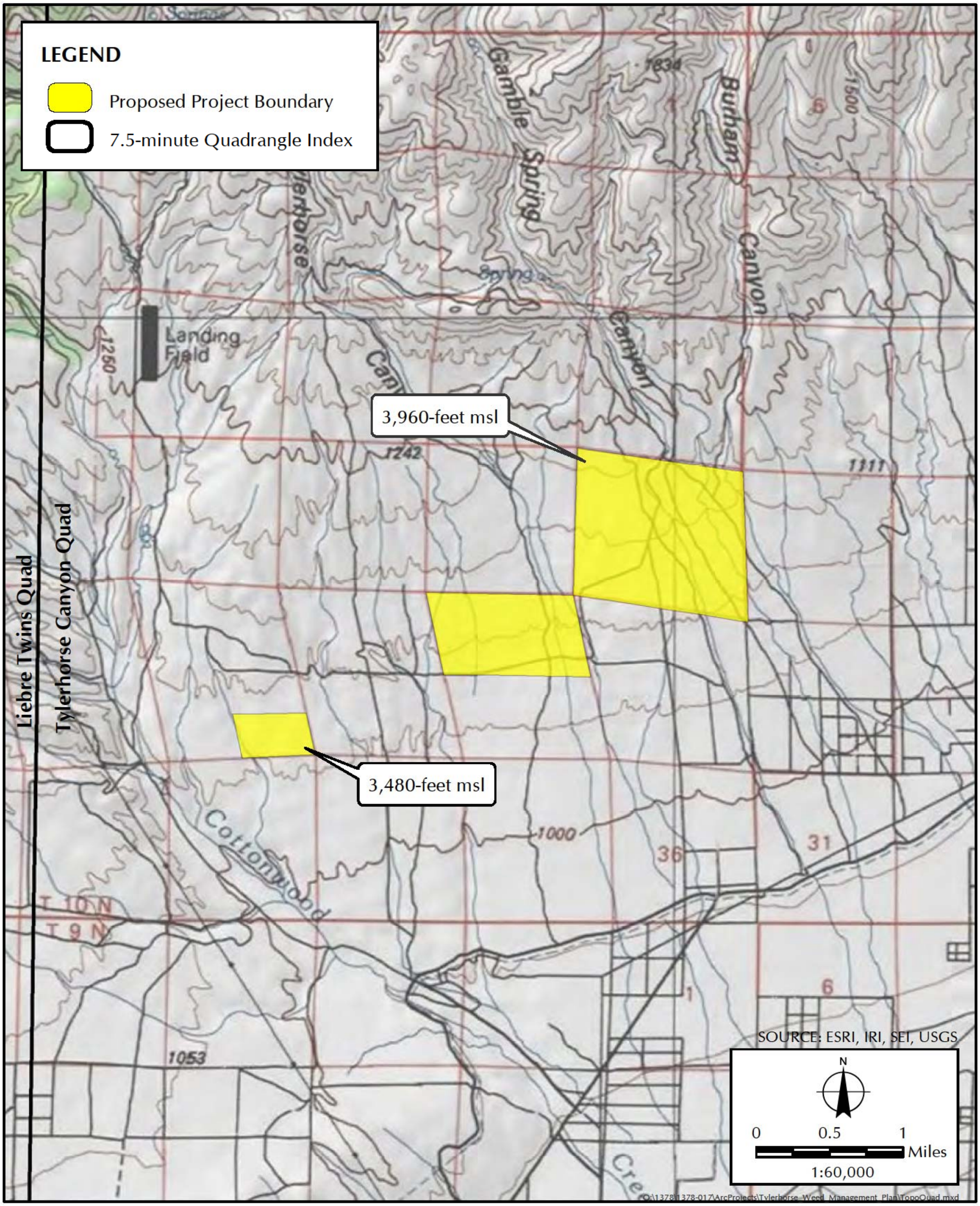

FIGURE 1.1-3
Topographic Map with USGS 7.5-minute Quadrangle Index

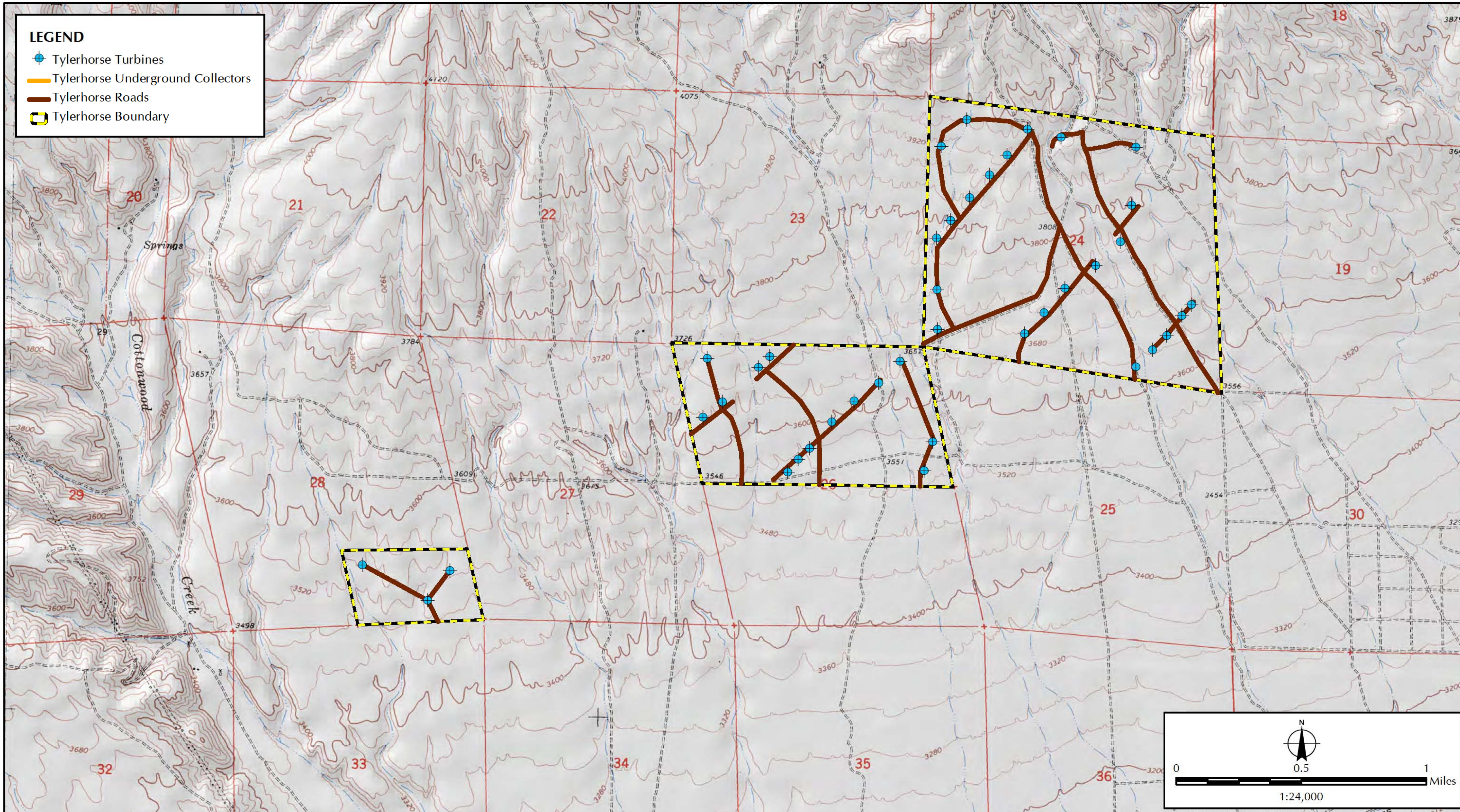

FIGURE 1.1-4
Conceptual Site Plan

1.2 PURPOSE

This document provides a comprehensive, adaptive weed management plan for preconstruction and long-term invasive weed abatement for the project. This plan includes the results of the pre-construction weed inventory, an assessment of weeds on adjacent lands, outlines appropriate pre-construction weed control measures, identifies required short- and long-term monitoring and adaptive management procedures, and identifies operation and maintenance requirements related to weed control including a site-specific analysis of effects of proposed herbicide use on-site. This plan is intended to be adaptive in order not only to control weed species that are currently known to exist on-site, but also to provide a framework to control unknown weed species that may occur in the future.

The purpose of this WMP is to fulfill requirements outlined in BLM's *Manual 9015: Integrated Weed Management*:[3]

1. Prevention Measures

    a. All landscaping and restoration seeds and plant materials shall be weed-free.

    b. All straw materials such as those used for erosion control shall be weed-free.

    c. Areas of temporary disturbance shall be revegetated with local native plant species as soon as practical after disturbances to reduce erosion and inhibit the establishment of weeds.

    d. Vehicles and equipment shall be cleaned (with water or high-pressure air) prior to commencing work in off-road areas. Vehicles and equipment shall be cleaned at existing construction yards or legally operating car washes, or at on-site washing station(s) at project access points. Once equipment and vehicles have been staged on the job site, no further washing would be required unless the vehicles or equipment are exposed to populations of non-native plants present on the site.

    e. The project proponent shall document that all vehicles have been washed prior to commencing project work. A written daily log shall be kept for all vehicle/equipment washing that states the date, time, and location; type of equipment washed; methods used; and staff present. The log shall include the signature of a responsible staff member. Logs shall be available to the BLM for inspection at any time and shall be submitted to the BLM upon request.

2. Weed Control Methods

    a. Develop species-specific control procedures for high-priority weeds (as determined through consultation with the BLM weed specialist, the Kern County Agricultural Commissioner, and the Kern County Weed Management Area).

[3] Bureau of Land Management. 1992. *Manual 9015: Integrated Weed Management*. Available at: http://www.blm.gov/ca/st/en/prog/weeds/9015.html

b. Potential methods include physical or mechanical removal, chemical control, and environmental control.

c. The application of herbicides shall be in compliance with all state and federal laws and BLM regulations and implemented by a Licensed Qualified Applicator. BLM-approved herbicides shall not be applied during or within 72 hours of a scheduled rain event. In riparian areas, only water-safe herbicides shall be used. Herbicides shall not be applied when wind velocities exceed 6 miles per hour.

d. Establish a long-term schedule for regular weed control on an annual basis throughout the project site.

e. Implement a weed control program using approved procedures, properly maintained equipment, and safety gear.

3. Monitoring and Follow-up

a. Conduct monitoring during construction and during post-construction to assess weed species presence until success criteria of control measures are met.

b. Implement remedial (follow-up) control measures if previous procedures have not achieved eradication or control objectives.

4. Reporting

a. Prepare a final report for submittal to the BLM at the end of the project construction phase. The report shall document the implementation of the WMP, including outcome of weed control measures and recommendations for changes to improve rates of success.

SECTION 2.0
GOALS AND OBJECTIVES

The goal of this WMP is to minimize the spread of weed species during construction of the project. This goal will be accomplished through meeting the following objectives:

1. Implementation of prevention measures that reduce the spread of weeds;

2. Implementation of weed control methods to eradicate weed infestations;

3. To conduct monitoring during construction phases of the project to identify any weed infestations;

4. Implementation of measures to eradicate any weed infestations that should arise; and

5. To report the outcome of weed management strategies and incorporate recommendations that may improve the likelihood of success for this plan.

In addition to the requirements outlined in the BLM's *Manual 9015: Integrated Weed Management*,[4] the BLM has responsibilities for weed management as governed by the following federal, state, and local regulations and management plans at minimum.

3.1 FEDERAL

Federal Endangered Species Act

The Federal Endangered Species Act (ESA) provides a framework for regulatory protection, conservation, and recovery of listed species. Under the federal ESA, special-status species are listed as endangered or threatened, and critical habitat areas are designated by the U.S. Fish and Wildlife Service (USFWS) if it is determined necessary for the recovery and survival of listed species. "Take" of endangered and threatened species is prohibited under the federal ESA and is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." *Incidental take* is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. If non-native plants threaten listed species, their eradication may be justified to avoid take, or incidental take, as defined by the federal ESA.

Federal Land Policy and Management Act of 1976

The Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701–1712) states that the BLM must manage public lands according to the principles of multiple use and sustained yield. These principles are further qualified in the act by the statutory duty that the BLM prevent unnecessary degradation of public lands.

Public Rangelands Improvement Act of 1987

The Public Rangelands Improvement Act of 1987 (43 U.S.C. 1901 *et seq.*) states the BLM must manage, maintain, and improve public lands suitable for livestock grazing so that they become as productive as feasible.

Federal Insecticide, Fungicide, and Rodenticide Act

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended (Public Law 92-516) requires all pesticides to be registered with the U.S. Environmental Protection Agency (EPA). The Federal Environmental Pesticide Control Act of 1972 amends FIFRA, as amended, and requires the basis for registration to be whether or not a pesticide causes unreasonable adverse effects on man or the environment. The act also makes it illegal to use a registered pesticide in a manner inconsistent with its labeling. It also requires the certification of all personnel who supervise or apply restricted pesticides. The degree of certification must meet the classification requirements for proper storage, transportation, or disposal of pesticides. The responsibility for administering the act is vested in the EPA.

[4] Bureau of Land Management. 1992. *Manual 9015: Integrated Weed Management*. Available at: http://www.blm.gov/ca/st/en/prog/weeds/9015.html

Superfund Amendments and Reauthorization Act of 1986

The Superfund Amendments and Reauthorization Act of 1986 (42 U.S.C. 11001), also known as the Emergency Planning and Community Right-to-Know Act, provides that workers must be given information such as Material Safety Data Sheets and Technical Data Sheets on pesticides that they will be handling or applying.

Federal Noxious Weed Act of 1974

The Federal Noxious Weed Act of 1974 (7 U.S.C. 2801–2813), as amended by Section 15, Management of Undesirable Plants on Federal Lands, in 1990, requires that each federal agency: (1) designate a lead office and person trained in the management of undesirable plants, (2) establish and fund an undesirable plant management program, (3) complete and implement cooperative agreements with State agencies, and (4) establish integrated management systems to control undesirable plant species.

Carlson-Foley Act of 1968

The Carlson-Foley Act of 1968 (Public Law 90-583) provides for the authorization for reimbursement of expenses to state and local agencies for weed control on federal lands.

Executive Order 13112

Executive Order 13112 (63 *Federal Register* 6183–6186, February 8, 1999) provides a framework for national management of invasive species. It was established to "prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause" by establishing the National Invasive Species Council and the National Invasive Species Management Plan. Executive Order 13112 further defines terms related to invasive species, clarifies the duties of the federal government regarding actions that may affect invasive species, outlines the scope and duties of the National Invasive Species Council, outlines the structure and implementation of the National Invasive Species Management Plan, and provides directives regarding judicial review and administration.

Executive Order 11987, Exotic Organisms

Executive Order 11987, Exotic Organisms, requires federal agencies to "restrict the introduction of exotic species into the natural ecosystems on lands and waters which they own, lease, or hold for purposes of administration; and, shall encourage the States, local governments, and private citizens to prevent the introduction of exotic species into natural ecosystems of the United States."

Plant Protection Act of 2000 and Noxious Weed Control and Eradication Act of 2004

The Plant Protection Act of 2000, as amended (7 U.S.C. 7701–7786) is intended to protect agriculture, the environment, and the U.S. economy from deleterious effects of plant pests or noxious weeds. The Plant Protection Act supersedes the Federal Noxious Weed Act of 1974 (7 U.S.C. 2801 *et seq.*; January 3, 1975, as amended in 2000), except for §2314, which applies to management on federal lands. The Plant Protection Act provides guidelines to facilitate protection against pests and weeds; regulates the movement of plant pests and invasive species; and facilitates the inspection, enforcement, and control of potential pests through a variety of means. The

Noxious Weed Control and Eradication Act of 2004 amends the Plant Protection Act of 2004 and provides for technical and financial assistance to control and eradicate noxious weeds.

3.2 STATE

California Food and Agricultural Code

The California Food and Agricultural Code provides specifications to prevent the spread of weeds to protect the agricultural industry. Sections 403, 2276.5, 7270–7224, 5101, and 5205 provide guidelines intended to prevent the spread of noxious weeds by providing funding and facilitating research for weed management planning and inhibiting the transport of weeds by inspection and certification of crops and forage.

4.1 BASELINE INVENTORIES AND MAPPING

4.1.1 Preconstruction Surveys

On previous surveys for the project, at least six non-native species were identified, including slender wildoats (*Avena barbata*), common wildoats (*Avena fatua*), red brome (*Bromus madritensis* ssp. *Rubens*), cheatgrass (*Bromus tectorum*), Arabian grass (*Schismus barbatus*), and salt cedar (*Tamarix* sp.). All of the six non-native plant species are listed by the California Invasive Plant Council (Cal-IPC)[5] as invasive plants (Table 4.1.1-1, *Non-native Species Determined to Be Present at the Tylerhorse Wind Energy Project*). None of the invasive species known to be present on the project site are listed as invasive by the California Department of Food and Agriculture (CDFA) or the Federal Noxious Weeds List (FNWL).[6]

**TABLE 4.1.1-1
NON-NATIVE SPECIES DETERMINED TO BE PRESENT AT THE
TYLERHORSE WIND ENERGY PROJECT**

Species	Invasiveness Ratings (Cal-IPC* / CDFA / FNWL)
Slender wildoats (*Avena barbata*)	Moderate / None / None
Common wildoats (*Avena fatua*)	Moderate / None / None
Red brome (*Bromus madritensis* ssp. *Rubens*)	High / None / None
Cheatgrass (*Bromus tectorum*)	High / None / None
Arabian grass (*Schismus barbatus*)	Limited / None / None
Salt cedar (*Tamarix* sp.)	High / None / None

KEY:
Cal-IPC = California Invasive Plant Council
CDFA = California Department of Food and Agriculture
FNWL = Federal Noxious Weed List
NOTE: *Cal-IPC definitions: High—species that cause severe ecological impacts; Moderate—species that cause substantial and apparent ecological impacts; Limited—species that cause minor ecological impacts in California, or with not enough information to justify higher score.

[5] California Invasive Plant Council. 2012. *Plant Profiles*. Available at: http://www.cal-ipc.org/ip/management/plant_profiles/

[6] U.S. Department of Agriculture, National Resources Conservation Service. 2012. *Federal Noxious Weeds*. Available at: http://plants.usda.gov/java/noxious?rptType=Federal

4.1.2 Post-construction Inventory and Mapping of Weed Infestations

During construction, weed surveys will be conducted to assess the species composition and abundance of weed infestations due to construction-related disturbances, focusing on areas of temporary impacts. Surveys will occur during the growing season, at the appropriate time for proper identification of weed species. The species information, location, time of year, priority, approximate cover, and suggested method of treatment will be recorded during field surveys. Where appropriate, areas where weeds are located will be targeted for monitoring as described in Section 8.0, *Monitoring*. Maps and data will be used to inform personnel trained in herbicide application to isolate and eradicate weedy species if herbicide application is the suggested method of treatment.

It is anticipated that the species composition of areas disturbed by the project may be affected by the infestation of weeds, resulting from both construction and restoration activities, and species not known to occur within the project area may be introduced.

Other non-native species of concern with occurrence records[7] in nearby areas of the Antelope Valley include: Russian knapweed (*Acroptilon repens*), black mustard (*Brassica nigra*), Saharan mustard (*Brassica tournefortii*), ripgut brome (*Bromus diandrus*), hairy whitetop (*Cardaria pubescens*), yellow star thistle (*Centaurea solstitialis*), mat sandbur (*Cenchrus longispinus*), crossflower (*Chorispora tenella*), Canada thistle (*Cirsium arvense*), bermudagrass (*Cynodon dactylon*), flix weed (*Descurainia sophia*), red-stemmed filaree (*Erodium cicutarium*), shortpod mustard (*Hirschfeldia incana*), foxtail barley (*Hordeum murinum*), harmal peganum (*Peganum harmala*), radish (*Raphanus sativus*), and Russian thistle (*Salsola tragus*). Special care will be taken to identify and eradicate any new introductions of weedy species, especially those identified herein that are known to successfully establish in similar habitats to the project site. Invasiveness ratings are provided in Table 4.1.2-1, *Non-native Species Known to Occur within the Vicinity of the Tylerhorse Wind Energy Project*.

[7] Consortium of California Herbaria. 2012. Search Page. http://ucjeps.berkeley.edu/consortium/

TABLE 4.1.2-1
NON-NATIVE SPECIES KNOWN TO OCCUR WITHIN THE VICINITY OF THE TYLERHORSE WIND ENERGY PROJECT

Species	Invasiveness Ratings (Cal-IPC* / CDFA** / FNWL)
Russian knapweed (*Acroptilon repens*)	Moderate / B / None
Black mustard (*Brassica nigra*)	Moderate / None / None
Saharan mustard (*Brassica tournefortii*)	High / None / None
Ripgut brome (*Bromus diandrus*)	Moderate / None / None
Hairy whitetop (*Cardaria pubescens*)	Limited / B / None
Yellow star thistle (*Centaurea solstitialis*)	High / C / None
Mat sandbur (*Cenchrus longispinus*)	None / C / None
Crossflower (*Chorispora tenella*)	None / B / None
Canada thistle (*Cirsium arvense*)	Moderate / B / None
Bermudagrass (*Cynodon dactylon*)	Moderate / C / None
Flix weed (*Descurainia sophia*)	Limited / None / None
Red-stemmed filaree (*Erodium cicutarium*)	Limited / None / None
Shortpod mustard (*Hirschfeldia incana*)	Moderate / None / None
Foxtail barley (*Hordeum murinum*)	Moderate / None / None
Harmal peganum (*Peganum harmala*)	None / A / None
Radish (*Raphanus sativus*)	Limited / None / None
Russian thistle (*Salsola tragus*)	Limited / None / None

KEY:
Cal-IPC = California Invasive Plant Council
CDFA = California Department of Food and Game

A = economic or environmental detriment, unknown in California, and prohibited from entering the state; B = economic or environmental detriment, unknown in California, and if found, subject to state eradication; C = economic or environmental detriment, usually widespread, able to enter state as long as conform to pest cleanliness; Q = suspected to be of economic or environmental detriment, status uncertain; D = little or no economic or environmental detriment.

FNWL = Federal Noxious Weed List

NOTE: *Cal-IPC definitions: High—species that cause severe ecological impacts; Moderate—species that cause substantial and apparent ecological impacts; Limited—species that cause minor ecological impacts in California, or with not enough information to justify higher score.

**CDFA definitions: Weed List A—control action required by state agencies; Weed List B—control required in nurseries, control elsewhere at the discretion of local County Agricultural Commissioner; Weed List C—control required in nurseries, not required elsewhere.

SECTION 5.0
WEED MANAGEMENT AREA

The weed management area includes all areas within the project where ground disturbance will occur (mowing, grubbing, grading, etc.), including a 100-foot buffer around ground disturbance activities (Figure 5-1, *Weed Management Area*). Management areas will include all areas where invasive plants could spread, such as areas within and surrounding wind turbines, along access roads, within corridors associated with electrical transmission, and on the grounds of O&M facilities (Figure 1.1-4, *Conceptual Site Plan*). Permanently impacted areas will be covered with gravel or other substrates that should prevent vegetation growth and, therefore, are not likely to be subjected to any weed control treatments (i.e., weed abatement or herbicide application), although they are still considered part of the weed management area. Temporarily impacted areas may be more prone to weed establishment and therefore will be the primary focus of weed management within the management area.

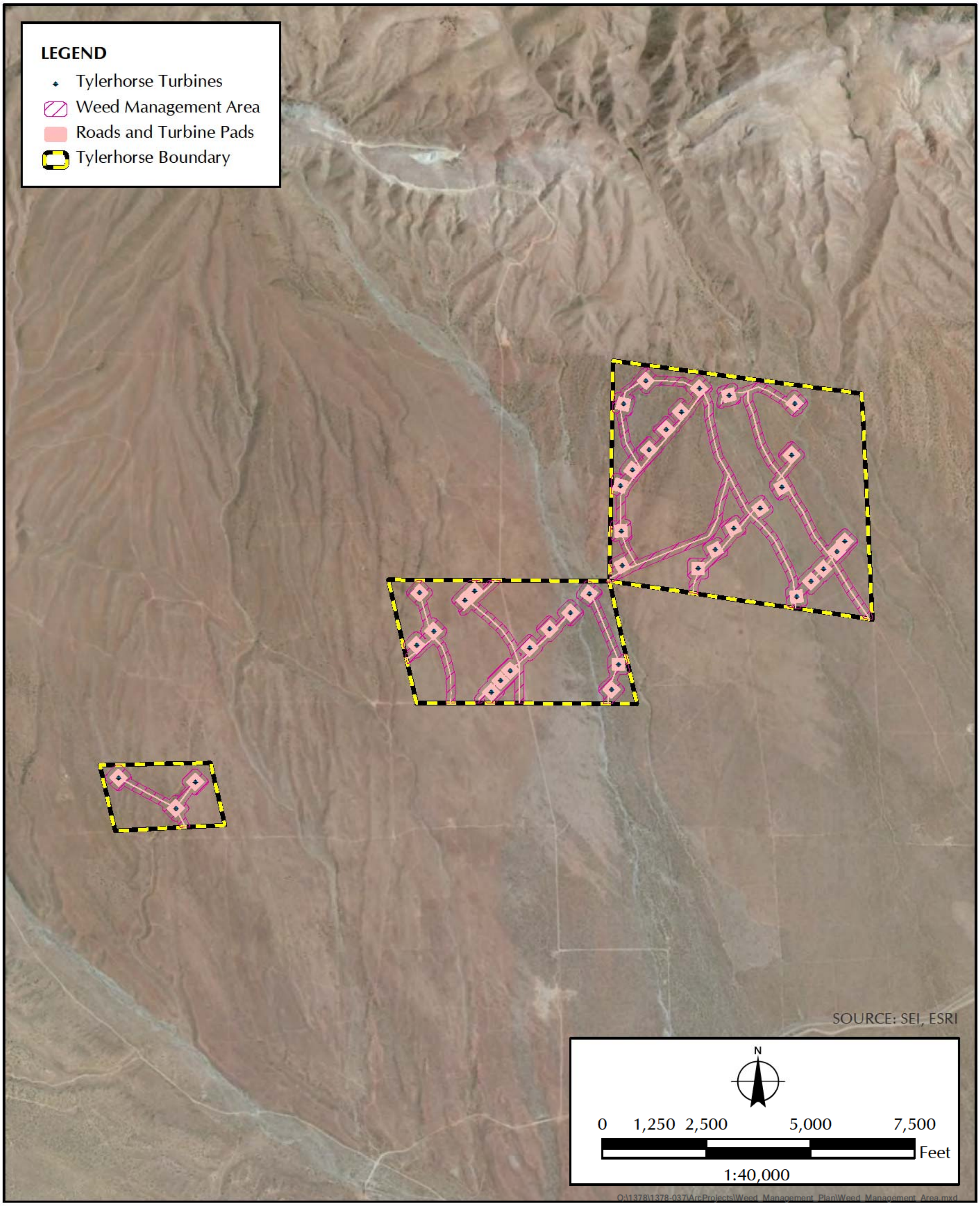

FIGURE 5-1

Weed Management Area

SECTION 6.0
PREVENTION MEASURES

6.1 EQUIPMENT CLEANING

Equipment and vehicles that have been cleaned prior to being staged on the job site require no further washing unless they are exposed to populations of non-native plants present on the site. Equipment required to be clean may include vehicles, shovels, plows, rakes, hand tools, power tools, augers, tillers, power mowers, jackhammers, weed whackers, or any other tool that may potentially spread weeds into new areas.[8]

Staging areas will be designated for equipment needing to be cleaned on the site and may be part of existing staging areas used for other purposes. Staging areas designated for cleaning will be equipped with berms or silt fences to prevent the spread of contamination and weeds into neighboring areas. Water used for cleaning equipment will be contained within the cleaning area to isolate propagules and further prevent the spread of weeds. If weed infestations occur within or immediately adjacent to equipment cleaning stations, herbicides or other weed removal procedures will be performed, as appropriate.

To fully clean soils and plant materials from equipment, appropriate cleaning tools will be available at the staging area, including brushes, brooms, high-pressure air devices, water hoses, vacuums, and other hand tools as required.[9] Following cleaning, equipment will be inspected for plant propagules immediately following cleaning. Equipment that is permanently stored at the work site will not need to be cleaned unless transported outside of the project property or exposed to areas within the project site that are infested with populations of non-native and invasive weeds.

A daily log will be maintained with the site project manager, or supervising official, and shall include the following information: data, time, location, type of equipment, cleaning method, list of staff present, and signature of the supervising official. Cleaning logs will be available for inspection at any time to the BLM and biological monitors, and will be submitted to the BLM upon request.

6.2 REVEGETATION AND WEED-FREE PRODUCTS

Revegetation should occur as soon as practical after disturbances. Areas of temporary disturbance shall be revegetated with local native plant species as soon as construction is complete to reduce erosion and inhibit the establishment of weeds. To prevent the spread of weeds in the project site, weed-free products will be exclusively used for all activities including, but not limited to, landscaping materials and soil erosion materials (i.e., mulch, soil mats, straw fencing, or wattles).

[8] California Invasive Plant Council. 2011. *Preventing the Spread of Invasive Plants: Best Practices for Land Managers*. Berkeley, CA.

[9] California Invasive Plant Council. 2011. *Preventing the Spread of Invasive Plants: Best Practices for Land Managers*. Berkeley, CA.

SECTION 7.0
WEED CONTROL MEASURES

7.1 SPECIES-SPECIFIC CONTROL PROCEDURES

As part of the implementation of this WMP, species-specific control procedures will be developed for high-priority weed species as they are located and mapped at the project site. The species-specific control procedures will be developed as part of implementation of this WMP because new species not considered in this plan have the potential to colonize the site,[10] and it is not known if the species included in this plan will actually cause infestations at the project site. The BLM weed specialist, Kern County Agricultural Commissioner, and other specialists in the Kern County Weed Management Area will be consulted to identify appropriate species-specific weed eradication procedures based on the most recent scientific knowledge and studies available. For each weed species identified within the project boundary, guidelines will be developed for their control (i.e., through BLM-approved herbicides or other means), and used as appropriate.

7.2 WEED CONTROL METHODS AND DURATION

Weed control methods will be species-specific and based on the density and species composition present at each infestation site. The "no chemical" weed control methods may be physical hand pulling and will include rakes, shovels, and so on as well as mechanical tools that will include mowers, weed whackers, and plows. Methods could also include chemical (herbicide) or environmental (increased seeding, planting rotation, thermal exclusion). The restoration monitor shall determine the most appropriate method for each infestation, in consultation with the BLM weed specialist, Kern County Agricultural Commissioner, and other specialists in the Kern County Weed Management Area.

Weed control procedures will comply with all federal, state, and local government laws and BLM regulations, and will be repeated at regular intervals to reduce the spread of weeds within the project site. A Licensed Qualified Applicator will apply BLM-approved herbicides as necessary and follow all required procedures. Herbicides will not be applied when wind velocities exceed 6 miles per hour or within 72 hours of a rain event. Only water-safe herbicides will be used in riparian areas.

The method of application of herbicides varies greatly from one weed species to the next and also with the degree of infestation, time of year, and environmental conditions. The application method ultimately chosen should minimize risks of harming non-target plants. The environmental risks of using herbicides include drift, volatilization, persistence in the environment, groundwater contamination, edge effects on sensitive wildlife, and harmful effects on animals.

[10] Tetra Tech EC, Inc. 2010. *Draft Weed Management Plan for the Genesis Solar Energy Project*. Prepared for: California Energy Commission, Docket No. 09-AFC-8. Lakewood, CO.

Herbicide application should always include marker dyes to make the herbicide visible. Higher visibility is desirable, because it:

- allows personnel to more effectively protect themselves against contamination;
- prevents unintended multiple application to a particular area or plant;
- ensures complete coverage of target area and plants; and
- informs personnel of overspray and wind-drift issues, which protects non-target plants.

SECTION 8.0
MONITORING

Implementation of the WMP will be required during the construction phase of the project. Monitoring will occur for the duration of the construction phase of the project and following construction until success criteria are met. Occurrences of weeds will be documented by recording the date identified, phenology (i.e., growth stage), density and/or abundance of plants, detailed location description and map of infestation areas, recommended treatment, treatments previously used (and results), and Cal-IPC status. The monitor shall also report the native plant communities immediately adjacent to infestation areas, and/or the communities expected after weed control, and/or restoration treatments. All infestations will be photographed before and after weed control treatments to document the progress and evaluate the success of weed control methods employed.

8.1 PERFORMANCE CRITERIA

To evaluate the success of weed control methods implemented in this WMP, success criteria will be employed. Success criteria of this WMP evaluate the dominant plants for each plant community, percentage cover, diversity of plants, and percentage cover of non-native invasive plants as a function of treatment. To reach performance goals, remedial seeding, herbicide treatments, and/or weed removal may be necessary as determined by the restoration monitor.

The project will obtain at least 10 percent cover of native perennial species, at least 20 percent cover of native annual species, and less than 20 percent cover of non-native species; and restored habitats must include a species composition that appropriately represents the vegetation community targeted for treatments.

SECTION 9.0
ADAPTIVE MANAGEMENT

To meet the goals and objectives established in this WMP, the principles of adaptive management will be followed. Adaptive management, as defined by the USFWS, is "a method for examining alternative strategies, for meeting measurable biological goals and objectives, and then, if necessary, adjusting future conservation management actions according to what is learned."[11] The restoration monitor will be responsible for making recommendations to reach the success criteria outlined in this WMP in consultation with agencies, as appropriate.

Allowing for adaptive management may promote the implementation of more appropriate weed management strategies that may more efficiently reach the goals described in this WMP. It is reasonably foreseeable that better (i.e., less costly, environmentally safer) weed control treatments may be developed in the near future that are not mentioned in this WMP; and if adaptive management were not permitted, these could not be used. Additionally, it may be necessary to perform more or less activities for weed control than described in this WMP. Adaptive management will allow for flexibility in implementing activities to perform tasks related to the goals and objectives of this WMP, and will also allow for different methods of weed control to be used. Thus, the goals and objectives may be met through different means without modifying or amending this WMP.

Adaptive management of this WMP follows the following strategies:

1. If the goals of this WMP are not met through the objectives included in this WMP, additional objectives and corresponding actions may be developed to reach the goals described in this WMP.

2. Ineffective methods for weed control, including application of certain herbicides, will be reevaluated and removed from consideration if they do not appear necessary to reach the goals of this WMP.

3. Alternate methods for weed control, such as the use of a less costly or environmentally safer herbicide, may be used if in accordance with regulatory requirements and approved by applicable agencies.

[11] *Federal Register*. 1 June 2000. *65*: 35242.

SECTION 10.0
REPORTING

A final report will be prepared for this WMP at the end of the construction period. The final report will describe monitoring efforts that occurred throughout the construction period. Memoranda for the Record (MFRs) will be provided to the BLM on a monthly basis for the duration of monitoring that follows construction.

SECTION 11.0
REFERENCES

Bureau of Land Management. 1992. *Manual 9015: Integrated Weed Management*. Available at: http://www.blm.gov/ca/st/en/prog/weeds/9015.html

California Invasive Plant Council. 2011. *Preventing the Spread of Invasive Plants: Best Practices for Land Managers*. Berkeley, CA.

California Invasive Plant Council. 2012. *Plant Profiles*. Available at: http://www.cal-ipc.org/ip/management/plant_profiles/

Consortium of California Herbaria. 2012. Search Page. http://ucjeps.berkeley.edu/consortium/

Federal Register. 1 June 2000. *65*: 35242.

Tetra Tech EC, Inc. 2010. *Draft Weed Management Plan for the Genesis Solar Energy Project*. Prepared for: California Energy Commission, Docket No. 09-AFC-8. Lakewood, CO.

U.S. Department of Agriculture, National Resources Conservation Service. 2012. *Federal Noxious Weeds*. Available at: http://plants.usda.gov/java/noxious?rptType=Federal

U.S. Geological Survey. 1965. *7.5-minute Series, Tylerhorse Canyon, California, Topographic Quadrangle*. Scale 1:24,000. Reston, VA.