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ENVIRONMENTAL ASSESSMENT
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PERRIN RANCH WIND ENERGY INTERCONNECTION PROJECT
COCONINO COUNTY, ARIZONA

Prepared for

U.S. Department of Energy
Western Area Power Administration
Desert Southwest Region
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ACRONYMS AND ABBREVIATIONS

AAC	Arizona Administrative Code
AADT	average annual daily traffic
ABPP	Avian and Bat Protection Plan
ACC	Arizona Corporation Commission
ADA	Arizona Department of Agriculture
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
AGFD	Arizona Game and Fish Department
AMA	active management area
amsl	above mean sea level
APE	area of potential effect
APLIC	Avian Power Line Interaction Committee
APS	Arizona Public Service
ASLD	Arizona State Land Department
ASM	Arizona State Museum
AZPDES	Arizona Pollutant Discharge Elimination System
AZ SWAP	Arizona State Wildlife Action Plan
BCC	USFWS Bird of Conservation Concern
BGEPA	Bald and Golden Eagle Protection Act
bgs	below ground surface
Big Sagebrush Shrubland	Inter-Mountain Basins Big Sagebrush Shrubland
BLM	Bureau of Land Management
BMP	best management practice
C-aquifer	Coconino Aquifer
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGP	construction general permit
CUP	Conditional Use Permit
CWA	Clean Water Act
cy	cubic yards
dB	decibels
dBA	A-weighted decibel
DM	Delisted; being monitored
DOE	U.S. Department of Energy
E	Endangered
EA	environmental assessment
EPA	U.S. Environmental Protection Agency
EXPN	Experimental Population/Non-Essential

FAA	Federal Aviation Administration
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
Forest Plan	Coconino National Forest Land and Resource Management Plan
FPA	Federal Power Act
FUTS	Flagstaff Urban Trails System
G Zone	General Zone
gen-tie	generation-tie
GIS	geographic information system
GMU	game management unit
HDMS	Heritage Data Management System
I-40	Interstate 40
IO	isolated occurrences
JEDI	Jobs and Economic Development Impacts
Juniper Savanna	Inter-Mountain Basins Juniper Savanna
KOP	key observation point
kV	kilovolt
LGIP	large generator interconnection procedures
LGP	loan guarantee program
MET	meteorological
MOU	Memorandum of Understanding
mph	miles per hour
MVZ	Museum of Vertebrate Zoology
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NextEra Energy	NextEra Energy Resources, LLC
NPDES	National Pollutant Discharge Elimination System
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
O&M	operations and maintenance
OCAS	obstacle collision lighting system
OSHA	Occupational Safety and Health Administration
Pandion	Pandion Systems, Inc.
Perrin Ranch Wind	Perrin Ranch Wind, LLC

Pinyon-Juniper	Colorado Plateau Pinyon-Juniper Woodland
Ponderosa Pine Woodland	Rocky Mountain Ponderosa Pine Woodland
PPA	power purchase agreement
Project	Perrin Ranch Wind Energy Center
PSS	preliminary site screening
R-aquifer	Redwall-Muav-aquifer
Reclamation	U.S. Department of the Interior Bureau of Reclamation
ROW	right-of-way
RPM	revolutions per minute
Salt Desert Scrub	Inter-Mountain Basins Mixed Salt Desert Scrub
SC	Species of Concern
SCADA	supervisory control and data acquisition
Semi-Desert Grassland	Inter-Mountain Basins Semi-Desert Grassland
Semi-Desert Shrub	Inter-Mountain Basins Semi-Desert Shrub Steppe
SHPO	State Historic Preservation Officer
SPCC Plan	Spill Prevention, Control and Countermeasure Plan
SR	State Route
SWCA	SWCA Environmental Consultants
SWPPP	Stormwater Pollution Prevention Plan
SWReGAP	Southwest Regional Gap Analysis Project
T	threatened
Tariff	Open Access Transmission Tariff
TCP	traditional cultural property
USACE	U.S. Army Corps of Engineers
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
Western	Western Area Power Administration
WRCC	Western Regional Climate Center
WUS	Waters of the U.S.

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EXECUTIVE SUMMARY

PROJECT LOCATION

The Perrin Ranch Wind Energy Center (the Project) would be constructed on private and state-owned land located north of Williams in Coconino County, Arizona.

PROJECT PARTICIPANTS

Perrin Ranch Wind, LLC (Perrin Ranch Wind), a subsidiary of NextEra Energy Resources, LLC (NextEra Energy), proposes to develop, operate, and maintain a wind energy facility that would require interconnection to the existing Moenkopi-Yavapai 500-kilovolt (kV) transmission line. Western Area Power Administration (Western), a power-marketing agency of the U.S. Department of Energy, is responding to an application from Perrin Ranch Wind to interconnect to the Moenkopi-Yavapai transmission line. Ownership of the transmission line is divided into four owners (Salt River Project, Arizona Public Service [APS], Tucson Electric, and the U.S. Bureau of Reclamation [Reclamation]), with APS acting as the operator. Reclamation and Western, through a Memorandum of Agreement/Understanding, have agreed that Western would perform the lead National Environmental Policy Act (NEPA) process, with Reclamation as a cooperating agency. This Environmental Assessment (EA) was prepared in accordance with NEPA to assess the impacts of constructing and operating the wind Project, which would be enabled by Western's execution of the interconnection agreement (a federal action).

PURPOSE AND NEED

Perrin Ranch Wind submitted an interconnection request to Western in 2010 to interconnect the proposed Project to the existing Moenkopi-Yavapai 500-kV transmission line. Western is required to respond to Perrin Ranch Wind's application for interconnection to Western's transmission system.

Western adopted an Open Access Transmission Tariff (Tariff) for its transmission system, which is generally consistent with the Federal Energy Regulatory Commission's pro forma open access tariff. Under Western's Tariff, procedures for new interconnections to the transmission system apply to all eligible customers, consistent with all Western requirements and subject to environmental review under NEPA. In responding to that request, Western must apply the terms and conditions of its Tariff and Interconnection Guidelines.

In reviewing interconnection requests, Western must ensure that existing reliability and service is not degraded. Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system. Western's approval of this interconnection would enable the Project to proceed. Because Western's action would enable the Project, the agency is required to analyze the potential environmental impacts associated with the construction, operation, and maintenance of all Project-related facilities regardless of ownership.

In summary, Western's purpose and need is to approve or deny the interconnection request in accordance with its Tariff and the Federal Power Act, as amended.

The primary purpose of the Project is to provide wind-generated electricity from a site in Arizona to further the objectives of the President's National Energy Policy to diversify energy sources by making greater use of non-hydroelectric renewable sources, such as wind power (National Energy Policy Development Group 2001), and to meet customer demand for competitively priced energy from renewable resources. NextEra Energy has conducted wind generation pre-NEPA studies at the Perrin Ranch location. These feasibility studies indicate favorable conditions (including but not limited to high-wind presence, existing energy transmission availability, and topographical conditions) at the Project location. New interconnections to Western's transmission system are subject to environmental review under NEPA. Therefore, the underlying purpose is to analyze the Project's wind-generated energy and the effects it may have on the surrounding environment. Per an existing power purchase agreement with APS, Perrin Ranch Wind needs to develop, operate, and maintain the generation infrastructure in order to develop the renewable wind resource.

ISSUES RAISED BY THE PUBLIC

Public scoping was conducted for the Project in January and February 2011 and included informational pamphlets that were mailed to local residents and businesses, as well as an open-house meeting in Williams, Arizona. Issues raised during scoping include the following concerns:

- Property Values
- Tourism
- Employment
- Visual Impacts
- Noise Impacts
- Wildlife Impacts
- Hazardous Materials
- Traffic and Transportation
- Project Suitability

ALTERNATIVES

Proposed Action

The proposed Project would include sixty-two 1.6-megawatt (MW) General Electric turbines, with a total Project output capacity of 99.2 MW of renewable energy. Due to the wind regime at the site, the average MW output is anticipated at 50% of 99.2 MW at any given time.

In addition, the Project includes the following components: six meteorological towers, underground electrical collection lines, access roads (existing and proposed), a 138-kV substation, a 138-kV generation-tie transmission line and 21-kV backfeed line, a 500-kV step-up substation, an APS 500-kV switchyard, a 21-kV Project power line, three microwave towers, an operation and maintenance facility, a temporary concrete batch plant, two temporary construction laydown areas, and an existing material source pit.

Access to the Project Area would be via State Route 64 and Espee Road (see Figure 1.1). Access to the Project facilities, including individual turbines, would be provided by existing Perrin Ranch roads and proposed access roads to be constructed for the purposes of Project construction and operation.

Perrin Ranch Wind proposes to implement Western's stand construction, operation, and maintenance practices, where applicable, to avoid and minimize impacts to the environment to the extent practicable. These measures are part of Perrin Ranch Wind's proposed Project, in addition to applicant-committed best management practices and conservation measures (see Section 2.27).

No Action Alternative

Under the No Action Alternative, Western would not approve an interconnection agreement with Perrin Ranch Wind, and for the Project to be constructed Perrin Ranch Wind would have to access or install another transmission system. In effect the proposed Project wind energy facility would not be constructed. For the purposes of this EA, which discusses the potential impacts of Western's decision, the No Action Alternative is considered to result in the Project not being constructed and the environmental impacts associated with the Project not occurring.

Summary of Impacts for the Proposed Action

The Proposed Action would have no major impacts based on the significance criteria and impact analysis presented herein. The Proposed Action would have certain potential impacts, and potential mitigated-impacts, which are summarized below.

Aesthetics and Visual Resources. Construction activities associated with the Proposed Action would introduce visual contrasts to the color, line, form, and texture of the existing characteristic landscape. Visual contrasts would result from ground disturbance, removal of vegetation, presence of construction personnel and vehicles, and the temporary storage of equipment and materials. Direct and indirect impacts from construction of the Proposed Action on aesthetics and visual resources would be local, minor, short term, and adverse. Direct and indirect impacts from operation of the Proposed Action on aesthetics and visual resources would be local, minor, long term, and adverse.

Noise. Noise generated by construction equipment would vary, depending on type, model, size, and condition of the equipment. Because construction activities are short term (occurring over a five- to seven-month period), the associated impacts of noise would be temporary and intermittent. Direct and indirect impacts from noise of the construction of the Proposed Action would be local, minor, short term, and adverse.

Water Resources. The Proposed Action would result in direct and indirect impacts to water resources from the use of water during construction of the Proposed Action. Because groundwater would be withdrawn from the local aquifer, the impacts to groundwater would be direct and local. With respect to surface water, best management practices would be in place during construction to protect against contamination of surface water and erosion; therefore, direct and indirect impacts to surface water resources would be short term and minor. With respect to groundwater, only a small amount of water from groundwater sources would be used during construction, and all impacts to water resources during construction would be short term and minor.

Vegetation. The construction phase of the Proposed Action would include ground-disturbing activities for the development of a substation, switchyard, wind turbines, access roads, transmission lines, and associated facilities (i.e., substations, operation and maintenance facilities, and switchyards) as described in Chapter 2. Adverse direct and indirect impacts to vegetation from construction of the Proposed Action would be long term and short term, local, and minor. Construction activities would result in the short-term disturbance of 648 acres, which is 1.6% of the Project Area. Construction activities would result in the long-term disturbance of 226 acres, 0.6% of the Project Area. Adverse, indirect, long-term impacts may occur from the spread and establishment of noxious weeds within the Project Area. Adverse impacts to vegetation resources are anticipated to be minimal during the operation of the Proposed Action. Indirect adverse impacts to vegetation communities may result from increased road access within the Project Area and would consist of increased legal and illegal take of plants, introduction of invasive vegetation, and increased risk of wildfire through campfires, off-highway vehicle use, and cigarettes.

Wildlife. Construction activities would result in a number of permanent and temporary adverse impacts to wildlife, potentially including direct injury or mortality, habitat disturbance, introduction or spread of invasive vegetation, interference with behavioral activities, increased levels of fugitive dust, and increased noise. The operation phase of the Proposed Action is anticipated to adversely impact wildlife through impacts related to wind turbines (i.e., avian and bat collisions and/or barotraumas for bats). Other adverse impacts to wildlife may result from electrocution from power lines, collisions with meteorological towers, increased predation, increased levels of noise, disturbance from maintenance activities, and interference with behavioral activities. Adverse impacts to raptors resulting from the operation phase of the Proposed Action may include collisions with wind turbines; electrocution from the 138-kV overhead transmission line, interference with behavioral activities, increased noise, and increased disturbance from maintenance activities. Indirect short-term adverse impacts to big game may occur from of human activity throughout the Project Area required for maintenance and repair of the site facilities. However, these impacts would be brief in duration and big game species are expected to return to the habitat within and adjacent to the Project Area following any maintenance activities.

Socioeconomics. Construction of the Project could result in a short-term increase in local employment. Because the Project workforce is expected to draw from the existing workforce, there would be adequate housing and associated infrastructure to support construction workers. Construction-related expenditures, as well as sales and use taxes for goods and services purchased during construction, would also result in a short-term boost to the local economy. Project construction would likely increase traffic in and around the Project Area and could result in some travel restrictions within Perrin Ranch; therefore, access for area recreationists would be affected. Construction could also result in short-term impacts to area quality of life, as well as a short-term reduction in recreational visitors who may choose to avoid the area during construction. Direct and indirect impacts to socioeconomics from construction of the Proposed Action would be regional, short term, and beneficial. Operation-related expenditures, as along with sales and use taxes, would result in a long-term boost to the local economy. In terms of residential property value, housing prices in the area are not expected to be directly affected by the physical presence of the proposed Project but may be affected by the perception of loss in value by real estate purchasers. Direct and indirect impacts to socioeconomic resources from operation of the Proposed Action would be local, long term, and minor.

Native American Religious Concerns. Construction of the Project would avoid 69 archaeological sites that are considered traditional cultural properties by the Hopi Tribe; there would be no short-term impact to these sites as a result of construction. Therefore, there would be no direct or indirect impacts to archaeological sites and, subsequently, Native American religious concerns as a result of construction of the Proposed Action. Operation of the Project would not create barriers to members of the Hopi Tribe from accessing the sites. The presence of the Project would not impair the cultural functions of the archaeological sites; therefore, there are no indirect impacts from the operation of the Project. There would be no direct or indirect impacts to archaeological sites and Native American religious concerns as a result of operation of the Proposed Action.

Transportation. Approximately 39 miles of roads would be constructed and/or maintained within the Project Area to provide construction and delivery personnel with access to turbine sites and associated Project facilities. Transportation of equipment and materials during construction would result in increases in the traffic levels on Interstate 40 (I-40) and State Route 64 by up to 1.5%. Traffic levels on Espee Road and other unnamed secondary roads in the Project footprint would also increase during the construction period. The additional traffic associated with Project construction could result in access delays to current travelers on Espee Road. Direct and indirect impacts to transportation from construction and operation of the Proposed Action would be adverse, local, long term, and minor.

SUMMARY OF RESOURCES DISMISSED FROM DETAILED ANALYSIS

Western provided the consultant with technical direction, advice, and example criteria to evaluate various resources and whether they would be considered or dismissed from detailed analysis. Criteria evaluated include 1) whether a resource would either not be affected or would sustain negligible impacts from the Project and thus does not distinguish between the alternatives or 2) are beyond the agency’s control. In all cases for this Project, resource areas were dismissed because the resource would either not be affected or would sustain negligible impacts from the Project. Resource areas dismissed from further analysis include climate and air quality, cultural resources, environmental justice, geology and soils, hazardous materials, human health and safety, intentional destructive acts, land use, and recreation.

CUMULATIVE IMPACTS

No major cumulative impacts are identified for aesthetics and visual resources, noise, water resources, vegetation, and Native American religious concerns.

The majority of past, present, and reasonably foreseeable projects in the area include roads, trails, and other similar projects that would result in minimal impacts to wildlife species. These projects do contribute to habitat loss and fragmentation; however, they occur at a more localized level (i.e., within and adjacent to the Project Area) and the additive impact is low relative to the available high-quality habitat in the area. Transmission line impacts are typically limited to birds and related to collision and electrocution; however, new transmission lines are typically built to Avian Power Line Interaction Committee standards, substantially reducing avian mortality associated with them. There would be an additive direct mortality impact associated with the cumulative projects, but it would be reduced through best management practices and mitigation measures.

The Project would make a minor and short-term contribution to the cumulative socioeconomic impacts that would result from construction and operation of the Project. Economic impacts could be beneficial to local laborers. Operation of the wind energy facility may contribute to a decrease in the perceived quality of life for residents living in nearby developments. There may be a perception of loss in value by real estate purchasers and existing residents in the Project Area. Given present and reasonably foreseeable actions in the Study Area, it is unlikely that the rural character of the area would be affected in the long term.

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Chapter 1

INTRODUCTION

1.1 BACKGROUND

Perrin Ranch Wind, LLC (Perrin Ranch Wind), a subsidiary of NextEra Energy Resources, LLC (NextEra Energy), proposes to develop, operate, and maintain a wind energy facility on private and state-owned land at Perrin Ranch in Coconino County, Arizona. The proposed Perrin Ranch Wind Energy Center (hereafter called the Project or the Proposed Action) would be a wind generation facility located on 39,833 acres owned by one private landowner and the Arizona State Land Department (ASLD), approximately 13 miles north of the town of Williams, Arizona (Figure 1.1). The maximum output of the Project at any given moment would be 99.2 megawatts (MW); however, because the net capacity factor for the Project is less than 50%, the average annual MW would be less than 49.6 MW (less than 50% of 99.2 MW).

Western Area Power Administration (Western), a power-marketing agency of the U.S. Department of Energy (DOE), is responding to an application from Perrin Ranch Wind to interconnect to the existing Moenkopi-Yavapai 500-kilovolt (kV) transmission line, which is part of the Navajo Project Transmission System. Ownership of the transmission line is divided into four owners (Salt River Project, Arizona Public Service [APS], Tucson Electric, and the U.S. Bureau of Reclamation [Reclamation]), with APS acting as the operator. Reclamation and Western, through a Memorandum of Agreement/Understanding, have agreed that Western would perform the National Environmental Policy Act (NEPA) process according to the DOE's NEPA-implementation regulations and rules. Western's Proposed Action is to approve Perrin Ranch Wind's proposed interconnection request. Under the Proposed Action, Western would execute an interconnection agreement to connect the proposed Project to the Moenkopi-Yavapai transmission line. Therefore, completion of the Project is a connected action to approval of the interconnection request and is therefore analyzed as part of the Proposed Action.

The Project is a federal action under NEPA, Section 102(2) (1969), Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500–1508), DOE NEPA Implementing Procedures (10 CFR Part 1021), and other applicable regulations. Western has prepared this Environmental Assessment (EA) under these regulations to describe the analysis of environmental impacts of the proposed Project and alternatives, including the No Action Alternative.

1.2 AGENCY PURPOSE AND NEED

The agency's purpose and need and that of the applicant affect the extent to which alternatives are considered reasonable. This EA provides an interdisciplinary analysis to support the decision to be made by Western to provide interconnection of the Project to the electrical grid. In addition, the DOE must assess whether the Proposed Action would comply with all applicable environmental requirements under NEPA, as well as all other applicable federal laws, including the Endangered Species Act, the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act.

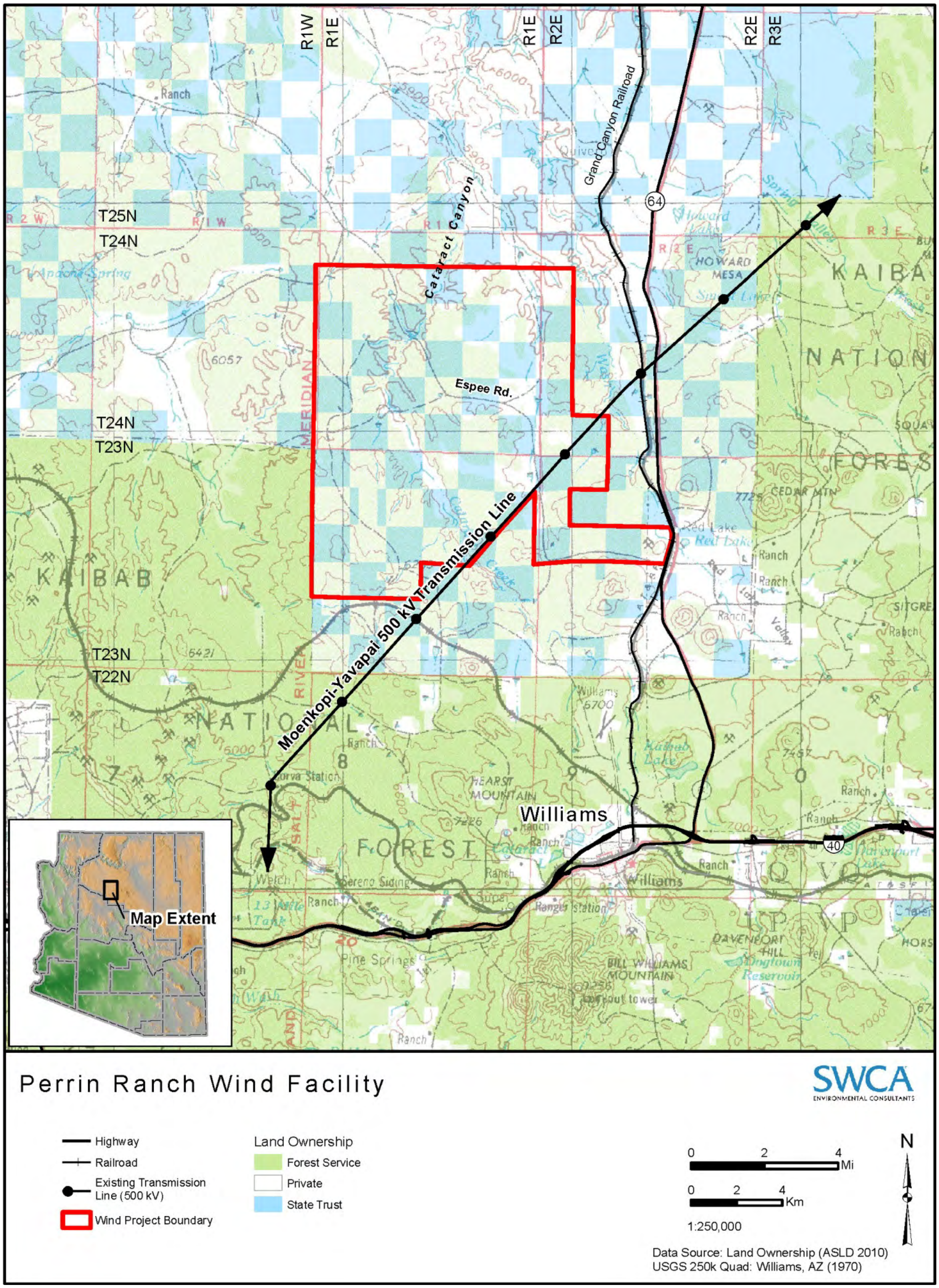

Figure 1.1. General location of the Project Area.

1.2.1 Western Area Power Administration

Perrin Ranch Wind submitted an application to the Navajo Project Transmission System ownership group to interconnect to the existing Moenkopi-Yavapai 500-kV transmission line. Western intends to treat this interconnection request as if it were a request to its own system to the extent practical. Western and Reclamation have negotiated and clarified the federal government's management procedures and responsibilities for this power system in an interagency Memorandum of Understanding (MOU).
The MOU, dated January 24, 2011, specifies Western's and Reclamation's NEPA agreements for how implementation procedures are conducted, such as defining the lead agency's (Western) responsibilities in providing all Project-related materials and documents to the cooperating agency (Reclamation). Western's NEPA responsibilities, per the MOU, also include coordinating information exchange among any third-party contractors, providing progress updates, leading Endangered Species Act Section 7 consultation, leading National Historic Preservation Act Section 106 consultation, and publishing legal notices. Reclamation's NEPA responsibilities include participating in all communications and providing written comments on NEPA-related documents.

Western adopted an Open Access Transmission Tariff (Tariff) for its transmission system, which is generally consistent with the Federal Energy Regulatory Commission's (FERC's) pro forma open access tariff. Under Western's Tariff, procedures for new interconnections to the transmission system apply to all eligible customers, consistent with all Western requirements and subject to environmental review under NEPA. In responding to that request, Western must apply the terms and conditions of its Tariff and Interconnection Guidelines.

Under the Tariff, Western offers capacity on its transmission system to deliver electricity when capacity is available. The Tariff also contains terms for processing requests for the interconnection of generation facilities to Western's transmission system. The Tariff substantially conforms to FERC final orders that provide for non-discriminatory transmission system access. Western originally filed its Tariff with FERC on December 31, 1997, pursuant to FERC Order Nos. 888 and 889. Responding to FERC Order No. 2003, Western submitted revisions regarding certain Tariff terms and included Large Generator Interconnection Procedures and a Large Generator Interconnection Agreement in January 2005. In response to FERC Order No. 2006, Western submitted additional term revisions and incorporated Small Generator Interconnection Procedures and a Small Generator Interconnection Agreement in March 2007. In September 2009, Western submitted yet another set of revisions to address FERC Order No. 890 requirements along with revisions to existing terms.

In reviewing interconnection requests, Western must ensure that existing reliability and service is not degraded. Western's Large Generator Interconnection Procedures provide for transmission and system studies to ensure that system reliability and service to existing customers are not adversely affected by new interconnections. These studies also identify system upgrades or additions necessary to accommodate the proposed Project and address whether the upgrades/additions are within the Project scope.

Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system. Western's approval of this interconnection would enable the Project to proceed. Because Western's action would enable the Project, the agency is required to analyze the potential environmental impacts associated with the construction, operation, and maintenance of all Project-related facilities regardless of ownership.

The DOE is responsible for the United States' policies regarding energy, including domestic energy production. Western is a federal power-marketing agency under the DOE that operates and maintains transmission lines and associated facilities.

In summary, Western's purpose and need is to approve or deny the interconnection request in accordance with its Tariff and the Federal Power Act, as amended (FPA).

Authority

Western must consider interconnection requests to the transmission system in accordance with its Tariff and the FPA. Western satisfies FPA requirements to provide transmission service on a non-discriminatory basis through compliance with its Tariff. Under the FPA, FERC has the authority to order Western to allow an interconnection and require the agency to provide transmission service at rates it charges itself and under terms and conditions comparable to those it provides itself.

1.2.2 Bureau of Reclamation

Reclamation is responsible for some of the nation's most important electrical resources with power plants located throughout the western United States. In this region, Reclamation plays an important role in providing electricity to agricultural, industrial, and residential customers. Reclamation owns 24% of the Moenkopi-Yavapai transmission line, to which Perrin Ranch Wind has requested an interconnection for the proposed Project.

Through an MOU, Reclamation agreed to defer its NEPA responsibilities to Western; for this proposed Project, Western would perform the NEPA process according to the DOE NEPA-implementation regulations and rules. Reclamation is delegating the approval of the proposed interconnect to Western and is a cooperating agency on this EA.

1.3 APPLICANT'S UNDERLYING PURPOSE AND NEED

The primary purpose of the Project is to provide wind-generated electricity from a site in Arizona to further the objectives of the President's National Energy Policy to diversify energy sources by making greater use of non-hydroelectric renewable sources, such as wind power (National Energy Policy Development Group 2001), and to meet customer demand for competitively priced energy from renewable resources. NextEra Energy has conducted wind generation pre-NEPA studies at the Perrin Ranch location. These feasibility studies indicate favorable conditions (including but not limited to high-wind presence, existing energy transmission availability, and topographical conditions) at the Perrin Ranch location. New interconnections to Western's transmission system are subject to environmental review under NEPA. Therefore, the underlying purpose is to analyze the Project's wind-generated energy and the effect it may have on the surrounding environment. Per an existing power purchase agreement (PPA) with APS, Perrin Ranch Wind needs to develop, operate, and maintain the generation infrastructure in order to develop the renewable wind resource.

According to Northern Arizona University Sustainable Energy Solutions (2007), approximately 45% of electricity generated in the state of Arizona is produced from coal-fired plants, 35% from nuclear plants, 10% from natural gas facilities, and 10% from hydroelectric power plants. In November 2006, the Arizona Corporation Commission adopted final rules to expand the state's Renewable Energy Standard to 15% by 2025, with 30% of the renewable energy to be derived from distributed energy technologies. In June 2007, the State Attorney General certified the rule as constitutional, allowing the new rules to go forward, and they took effect 60 days later. To help meet the state's renewable energy standard, Perrin Ranch Wind has proposed the Project.

1.4 AUTHORIZING ACTION

Federal, state, and local agencies have jurisdiction over certain aspects of the Proposed Action. Major federal agencies and their respective permit/authorizing responsibilities with respect to the proposed Project are summarized in Table 1.1.

Table 1.1. Proposed Action Permit/Authorizing Responsibilities

Authorizing Action/Applicable Regulation	Responsible Agency
Interconnection/Transmission Service Agreement	Western
NEPA	Western
Clean Air Act	U.S. Environmental Protection Agency, Arizona Department of Environmental Quality
Utility Occupancy Agreement	Arizona Department of Transportation
Easement Grants and Road Crossing Permits	Arizona Department of Transportation, Coconino County Public Works
Conditional Use Permit	Coconino County
Review and Approval of Noxious Weed Management Plan	Coconino County
National Historic Preservation Act	Western, Arizona State Parks Historic Preservation Office,
Native American Graves Protection and Repatriation Act	Western
American Indian Religious Freedom Act	Western
Construction Stormwater Permit	Arizona Department of Environmental Quality, Arizona Division of Water Quality, Storm Water Program
Clean Water Act compliance	U.S. Army Corps of Engineers
Safety Plan	Arizona Division of Occupational Safety and Health
Migratory Bird Treaty Act	U.S. Fish and Wildlife Service, Western
Bald and Golden Eagle Protection Act	U.S. Fish and Wildlife Service, Western
Endangered Species Act	U.S. Fish and Wildlife Service, Western
Certificate of Environmental Compatibility	Arizona Corporation Commission
Right-of-Way request	ASLD
Tower lighting	Federal Aviation Administration

1.5 PUBLIC PARTICIPATION

Public and regulatory agency involvement is critical in analyzing the proposed Project. In addition to the NEPA process, Perrin Ranch Wind underwent a permitting process (for a Conditional Use Permit [CUP]) through Coconino County, which also included stakeholder involvement.

On January 17, 2011, Western sent scoping letters to the public announcing Western's decision to prepare an EA and request comments on Western's proposal to approve the interconnection request. The letter was sent to adjacent landowners and state and local government agencies and officials. Comments received from the public were considered in this EA. Persons requesting copies of the EA will receive copies for review during the public comment period.

Western held a public meeting on February 2, 2011, at the Williams High School in Williams, Arizona. Representatives from Western and the Project team were available to meet with interested members of the public to discuss the EA activities and the Project in general. Approximately 24 people were in attendance and were supportive of the Project. The public comments noted during the public scoping comment period, from January 17 to February 16, 2011, are summarized below.

1.5.1 Scoping Comment Summary

Property Values: A primary concern was from residents living in nearby developments who anticipated a decrease in the property values of their homes due to the presence of the wind energy facility. Existing real estate brokers stated that there has already been a marked decrease in interest to the area from potential residents once informed of future plans.

Tourism: Potential impacts to tourism were raised during the public scoping period. Perceived impacts included a potential decrease in the number of tourists visiting the Grand Canyon who would be deterred from the site of an industrial facility.

Employment: Concerns related to economic conditions include construction and operation employment and the use of local workers. It was anticipated that the construction and operation of a wind energy facility would require specialized and highly skilled workers from outside of the region and that local workers would not economically benefit.

Visual Impacts: Residents living in nearby developments expressed concern over the visual impacts that would result from the operation of the wind energy facility. Primarily, they were concerned about changes to the night sky and the flashing of blinking lights placed on top of the turbines. There was also concern that the turbines would obstruct the view from both residences and travelers on roads headed to the Grand Canyon.

Noise Impacts: Concerns related to noise were that the turbines would emit a low moan that would be heard from nearby residences.

Wildlife Impacts: Numerous concerns were raised about the potential impact to raptors, such as the California condor (*Gymnogyps californianus*) and golden eagle (*Aquila chrysaetos*), and other species including the Mexican gray wolf (*Canis lupus baileyi*). Concern that the turbines would kill such raptors and disrupt current conservation efforts were prevalent, as well as concerns that there might be an overall decrease in the presence of big game species, that would in turn affect other resources such as hunting.

Hazardous Materials: Concerns were expressed over the presence of hazardous materials on the turbines and in the solvents and detergents used to clean the turbines. Comments included the following: the turbines contain over 700 pounds of magnets made from neomydium, which is radioactive material; blades are made of carbon-fiber and fiberglass, neither of which should be burned due to toxic fumes; turbines are power-washed with solvents and detergents, which might go into the watershed; concern regarding how defunct turbines would be disposed; and concern that there would be toxic fumes in the area if turbines catch fire or are struck by lightning.

Traffic and Transportation: Concerns with potential congestion and increases in traffic volume along State Route (SR) 64 and Espee Road caused by Project-related traffic and possible road/lane closures were raised during public scoping.

Suitability: Questions were raised regarding the suitability of the site for wind generation; many comments indicated the amount of power that would be generated did not seem to outweigh the adverse impacts from the Project.

1.6 TRIBAL CONSULTATION

Western initiated consultation with Native American tribes with a notice of Project letter sent on January 21, 2011. Tribes contacted include the Havasupai, Hopi, Hualapai, Yavapai-Apache, Yavapai-Prescott, and Navajo Nation. Copies of the cultural resources Class I report were included in the January 21, 2011, letter. Once complete, the Class III cultural resources survey report and Project avoidance plan were sent with a letter to these same six tribes on March 31, 2011. As of this draft EA, Western was working with the tribes to schedule site visits at their request.

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Chapter 2

PROPOSED ACTION AND ALTERNATIVES

2.1 WESTERN'S PROPOSED ACTION

Western's Proposed Action is to approve Perrin Ranch Wind's interconnection request. Approval of the request would enable Perrin Ranch Wind to proceed; denial of the request would keep the Project from proceeding because power could not be delivered to customers. Therefore, completion of the Project is a connected action to approval of the interconnection request and is therefore analyzed as part of the Proposed Action. The description of the Proposed Action in the following sections describes each of the Project features and includes best management practices (BMPs) and conservation measures to reduce environmental impacts.

2.2 DESCRIPTION OF THE PROPOSED ACTION

2.2.1 Overview of the Project

The proposed Project (Proposed Action) is located at Perrin Ranch, approximately 13 miles north of the town of Williams, Arizona. Under the Proposed Action, Western would approve an interconnection agreement to connect the proposed Project to the Moenkopi-Yavapai 500-kV transmission line. Perrin Ranch Wind would construct, operate, and maintain a wind energy facility on private and state-owned land at Perrin Ranch.

The maximum output[1] of the Project at any given moment would be 99.2 MW; however, because the net capacity factor for the Project is less than 50%, the average annual MW would be less than 50% of 99.2 MW. The Proposed Action would consist of the following components:

- sixty-two 1.6-MW General Electric turbines;
- six meteorological (MET) towers;
- underground electrical collection lines;
- access roads;
- a 138-kV substation;
- a 138-kV generation-tie (gen-tie) transmission line and a 21-kV backfeed line;
- a 500-kV step-up substation;
- an APS 500-kV switchyard;
- a 21-kV Project power line;
- three microwave towers;
- operation and maintenance (O&M) facilities;
- a temporary concrete batch plant;
- two temporary construction laydown areas; and
- An existing material source pit.

[1] Maximum output: The highest total MW capable of being produced by the Project.

The following sections describe these Project components, pre-construction planning, and construction activities associated with each. The Project footprint (i.e., the area to be disturbed during construction and throughout the 30-year life of the Project) would be limited to the areas immediately adjacent to turbines, access roads, and other facilities. Short- (Figures 2.1a–f) and long-term disturbances (Figures 2.2a–f) are shown below in Table 2.1 and Table 2.2. Short-term disturbances can generally be defined as those expected during construction; these represent the maximum acreages of disturbance associated with the Project (or total Project disturbance). Long-term disturbance can generally be characterized as impacts expected during facility operation. Long-term impacts represent the final expected disturbance once short-term impacts are reclaimed.

Table 2.1. Perrin Project Components: Maximum Short-term Disturbance Summary Table, Based on Construction of the Proposed Action

Facility Component	Disturbance Length (feet)	Disturbance Width (feet)	Short-term Disturbance (acres)	% Project Area
Turbine foundations and crane pads (× 62)	300*	N/A	100.8	0.25%
138-kV substation, O&M building, and laydown	1,200	896	24.8	0.06%
Secondary laydown	2,000	590	30.0	0.08%
APS corridor (500-kV step-up substation and 500-kV switchyard)	2,800	1,300	80.0	0.20%
138-kV gen-tie line and 21-kV backfeed line	16,020	75	27.7	0.07%
21-kV Project power line	19,088	150	66.1	0.17%
Access roads only	89,861	60	124.7	0.31%
Access roads with adjacent collection system	120,820	60	167.4	0.42%
Collection system only	108,994	20	50.1	0.13%
Component overlap†	N/A	N/A	−23.7	−0.06%
Total			**647.9**	**1.63%**

* This measurement represents the diameter of the disturbance area.

† Overlap is the intersection of two different component disturbance areas and is therefore removed from the total disturbance. For example, a temporary turbine work area may partially overlap the collection system. In that case, the overlapping turbine acreage has been subtracted in order to not double-count disturbance.

Table 2.2. Perrin Project Components: Maximum Long-term Disturbance Summary Table, Based on Operation of the Project Facility

Facility Component	Disturbance Length (feet)	Disturbance Width (feet)	Long-term Disturbance (acres)	% Project Area
Turbine foundations and crane pads (× 62)	75*	N/A	6.3	0.02%
138-kV substation	410	320	3.1	0.01%
O&M building	355	270	2.2	0.01%
MET Towers (× 6)	100*	N/A	0.9	0.00%
500-kV step-up substation	240	600	2.0	0.01%
500-kV switchyard	400	800	7.3	0.02%
138-kV gen-tie line and 21-kV backfeed line	16,020	50	18.4	0.05%
21-kV Project power line	19,088	50	22.0	0.06%
Access roads only	89,861	34	70.4	0.18%

Table 2.2. Perrin Project Components: Maximum Long-term Disturbance Summary Table, based on Operation of the Project Facility (Continued)

Facility Component	Disturbance Length (feet)	Disturbance Width (feet)	Long-term Disturbance (acres)	% Project Area
Access roads with adjacent collection system	120,820	34	94.6	0.24%
Component overlap†	N/A	N/A	−1.8	0.00%
Total			**225.4**	**0.60%**

* This measurement represents the diameter of the disturbance area.

† Overlap is the intersection of two different component disturbance areas and is therefore removed from the total disturbance. For example, a temporary turbine work area may partially overlap the collection system. In that case, the overlapping turbine acreage has been subtracted in order to not double-count disturbance.

2.2.2 Proposed Facilities

Turbines

The Project would consist of up to 62 General Electric 1.6-MW XLE turbines (Figure 2.3). The turbines can generate electricity once wind speeds reach 7.8 miles per hour (mph) and reach a rated capacity (1.6 MW) at a wind speed of 55 mph. The turbines are designed to self-regulate the angles and pitches required for different wind speeds and direction. All generator components and the drive train components are joined on common structures within the nacelle (see Figure 2.3) to improve durability.

The towers are conical tubular steel with a hub height of up to 262 feet. The turbine tower, on which the nacelle is mounted, consists of three to four sections manufactured from certified steel plates. All welds are made by automatically controlled power welding machines and ultrasonically inspected during manufacturing per American National Standards Institute specifications. All surfaces are sandblasted and multi-layer coated for protection against corrosion. Access to the turbine is through a lockable steel door at the base of the tower.

The turbines would have supervisory control and data acquisition (SCADA) communication technology to allow control and monitoring of the wind farm. The SCADA communications system permits automatic, independent operation and remote supervision, thus allowing the simultaneous control of many wind turbines. Maintenance and service for the Project would be structured so as to provide for timely and efficient operations. The computerized data network would provide detailed operating and performance information for each wind turbine. Perrin Ranch Wind would maintain a computer program and database for tracking each wind turbine's operational history.

Other specifications of the turbines would include:

- rotor blade pitch regulation;
- gearbox with three-stage planetary/helical system;
- double-fed three-phase asynchronous generator and an asynchronous four-pole generator with a wound rotor;
- a braking system for each blade (three self-contained systems) and a fail-safe disc brake; and
- The rotor would consist of three blades mounted to a rotor hub. The hub would be attached to the nacelle, which houses the gearbox, generator, brake, cooling system, and other electrical and mechanical systems. The preliminary turbine design identifies a 262-foot rotor diameter, with a swept area of 57,544 square feet and a rotor speed of 10.1 to 18.7 revolutions per minute (rpm).

Each turbine would be equipped with a lightning protection system. The turbine is grounded and shielded to protect against lightning. The grounding system would be installed during foundation work and would be designed for local soil conditions. The resistance to neutral earth would be in accordance with local utility or code requirements. Lightning receptors would be placed in each rotor blade and in the tower. The electrical components would also be protected.

Temporary disturbance during construction of all turbines would total 102 acres, using an estimated 300-foot radius around each proposed tower base for construction impacts. Permanent disturbance would total 7 acres, based on a 75-foot radius around each tower base.

Lighting

Turbines would be lit as required by the Federal Aviation Administration (FAA). Based on FAA Obstruction Marking and Lighting Advisory Circular 70/7460-1K, no structural markings or alternative colors are proposed for the turbines. Although not currently approved by the FAA, a radar-activated lighting system (Obstacle Collision Lighting System [OCAS]) would be installed on the turbine towers. The system would be designed to keep the towers dark before activating lights on the towers when a plane is detected in the area. The system would be installed and only activated once the FAA approves it.

Lights would not be placed on all turbines; only those turbines along the periphery of the Project Area, and no more than 0.5 mile apart within each array, would have lights to mark the extent of the facility. If the FAA does not approve the radar-activated OCAS lighting proposal, two pulsing red beacons would be mounted on the nacelle. The layout for which turbines would be lit with red lights would be the same as described above for radar-activated lighting.

The lighting plan for the Project has not been approved by the FAA, but an estimated 28 turbines would have lights. No additional ground disturbance would occur for Project lighting.

Meteorological Towers

The Project includes six proposed MET towers that would measure the wind for speed and direction. The six proposed MET towers would each be 164 feet high when installed, each with a 50-foot-radius permanent disturbance footprint. Each tower would be 8 to 10 inches wide and secured with several guy wires anchored up to 165 feet away. The towers would be marked with diverter balls (for planes), which also serve as bird diverters. The proposed locations of the towers are shown on Figures 2.2a–f.

Underground Electrical Collection Lines

Approximately 39 miles of underground collection lines would be installed across Perrin Ranch. Each wind turbine would be connected with underground power and communication cables, called the collection lines. The underground collection lines would be placed in a trench and connect each of the wind turbines to the Project substation. Whenever possible, the collection lines would be located along existing and proposed access roads (see description below), within an average temporary corridor 50 feet wide and a permanent corridor 34 feet wide. Temporary disturbance during construction from collection line trenches and access roads would total 240 acres, whereas permanent disturbance would be 165 acres. Short-term disturbance from other collection line trenches (not associated with access roads) would be an additional 65 acres, based on a temporary width of 20 feet. No long-term (permanent) disturbance for the collection lines not along access roads is anticipated, as all temporary disturbances would be revegetated based on the Project-specific Restoration and Reclamation Plan (see Figures 2.1a–f; Appendix A).

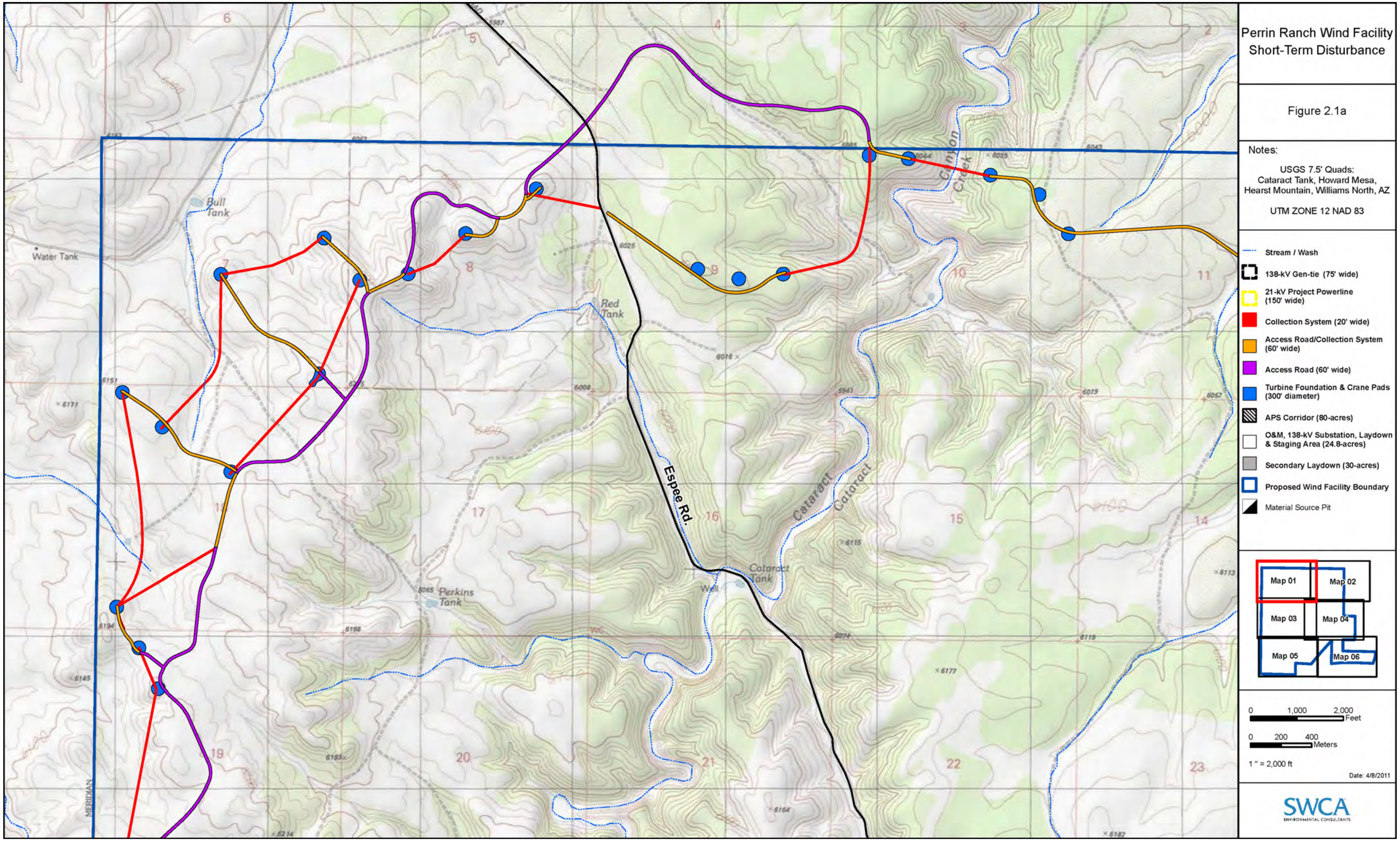

Figure 2.1a. Short-term disturbance in the Project Area (map 1 of 6).

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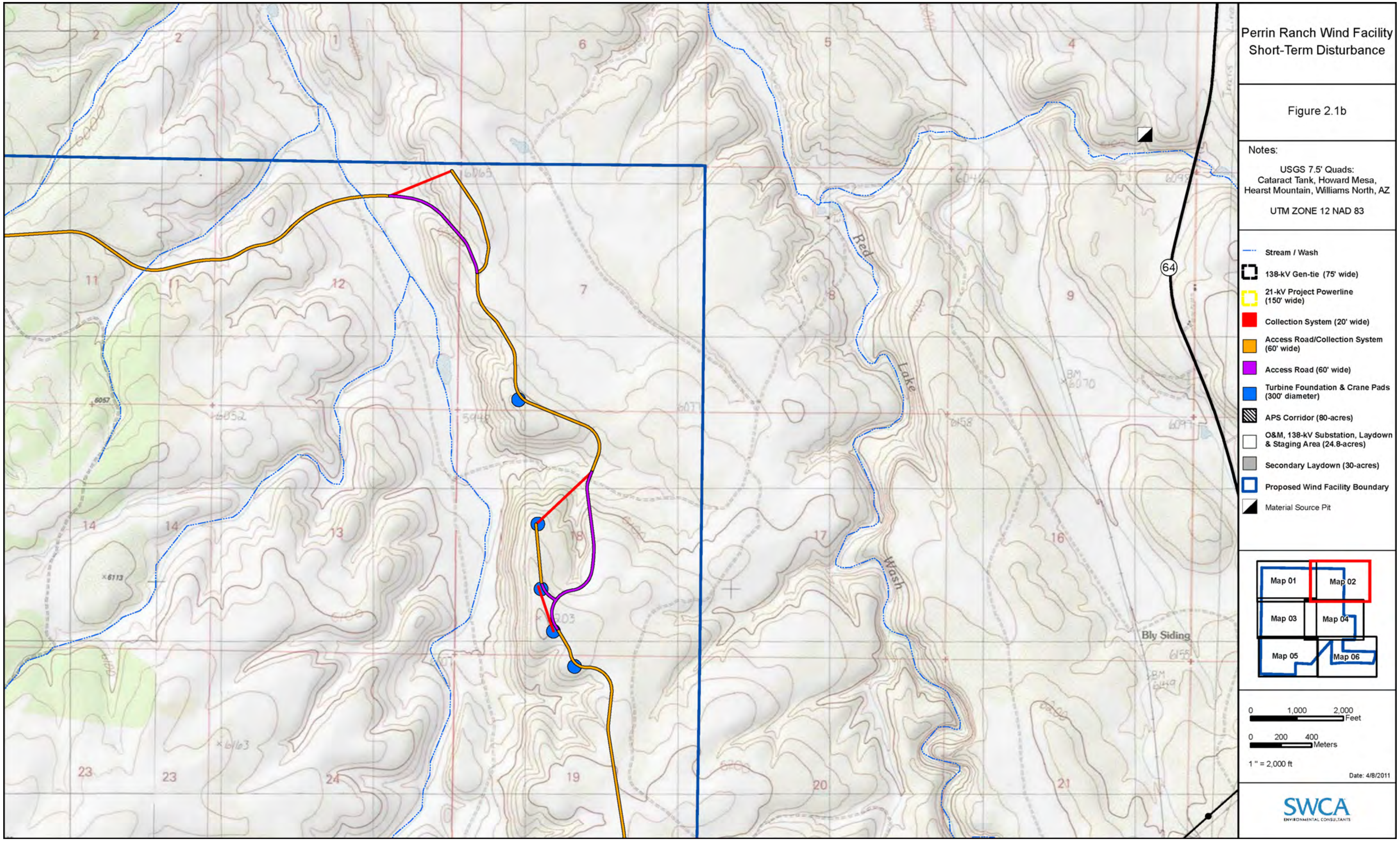

Figure 2.1b. Short-term disturbance in the Project Area (map 2 of 6).

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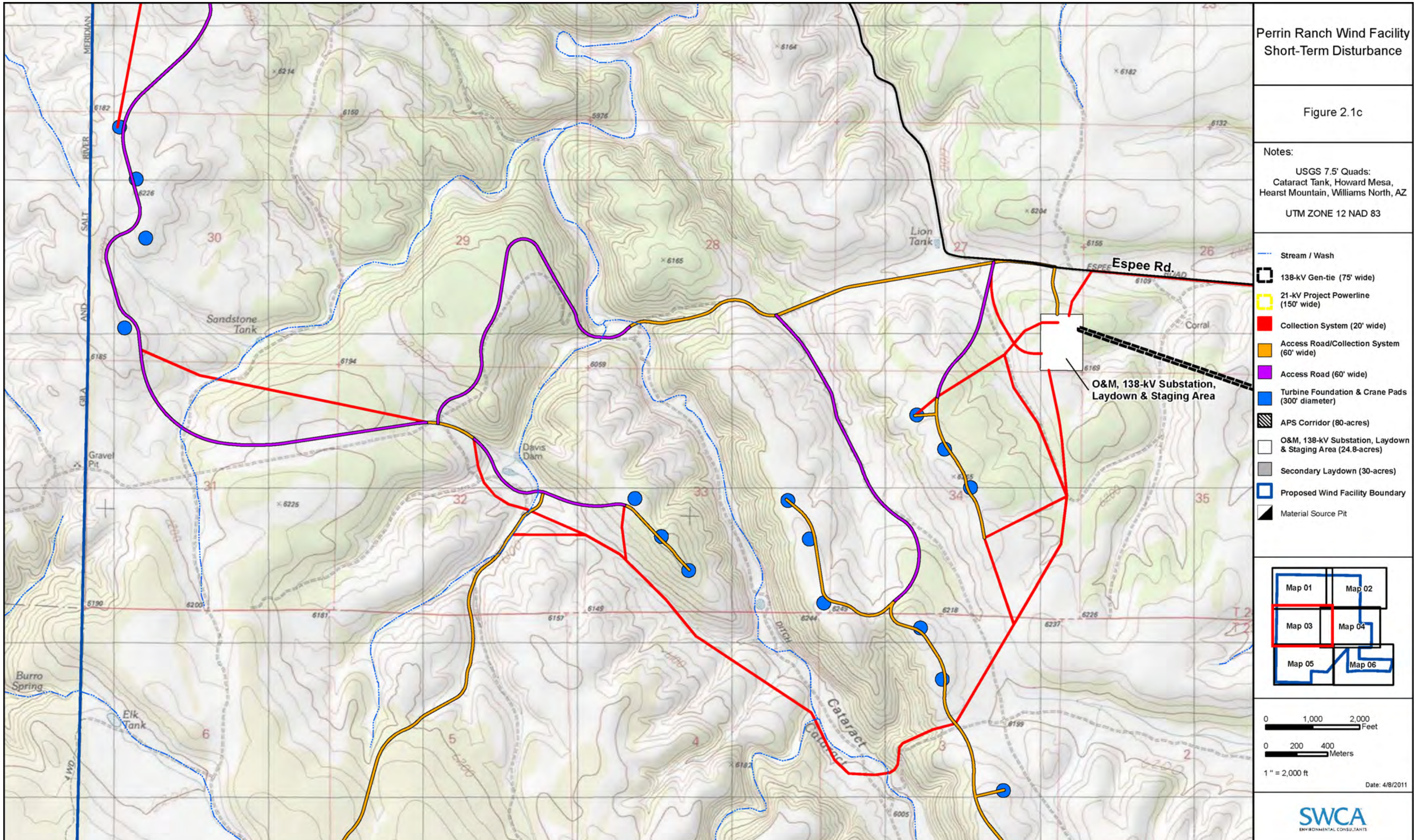

Figure 2.1c. Short-term disturbance in the Project Area (map 3 of 6).

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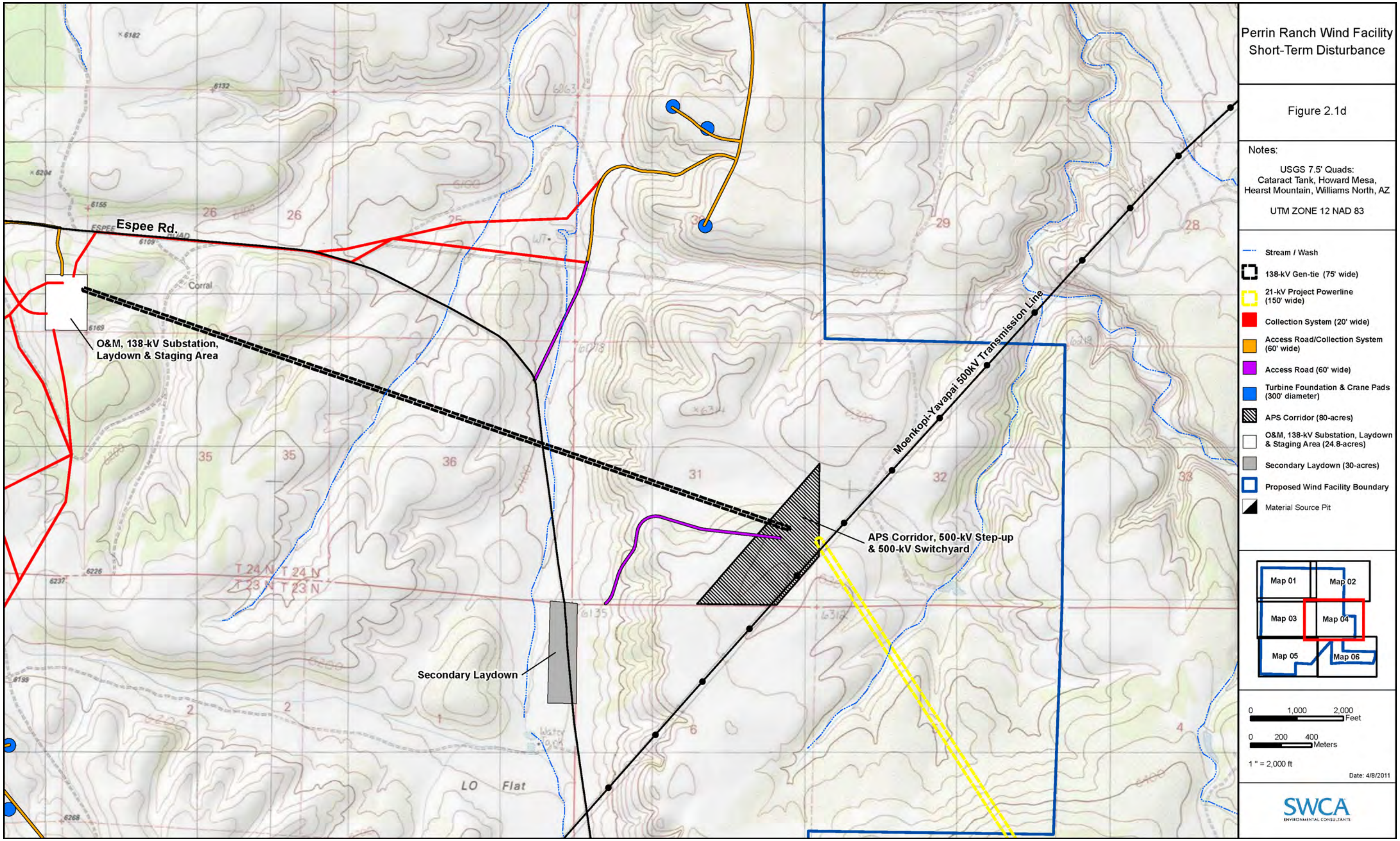

Figure 2.1d. Short-term disturbance in the Project Area (map 4 of 6).

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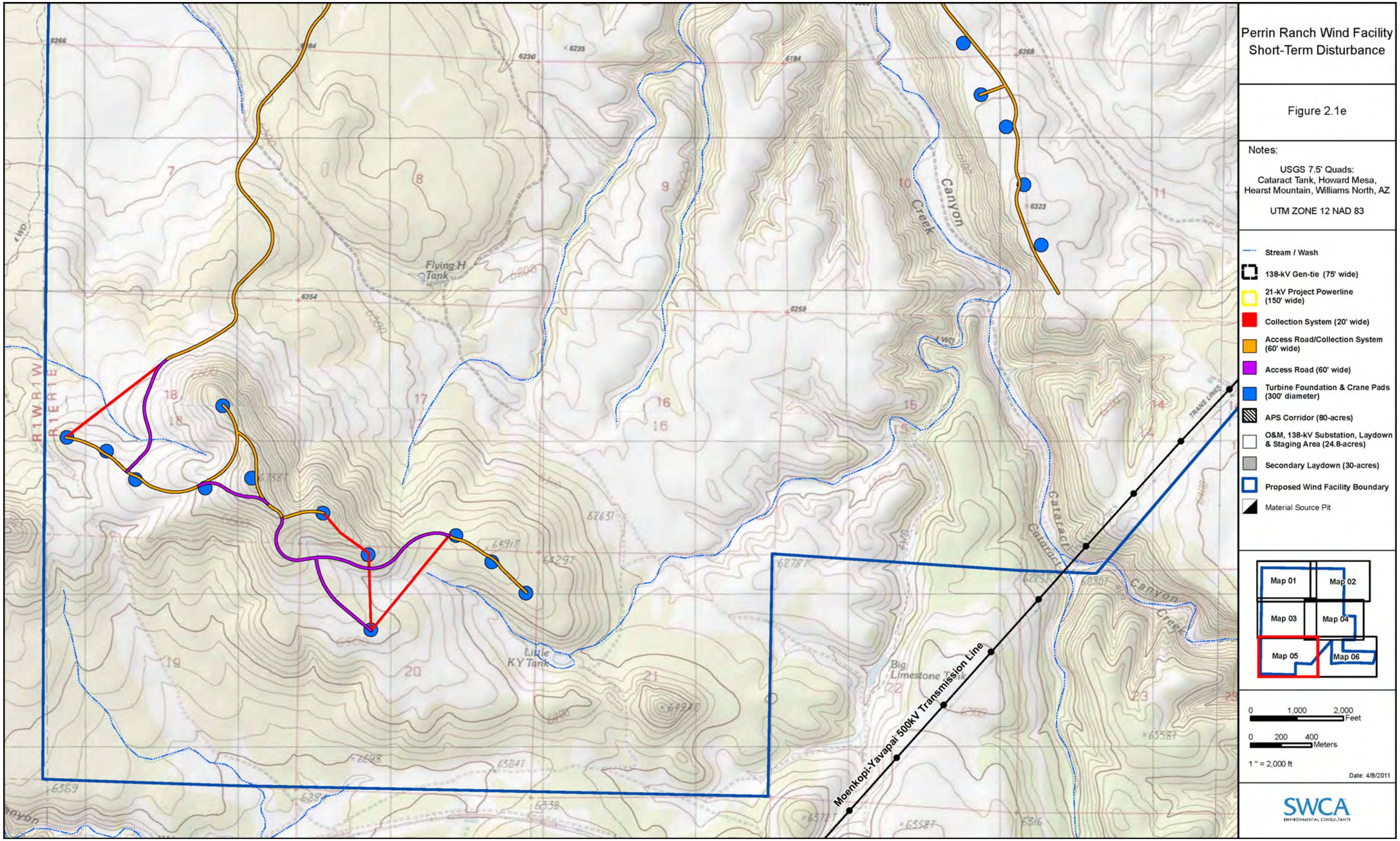

Figure 2.1e. Short-term disturbance in the Project Area (map 5 of 6).

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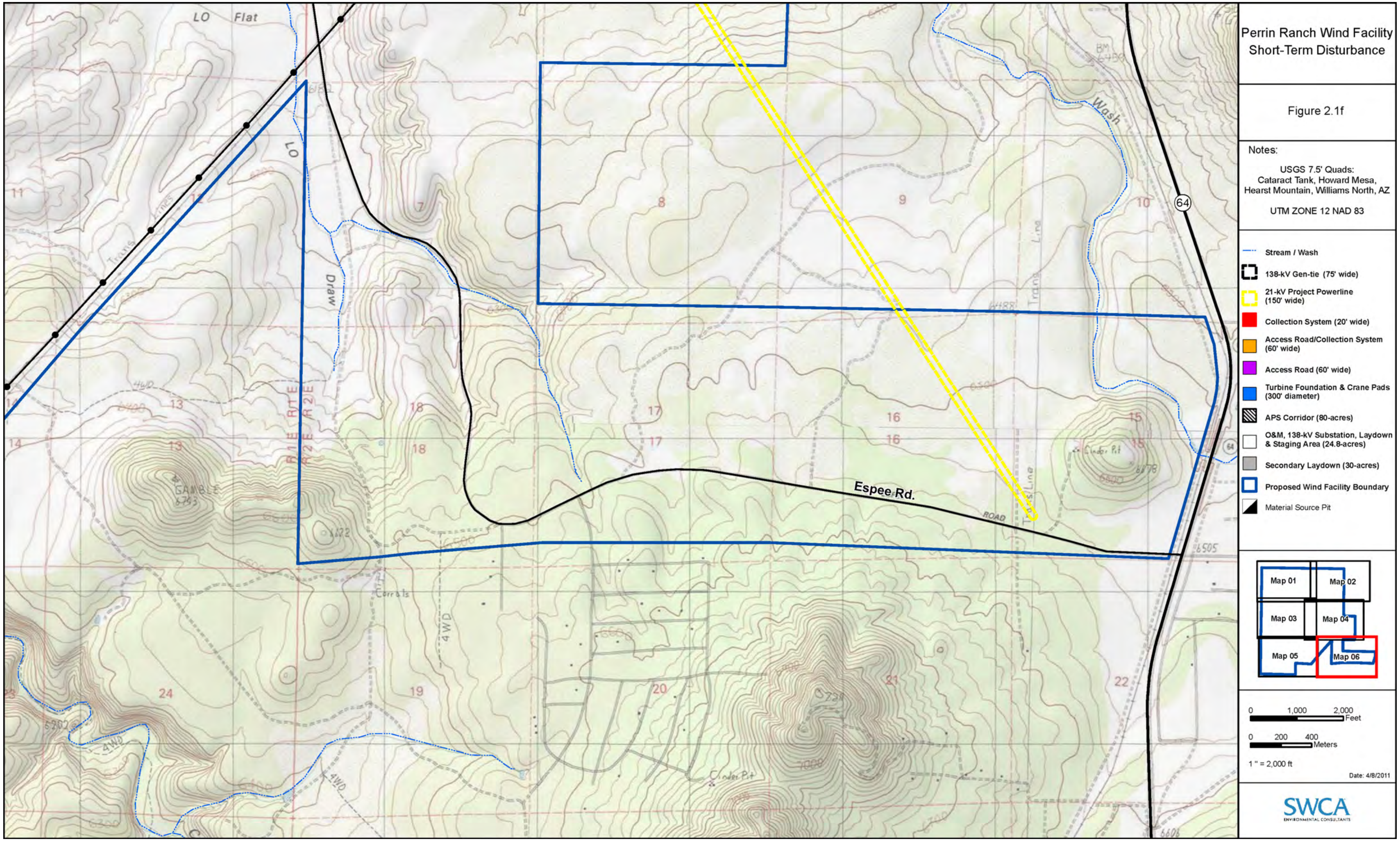

Figure 2.1f. Short-term disturbance in the Project Area (map 6 of 6).

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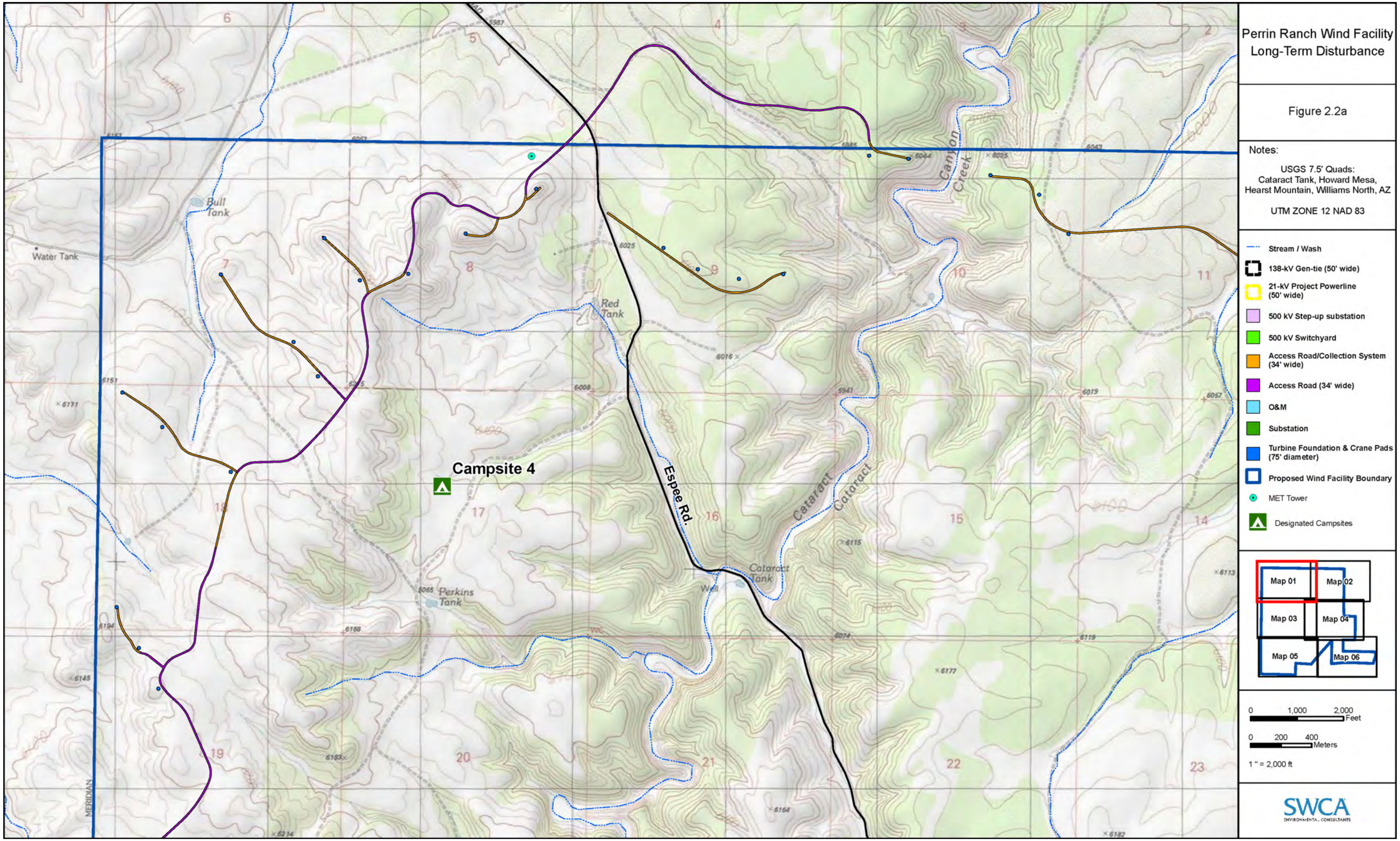

Figure 2.2a. Long-term disturbance in the Project Area (map 1 of 6).

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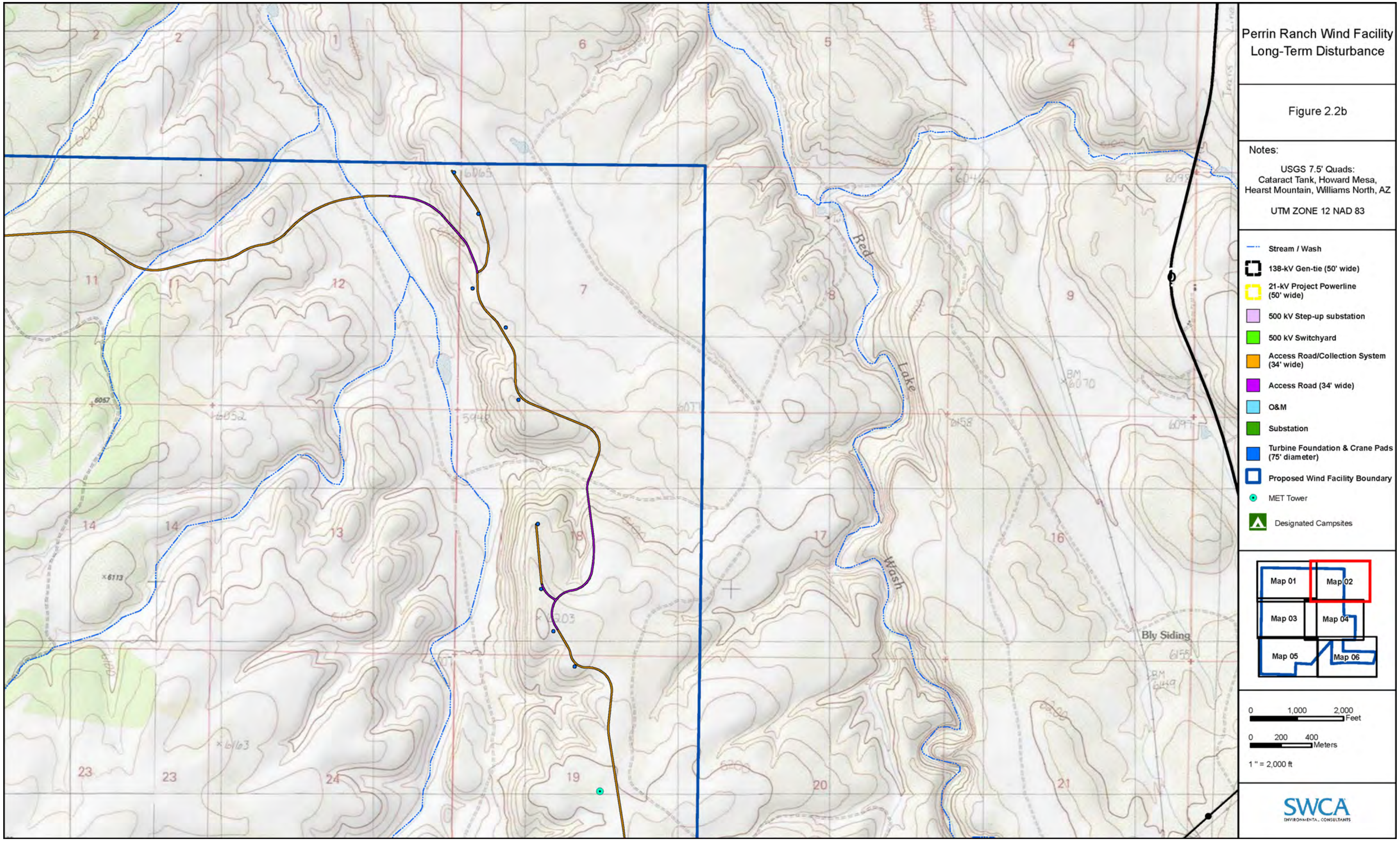

Figure 2.2b. Long-term disturbance in the Project Area (map 2 of 6).

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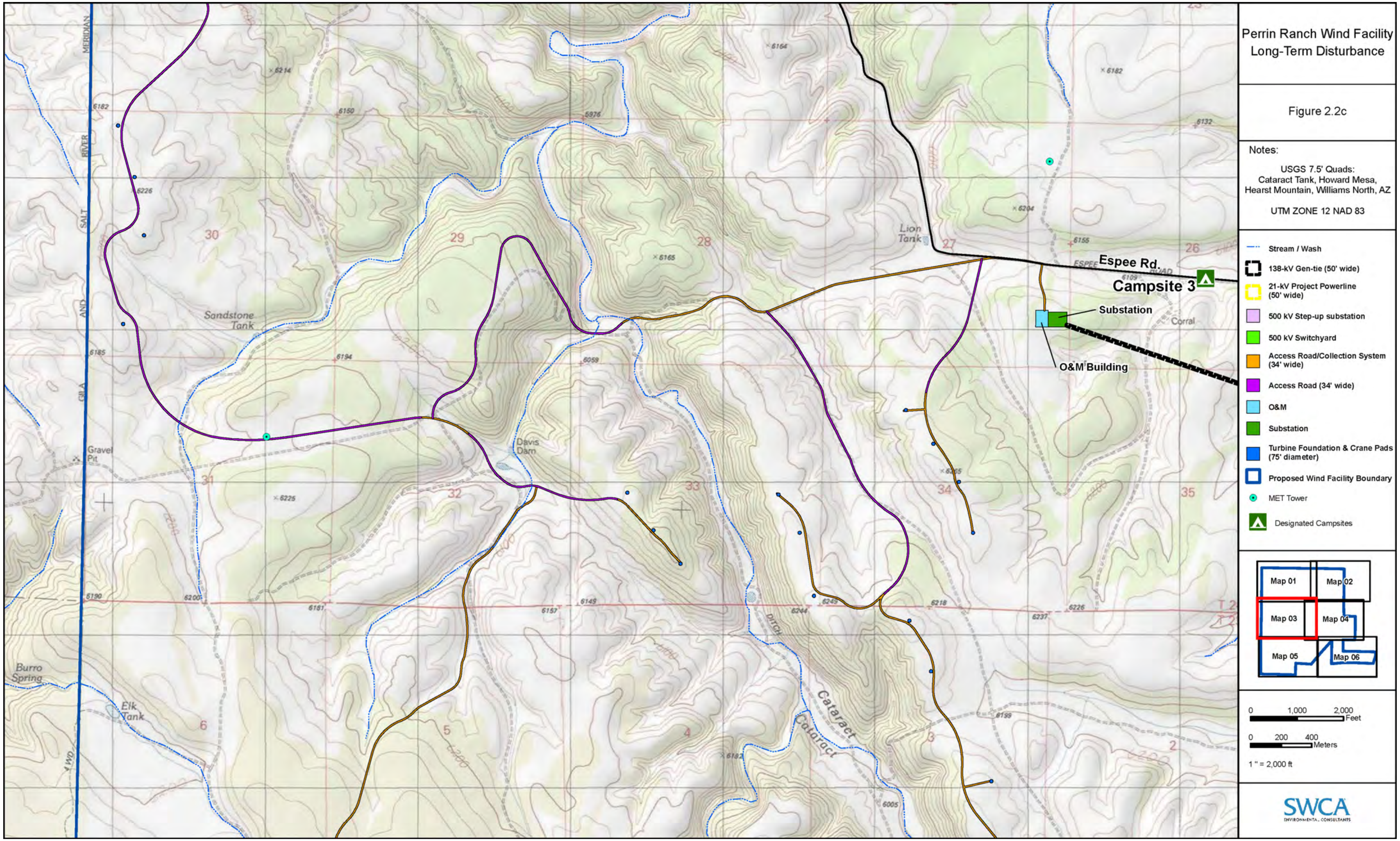

Figure 2.2c. Long-term disturbance in the Project Area (map 3 of 6).

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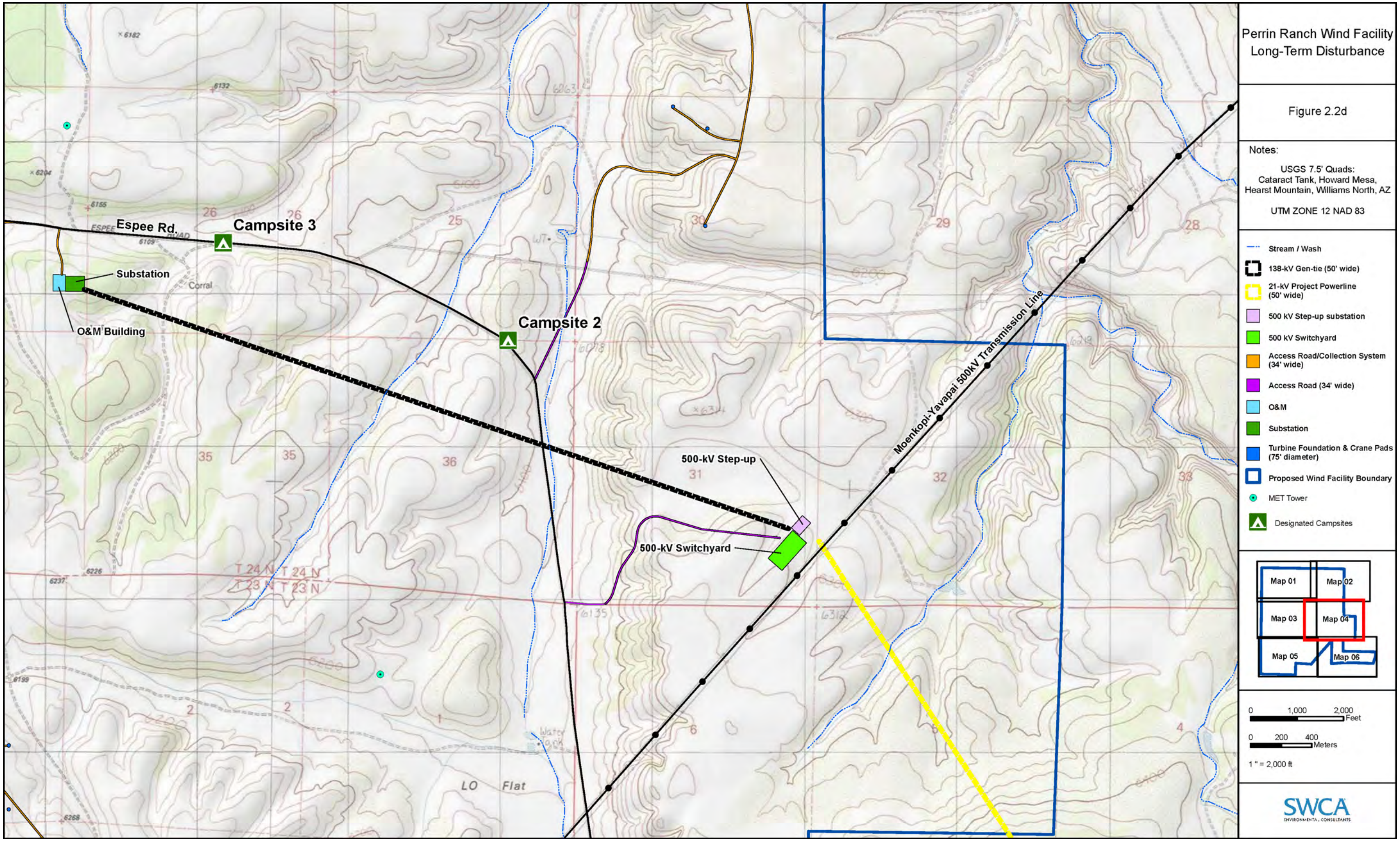

Figure 2.2d. Long-term disturbance in the Project Area (map 4 of 6).

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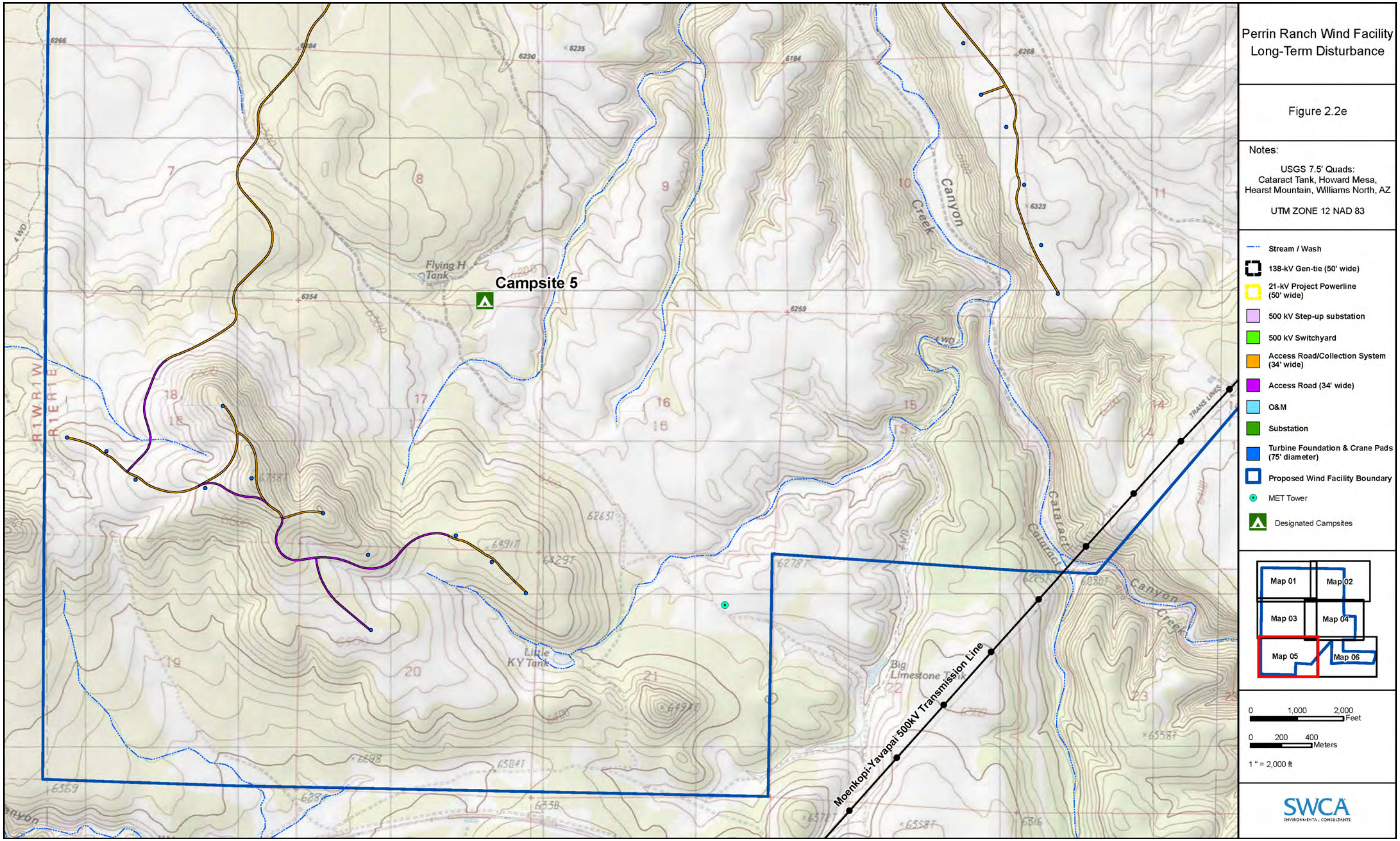

Figure 2.2e. Long-term disturbance in the Project Area (map 5 of 6).

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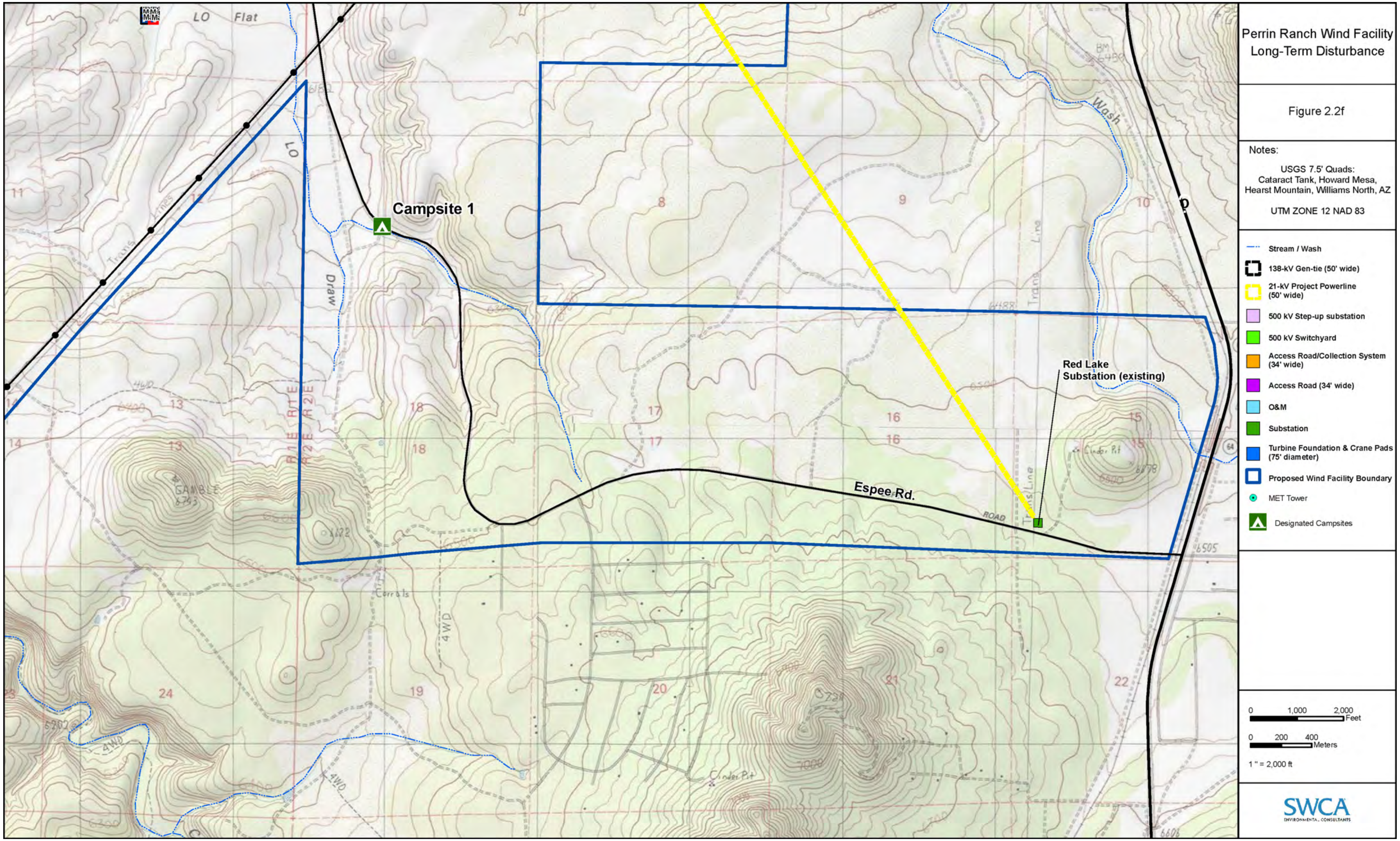

Figure 2.2f. Long-term disturbance in the Project Area (map 6 of 6).

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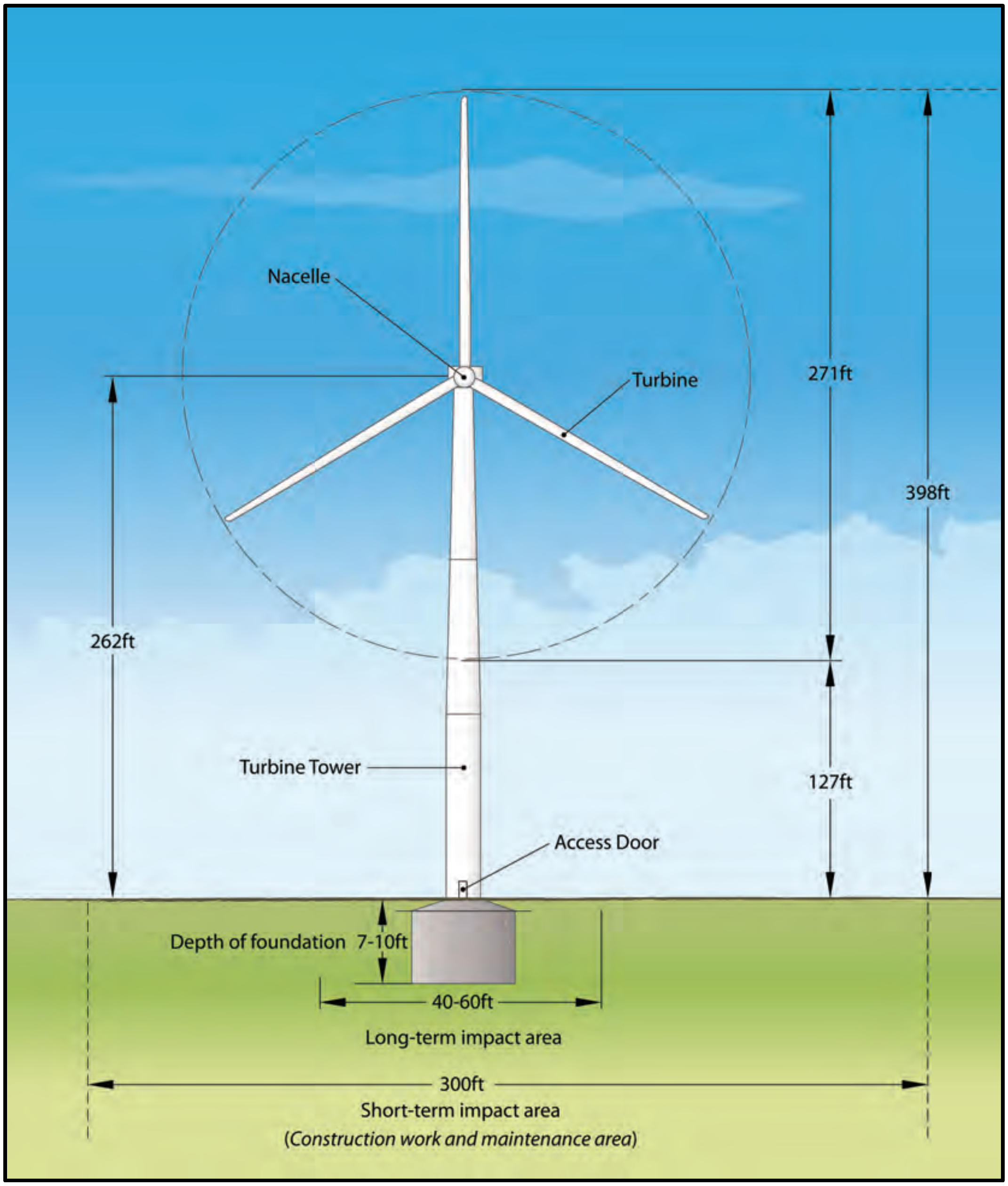

Figure 2.3. Conceptual design of the General Electric 1.6-MW XLE turbine (from NextEra 2010).

Access Roads

A network of access roads would be used to facilitate construction and maintenance of the wind turbines, as well access to the substations, the switchyard, and the Project's O&M building. As described above, there would be an estimated 39 miles of access roads used for the Project (see Figures 2.1a–f). These roads would be 34 feet wide when completed, would have an aggregate surface cover, and would be adequate to support the size and weight of maintenance vehicles. Short- and long-term acreages of disturbances are calculated and provided above under "Underground Electrical Collection Lines."

Project Substation

All underground electrical collection lines would terminate at the Project substation. The substation would include a power transformer, one 138-kV breaker and one 35-kV main breaker, five 35-kV feeder breakers, switches, a control house, and a substation superstructure. Short-term disturbance during construction would be 4 acres (see Figures 2.1a–f) and long-term disturbance would be 3 acres (see Figures 2.2a–f). The 3-acre facility would be surrounded by an approximately 8-foot-tall, chain link metal-fabric security fence enclosure with 1-foot barbed wire on top

Generation-tie Transmission Line and 21-kV Backfeed Line

A roughly 3-mile-long, 138-kV gen-tie transmission line would be constructed to connect the Project substation to the step-up substation, which would then connect to the APS switchyard. The gen-tie transmission line pole towers would be permanent wood structures measuring approximately 80 feet tall, with a 21-foot radius of temporary ground disturbance at each pole. Average spacing between poles is anticipated to be 520 feet, with an estimated 35 poles for the 3-mile transmission line, including dead-end structures. Dead-end structures would be used where a transmission line turns or ends, and often have a wider base and stronger insulator strings. Short-term disturbance during construction for the gen-tie transmission line would be 27.7 acres (3 miles of a 75-foot-wide corridor). Long-term disturbance would be 18.4 acres, along 3 miles of a 50-foot-wide corridor.

A 21-kV backfeed line would be strung along the gen-tie line and poles. No additional ground disturbance for the backfeed line is anticipated.

Step-up Substation (500-kV Connection)

The 500-kV step-up substation would connect the Project-generated power to the APS 500-kV switchyard. It would include an auto transformer, 138-kV and 500-kV breakers, switches, a control house, and a substation superstructure within an approximately 8-foot-tall fence enclosure. Short-term disturbance would total approximately 3 acres (see Figures 2.1a–f), and long-term disturbance would total 2 acres (see Figures 2.2a–f).

APS Switchyard

APS would construct a new 500-kV switchyard that would connect the Project to the existing Moenkopi-Yavapai 500-kV transmission line. The APS switchyard would be engineered and built by APS. It is anticipated that the switchyard would consist of three 500-kV breakers, switches, and control houses located within a 10-acre parcel. The facilities would be enclosed by an 8-foot-tall fence to protect the public from energized equipment. Short-term disturbance for the entire APS corridor including the switchyard and the 500-kV step-up substation would be 80 acres (see Figures 2.1a–f), and long-term disturbance would total 10 acres (see Figures 2.2a–f).

Information from APS indicates that there is transmission service adequate to accommodate the Project (APS 2011). APS filed an application with the Arizona Corporation Commission on July 26, 2010, seeking approval associated with a PPA to procure renewable energy from the Project. In decision No. 72058 (January 6, 2011), the Arizona Corporation Commission approved the Perrin Ranch Wind PPA and that the energy provided through the Project wind facility would meet the requirements of Renewable Energy Standards.

21-kV Project Power Line

Power generated on-site from the wind resource would not be used to power Project facilities. A roughly 3.6-mile-long, 21-kV Project power line would be constructed to provide power to the facilities. The Project power line would originate at the existing Red Lake substation and connect to the proposed APS switchyard. As shown in Figures 2.1a–f and Figures 2.2a–f, temporary disturbance for the construction of the 21-kV Project power line and access road would be 65 acres (150-foot-wide corridor over 3.6 miles), and permanent disturbance would be 22 acres (50-foot-wide corridor over 3.6 miles). The construction access road is included in the permanent disturbance 50-foot-wide corridor in order for annual inspection and maintenance of the 21-kV line. The 21-kV Project power line would pass beneath the existing Moenkopi-Yavapai 500-kV transmission line. As discussed above, APS has been involved with the Project since July 2010 and would resolve all encroachment issues with the 500-kV line, if any.

Microwave Towers and Fiber Optic Line

Switchyards are required to have two separate modes and paths of communication for reliability purposes; this Project proposes to use microwave and fiber optic communication. Three microwave towers would be installed: one tower would be located within the Project substation footprint, the second would be located adjacent to the O&M building, and the third would be located at the Red Lake Substation.

The tower at the Project substation would be a monopole tower no taller than 100 feet. There would be a 60-foot lattice tower at the point of interconnection, as well as a 40-foot monopole at Red Lake Substation that would beam signals to an existing dish at Bill Williams Mountain. The towers would allow for communication and control of these facilities. Fiber optic cables would also be installed along the proposed 21-kV power station line to the APS switchyard to allow for communication. Microwave radio systems are a line-of-sight technology, meaning the signals would not pass through objects (e.g., mountains, building, etc.). The microwave towers would have a temporary disturbance of 0.1 acre with two towers at a 20-foot radius. There would be 0.05 acre of permanent disturbance with two towers at a 10-foot radius and one microwave tower within the substation footprint.

Operation and Maintenance Facilities

The Project would include O&M facilities that would be built in the vicinity of the substation. The building itself would be approximately 5,000 square feet (0.11 acre) with an associated gravel parking area and outdoor storage facility. It would also include a septic drain-field appropriately sized for the O&M facilities and soil conditions. The O&M facilities would be enclosed by an 8-foot-tall chain-link fence with three-strand barbed wire on top, and lit with five exterior lights that would be down-shielded.

Short-term disturbance to construct the O&M facilities would be 26 acres, which includes the building, parking, storage, and septic drain-field and associated access road. Once built, long-term disturbance would be 2.2 acres (about 0.01% of the Project Area).

Temporary Concrete Batch Plant

There would be a temporary on-site concrete batch plant located within the O&M facility footprint. The plant would generate an estimated 22,000 cubic yards (CY) of concrete needed for Project components to be prepared at the plant. The dimensions of the batch plant would be 300 × 435 feet (3 acres) and would form part of the O&M facility footprint, thus not causing additional disturbance beyond what is described above for the O&M facilities.

Temporary Laydown Areas

Two temporary laydown areas would be used for the Project. The primary laydown area would be part of the O&M facility footprint and would not cause additional ground disturbance beyond what is described above for the O&M facilities. The construction of the laydown area would occur prior to the installation and construction of the towers, substations, O&M facilities, and concrete batch plant. These areas would include construction parking as needed and permanent O&M parking.

A secondary laydown area would be located near the APS switchyard along Espee Road (see Figure 2.1d). This laydown area would measure up to 30 acres.

Material Source Pit

An existing off-site material source pit (the Red Lake Quarry) is anticipated to be used for Project material needs. The pit is located west of SR 64, approximately 18 miles north of Williams (see Figure 2.1b). The pit is 5 acres in size and would supply 250,000 CY of gravel for roads; 200,000 CY of gravel for crane pads; 30,000 CY of gravel for laydown, turbine staging, and O&M parking; and 16,000 CY of gravel for the substations. The pit is owned by QMAX, and was source-certified by the Arizona Department of Transportation (ADOT) in 2003.

2.2.3 Construction

Western's Standard Construction, Operation, and Maintenance Practices

Perrin Ranch Wind proposes to implement Western's standard construction, operation, and maintenance practices, where applicable, to avoid and minimize impacts to the environment to the extent practicable (Appendix B). These measures are part of Perrin Ranch Wind's proposed Project and Western's Proposed Action and are considered in this EA's impact analysis.

Additionally, all facilities would be constructed in accordance with the National Electrical Safety Code, U.S. Department of Labor Occupational Safety and Health Administration (OSHA) Standards, and Central's Power System Safety Manual for maximum safety and property protection.

Project Construction

The specific requirements of construction would involve the following major actions:

- improving existing public access roads to the Project Area;
- grading (turbine locations, roads, substations, switchyard, etc.);
- constructing laydown areas;
- excavating for tower foundations;
- erecting towers;
- installing rotors;
- installing underground cabling for connecting the individual wind turbines;
- installing an on-site feeder system for connecting wind turbine strings for delivery to the electricity collection/metering location;
- installing MET towers;
- constructing electrical substations;

- constructing the gen-tie line;
- constructing the O&M building;
- installing temporary concrete batch plant;
- inspecting facilities; and
- restoring and revegetating disturbed land when construction activities are completed.

Improvements to existing public access roads would consist of regrading and filling of the surface to allow access for all vehicles in inclement weather. No asphalt or other paving is anticipated. Turbine access roads would be constructed along turbine strings or arrays. These roads would be sited in consultation with the local landowner and completed in accordance with local building requirements where these roads intersect with public roads. Roads would be located to facilitate both construction (cranes) and continued operation and maintenance. Siting roads in areas with unstable soil would be avoided wherever possible. All roads would include appropriate drainage and culverts. The roads would be 34 feet wide and would be covered with road base designed to allow passage under inclement weather conditions. The roads would consist of graded dirt and would be covered with an aggregate surface. Once construction is completed, the roads would be regraded, filled, and dressed as needed.

The wind turbines' free-standing 262-foot tubular towers would be connected by anchor bolts to an underground concrete foundation. Geotechnical surveys, turbine tower load specifications, and cost considerations would dictate final design parameters of the foundations. Foundations for similar-sized turbines are generally octagonal, approximately 40 to 60 feet across at the base, and extend 7 to 10 feet below grade. The area is cleared with a bulldozer and/or road grader and excavated with a backhoe to prepare for each concrete foundation. Excess excavated material would be used for road construction or otherwise disposed of in accordance with all applicable regulations and permit conditions. An aluminum tube and bolt cage is installed and concrete is placed into the hole. Approximately 150 CY of concrete are needed for each turbine. Concrete spoil would be disposed of off-site by the contractor at a licensed waste facility. Once cured, the foundation would be complete and ready to receive the turbine tower. The wind turbine foundation design would be prepared by a registered professional engineer licensed to practice in the state of Arizona.

Typically the same lifting equipment would be used for tower erection and for nacelle and rotor installations. The cranes would operate in the planned 1.6-acre area around each turbine location and would move between tower locations on the roads constructed for the Project. Gravel and rock likely would need to be placed on the areas around the planned tower locations to support the weight of the crane, provide a level surface, and provide all-weather access in the areas that the crane would operate. Turbine towers would be anchor-bolted to concrete foundations. Towers for the Project would arrive on-site in segments (typically, segments would be no longer than 66 feet long) and would be welded/bolted together as the tower is erected. The nacelles would contain an already assembled drive train. The hub and blades would be installed on the nacelle. It is anticipated that household quantities of paints, lubricants, and grease would be used during installation.

Approximately 39 miles of underground collection lines would be installed as part of the Project. The collection line would consist of a cable buried in trenches at a depth of approximately 42 inches. Trenches are anticipated to be approximately 8feet wide and would generally follow access roads. Where shorter distances can be achieved via more direct paths, those routes would be implemented.

Trenches would be excavated using both a trencher and a backhoe. Disturbance associated with all buried collection lines would be limited to a construction easement corridor (34 feet wide) associated with each proposed linear disturbance. All trenches would be filled with compacted material, and associated disturbances would be reclaimed following burial of electrical cables. Where collection lines would cross features such as surface water drainages, horizontal directional drilling below the features would be used to avoid any impacts.

Foundations for the O&M building and any other on-site material storage buildings, if necessary, as well as pads for each electrical transformer, may be placed concurrent with tower foundation construction. On-site buildings would require only slab-on-grade foundations augmented by frost-resistant perimeter footings.

A temporary concrete batching plant would be constructed within the O&M facility construction footprint. The concrete components (aggregate, sand, and cement) would be hauled to the on-site batching plant. Electrical power for the batching plant would be provided through power received from the 21-kV backfeed line. Similar to the equipment laydown areas, surface vegetation would need to be removed, some regrading of surface soils might be required, and soils are expected to be heavily compacted as a result of batching plant activities, including associated truck traffic. The batching plant and any excess concrete constituents would be removed at the end of the concrete placing phase and may be recycled or otherwise used on other projects by the construction contractor.

The Project would be commissioned after completion of the construction phase. The Project would undergo detailed inspection and testing procedures prior to final turbine commissioning. Inspection and testing would occur for each component of the wind turbines, as well as the communication system, MET system, obstruction lighting, high-voltage collection and feeder system, and the SCADA system. Once construction activities are completed, temporary construction areas would be restored and revegetated.

Truck and Automobile Traffic

During construction, workers commuting to the Project Area and transporting materials and equipment would use Espee Road at SR 64. Access to Perrin Ranch in general would be maintained. Warning signs would be posted at the two existing sign-in kiosks, located at the entrances to the ranch. The signage would indicate the dates of construction activities. No restrictions to travel along SR 64 are anticipated.

All on-site construction personnel would receive an orientation detailing the on-site traffic rules such as emergency procedures, off-road travel restrictions and the penalties for doing such, and Project access routes (see Figures 2.1a–f). During construction, traffic would stay within designated construction areas and access roads.

Materials and equipment delivery vehicles would be directed to a single point of access exiting SR 64 at Espee Road, then directed to one of to the turbine locations or to one of the two temporary Project laydown areas. During construction, on-site speed would be restricted to 25 mph to control for safety and minimize fugitive dust; signage indicating speed would be provided as necessary throughout the Project. Violation of the speed limit would result in construction personnel warnings and possibly termination of site access privileges.

In general, the heavy equipment and materials needed for site access, site preparation, and foundation construction are typical of road construction projects and do not pose unique transportation considerations. The types of heavy equipment required would include bulldozers, graders, excavators, front-end loaders, compactors, and dump trucks. Typically, the equipment would be transported to the site by flatbed combination truck and most would remain on-site through the duration of construction activities. Typical construction materials hauled to the site would include gravel, rock, sand, and water, which are generally available locally. Ready-mix concrete might also be transported to the site, if available, but would likely be batched on-site.

The movement of equipment and materials to the site during construction would cause a relatively short-term increase in the traffic levels on local roadways during the construction period. Additionally, the delivery of the erection cranes and wind turbine generators could affect traffic temporarily due to the size of the crane and turbine tower components and blades. However, the delivery of the oversized equipment and wind turbine generator components would be intermittent and cause only temporary traffic delays. The majority of traffic to the Project site would occur during an approximately eight-week period during delivery of the turbines, the exact timing of which is to be determined. The turbine delivery company is required to prepare a transportation plan that, among other elements, would include a turbine delivery schedule; the plan would need to be submitted to, and approved by, ADOT (see “Transportation Planning” below).

Water would be used in the construction of the turbine tower and substation foundations and for dust control during construction. During construction, less than 60 acre-feet of water would be required as described above. Most of this water use would occur during the approximate five- to seven-month construction period. Minimal, if any, dust control is anticipated to be needed during the O&M phase of the Project.

Construction of Project facilities would occur simultaneously, using single vehicles for multiple tasks. The average number of daily vehicle trips to the site would vary, but would be on the order of 75 daily vehicle trips, while the number of vehicles actually working on-site would be on the order of 20. Also, Perrin Ranch Wind and its contractors would use water, as necessary, to control dust from traffic on the Project site roads located on private property. Snow removal equipment (pickup trucks equipped with wing-style blades) would be used as needed during winter.

TRANSPORTATION PLANNING

Turbine equipment would eventually be delivered, which would warrant a separate and more detailed transportation plan, the dates and schedule of which are yet to be determined. A detailed route transportation study for the Project would be provided by the turbine manufacturer once wind turbines are purchased. This study would include the following information:

- Project Description – This section would include the site location, number of turbines, general terrain, and other conditions, based on information in this EA.
- Purpose of Report – The turbine transport company (as contracted by the turbine manufacturer) would identify all relevant permit requirements that may be required to permit the transport of the units to the Project site.
- Equipment – This section would provide a detailed description of the transportation equipment planned for use in delivering the turbine components to the Project site. Typically the section includes a figure with overall dimensions for the nacelle, tower top, tower base, tower mid, and tower blade transports. It also includes information on turning radius requirements and axle loading of each oversized transport vehicle.
- Route Study – This section would provide a detailed description of each route proposed for the various components, including the starting location and list of roads/highways/etc. that are considered the best route option. This study would include a check on clearance of bridges and power lines. Note that each type of component is likely to have a different starting location (i.e., a factory, port, or rail location).
- Points of Note – This section would summarize any areas of general concern for each of the transports. These concerns can range from road radius or structural limitations to overhead wire clearance to traffic curfews. Any restrictions would also be detailed in this section with proposed work around plans.

- Required Improvements and Actions – This section summarizes those areas that need to be addressed prior to delivery.
- Photographs – The study would provide photographs showing the various roads, with emphasis on areas needing improvement or areas of concern.

Workforce

Construction of the Project would require a minimum of 50 to 70 construction employees, with a maximum of 200, and would last approximately five to seven months. Construction crews would likely work 8- to 12-hour work days, six days per week, depending on the weather. The Project team would consist of qualified contractors and subcontractors who employ trained and competent personnel. All contractors, subcontractors, and their personnel are required to comply with all state and federal worker safety requirements, specifically all of the applicable requirements of OSHA. Each contractor would be required to provide a site-specific health and safety plan as required by OSHA. In addition, due to the multiple employers that would have employees on-site, safety would be coordinated on a Project-wide basis through activity-specific hazard assessments and job safety assessments.

Estimated Project Schedule

As previously discussed, construction of the Project would last five to seven months and is proposed to begin in July 2011, with completion estimated to be in December 2011. Following is a general discussion of the anticipated Project schedule. The specific dates of the beginning and end of each Project task are unknown and would depend, in part, on site conditions, weather, and delivery schedules.

Construction would begin with installation of civil improvements, including temporary laydown areas for turbine and tower deliveries, access roads, trenching for electrical cabling, turbine foundations, and crane pads for erection of the turbines. The second construction phase, in which some of the work would proceed in parallel with the civil works, includes installation of the electrical hardware (including cabling), construction of the switchyard, Project substation, O&M building, and erection of the turbines. The third and final construction phase includes mechanical completion of all turbines, substation and switchyard, and other facilities, followed by commissioning and testing of each turbine, utility interconnection, testing of the electrical system, and restoration of all temporary disturbance areas (as detailed in the Restoration and Reclamation Plan; see Appendix A). A bulleted list of these tasks follows:

- engineering work;
- construction mobilization;
- civil works commencement (roads, underground electrical, foundations);
- turbine deliveries;
- power transformer delivered;
- turbine deliveries completed;
- substation and switchyard completed; and
- turbine commissioning and testing.

2.2.4 Operation and Maintenance

Perrin Ranch Wind would be responsible for Project operation and maintenance for the 30-year life of the Project and would use NextEra Operating Services, Inc., at the time of operation, to assure timely and efficient operations. The operators estimate that nine full-time people would be employed during operation of the facility.

Perrin Ranch Wind estimates that there would be approximately eight vehicles on-site per day during operation. Perrin Ranch Wind and NextEra Operating Services, Inc., would control, monitor, operate, and maintain the Project by means of a SCADA computer software program. In addition to regularly scheduled on-site visits, the Project may be monitored via computer. Operation of the facility, including discrete settings for individual turbines, is managed by the centralized SCADA system.

The SCADA system offers access to wind turbine generation or production data, availability, MET, and communications data, as well as alarms and communication error information. Performance data and parameters for each machine (generator speed, wind speed, power output, etc.) can also be viewed, and machine status can be changed. There is also a “snapshot” facility that collects frames of operating data to aid in diagnostics and troubleshooting of problems. The primary functions of the SCADA system are to:

- monitor Project status;
- allow for autonomous turbine operation;
- alert operations personnel to Project conditions requiring resolution;
- provide a user/operator interface for controlling and monitoring wind turbines;
- collect meteorological performance data from turbines;
- monitor field communications;
- provide diagnostic capabilities of wind turbine performance for operators and maintenance personnel;
- collect wind turbine and Project material and labor resource information;
- provide information archive capabilities;
- provide inventory control capabilities; and
- provide information reporting on a regular basis.

Truck and Automobile Traffic

During routine O&M, traffic to and on the site would be limited and infrequent, and include eight four-wheel drive pickup trucks. As with construction, access to the Project Area would be maintained at all times with no anticipated closures. On-site personnel are expected to obey the existing posted speed limit of 35 mph.

All on-site personnel would receive an orientation detailing the on-site traffic rules such as emergency procedures, off-road travel restrictions and the penalties for doing such, and Project access routes (see Figures 2.2a–f).

Maintenance Schedule

Perrin Ranch Wind would remotely monitor the Project on a daily basis for the entire 30-year life of the Project. This would be accompanied by a visual inspection by the on-site operating staff. Several daily checks would be made in the first three months of commercial operation to see that the Project is operating within expected parameters.

Once installed, the Project service and maintenance is carefully planned and divided into the following intervals:

- first service inspection;
- semi-annual service inspection;
- annual service inspection;

- two years service inspection; and
- five years service inspection.

First Service Inspection. The first service inspection would take place one to three months after the turbines have been commissioned. At this inspection, particular attention is paid to tightening all bolts, a full greasing, and filtering of gear oil.

Semi-annual Service Inspection. Regular service inspections commence six months after the first inspection. The semi-annual inspection consists of lubrication and a safety test of the turbines.

Annual Service Inspection. The annual service inspection consists of a semi-annual inspection plus a full component check. Bolts are checked with a torque wrench. If any bolts are found to be loose, all bolts in that assembly are tightened and the event is logged.

Two Years Service Inspection. The two years service inspection consists of the annual inspection, plus checking and tightening of terminal connectors.

Five Years Service Inspection. The five years inspection consists of the annual inspection, an extensive inspection of the wind braking system, checking and testing of oil and grease, balance check, and tightness of terminal connectors.

General Maintenance Duties

O&M field duties include performing all scheduled and unscheduled maintenance, including periodic operational checks and tests, regular preventive maintenance on all turbines, related plant facilities and equipment, safety systems, controls, instruments, and machinery for the entire 30-year life of the Project, including:

- conducting maintenance on the wind turbines and on the mechanical, electrical power, and communications system;
- performing all routine inspections;
- maintaining all oil levels and changing oil filters;
- conducting maintenance of the control systems, all Project structures, access roads, drainage systems, and other facilities necessary for the operation;
- conducting maintenance of all O&M field maintenance manuals, service bulletins, revisions, and documentation for the Project;
- conducting maintenance of all parts, price lists, and computer software;
- conducting maintenance and operation of the Project substation;
- providing all labor, services, consumables, and parts required to perform scheduled and unscheduled maintenance on the Project, including repairs and replacement of parts and removal of failed parts;
- cooperating with avian and other wildlife studies as may be required, to include reporting and monitoring;
- managing lubricants, solvents, and fuels as required by local and/or state regulations;
- maintaining appropriate levels of spare parts in order to maintain equipment;
- ordering and maintaining spare parts inventory;
- providing all necessary equipment, including industrial cranes for removal and reinstallation of turbines;

- hiring, training, and supervising a workforce necessary to meet the general maintenance requirements; and
- implementing appropriate security methods.

Water Use

Water would be used to clean wind turbine rotor blades. The purpose of blade cleaning is to eliminate dust and insect buildup, which otherwise deforms the shape of the airfoil and degrades performance. Water would also be used for dust abatement, washing down equipment, concrete batching, etc. Water would be purchased from established local retailers and delivery services with existing water sources and trucked to the site. Potable water for drinking for operations staff would be supplied by bottled water purchased from local retailers.

It is estimated that 20,000 to 24,000 gallons of water per year would be used at the facility.

Hazardous Materials

Hazardous materials are not anticipated to be used or stored on-site with the exception of chemical constituents contained in fuels (gasoline and diesel fuel), coolants (ethylene glycol), and lubricants (oils and greases). Fuels would be stored at the O&M building and at each substation in aboveground dual-containment tank equipped with a leak detection system. At the O&M site, 1,000 gallons of propane and 500 gallons of diesel would be stored. Each of the three substations would contain one propane tank, typically 1,000 gallons, resulting in a total Project storage of 4,000 gallons of propane.

The types of petroleum products used include hydraulic oil, gearbox oil, grease, and transformer/mineral oil. The majority of oil storage above 55 gallons would be contained at the Project substation within the substation's main transformer, the pad mount transformers located at the base of each turbine, and in the turbine gearboxes. The substation transformer could contain up to a maximum of 8,190 gallons of mineral oil used as an internal coolant. Storage of hydraulic and gearbox oil, grease, and transformer oil would include concrete curbing and a concrete floor with all joints sealed, providing containment for the oil in the transformer and freeboard (the vertical height of an oil boom above the water line) for a 25-year, 24-hour rainfall event. The pad mount transformers would also store mineral oil with a capacity of 633 gallons each. If a small spill occurs, the spill would likely be contained in the gravel/rock base of the turbine. Absorbents maintained on-site would be available to stop or retard the flow of the discharge. In the event of a larger spill, an appropriate response contractor would be notified to provide cleanup. Small volumes (less than 55 gallons per container) of new and used oil and hydraulic fluids would be stored for short periods of time at the O&M building for any necessary use on on-site equipment. Used oil would be stored in 55-gallon containers on spill containment pallets. If the pallets become full, a licensed vendor would be called to remove and transport the oil to a licensed recycling facility.

Only non-hazardous solvents would be used to clean the turbines. In the rare event that a turbine tower is washed (i.e., a significant amount of gearbox oil running down the side), a biodegradable detergent and/or bioremediation would be used. Washing would only occur on a low-wind day and water would be collected by attaching a collar around the turbine tower that would gather the water into a container for subsequent disposal.

Perrin Ranch Wind and its contractors would comply with all applicable hazard communication and hazardous materials laws and regulations regarding these chemicals and would implement a Spill Prevention, Control, and Countermeasure Plan (SPCC Plan) as necessary. In addition, Perrin Ranch Wind would comply with all applicable federal and state regulations regarding notices to federal and local emergency response authorities and development of applicable emergency response plans, if required.

To mitigate impacts from leaks of hazardous materials during on-site storage, materials storage, and dispensing areas, any fuels, coolants, or lubricants storage would be equipped with secondary containment features in accordance with all applicable laws and regulations and appropriate engineering practice. BMPs would be used during the duration of the Project. Vehicle refueling and minor maintenance would only be performed by trained and qualified personnel. All vehicle refueling and minor maintenance would be conducted away from surface water features and drainage areas, such as washes, arroyos, or ditches.

Any Project wastewater would be disposed of in accordance with federal, state, and county regulations.

2.2.5 Construction Waste Management

Debris associated with construction may include packaging material, crates, reels, and parts wrapping. This debris may also include excess excavated soil, waste concrete, and removed vegetation. Materials with salvage value would be removed from the Project Area for reuse. Excavated spoils would be backfilled within the area of permanent disturbance and restored in compliance with applicable guidelines. If necessary, solid waste, including topsoil, waste concrete, or other excavated materials not otherwise disposed of would be temporarily stored within the corridor or within the temporary construction easements, and then transported to appropriate disposal facilities in accordance with federal, state, and local regulations.

2.2.6 Restoration/Reclamation and Abandonment

Following construction, areas not maintained as permanent facilities would be reclaimed for their prior land use. Reclamation would initially consist of grading to replace the approximate original contour and drainage of disturbed areas. Grading would include removal of any temporary crossing or drainage control structures. If necessary, solid waste, including topsoil, waste concrete, or other excavated materials not otherwise disposed of that have been temporarily stored within the corridor or within the temporary construction easements, would be used for reclamation of the Project, where appropriate. Following grading, salvaged topsoil would be spread and blended with adjacent areas to provide a growth medium for vegetation. Soil that has been compacted by equipment operation would be tilled to alleviate compaction and prepare a seed bed. Where natural regrowth of vegetation is not anticipated, disturbed areas would be reseeded with regionally native species, as specified under the SWPP Plan’s soil stabilization (which may included reseeding) under the National Pollutant Discharge Elimination System/Arizona Pollutant Discharge Elimination System (NPDES/AZPDES). Detailed methods for restoration activities and management of noxious weeds would be detailed in the Project-specific restoration plan and weed management plan, respectively.

If the Project is not retrofitted, at the end of the Project’s estimated 30-year life, Perrin Ranch Wind would obtain any necessary authorization from the appropriate regulatory agency or landowners to abandon the Project and would again apply for a stormwater management permit to cover demolition and removal of Project-related improvements. Turbines, towers, and transformers would be removed and recycled or disposed of at approved licensed facilities. Foundations would be abandoned in place to a depth of 4 feet below grade and backfilled with 4 feet of stockpiled material unless allowed to remain in place by the landowner. All private Project roads would be removed or, upon landowner request, revert to landowner control. Underground power and communication lines would be abandoned in place; overhead power lines and poles would be removed. Reclamation procedures would be similar to reclamation measures used to permanently stabilize temporarily disturbed soils and would be based on site-specific requirements and techniques commonly employed at the time. This EA does not address the potential that the Project could be re-powered (i.e., new or refurbished turbines could be installed after the life of the Project).

2.2.7 Applicant-committed Best Management Practices and Conservation Measures

Facility Commitments

- Existing roads, such as Espee Road, would be used as much as possible to reduce the need for additional disturbance.
- Tubular conical steel turbine towers do not provide locations for raptors to perch, which decreases the risk of collisions with turbine blades.
- An underground collection system reduces the visual impact of overhead transmission and the potential impact to avian and bat species from collisions.
- Turbines would be set back from SR 64 at least 3 miles and at least 1.5 miles from any residence.
- Although not currently approved by the FAA, a radar-activated lighting system (OCAS) would be installed on the turbine towers but would not be activated until approved by the FAA.

Construction, Operation, and Decommissioning Commitments

- Construction vehicle movement within the Project boundary would not travel cross-country and would be restricted to construction right-of-way (ROW) corridors.
- During construction, a maximum speed limit of 25 mph on all Project roads would be enforced for all employees and contractors of Perrin Ranch Wind.
- At least one lane of all access roads used by residents, recreationists, and emergency vehicles would be maintained during construction.
- An environmental monitor would be assigned to the Project by the engineering, procurement, and construction contractor during construction to ensure compliance with all Project authorizations, permits, approvals, and mitigation commitments.
- In construction areas where ground disturbance is unavoidable, surface restoration would consist of recontouring and reseeding based on the Project-specific restoration plan.
- Crews would use silt fencing, straw bales, and ditch blocks during construction activities in areas where runoff would have the potential of entering any drainage, wet or dry, to further minimize erosion.
- Security lighting for Project facilities and equipment would be down-shielded to keep light within the boundaries of the Project Area. This would minimize attracting night-migrating birds to the substation or turbine locations during inclement weather conditions, as well as potential impacts to dark skies.
- For all excavations, crews would be instructed to minimize the period of time that a trench or hole is open; however, in some cases excavations would be left open overnight or for several days in the case of turbine foundations. For all excavations left overnight, measures would be put in place to prevent injury to wildlife. Those measures include either covering holes or installing temporary visible barriers around trenches and holes. All turbine foundations would also have ramps that would allow animals to climb out.

- Roads would be watered during construction to minimize dust.
- Signs would be installed where construction vehicles frequently enter or exit SR 64. Signs would be installed in consultation with ADOT.

Resource Conservation Measures

- The Cultural Resources Monitoring and Discovery Plan describes procedures to follow in accordance with state and federal laws if archaeological materials or human remains are discovered. Adherence to this plan would protect cultural resources that are discovered, assist construction personnel in complying with applicable laws, and expedite a response in the event of discovery.
- Per the Monitoring and Discovery Plan (Barr and Hesse 2011), all eligible[2] sites would be avoided by and protected from ground-disturbing activities in undisturbed areas such as roads. Project-related ground-disturbing activities within 50 feet of a site would be monitored by an Arizona-permitted archaeologist to protect sites from inadvertent impacts. These measures are presented in the Monitoring and Discovery Plan.
- A worker education awareness program providing instruction on avoiding harassment and disturbance of wildlife, especially during reproductive (e.g., courtship, nesting) seasons, would be provided to all construction employees prior to ground-breaking activities. This training would also be provided to new personnel and new contractors that come on after ground breaking.
- The Avian and Bat Protection Plan (ABPP) (SWCA Environmental Consultants [SWCA] 2011) describes initial mitigation requirements, post-construction monitoring requirements, and an adaptive mitigation strategy. The plan uses a tiered approach that would result in different levels of mitigation being implemented based on the findings of post-construction monitoring.
- Per the ABPP, a biological monitor would be on-site during construction to enforce adherence to stipulations and guidelines from the ABPP, the EA, and other related permits and documents.
- Facilities would be designed to discourage their use as perching or for nesting by birds. For example, power lines and poles would be configured to Avian Power Line Interaction Committee (APLIC) standards (APLIC 2006) to minimize raptor electrocutions and discourage raptor and raven nesting and perching.
- Aboveground power lines would be outfitted with bird deterrents to reduce the potential impact from collisions.
- If construction is planned during typical avian breeding season (between March 15 and June 30) avoidance measures would be implemented. Construction activities would avoid active raptor nests by 0.25 mile and active non-raptor nests by 100 feet until birds have fledged the nest.
- Measures for reducing the spread and establishment of noxious and invasive weeds would be provided in a Project-specific Weed Management Plan. The plan would 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 mulching would be required. Trucks and construction equipment (including mobile office trailers, etc.) arriving from other locations would

[2] Eligibility for registering a historic site is conducted under Section 106 of the National Historic Preservation Act. For a property to be eligible for the National Register of Historic Places , it must meet at least one of the four main criteria: **Criterion A – Event** involves the property making a contribution to the major pattern of American History; **Criterion B – Person** is associated with significant people of the American past; **Criterion C – Design/Construction** concerns the distinctive characteristics of the building by its architecture and construction; and **Criterion D – Informational Potential** is satisfied if the property has yielded information important to prehistory or history.

have a controlled inspection, and a cleaning area would be established to visually inspect equipment arriving at the Project Area and to remove and contain seeds that may be adhering to tires and other equipment surfaces.

- All notice and salvage requirements of the Arizona Native Plant Law (Arizona Revised Statutes 5 3-901 et seq.) would be followed, and the destruction of native plants would be minimized to the extent feasible during construction.

2.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, Western would not approve an interconnection agreement with Perrin Ranch Wind and for the Project to be constructed; Perrin Ranch Wind would have to access or install another transmission system. In effect, the proposed Project wind energy facility would not be constructed. For the purposes of this EA, which discusses the potential impacts of Western's decision, the No Action Alternative is considered to result in the Project not being constructed and the environmental impacts associated with the Project not occurring.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER CONSIDERATION

Prior to submitting the interconnection request, NextEra Energy considered multiple factors in the evaluation of potential Project sites, most important being the presence of a commercially viable wind resource and access to transmission with available capacity. Finally, APS expressed a preference for a Project in this area, further limiting site locations.

The DOE's loan guarantee program (LGP) was considered as a funding option for the Project prior to submitting the interconnection request. Title XVII of the Energy Policy Act of 2005 established the DOE's LGP for innovative energy projects that should decrease air pollutants or greenhouse gases and that have a reasonable prospect of repayment. Perrin Ranch Wind did not pursue the application process for the LGP.

2.4.1 Other Locations

Public meetings were held for the Coconino County CUP process in the fall of 2010. Through the public process, two alternative locations were presented: 1) placing the site in Sedona, Arizona, and 2) placing the site in undefined disturbed areas of northern Arizona. As stated above, Perrin Ranch Wind evaluated multiple factors for site placement and Perrin Ranch met all the necessary criteria, which included the presence of wind, existing power transmission lines, and suitable access. Available transmission that would meet PPA requirements is not available in Sedona and other disturbed sites identified by Perrin Ranch Wind. Additionally, available land and a commercially viable wind resource have not been identified in those areas. Therefore, these areas were eliminated from further consideration.

However, through the CUP process it was determined that turbines should be no closer than 1.5 miles to the nearest occupied structure (i.e., residence). The northern Project boundary was moved 1 mile south from its original location, resulting in the adjustment of 12 turbines to ensure the closest turbine was approximately 2 miles from any occupied structure.

2.4.2 Adjustments at This Location

Additionally, turbine layout has been screened and changed over the course of Project design to minimize environmental impacts. Perrin Ranch Wind used an environmental screening process (Preliminary Site Screening [PSS] analysis) to guide Project design. The PSS describes the biological resources present within and surrounding the proposed Project and identifies biologically sensitive areas to avoid for Project design. Further, a comprehensive cultural resources survey of the proposed Project components was conducted in 2010 and 2011 (Barr et al. 2011) and, along with the PSS, helped to identify environmentally sensitive areas to guide the Project footprint and layout.

Alternate locations for the Project substation, step-up substation, and an alternative alignment for the gen-tie transmission line were also considered during the Arizona Corporation Commission (ACC) Certificate of Environmental Compatibility process; however, the alternate locations (called “Option 2” during that process) did not depart measurably from the current Proposed Action. These alternate locations are described below:

- The potential Project substation location would be in the northwest quarter of Section 35, located to the south of Espee Road.
- The step-up substation would be located in one of two locations in the southeast quarter of Section 31, adjacent to the existing Moenkopi-Yavapai 500-kV transmission line.
- The potential gen-tie route would originate respectively at Project substation Option 2 and Project substation Location 2 and terminate respectively at step-up substation Option 2.

Through the ACC process, the siting committee selected Option 1, the Proposed Action, and therefore Option 2 was eliminated from further consideration.

Chapter 3

ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

This chapter describes the affected environment and anticipated environmental consequences (impacts) of the Proposed Action and No Action Alternative. The area of analysis includes the roughly 39,833-acre Perrin Ranch, referred to as the Project Area (see Figure 1.1). Environmental impacts are considered in terms of construction, as well as operation and maintenance. Impacts are described according to type (beneficial, adverse, direct, and/or indirect), context, duration (short- or long-term, or cumulative), and intensity. Each of these types of impacts is briefly defined below. The means by which potential adverse impacts would be reduced or mitigated to non-significance are described in Section 2.2.7, Applicant-committed Best Management Practices and Conservation Measures. A discussion of "significance" is provided following impact type definitions. Cumulative impacts are also discussed in detail.

Definitions for type, context, duration, and intensity are defined as follows.

- **Type** describes the classification of the impact as either beneficial or adverse, direct or indirect:
    - *Beneficial*: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.
    - *Adverse*: A change that moves the resource away from a desired condition or detracts from its appearance or condition.
    - *Direct*: An effect that is caused by an action and occurs at the same time and place.
    - *Indirect*: An effect that is caused by an action but occurs later in time or is farther removed in distance, but is still reasonably foreseeable.
- **Context** describes the area or location in which the impact would occur. Are the impacts site-specific, local, regional, or even broader?
    - *Site-specific* impacts would occur at Perrin Ranch.
    - *Local* impacts would occur directly adjacent to the Perrin Ranch (e.g., at a nearby residence).
    - *Regional* impacts would occur within Coconino County.
- **Duration** describes the length of time an effect would occur, either short or long term:
    - *Short-term* impacts generally last only during construction, and the resources resume their pre-construction conditions following construction.
    - *Long-term* impacts last beyond the construction period, and the resources may not recover to their pre-construction conditions for a longer period of time following construction.
- **Intensity** describes the degree, level, or strength of an impact. For this analysis, intensity has been categorized into negligible, minor, moderate, and major (see below).
    - Impacts are considered *negligible* if Project-related impacts would occur, but no obvious changes in baseline conditions would occur.
    - Impacts are considered *minor* if Project-related impacts would occur, but resources would retain existing character and overall baseline conditions.

  - Impacts are considered *moderate* if Project-related impacts would occur, and resources would partially retain existing character. Some baseline conditions would remain unchanged.
  - Impacts are considered *major* if Project-related impacts would occur that would create a high degree of change within the existing resource character and overall condition of resources.
- **Cumulative impacts** are additive impacts to a resource by the Project to impacts from other actions in the Project Area (see Section 3.1.1).

Significance has a very particular meaning when used in a NEPA document. Significance is defined by the CEQ (40 CFR 1508.27) as a measure of the *context* and *intensity* of the impacts of a federal action, or the importance of that action, to the human environment. Use of the term “significant” when referring to resource impacts indicates that the intensity for impacts has reached some threshold, usually a “major” impact as defined above. Significance varies with the setting of the Proposed Action. For instance, in the case of a site-specific action like the Perrin Ranch Project, significance would depend on the effects in the locale (see “context” as described above) rather than in the world as a whole. Additionally, both short- and long-term effects are relevant. Finally, significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment.

3.1.1 Cumulative Impacts

The CEQ regulations for implementing NEPA define *cumulative impacts* as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR 1508.7).

The purpose of the cumulative impacts analysis is to ensure that decision-makers consider the full range of the consequences of the Proposed Action and the No Action Alternative. Assessing the cumulative impacts of the actions begins early in the NEPA process during the identification of issues. If the actions under each alternative have no direct or indirect effect on a resource, then the cumulative impacts on that resource are not addressed.

Appendix C provides a list of past, present, and reasonably foreseeable future actions that have been taken into consideration in developing the cumulative impacts analysis for each resource

A geographic scope for each resource is specified for analyzing cumulative impacts. The geographic scope is generally based on the natural boundaries of the resource affected, rather than jurisdictional boundaries. The geographic scope may be different for each cumulative impacts issue and each resource. The geographic scope of cumulative impacts would often extend beyond the scope of the direct impacts, but not beyond the scope of the combined direct and indirect impacts of the Proposed Action. In addition to a geographic scope, a time frame for analyzing cumulative impacts has been established for this EA and is described below.

For the purpose of this analysis, long-term cumulative impacts are those that would substantially remain for five or more years or for the life of the Project. Short-term cumulative impacts result in changes to the environment that are stabilized or mitigated in less than five years and without long-term impacts.

In the following resource discussions, cumulative impacts are presented with each resource analysis for clarity, as opposed to a standalone section at the end of Chapter 3. For clarity, the cumulative impacts are discussed with each resource; the cumulative impacts analysis considers the impacts of past, present, reasonably foreseeable actions (see Appendix C), along with the impacts of the Proposed Action and the interaction of the combined impacts.

3.2 RESOURCES AREAS DISMISSED FROM FURTHER CONSIDERATION

Western provided the consultant with technical direction, advice, and example criteria to evaluate various resources and whether they would be considered or dismissed from detailed analysis. Criteria evaluated included 1) whether a resource would either not be affected or would sustain negligible impacts from the Project and thus does not distinguish between the alternatives or 2) are beyond the agency's control. In all cases for this Project, resource areas were dismissed because the resource would either not be affected or would sustain negligible impacts from the Project. Resource areas dismissed from further analysis include climate and air quality, cultural resources, environmental justice, geology and soils, hazardous materials, human health and safety, intentional destructive acts, land use, and recreation. Therefore, these resource areas are briefly discussed in this section and rationale is provided as to why the resource would not be affected or would sustain negligible impacts.

Climate and Air Quality: Climate would not be affected by construction or operation of the Proposed Action, nor is the Project expected to change climate.

In terms of air quality, the U.S. Environmental Protection Agency (EPA) designates communities that do not meet National Ambient Air Quality Standards (NAAQS), over a period of time, as "non-attainment areas;" the Project would not be located in a non-attainment area.

Construction of the Project has the potential to result in short-term increases in fugitive dust and particulate matter in the Project Area from ground-disturbing activities, as well as tail pipe emissions from construction vehicle traffic. As discussed in Chapter 2 (see the Proposed Action), traffic during construction would include vehicles used to transport construction workers, materials, and equipment to the site. The average number of daily vehicle trips to the site would vary, but would not exceed 75 vehicles per day, while the number of vehicles actually working on-site would be closer to 20. During operation, traffic to and on the site during operation and maintenance would be limited and include up to eight vehicles on-site per day during routine operation and maintenance. Increases in particulates could result from dust from excavation, as well as vehicle traffic traveling on unpaved roads. These increases are not anticipated to exceed any state or federal air quality standards. Thus, short-term adverse impacts to local air quality would result during construction; however, these are expected to be negligible. No other direct or indirect impacts are anticipated.

Operation and maintenance of the Project are not expected to result in ground disturbance or increases in traffic; thus, no changes in air quality are expected as a result of operation and/or maintenance.

Cultural Resources: In accordance with 36 CFR 800, Western consulted with the Arizona State Historic Preservation Officer (SHPO) and interested Native American tribes to determine the scope of the identification efforts, including defining the area of potential effects (APE), which is the geographic area in which an undertaking may indirectly or directly cause alterations to historic properties. The APE for this undertaking, as proposed by Western, is the total short-term disturbance area (647.9 acres) and represents the maximum expected disturbance during construction (see Table 2.1; see Figures 2.1a–f). Of the 647.9 acres, 225.4 acres would be the final footprint of the Project (the long-term disturbances) (see Table 2.2; see Figures 2.2a–f).

The proposed Project was subjected to multiple survey efforts resulting from Project modifications and the desire to avoid impacts to cultural resources. These surveys occurred episodically from October 2010 to February 2011. The resulting reports are titled *Archaeological Survey for the Proposed Perrin Ranch Wind Facility near Williams, Coconino County, Arizona* (Barr et al. 2011) and *Archaeological Survey of 96 Acres: An Addendum to the Archaeological Survey for the Proposed Perrin Ranch Wind Facility near Williams, Coconino County, Arizona* (West and Barr 2011). The studies included background research and a pedestrian survey with a 49-foot transect interval and a site definition from the Arizona State Museum (ASM). In addition, an avoidance and unanticipated discovery plan titled *Cultural Resources Avoidance and Unanticipated Discoveries Plan for the Perrin Ranch Wind Facility Project near Williams, Coconino County, Arizona* (Barr and Hesse 2011) was prepared.

Cultural resources surveys resulted in the documentation of 412 cultural properties, of which 75 properties were assigned ASM site numbers and 337 were designated as isolated occurrences (IOs). Table C-1, Summary of Project Results and NRHP-Eligibility Determinations (Appendix D) summarizes the resources and their status in terms of the National Register of Historic Places (NRHP) eligibility criteria. None of the properties had been previously evaluated. The IOs and 16 of the sites are determined not eligible for inclusion in the NRHP. Fifty-nine properties are determined eligible for inclusion in the NRHP. Sixty-nine of the properties assigned site numbers reflect use of the Project Area by Native American groups. Five properties date to the late Historic period and reflect use of the Project Area by Euro-Americans. The temporal and cultural affiliation of one property is indeterminate.

Of the 75 properties assigned site numbers, only 20 occur within the Project APE for ground-disturbing activities. However, Western made determinations on all identified resources so that the applicant could respond quickly in the event of a discovery situation involving unanticipated impacts.

Western would ensure that the applicant avoids conducting Project-related, ground-disturbing activities (construction) within NRHP-eligible properties with one possible exception. Although the applicant currently intends to avoid AZ H:12:56(ASM), an NRHP-eligible Cohonina artifact scatter, any Project activities within this site’s boundary would be restricted to driving rubber-tired vehicles on an existing dirt access road. Furthermore, road improvements, such as blading or grading, would not occur within this site’s boundaries. Artifacts or features are not evident on the road surface.

During construction, the applicant plans to avoid as many properties as possible, including NRHP-ineligible ones. The Project avoidance plan describes the avoidance and monitoring strategy, worker education program, and unanticipated discovery procedures (Barr and Hesse 2011) to be employed during construction and maintenance. The IOs and AZ H:12:75(ASM), which is a Euro-American historic period fence, are NRHP-ineligible properties that may not be avoided, and no further preservation treatment is planned for them.

Operation and maintenance activities would have no impact on cultural resources, as discussed above. In summary, no impacts to cultural resources from construction or operation and maintenance are expected if the Project is implemented.

Environmental Justice: Using the same 10-mile Study Area used for the socioeconomics analysis (see Section 3.4), proposed Project impacts were evaluated in accordance with Executive Order 12898 (Federal Actions Address Environmental Justice in Minority Populations and Low-Income Populations), using EPA thresholds for environmental justice (ethnicity and poverty) (Table 3.1). Information for Arizona is presented for comparison. Census Bureau data from the 2005–2009 American Community Survey (U.S. Census Bureau 2009a, 2009b, 2009c) is used in Table 3.2-1 to determine presence or absence of these populations.

Table 3.1. Environmental Justice Information for the Study Area

Geography	Minority Population (% non-white)	Low-income Population (% individuals below poverty level)	Environmental Justice Community (Yes/No)
Williams, Arizona	28.8	17.0	No
Coconino County	39.2	17.4	No
Arizona	22.4	14.7	No

Source: U.S. Census Bureau (2009a, 2009b, 2009c).

Executive Order 12898 (February 11, 1994) and its accompanying memorandum have the primary purpose of ensuring that "each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on ***minority*** populations and ***low-income*** populations."

Minority or low-income communities that may be addressed in the scope of NEPA analysis are generally considered an environmental justice community if 1) a population is Black/African American, Hispanic, Asian and Pacific Islander, American Indian, Eskimo, Aleut, and other non-white persons ***and*** 2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

A population is considered low income if it is living below the poverty level. A low-income population exists where either 1) the low-income population of the affected area exceeds 50% ***or*** 2) the low-income population percentage of the affected area is meaningfully greater than the low-income population percentage in the general population or other appropriate unit of geographic analysis.

Using the criteria above for minority or low-income populations, no environmental justice communities are located in the Study Area. Thus, there would be no impacts to environmental justice from the Proposed Action.

Geology and Soils: Alteration of geological process and features is not proposed in any of the alternatives, thus construction and operation of the Project would not directly or indirectly affect local geology and geologic events. Direct impacts to topography would include temporary or permanent changes in the land surface due to ground-disturbing activities during construction, such as cut-and-fill activities required to excavate foundations and build roads. Of the 39,833-acre Project Area, the maximum surface disturbance would be 647.9 acres, or 1.63% of the Project Area.

Indirect impacts to soils within the Project Area are not anticipated if proper BMPs and a Stormwater Pollution Prevention Plan (SWPPP) are implemented to avoid potential damage from soil erosion. Once construction and reclamation efforts are completed, operation of the Project would not directly or indirectly affect soil resources. Thus impacts are expected to be negligible.

Hazardous Materials: Construction and operation of the Project would not include the use of hazardous materials with the exception of chemical constituents contained in fuels (gasoline and diesel fuel), coolants (ethylene glycol), and lubricants (oils and greases), which would be stored at the O&M facilities (see Figures 2.1d and 2.2c). Perrin Ranch Wind and its contractors would comply with all applicable hazard communication and hazardous materials laws and regulations regarding these chemicals and would implement an SPCC Plan as necessary. In addition, Perrin Ranch Wind would comply with all applicable federal and state regulations regarding notices to federal and local emergency response authorities and development of applicable emergency response plans, if required. Thus no direct or indirect impacts from hazardous materials are anticipated.

Human Health and Safety: During construction and operation of the Project, impacts to human health and safety are not anticipated. Signage regarding safety would be posted around all towers, transformers, and other high-voltage facilities, as well as along roads. Signage would be in conformance with applicable federal and state and regulations. In accordance with requirements specified by the FAA, structures more than 200 feet tall must have aircraft warning lights. These lights would be installed on the nacelle prior to lifting the nacelle onto the turbine tower (see Chapter 2). This would serve to provide safety from potential aircraft hazards.

High winds, dense and dry vegetation, and lightning strikes on the turbines may combine to cause a potential fire hazard around the Project Area. Each turbine is fitted with a lightning protection system (arrestor) to minimize the fire risk. Fires can result if the protection system fails or is not properly installed; however, a properly installed lightning protection system would intercept the lightning and effectively and safely conduct it to the earth without risking physical destruction to the wind turbine.

Landowners around the Project Area and the Coconino County sheriff's department would be notified immediately of any fires. Provided that there is no danger to life or personal safety, all fires would be immediately extinguished by Perrin Ranch Wind personnel. As an added precaution, all operational vehicles and facilities within the Project Area would contain firefighting equipment. Additionally, the applicant is committed to providing funding to the local fire department to increase firefighting response capabilities.

Thus, while there are possible risks to human health and safety, the Project includes several protection measures designed to minimize these risks; as a result, direct or indirect impacts, if any, to human health and safety are expected to be negligible.

Intentional Destructive Acts: Construction of the Project, as with any energy infrastructure, could potentially be the target of terrorist attacks or sabotage. Workers could be injured or killed in the event of fire or explosion at the substation. Risk to the public from such events would be minimized by restricting public access to facilities such as the proposed substation and APS switchyard. Site facilities would be fenced and the site would be monitored. In addition, emergency response and site security plans would be prepared for each facility that could experience potential intentional destructive acts. Such plans would not be released for public review due to the sensitive nature of information contained within these plans. However, it is not anticipated that the Project would increase the risk of environmental impacts from intentional destructive acts. As a result, direct or indirect impacts, if any, from intentional destructive acts are expected to be negligible.

Land Use: Lands within the Project Area are a mix of private and state lands (see Figure 1.1). Land use within the Project Area is primarily undeveloped with uses such as ranching and rangeland, dispersed recreation, and utility transmission. Land use in the Project Area is regulated under two plans: the Red Lake Area Plan, a community-planning document, and the broader Coconino County Comprehensive Plan. The Red Lake Area Plan and Coconino County Comprehensive Plan allow for land uses such as the proposed Project under a CUP and guided by Policies 35 and 36 (Coconino County 2003).

Management objectives for ASLD land occurring within Coconino County are also discussed in the Coconino County Comprehensive Plan under the section of the plan that addresses "Landscapes and Open Space." The Red Lake Plan's Land Use Policies section includes management guidance for actions that may affect visitors traveling the SR 64 corridor en route to the Grand Canyon (Coconino County 1992). Project Area lands are zoned for agricultural, residential, general, and low-density residential uses.

Other land uses include transportation (roads) and utility corridors (the Moenkopi-Yavapai 500-kV transmission line and the AT&T Transcontinental Fiber-Optic Cable).

Construction and operation of the Project would not displace any residences or existing or planned utility, agricultural, or industrial facilities. The Project would be sited in the General (G) Zone under the Coconino County Comprehensive Plan, which is a rural land use designation for unincorporated areas of the county not specifically designated for any other zone classification. Within the G Zone, a public utility and public service substation and infrastructure are considered a conditional use and a CUP is required.

Perrin Ranch Wind applied for and received a CUP for the construction, operation, and maintenance of this Project (Resolution 2011-04, see Appendix E). Because use of lands in the Project Area have been approved for the proposed Perrin Ranch facility, land use conforms with area plans.

Recreation: The primary recreation opportunity in the Project Area is big game hunting. The Project Area is within Arizona Game and Fish Department (AGFD) Game Management Unit (GMU) 10. Between 2005 and 2009, hunter days in the 1.4-million-acre GMU ranged between a low of 5,100 in 2009 to 8,066 in 2006, with an average of 7,120 for the five-year period (Table 3.2) (AGFD 2010a). The hunting season at Perrin Ranch is between August and December; antelope hunting season is August and September, deer hunting season is October through December, and elk hunting season is September and November (AGFD 2010a).Turkey and mountain lion are also hunted in GMU 10 in the fall, though no months are provided.

Table 3.2. Hunter Days for Game Management Unit 10 between 2005 and 2009*

Year	Deer	Archery Deer	Mountain Lion	Archery Turkey	Elk	Antelope*	Total
2005	651	4,669	8	369	1,546	619	**7,862**
2006	678	5,018	2	219	1,610	539	**8,066**
2007	691	4,277	8	144	1,900	575	**7,595**
2008	683	3,109	11	150	1,790	535	**6,278**
2009	706	2,397	10	181	2,060	446	**5,800**

* Source: AGFD (2010a).

The AGFD, together with private landowners, administers a program called Adopt-A-Ranch, which allows public use of private land. Perrin Ranch Wind, the owners of the private land on which the Project would be constructed, participates in an Adopt-A-Ranch program with AGFD (AGFD 2009a). Under the Perrin Adopt-A-Ranch program, groups of interested members of the public (for example, sportsman groups, Boy Scouts, and four-wheeling clubs) have “adopted” the 39,833-acre ranch for the purpose of working directly with the landowner and AGFD to mitigate problems associated with public recreational access. There are multiple hunting groups that have volunteered to visit Perrin Ranch one or two times a year to perform regular maintenance, such as rebuilding fences, hanging gates, picking up litter, or helping with various ranch improvement projects (AGFD 2009a).

Under the Adopt-A-Ranch program, the Perrin Ranch owners allow limited vehicular access for hunting, camping, and other recreational activities, and provide informational kiosks at several locations within the Perrin Ranch. Permits are required for legal access and legal camping within the Perrin Adopt-A-Ranch. According to the ranch owner, an estimated 550 to 600 hunters per month visit Perrin Ranch during the hunting season between August and December (personal communication, Macauley, 2011).

There are five designated campsites on Perrin Ranch open to the public (Campsites 1–5) (see Figures 2.2a–f). Dispersed camping on the ranch is not allowed. In fact, according to the ranch owner, the campsites were designated and developed as a means to concentrate trash dumping on the ranch and for hunters to use (personal communication, Macauley, 2011). No permits are issued to use the campgrounds. Further, these campsites are not designated for a specific recreational experience, but rather for use by people hunting on Perrin Ranch. Access to these campsites occurs along routes proposed for use and improvement by the Project. Lands within the Project Area would remain open to hunting during construction and operation of the Project.

The Proposed Action does not include disturbances to the existing campgrounds; these designated camping areas are not located within short- or long-term disturbance areas and no closures are planned. Hunters and other recreationists, as well as wildlife sought by hunters, may be temporarily displaced during construction due to construction-related noise and traffic; however, wildlife are expected to return to the area once construction is complete, and hunters are expected to return once the wildlife does. The Project boundary of 39,833 acres (see Figure 1.1) represents 2.85% of GMU 10 and associated hunting and recreation opportunities within the GMU. The total Project disturbance of 647.9 acres (see Table 2.1) represents 0.05% of GMU 10.

In summary, Project-related impacts would occur, but no obvious changes in baseline conditions for recreation are expected. Thus, impacts to recreation are expected to be negligible.

3.3 RESOURCE AREAS CONSIDERED IN DETAIL

As discussed in Section 3.2, Western provided the consultant with technical direction, advice, and example criteria to evaluate various resources and whether they would be considered or dismissed from detailed analysis. Resource areas considered in detail were selected when construction, operation, and/or maintenance of the Project components might have an impact on these resources that was either minor, moderate, or major, and if mitigation did not reduce or eliminate these impacts. Significance criteria for each resource area are provided in each resource section; these thresholds were developed by Western for use in determining whether the impacts from the proposed Project would be significant.

3.3.1 Aesthetics and Visual Resources

This section provides an overview of the existing visual resources and a description of the changes to the landscape that would result from the construction and operation of both the interconnection and wind energy facility within the Project Area. The Study Area for visual resources is considered to be lands where potential impacts to the landscape from the Project may be discerned and includes the 39,833-acre Project Area plus lands extending out to 10 miles, which roughly marks the maximum distance from which an observer could distinguish turbines (Figure 3.1).

The Study Area for visual resources is a mixture of undeveloped, vacant ASLD land, private land owned by Perrin Ranch Wind, the U.S. Forest Service (USFS) land, and other private lands, and includes agricultural, low-density residential, and general zoning land use classifications. The Coconino County Comprehensive Plan does address visions, goals, and policies for landscapes and open space in the county. In general, the goal for landscapes and open space in Coconino County is to ensure the preservation of open space “for the purposes of preserving scenic viewsheds, preventing the fragmentation of open lands, preserving wildlife habitat, protecting watershed, providing buffers between developed areas, and protecting environmentally sensitive lands” (Coconino County 2003).

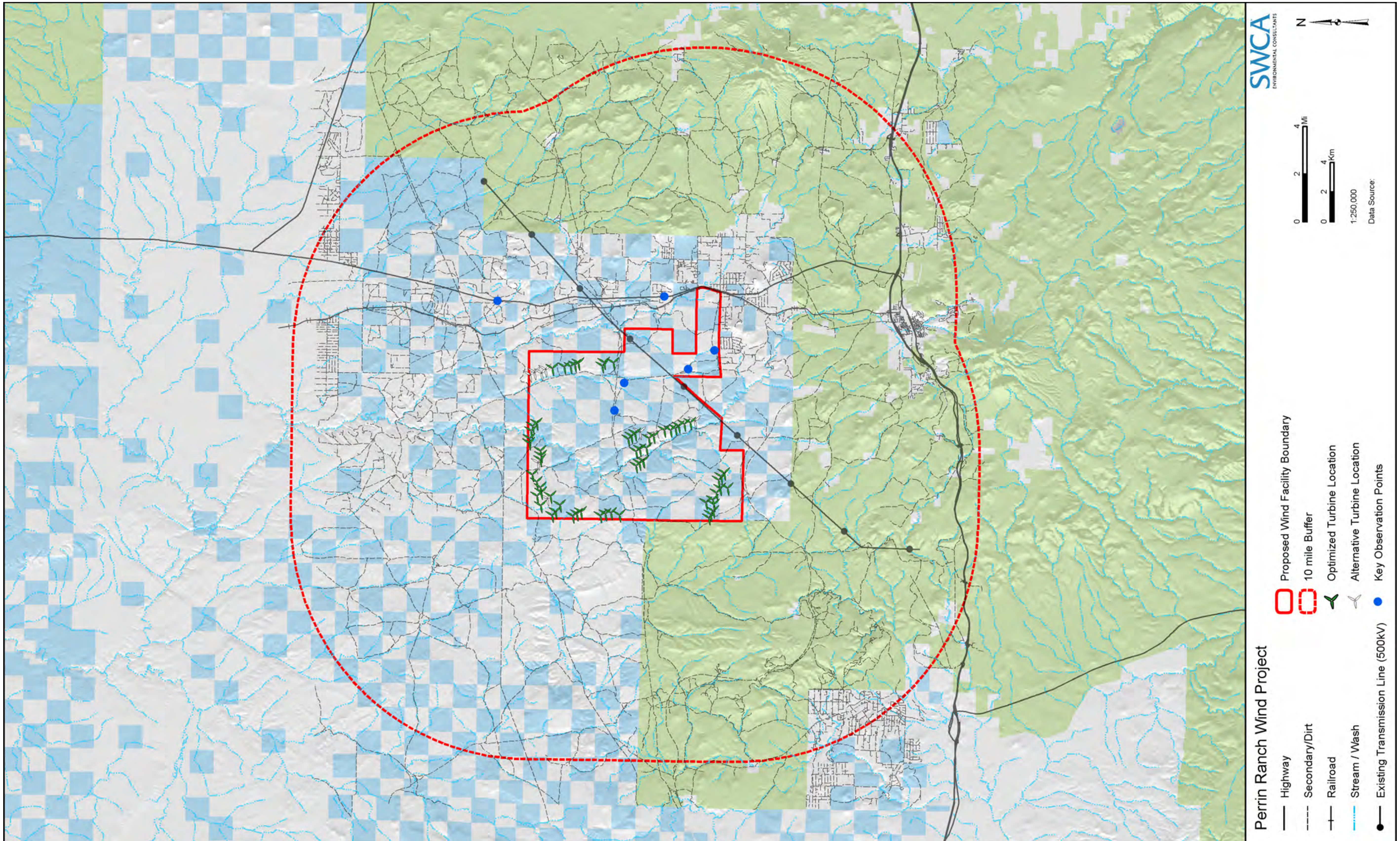

Figure 3.1. Visual resources Study Area and Key Observation Points.

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Affected Environment

Visual resources are the physical features of a landscape and consist of landform (topography and soils), vegetation, and human-made structures (roads, buildings, fences, and modifications of the land and vegetation). Landscape character is a combination of physical, biological, and cultural attributes that make each landscape identifiable or unique (USFS 1995).

The landscape of the Study Area is characterized by low-rising ridges and hills with taller mountainous peaks and ridges occurring in the distant background. Vegetation typical of this area of the Coconino Plateau includes large, open areas of light-colored perennial grasses, forbs, and shrubs interspersed with dense stands of darker green juniper (*Juniperus* spp.) and pine (*Pinus* spp.) trees (U.S. Geological Survey [USGS] 2004). Vegetation cover is continuous across a majority of the Study Area. Dirt roads, dispersed ranch developments, barbed wire fence lines, buried fiber optic lines, the Grand Canyon Railway, and the Moenkopi-Yavapai 500-kV transmission line have all contributed to modifications to the existing landscape. Espee Road, along with a number of other dirt surface graded and two-track roads, contribute smooth, light-colored, linear contrasts to the existing vegetation. The geometric shapes, lines, and metallic color of the 500-kV transmission line support structures are large and visible from many locations within the Study Area. Although the Study Area has been modified by the activities described above, overall, the setting remains largely undeveloped with few visible buildings and structures. In the background, the mountains that border the Study Area to the south and east increase the sense of a natural and undeveloped landscape.

Primary views of the Project Area are from travel routes, residential areas, and backcountry campsites within the Perrin Ranch. Many visitors through this area are traveling to the Grand Canyon National Park and other destinations in northern Arizona, and have expectations of an undeveloped landscape of the Colorado Plateau. The Grand Canyon Railway is a tourist train that travels from Williams to the South Rim of the Grand Canyon, passing east of the Project Area. The Grand Canyon Railway is approximately 65 miles long, and the trip between Williams and South Rim takes approximately 2.25 hours to complete at an average speed of 29 miles per hour. Passengers of the train would have views of the Project Area between Junipine Estates and Howard Mesa Ranch (approximately 10 miles of the route) for no more than 20 minutes or 15% of the total travel time. Key Observation Points (KOPs) are the most critical viewpoints and typically consist of commonly traveled routes or other likely observation points. Six KOPs were identified (see Figure 3.1) as being representative of critical views of the Project Area and include residential areas, commonly traveled routes, and backcountry recreation sites.

Junipine Estates (residential and roadway KOP): This KOP is located at the southern edge of the Project Area, approximately 2.5 miles from the nearest turbine. The Junipine Estates KOP is located on Espee Road just north of the Junipine Estates residential area. From this location, the view is to the northwest. Low shrubs and grasses cover the area, interspersed with darker green juniper and pine trees that range from 10 to 15 feet tall (Figure 3.2). This location represents the views of people traveling on Espee Road both in and out of Junipine Estates.

Figure 3.2. Junipine Estates KOP, view facing north.

Red Lake Mountain Ranch (residential and roadway KOP): This KOP is located west of the Project Area, approximately 3 miles from the nearest turbine. The Red Lake Mountain Ranch KOP is located off of SR 64 outside the entrance to Red Lake Mountain Ranch. From this location, the view of the Project Area is to the west and looks out over the wide open landscape. Low shrubs and grasses cover the valley floor, interspersed with patches of darker green juniper (Figure 3.3). This location is representative of the views of people traveling both in and out of the Red Lake Mountain Ranch area, individuals traveling both directions along SR 64, and from the Grand Canyon Railway.

Figure 3.3. Red Lake Mountain Ranch KOP, view facing west.

Howard Mesa Ranch (residential and roadway KOP): This KOP is located to the northwest of the Project Area, approximately 3 miles from the nearest turbine. There are residences in Howard Mesa Ranch that are approximately 1.5 miles from the nearest turbine. The Howard Mesa Ranch KOP is located off of SR 64 outside the entrance to Howard Mesa Ranch. From this location, the view is to the southwest and looks out over the Project Area. Low shrubs and grasses cover the valley floor, interspersed with patches of darker green juniper (Figure 3.4). This location represents the views of residents of Howard Mesa Ranch in addition to individuals traveling both directions along SR 64.

Designated Campsite 1 (recreation KOP): This KOP is located within the Project Area, approximately 2 miles from the nearest turbine. The Designated Campsite 1 KOP is located off of Espee Road. From this location, the view of the Project Area is primarily to the northwest. Views of the Project Area are screened by taller juniper trees surrounding the campsite (Figure 3.5). This location represents the views of campers and other recreational visitors to the Perrin Ranch, in addition to individuals traveling along Espee Road through the Project Area.

Figure 3.4. Howard Mesa Ranch KOP, view facing southwest.

Figure 3.5. Designated Campsite 1 KOP, view facing north.

Designated Campsite 2 (recreation KOP): This KOP is located within the eastern half of the Project Area, approximately 1 mile from the nearest turbine. The Designated Campsite 2 KOP is located along a high point off of Espee Road. From this location, the view of the Project Area is in all directions. Views of the Project Area are screened by taller piñon and juniper trees surrounding the campsite (Figure 3.6). This location represents the views of campers and other recreational visitors to the Perrin Ranch in addition to individuals traveling along Espee Road through the Project Area.

Figure 3.6. Designated Campsite 2 KOP, view facing northeast.

Designated Campsite 3 (recreation KOP): This KOP is located within the eastern half of the Project Area, approximately 0.5 mile from the nearest turbine. The Designated Campsite 3 KOP is located along Espee Road close to the center of the Project Area. From this location, the view of the Project Area is in all directions. Views of the Project Area are partially screened by the local topography, in addition to piñon and juniper trees that occur along Espee Road and the campsite (Figure 3.7). This location represents the views of campers and other recreational visitors to the Perrin Ranch, as well as individuals traveling along Espee Road through the Project Area.

SHADOW EFFECTS

Shadow flicker may occur under specific environmental conditions when the sun passes behind the hub of a wind turbine and casts a shadow over nearby property. Shadow flicker does not occur continuously but varies with weather conditions and position of the sun in the sky.

NIGHTIME LIGHTING AND SKY GLOW

Light pollution is defined as the illumination of the night sky caused by artificial light (Bortle 2001). Effects of light pollution consist of a decrease in the visibility of stars and other natural night sky features, as well as disruption in natural lightscapes. Light pollution is caused by artificial light sources that are directed upward or sideways. Light then scatters throughout the atmosphere, resulting in sky glow. Other factors that influence sky glow consist of humidity, snow cover, cloud cover, and increased particulate matter in the air. Another form of light pollution is the glare that results from direct lighting.

Existing or potential sources of artificial nighttime light in the Study Area include residential areas at Junipine Estates and Howard Mesa Ranch. The town of Williams is the largest source of artificial nighttime light and sky glow in the region and is approximately 7 miles south of the Project Area's southernmost boundary. Other nearby sources of artificial light includes traffic on SR 64 east of the Project Area, area residences, and developments near the South Rim of the Grand Canyon.

Figure 3.7. Designated Campsite 3 KOP, view facing southwest.

Environmental Impacts

SIGNIFICANCE CRITERIA

A significant impact to visual resources would result if any of the following were to occur from construction or operation of the proposed Project:

- Degradation of the foreground character or scenic quality of a visually important landscape.
- Dominant visual changes in the landscape that are seen by highly sensitive viewer locations such as community enhancement areas (community gateways, roadside parks, viewpoints, and historic markers,) or locations with special scenic, historic, recreational, cultural, archaeological, and/or natural qualities that have been recognized as such through legislation or some other official declaration.
- Predicted air pollutant emissions causing a change in visibility that would exceed Class I standards.
- Conflict with visual standards identified by a federal land management agency (e.g., Bureau of Land Management [BLM], National Park Service, USFS).
- Lighting not consistent with Coconino County lighting ordinance.
- Intrusion on a viewshed from a cultural resource that is registered (or eligible for registration) with the NRHP or from a traditional cultural property (TCP) identified as important to tribes.
- Visual interruption that would dominate a unique viewshed or scenic view.

DIRECT AND INDIRECT IMPACTS OF THE PROPOSED PROJECT

The impacts analysis for visual resources is an assessment of changes to the characteristic landscape that would result from the construction and operation of the proposed Project, including the interconnection facilities. As discussed above, visual resources consist of landform, vegetation, and human-made structures. Impacts to visual resources were assessed by evaluating visual contrasts that would result from the construction, operation, and maintenance of the Project facilities. The analysis also consists of an assessment of visual contrasts resulting from the same actions as they would be seen from six KOPs (see Figures 3.1–3.7). In addition, an analysis of the shadow effects of the proposed facilities and impacts to night skies is presented.

Construction

Construction activities associated with the Proposed Action would introduce visual contrasts to the color, line, form, and texture of the existing characteristic landscape. Visual contrasts would result from ground disturbance, removal of vegetation, presence of construction personnel and vehicles, and the temporary storage of equipment and materials. In addition, there would be temporary structures associated with the concrete batch plant located with the O&M facilities. New roads associated with the Project would introduce contrasts to the line, color, and texture of the existing landscape. In addition, construction equipment, vehicles, and associated Project activities, including restoration, would be visible during the approximately five to seven months of construction activities. Direct and indirect impacts from construction of the Proposed Action on aesthetics and visual resources would be local, minor, short term, and adverse.

The degree of visual contrasts from each KOP was evaluated based on the form, line, color, and texture changes between the existing landscape and how the landscapes would look during construction of the wind energy facility. This evaluation was accomplished in the field from each KOP and is summarized below.

Junipine Estates (residential KOP): Vegetation clearing for construction associated with the wind energy facility would introduce straight lines through relatively dense vegetative cover and expose varying (often lighter) soil colors. However, the majority of the visual contrast from construction activities would not be visible because of intervening topography and vegetation. The juniper trees in the foreground and middle ground would continue to dominate the views from Junipine Estates.

Red Lake Mountain Ranch (residential KOP): Vegetation clearing for construction associated with the wind energy facility would introduce straight lines through relatively dense vegetative cover and expose varying (often lighter) soil colors. However, the majority of the visual contrast from construction activities would not be visible because of intervening topography and vegetation. As a result of distance, intervening topography and vegetation, views of the construction activities would be obstructed. The flat and open plateau would continue to dominate the views from Red Lake Mountain Ranch.

Howard Mesa Ranch (residential KOP): Vegetation clearing for construction associated with the Proposed Action would introduce straight lines through relatively dense vegetative cover and expose varying (often lighter) soil colors. However, the majority of the visual contrast from construction activities would not be visible because of intervening topography and vegetation. Although views from the KOP and some individual residences within Howard Mesa Ranch would be partially obstructed as a result of intervening topography and vegetation, there are some locations within Howard Mesa Ranch that would have unobstructed views of construction activities associated with the nearest turbines (1.5 miles) The visual contrast would diminish the further away the activities are from the KOP and the majority of the turbines would be greater than 5 miles away from Howard Mesa Ranch.

Designated Campsite 1 (recreation KOP): Vegetation clearing for construction associated with the wind energy facility would introduce straight lines through relatively dense vegetative cover and expose varying (often lighter) soil colors. However, the majority of the visual contrast from construction activities would not be visible because of intervening topography and vegetation. The juniper trees in the foreground and middle ground would continue to dominate the views from Designated Campsite 1.

Designated Campsite 2 (recreation KOP): Vegetation clearing for construction associated with the wind energy facility would introduce straight lines through relatively dense vegetative cover and expose varying (often lighter) soil colors. In addition, the 26-acre temporary clearing associated with the O&M facilities would be 2 miles east of the KOP and would be visible from Designated Campsite 2. Construction associated with the O&M facilities would introduce flat graded surfaces, straight lines, and geometric angles to the rolling topography and vegetative cover.

Designated Campsite 3 (recreation KOP): Vegetation clearing for construction associated with the wind energy facility would introduce straight lines and expose lighter soil colors. The 26-acre temporary clearing associated with the O&M facilities would be directly south of the KOP and would be visible from Designated Campsite 3. Construction associated with the O&M facilities would introduce flat graded surfaces, straight lines, and geometric angles to the rolling topography and vegetative cover.

Other Views. In addition to the six KOPs identified above, passengers of the Grand Canyon Railway would have intermittent views of the construction activities associated with the Proposed Action while traveling between the Grand Canyon and Williams. Views of the Project Area from the train would occur intermittently along the approximate 10 miles of railroad between Howard Mesa Ranch and Junipine Estates. Visual contrasts would be similar to those described for the Howard Mesa Ranch and Red Lake Mountain Ranch KOPs, both of which occur along SR 64, which runs parallel to the railroad.

Operation and Maintenance

During the operations phase, the Proposed Action would have three types of facilities that would result in changes to the characteristic landscape: turbines, access roads, and the interconnection facilities.

The regular geometric forms and horizontal and vertical lines associated with the turbines would result in a visual contrast with the irregular, organic forms and colors of the existing landform and vegetation. The turbine hub height would be 262 feet, constructed of matte gray, tubular, welded steel. The towers would taper from the base to the top and would have three rotating blades with a 262-foot rotor diameter. Turbines would be spaced no more than 2.4 to 3.5 rotor diameters (629–917 feet) apart. The turbines generally follow ridgelines through the Project Area. The layout is made up of four distinct “strings” or “clusters” of turbines that are separated by 2 or more miles. Color contrasts associated with the turbines would vary throughout the day and throughout the seasons as natural lighting conditions and colors change. Although the turbines would not be made a reflective material, when seen at certain times of the day, they would result in intermittent brighter colors that would sharply contrast with the dull hues of the surrounding tan soils and gray-green vegetation.

Although the visual evidence of the proposed turbines in Perrin Ranch cannot be concealed as a result of their size and location, the overall visual contrast of the turbines is reduced by having fewer turbines clustered together in any one location within the Project Area. As a result of the turbine layout, intervening topography, and vegetation, there are limited locations from which all 62 turbines would be visible at once (Table 3.3). Direct and indirect impacts from operation of the Proposed Action on aesthetics and visual resources would be local, minor, long term, and adverse.

Table 3.3. Key Observation Point Summary of Impacts

Key Observation Point	<0.5 Mile (range where individual turbines are visible)	0.5–1.5 Miles (range where individual turbines are visible)	1.5–3.0 Miles (range where individual turbines are visible)	>3.0 Miles (range where individual turbines are visible)	Total Individual Turbines Visible*	Other Facilities Visible
Junipine Estates	0	0	0	55 (4 Alts)	55 (4 Alts)	Yes
Red Lake Mountain Ranch	0	0	0	66 (4 Alts)	66 (4 Alts)	Yes
Howard Mesa Ranch	0	0	0	66 (4 Alts)	66 (4 Alts)	Yes
Designated Campsite 1	0	0	7 (1 Alt)	57 (3 Alts)	57 (3 Alts)	Yes
Designated Campsite 2	0	3	17 (1 Alt)	66 (4 Alts)	66 (4 Alts)	Yes
Designated Campsite 3	0	3	4	11 (0 Alts)	11 (0 Alts)	Yes

*The total number of visible turbines does not account for existing vegetation, buildings, and structures that would screen some views of the facility. This is especially important to consider in the residential areas.

The regular geometric forms and horizontal and vertical lines associated with the access roads and interconnection facilities would result in a visual contrast with the irregular, organic forms, and colors of the existing landform and vegetation. A total of 39 miles of access roads would be used in support of the Project. Although some existing dirt roads through the Project Area would be used, they would be expanded and improved to provide access to the Project. Additionally, Espee Road would be used but would not be improved. The substation, switchyard, and gen-tie line would be located in proximity to the existing power transmission lines crossing the Study Area and would repeat the basic visual elements of form, line, color, and texture of the existing roads and transmission line.

A viewshed delineation was prepared for the proposed action (Figure 3.8). To generate the three-dimensional environment necessary for the viewshed delineation, digital elevation model data files from the USGS were joined into a mosaic within the Study Area. The “Visible” and “Not Visible” areas resulting from the delineations indicate the areas from which an observer at a KOP may theoretically be able to see elements of the Project as well as the number of the turbines that would be visible.

Visibility was based on the highest point (398 feet) for each of the turbines being considered. The viewshed delineation considers the topography within the Study Area but do not consider how existing vegetation or human modifications would affect visibility. The degree of visual contrasts from each KOP was then evaluated based on the form, line, color, and texture changes between the existing landscape and how the landscapes would look after construction of the wind energy facility. This evaluation was accomplished in the field from each KOP and is summarized below.

Junipine Estates (residential KOP): The nearest turbine to this KOP would be more than 3 miles to the northwest (see Figure 3.8). Beyond 3 miles, as many as 55 turbines (including 4 alternate turbine locations) would theoretically be visible and would contrast with the rolling topography, low shrubs, grasses, and trees that currently cover the area. As a result of intervening topography and vegetation, views of the facilities would be partially obstructed and the turbines would not dominate the view (Figure 3.9). In addition, the visual contrast would diminish the farther away the turbines are from the KOP, and all of the turbines would be between 3 and 7 miles away. The juniper trees in the foreground and middle ground would continue to dominate the views from Junipine Estates.

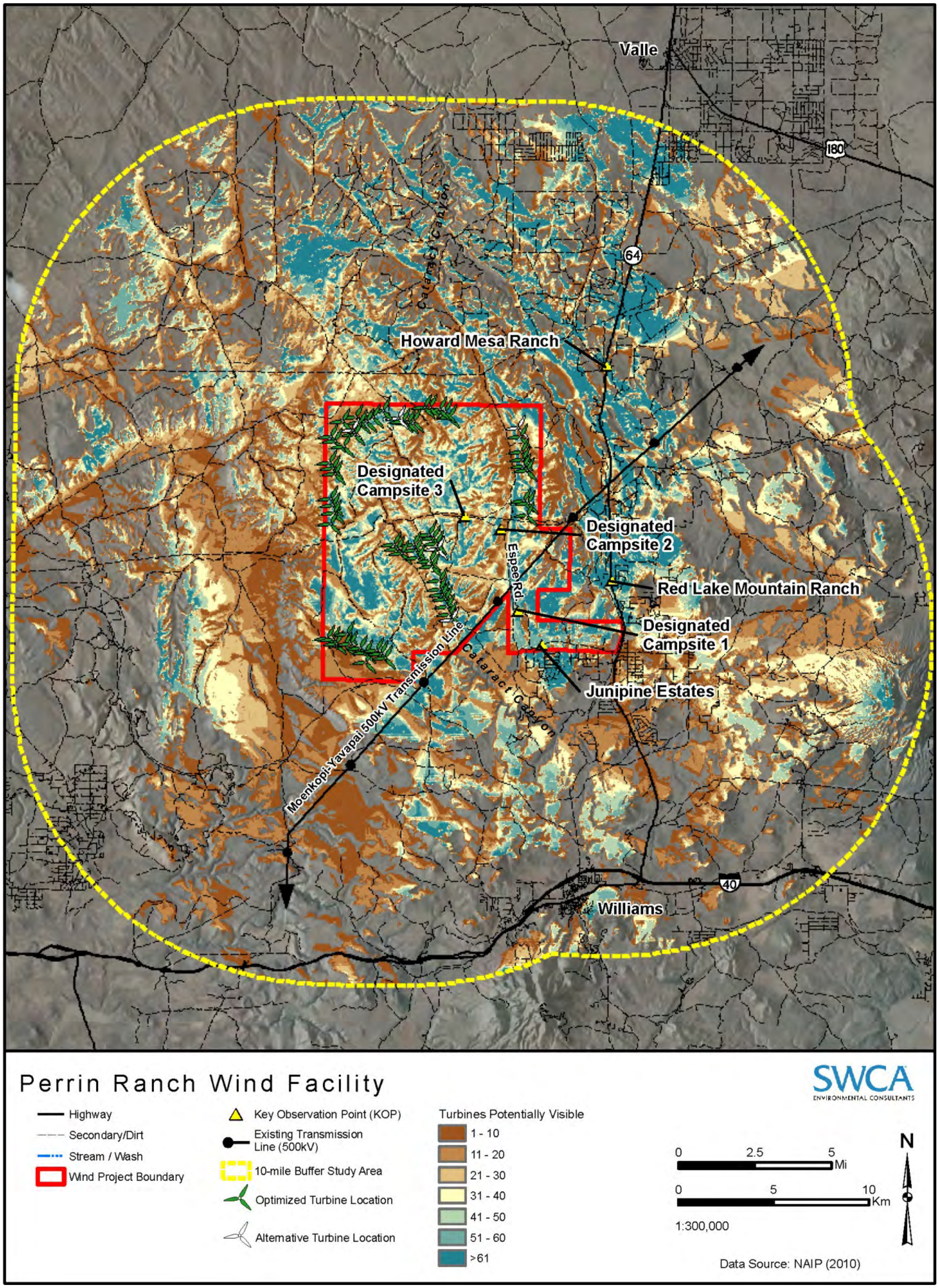

Figure 3.8. Viewshed delineation.

Figure 3.9. Junipine Estates photographic simulation.

Red Lake Mountain Ranch (residential KOP): The nearest turbine to this KOP would be 3.5 miles to the northwest (see Figure 3.8). Beyond 3.5 miles, as many as 66 turbines (including 4 alternate turbine locations) would theoretically be visible and would contrast with the rolling topography, low shrubs, grasses, and trees that currently cover the area. The visual contrast would diminish the farther away the turbines are from the KOP, and the majority of the turbines would be greater than 5 miles away (Figure 3.10). As a result of distance, intervening topography, and vegetation, there would be obstructed views of the turbines from this KOP. The flat and open plateau would continue to dominate the views from Red Lake Mountain Ranch.

Figure 3.10. Red Lake Mountain Ranch photographic simulation.

Howard Mesa Ranch (residential KOP): The nearest turbine to this KOP would be 3.5 miles to the southwest (see Figure 3.8). The nearest turbine to residences within Howard Mesa Ranch would be 1.5 miles. Beyond 3.5 miles, as many as 66 turbines (including 4 alternate turbine locations) would theoretically be visible and would contrast with the rolling topography, low shrubs, grasses, and trees that currently cover the area. Although views from the KOP and individual residences within Howard Mesa Ranch would be partially obstructed as a result of intervening topography, vegetation, and existing buildings, there are some locations within Howard Mesa Ranch that would have unobstructed views of the nearest turbines (Figure 3.11). The visual contrast would diminish the farther away the turbines are from the KOP, and the majority of the turbines would be greater than 5 miles away from Howard Mesa Ranch.

Figure 3.11. Howard Mesa Ranch photographic simulation.

Designated Campsite 1 (recreation KOP): The nearest turbine to this KOP would be less than 2 miles to the west (see Figure 3.8). At these distances, up to 7 turbines (including 1 alternate turbine location) would theoretically be visible and would contrast with the rolling topography, low shrubs, grasses, and trees that currently cover the area. As a result of intervening topography, and vegetation, views of the facilities would be partially obstructed and the turbines would not dominate the view. In addition, the visual contrast would diminish the farther away the turbines are from the KOP and the majority of the turbines would be more than 3 miles away (Figure 3.12). The juniper trees in the foreground and middle ground would continue to dominate the views from Designated Campsite 1.

Designated Campsite 2 (recreation KOP): The 26-acre temporary clearing associated with the O&M facilities would be 2 miles east of the KOP and would be visible from Designated Campsite 2 (see Figure 3.8). The O&M facilities would introduce flat graded surfaces, straight lines, and geometric angles to the rolling topography and vegetative cover.

The nearest turbine to this KOP would be less than 1.5 miles to the northeast. Up to 17 turbines to the northeast of the KOP would be visible and would introduce tall, straight lines and moving blades that would contrast with the rolling topography and muted colors of the low shrubs, grasses, and trees that currently cover the area (Figure 3.13). The wooden poles associated with the gen-tie transmission line would also be clearly visible from this KOP. The wooden poles would repeat the basic elements of color, line, and texture associated with the juniper trees in the foreground and middle ground and would result in minor visual contrasts with the existing landscape.

Views of the remaining turbines and facilities would be partially obstructed and would not dominate the view. In addition, the visual contrast would diminish the further away the turbines are from the KOP and the majority of the turbines would be between 3 and 5 miles away.

Figure 3.12. Designated Campsite 1 photographic simulation.

Figure 3.13. Designated Campsite 2 photographic simulation.

Designated Campsite 3 (recreation KOP): The O&M facilities would introduce flat graded surfaces, straight lines, and geometric angles to the rolling topography and vegetative cover. The geometric and metallic structure of the substation and other structures of the O&M facilities would contrast with the existing organic form, line, and color of the existing landscape.

The nearest turbine to this KOP would be less than 1.5 miles to the south (see Figure 3.8). Up to 4 turbines (including 1 alternate turbine location) within 1.5 miles of the KOPwould be visible and would introduce tall, straight lines and moving blades that would contrast with the rolling topography and muted colors of the low shrubs, grasses, and trees that currently cover the area (Figure 3.14). The wooden poles associated with the gen-tie transmission line would also be clearly visible from this KOP. The wooden poles would repeat the basic elements of color, line, and texture associated with the juniper trees in the foreground and middle ground and would result in minor visual contrasts with the existing landscape.

As a result of intervening topography and vegetation, only 11 turbines would theoretically be visible, and views of the remaining turbines and facilities would be partially obstructed and would not dominate the view. In addition, the visual contrast would diminish the further away the turbines are from the KOP.

Figure 3.14. Designated Campsite 3 photographic simulation.

Other Views. In addition to the six KOPs identified above, passengers of the Grand Canyon Railway would have intermittent views of the Proposed Action while traveling between the Grand Canyon and Williams. The nearest turbines to the railroad are located in the northeast corner of the Study Area and would be approximately 2 miles away. This string of nine turbines is approximately 2.7 miles long from north to south. At an average speed of 29 mph, the train would travel along the string of turbines for five minutes and 35 seconds. However, passengers of the train would have views of the Proposed Action along the 10 miles of railroad between Howard Mesa Ranch and Junipine Estates. Visual contrasts would be similar to those described for the Howard Mesa Ranch and Red Lake Mountain Ranch KOPs, both of which occur along SR 64, which runs parallel to the railroad.

Shadow Effects

When the wind turbine blades rotate, shadows pass over the same point resulting in shadow flicker. A shadow effect analysis was prepared for the Proposed Action delineating where shadow flicker has the potential to occur and for how many hours a year it can be expected to occur (Figure 3.15). The potential for shadow flicker occurs in an irregular pattern surrounding each turbine as far out as 3,200 feet, though at that 3,200 feet shadow flicker would be limited to zero to 10 hours per year.

Shadow flicker would not result in impacts to any occupied structures or residential buildings. The impacts of shadow flicker would depend on environmental conditions and would be limited to individuals traveling by road through the areas of shadow effect or individuals standing within the shadowed area of a wind turbine blade. Thus, direct impacts to individuals from shadow flicker would be intermittent, local, long term, and minor.

Nighttime Lighting and Sky Glow

Security and safety lighting associated with the Proposed Action would contribute to the increased nighttime visibility of the turbines and facilities. The addition of security lighting at the substation, switchyard, and O&M facilities would also contribute to sky glow. The impacts on night skies and sky glow would be minimized by the reduced amount of artificial lighting associated with the facility and by including motion sensor controls on the safety lighting.

In addition to security lighting, FAA rules require lights mounted on nacelles that flash red at night (2,000 candela). Typically, the FAA requires warning lights on the first and last turbines in a string and every 1,000 to 1,400 feet in between. Although not currently approved by the FAA, a radar-activated lighting system (OCAS) would be installed on the turbine towers. The system would be designed to keep the towers dark before activating lights on the towers when a plane is detected in the area. The system would be installed but would not be activated until approved by the FAA. Only 28 of the 62 turbines of the Proposed Action would have obstruction lighting installed. Because obstruction lighting would be installed on 28 turbines and would pulsate on and off, the increase in sky glow that would result would be undetectable by even the most sensitive viewer. In addition, should the radar-activated system be approved, obstruction lighting would only operate when an aircraft is detected by the radar system, further reducing the contribution to sky glow. When lit, the red warning beacons would be directly visible and would change the visible perception of the night sky over the Study Area. Direct impacts to night sky conditions from the Proposed Action would be intermittent, local, long term, and minor.

In terms of the seven significance criteria identified for visual resources, none of the criteria would be met by the implementation of the Proposed Action. The construction and operation of the proposed wind energy facility would not result in significant impacts to visual resources if implemented.

CUMULATIVE IMPACTS

The cumulative impacts area of analysis for visual resources is the Project Area plus lands extending out to 10 miles surrounding the Project Area. This is the same area as the Study Area for visual impacts. This is based on the natural boundaries of the resource affected. Lands in the cumulative impacts area of analysis for visual resources are made up private land owned by Perrin Ranch Wind, ASLD lands, USFS lands, and other private lands. Lands are used for a variety of purposes, including dispersed recreation, livestock grazing, utility corridors, the Grand Canyon Railway, agriculture, low-density residential

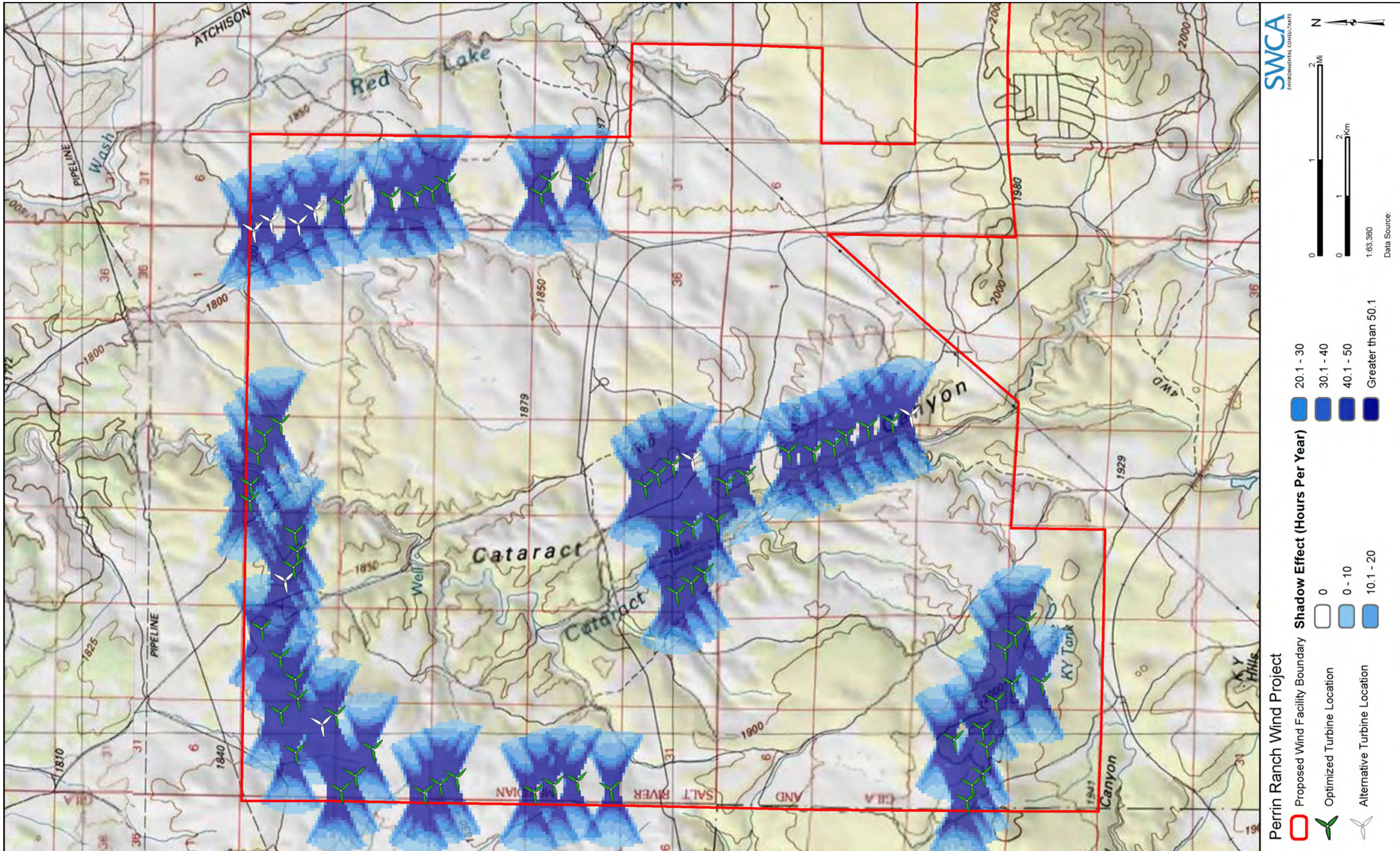

Figure 3.15. Shadow effects analysis map.

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development, and general zoning land use classifications. These are lands that are managed for some degree of landscape change to provide for uses that alter the characteristic landscape. Private lands associated with Perrin Ranch are primarily used for ranching and dispersed recreation. The lands are a mixture of undeveloped landscapes, interspersed with roads, utility lines, public purposes, and dispersed ranches and residences that alter the land and its character. The past and present land uses in the cumulative impacts area of analysis for visual resources have resulted in the current landscape character of the area.

There have been no reasonably foreseeable future actions identified in the area of cumulative impacts for visual resources that would contribute to further alteration and development of the existing landscape.

Mitigation Measures

Because none of the significance criteria would be met by the implementation of the Proposed Action, no mitigation measures specific to visual resources are recommended.

ENVIRONMENTAL IMPACTS OF THE NO ACTION ALTERNATIVE

Under the No Action Alternative, the Project would not be developed and there would be no direct or indirect impacts. Aesthetic and visual conditions would continue as described in the affected environment.

3.3.2 Noise

This section provides an overview of the existing ambient noise levels and a description of the changes in ambient noise level that would result from the construction and operation of wind facilities within the Perrin Ranch Study Area. The Study Area for noise includes the 39,833-acre Project Area plus lands extending out to 1 mile, which roughly marks the maximum distance from where noise from the Project would be audible (Figure 3.16). The Study Area for noise is a mixture of undeveloped, vacant ASLD land and private land owned by Perrin Ranch Wind, and includes agricultural, low-density residential, and general zoning land use classifications. Low-density residential areas are located north, east, and south of the Study Area for noise.

Affected Environment

Acoustics is the study of sound, and noise is defined as unwanted sound. Under certain conditions, noise may cause hearing loss, interfere with human activities at home and work, and in various ways affect people’s health and well-being. Sound is measured on a logarithmic scale, expressed in decibels (dB), which is the accepted standard unit for measuring sound pressure amplitude using a more manageable range of numbers. On this scale, an increase of 10 dB represents a perceived doubling of loudness to someone with normal hearing. When describing sound and its effect on a human population, A-weighted sound levels are typically used to account for or approximate the response of the human ear. The term “A-weighted filter” refers to a filtering of the noise signal in a manner that corresponds to the way the human ear perceives sound. The A-weighted filter de-emphasizes the very low- and the very high-frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. The A-weighted sound level is denoted dBA. The dBA has been found to correlate well with people’s judgment of the “noisiness” of different sounds and has been used for many years as a measure of community and industrial noise (Harris 1991).

Although the A-weighted scale is commonly used to quantify the range of human responses to individual noise events or general community sound levels, the degree of annoyance or other response impacts are variable and depend on other factors, including:

- ambient (background) sound level;
- general nature of the existing conditions (e.g., quiet rural vs. busy urban);
- difference between the magnitude of the sound event level and the ambient condition;
- duration of the sound event;
- number of event occurrences and their repetitiveness; and
- time-of-day that the event occurs.

Because people do not routinely work with dB or dBA sound levels, it is often difficult to appreciate what a dBA number means. To help relate dBA values to common experience, Table 3.4 provides examples of typical A-weighted sound pressure levels for various indoor and outdoor noise sources.

Table 3.4. Typical Sound Pressure Levels Measured in the Environment and Industry

Noise Source at a Given Distance	A-Weighted Sound Level in Decibels	Qualitative Description
Carrier deck jet operation	130 to 140	Pain threshold
Jet takeoff (200 feet)	120	
Auto horn (3 feet)	110	Maximum vocal effort
Jet takeoff (1,000 feet)	100	
Shout (0.5 feet)	100	
New York City subway station	90	Very annoying
Heavy truck (50 feet)	90	Hearing damage (8-hour, continuous exposure)
Pneumatic drill (50 feet)	80	Annoying
Freight train (50 feet)	70 to 80	
Freeway traffic (50 feet)	70	Intrusive (telephone use difficult)
Air conditioning unit (20 feet)	60	
Light auto traffic (50 feet)	50	Quiet
Living room	40	
Bedroom	40	
Library	30	Very quiet
Soft whisper (5 feet)	30	Very quiet
Broadcasting/Recording studio	10 to 20	Just audible

Source: Adapted from Table E, “Assessing and Mitigating Noise Impacts,” New York Department of Environmental Conservation (2001).

Ambient noise in the Study Area is typical of rural areas where ranching activities are the most common use. Typical daytime noise levels in rural areas range from 30 to 50 dB (ADOT 2008). Noise-producing activities in the Study Area include motorized traffic along SR 64, train traffic on the nearby Grand Canyon Railway, gunfire from hunting, and the existing Moenkopi-Yavapai 500-kV transmission line. Noise from the transmission line is created by corona discharge. Transmission line audible noise is categorized into broadband high-frequency sounds, which can be described as hissing or sputtering, and low-frequency tones, which are best described as humming sounds. Other noise sources consist of general environmental sounds, rustling vegetation, birds, and insects, distant aircraft, and wind.

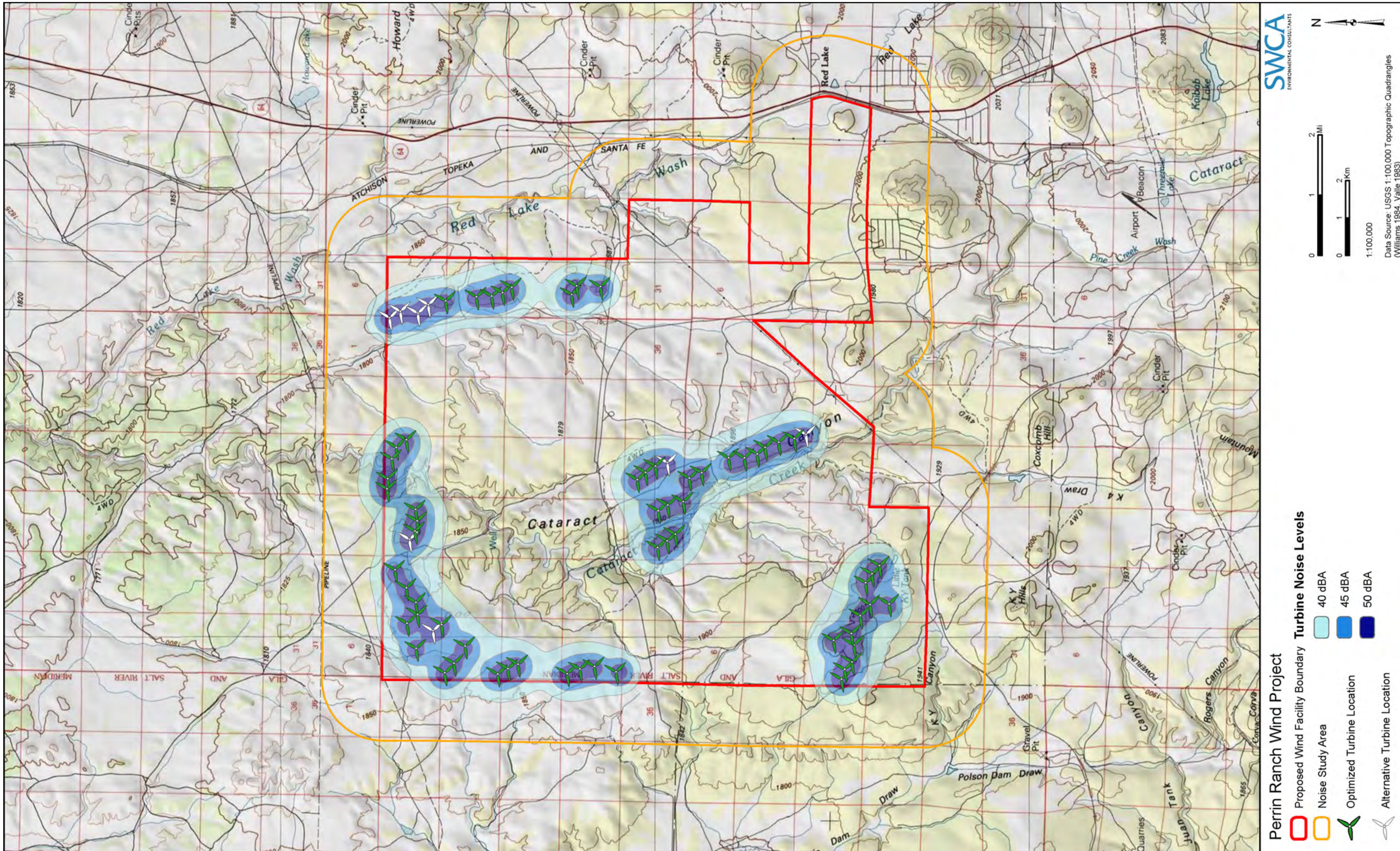

Figure 3.16. Noise analysis Study Area.

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Environmental Impacts

SIGNIFICANCE CRITERIA

A significant impact on noise would result if any of the following were to occur from construction or operation of the proposed Project:

- Exceedance of local, state, or federal noise regulations or guidelines.
- Increased noise levels that would impose restrictions on land currently planned for residential development.
- Increased noise levels that directly or indirectly affect any traditional use or TCP locations that are NRHP registered or eligible, or identified as important to tribes.

DIRECT AND INDIRECT IMPACTS OF THE PROPOSED PROJECT

The relative impacts of the Proposed Action were assessed by comparing changes in ambient noise levels from the construction, operation, and maintenance of the proposed wind energy facility. Although noise emissions are regulated by the EPA and OSHA, regulations typically address noise levels that may damage one's ability to hear. It is assumed that the Proposed Action would comply with all federal, state, and local noise regulations, requirements, and ordinances during both the construction and operation phases of the interconnection. It is further assumed that a hearing protection plan for workers and visitors would be part of the health and safety plan and would comply with OSHA standards. A description of the impacts of noise on wildlife may be found in Section 3.3.5, Wildlife.

Construction

Construction of a wind energy facility is accomplished in several different stages. Each stage has a different combination of equipment, depending on the work to be accomplished. Noise generated by construction equipment would vary, depending on type, model, size, and condition of the equipment. Construction activities are not planned to occur at night, and nighttime noise levels would drop to the background levels of the Project Area. Because construction activities are short term (occurring over a five- to seven-month period), the associated impacts of noise would be temporary and intermittent.

Construction for the Project would occur in a phased schedule over a five- to seven-month period. The following actions would be implemented as part of the construction phase and would result in increased ambient noise levels in the Study Area in the short term:

- employee and construction vehicle traffic; and
- construction equipment operation.

Construction vehicle traffic would consist of workers traveling to and from the Project Area and haul trucks carrying equipment, supplies, and materials in and out of the Project Area. At the peak of construction, 50 to 70 employee vehicles would access the Project Area on a daily basis. Primary access for construction would be via SR 64 and Espee Road. Noise from worker vehicles would be similar to the sound of existing traffic on SR 64. There would be an average of 75 daily large truck trips required for the delivery of turbine components and related equipment to the Project site over the course of the construction phase. Assuming a vehicle speed of no more than 25 mph along Espee Road within the Project Area, the average noise level generated by haul trucks during the construction period would be approximately 90 dBA at a distance of 50 feet from the source.

Noise levels for typical equipment used during the construction of a wind energy facility Project site range between 80 to 90 dBA at a distance of 45 feet (Table 3.5). The nearest residence occurs at Howard Mesa Ranch, which is located approximately 2 miles from the nearest turbine location where construction activities would occur. At that distance, the construction noise would be intermittently audible, but would not exceed the EPA guideline for residential noise (55 dBA).

During construction, increased vehicle traffic, equipment used for assembly and erection of structures, and wire pulling and splicing would result in increased ambient noise levels. Table 3.5 presents typical noise levels of construction equipment at a distance of 45 feet (Crocker and Kessler 1982).These values assume that the equipment is operating at full power.

Table 3.5. Typical Noise Levels of Construction Equipment

Equipment Category	Noise Level at 45 feet (dBA)
Dump truck	88
Portable rock drill	88
Concrete mixer truck	85
Pneumatic tool	85
Grader	85
Backhoe	81
Dozer	78

Source: Crocker and Kessler (1982)

The data presented Table 3.5 indicate that there would be a temporary increase in ambient noise within 45 feet of construction activities. Noise from construction activities would be audible to recreationists in the area, but construction would occur during daytime hours when tolerance to noise is higher. Hunting activities in the general area of construction could be temporarily affected by increases in sound levels within proximity to construction sites, which could temporarily displace or be a nuisance to wildlife. These impacts would cease after construction activities are completed. Therefore, direct and indirect impacts from noise of the construction of the Proposed Action would be local, minor, short term, and adverse.

Operation and Maintenance

Noise associated with the operation and maintenance of the Proposed Action would occur throughout the 30-year life of the Project. The following actions and facilities would be implemented as part of the Proposed Action and would result in increased ambient noise levels in the Study Area for noise:

- turbines;
- employee and maintenance vehicle traffic; and
- the generator at the O&M facilities.

The turbine manufacturer projects noise levels of 50 dBA to occur up to 850 feet from the turbines (see Figure 3.16). Noise from the turbines would diminish with distance. The nearest residence occurs at Howard Mesa Ranch, which is located approximately 2 miles from the nearest turbine. Based on the distance to the nearest residences, as well as intervening topography and vegetation, the noise resulting from the operation of turbines would not be audible at residences at Junipine Estates or Howard Mesa

Ranch. The nearest campsite is Designated Campsite 3, which occurs approximately 0.5 mile from the nearest turbines. Audible noise from turbine operation at Designated Campsite 3 would be no more than 40 dBA and would be a negligible increase in ambient noise levels.

In addition to noise emissions from the operation of turbines, there are electromagnetic impacts associated with substations and overhead transmission facilities known as corona discharge. Corona impacts are manifested as audible noise, radio interference, and television interference. Audible noise would result from corona discharge at the Project substation, step-up substation, and along the gen-tie transmission line. Transmission line audible noise is categorized into broadband high-frequency sounds, which can be described as hissing, sputtering, or humming, and low-frequency tones. Historical measurements along transmission corridors in similar environments have shown typical ambient audible noise levels in the range of 43 to 52 dBA with an average value of 50 dBA (Electric Power Research Institute 1982). Because audible noise levels are low, corona discharge is usually not a design issue for power lines rated at 230 kV and lower.

The highest calculated audible noise levels for the gen-tie transmission line would occur only during rain and would reach up to 48.7 dBA up to 500 feet from the transmission line. During fair weather, the audible noise out to 500 feet from the gen-tie transmission line would be reduced to a maximum value of 37.5 dBA. As previously mentioned, the nearest residences to the proposed interconnection facilities are approximately 2 miles to the east and 3 miles to the south of the interconnection footprint. Because there are no residences within 500 feet of the proposed transmission line, corona noise from the proposed transmission line would not be audible from outside or within the nearest residences. Therefore, direct and indirect impacts from noise of the operation of the Proposed Action would be local, minor, short term, and adverse.

In terms of the three significance criteria described for noise, none would be met by implementation of the Proposed Action. Thus, the Project would not have a significant impact on ambient noise levels if implemented.

CUMULATIVE IMPACTS

The cumulative impacts area of analysis for noise would be the Project Area plus lands extending out to 1 mile surrounding the Project Area. This is the same area as the Study Area for noise impacts. During operations, given that at a distance of approximately 0.5 mile from turbines, the area would not experience an increase in noise compared to existing conditions. There have been no reasonably foreseeable future actions identified in the cumulative impacts area of analysis for noise that would contribute to further changes in the existing noise levels. The cumulative impacts from noise would be negligible.

Mitigation Measures

No mitigation measures specific to noise are necessary.

ENVIRONMENTAL IMPACTS OF THE NO ACTION ALTERNATIVE

Under the No Action Alternative, the Project would not be developed and there would be no direct or indirect impacts. Noise conditions would continue as described in the affected environment.

3.3.3 Water Resources

Following is an overview of the physical features of the Project Area's water resources and an analysis of the environmental consequences of Project implementation on these resources.

The Study Area for water resources includes both groundwater and surface water resources and how construction and operation of the proposed Project could affect these resources. The Study Area for groundwater resources is depicted in Figure 3.17 and includes the Coconino Plateau groundwater sub-basin, the primary regional basin from which the water needs for the Project would be derived. The Study Area for surface water resources is depicted in Figure 3.18 and is based on the direct modification of the topography and alteration of the surface water regime within the Project Area and indirect effects on downstream surface water drainages. On-site drainage includes Cataract Creek and all washes within the Project Area where surface water collects. Downstream surface water drainages within the Study Area include those in the immediate sub-watershed that receives discharge from the Project Area.

Affected Environment

Section 404 of the Clean Water Act (CWA) governs surface water resources and establishes the permit program for discharge of dredge or fill material into waters of the U.S. (WUS). The permit program and activities inside WUS are administered by the U.S. Army Corps of Engineers (USACE). It is anticipated that a Section 404 non-notifying nationwide permit would be needed for the proposed Project and associated permit conditions would apply.

Section 401 of the CWA requires Water Quality Certification from the state where a proposed activity may result in a discharge to WUS. Section 401 certification would be required from the Arizona Department of Environmental Quality (ADEQ) for the proposed Project.

Section 402 of the CWA establishes the NPDES, a permitting system for the discharge of any pollutant (except for dredged or fill material) into WUS. In Arizona, the NPDES program is administered by ADEQ under the AZPDES program. ADEQ issues permits on behalf of the EPA for activities in Arizona, except on Indian lands, that could cause impacts to surface water and groundwater sources, including construction activities. The ADEQ also administers water pollution control programs and water quality functions throughout the state. As part of the AZPDES program, projects that would disturb more than 1 acre of land are required to obtain coverage under Construction General Permit (CGP) No. AZG2008-001. Construction activity subject to this permit includes clearing, grading, and disturbances to the ground, such as stockpiling or excavation.

As part of Project implementation, an SWPPP must be developed and implemented to comply with conditions of the CGP. The SWPPP must include site-specific information on erosion and sediment controls and must list BMPs that would be installed to reduce pollutants and meet water quality standards. As part of the SWPPP, the applicant must implement BMPs to reduce or eliminate stormwater pollution. Dischargers must also comply with state water quality objectives, as defined in Arizona Administrative Code (AAC) Title 18, Chapter 11, Article 1.

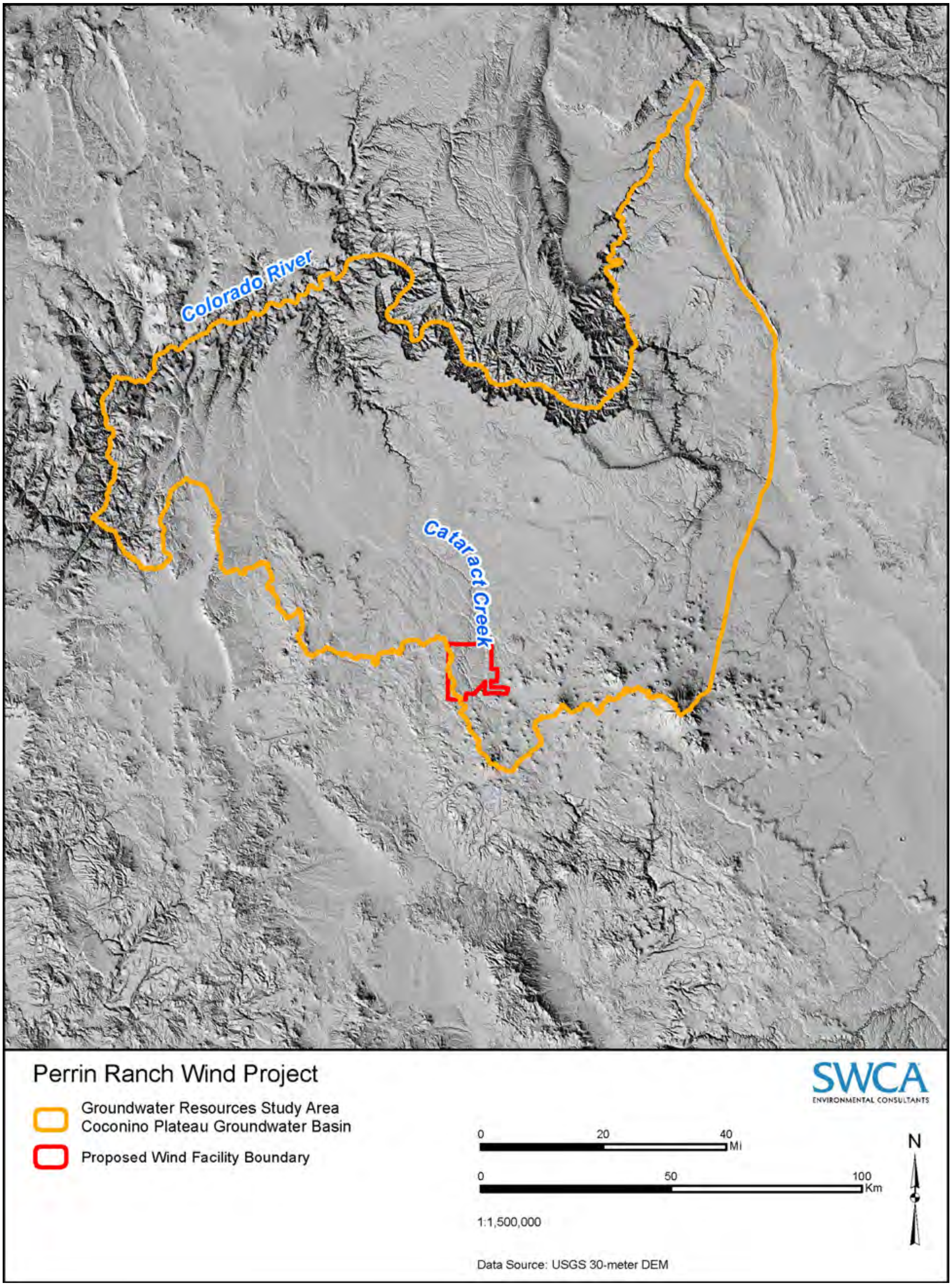

Figure 3.17. Groundwater Study Area map.

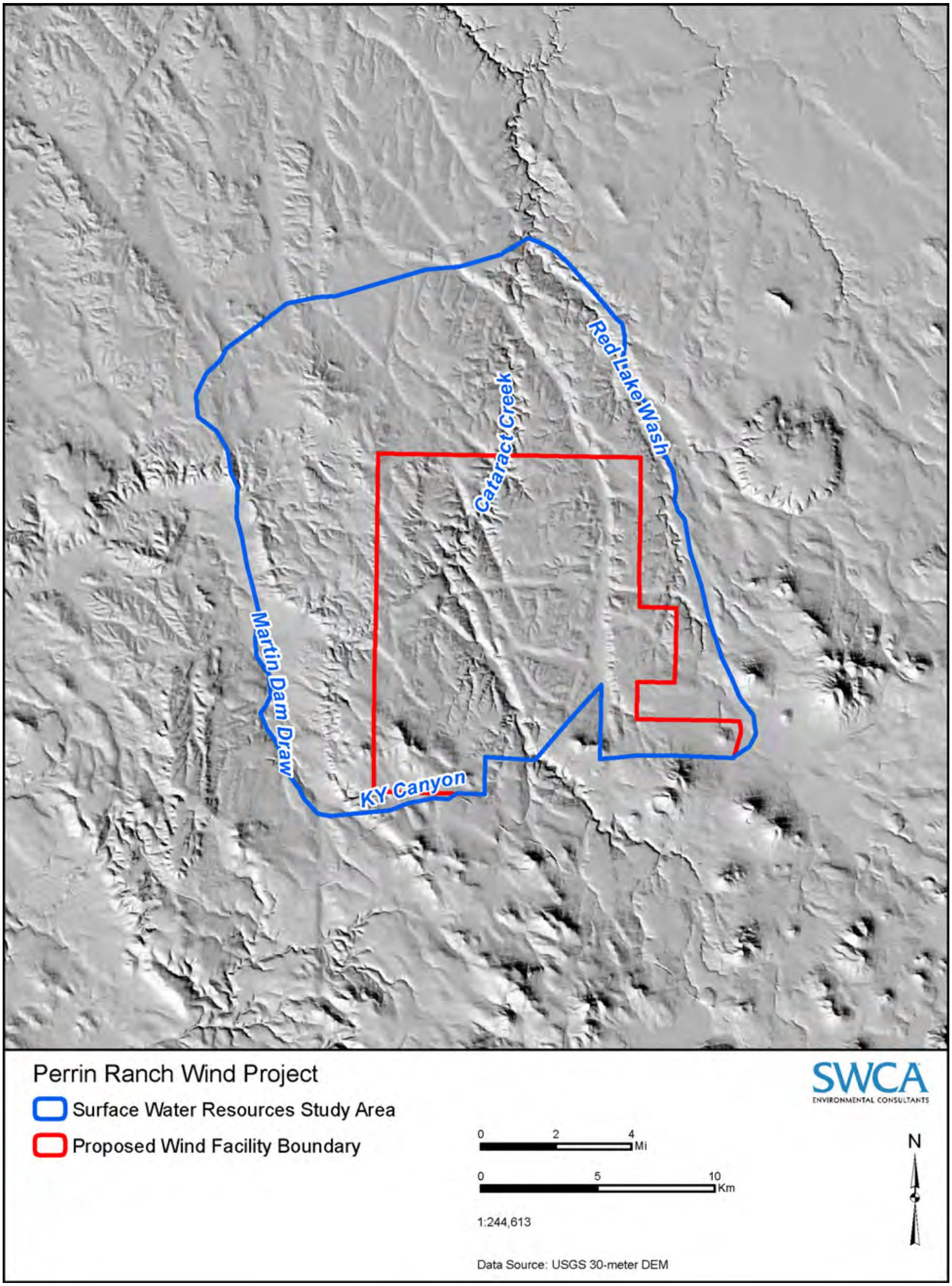

Figure 3.18. Surface water Study Area map.

ADEQ has developed surface water quality standards, including narrative limitations, to define water quality goals for Arizona's streams and lakes and to provide the basis for controlling discharge of pollutants to surface waters. Beneficial uses for water bodies are identified in state water quality standards (AAC Title 18, Chapter 11, Article 1) and must be achieved and maintained as required under the CWA. Beneficial uses can include support of aquatic life, fish consumption, public water supply, and irrigation. The 303(d) list, as required by Section 303(d) of the CWA, is a list of water bodies that have a designated beneficial use that is impaired by one or more pollutants. Water bodies included on this list are referred to as "impaired waters." The state must take appropriate action to improve impaired water bodies by establishing total maximum daily loads and reducing or eliminating pollutant discharges.

The Arizona Department of Water Resources (ADWR) implements the Groundwater Management Code of 1980 and manages groundwater supplies throughout the state. The goal of the Groundwater Management Code is to control groundwater depletion and provide a means for allocation. Areas of heavy reliance on groundwater have been identified and designated Active Management Areas (AMAs). Pursuant to the Groundwater Management Code, the five designated AMAs are required to comply with regulations and remain the primary focus of ADWR's long-term groundwater management and conservation efforts. The proposed Project is in not within any designated AMA.

Regionally, the Project is located in the Colorado Plateau physiographic province, which is generally characterized by horizontally stratified sedimentary rocks that have eroded into numerous incised canyons and plateaus (ADWR 2009). For the most part the Project Area comprises undeveloped lands that range in elevation from approximately 5,200 to 6,800 feet above mean sea level (amsl). Washes in the vicinity are ephemeral in nature, flowing only in response to precipitation. In general, the average annual precipitation in the region is 10.1 inches, which is received both in the summer from monsoonal storms and in the winter from frontal storms, oftentimes as snowfall (on average approximately 70 inches of snow per year) (ADWR 2009). No site-specific precipitation data are publicly available; however, there are two nearby Western Regional Climate Center (WRCC) stations with long-term data (WRCC 2011). The Williams station (approximately 8 miles to the south) has a reported average annual precipitation of 21.6 inches; Valle Airport (approximately 12 miles to the northeast) average annual precipitation is 9.4 inches. The majority of water required for the proposed Project would be used during the first approximately five to seven months for the construction phase, with only minor water needs for 30 years during the operational phase.

GROUNDWATER

The Project Area is located in the southernmost area of the Coconino Plateau Basin, one of six groundwater basins within the ADWR Western Plateau Planning Area. The Redwall-Muav (R-aquifer or limestone aquifer) is the primary water-bearing unit of the Coconino Plateau Basin. The Kaibab, Coconino, and Supai formations form the regional Coconino Aquifer (C-aquifer), which overlies the R-aquifer. The Moenkopi and Chinle formations, volcanic rocks, and unconsolidated sediments overlie the C- and R-aquifers and provide locally important sources of water. Perched aquifer zones in association with volcanic rocks occur primarily in the central and southern part of the basin and in consolidated sedimentary rocks west and northwest of the volcanic fields. Though data for groundwater recharge in the basin are not available, these perched aquifers are known to be dependent on recharge from precipitation runoff and may be undependable water supplies (ADWR 2009).

The R-aquifer underlies the entire Coconino Plateau Basin at a depth of more than 3,000 feet below ground surface (bgs) in most areas. Relatively few wells have been completed in this aquifer because of its extreme depth. Water levels in wells are typically quite deep in the basin, and yields in the R-aquifer are relatively low, depending on the occurrence of fractures, faults, and solution channels. Lateral movement of groundwater occurs through fracture zones and solution cavities and is generally northward toward the Grand Canyon. While water has been found in perched aquifers near Williams at depths less than 950 feet, yields from these more shallow wells are generally less than 5 gallons per minute. Water quality in the basin is generally good, especially in the upper and middle aquifers, but degrades with depth due to salts leaching from upper units. At Williams, three of four water system wells are deeper than 3,500 feet bgs, with water levels between 2,740 and 2,875 feet bgs. Water in the deepest of these wells is of poor quality, with elevated metals concentrations, including arsenic, and high corrosivity (ADWR 2009).

It is estimated that approximately 3 million acre-feet of water is stored in the major aquifers of the Coconino Plateau Basin. Regional water supply for municipal, industrial, and agricultural use is for the most part is derived from groundwater. Total groundwater usage in the region averaged about 6,000 acre-feet per year between 2001 and 2005 (ADWR 2009).

Well data from ADWR indicate that there is one well located within the Project Area, which is owned by the ASLD. No information was available for this well. Four wells are located within 1 mile of the Project Area, all of which are used for domestic and/or stock watering and have a pumping rate of 35 gallons per minute or less. These wells have reported depths ranging from 25 to 700 feet bgs and have reported water levels ranging from 10 to 106 feet bgs (ADWR 2011).

SURFACE WATER

There are no perennial washes within the Project Area; washes on the site are ephemeral and surface water is limited to constructed stock ponds. Surface runoff follows the general topography of the area, flowing overall toward the north. The only named wash on the property is Cataract Creek, which drains northward in Cataract Canyon. Unnamed tributaries drain the majority of the property into Cataract Creek. A small area in the northeast corner of the property drains toward the northeast to Red Lake Wash, which later joins Cataract Creek at a point off-site. Cataract Canyon continues toward the northwest for approximately 70 miles before it joins Havasu Creek near the Grand Canyon and enters the Colorado River at the Grand Canyon. A small portion of the southwest corner of the Project Area drains west into KY Canyon and Martin Canyon Draw, which flow into Partridge Creek before entering Big Chino Wash and Big Chino Valley. Natural channels in the area have been somewhat affected by ranching activities, as many cattle tanks and water impoundments exist on the subject property.

No stream flow data are available for the Project Area, and publically available stream flow data for the region are limited. A USGS stream gage is located on Cataract Creek at Redlands crossing near Valle, Arizona (USGS Gage No. 09404104), approximately 13 miles downstream of the Project Area. Stream flow data at this gage are limited to 11 field measurements taken between 2008 and 2010. For the period of record, flow has occurred at this gage location three times, once in 2008 (4,100 cubic feet per second [cfs]) and twice in 2010 (16 cfs and 62 cfs) (USGS 2011).

Fieldwork was conducted following USACE protocol in order to identify and map the limits of potential jurisdictional waters within the Project Area (Figure 3.19). Approximately 43.8 acres along Cataract Creek and seven washes that are tributary to Cataract Creek were identified within the Project Area as having characteristics of WUS. Although these field data have not been submitted to the USACE for approval, it is a reasonable estimate of jurisdictional waters that are potentially within the Project Area.

Grazing activities and associated stock tank development and maintenance occur on and around the Project Area. The water source that feeds these stock ponds varies. Most commonly, the stock ponds are constructed earthen berms within drainages that impound surface runoff. Ten stock tanks were identified to be within the Project Area; data were obtained from USGS topographic maps.

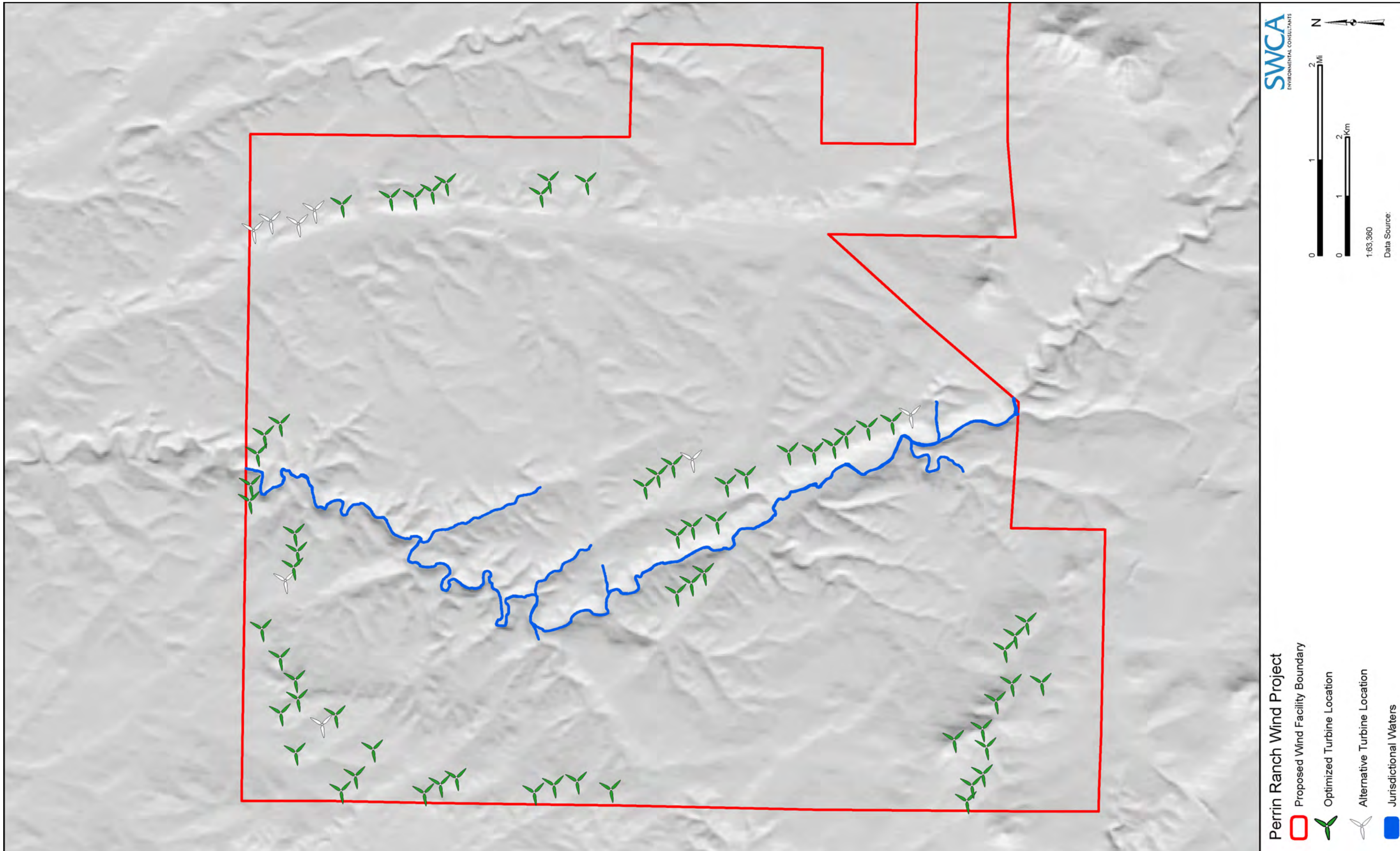

Figure 3.19. Jurisdictional waters within the Project Area.

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Environmental Impacts

SIGNIFICANCE CRITERIA

Groundwater

A significant impact on groundwater would result if any the following were to occur from construction or operation of the proposed Project:

- Groundwater quality degradation that causes groundwater quality to exceed state or federal standards.
- Groundwater depletion or interference with groundwater recharge that adversely affects existing or proposed uses of the groundwater aquifer.

Surface Water

A significant impact on surface water would result if any of the following were to occur from construction or operation of the proposed Project:

- Contamination of surface water from erosion or stormwater runoff that would result in a violation of federal and/or state water quality standards.
- Surface water quality degradation that causes a long-term loss of human use or use by aquatic wildlife and plants.
- Alteration of the existing drainage pattern of the site or area that would result in off-site erosion or siltation, resulting in adverse impacts to adjacent properties.
- Surface water impacts that would violate Section 404 of the CWA or other applicable surface water regulations, including state-established standards for designated uses.
- Reduction of instream flow in Cataract Creek and/or downstream watercourses.
- Any impact to existing surface water rights on Cataract Creek and/or downstream watercourses.

DIRECT AND INDIRECT IMPACTS OF THE PROPOSED PROJECT

Construction

Construction for the Project would disturb approximately 58 acres for the substations and 3 miles for the gen-tie transmission with associated access roads. Fifty feet of the 150-foot-wide access road ROW that would be disturbed during construction is temporary. A temporary construction laydown area would be used to store construction materials and equipment. An on-site concrete batch plant would be assembled nearby for the concrete needed in constructing foundations. It is estimated that 25 acre-feet of water would be needed during construction to make the concrete and for dust suppression. No new water source would be developed for the construction of the proposed Project; all water would be trucked to the Project Area from existing nearby sources. The water source has yet to be determined but would be located within the same groundwater basin. The Proposed Action would result in direct and indirect impacts to water resources from the use of water during construction of the Proposed Action. Because groundwater would be withdrawn from the local aquifer, the impacts to groundwater would be direct and local. With respect to surface water, BMPs would be in place during construction to protect against contamination of surface water and erosion; therefore, direct and indirect impacts to surface water resources would be short term and minor. With respect to groundwater, only a small amount of water from groundwater sources would be used during construction, all impacts to water resources during construction are short term and minor.

Groundwater

No new water source would be developed for the water needed to meet demands during construction of the Project; all water would be trucked to the site from existing local sources. Because the total amount of water need for this phase of the Project is 25 acre-feet, or significantly less than 0.01% of the total water available in storage for the basin, direct impacts to local groundwater resources for construction of the Project are considered to be insignificant. With respect to groundwater quality, because BMPs would be in place during construction that would prevent accidental spills or contaminants to enter underground water sources, the potential for impacts to groundwater quality during this phase of the Project would be minor.

Surface Water

Construction of the Project would not directly disturb any perennial surface water resources. The access roads cross several washes that are potentially WUS. Access road ROW would be 150 feet during the construction phase, 50 feet of which are temporary impacts that would be reclaimed after the construction phase is complete. Approximately 0.13 acre of potentially jurisdictional waters would be impacted during construction, of which 0.09 acre are temporary, short-term impacts. The remaining 0.04 acre of permanent, long-term impacts to jurisdictional waters would be subject to CWA permit general conditions, as well as any special conditions developed by the USACE. Impacts must also meet state and federal water quality standards, which are administered by ADEQ. All construction staging areas, substations, and transmission pole towers would be located outside washes. During construction, BMPs would be in place so as to prevent accidental spills, construction debris, or contaminants from entering washes and to prevent erosion. After construction of the Project is complete, all staging areas and temporary ROW would be recontoured to allow for natural surface drainage and revegetated to reduce erosion.

Additionally, a site-specific SWPPP that would identify temporary BMPs to control erosion and sedimentation from the Project Area would be put in place before the start of construction activities and would remain until final stabilization has occurred. Because no perennial surface water would be directly impacted during the construction phase and because BMPs would be in place throughout construction to protect impacts to surface water quality, indirect impacts to surface water resources during construction of the Project would be minor and are considered insignificant.

Operation and Maintenance

There would be negligible use of water during the operational phase of the Project. It is assumed that access roads would be designed in a manner that would allow natural surface flows to be maintained at all wash crossings and prevent erosion on hillsides using features such as water turnoff bars or small terraces. No storm runoff would be retained on the substation sites. With mitigation measures in place, direct and indirect impacts to water from operation of the Proposed Action would be considered minor, adverse impacts that would have a long-term insignificant impact on water resources.

Groundwater

Because there would be only negligible water demands during the operational phase of the Project, no impacts to groundwater resources are anticipated.

Surface Water

No surface water resources are directly impacted by the operation of the Project. Mitigation measures would allow for natural surface flows to be maintained at wash crossings. With respect to surface water quality, erosion control features would be incorporated into the road design and an SPCC Plan with site-specific BMPs would be in place to prevent chemicals or pollutants from entering surface waterways. With these mitigation measures in place, impacts to surface water resources during the operation of the Project are considered minor.

CUMULATIVE IMPACTS

Several past, present, or reasonably foreseeable projects in the area that could affect water resources involve installation of precipitation gages or a bridge replacement that would occur 18 miles southeast of Flagstaff. Because all these actions are located outside the Study Area for the proposed Project in a different watershed and different groundwater basin, they were not considered for cumulative impacts. The cumulative impacts area of analysis for water resources is the Study Area for the Project. Construction and operation of the Project would not directly impact groundwater or surface water. Thus, cumulative impacts would not occur. Perrin Ranch Wind would use BMPs to minimize erosion and sedimentation and also prevent pollutants from entering the surface waterways.

In terms of the two significance criteria described for groundwater, none of these criteria would be met by implementation of the Proposed Action. Thus, the Project would not have a significant impact on groundwater resources, if implemented. In terms of the six significance criteria described for surface water, with BMPs and mitigation measures in place, none of these criteria would be met by implementation of the Proposed Action. Thus, the Project would not have a significant impact on surface water resources, if implemented.

Mitigation Measures

As stated above, mitigation measures for water resources include:

- incorporating wash crossings devised to maintain natural surface flow and erosion control features into the road design;
- preparing a site-specific SWPPP that would identify temporary BMPs to control erosion and sedimentation from the Project Area, to be put in place before the start of construction activities and to remain until final stabilization has occurred; and
- preparing an SPCC Plan with site-specific BMPs that would help prevent chemicals or pollutants from entering surface waterways during operation.

ENVIRONMENTAL IMPACTS OF THE NO ACTION ALTERNATIVE

Under the No Action Alternative, the Project would not be developed and there would be no direct or indirect impacts on water resources. Water resource conditions would continue as described in the affected environment.

3.3.4 Vegetation

Affected Environment

This section describes vegetation resources that are known, or anticipated, to be present in the 39,833-acre Project Area based on results of Project-specific field surveys and/or publically available geographic information system (GIS) data. The Study Area includes the Project Area and a surrounding 5-mile buffer (see Figure 3.20), within which rare plant locations were queried through Arizona's Heritage Data Management System (HDMS).

VEGETATION COMMUNITIES

The vegetation within the Project Area is primarily characterized by Utah juniper (*Juniperus osteosperma*), two-needle pinyon (*Pinus edulis*), rabbitbrush (*Chrysothamnus* spp.), barberry (*Berberis* sp.), snakeweed (*Gutierrezia* spp.), bitterbrush (*Purshia* sp.), and numerous annual and perennial grasses. Southwest Regional Gap Analysis Project (SWReGAP) land cover data (USGS 2004) characterize the Project Area as nine distinct land cover classes; however, only seven of these would be disturbed from the Proposed Action (Table 3.6).

Table 3.6. SWReGAP Land Cover Classes Occurring within the Project Footprint

SWReGAP Land Cover Class	Acreage within the Project Area
Colorado Plateau Pinyon-Juniper Woodland	30,527
Inter-Mountain Basins Semi-Desert Shrub Steppe	4,462
Inter-Mountain Basins Juniper Savanna	2,091
Inter-Mountain Basins Semi-Desert Grassland	1,388
Inter-Mountain Basins Big Sagebrush Shrubland	1,001
Rocky Mountain Ponderosa Pine Woodland	172
Inter-Mountain Basins Mixed Salt Desert Scrub	128

The Colorado Plateau Pinyon-Juniper Woodland (Pinyon-Juniper) is the dominant land cover class within the Project Area, comprising 30,527 acres or 77% of the cover. The Pinyon-Juniper land cover class occurs in dry mountains and foothills throughout the Colorado Plateau, ranging from western Colorado, northeastern Utah, northern Arizona, and eastern New Mexico (USGS 2004). This land cover class can generally be found on warm, dry areas on slopes, mesas, plateaus, and ridges that are characterized by extreme weather conditions (USGS 2004). Two-needle pinyon and juniper are the dominant tree species in this land cover class, which may also include a variety of shrub, forb, and grass species in the understory (USGS 2004). Other common species in this land cover class include big sagebrush (*Artemisia tridentata*), littleleaf mountain mahogany (*Cercocarpus intricatus*), antelope bitterbrush (*Purshia tridentata*), James' galleta (*Pleuraphis jamesii*), and muttongrass (*Poa fendleriana*) (USGS 2004).

The Inter-Mountains Basins Semi-Desert Shrub Steppe (Semi-Desert Shrub) comprises 4,462 acres or 11% of the land cover within the Project Area. This land cover class occurs throughout the Intermountain West on alluvial fans and flats, and is characterized by grasses interspersed with shrubs. Common grass species include blue grama (*Bouteloua gracilis*), saltgrass (*Distichlis spicata*), needle and thread (*Hesperostipa comata*), James' galleta, Sandberg bluegrass (*Poa secunda*), and alkali sacaton (*Sporobolus airoides*) (USGS 2004). Typical shrub species include fourwing saltbush (*Atriplex canescens*), big sagebrush, rabbitbrush, ephedra (*Ephedra* spp.), rubber rabbitbrush (*Ericameria nauseosa*), snakeweed (*Gutierrezia sarothrae*), and winterfat (*Krascheninnikovia lanata*) (USGS 2004).

The Inter-Mountains Basins Juniper Savanna (Juniper Savanna) comprises 2,091 acres or 5% of the land cover within the Project Area. Juniper Savanna can be found across a large geographical area from western Colorado, northwest New Mexico, northern Arizona, throughout Utah, and into the Great Basin in Nevada, and Idaho (USGS 2004). The Juniper Savanna land cover class is generally characterized by open grasses with interspersed juniper trees, although some areas may have more dense stands of juniper (USGS 2004). Typical plant species include Utah juniper, blue grama, needle and thread, and James' galleta (USGS 2004).

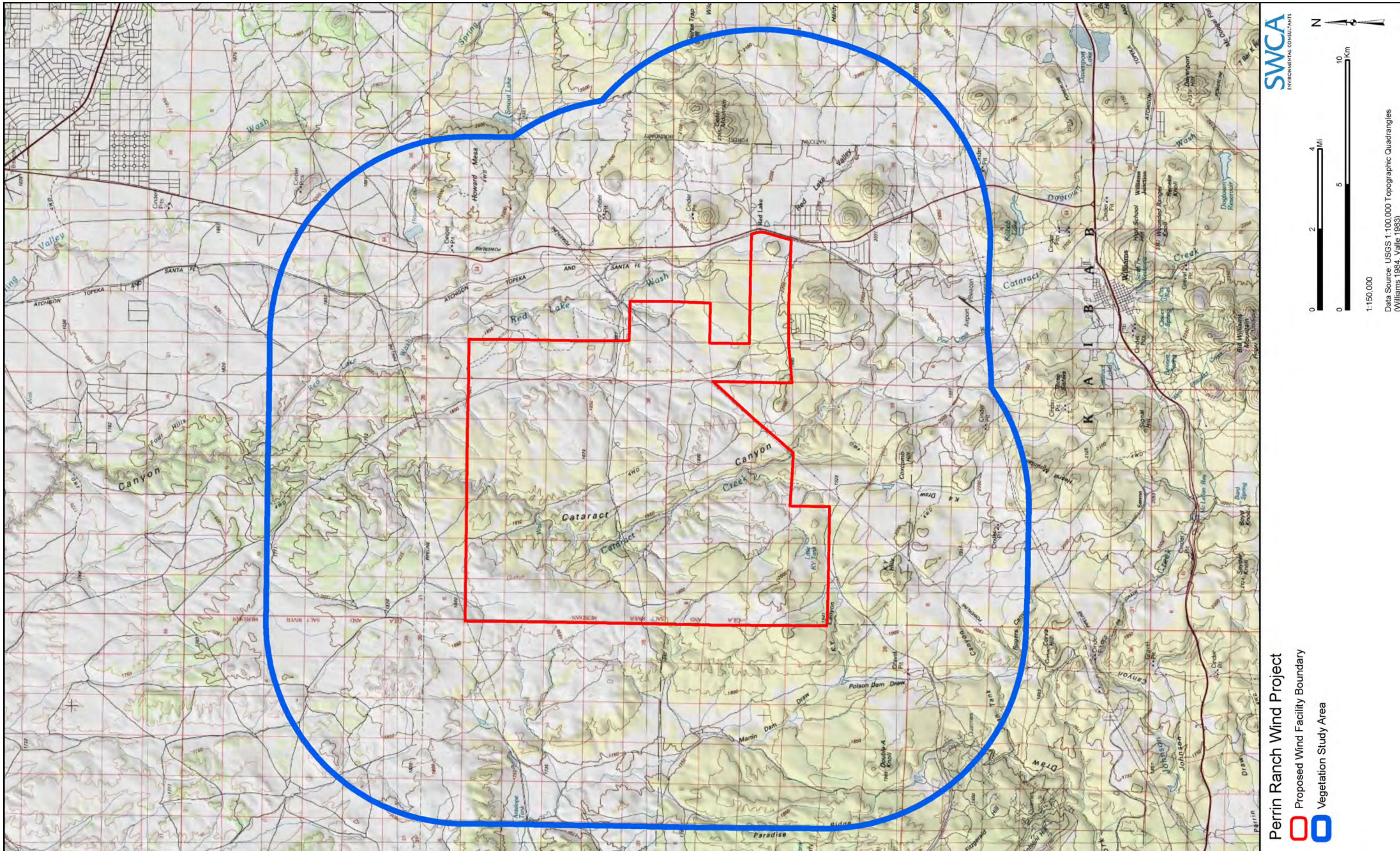

Figure 3.20. Vegetation Study Area map.

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The Inter-Mountains Basins Semi-Desert Grassland (Semi-Desert Grassland) comprises 1,388 acres or 3% of the land cover within the Project Area. The Semi-Desert Grassland land cover type is found throughout the Intermountain West on dry plains and mesas and is characterized by perennial bunch grasses with interspersed dwarf shrubs (USGS 2004). Typical plant species include Indian ricegrass (*Achnatherum hymenoides*), threeawn (*Aristida* spp.), blue grama, needle and thread, muhly (*Muhlenbergia* spp.), James' galleta, sagebrush (*Artemesia* spp.), saltbush (*Atriplex* spp.), snakeweed, and winterfat (USGS 2004).

The Inter-Mountains Basins Big Sagebrush Shrubland (Big Sagebrush Shrubland) comprises 1,001 acres or 3% of the land cover within the Project Area. The Big Sagebrush Shrubland is found throughout the western United States where it is generally found in basins between mountain ranges (USGS 2004). This land cover class is dominated by big sagebrush and Wyoming big sagebrush (*Artemesia tridentata* var. *tridentata*), and typically also includes scattered juniper trees and perennial bunch grasses (USGS 2004). Other plant species that are typically found in this land cover class include greasewood (*Sarcobatus vermiculatus*), saltbush, rubber rabbitbrush, yellow rabbitbrush (*Chrysothamnus viscidiflorus*), antelope bitterbrush, Indian ricegrass, blue grama, thickspike wheatgrass (*Elymus lanceolatus*), Idaho fescue (*Festuca idahoensis*), needle and thread, and James' galleta (USGS 2004).

The Rocky Mountain Ponderosa Pine Woodland (Ponderosa Pine Woodland) comprises 172 acres or less than 1% of the land cover within the Project Area. This widespread land cover class is found scattered throughout the West from elevations ranging from approximately 6,293 to 9,186 feet amsl (USGS 2004). While this land cover class occurs on all slopes and aspects, it is typically found on moderate to steep slopes and along ridgelines (USGS 2004). Two-needle pinyon, ponderosa pine (*Pinus ponderosa*), and juniper may be found growing within this land cover class (USGS 2004). The understory includes a variety of shrub species including sagebrush, manzanita (*Arctostaphylos* spp.), bitterbrush, and serviceberry (*Amelanchier* spp.) (USGS 2004). Some grasses may occur and could include needle and thread, needlegrasses (*Acnatherum* spp.), muhly, and grama.

The Inter-Mountain Basins Mixed Salt Desert Scrub (Salt Desert Scrub) comprises 128 acres or less than 1% of the land cover within the Project Area. This extensive land cover class consists of open canopy shrub communities in saline basins, alluvial slopes, and plains (USGS 2004). A variety of saltbush dominates this land cover type, although sagebrush, rabbitbrush, Nevada ephedra (*Ephedra nevadensis*), spiny hopsage (*Grayia spinosa*), and winterfat may be encountered (USGS 2004). Typical grasses include Indian ricegrass, blue grama, James' galleta, big galleta, and alkali sacaton.

Rare Plant Populations

In order to determine if rare plant populations are present in the Study Area, AGFD's HDMS online tool was queried on April 12, 2010 (AGFD 2010b). This query did not result in identification of any state or federally protected plant species within the Study Area.

Noxious and Invasive Weeds

Three species of noxious weeds are known to occur within the Project Area (Table 3.7) (USGS 2007): field bindweed (*Convolvulus arvensis*), dalmatian toadflax (*Linaria dalmatica*), and Scotch thistle (*Onopordum acanthium*). Additional non-regulated, invasive plant species maintained in USGS database have been include in Table 3.7, although the containment or control of these plants is not regulated. The Arizona Department of Agriculture (ADA 2006) indicates that prohibited plant species are barred from entry into the state of Arizona, regulated plants may be controlled or quarantined in order to prevent spread, and restricted plants shall be quarantined to prevent spread.

Table 3.7. Noxious and Invasive Weeds within the Project Area

Scientific name	Common Name	Status
Bromus tectorum	Cheatgrass	Invasive
Convolvulus arvensis	Field bindweed	Regulated*
Erodium cicutarium	Redstem stork's bill	Invasive
Linaria dalmatica	Dalmatian toadflax	Restricted*
Marrubium vulgare	Horehound	Invasive
Onopordum acanthium	Scotch cottonthistle	Prohibited*
Salsola tragus	Russian thistle	Invasive
Verbascum thapsus	Common mullein	Invasive

* Listing status from ADA (2006)

Environmental Impacts

SIGNIFICANCE CRITERIA

A significant impact on vegetation would result if any of the following were to occur from construction or operation of the proposed Project:

- Loss to any population of sensitive plants that would jeopardize the continued existence of that population.
- Loss to any population of plants that would result in a species being listed or proposed for listing as endangered or threatened.
- The introduction or increase of the spread of noxious weeds.

A significant impact on endangered or threatened species or their critical habitats would result if any of the following were to occur from construction or operation of the proposed Project:

- Jeopardizing the continued existence of a federally listed species.
- Loss of individuals of a population of species that would result in a lowering a species status (e.g., from threatened to endangered).
- Adversely modifying critical habitat to the degree it would no longer support the species for which it was designated.
- Modification of habitat used by special status species for resting, nesting, feeding, or escape cover.

DIRECT AND INDIRECT IMPACTS OF THE PROPOSED PROJECT

Construction

The construction phase of the Proposed Action would include ground-disturbing activities for the development of a substation, switchyard, wind turbines, access roads, transmission lines, and associated facilities (i.e., substations, O&M, and switchyards) as described in Chapter 2. Adverse direct and indirect impacts to vegetation from construction of the Proposed Action would be long-term and short-term, local, and minor.

Vegetation Communities

Construction activities would result in the short-term disturbance of 648 acres, which is 1.6% of the Project Area. Temporary use areas would be reclaimed immediately following construction according to guidelines described in the Restoration and Reclamation Plan (see Appendix A). The Restoration and Reclamation Plan details the types of impacts that would occur from disturbance to native vegetation communities and provide methods and techniques for returning impacted areas to pre-disturbance conditions. Included in the Restoration and Reclamation Plan are seed mixes, monitoring schedules, noxious weed management measures, and measures to improve areas where restoration and reclamation does not meet success criteria, if necessary.

Construction activities would also result in the long-term disturbance of 226 acres, 0.6% of the Project Area. Long-term disturbance would extend throughout the life of the Project and continue until all impacted areas are revegetated. The acreages of each land cover class that would be directly affected as a result of long- and short-term vegetation impacts are summarized below in Table 3.8. The long- and short-term vegetation impacts to these land cover classes are not anticipated to have a substantial impact, as each of these land cover classes are common and well distributed in the western United States.

Table 3.8. SWReGAP Land Cover Classes Potentially Affected by the Proposed Action

SWReGAP Land Cover Class	Acreage within Project Area	Short-term Impact Acreage	Long-term Impact Acreage
Colorado Plateau Pinyon-Juniper Woodland	30,527	399	154
Inter-Mountain Basins Semi-Desert Shrub Steppe	4,462	129	35
Inter-Mountain Basins Juniper Savanna	2,091	33	14
Inter-Mountain Basins Semi-Desert Grassland	1,388	61	14
Inter-Mountain Basins Big Sagebrush Shrubland	1,001	12	3
Rocky Mountain Ponderosa Pine Woodland	172	13	5
Inter-Mountain Basins Mixed Salt Desert Scrub	128	1	1
Total	**39,769**	**648**	**226**

Adverse, indirect, long-term impacts may occur from the spread and establishment of noxious weeds within the Project Area. Construction equipment and vehicles, and imported fill, have the potential to carry noxious weed seeds from within or outside the Project Area. However, the spread or establishment of noxious weeds within the Project Area would be minimized through the use of BMPs and the Restoration and Reclamation Plan. No significant impacts to vegetation communities are anticipated to occur as described in significance criteria above.

Rare Plants

No state or federally protected plant species are known to occur within the Project Area. Therefore, there would be no impacts to rare plants resulting from construction of the Proposed Action. No significant impacts to rare plants are anticipated to occur as described in significance criteria above.

Operation and Maintenance

Adverse impacts to vegetation resources are anticipated to be minimal during the operation of the Proposed Action. Adverse impacts would generally be related to an increase in the number and mileage of roads within the Project Area that may provide additional access for vehicles. Therefore, direct and indirect adverse impacts to vegetation resources from operation of the Proposed Action would be local, long term, and negligible.

Vegetation Communities

Direct adverse impacts to vegetation communities resulting from operation are not anticipated to occur. Indirect adverse impacts to vegetation communities may result from increased road access within the Project Area and would consist of increased legal and illegal take of plants, introduction of invasive vegetation, and increased risk of wildfire through campfires, off-highway vehicle use, and cigarettes. Increased road access may also result in spread of current populations of noxious and invasive weeds. However, the Restoration and Reclamation Plan (see Appendix A) would address the control and treatment of noxious weeds in the Project Area. The Restoration and Reclamation Plan includes methods of preventing the introduction and spread of noxious weeds, noxious weed treatment options, and a monitoring plan for tracking the success of noxious weed treatment. No significant impacts to vegetation communities are anticipated to occur as described in significance criteria above.

Rare Plants

No state or federally protected plant species are known to occur within the Project Area. Therefore, there would be no impacts to rare plants resulting from construction of the Proposed Action. No significant impacts to rare plants, as described by significance criteria above, are anticipated to occur.

CUMULATIVE IMPACTS

The cumulative impacts area of analysis for vegetation includes Coconino County, Arizona. Within this area the majority of past, present, and reasonably foreseeable projects in the area are roads, trails, and other similar projects that would result in minimal disturbance to vegetation resources. These projects would contribute to habitat loss and fragmentation, and increase the potential for spreading noxious and invasive weeds; however, these impacts would occur at a localized level (i.e., within and adjacent to the Project Area) and the additive impact is anticipated to be low. Projects related to habitat improvement and prescribed burns would have a net benefit to the land cover classes that are targeted for improvement.

Mitigation Measures

The Restoration and Reclamation Plan (see Appendix A) provides all the necessary mitigation for vegetation resources; no additional mitigation measures would be necessary.

ENVIRONMENTAL IMPACTS OF THE NO ACTION ALTERNATIVE

Under the No Action Alternative, the Project would not be developed and there would be no direct or indirect impacts on vegetative conditions. Vegetative conditions would continue as described in the affected environment.

3.3.5 Wildlife

This section describes wildlife that is known, or anticipated, to be present in the Project Area based on results of Project-specific field surveys and/or publicly available GIS data. The Study Area for all wildlife species included a 3-mile buffer (i.e., the extent of the HDMS search request [AGFD 2010b]) surrounding the Project Area, and a 10-mile buffer for eagle species (Pagel et al. 2010) (Figure 3.21). Throughout this section all wildlife is grouped in species assemblages, and although individual species are listed to inform the reader, impacts to wildlife are discussed as they relate to species assemblages. These species assemblages included general wildlife and species that are protected through state and federal regulations.

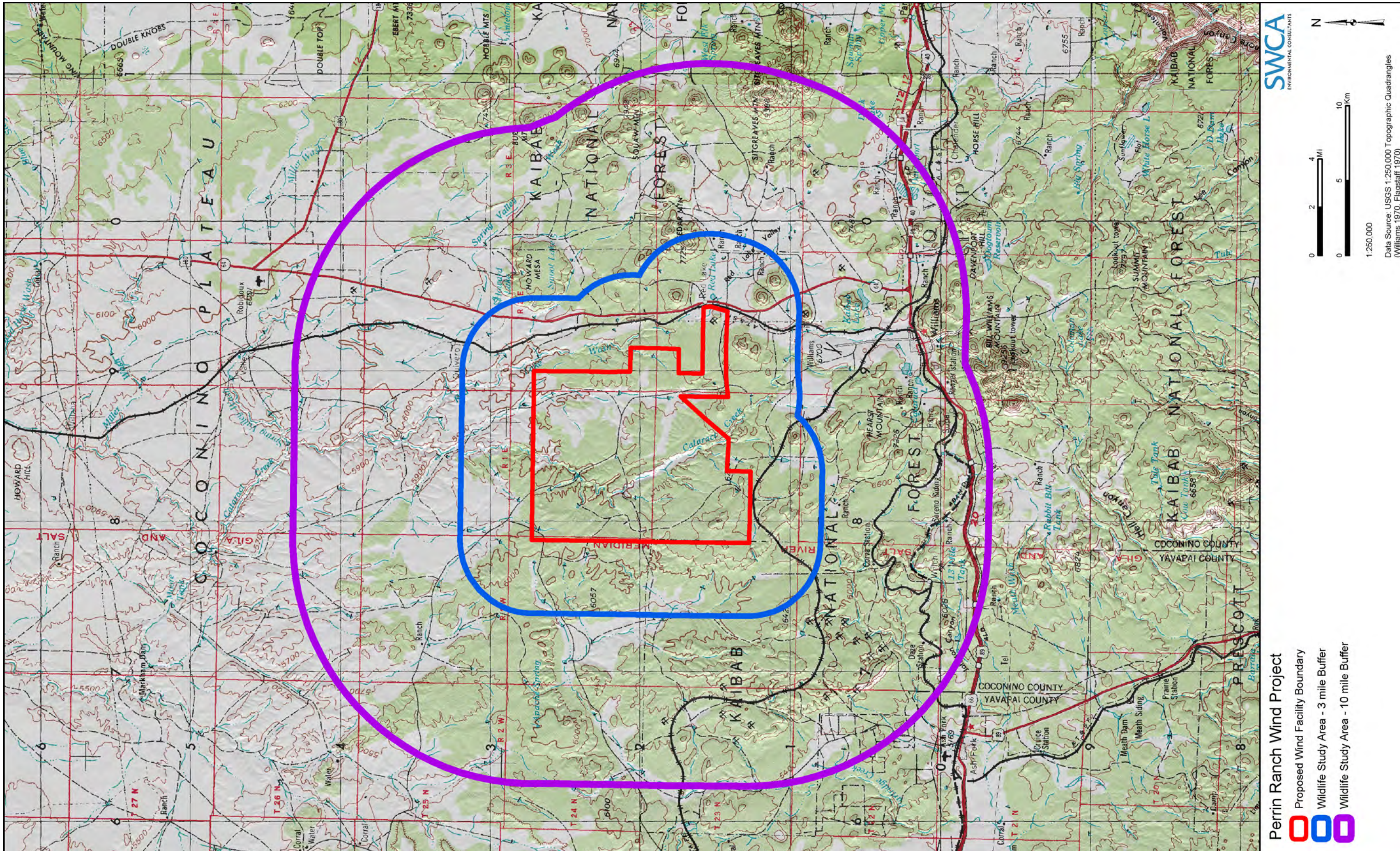

Figure 3.21. Wildlife Study Area map.

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Affected Environment

RAPTORS

Raptors include diurnal birds of prey (Order Falconiformes) and nocturnal birds of prey or owls (Order Strigiformes). The U.S. Fish and Wildlife Service (USFWS) and the AGFD have provided a list of 17 raptor species that have the potential to occur in the Project Area. These species, along with their USFWS and Arizona State Wildlife Action Plan (AZ SWAP) listing status, are provided below in Table 3.9. Potential for occurrence is described by the following categories:

- *Likely to occur*—the Project Area is either within the known geographic area or breeding range of the species and the species has been documented in the Project Area.
- *May occur*—the Project Area is either within the known geographic area or breeding range of the species, and/or suitable foraging or roosting habitat is present; the species may have been briefly documented within the Project Area vicinity.
- *Unlikely to occur, may wander*—the Project Area is either outside the known geographic and elevational range and/or does not contain suitable habitat for the species; however, suitable habitat is located nearby and wandering individuals could be encountered.
- *Unlikely to occur*—the Project Area is either outside the known geographic and elevational range and/or does not contain suitable habitat for the species.

Table 3.9. Raptor Species with Potential to Occur in the Project Area

Species Common Name	Species Scientific Name	USFWS (protection status)	AZSWAP (protection status)	Potential for Occurrence in the Project Area
American peregrine falcon	*Falco peregrinus anatum*	BCC± DM* SC*	1A	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Bald eagle – wintering population	*Haliaeetus leucocephalus*	BCC± BGEPA SC*	1A	**Likely to occur.** The Project Area is within the known geographic and elevational range of the bald eagle wintering population. Although there is potentially suitable roosting and winter foraging habitat within the Project Area, no breeding habitat is present. This species has been documented within the Project Area.
California condor	*Gymnogyps californianus*	E †,* EXPN†,*	1A	**May occur.** Condors are known to fly long distances in search of carrion, with the southern extent of the species' current range reaching Grand Canyon. Long-term movement studies using telemetry show that the species does not use the Project Area. Historically, the species has been documented within 5 miles of the Project Area and could enter the Project Area in the future.
Common black hawk	*Buteogallus anthracinus*		1C	**Unlikely to occur.** The Project Area does not contain riparian forest and is well outside the known geographic range of the species.
Ferruginous hawk	*Buteo regalis*	BCC± SC*	1B	**Unlikely to occur.** There are no documented occurrences of the species within 5 miles of the Project Area (according to the AGFD). Although the Project Area is within the known geographic range of the species, little to no suitable breeding habitat occurs within the Project Area. The species may migrate through the area.
Flammulated owl	*Otus flammeolus*	BCC±	1C	**Unlikely to occur.** The Project Area does not contain montane forest habitat with brushy understory, which is typical habitat for this species.

Table 3.9. Raptor Species with Potential to Occur in the Project Area (Continued)

Species Common Name	Species Scientific Name	USFWS (protection status)	AZSWAP (protection status)	Potential for Occurrence in the Project Area
Golden eagle	*Aquila chrysaetos*	BCC[±] BGEPA	1B	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. There is potentially suitable nesting habitat within the Project Area. This species has been documented during site-specific surveys.
Long-eared owl	*Asio otus*		1C	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Mexican spotted owl	*Strix occidentalis lucida*	T[†,*]	1A	**Unlikely to occur.** Although the Project Area is within the known geographic and elevational range of the species, there is no suitable breeding habitat within the Project Area.
Northern goshawk	*Accipiter gentilis*	SC*	1B	**Unlikely to occur.** May wander. Although the Project Area is within the geographic and elevational range of the species, and the species has been documented within 5 miles of the Project Area (according to the AGFD), suitable breeding habitat does not occur within the Project Area.
Northern pygmy owl	*Glaucidium gnoma californicum*		1C	**May occur.** The Project Area is within the known geographic and elevational range of the species. There is potentially suitable nesting habitat within the Project Area.
Northern saw-whet owl	*Aegolius acadicus*		1C	**May occur.** The Project Area is within the known geographic and elevational range of the species. There is potentially suitable nesting and wintering habitat within the Project Area.
Osprey	*Pandion haliaetus*		1B	**May occur.** Although the Project Area is within the known geographic and elevational range of the species, no suitable breeding or foraging habitat occurs within the Project Area. This species has been documented within 5 miles of the Project Area (according to the AGFD).
Prairie falcon	*Flaco mexicanus*	BCC[±]	1C	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented as a migrant during site-specific surveys.
Swainson's hawk	*Buteo swainsoni*		1C	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented as a migrant during site-specific surveys.
Western burrowing owl	*Athene cunicularia hypugaea*	BCC[±] SC*	1B	**Unlikely to occur.** Suitable breeding habitat does not occur within the Project Area.
Western screech-owl	*Megascops kennicottii*		1C	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. There is potentially suitable nesting habitat within the Project Area.

Notes:

BCC = USFWS Bird of Conservation Concern; BGEPA = Bald and Golden Eagle Protection Act; DM = Delisted, Being Monitored; E = Endangered; EXPN = Experimental Population/Non-essential; SC = Species of Concern; T = Threatened; 1A = Federally listed species, or candidate species, or species has existing signed conservation agreement, or species requires monitoring following delisting; 1B = Species is petitioned for listing, or species is a high priority for the Arizona Partners in Flight Bird Conservation Plan, or species is a BLM, USFS, National Park Service, or other sensitive species; 1C = Species was identified as vulnerable but did not meet criteria identified for 1A or 1B.

* AGFD (2010b).

† USFWS (2010).

± USFWS (2008).

Raptors, like most species of birds, are protected under the Migratory Bird Treaty Act of 1918, which is the domestic law that affirms, or implements, the United States' commitment to four international conventions (with Canada, Japan, Mexico, and Russia) for the protection of a shared migratory bird resource. Each of the conventions protects selected species of birds that are common to these countries (i.e., species occur in any countries at some point during their annual life cycle). The Migratory Bird Treaty Act protects all migratory birds and their parts (including eggs, nests, and feathers). Bald and golden eagles are also protected under the Bald and Golden Eagle Protection Act. Additionally, raptor species are protected by the State of Arizona under Arizona Revised Statute 17-102 and 17-236.

SWCA initiated site-specific raptor surveys in the spring of 2010 and are still underway. Survey methods have followed those identified by the AGFD guidelines (AGFD 2009b), although the duration of these surveys exceeded AGFD requirements. These surveys included ground-based and aerial nest surveys throughout the Project Area and a surrounding 2-mile buffer for all raptors and throughout the Project Area and a 10-mile buffer for golden eagle. While surveys are ongoing, initial results indicate that while raptors use the habitat within the Project Area and surrounding buffers, the levels of use are low relative to the use of habitat within the Grand Canyon (SWCA 2010). Raptors may be especially sensitive to mortality at wind energy sites due to their low reproductive rates, which limits the ability of local populations to recover from unnatural sources of mortality.

NON-RAPTOR AVIAN SPECIES

Non-raptor avian species include passerines or songbirds (Order Passeriformes), waterfowl (Order Anseriformes), upland game birds (Order Galliformes), doves and pigeons (Order Columbiformes), and others. The USFWS and the AGFD have provided a list of 60 non-raptor avian species that have the potential to occur in the Project Area. These species, along with their USFWS and AZ SWAP listing status, are provided below in Table 3.10.

Table 3.10. Non-raptor Avian Species with Potential to Occur in the Project Area

Species Common Name	Species Scientific Name	USFWS (protection status)	AZSWAP (protection status)	Potential for Occurrence in the Project Area
Acorn woodpecker	*Melanerpes formicivorus*		1C	**Unlikely to occur. May wander.** Although there is no suitable breeding habitat within the Project Area, the species may wander into the Project Area.
American bittern	*Botaurus lentiginosus*	BCC±	1B	**Unlikely to occur.** The Project Area does not contain marshes or other wetland habitat.
American pipit	*Anthus rubescens*		1C	**Unlikely to occur.** Although the Project Area is outside the breeding and wintering range of the species, the species may migrate through or winter in the Project Area.
Baird's sparrow	*Ammodramus bairdii*	SC*	1C	**Unlikely to occur.** Although the Project Area is outside the breeding and wintering range of the species, the species may migrate through the area. The Project Area does not contain any suitable breeding habitat for the species.
Band-tailed pigeon	*Patagioenas fasciata*		1C	**Unlikely to occur. May wander.** Although the Project Area does not contain suitable habitat for the species, the species may wander through the Project Area.
Belted kingfisher	*Megaceryle alcyon*		NA	**Unlikely to occur.** The Project Area does not contain any suitable aquatic habitat for the species.
Bendire's thrasher	*Toxostoma bendirei*	BCC±	1C	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Black-chinned sparrow	*Spizella atrogularis*		1C	**Unlikely to occur. May wander.** Although the Project Area does not occur within the species range, the species may wander through the Project Area.

Table 3.10. Non-raptor Avian Species with Potential to Occur in the Project Area (Continued)

Species Common Name	Species Scientific Name	USFWS (protection status)	AZSWAP (protection status)	Potential for Occurrence in the Project Area
Black-throated gray warbler	*Dendroica nigrescens*		1C	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Brewer's sparrow	*Spizella breweri*	BCC±	1C	**May occur.** Although the Project Area lies between the breeding and wintering range of the species, the species may occur, especially during winter.
Brown-crested flycatcher	*Myiarchus tyrannulus*		1C	**Unlikely to occur. May wander.** Although the Project Area lies just north of the species range, the species may wander through the Project Area.
Bullock's oriole	*Icterus bullockii*		1C	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Cassin's finch	*Carpodacus cassinii*	BCC±		**May occur.** The Project Area occurs within the species' wintering range.
Chestnut-collared Longspur	*Calcarius ornatus*	BCC±	1C	**Unlikely to occur.** Although the Project Area is outside the breeding and wintering range of the species, the species may migrate through the area.
Common nighthawk	*Chordeiles minor*		1B	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented within the Project Area.
Common poorwill	*Phalaenoptilus nuttallii*		1C	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Cordilleran flycatcher	*Empidonax occidentalis*		1C	**Unlikely to occur. Migration only.** Although the Project Area is within the known geographic and elevational range of the species, no suitable breeding habitat is present within the Project Area. The species may migrate through the area.
Dusky flycatcher	*Empidonax oberholseri*		1C	**Unlikely to occur. Migration only.** Although the Project Area is outside the known range of the species, the species may migrate through the Project Area.
Eastern meadowlark	*Sturnella magna*		1C	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Evening grosbeak	*Coccothraustes vespertinus*		1B	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species.
Golden-crowned kinglet	*Regulus satrapa*		1C	**May occur. May wander.** Although the Project Area is within the range of the species, the Project Area does not contain suitable habitat. The species may wander through the Project Area.
Grace's warbler	*Dendroica graciae*	BCC±	1C	**Unlikely to occur. May migrate/wander.** Although the Project Area is within the breeding range of the species, the Project Area does not contain suitable habitat. The species may migrate through the Project Area.
Gray catbird	*Dumetella carolinensis*		1B	**Unlikely to occur.** Although the Project Area is outside the breeding and wintering range of the species, the species may migrate through the area. The Project Area does not contain any suitable breeding habitat for the species.
Gray flycatcher	*Empidonax wrightii*		1C	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented during site specific surveys.

Table 3.10. Non-raptor Avian Species with Potential to Occur in the Project Area (Continued)

Species Common Name	Species Scientific Name	USFWS (protection status)	AZSWAP (protection status)	Potential for Occurrence in the Project Area
Gray vireo	*Vireo vicinior*	BCC±	1C	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Hooded oriole	*Icterus cucullatus*		1C	**Unlikely to occur. May wander.** Although the Project Area lies just north of the species range, the species may wander through the Project Area.
Juniper titmouse	*Baeolophus ridgwayi*	BCC±	1C	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Lazuli bunting	*Passerina amoena*		1C	**Unlikely to occur. Migration only.** Although the Project Area lies just south of the species range, the species may migrate through the Project Area.
Lewis's woodpecker	*Melanerpes lewis*	BCC±	1C	**Unlikely to occur. May wander.** Although there is no suitable breeding habitat within the Project Area, the species may wander into the Project Area.
Lincoln's sparrow	*Melospiza lincolnii*		1B	**May occur.** The Project Area occurs within the species' range.
MacGillivray's warbler	*Oporornis tolmiei*		1B	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
McCown's longspur	*Rhynchophanes mccownii*		1C	**Unlikely to occur. Migration only.** Although the Project Area is not within the breeding or wintering range of the species, the species may migrate through the area.
Mexican whippoorwill	*Caprimulgus arizonae*		1C	**Unlikely to occur. May wander.** The Project Area lies just north of the known geographic and elevational range of the species. Therefore, the species may wander into the Project Area.
Mountain bluebird	*Siala currucoides*		1C	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Olive-sided flycatcher	*Contopus cooperi*	SC*	1C	**Unlikely to occur.** Although the Project Area is within the known geographic and elevational range of the species, no suitable breeding habitat is present within the Project Area. The species may migrate through the area.
Phainopepla	*Phainopepla nitens*		1C	**Unlikely to occur. May wander.** Although the Project Area occurs within the species range, no suitable habitat for the species is present. The species may wander through the Project Area.
Pine grosbeak	*Pinicola enucleator*		1B	**Unlikely to occur.** The Project Area is outside the known geographic range of the species, and no suitable habitat is present within the Project Area.
Pinyon jay	*Gymnorhinus cyanocephalus*	BCC±	1B	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Red crossbill	*Loxia curvirostra*		1C	**May occur. May wander**. The Project Area is within the known geographic and elevational range of the species. Although there is no potentially suitable breeding habitat within the Project Area, the species is highly irregular in its wanderings.
Red-naped sapsucker	*Sphyrapicus nuchalis*		1C	**Unlikely to occur. May wander.** Although the Project Area is within the range of the species, the Project Area does not contain suitable habitat. The species may wander through the Project Area.

Table 3.10. Non-raptor Avian Species with Potential to Occur in the Project Area (Continued)

Species Common Name	Species Scientific Name	USFWS (protection status)	AZSWAP (protection status)	Potential for Occurrence in the Project Area
Sage sparrow	*Amphispiza belli*		1C	**Unlikely to occur.** Although the Project Area is within the wintering range of the species, the Project Area does not contain suitable habitat. The species may migrate through the Project Area.
Sage thrasher	*Oreoscoptes montanus*		1C	**Unlikely to occur. May wander. Migration only.** Although the Project lies within the winter range of the species, the Project Area does not contain suitable wintering habitat. The species may migrate and/or wander through the Project Area.
Savannah sparrow	*Passerculus sandwichensis*		1B	**May occur. Winter/Migration only.** Although the Project Area lies just outside the breeding and wintering range of the species, the species may occur, most likely during winter.
Scott's oriole	*Icterus parisorum*		1C	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Southwestern willow flycatcher	*Empidonax traillii extimus*	BCC± E†,*	1A	**Unlikely to occur.** The Project Area does not contain any suitable riparian habitat.
Sprague's pipit	*Anthus spragueii*	C†,*	1A	**Unlikely to occur.** Although the Project Area is outside the breeding and wintering range of the species, the species may migrate through the area. The Project Area does not contain any suitable breeding habitat for the species.
Swainson's thrush	*Catharus ustulatus*		1B	**Unlikely to occur.** Although the Project Area is outside the breeding and wintering range of the species, the species may migrate through the area.
Varied bunting	*Passerine versicolor*		1C	**Unlikely to occur.** The Project Area does not occur within the species range.
Veery	*Catharus fuscescens*	BCC±		**Unlikely to occur.** Although the Project Area is outside the breeding and wintering range of the species, the species may migrate through the area. The Project Area does not contain any suitable breeding habitat for the species.
Vermilion flycatcher	*Pyrocephalus rubinus*		1C	**Unlikely to occur. May Wander.** The Project Area is within the known geographic and elevational range of the species. Although this species has been documented during site specific surveys, the sighting is considered rare, with the individual recorded as a vagrant.
Virginia's warbler	*Oreothlypis virginiae*		1C	**May occur.** The Project Area is within the known geographic and elevational range of the species.
Western grasshopper sparrow	*Ammodramus savannarum*	BCC± SC*	1B	**Unlikely to occur.** Although the Project Area is outside the breeding and wintering range of the species, the species may migrate through the area.
Western purple martin	*Progne subis arboricola*		1C	**Unlikely to occur. May wander/Migration only.** Although the Project Area does not contain suitable breeding habitat, the species may migrate and/or wander through the area.
Western scrub-jay	*Aphelocoma californica*		1C	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Western snowy plover	*Charadrius alexandrinus nivosus*	BCC± E†,*	1B	**Unlikely to occur.** Although the Project Area is outside the breeding and wintering range of the species, the species may migrate through the area. The Project Area does not contain any suitable breeding habitat for the species.

Table 3.10. Non-raptor Avian Species with Potential to Occur in the Project Area (Continued)

Species Common Name	Species Scientific Name	USFWS (protection status)	AZSWAP (protection status)	Potential for Occurrence in the Project Area
White-crowned sparrow	*Zonotrichia leucophrys*		1C	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
White-faced ibis	*Plegadis chihi*	SC*	NA	**Unlikely to occur.** The Project Area does not contain riparian habitat. In addition, the Project Area is outside the known geographic range and is above the known elevational range of the species.
White-throated swift	*Aeronautes saxatalis*		1C	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Williamson's sapsucker	*Sphyrapicus thyroideus*		1C	**Likely to occur.** The Project Area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Yellow warbler	*Dendroica petechia*		1B	**May occur. Migration only.** Although the Project Area is within the breeding range of the species, the Project Area does not contain suitable habitat. The species may migrate through the Project Area.
Yellow-billed cuckoo	*Coccyzus americanus*	BCC[±] C[†,*]	1A	**Unlikely to occur.** The Project Area does not contain riparian woodland vegetation (cottonwood, willow, or saltcedar).
Yellow-breasted chat	*Icteria virens*		1C	**Unlikely to occur. May wander.** Although the Project Area occurs within the species range, no suitable habitat for the species is present. The species may wander through the Project Area.

Notes:

BCC = USFWS Bird of Conservation Concern; E = Endangered; EXPN = Experimental Population/Non-essential; SC = Species of Concern; 1A = Federally listed species, or candidate species, or species has existing signed conservation agreement, or species requires monitoring following delisting; 1B = Species is petitioned for listing, or species is a high priority for the Arizona Partners in Flight Bird Conservation Plan, or species is a BLM, USFS, National Park Service, or other sensitive species; 1C = Species was identified as vulnerable but did not meet criteria identified for 1A or 1B.

* AGFD (2010b)

[†] USFWS (2010)

[±] USFWS (2008)

BATS

The USFWS and the AGFD have provided a list of sensitive bat species that have the potential to occur in the Project Area. These species, along with their USFWS and AZ SWAP listing status, are provided below in Table 3.11. In accordance with AGFD guidelines (AGFD 2009b), long-term site-specific acoustic bat studies were initiated by Pandion Systems, Inc. (Pandion), using ReBAT acoustic detectors (Pandion 2011). The Pandion study resulted in the identification of 18 bat species, including many of those identified in Table 3.11, with exception to Mexican long-tongued bat (*Choeronycteris mexicana*), western red bat (*Lasiurus blossevilli*), and cave myotis (*Myotis velifer*). SWCA completed supplemental bat surveys including six weeks of AnaBat acoustic surveys, five mist-net capture surveys, and roost searches during September and October within Cataract Canyon. AnaBat acoustic and mist-net capture surveys confirmed the presence of 14 of the 18 species observed by Pandion. No roosting resources were observed during roost searches; however, numerous crack, crevices, and pockets in the rock formations of Cataract Canyon may provide roosting resources for low numbers of dispersed bats. Additionally, species that roost in foliage of pine trees and beneath tree bark would find numerous suitable locations for roosting.

Table 3.11. Sensitive Bat Species with Potential to Occur in the Project Area

Species Common name	Species Scientific name	USFWS (protection status)	AZ SWAP (protection status)	Potential for Occurrence in the Project Area
Allen's lappet-browed bat	*Idionycteris phyllotis*	SC*	1B	**Likely to occur.** The Project Area is within the known geographic range of the species; site specific it has been acoustically detected in relatively low amounts.
Arizona myotis	*Myotis occultus*	SC*	1B	**May occur.** The Project Area is within the known geographic and elevational range of the species. In addition, some suitable foraging and roosting habitat is present within the Project Area, and roughly 40,000 myotis species, which may include this species, have been acoustically detected site-specific. .
Big tree-tailed bat	*Nyctinomops macrotis*	SC*	1C	**Likely to occur.** The Project Area is within the known geographic range of the species; site specific it has been acoustically detected in relatively low amounts.
Cave myotis	*Myotis velifer*	SC*	1B	**Unlikely to occur.** The Project Area is outside the known geographic range of the species and is above the species' elevational range.
Fringed myotis	*Myotis thysanodes*	SC*	NA	**Likely to occur.** The Project Area is within the known geographic range of the species; site specific it has been acoustically detected in relatively low amounts.
Long-eared myotis	*Myotis evotis*	SC*	1C	**Likely to occur.** The Project Area is within the known geographic range of the species; site specific it has been acoustically detected in relatively low amounts.
Long-legged myotis	*Myotis volans*	SC*	NA	**May occur.** The Project Area contains some suitable habitat and is within the known geographic range of the species. Also, ±40,000 myotis species, which may include this species, have been acoustically detected site specific.
Mexican free-tailed bat	*Tadarida brasiliensis*		1B	**Likely to occur.** The Project Area is within the known geographic range of the species; site specific it has been acoustically detected in relatively low amounts.
Mexican long-tongued bat	*Choeronycteris mexicana*		1C	**Unlikely to occur. May Wander.** The Project Area is outside the known geographic range of the species however it has been identified at the Grand Canyon. There is no suitable habitat within the Project Area.
Pale Townsend's big-eared bat	*Corynorhinus townsendii pallescens*	SC*	1B	**May occur.** The Project Area is within the known geographic range and elevation range for the species. In addition, some suitable foraging and roosting habitat is present within the Project Area.
Spotted bat	*Euderma maculatum*	SC*	1B	**Likely to occur.** The Project Area is within the known geographic range of the species; site specific it has been acoustically detected in relatively low amounts.
Western red bat	*Lasiurus blossevillii*		1B	**May occur.** The Project Area has very limited suitable habitat for the species.
Western small-footed myotis	*Myotis ciliolabrum*	SC*	NA	**Unlikely to occur.** The Project Area does not contain suitable habitat for the species.
Yuma myotis	*Myotis yumanensis*	SC*	1B	**May occur.** The Project Area is within the known geographic and elevational range of the species. In addition, ±40,000 myotis species, which may include this species, have been acoustically detected site-specifc.

Note: SC = Species of Concern; 1B = Species is petitioned for listing, or species is a high priority for the Arizona Partners in Flight Bird Conservation Plan, or species is a BLM, USFS, National Park Service, or other sensitive species; 1C = Species was identified as vulnerable but did not meet criteria identified for 1A or 1B.

Sources: *AGFD (2010); USFWS (2010).

The Pandion (2011) report indicated that fall bat activity at both MET tower monitoring stations is skewed (≥60%) toward the zone below the rotors, an area of low exposure. During the late summer and fall seasons (July 15–October 31), 1,100 bat passes were detected at the upper detector. Of these 1,100 bat passes, two species known to be vulnerable to turbine mortality, the hoary bat (*Lasiurus cinereus*) and silver-haired bat (*Lasionycteris noctivagans* [Arnett et al. 2008; Kunz et al. 2007]), were detected in low numbers. A single silver-haired bat pass was detected, and hoary bat activity accounted for only 8% of recorded activity. The bat activity in the rotor swept area is heavily skewed toward Mexican free-tailed bat (*Tadarida brasiliensis*), with 83% recorded activity attributable to this species.

There is limited information on Mexican free-tailed bat fatalities and mortality at wind facilities, in part due to the relatively few post-construction studies conducted at facilities within the core of this species range. However, this species has been reported as a mortality at wind energy facilities in Oklahoma (Piorkowski 2006), California (Kerlinger et al. 2006), and Texas (Miller 2008). This species is highly colonial, forming maternity colonies ranging from the tens of thousands to over 20 million individuals, and they are wide-ranging during foraging (up to 50 miles one-way), capable of long-distance migrations, and are high fliers (up to 1 mile above ground level).

The two species that are most abundant at the area of exposure are the Mexican free-tailed bat and the hoary bat. From the limited studies conducted to date, Mexican free-tailed bat is not known to be susceptible to collision mortality in the fall, when the species is detected in relatively high numbers in the Project Area. The hoary bat is known to be highly susceptible to collision mortality in the fall, during the migratory period (Arnett et al. 2008; Kunz et al. 2007).

BIG GAME

Per correspondence with the AGFD, large mammal species known to occur within the Project Area include pronghorn antelope (*Antilocapra americana*), elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), and mountain lion (*Puma concolor*). Telemetry data collected during an AGFD study conducted to evaluate wildlife movement along SR 64 show wildlife use in the Kaibab National Forest as well as Perrin Ranch as travel corridors. The Project Area is not known to contain any wintering habitat or other unique habitat for big game species.

REPTILES AND AMPHIBIANS

Targeted surveys for reptiles and amphibians were not performed within the Project Area. Due to the cold climatic conditions encountered within the Apache Highlands-North ecoregion, reptile and amphibian species diversity is likely low relative to warmer regions of the state (AGFD 2006). Tree lizards (*Urosaurus ornatus*) were incidentally observed within Cataract Canyon during acoustic bat surveys. Other reptile species that are likely to occur in the Project Area include eastern collared lizard (*Crotaphytus collaris*), greater short-horned lizard (*Phrynosoma hernandesi*), gophersnake (*Pituophis catenifer*), and striped whipsnake (*Coluber taeniatus*) (Brennan and Holycross 2006; Museum of Vertebrate Zoology (MVZ) 2011; Stebbins 2003). Rocky formations within Cataract Canyon may provide suitable habitat for Arizona black rattlesnake (*Crotalus cerberus*). Suitable amphibian habitat within the Project Area is limited. Mexican spadefoot toads (*Spea multiplacata*) were encountered in earthen cattle tanks within Cataract Canyon. Other species that may be found include canyon treefrog (*Hyla arenicolor*) (Brennan and Holycross 2006; MVZ 2011; Stebbins 2003).

SMALL MAMMALS

Most mammals occurring within the Apache Highlands-North ecoregion and the Project Area are primarily active at night, but may occasionally be seen during the day. Habitat for small mammals is widespread in the Project Area. Small mammal species likely to occur within the Project Area are typical of species commonly encountered within the Great Basin Conifer woodland biotic community and include desert cottontail (*Sylvilagus audobonii*), white-throated woodrat (*Neotoma albigula*), and deermouse (*Peromyscus maniculatus*) (AGFD 2006; MVZ 2011; Reid 2006).

Gunnison prairie dogs (*Cynomys gunnisoni*) inhabit Arizona, although the status of this species within the Project Area is unknown. Habitat assessment surveys have shown a low presence of prairie dogs and other colonial burrowing rodents, like ground squirrels (Family Sciuridae), that may attract raptors to the area to forage; this may be due to intensive cattle and sheep ranching over the past 100 years (SWCA 2010). Specifically, ranchers typically actively remove prairie dogs from ranchlands, including from this area. The status of the Gunnison's prairie dog under the ESA is currently being challenged in a pending court preceding (WildEarth Guardians vs. Ken Salazar, Secretary of the Interior CV-09-00574-PHX-FJM).

Environmental Impacts

This section analyzes the environmental consequences that development of the Proposed Action would have on the wildlife resources described in the Affected Environment section above. Environmental consequences are described in terms of direct, indirect, short-term, and long-term impacts. These impacts are described separately for the construction and operation phases of this Project.

SIGNIFICANCE CRITERIA

Impacts to wildlife would occur when habitats or individuals are disturbed or lost during the proposed Project's construction or operation. The significance of the impact depends in part on the sensitivity of the population. A significant impact on wildlife would result if any of the following were to occur from construction or operation of the proposed Project:

- Loss to any population of sensitive wildlife that would jeopardize the continued existence of that population.
- Loss to any population of animals that would result in the species being listed or proposed for listing as endangered or threatened.
- Introduction of constituents into a water body (such as evaporation or sludge ponds) in concentrations that could cause adverse impacts on wildlife.
- Interference with the movement of any native, resident, or migratory wildlife species for more than two reproductive seasons.
- Local loss of wildlife habitat (as compared to total available resources within the area) or habitat productivity.
- Interference with nesting or breeding periods of any species.
- Reduction of the range of occurrence of any wildlife species.

As discussed in the previous vegetation section, a significant impact on endangered or threatened species or their critical habitats would result if any of the following were to occur from construction or operation of the proposed Project:

- Jeopardizing the continued existence of a federally listed species.
- Loss of individuals of a population of species that would result in a lowering a species status (e.g., from threatened to endangered).
- Adverse modification of critical habitat to the degree it would no longer support the species for which it was designated.

- Modification of habitat used by special status species for resting, nesting, feeding, or escape cover.

DIRECT AND INDIRECT IMPACTS OF THE PROPOSED PROJECT

Construction

The construction phase of the Proposed Action would include ground-disturbing activities for the development of a substation, switchyard, wind turbines, access roads, transmission lines, and associated facilities (i.e., substations, O&M, and switchyards) as described in Chapter 2. Construction activities would result in a number of permanent and temporary adverse impacts to wildlife, potentially including direct injury or mortality, habitat disturbance, introduction or spread of invasive vegetation, interference with behavioral activities, increased levels of fugitive dust, and increased noise. An overview of these impacts is provided below in Table 3.12. Many of the potential adverse construction-related impacts would be consistent between wildlife groups. These potential impacts are referenced as necessary in order to eliminate redundancy.

Table 3.12. Potential Construction Impacts on Wildlife

Wildlife Impact	Potential Effect and Likely Wildlife Affected	Effect Intensity and Duration
Direct injury or mortality	Destruction and injury of wildlife with limited mobility; amphibians, reptiles, birds, and mammals.	Minor short-term impacts to species within and adjacent to construction areas.
Habitat disturbance	Reduction or alterative on site-specific habitat; all wildlife.	Minor long-term impacts in areas in areas of permanent disturbance. Minor short-term impacts in areas of temporary disturbance.
Interference with behavioral activities	Disturbance of migratory movements; avoidance of construction areas by migrating birds and mammals. Disturbance of foraging and reproductive behaviors; birds and mammals.	Minor short-term impacts would occur for some species, while minor long-term impacts would occur for other species that may completely abandon the disturbed habitats and adjacent areas.
Introduction or spread of invasive vegetation	Reduced habitat quality; all wildlife.	Minor long-term if established in areas where turbines, support facilities, and access roads are situated.
Increased fugitive dust	Respiratory impairment; all wildlife.	Minor short-term impacts.
Increased noise	Disturbance of foraging and reproductive behaviors; habitat avoidance; birds and mammals.	Minor short-term impacts.

Source: Adapted from BLM (2005).

Raptors

Direct long-term adverse impacts to raptors would include the potential for direct mortality through collisions with construction equipment and vehicles. Direct mortality resulting from collisions with equipment and vehicles are not anticipated to be common, and therefore directly mortality is likely to be negligible for raptors. Site clearing and grading would result in the permanent loss of 220 acres (0.6% of the Project Area) of habitat that may provide nesting and foraging habitat. Direct short-term adverse impacts would include site clearing and grading that would result in the temporary loss of 648 acres (0.16% of the Project Area) of habitat that may provide nesting and foraging habitat. Both permanent and temporary losses in habitat are insubstantial relative the amount of potential habitat within the Project Area, and therefore these actions are anticipated to have a minor adverse impact. Furthermore, the limited amount of habitat that would be lost does not differ in quality from the expanse of habitat that would remain in the Project Area.

Per applicant-committed guidelines in Chapter 2, known raptor nests would be checked for activity prior to construction during raptor breeding season (between March 15 and June 30). Construction activities would avoid active nests by 0.25 mile until birds have fledged the nest.

Indirect long-term adverse impacts to raptors may include the introduction or spread of noxious weed species, leading to a decline in habitat quality. Adverse impacts resulting from noxious weeds are addressed in the Restoration and Reclamation Plan (see Appendix A). Indirect short-term adverse impacts to raptors would result from short-term increases in fugitive dust and noise levels. Short-term disturbance from construction activity is not anticipated to have substantial adverse impacts on the populations of raptors within the Project Area. Raptors are highly mobile, and it is anticipated that they would move away from disturbance during construction but return following the completion of construction. Therefore, direct adverse impacts from construction of the Proposed Action on raptors would be local, short term, and adverse. Indirect adverse impacts would be local, short term, and negligible. No significant adverse impacts to raptors, as described by significance criteria above, are anticipated to occur from construction of the Proposed Action

Non-raptor Avian Species

Potential adverse impacts to non-raptor avian species resulting from construction of the Proposed Action would be the same as those described for raptors. Per applicant-committed guidelines in Chapter 2, known nests would be checked for activity prior to construction during the breeding season (between March 15 and June 30). Construction activities would avoid active nests by 0.25 mile until birds have fledged the nest. Adverse impacts resulting from noxious weeds are addressed in the Restoration and Reclamation Plan (see Appendix A). No significant adverse impacts to non-raptor avian species, as described by significance criteria above, are anticipated to occur from construction of the Proposed Action

Bats

Potential adverse impacts to bats resulting from construction of the Proposed Action would predominantly be the same as those described for raptors. However, short-term disturbance is anticipated to have less of an impact to bats, as they are nocturnal and would not be active during construction. No significant impacts to bats, as described by significance criteria above, are anticipated to occur from construction of the Proposed Action.

Big Game

Potential adverse impacts to big game resulting from construction of the Proposed Action would be the same as those described for raptors. Since there are no migratory corridors within the Project Area, construction would not adversely affect migratory movement. No significant impacts to big game, as described by significance criteria above, are anticipated to occur from construction of the Proposed Action.

Reptiles and Amphibians

Potential adverse impacts to reptiles and amphibians resulting from construction of the Proposed Action would predominantly be the same as those described for raptors. However, it is likely that a number of reptiles and amphibians would be directly killed from development of the interconnection as a result of ground-disturbing activities. Reptiles in particular would often seek refuge within burrows, which may be crushed during construction activities. The reptiles and amphibians that are expected to occur in the Project Area are relatively common, and the losses of some individuals are unlikely to affect local populations. No significant impacts reptiles and amphibians, as described by significance criteria above, are anticipated to occur from construction of the Proposed Action.

Small Mammals

Potential adverse impacts to small mammals resulting from construction of the Proposed Actions would predominantly be the same as those described for raptors. However, it is likely that some small mammals would be killed from development of the interconnection as a result of ground-disturbing activities that could crush burrows and result in collisions with increased vehicular traffic. The small mammals that are expected to occur in the Project Area are relatively common, and the losses some individuals are unlikely to affect local populations. No significant impacts to small mammals, as described by significance criteria above, are anticipated to occur from construction of the Proposed Action.

Operation and Maintenance

The operation phase of the Proposed Action is anticipated to adversely impact wildlife through impacts related to wind turbines (i.e., avian and bat collisions and/or barotraumas for bats). Other adverse impacts to wildlife may result from electrocution from power lines, collisions with MET towers, increased predation, increased levels of noise, disturbance from maintenance activities, and interference with behavioral activities. These potential adverse impacts are summarized in Table 3.13 below and described in relation to the wildlife group that may be affected.

Table 3.13. Potential Wind Energy Operations and Maintenance Impacts on Wildlife

Wildlife Stressor	Activity	Potential Effect and Likely Wildlife Affected	Adverse Impact Intensity and Duration
Collision with turbines, towers, and transmission lines	Presence and operation of turbines; presence of transmission and MET towers and transmission lines.	Injury or mortality of birds and bats.	Local, long-term, minor impacts possible for many species. Potential for greater intensity impacts to regional populations.
Electrocution	Electric transmission lines and electrical utility lines.	Mortality of birds.	Local, long-term, but minor impacts to some bid species.
Predation	Transmission and MET towers.	Increase in avian predators due to more perch sites for foraging; may decrease local prey populations.	Local, long-term, minor impacts to prey species.
Interference with behavioral activities	Presence of wind energy facility and support structures.	Migratory mammals may avoid previously used migration routes, potentially affecting condition and survival. Species may avoid areas surrounding the wind energy facility, including foraging and nesting habitats.	Local, long-term, minor impacts to populations directly affected by the presence of the facility. Local, long-term, moderate for species that completely abandon adjacent areas; population-level impacts possible for some species.
Disturbance from maintenance activities	Daily human and vehicle activities.	Disturbance of nearby wildlife and bird and mammal behavior; habitat avoidance.	Local, long-term, minor impacts.
Noise	Turbine operation, support machinery, motorized vehicles, and mowing equipment.	Disturbance of foraging and reproductive behaviors of birds and mammals; habitat avoidance.	Local, long-term, minor impacts.

Source: Adapted from BLM (2005).

Raptors

Adverse impacts to raptors resulting from the operation phase of the Proposed Action may include collisions with wind turbines, electrocution from the 138-kV overhead transmission line, interference with behavioral activities, increased noise, and increased disturbance from maintenance activities.

Direct adverse impacts to raptors as a result of collisions with wind turbines have been documented at a number of wind energy facilities (California Energy Commission 1989; Erickson et al. 2005; Young et al. 2003). For this Project, raptor collisions with wind turbines would be mitigated through the ABPP (Appendix F). The ABPP includes mitigation measures to reduce or eliminate adverse impacts to raptors from collisions with wind turbines to avoid population-level impacts.

Raptors could potentially be electrocuted through contact with the138-kV gen-tie transmission line that would transmit power from the wind energy facility to the existing 500-kV line. However, the 138-kV line would be built to APLIC standards (APLIC 2006), as indicated in Applicant-committed measures in Chapter 2, in order to reduce the potential for electrocution.

The turbine manufacturer projects noise levels of 50 dBA, consistent with the anticipated current ambient noise level in the area, to occur up to 850 feet from the wind turbines. This level of noise is not anticipated to adversely impacts raptors.

Changes in behavioral activities of raptors would occur that are consistent with those described under construction impacts. The introduction of wind turbines and associated facilities may result in changes to the local migratory movements of raptors through the area. However, the Project Area is not known to be located within a migratory corridor (ABPP; see Appendix F). Presence of wind turbines may increase the risk of nest abandonment for species sensitive to human disturbance in and near the Project Area. These impacts to raptor populations are anticipated to be minor and long term.

Long-term indirect adverse impacts to raptors resulting from maintenance operations may occur. Human activity required for maintenance activities is anticipated to be minor, and raptors are expected to return to habitat within and adjacent to portions of the Project Area following maintenance activities.

Adverse impacts to individual raptors may occur; however, adverse impacts to raptor populations would be avoided through implementation of the ABPP (see Appendix F). Therefore, no significant impacts to raptors, as described by significance criteria above, are anticipated to occur from operation and maintenance of the Proposed Action.

Non-Raptor Avian Species

Adverse impacts to non-raptor avian species resulting from the operation phase of The Proposed Action may include collisions with wind turbines, electrocution from the 138-kV overhead transmission line, interference with behavioral activities, increased noise, and increased disturbance from maintenance activities.

Direct long-term adverse impacts to non-raptor avian species may occur as a result of collisions with wind turbines, which have been documented at a number of wind energy facilities (Erickson et al. 2005; Young et al. 2003). For this Project, non-raptor avian collisions with wind turbines would be mitigated through the ABPP (see Appendix F). The ABPP would identify mitigation measures to reduce or eliminate adverse impacts to non-raptor avian species from collisions with wind turbines to avoid population-level impacts.

Direct long-term adverse impacts may occur as a result of the 138-kV gen-tie transmission line that would transmit power from the wind energy facility to the existing 500-kV line. Non-raptor avian species could potentially be electrocuted through contact with this transmission line. However, the 138-kV line would be built to APLIC standards (APLIC 2006), as indicated in Chapter 2, in order to reduce the potential for electrocution.

Direct long-term adverse impacts to non-raptor avian species may occur from increased noise levels in areas adjacent to the wind turbines. The turbine manufacturer projects noise levels of 50 dBA to occur up to 850 feet from the wind turbines. Ambient noise levels within the Project Area are expected to be between 30 and 50 dBA. The minor increase in noise from the operation of wind turbines may result in reduced nesting and hunting behavior and habitat avoidance by non-raptor avian species.

Changes in behavioral activities of non-raptor avian species would occur that are consistent with those changes described under construction impacts. The introduction of wind turbines and associated facilities may result in changes to the migratory movements of non-raptor avian species through the area. Additionally, the presence of wind turbines would increase the risk of nest abandonment in and near the Project Area. These impacts are not anticipated to be significant, as the wind turbines occupy a small area where migratory movements could occur relative to the entire Project Area.

Long-term indirect adverse impacts to non-raptor avian species may occur from maintenance of the Project facilities and infrastructure. Because of the low amounts of human activity projected to occur throughout the Project Area during the long-term operation, non-raptor avian species are expected to return to habitat within and adjacent to portions of the Project Area following maintenance activities. Therefore, direct adverse impacts from operation of the Proposed Action on raptors would be local, long term, and adverse. However, indirect adverse impacts would be local, long term, and negligible. Adverse impacts to individual non-raptor avian species may occur; however, adverse impacts to non-raptor avian populations would be avoided through implementation of the ABPP (see Appendix F). Therefore, no significant impacts to non-raptor avian species, as described by significance criteria above, are anticipated to occur from operation and maintenance of the Proposed Action.

Bats

Adverse impacts to bats resulting from the operation phase of the Proposed Action may include collisions with wind turbines, increased noise, interference with behavioral activities, and increased disturbance from maintenance activities.

Direct long-term adverse impacts to bats may include direct injury or mortality from turbine blades. Previous studies indicate that there is potential to injure or kill numerous bats at wind energy facilities (Arnett 2005; BLM 2005; Kerlinger et al. 2006) and that some species, such as migratory and tree-roosting species like western red bats, hoary bat, silver-haired bats, and Mexican free-tailed bats, are more likely to be injured or killed at wind energy facilities (Arnett et al. 2008), especially during the fall migratory period (Arnett et al. 2008). Bats are killed through direct collision with turbine blades (Arnett et al. 2008; BLM 2005) and barotrauma (Baerwald 2008). Barotrauma results when bats fly within low-pressure airspace created in the wake of the wind turbine blades. Adverse impacts to bats resulting from collisions with wind turbines or barotrauma would be mitigated through the ABPP (see Appendix F). The ABPP would identify mitigation measures to reduce or eliminate adverse impacts to bats to avoid population-level impacts.

While it is likely that some bats are roosting within the Project Area in rock crevices or trees, there is currently no known roost or maternity site in the Project Area that would be affected by noise. Based on currently operating projects, bats are known to forage around wind turbines, and increased noise from wind turbines is not currently thought to directly impact bat species. Because bats are nocturnal, they are not likely to be active when maintenance activities are done; therefore, bats would not be affected by the increased levels of human activity during the operation and maintenance period.

The introduction of wind turbines and associated facilities is not expected to change the regional movements of bats through the Project Area. Local bat movement may be affected; however, bats are highly maneuverable and are anticipated to fly around the new structures or over the facility, allowing them to continue on their path. Direct adverse impacts from operation of the Proposed Action on bats would be local, long term, and adverse. However, indirect adverse impacts would be local, long term, and negligible. Adverse impacts to individual bats may occur; however, adverse impacts to bat populations would be avoided through implementation of the ABPP (Appendix F). Therefore, no significant impacts to bats, as described by significance criteria above, are anticipated to occur from operation and maintenance of the Proposed Action.

Big Game

Direct short-term adverse impacts to big game may include altered behavioral activities of big game species. However, it is anticipated that these impacts would be consistent with those described by Johnson et al. (2000), which found that pronghorn numbers at the Foote Creek Rim project in Wyoming did not decrease following construction of that facility. Walter et al. (2006) conducted a radio-telemetry and fecal sampling study on elk at a wind power development in southwestern Oklahoma and found that elk were not adversely affected by wind power operations. The researchers found that elk did not leave the Study Area, regularly crossed facility roads, and appeared not to be alarmed or stressed when directly observed. Walter et al. (2006) also determined through fecal sampling that nutritional intake was not affected. This suggests that big game behavior would be minimally affected by the routine operations following construction.

Direct long-term adverse impacts to big game may occur in areas adjacent to the wind turbines. The turbine manufacturer projects noise levels of 50 dBA to occur up to 850 feet from the wind turbines. Ambient noise levels within the Project Area are expected to be between 30 and 50 dBA, indicating that noise from turbines would only have a minor effect on activity within the 850-foot area surrounding wind turbines. Studies by Johnson et al. (2000) and Walter et al. (2006) indicate that big game species do not avoid wind facilities.

Indirect short-term adverse impacts to big game may occur from of human activity throughout the Project Area required for maintenance and repair of the site facilities. However, these impacts would be brief in duration and big game species are expected to return to the habitat within and adjacent to the Project Area following any maintenance activities. Therefore, direct and indirect adverse impacts from operation of the Proposed Action on big game would be local, long term, and negligible. No significant impacts to big game, as described by significance criteria above, are anticipated to occur from operation and maintenance of the Proposed Action.

Reptiles and Amphibians

Direct long-term adverse impacts may occur to small reptiles and amphibians as a result of predation. The addition of a 138-kV connector transmission line would create additional perch sites for raptors. The 138-kV aboveground line connecting the switching station to the 500-kV transmission line is the only aboveground transmission line. Therefore, the predation of reptiles and amphibians would only occur in a localized area.

Indirect long-term adverse impacts to reptiles and amphibians may occur from increased activity for site maintenance and operations. Reptiles and amphibians in the Project Area have limited mobility and would not be able to easily avoid operations and maintenance staff and vehicle movement throughout the

Project Area. Regular vehicle traffic on access roads in the Project Area would occur throughout the year over the 30-year duration of the Project. Increased risk of injury and mortality of individual reptiles and amphibians would occur as a result of the maintenance and operations activities of the Project workforce, likely as a result of collisions with vehicles.

Indirect long-term adverse impacts to reptiles and amphibians may result from increased noise levels. The turbine manufacturer projects noise levels of 50 dBA to occur up to 850 feet from the wind turbines. Ambient noise levels within the Project Area are expected to be between 30 and 50 dBA, indicating that noise from turbines would only have a minor effect on activity within the 850-foot area surrounding wind turbines. The increased noise from the operation of wind turbines may lead to reduced habitat use and disruption of foraging activities and behavior of reptiles and amphibians. Therefore, direct and indirect adverse impacts from operation of the Proposed Action on reptiles and amphibians would be local, long term, and adverse. No significant impacts to reptiles and amphibians, as described by significance criteria above, are anticipated to occur from operation and maintenance of the Proposed Action.

Small Mammals

Adverse impacts to small mammals would be the same as those described for reptiles and amphibians. No significant impacts to small mammals, as described by significance criteria above, are anticipated to occur from operation and maintenance of the Proposed Action.

CUMULATIVE IMPACTS

The Study Area for cumulative impacts to wildlife resources includes north-central Arizona. Within this area the majority of past, present, and reasonably foreseeable projects in the area are roads, trails, and other similar projects that would result in minimal impacts to wildlife species. These projects do contribute to habitat loss and fragmentation; however, they occur at a more localized level (i.e., within and adjacent to the Project Area) and the additive impact is low relative to the available high-quality habitat in the area.

There is a proposal to develop 9 linear miles of 345-kV transmission line approximately 61 miles from the Project facility. Transmission line impacts are typically limited to birds and related to collision and electrocution; however, new transmission lines are typically build to APLIC standards, substantially reducing avian mortality associated with them. There would be an additive direct mortality impact associated with the cumulative projects, but it would be reduced through BMPs and mitigation measures.

The recent enactment of the Renewable Energy Standard and Tariff in Arizona requires that by 2025, 15% of Arizona’s energy must come from renewable energy sources. One of the most efficient and cost-effective sources of renewable energy is large-scale wind. The Renewable Energy Standard and Tariff means that it is likely that wind development would occur through Arizona, as well as on or near the Coconino Plateau. To date only one wind energy facility, the Dry Lake Wind Facility located approximately 125 miles east-southeast of Perrin Ranch, is in operation. This facility currently has 60 operating turbines. Past and future wind development has or would contribute to injury, mortality, loss of habitat, habitat fragmentation, avoidance, and displacement, but careful siting of these facilities and appropriate mitigation is an important factor in reducing impacts to avian and bat species. Although the cumulative impacts of additional wind development are difficult to measure, they would be reduced through compliance with all federal and state laws and the application of USFWS and AGFD guidelines for wind development. The Proposed Action conforms to applicable federal and state laws, and adheres to the most recent wind energy guidelines, including the preparation of a Project-specific ABPP. Therefore, the Project is not anticipated to have a substantial additive effect when considered with other past and future wind projects.

Mitigation Measures

No mitigation measures for wildlife conditions are necessary.

ENVIRONMENTAL IMPACTS OF THE NO ACTION ALTERNATIVE

Under the No Action Alternative, the Project would not be developed and there would be no direct or indirect impacts. Wildlife conditions would continue as described in the affected environment.

3.3.6 Socioeconomics

Affected Environment

Potentially affected parties (Project stakeholders) include area residents, area recreationists, and business owners. The Study Area for socioeconomic analysis is defined as the Project Area together with private communities located within 10 miles of the Perrin Ranch. The 10-mile buffer was established to include the town of Williams, where much of the local workforce would draw from, as well as construction and operation workforce housing, etc. (see environmental impacts discussions below) (Figure 3.22).

The Study Area is located in the north-central part of Arizona, within Coconino County (see Figure 3.22) in a generally rural area along SR 64, approximately 13 miles north of downtown Williams. Williams is the largest community in the Study Area; however, several small private subdivisions exist within 1.5 miles. These communities include Junipine Estates, Howard Mesa Ranch, Four Hills Ranch, Red Lake Estates, and Canyon Vista Ranch. These subdivisions are not located within the limits of Williams, but are located in unincorporated Coconino County.

The population in the town of Williams grew by 11.4% from 2,842 in 2000 to 3,165 in 2008 (Arizona Department of Commerce 2008; U.S. Census Bureau 2009a). This rate of growth was less than for all of Coconino County, which grew by 16.6% within the same time period, and less than that of the state, which increased by 29.2% (Arizona Department of Commerce 2008; U.S. Census Bureau 2009b). In 2009, the median age of the town's residents was 30.9, and 11.7% were 65 years and over (Arizona Department of Commerce 2008; U.S. Census Bureau 2009c). No census or demographic data are available for the small private subdivisions in the Study Area.

Williams describes itself as a picturesque mountain town and considers itself the Gateway to the Grand Canyon. Williams' economic activity is dominated by tourism-related services. The town and its environs are known for their natural beauty and recreational opportunities as a result of its proximity to the Grand Canyon and the Kaibab National Forest. Proximity and access to, as well as views of, open space are highly valued by residents of Junipine Estates, Howard Mesa Ranch, Four Hills Ranch, Red Lake Estates, and Canyon Vista Ranch.

Access to and views of open space are often reflected in increased real property values and increased marketability of a property because of its proximity to such lands. The subdivisions of Junipine Estates, Howard Mesa Ranch, Four Hills Ranch, Red Lake Estates, and Canyon Vista Ranch are located in U.S. Postal Service zip code 86046. Over the past five years, housing prices in this zip code have declined from an average close to $240,000 in 2006 to $134,700 in 2011 (Zillow 2011), a decline of over 78%. These housing prices do not include undeveloped properties.

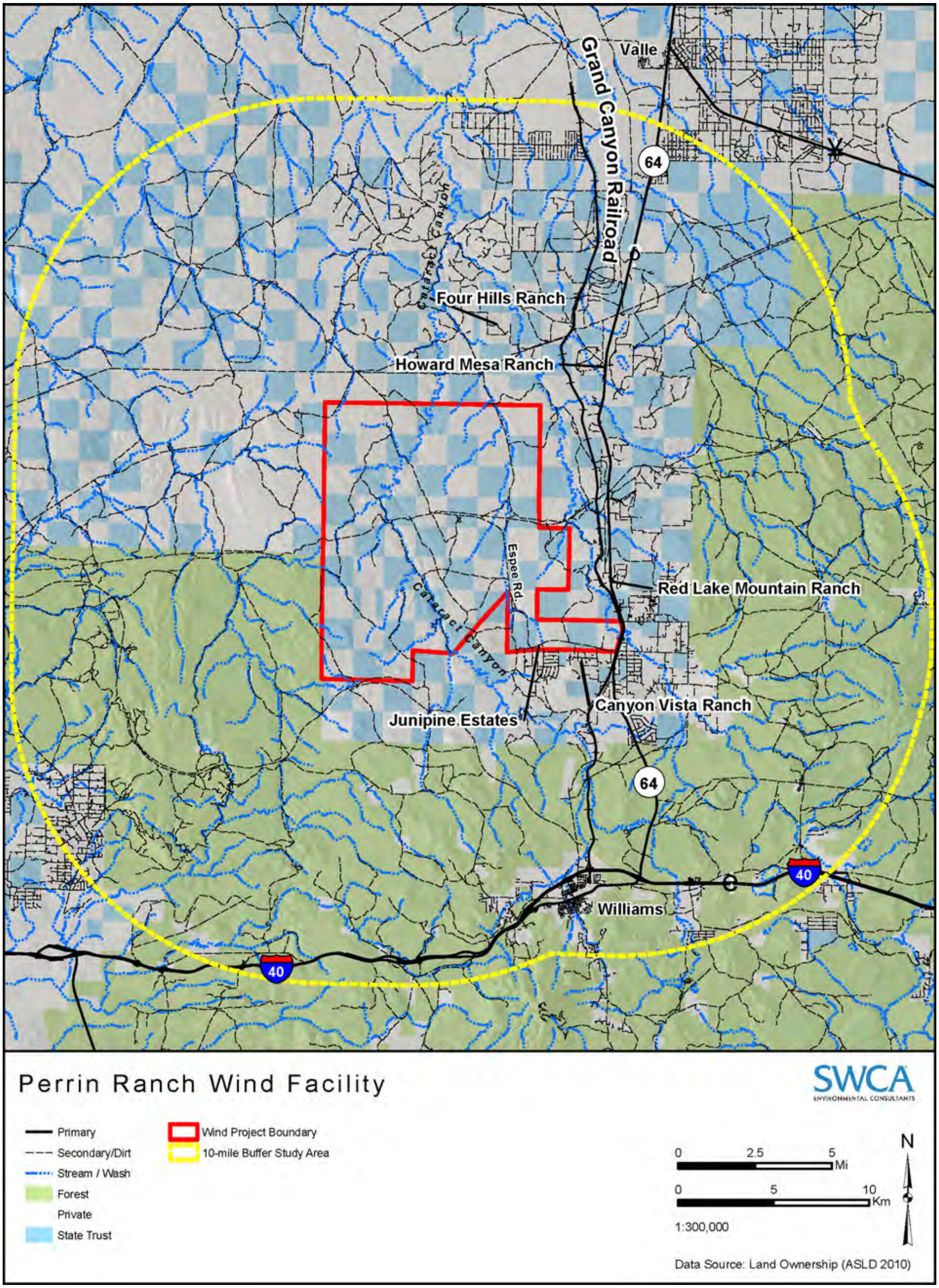

Figure 3.22. Study area for socioeconomics and transportation.

Environmental Impacts

SIGNIFICANCE CRITERIA

A significant impact on social and economic values would result if any of the following were to occur from construction or operation of the proposed Project:

- An increase in population that would create shortages of housing and place an excessive burden on local government and community facilities and services.
- Permanent displacement of existing residences or businesses.
- Long-term loss of economic viability of farms, ranches, or other businesses.
- Permanent and irreversible loss of work for any sector of a community.
- Physical division of an established community.
- Change resulting from the proposed Project that exceeds historical or estimated fluctuations in the regional economy.
- Result in a need for new infrastructure systems, including power or gas utilities, communications systems, water and sewer services, or solid waste disposal systems.
- Long-term economic benefit (a positive impact that could be considered significant).

A significant impact on environmental justice issues would occur from construction or operation of the proposed Project if there were a disproportionate negative effect on minority or low-income populations in the area, as defined by Executive Order 12898.

DIRECT AND INDIRECT IMPACTS OF THE PROPOSED PROJECT

Construction

Construction of the Project would require 50 to 70 workers over a five- to seven-month construction period with a peak of 200 workers. The Project workforce would be expected to draw from the existing local construction workforce, therefore generating 50 to 70 jobs. Thus, construction of the Project could result in short-term increase in local employment. Because the Project is expected to draw from the existing workforce, there would be adequate housing and associated infrastructure to support the construction workers.

Construction-related expenditures as well as sales and use taxes for goods and services purchased during construction would also result in a short-term boost to the local economy. The Project would generate sales and use taxes for goods and services purchased during construction (and operation and maintenance, see below).

Table 3.14 below was prepared by the Renewable Energy Program Coordinator at Northern Arizona University for the proponent’s CUP application (NextEra Energy 2010). The data generated are based on the National Renewable Energy Laboratory’s (NREL’s) Jobs and Economic Development Impacts (JEDI) model, which is an input/output model that quantifies economic impacts. A full description of the model and how to understand the results can be found on the NREL JEDI website (NREL n.d.). The total economic earnings (wages and salaries) for the construction phase of the Project would be $19.79 million, while the total for output (all economic activity related to the Project) would be $54.71 million (see Table 3.14).

Table 3.14. NREL JEDI Model Results of 99-MW Wind Development in Arizona for the Construction Phase*

Project Component	Earnings (million dollar)[1]	Output[1]
Labor	$4.60	$5.24
Turbine and supply chain impacts	$11.17	$36.30
Induced	$4.02	$13.17
Total	**$19.79**	**$54.71**

* Adapted from NextEra Energy (2010).
[1] One time economic impact.

Alternatively, as previously noted, Project construction would likely increase traffic in and around the Project Area and could result in some travel restrictions within Perrin Ranch; therefore, access for area recreationists would be affected. Therefore, construction could also result in short-term impacts to area quality of life, as well as a short-term reduction in recreational visitors who may choose to avoid the area during construction. Direct and indirect impacts to socioeconomics from construction of the Proposed Action would be regional, short term, and beneficial.

Operation and Maintenance

During operation of the Project, nine full-time personnel would be required to oversee Project operation. As with construction, most employees would likely be drawn from the existing local workforce; however, it is possible that a few workers would be required from outside the area and relocate to the area for highly skilled positions. Any increase to the local population from workers who relocate to the area would be negligible.

Operation-related expenditures, as well as sales and use taxes for goods and services purchased during operation, would result in a long-term boost to the local economy. For the life of the Project, the annual impact of the operation phase of the Project would be $92,000 in earnings (wages and salaries) and $2.35 million in output (all economic activity related to the Project) (see Table 3.15). Local revenue and supply chain impacts includes property tax revenue.

Table 3.15. NREL JEDI Model Results of 99-MW Wind Development in Arizona for the Operation Phase*

Project Component	Earnings[1]	Output[1]
Labor	$0.42	$0.42
Local revenue and supply chain impacts	$0.32	$1.36
Induced	$0.18	$0.57
Total	**$0.92**	**$2.35**

* Adapted from NextEra Energy (2010).
[1] Annual impact.

In terms of residential property value, housing prices in the area are not expected to be directly affected by the physical presence of the proposed Project but may be affected by the perception of loss in value by real estate purchasers. Although not discussed in this analysis, this could be true for the value of undeveloped or raw land. Raw land is considered to be unimproved with no utilities, sewers, streets, or structures. The following discussion of wind development impacts on property values was excerpted from the BLM's *Final Programmatic Environmental Impact Statement on Wind Energy Development of BLM-Administered Lands in the Western United States* (BLM 2005).

> The potential impact of wind development projects on residential property values has often been a concern in the vicinity of locations selected for wind power. Although this EA does not directly assess the potential impacts of wind power on property values, a review of two studies that examined potential property value impacts of wind power facilities suggests that there would not be measureable negative impacts.
>
> ENONorthwest (2002) interviewed county tax assessors in 13 locations that had recently experienced multiple-turbine wind energy developments. Although not all the locations chosen had wind turbines that were visible from residential areas, and some development projects had been constructed too recently for their full impact to be properly assessed, the study found no evidence that wind turbines decreased property values. In one area examined, it was found that designation of land parcels for wind development actually increased property values.
>
> Sterzinger et al. (2003) analyzed the effects of 10 wind energy development projects built during the period 1998 to 2001 on housing sale prices. The study used a hedonic statistical framework that attempted to account for all influences on changes in property value; its data came from sales of 25,000 properties, both within view of recent wind energy developments and in a comparable region with no wind energy projects, before and after project construction. The results of the study indicate that there were no negative impacts on property values. For the majority of the wind energy projects considered, property values actually increased within the viewshed of each project, with property values also tending to increased faster in areas with a view of the wind turbines than in areas with no wind projects.

As during construction, the Project would generate sales and use taxes for goods and services purchased over the life of the Project. It would also provide an estimated $140,000 per year property taxes to the town of Williams and Coconino County (NextEra Energy 2010).

Additionally, the proposed Project would provide enough energy for an estimated 25,000 homes (Energy Business Review 2010). According to the Alternative Energy Institute (n.d.), "many utility services around the world offer wind-generated electricity at a premium of 2 to 3 cents per kWh." Further, "compare this to 4.8 to 5.5 cents per kWh for coal or 11.1 to 14.5 cents per kWh for nuclear power" (Alternative Energy Institute n.d.).

Direct and indirect impacts to socioeconomic resources from operation of the Proposed Action would be local, long term, and minor.

In terms of the eight significance criteria described for socioeconomics, only one of these criteria would be met by implementation of the Proposed Action: the Project would result in a long-term economic benefit to the Study Area and Coconino County. As previously discussed (see Table 3.15), the annual impact of the operation phase of the Project would be $92,000 in earnings (wages and salaries) and $2.35 million in output (all economic activity related to the Project), for the life of the Project. Thus, the Project would have a significant impact on socioeconomics, if implemented.

CUMULATIVE IMPACTS

The cumulative impacts area of analysis for socioeconomics is Coconino County, versus the 10-mile Study Area for direct and indirect effects. The Project would make a minor and short-term contribution to the cumulative socioeconomic impacts that would result from construction and operation of the Project.

Economic impacts could be beneficial to local laborers; however, operation of the wind energy facility may contribute to a decrease in the perceived quality of life for residents living in nearby developments. There may be a perception of loss in value by real estate purchasers and existing residents in the Project Area. Given present and reasonably foreseeable actions in the Study Area, it is unlikely that the rural character of Coconino County as a whole would be affected in the long term.

Mitigation Measures

Mitigation for socioeconomic resources as a result of the Project would not be needed as impacts to employment from construction would be short term and impacts from operation would be negligible.

ENVIRONMENTAL IMPACTS OF THE NO ACTION ALTERNATIVE

Under the No Action Alternative, the Project would not be developed and there would be no direct or indirect impacts to socioeconomics in the Study Area. Under the No Action Alternative, Williams and Coconino County would not realize the economic benefits of construction or operation (including wages, income, and economic output) of the Project. Socioeconomic conditions would continue as described in the affected environment.

3.3.7 Native American Religious Concerns

The Study Area for Native American Religious Concerns is the Project boundary (the 39,833-acre Perrin Ranch). In accordance with NEPA and the NRHP, Western initiated consultation with the Havasupai Tribe, the Hualapai Tribe, the Yavapai-Apache Nation, the Yavapai-Prescott Indian Tribe, the Hopi Tribe, and the Navajo Nation about the proposed undertaking. NEPA requires assessing the impacts on the human environment that may include places of traditional importance to Native Americans. Section 106 of the National Historic Preservation Act requires that federal agencies consider the impacts of their actions and decisions on places of traditional cultural and religious significance for Native American tribes in addition to historic properties. As tribal consultation progresses, it is possible the Study Area may change in response to tribal concerns. Other applicable laws, regulations, or policies include the American Indian Religious Freedom Act, which protects the Native American right to religious expression including access to sacred sites.

Affected Environment

The vicinity of the Project Area is within the traditional use area of the Havasupai Tribe, the Hualapai Tribe, the Yavapai-Apache Nation, the Yavapai-Prescott Indian Tribe, the Hopi Tribe, and the Navajo Nation. The Havasupai Tribe’s traditional territory stretches from the Colorado River to Bill Williams Mountain and from the Aubrey Cliffs to the Little Colorado River; the Hualapai Tribe’s traditional territory stretches from the Colorado River south to the Bill Williams River and from the Black Mountains east to Havasu Canyon. The Yavapai traditional territory stretches from Ask Fork and Flagstaff to the Salt River and from the Colorado River to the Tonto Basin. The Hopi Tribe’s traditional territory extends over the entire state of Arizona. The Navajo Nation’s traditional territory extends from just west of the Rio Grande in New Mexico to the Colorado River in Arizona and from north of the San Juan River to just south of the Little Colorado River.

Western initiated government-to-government consultation with the above tribes via letters sent on January 21, 2011. The letters included a draft of the cultural resources Class I report for review and requested information on any unique, special, ethnographic, or archaeological resources or areas in or near the proposed Project Area that are of interest to each tribe. In a letter dated February 3, 2011, the Hopi Tribe requested a copy of the Draft EA and the Class III cultural resources report. The Hopi expressed concern about the Project's impacts to cultural resources and stated that they consider all archaeological sites within the Project Area to be TCPs.

Western submitted copies of the reports titled *Archaeological Survey for the Proposed Perrin Ranch Wind Facility near Williams, Coconino County, Arizona* (Barr et al. 2011), *Archaeological Survey of 96 Acres: An Addendum to the Archaeological Survey for the Proposed Perrin Ranch Wind Facility near Williams, Coconino County, Arizona* (West and Barr 2011), and *Cultural Resources Avoidance and Unanticipated Discoveries Plan for the Perrin Ranch Wind Facility Project near Williams, Coconino County, Arizona* (Barr and Hesse 2011) on March 30, 2011, to each tribe. In addition, Western conducted follow-up phone calls and emails to each tribe between April 14 and 26, 2011, to verify that the documents were received (Appendix G).

During these conversations, the Havasupai Tribe, the Hualapai Nation, and the Yavapai-Prescott Tribe requested a field visit to the Project Area. Based on communication from April 26, 2011, The Yavapai-Prescott Tribe was unable to attend and stated that without seeing the Project Area, the tribe could not consult effectively but to keep it posted on the results of the meeting. The field visit with governmental representatives of the Havasupai Tribe and Hualapai Nation will be conducted on May 5, 2011. Results of the field visits will be provided in the final EA document.

The Hopi Tribe, the Navajo Nation, and the Yavapai-Apache Nation did not request a field visit. The Navajo Nation stated that if Western does not receive comments, than it should assume there are no concerns regarding the Project. The Yavapai-Apache Nation did not express any problems or concerns regarding the Project and deferred to other tribes if issues arise. Finally, the Hopi Tribe expressed concerns regarding birds and eagles and requested a copy to the ABPP (SWCA 2011; see Appendix F), which was sent on April 19, 2011.

Resource condition indicators for places of traditional use are not easily definable or quantifiable. Disturbance to TCPs and other places of traditional use may affect an individual "sense of place" or how a tribal member experiences that place within its cultural context. Sense of place can vary from person to person within and between cultures, making it difficult to analyze impacts in terms of quantifiable data and degree of magnitude. Some possible indicators include the following:

- acreage of disturbance of the Project;
- number of archaeological sites or other sites of traditional cultural value to be disturbed by the proposed Project;
- number of sites with limited access during construction; and
- extent of auditory and visual disruptions during and after construction.

Environmental Impacts and Mitigation Measures

SIGNIFICANCE CRITERIA

A significant impact on Native American religious concerns would result if any of the following were to occur from construction or operation of the proposed Project:

- Loss or degradation of a TCP or sacred site, or if the property or site is made inaccessible for future use.
- Any disturbed human remains, including those interred outside formal cemeteries.
- Unmitigated adverse effects to a TCP determined to be NRHP-eligible or identified as important to tribes.

DIRECT AND INDIRECT IMPACTS OF THE PROPOSED PROJECT

Construction

Construction of the Project would avoid 69 archaeological sites that are considered TCPs by the Hopi Tribe. Thus, there would be no short-term impact to these sites as a result of construction. Therefore, there would be no direct or indirect impacts to archaeological sites and subsequently Native American religious concerns as a result of construction of the Proposed Action.

Operation and Maintenance

Once construction is complete there would be no disturbance to the archaeological sites; therefore, there would be no direct impacts from operation. Operation of the Project would not create barriers to members of the Hopi Tribe from accessing the sites. The presence of the Project would not impair the cultural functions of the archaeological sites; therefore, there are no indirect impacts from the operation of the Project. Therefore, there would be no direct or indirect impacts to archaeological sites and subsequently Native American religious concerns as a result of operation of the Proposed Action.

Based on the current construction design, none of the above listed significance criteria would be met. The Project Area would remain accessible for future use during and after construction. Since the proposed Project would avoid the archaeological sites, disturbance of human remains is not anticipated. Finally, the development of the avoidance and unanticipated discovery plan (Barr and Hesse 2011) provides procedures to mitigate unanticipated discoveries.

CUMULATIVE IMPACTS

The cumulative impacts area of analysis for Native American religious concerns is the same as the Study Area for direct and indirect impacts. Cumulative impacts to resources affecting Native American religious concerns are not anticipated since impacts on properties eligible for listing in the NRHP would be mitigated through avoidance. As previously stated, construction and operation of the Project would avoid NRHP-eligible sites so cumulative impacts are not expected.

Mitigation Measures

Because all cultural sites would be avoided during construction and operation of the Project, no mitigation measures for Native American religious concerns are necessary.

ENVIRONMENTAL IMPACTS OF THE NO ACTION ALTERNATIVE

Under the No Action Alternative, the Project would not be developed and there would be no direct or indirect impacts. Conditions related to Native American religious concerns would continue as described in the affected environment.

3.3.8 Transportation

This section provides an overview of the existing transportation conditions and a description of the proposed changes that would result during construction and operation of the Project. The Study Area for transportation includes the Perrin Ranch and a 10-mile buffer (see Figure 3.22). The 10-mile buffer is used to account for construction and operation traffic expected to come from I-40 and the Williams area.

Affected Environment

The Study Area includes a network of primary (paved) and secondary (unpaved) roads. Paved roads in the Study Area include I-40 and SR 64, and numerous residential roads. I-40 is a four-lane divided freeway, while SR 64 is a two-lane highway. In 2009, average annual daily traffic (AADT) along I-40 at SR 64 was 14,000 to 17,000, and on SR 64 at I-40 was 5,100 (ADOT 2009).

Additionally, Espee Road and numerous unnamed dirt roads are located within the Project boundary and Study Area. These consist primarily of an unpaved road network associated with the Kaibab National Forest, residential development roads, access to linear utilities in the Study Area (including, but not limited to, the Moenkopi-Yavapai 500-kV transmission line access road and the Burlington Northern Santa Fe and Grand Canyon Railway frontage roads), and Perrin Ranch access roads used for ranching and dispersed recreation activities. Perrin Ranch allows access for hunters, but has implemented several road closures on the ranch. A map with designated open roads can be found at the sign-in boxes at the access points of the ranch. The AADT for secondary roads in the Study Area is unknown. As previously discussed, an estimated 550 to 600 vehicles per month visit Perrin Ranch during the five-month hunting season (August to December). Assuming all hunters use Espee Road, AADT for Espee Road is approximately 20 vehicles per day during this five-month period.

Environmental Impacts

SIGNIFICANCE CRITERIA

A significant impact on transportation would result if any of the following were to occur from construction or operation of the proposed Project:

- Increases in traffic that exceed a level of service established by the local or state transportation management agency.
- Creation of road dust and/or severe road damage at levels that create hazardous situations for motorists and pedestrians.
- Major traffic delays on a primary transportation corridor.
- Change in air traffic patterns, including either an increase in traffic levels or a change in location that results in safety risks.

DIRECT AND INDIRECT IMPACTS OF THE PROPOSED PROJECT

Construction

Site construction activities related to transportation would involve vehicular traffic, associated equipment and materials delivery, and access road construction. During construction, I-40, SR 64, Espee Road, and several existing secondary roads would be used (see Figures 2.1a–f). Additionally, approximately 39 miles of roads would be constructed and/or maintained within the Project Area to provide construction and delivery personnel with access to turbine sites and associated Project facilities.

As discussed in the Proposed Action, the average number of daily vehicle trips to the site would vary, but would be an estimated 75 vehicle trips per day traveling to the site, while the number of vehicles actually working on-site would be an estimated 20. The additional traffic associated with Project construction could result in access delays to current travelers in the Study Area. The additional large-truck traffic would contribute to intermittent traffic delays on I-40 and SR 64, as well as Espee Road. Based on AADT for I-40, traffic associated with the Proposed Action would increase AADT by less than 1% (75 vehicles plus the maximum estimated AADT of 17,000). Based on AADT for SR64, traffic associated with the Proposed Action would increase AADT by 15% (75 vehicles plus the estimated AADT of 5,100). Based on the estimated AADT for Espee Road between August and December, the Proposed Action would increase traffic by 100%, or an additional 20 vehicles per day.

Transportation of equipment and materials during construction would result in increases in the traffic levels on I-40 and SR 64 by up to 1.5%. Traffic levels on Espee Road and other unnamed secondary roads in the Project footprint would also increase during the construction period. Most construction equipment (e.g., heavy earthmoving equipment and cranes) would remain on-site during the entire construction period.

Level of service is a measure used by traffic engineers to determine capacity for primary roads and traffic operating conditions; level of service was not measured for the primary roads (I-40 and SR-64) associated with this Project because traffic is only expected to increase up to 1.5% during construction.

As discussed in the Proposed Action, on-site speed would be restricted to 25 mph and water would be used to minimize fugitive dust during construction and use of unpaved roads. Additionally, access for residents, recreational users, and emergency vehicles on roads to be used by the Project would be maintained at all times. The Project proponent would follow guidelines for oversized loads and road/lane closures established by ADOT and Coconino County, and all traffic control activities, personnel, and measures would be provided in accordance with the Federal Highway Administration's (FHWA's) latest *Manual on Uniform Traffic Control Devices for Streets and Highways.*

Operation and Maintenance

As discussed in the Proposed Action, Perrin Ranch Wind estimates that there would be approximately eight vehicles on-site per day during operation. The transportation needs of this crew would be restricted to daily trips by pickup trucks, medium-duty vehicles, or personal vehicles on-site. The access roads used and/or built during the construction phase would be maintained throughout Project operation and maintenance.

In order to minimize fugitive dust, as discussed in the Proposed Action, on-site speed would be restricted to 35 mph during operation and maintenance and personnel would be briefed about cross-country travel being prohibited. On-site personnel are expected to obey the existing posted speed limit of 35 mph.

Direct and indirect impacts to transportation from construction and operation of the Proposed Action would be adverse, local, long term, and minor.

In terms of the four significance criteria described for transportation, none of these criteria would be met; thus, none of the Project impacts would be significant.

CUMULATIVE IMPACTS

The cumulative impacts Study Area for transportation is Coconino County, versus the 10-mile Study Area for direct and indirect effects. Projects listed in Appendix C, which would cumulatively increase long-term impacts, include the Williams Travel Management EA, I-40 and I-17 street widening projects, and SR 64 street improvements near the Grand Canyon. The Proposed Action would make a minor and long-term contribution to the cumulative transportation impacts that would result from construction and operation; however, these cumulative impacts are not expected to change the overall character of the transportation network in the cumulative Study Area.

Mitigation Measures

As discussed in the Proposed Action, mitigation measures for transportation include:

- The turbine delivery company would prepare a transportation plan that, among other elements, would include a turbine delivery schedule; the plan would need to be submitted to and approved by ADOT.
    - During development of the transportation plan, ADOT may require the following mitigation measures for SR 64:
        - Traffic control measures would be communicated with the public, local officials, and the media prior to and during construction activities.
        - Construction notices to residents and businesses in the Project Area would be provided at least two weeks prior to construction.
        - Advance warning signs shall be placed at locations designated by the Kaibab National Forest to notify motorists and pedestrians of construction-related delays.

ENVIRONMENTAL IMPACTS OF THE NO ACTION ALTERNATIVE

Under the No Action Alternative, the Project would not be developed and there would be no direct or indirect impacts. Transportation conditions would continue as described in the affected environment.

Chapter 4

CONSULTATION AND COORDINATION

Table 4.1 presents a list of individuals and organizations that were contacted during preparation of this EA.

Table 4.1. Individuals and Organizations Contacted during Preparation of This EA

Contact	Affiliation, Location	Date	Purpose of Contact
Federal			
Sandra Eto	Reclamation, Phoenix	January 2011–present	Cooperating agency coordination
Brian Wooldridge	USFWS, Flagstaff	March 2010–present	ABPP and wildlife risk assessment; condor 10(j) conference
Brenda Smith	USFWS, Flagstaff	March 2010–present	ABPP and wildlife risk assessment; condor 10(j) conference
Robert Murphy	USFWS, Migratory Birds Region 3, Albuquerque	March 2010–present	ABPP and wildlife risk assessment
Marc Wicke	USFWS, Phoenix	March 2011–present	ABPP and wildlife risk assessment
Steve Spangle	USFWS, Phoenix	March 2011–present	ABPP and wildlife risk assessment
State			
James Garrison	Arizona SHPO	March 2011–present	National Historic Preservation Act
David Jacobs	Arizona SHPO	March 2011–present	National Historic Preservation Act
Chuck Vencill	ASLD, Flagstaff	March 2010–present	State Land Special Land Use Permit and ROW
Andi Rogers	AGFD, Flagstaff	March 2010–present	ABPP and wildlife risk assessment
Mark Ogonowski	AGFD, Flagstaff	March 2010–present	ABPP and wildlife risk assessment
Susi MacVean	AGFD, Flagstaff	March 2010–present	ABPP and wildlife risk assessment
Kenneth Jacobson	AGFD, Phoenix	March 2010–present	ABPP and wildlife risk assessment
Ginger Ritter	AGFD, Phoenix	March 2010–present	ABPP and wildlife risk assessment
County			
Bill Towler	Coconino County, Flagstaff	March 2010–present	County permitting
Tribal			
Bernadine Jones	Havasupai Tribe	1/21/11 and 3/31/11	Project scoping and initiate consultation
LeRoy Shingoitewa	Hopi Tribe	1/21/11 and 3/31/11	Project scoping and initiate consultation
Wilfred Whatoname	Hualapai Tribe	1/21/11 and 3/31/11	Project scoping and initiate consultation
Ben Shelly	Navajo Nation	1/21/11 and 3/31/11	Project scoping and initiate consultation
Thomas Beauty	Yavapai-Apache Nation	1/21/11 and 3/31/11	Project scoping and initiate consultation
Ernest Jones, Sr.	Yavapai-Prescott Indian Tribe	1/21/11 and 3/31/11	Project scoping and initiate consultation

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Chapter 5

LIST OF PREPARERS

The following is a list of people who made contributions as team members or specialists to the EA analysis process and this EA document.

Western Area Power Administration

Matthew Bilsbarrow – Project Manager

William Werner – Biologist

Michael Garcia – Engineering Technical Advisor

Bureau of Reclamation

Sandra Eto – Environmental Resource Management Division, Bureau of Reclamation

Alex Smith – Environmental Resource Management Division, Bureau of Reclamation

SWCA Environmental Consultants

Eric Koster – Project Manager

Cara Bellavia – Task Manager

Christina White – Environmental Planner

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Chapter 6

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Appendix A

RECLAMATION AND RESTORATION PLAN

Perrin Ranch Restoration and Reclamation Plan

Prepared for

NextEra Energy Resources, LLC

Prepared by

SWCA Environmental Consultants

May 2011

PERRIN RANCH RESTORATION AND RECLAMATION PLAN

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SWCA Project No. 16440

May 2011

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Appendices

Tables

1.0 INTRODUCTION

NextEra Energy Resources, LLC (NextEra Energy), is proposing to develop the Perrin Ranch Wind Energy facility in Coconino County, Arizona, approximately 13 miles north of the city of Williams. Development of the Perrin Ranch Wind Energy facility (Project) will result in the disturbance of lands owned by the State of Arizona, as well as private lands. As a condition of the County Use Permit for the Project, NextEra Energy is required to complete a management plan detailing the restoration and reclamation of disturbed lands resulting from this Project. NextEra Energy retained SWCA Environmental Consultants (SWCA) to complete this report in order to satisfy the conditions of the County Use Permit.

This report summarizes the work that is expected to occur for the development of the Project and provides specific restoration and reclamation guidelines for contractors completing restoration and reclamation. *Coconino County Public Works Department Seeding Standards* (Coconino County 2008) were used as a guideline for the development of the plan. This report includes an overview of acceptable restoration and reclamation techniques and the criteria for selecting each technique; however, it is incumbent on the restoration and reclamation contractor to implement these techniques as appropriate. Methods for the control, treatment, and eradication of noxious weeds are included in this report. Noxious weed populations diminish the habitat and quality of forage for wildlife as well as livestock. Limiting the spread and establishment of noxious weeds is a crucial goal of the plan, and in fact, the primary reason for replanting disturbed areas is to control noxious weeds. Within this report there will be references to invasive and noxious weeds; however, invasive weeds are not controlled to the same standards as noxious weeds, and therefore any discussion of invasive weeds is purely informational.

1.1 Responsible Parties

The Project proponent will have the overall responsibility of directing and monitoring the weed control and restoration efforts for the Project. The construction contractor may retain the services of a subcontractor who specializes in reclamation to implement the protocols identified in this plan during and following construction. It is anticipated that post-construction reclamation monitoring will occur concurrent with weed control efforts outlined in this plan.

1.2 Regulatory Authority and Requirements

Regulatory authority and requirements are provided by federal regulations, including the Executive Order (EO) on Invasive Species and the Plant Protection Act, plus state regulations, including Arizona Department of Agriculture (ADA) regulations on noxious weeds.

EO 13112, Invasive Species, February 3, 1999. This EO seeks to improve coordination between federal agencies in efforts to combat invasive plant and animal species. EO 13112 established the National Invasive Species Council as a high-level, interdepartmental federal advisory panel to provide leadership and planning in the prevention and control of invasive species nationwide.

Arizona Administrative Code (AAC) R3-4-244 and R3-4-245. The State of Arizona has laws addressing the control and eradication of noxious weeds and identifying specific species that fall under three noxious weed categories: regulated, restricted, and prohibited. The Plant Services Division of the ADA is responsible for implementing these noxious weed regulations. Definitions of these three weed classes are as follows: 1) regulated noxious weeds are exotic plant species that are well established and generally distributed throughout Arizona, 2) restricted noxious weeds are exotic plant species that occur in Arizona in isolated infestations or very low populations, and 3) prohibited noxious weeds are exotic plant species with known qualities that do not currently exist in Arizona.

As part of the Coconino County Board of Supervisor's Resolution No. 2011-04 (titled "Modifying a Decision by the Planning and Zoning Commission in Response to Two Appeals and Approving a Conditional Use Permit for a Wind Energy Park On Perrin Ranch on Assessor's Parcel Numbers 500-03-001, 500-04-003 & 202-01-001"), an erosion control plan, a noxious weed management plan, and a native plant revegetation plan will be submitted prior to or in conjunction with the submittal for any county permits. The native plant revegetation plan will address road shoulders, the disturbed area around the towers, and any other disturbed areas. The noxious weed plan will include provisions for preventing the spread of noxious weeds during construction and throughout Project operation. The applicant will develop a noxious weed management plan for construction, operation, and post-operation (five years) phases. The plan will begin with a pre-construction noxious weed survey. The goal of the plan will be to maintain noxious weed conditions at pre-construction conditions or better. The plan will consist of annual noxious weed monitoring and annual mitigation programs. A summary of conditions and mitigation efforts will be delivered annually to the Coconino County Planning Department.

2.0 PROJECT DESCRIPTION

The Restoration and Reclamation Plan for the Project will provide site-specific guidelines for successful restoration and reclamation of impacted areas, which will include up to 648 acres for this Project. The approach to restoration and reclamation will be based on guidance provided by *Coconino County Public Works Department Seeding Standards* (Coconino County 2008). The plan will describe permanent and temporary disturbance conditions that will result from development of wind turbines, collections lines, access roads, the substation, operations and maintenance facilities, and all other associated development.

2.1 General Vegetation

The vegetation within the Project Area is primarily characterized by Utah juniper (*Juniperus osteosperma*), two-needle pinyon (*Pinus edulis*), rabbitbrush (*Chrysothamnus* spp.), barberry (*Berberis* sp.), snakeweed (*Gutierrezia* spp.), bitterbrush (*Purshia* sp.), and numerous annual and perennial grasses. Southwest Regional GAP (SWReGAP) land cover data (U.S. Geological Survey [USGS] 2004) characterizes the Project Area as nine distinct land cover classes; however, only seven of these would be disturbed from the Proposed Action (Table 1).

Table 1. SWReGAP Land Cover Classes Occurring within the Project Footprint

SWReGAP Land Cover Class	Acreage within the Project Area
Colorado Plateau Pinyon-Juniper Woodland	30,527
Inter-Mountain Basins Semi-Desert Shrub Steppe	4,462
Inter-Mountain Basins Juniper Savanna	2,091
Inter-Mountain Basins Semi-Desert Grassland	1,388
Inter-Mountain Basins Big Sagebrush Shrubland	1,001
Rocky Mountain Ponderosa Pine Woodland	172
Inter-Mountain Basins Mixed Salt Desert Scrub	128

The Colorado Plateau Pinyon-Juniper Woodland (Pinyon-Juniper) is the dominant land cover class within the Project Area, comprising 30,527 acres or 77% of the cover. The Pinyon-Juniper land cover class occurs in dry mountains and foothills throughout the Colorado Plateau, ranging from western Colorado, northeastern Utah, northern Arizona, and eastern New Mexico (USGS 2004). This land cover class can generally be found on warm, dry areas on slopes, mesas, plateaus, and ridges that are characterized by extreme weather conditions (USGS 2004). Two-needle pinyon and juniper are the dominant tree species in this land cover class, which may also include a variety of shrub, forb, and grass species in the understory (USGS 2004). Other common species in this land cover class include big sagebrush (*Artemisia tridentata*), littleleaf mountain mahogany (*Cercocarpus intricatus*), antelope bitterbrush (*Purshia tridentata*), James' galleta (*Pleuraphis jamesii*), and muttongrass (*Poa fendleriana*) (USGS 2004).

The Inter-Mountains Basins Semi-Desert Shrub Steppe (Semi-Desert Shrub) comprises 4,462 acres or 11% of the land cover within the Project Area. This land cover class occurs throughout the Intermountain West on alluvial fans and flats, and is characterized by grasses interspersed with shrubs. Common grass species include blue grama (*Bouteloua gracilis*), saltgrass (*Distichlis spicata*), needle and thread (*Hesperostipa comata*), James' galleta, Sandberg bluegrass (*Poa secunda*), and alkali sacaton (*Sporobolus airoides*) (USGS 2004). Typical shrub species include fourwing saltbush (*Atriplex canescens*), big sagebrush, rabbitbrush, ephedra (*Ephedra* spp.), rubber rabbitbrush (*Ericameria nauseosa*), snakeweed (*Gutierrezia sarothrae*), and winterfat (*Krascheninnikovia lanata*) (USGS 2004).

The Inter-Mountains Basins Juniper Savanna (Juniper Savanna) comprises 2,091 acres or 5% of the land cover within the Project Area. Juniper Savanna can be found across a large geographical area from western Colorado, northwest New Mexico, northern Arizona, throughout Utah, and into the Great Basin in Nevada, and Idaho (USGS 2004). The Juniper Savanna land cover class is generally characterized by open grasses with interspersed juniper trees, although some areas may have more dense stands of juniper (USGS 2004). Typical plant species include Utah juniper, blue grama, needle and thread, and James' galleta (USGS 2004).

The Inter-Mountains Basins Semi-Desert Grassland (Semi-Desert Grassland) comprises 1,388 acres or 3% of the land cover within the Project Area. The Semi-Desert Grassland land cover type is found throughout the Intermountain West on dry plains and mesas and is characterized by perennial bunch grasses with interspersed dwarf shrubs (USGS 2004). Typical plant species include Indian ricegrass (*Achnatherum hymenoides*), threeawn (*Aristida* spp.), blue grama, needle and thread, muhly (*Muhlenbergia* spp.), James' galleta, sagebrush (*Artemesia* spp.), saltbush (*Atriplex* spp.), snakeweed, and winterfat (USGS 2004).

The Inter-Mountains Basins Big Sagebrush Shrubland (Big Sagebrush Shrubland) comprises 1,001 acres or 3% of the land cover within the Project Area. The Big Sagebrush Shrubland is found throughout the western United States where it is generally found in basins between mountain ranges (USGS 2004). This land cover class is dominated by big sagebrush and Wyoming big sagebrush (*Artemesia tridentata* var. *tridentata*), and typically also includes scattered juniper trees and perennial bunch grasses (USGS 2004). Other plant species that are typically found in this land cover class include greasewood (*Sarcobatus vermiculatus*), saltbush, rubber rabbitbrush, yellow rabbitbrush (*Chrysothamnus viscidiflorus*), antelope bitterbrush, Indian ricegrass, blue grama, thickspike wheatgrass (*Elymus lanceolatus*), Idaho fescue (*Festuca idahoensis*), needle and thread, and James' galleta (USGS 2004).

The Rocky Mountain Ponderosa Pine Woodland (Ponderosa Pine Woodland) comprises 172 acres or less than 1% of the land cover within the Project Area. This widespread land cover class is found scattered throughout the West from elevations ranging from approximately 6,293 to 9,186 feet amsl (USGS 2004). While this land cover class occurs on all slopes and aspects, it is typically found on moderate to steep slopes and along ridgelines (USGS 2004). Two-needle pinyon, ponderosa pine (*Pinus ponderosa*), and juniper may be found growing within this land cover class (USGS 2004). The understory includes a variety of shrub species including sagebrush, manzanita (*Arctostaphylos* spp.), bitterbrush, and serviceberry (*Amelanchier* spp.) (USGS 2004). Some grasses may occur and could include needle and thread, needlegrasses (*Acnatherum* spp.), muhly, and grama.

The Inter-Mountain Basins Mixed Salt Desert Scrub (Salt Desert Scrub) comprises 128 acres or less than 1% of the land cover within the Project Area. This extensive land cover class consists of open canopy shrub communities in saline basins, alluvial slopes, and plains (USGS 2004). A variety of saltbush dominates this land cover type, although sagebrush, rabbitbrush, Nevada ephedra (*Ephedra nevadensis*), spiny hopsage (*Grayia spinosa*), and winterfat may be encountered (USGS 2004). Typical grasses include Indian ricegrass, blue grama, James' galleta, big galleta, and alkali sacaton.

2.2 Noxious Weeds

The invasion and establishment of non-native plant species are a threat to the overall health of the ecosystem. Not only do these species outcompete the native flora for resources, but the presence of these invasive, non-native plants also increases the fuel load for wildfires. Native flora did not evolve with these non-native plants; thus, competition for resources, such as soil, water, and nutrients, is severe, and often the non-natives replace the natives throughout the landscape. In addition, these non-natives do not have natural control systems in a foreign environment; thus, they are able to establish and proliferate without natural ecosystem balances (Sheley and Petroff 1999). Furthermore, the dead stems of these non-natives provide an unnatural fuel load that promotes wildfires and causes wildfires to be more extensive than they otherwise would be. Wildfire can cause rapid and profound changes in the local native habitat, both in the short and long term, because many desert plants are not well adapted to large disturbances by fire. In addition, fires fueled by non-native species burn hotter and farther, reducing the natural mosaic pattern (patchy distribution of plants and open space) typical to these communities (Esque et al. 2003).

As defined by the National Invasive Species Council (2006): An invasive species is defined as a species that is 1) non-native (or alien) to the ecosystem under consideration and 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health (EO 13112). Invasive species can be plants, animals, and other organisms (e.g., microbes) and human actions are the primary means of invasive species introductions (Center for Invasive Plant Management [CIPM] 2006). Noxious weeds are plants that are not native to an area; most noxious weeds in the western United States have come from Europe or Asia, either accidentally or as ornamentals that have escaped (Colorado Weed Management Association [CWMA] 2010). These plants have an advantage because the insects, diseases, and animals that would normally control them are not found in areas they invade, and since these plants have developed specialized mechanisms to survive, they are able to spread at an alarming rate (CWMA 2010).

2.2.1 Noxious Weed Survey

Specific surveys for noxious weeds have not been conducted within the Project Area at the time of this writing. Pre-construction noxious weed surveys of the Project footprint will be completed by a qualified botanist in order to identify existing noxious weed infestations. The locations of all noxious weed species will be recorded using a global positioning system (GPS) unit. Point data will be used to record the locations of small occurrences (e.g., several plants), while a polygon will be collected for larger occurrences. These noxious weed location data will be useful for establishing a baseline understanding of the noxious weeds in the Project Area and tracking the change in these populations over time.

Once complete, the survey data, along with data obtained from various regional sources on pertinent noxious weeds for the region, will be used to create a final baseline map of known weed infestations present within the Project Area. This map will be provided in a supplemental report to this plan and will also be provided in digital format for use by NextEra Energy. These data can be used to track changes in weed occurrences throughout the duration of the Project.

2.2.2 Noxious and Invasive Weeds Present in the Project Area

While noxious weed surveys have not been completed, the USGS (2007) maintains a database of noxious weed occurrences in Arizona. These data are useful to complete a baseline assessment of the noxious weeds within the Project Area. Table 2 below lists the eight noxious and invasive weeds that have been noted as present within the Project Area. Fact sheets are available in Appendix A for each noxious species. Subsequent field surveys will identify the locations of any additional noxious weeds in the Project Area. Invasive weeds will be noted; however, the locations of these species will not be recorded as invasive species are generally widespread.

Table 2. Noxious and Invasive Weeds within the Project Area

Common Name (Scientific Name)	ADA Status	AZWPWIG Status†
Cheatgrass (Bromus tectorum)	Invasive	High
Common mullein (Verbascum thapsus)	Invasive	Evaluated, but not listed
Dalmatian toadflax (Linaria dalmatica)	Restricted*	Medium and Red Flag
Field bindweed (Convolvulus arvensis)	Regulated*	Medium
Horehound (Marrubium vulgare)	Invasive	No ranking
Redstem stork's-bill (Erodium cicutarium)	Invasive	Medium
Russian thistle (Salsola tragus)	Invasive	Medium
Scotch cottonthistle (Onopordum acanthium)	Prohibited*	Low

*Listing status from ADA (2006).

† AZWPWIG is Arizona Wildlands Invasive Plant Working Group.

2.3 Disturbance Levels

This plan defines two types of disturbance conditions—permanent and temporary use. Temporary use areas are further subdivided into three levels (Overland Drive and Crush; Grading and Clearing; Cut with Soil Excavation) corresponding to the types of impacts that will occur. Anticipated disturbance levels for all Project components are summarized in Appendix B. All areas to be disturbed will have boundaries marked using stakes spaced to maintain a site line, before beginning the activity, and all disturbances will be confined to the marked areas. All Project personnel will be instructed that their activities must be confined to locations within the marked areas. Disturbance beyond the actual construction zone is prohibited without site-specific surveys. If disturbance must occur outside the marked areas, an approved biologist must survey the area to be impacted prior to disturbance.

If sensitive species or noxious weed species are observed within the area to be disturbed, a different area will be selected if possible. Cross-country travel and travel outside the marked construction zones are prohibited.

2.4 Permanent Use Areas

The use of these areas is long term, and the landscape is permanently altered as a result of removing vegetation, site leveling, modifying natural drainages, fencing, constructing facilities, towers, and other structures. Permanent disturbance also includes constructing access roads needed for regularly scheduled maintenance of facilities and structures. Vertical mulch and topsoil will be salvaged and used on restoration areas within temporarily disturbed locations. Approximately 225 acres will have long-term (permanent) disturbance (Table 3). These areas are required to be reclaimed to their original condition once the Project has reached the end of its operating period.

Table 3. Proposed Action Permanent Disturbance Summary Table

Facility Component	Disturbance Length (feet)	Disturbance Width (feet)	Long-Term Disturbance (acres)	% Project Area
Turbine foundations and crane pads (×62)	75[1]	N/A	6.3	0.02%
138-kV substation	410	320	3.1	0.01%
Operation and maintenance building	355	270	2.2	0.01%
Meteorological towers (x5)	100[1]	N/A	.9	0.00%
500-kV step-up substation	240	600	2.0	0.01%
500-kV switchyard	400	800	7.3	0.02%
138-kV generation tie transmission line	16,020	50	18.4	0.05%
21-kV Project power line	19,088	50	22.0	0.06%
Access roads only	89,861	34	70.4	0.18%
Access roads w/ adjacent collection system	120,820	34	94.6	0.24%
Component overlap[2]	n/a	n/a	-1.8	0.00%
Total			**225.4**	**0.60%**

[1] This measurement represents the diameter of the disturbance area.

[2] Overlap is the intersection of two different component disturbance areas and is therefore removed from the total disturbance. For example, a temporary turbine work area may partially overlap the collection system. In that case, the overlapping turbine acreage has been subtracted in order to not double-count disturbance.

2.5 Temporary Use Areas

Temporary use is defined as using an area only for the amount of time it takes to construct the Project. This will include using various types of heavy equipment to install towers or underground transmission lines, driving across public land to gain access to the Project site, parking vehicles and equipment, and storing materials in designated staging areas. These areas will be restored following the completion of construction. Three levels of temporary disturbance (Overland Drive and Crush; Grading and Clearing; Cut with Soil Excavation) are defined based on the type of impacts to the land, and therefore the components of restoration that are required. The Project area will include approximately 648 acres of temporary disturbance. Table 4 provides a list of Project components and their temporary disturbance. The actions required for each temporary disturbance type are summarized in Table 5.

2.5.1 Overland Drive and Crush (D-1)

Overland drive and crush is defined by a disturbance caused by accessing a site without significantly modifying the landscape. Vegetation is crushed but not cropped. Soil is compacted, but no surface soil (topsoil) is removed. Even though vegetation may be damaged and even destroyed, the topsoil and seed bank remains in place. Some crushed vegetation would likely resprout after disturbance ceases. These activities would result in minimal to moderate disturbance and will be implemented whenever vegetation and/or soil removal is not required. This disturbance type would result in minimal disturbance.

2.5.2 Grading and Clearing (D-2)

Grading and clearing requires the removal of all vegetation and soils are compacted. Removal of topsoil may also occur under this disturbance category; however, soil removal is limited to topsoil, which includes all soils to a depth of 4 inches (± 2 inches). This disturbance type would result in moderate disturbance.

2.5.3 Cut with Soil Excavation (D-3)

This category of disturbance is caused by removing all vegetation, topsoil, and excavating subsurface soils. This type of disturbance requires careful separation of vegetation and distinct soil layers for post-construction restoration. These activities result in heavy disturbance and require extensive earthwork.

Table 4. Proposed Action Temporary Disturbance Summary Table

Facility Component	Disturbance Length (feet)	Disturbance Width (feet)	Short-Term Disturbance (acres)	% Project Area
Turbine foundations and crane pads (×62)	300[1]	N/A	100.8	0.25%
138-kV substation, operation and maintenance building, and laydown	1200	896	24.8	0.06%
Secondary laydown	2000	590	30.0	0.08%
Arizona Public Service corridor (500-kV step-up substation & 500-kV switchyard)	2,800	1,300	80.0	0.20%
138 kV generation tie line and 21-kV backfeed line	16,020	75	27.7	0.07%
21-kV Project power line	19,088	150	66.1	0.17%
Access roads only	89,861	60	124.7	0.31%
Access roads w/ adjacent collection system	120,820	60	167.4	0.42%
Collection system only	108,994	20	50.1	0.13%
Component overlap[2]	n/a	n/a	-23.7	-0.06%
Total			**647.9**	**1.63%**

[1] This measurement represents the diameter of the disturbance area.

[2] Overlap is the intersection of two different component disturbance areas and is therefore removed from the total disturbance. For example, a temporary turbine work area may partially overlap the collection system. In that case, the overlapping turbine acreage has been subtracted in order to not double-count disturbance.

Table 5. Restoration Actions for Each Temporary Disturbance Type

Action	D-1 (disturbance type)	D-2 (disturbance type)	D-3 (disturbance type)
Pre-construction			
Conduct weed survey	X	X	X
Windrow vertical mulch and rocks alongside disturbance		X	X
Separate and windrow topsoil and subsurface soil			X
Post-construction			
Decompact terrain or erase tracks, as necessary	X		
Decompact terrain and restore natural drainages and contours		X	X
Replace subsurface soils (in proper order)			X
Stabilize soil surface	X	X	X
Replace vertical mulch and large rocks		X	X
Reseed	X	X	X
Install restoration signs	X	X	X
Monitor and apply contingency measures as necessary	X	X	X

3.0 RESTORATION ACTIONS

3.1 Pre-construction

3.1.1 Pre-construction Weed Surveys and Control

Pre-construction surveys will be completed prior to construction by a qualified botanist in order to determine site-specific salvage activities and existing noxious and invasive weed infestations. The results of these surveys will be provided in a supplemental report to this document. Weed treatment prior to earthwork or topsoil salvage will reduce the seedbank and help reduce weed infestations during restoration efforts. Specific control measures will be determined at that time.

3.1.2 Salvage Vertical Mulch and Rocks

For areas that require grading and clearing and cut with soil excavation (D-2 and D-3), cleared vegetation will be mowed, mixed, and mechanically windrowed (material is pushed to the side using a blade or plow) to an area outside the disturbance boundary within the right-of-way (ROW). Large rocks and boulders will also be mechanically windrowed to an area outside the disturbance boundary.

3.1.3 Soil Salvage and Stockpiling

For areas that require grading and clearing and cut with soil excavation (D-2 and D-3), topsoil salvage should be conducted and include the top 4 inches (± 2 inches) of soil. All possible topsoil should be salvaged where bedrock limits salvage to less than 4 inches. Topsoil should be labeled and protected from erosion and inadvertent use as fill. Subsoil should be collected and stored in the same way as topsoil, and these soil layers should never be mixed. When stockpiled, soils will be treated with a tackifier to a 2-inch wetting depth to minimize erosion as indicated in the *Coconino County Public Works Department Seeding Standards* (Coconino County 2008). Different soil types will be stockpiled separately (caliche and sand for example).

3.2 Post-Construction

The following is a description of actions that will be implemented after the completion of construction activities and include 1) earthwork, 2) seeding, and 3) erecting restoration signs.

3.2.1 Earthwork

Post-construction earthwork includes burying subsurface soils (including caliche), applying topsoil, decompacting terrain, and replacing windrowed plant material and rocks. For underground transmission lines that disturb soil from the topsoil <u>and</u> subsurface soil (D-3), the segregated material will be replaced back into the trench in the proper order. If significant caliche is encountered during the excavation, it will be crushed into fine material before replacing it back into the trench. Small amounts of caliche may be replaced into the trench; however, there must be sufficient finer material to achieve natural terrain contours. After recontouring to natural grade and loosening the subsurface soil, topsoil will be replaced and spread evenly over the restoration area.

Where any compaction exists (D-1 and D-2), the surface will be ripped, scarified, tilled, or harrowed to a depth of 6 inches, as appropriate (e.g., not applicable to rock faces, severe slopes, or cliff areas). Depth of compaction relief will depend on site-specific conditions. Cross-ripping is preferable and care should be taken to prevent inverting the soil layers. If necessary, the topsoil will be redistributed following site recontouring and preparation (decompacting and ripping). Soil will be wet to a depth of 2 inches to prevent further erosion. The site will be left adequately rough after topsoil placement to provide micro-sites for seed germination and to reduce soil movement.

Replaced topsoil will be left in an unscreened condition in an effort to minimize erosion; small soil particles may be lost during the process of screening. In case of shortage, it is better to replace a shallower depth in all areas than none in a few places. Additional erosion control and soil stabilization may be required to minimize soil movement, especially for heavily sloped areas or for fine-textured soils. Soil must be stabilized with a tacking agent derived from a naturally occurring organic compound and must also be non-toxic. The swell volume of the tackifier should be at least 24 milliliters per gram, although 30 milliliters per gram will be considered to be the standard swell volume. Topsoil will not be handled excessively during windy or wet conditions. For areas that have been cleared, large rocks and boulders removed to the side of the disturbance will be placed back with the darkened side facing up in a natural appearing pattern when feasible.

3.2.2 Revegetation

Revegetation will be done immediately following the completion of earthwork. The revegetation process includes preparing areas to be seeded (tillage and soil amendments), applying seed, and stabilizing soil. Techniques to accomplish the revegetation process are generally influenced on the slope of the area to be revegetated.

Steep slopes (exceeding 3:1) will first require appropriate erosion control measures in order to intercept upslope runoff from snowmelt and rainfall by swales and other naturalized landforms. This runoff needs to be channeled away from the reclamation slopes and into native drainages using erosion control techniques such as waddles or straw bales. Eroded areas will be restored to the specified condition, grade, and slope prior to seeding.

PREPARATION OF AREAS TO BE SEEDED

Tillage will be done with a ripper bar, chisel plow, or other device that thoroughly cultivates soil to the specified depth. On slopes exceeding 3:1 and areas with underground utilities, tillage will be done at a minimum depth of 6 inches, while slopes of less than 3:1 will be tilled to a minimum depth of 12 inches. In either case, tillage furrows must be no greater than 12 inches apart. Clods, stones, or other materials exceeding 4 inches in length in any dimension should be removed, as these materials may interfere with seeding. All tilled areas will require the incorporation of fertilizer and compost (soil amendments). The specific requirements of approved fertilizer and compost are provided in Appendix C.

SEEDING

Timely seeding is critical to preventing annual grasses from reestablishing in openings (Monsen et al. 2004). Seeding operations will be conducted in fall or winter (September–March) following the last disturbance activity. A seed mix identified in the *Coconino County Public Works Department Seeding Standards* (Coconino County 2008) is presented in Table 6. Substitution of seed may be allowable if the seed identified in Table 6 is unobtainable at the time that seeding will be done or if seed from other native species is preferred.

Drill seeding has a relatively high success rates and is the preferred method of seeding in all areas where slopes are less than 3:1. Drill seeding is the process of placing seeds directly into the soil at a depth of 0.25 to 0.5 inch using specialized equipment. If the furrow openers on the drill seeding equipment exceed 8 inches in width, the area will be drill seeded twice. Further detailed descriptions of the seed drilling equipment can be found in the *Coconino County Public Works Department Seeding Standards* (Coconino County 2008).

Table 6. Seed Mix for Restoration

Scientific Name	Common Name	Pure Live Seed Application Rate (pounds per acre)
Bouteloua curtipendula	Sideoats grama	6
Bouteloua gracilis	Blue grama	1
Muhlenbergia wrightii	Spike muhly	0.25
Elymus elymoides	Bottlebrush squirreltail	1
Elymus trachycaulum	Slender wheatgrass	7
Festuca arizonica	Arizona fescue	2
Linum lewisii	Blue flax	1

Where slopes exceed 3:1, where drill seeding is infeasible, or where seed mix is inappropriate for drill seeding, hydroseeding techniques will be used. The approved seed mix and volume will be incorporated into a "slurry containing a minimum of 40 pounds of tacking agent and 200 pounds of wood fiber mulch per acre" (Coconino County 2008:7).

The application of certified weed-free mulch will serve to retain moisture and increase germination rates. Straw mulch must be applied to all areas that have been seeding via drilling or hydroseeding methods within 24 hours after seeding. Straw mulch will either be stabilized via crimping or tacking within the same day that it is installed. Crimping is the preferred method and should be done wherever slopes are less than 3:1 and where conditions are suitable for crimping equipment. Tacking should be done on slopes exceeding 3:1 and areas that are inaccessible or inappropriate for crimping equipment.

Straw mulch must be applied at a minimum rate of 2.5 tons per acre for crimped areas and 2 tons per acre for tacked areas. Mulch in the form of straw matting, blown straw and tackifier, hydromulch, or vertical mulch will be applied to retain moisture and increase germination rates. All seed mixes and straw mulch will be certified weed free.

SEASONAL TIMING OF SEEDING

Seeding should take place in the late fall when air temperatures are lower and the chance of precipitation is high. Many seeds require overwintering to scarify the seedcoat and allow them to germinate. Spring seeding of native seeds can lead to excessive rodent predation and early germination resulting in seedling without established root systems that are unable to withstand summer temperatures and lack of precipitation.

ERECTING RESTORATION SIGNS

Within Arizona State lands, restoration areas will have signs installed at regular intervals to deter vehicular damage to the site. The proponent will provide the restoration signs and t-posts. Signs should be checked yearly to ensure that signage is visible to the public.

4.0 NOXIOUS WEED MANAGEMENT

4.1 Weed Management Strategies

Noxious and invasive weed monitoring will be included in the overall site monitoring program. Weeds found within or adjacent to the Project Area will be treated with the appropriate control options per each species. In the event that this treatment is not adequate, additional measures such as adaptive management, mowing or other mechanical treatments, weed removal, and other forms of chemical control can be implemented.

4.1.1 Adaptive Management

Adaptive management is an effective way of addressing the complex and numerous problems that noxious weeds pose to landowners and land managers. In an adaptive management strategy, the outcome of control efforts may vary and necessitate changes in methods for prevention and suppression and are incorporated into an integrated weed management plan (Colorado State University 2000). No single management technique is perfect for all weed control situations, and multiple management actions may be required for effective control. Ecologically Based Integrated Weed Management (EBIWM) is a process by which one selects and applies a combination of management techniques (biological, chemical, mechanical, and cultural) that, together, will control a particular weed species or infestation efficiently and effectively with minimal adverse impacts to non-target organisms. Ideally, these management techniques should be selected and applied within the context of a complete natural resource management plan.

Most traditional weed management concentrates only on suppression, which treats the symptoms of weed infestation, typically by using herbicides to kill weeds. EBIWM differs from ordinary weed management in attempting to address the ultimate causes of weed infestation, rather than simply focusing on controlling weeds. EBIWM seeks to combine two or more control actions that will interact to provide better control than any one of the actions alone might provide. However, even if multiple control actions do not interact, their additive effects can mean the difference between success and failure. In addition, employing multiple control actions should increase the likelihood that at least one of them will control the target weed species. EBIWM is species and site specific, tailored to exploit the weaknesses of a particular weed species, and designed to be practical with minimal risk to the organisms and their habitats (Colorado State University 2000).

4.1.2 Prevention

According to the CIPM (2003: pg1),

> The most effective, economical, and ecologically sound approach to managing invasive plants is to prevent their invasion in the first place. Often landowners and land managers direct limited resources into fighting firmly established infestations. By that stage, management is expensive and eradication is probably impossible. Certainly it is necessary to manage infestations to limit the spread of invasive plants – which are often categorized as “weeds” – into non-infested areas. However, limited resources might be spent more efficiently on proactive weed management that controls existing weed infestations but also focuses strongly on prevention or early detection of new invasions.

The State of Arizona has identified several plant species as noxious and invasive weeds (ADA 2005). Eight of these noxious weed species are known to occur within the Project Area. There are many preventative measures that should be considered in order to avoid allowing other invasive species to invade the Project Area. For instance, proper identification of noxious and invasive weeds is critical to the success of any weed control program. Distributing weed identification pamphlets or lists to all employees and including a discussion of weed control efforts in the environmental awareness training will aid in the identification of new infestations. All personnel are encouraged to report weed species observed within the Project Area. Weed-free hay and seed should be used during all construction, operational, or restoration activities. Early identification can reduce costs associated with eradicating established stands of noxious weeds. The Project proponent should provide a staging area outside the Project location to clean (using water, compressed air, shaker diamond grid, or similar) all vehicles and equipment, concentrating on the undercarriage and wheels to remove seed and plants parts. Similarly, all vehicles and equipment should be cleaned after traveling through weed-infested areas. The U.S. Forest Service (USFS 2005) provides a detailed review of methods for cleaning construction site vehicles and equipment. This publication summarizes the various techniques and materials used to remove noxious weeds and invasive species from vehicles and equipment, and provides vendor information for any materials needed (i.e. truck washing stations). The following are Project-specific stipulations that will attempt to control listed noxious weeds on this Project.

1. Limit the size of any vegetation and/or ground disturbance to the absolute minimum necessary to perform the activity safely and as designed. The Project proponent will avoid creating soil conditions that promote weed germination and establishment.
2. Begin Project operations in weed-free areas whenever feasible before operating in weed-infested areas.
3. Locate equipment storage, machine and vehicle parking, or any other area needed for the temporary placement of people, machinery, and supplies in areas that are relatively weed free. The Project Proponent will avoid or minimize all types of travel through weed-infested areas or restrict major activities to periods of time when the spread of seed or plant parts is least likely.
4. Determine equipment-cleaning sites (if equipment is infested with weed seeds, plant parts, or mud and dirt). Project-related equipment and machinery (this especially includes every part of the undercarriages) will be cleaned using compressed air or water to remove mud, dirt, and plant parts before moving into and out of relatively weed-free areas. Seeds and plant parts will be collected, bagged, and deposited in dumpsters destined for local landfills, when practical.
5. Inspect, remove, and dispose of weed seed and plant parts found on their clothing and personal equipment, bag the product, and dispose of it in a dumpster for deposit in local landfills. Disposal methods may vary, depending on the specific activity.

4.1.3 Monitoring

Pre-construction surveys will be completed in order to determine site-specific salvage activities and existing noxious and invasive weed infestations. Weed treatment prior to earthwork or topsoil salvage will reduce the seedbank and help reduce weed infestations during restoration efforts. Specific control measures will be determined at that time.

Establishing a strong monitoring program that can be easily followed and repeated will greatly assist in future efforts to make appropriate management decisions. The monitoring plan should include careful documentation of existing weed infestations and control agent release sites, designed to capture changes in plant performance and plant populations. The purpose of monitoring is to obtain information for use in evaluating responses to land management practices. Successful native grass, forb, and shrub establishment is known to take four to six years following the initial seeding (Monsen et al. 2004). Annual monitoring will continue for a minimum of three years, with an additional two years if restoration efforts are not successful. Methods will be designed to quantify the level of recovery for the treated sites by comparing the recovery progress with adjacent undisturbed habitat of similar soil and vegetative characteristics. The use of photographic and global positioning system (GPS) technology to enhance mapping efforts, capture abiotic factors, and monitoring off-season conditions to better understand seasonal changes that may affect the control agents can provide insight into the best management techniques to combat noxious and invasive weed population. Monitoring should include disturbance, treatment, and weed mapping and can have a variety of objectives, including:

- assessing the impact of management activities;
- detecting weeds in uninfested areas;
- assessing the impact of weeds on the ecosystem;
- assessing the effects of management activities on the ecosystem; and
- evaluating weed spread.

Monitoring provides feedback on the efficacy of management activities. Management plans can and should be adjusted based on feedback from monitoring. Although monitoring is often restricted to small areas or plots, weed expansion or contraction across large geographic areas can be monitored by comparing maps from different years. If revegetation is not successful, the situation should be remedied and the area revegetated. Weed mapping and monitoring will be included as part of the monitoring program. New populations of weeds found within or adjacent to the Project Area will be treated with the appropriate herbicide for the target species.

4.1.4 Control

MECHANICAL

Mowing

The ecological basis for mowing weeds is directed at the efficiency of invasive plants to take up and assimilate carbon dioxide and then alter that physiological function. Properly timed mowing can suppress invasive weeds and favor native and desirable plant species. The most effective time to mow is when the invasive weed is actively growing and the desirable species is dormant. This can prevent weed seed production, as well as stress the plant after they have invested large amounts of energy into flowering and photosynthetic tissue, and repeated mowing can deplete root reserves. Effective mowing is a long-term commitment; some weeds are stimulated by mowing thereby increasing stand densities. However, over several years, the root reserves will become depleted and stand densities will decrease. Species that respond well to mowing include Canada thistle (*Cirsium arvense*), Dalmatian toadflax (*Linaria dalmatica*), and Russian knapweed (*Acroptilon repens*) (Sheley 2002).

Mowing frequency is dependent on several factors. A spring mowing may be sufficient to reduce annual or biennial species, unless summer rains or soil moisture allows the weed species to regenerate, requiring a second or even third mowing. Rhizomatous weeds often require several mowings over a growing season to successfully control growth. Mowing is not likely to be effective alone, but can increase effectiveness of other control efforts, such as herbicide application (Sheley 2002). Other limitations to mowing include spreading weed seeds and high cost of equipment and labor. Mowing may be an effective form of ongoing weed control in recently disturbed roadsides resulting from access road expansion.

Removal

Removing plants by hand pulling them to uproot the plant works well for small infestations of annual and biennial plants. The Project proponent should be sure that plant species do not resprout from residual roots. Pulling does not generally remove the entire root system and is ineffective for killing rhizomatous weed species. Species that are good candidates for hand pulling include cheatgrass (*Bromus tectorum*), Dalmatian toadflax, musk thistle (*Carduus nutans*), Scotch thistle (*Onopordum acanthium*), and bull thistle (*Cirsium vulgare*). Some plants produce chemicals that cause allergic reaction or dermatitis in some people. Workers should wear personal protection equipment (long sleeves, gloves) and avoid areas where chemical treatments or other safety restrictions apply.

CHEMICAL

Numerous herbicides may prove useful to the reduction and eradication of noxious weeds. Chemicals may reside in upland and drier areas due to the lack of water and subsequent hydrolysis (breakdown) of the herbicide; therefore, consideration of these side effects must be taken into account. Herbicides can be categorized according to how they move through a plant: downwardly mobile, upwardly mobile, and contact. Choosing the correct herbicide for the target species is important to avoid damaging desirable species, ensuring effective control of the weed species, and avoiding impacts to wildlife and the environment. Table 7 summarizes some of the commonly used herbicides and their effectiveness on target species. Ratings were presented when available, and were obtained largely from Dewey et al. (2006), Colorado State University (2000), and specific herbicide labels.

Table 7. Herbicide Controls for Noxious and Invasive Weed Species

Common Name (Scientific Name)	Aminopyralid	Glyphosate	Imazapic	Chlorsulfuron
Bermudagrass (*Cynodon dactylon*)	P	G	X	X
Bull thistle (*Cirsium vulgare*)	E	E, G	X	G
Canada thistle (*Cirsium arvense*)	E	G	X	G
Cheatgrass (*Bromus tectorum*)	P	E, G	E	X
Common mullein (*Verbascum thapsus*)	X	E	X	X
Dalmatian toadflax (*Linaria dalmatica*)	F,P	G	G	G
Field bindweed (*Convolvulus arvensis*)	F	G, F	X	X
Horehound (*Marrubium vulgare*)	X	G	X	X
Johnsongrass (*Sorghum halepense*)	P	E, G	X	X
Musk thistle (*Carduus nutans*)	E	E	G	G
Prickly Russian thistle (*Salsola tragus*)	X	G	X	X
Red-stem stork's bill (*Erodium cicutarium*)	X	E	X	X
Russian knapweed (*Acroptilon repens*)	E	G, P	G	F
Scotch cottonthistle (*Onopordum acanthium*)	E	X	G	G
Tamarisk (*Tamarix ramosissima*)	X	G	X	X

E = Excellent, G = Good, F = Fair, P = Poor, X = Unrated.

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APPENDIX A

Noxious and Invasive Weed Fact Sheets

Species: Dalmatian toadflax (*Linaria dalmatica*); figwort family (Scrophulariaceae)

Description: This herbaceous perennial plant grows to 4 feet tall and may have a woody base. The leaves are approximately 1 to 3 inches long, heart-shaped, and clasp the stem. Bright yellow flowers with orange marking are generally present from midsummer to early fall. This species is generally found along disturbed areas such as along roads, fences, pastures and rangelands. This plant can form colonies that reduce crop production and outcompete grasses and annual forbs.

Control Methods:

Manual - Hand-pulling, mowing, and tillage can be effective in preventing seed production and starving toadflax roots, thereby controlling infestations under certain conditions only if done repeatedly and/or in combination with other control methods

Chemical - Effective herbicides for Dalmatian toadflax include chlorsulfuron, dicamba, picloram, and imazapic. It may be necessary to retreat infestations every three to four years. Follow label and state requirements. Triclopyr and glyphosate do not effectively control this plant.

Biological control - Flower feeding beetles (*Brachypterolus pulicarius* and *Gymnetron antirrhini*) reduce seed production in toadflax.

Photos:


Images taken from Western New Mexico University Department of Natural Sciences and the Dale A. Zimmerman Herbarium, available at:
http://www.wnmu.edu/academic/nspages/gilaflora/linaria_dalmatica.html

Species: Field bindweed (*Convolvulus arvensis*); morning glory family (Convolvulaceae)

Description: This perennial vine (0.4–2 inches in height) is trailing to twining, with branched stems 8 to 79 inches long that may form mats. Leaves are variable, ranging from 0.5 to 4 inches long and 0.125 to 2.5 inches wide. White to pink flowers grow from the axils and are present from June to August. This species is found in a wide variety of disturbed habitats and prefers strong sunlight and moderate to low moisture.

Control Methods:

Mechanical - Discing, tilling, or hand pulling are effective.

Chemical - Herbicide 2,4-D or glyphosate (Roundup) can be applied, as well as applications that translocate to roots, before seeds set.

Other approaches: Research suggests that shading will help control this species; mulching using paper, straw, wood chips, or black plastic can be effective in certain areas.

Photos:

Images taken from Western New Mexico University Department of Natural Sciences and the Dale A. Zimmerman Herbarium, available at:
http://www.wnmu.edu/academic/nspages/gilaflora/convolvulus_arvensis.html

Species Name: Scotch cottonthistle (*Onopordum acanthium*); sunflower family (Asteraceae)

Description: This biennial herb can attain heights of 12 feet. The leaves of this plant are large and armed with spines. Both the leaves and stems are covered with dense hairs that have a cotton-like appearance. Purple to red flower heads occur on the terminal end of the stem and are 1 to 2 inches in diameter.

Control Methods:

Mechanical - Hand pulling or digging can be effective for isolated plants or small patches, especially if done in the seedling stage. Larger patches or plants at or near the blooming stage can be difficult to control manually because of the size of the plants and numerous thorns on the leaves, stems, and flower heads. Mowing is generally not effective. Any plants with flower heads or buds should be disposed of carefully as there is usually enough reserve in the removed plants to produce viable seeds.

Chemical - Spot spraying with glyphosate is effective in controlling Scotch thistle. Glyphosate products can be used to treat individual plants or small patches.

Photos:

Image taken from Colorado Weed Identification Guide, available at:
http://weeds.hotmeal.net/weeds/List_B_Part2.html

APPENDIX B

Anticipated Disturbance Type by Project Component

Table B.1. Anticipated Disturbance Type by Project Component

Facility Component	Short-Term Disturbance (acres)	% Project Area	Long-Term Disturbance (acres)	% Project Area	Anticipated Disturbance Level
Turbine foundations and crane pads (×62)	100.8	0.25%	6.3	0.02%	D-1; D-2
138-kV substation, operation and maintenance building, and laydown	24.8	0.06%	5.3	0.02%	D-1; D-2
Secondary laydown	30.0	0.08%	0	0.00%	D-1
Meteorological towers (x5)	0	0.0%	0.9	0.00%	D-1
Arizona Public Service corridor (500-kV step-up substation and 500-kV switchyard)	80.0	0.20%	9.3	0.03%	D-1; D-2
138-kV generation-tie line and 21-kV backfeed line	27.7	0.07%	18.4	0.05%	D-1; D-2
21-kV Project ower line	66.1	0.17%	22.0	0.06%	D-1; D-2
Access roads only	124.7	0.31%	70.4	0.18%	D-1; D-2
Access roads w/ adjacent collection system	167.4	0.42%	94.6	0.24%	D-1; D-2; D-3
Collection system only	50.1	0.13%	0	0.00%	D-3
Component overlap[1]	-23.7	-0.06%	-1.8	0.00%	N/A
Total	**647.9**	**1.63%**	**225.4**	**0.60%**	**N/A**

[1] Overlap is the intersection of two different component disturbance areas and is therefore removed from the total disturbance. For example, a temporary turbine work area may partially overlap the collection system. In that case, the overlapping turbine acreage has been subtracted in order to not double-count disturbance.

APPENDIX C

Soil Amendments

Soil amendments are required as indicated in the *Coconino County Public Works Department Seeding Standards* (Coconino County 2008).

Compost:

Compost will be added to the soil before final soil tillage at a rate of 12 cubic yards per acre and will consist of organic vegetative matter. Per the *Coconino County Public Works Department Seeding Standards*, (Coconino County 2008: pg 4) “Compost shall be dark brown in color with the parent material composted and no longer visible. The structure shall be a mixture of find and medium size particles and humus crumbs. The odor shall be that of rich humus with no ammonia or anaerobic odors.” Compost will meet the requirements identified below in Table C.1.

Table C.1. Compost Standards

Category	Requirement
Cation exchange capacity	Greater than 60 meq/100g
Carbon to nitrogen ratio	Less than 20:1
pH (of extract)	6.0–8.5
Organic matter content	Greater than 25%
Total nitrogen (not added)	Greater than 1%
Humic acid	Greater than 5%
Maturity index	Greater than 50% on maturity index at a 10:1 ratio
Stability	Less than 100mb 02/Kg compost dry solids - hour

Table adapted from the Coconino County Public Works Department Seeding Standards (Coconino County2008)

Fertilizer:

Per the Coconino County Public Works Department Seeding Standards,

> Chemical fertilizer shall be composed of a mixture of one part sulfur coated urea 25-4-8, one part monammonium phosphate 11-52-0, and one part methylene urea 38-0-0. The sulfur coated urea, a blended fertilizer 25-4-8, shall have 80 percent of the nitrogen defined as slow release, and contain 5 percent iron, 10 percent sulfur and trace amounts of zinc and manganese. The resulting 24-18-2 chemical blended fertilizer, as specified herein, shall be applied at the rate of 200 pounds per acre. In addition to the fertilizer mixture, agricultural sulfur compounds, comprised of between 80 percent and 96 percent sulfur, shall be applied at the rate of 200 pounds per acre. (Coconino County 2008)

Appendix B

WESTERN AREA POWER ADMINISTRATION STANDARD CONSTRUCTION PROJECT PRACTICES AND MITIGATION

Table B.1. Western Standard Construction Project Practices and Mitigation

Mitigation Action Identifier	Mitigation Action
GEN-1	The construction contractor shall limit the movement of crews and equipment to the ROW, including access routes. The contractor shall limit movement on the ROW to minimize damage to residential yards, grazing land, crops, orchards, and property, and shall avoid damage to property. The construction contractor shall coordinate with the landowners to avoid impacting the normal function of irrigation devices and other agricultural operations during Project construction.
GEN-2	When weather and ground conditions permit, the construction contractor shall obliterate all construction-caused deep ruts that are hazardous to farming operations and movement of equipment. Ruts shall be leveled, filled, graded, or otherwise eliminated as approved by Western. Ruts, scars, and compacted soils in hay meadows, alfalfa fields, pastures, and cultivated productive lands shall have the soil loosened and leveled by scarifying, harrowing, disking, or other approved methods. Damage to ditches, tile drains, terraces, roads, and other features of the land shall be corrected. At the end of each construction season and before final acceptance of the work in these agricultural areas, all ruts shall be obliterated, and all trails and areas that are hard-packed as a result of construction operations shall be loosened and leveled. The land and facilities shall be restored as nearly as practicable to the original grade condition.
EROSION-1	Water turnoff bars or small terraces shall be constructed across all ROW trails on hillsides to prevent water erosion and to facilitate natural re-vegetation on the trails.
ENV-1	The construction contractor and Western shall comply with all federal, state, and local environmental laws, orders, and regulations. Prior to construction, all supervisory construction personnel would be instructed on the protection of cultural and environmental resources. To assist in this effort, the construction contract would address: a) federal and state laws regarding antiquities and plants and wildlife, including disturbance, collection and removal; and b) the importance of these resources and the purpose and need to protect them.
ENV-2	The construction contractor shall exercise care to preserve the natural landscape. Construction activities shall be conducted to minimize scarring or defacing of the natural surroundings in the vicinity of the work. Except where clearing is required for permanent works, approved construction roads, or excavation operations, vegetation shall be preserved and shall be protected from damage by the contractor's construction operations and equipment.
VEG-3	On completion of the work, all work areas except access trails shall be scarified or left in a condition that would facilitate natural revegetation (unless reseeding, mulching, or other specific requirements apply), provide for proper drainage, and prevent erosion. All destruction, scarring, damage, or defacing of the landscape resulting from the contractor's operations shall be repaired by the contractor.
GEN-3	Construction trails not required for maintenance access shall be restored to the original contour and be left in a state acceptable to the landowner. The surfaces of these construction trails shall be scarified as needed to provide conditions that would facilitate natural revegetation, provide for proper drainage, and prevent erosion.
GEN-4	Construction staging areas shall be located and arranged in a manner to preserve trees and vegetation to the maximum practicable extent. On abandonment, all storage and construction materials and debris shall be removed from the site. The area shall be regraded, as required, so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that would facilitate natural revegetation, provide for proper drainage, and prevent erosion.
GEN-5	Borrow pits shall be excavated so that water would not collect and stand therein. Before being abandoned, the sides of borrow pits shall be brought to stable slopes, with slope intersections shaped to carry the natural contour of adjacent, undisturbed terrain into the pit or borrow area, giving a natural appearance. Piles of excess soil or other borrow shall be shaped to provide a natural appearance.
WASTE-1	Construction activities shall be performed by methods that prevent accidental spills of solid matter, liquids, contaminants, debris, and other pollutants and wastes into flowing streams or dry water courses, lakes, playas, and underground water sources. These pollutants and wastes include, but are not restricted to, refuse, garbage, cement, concrete, sanitary waste, industrial waste, oil and other petroleum products, aggregate processing tailings, mineral salts, and thermal pollution (temperature change in local water bodies).
WATER-1	Dewatering work for structure foundations or earthwork operations adjacent to, or encroaching on, streams or water courses would not be performed without prior notice to appropriate state agencies and compliance with applicable NPDES requirements.
WATER-2	Excavated material or other construction materials shall not be stockpiled or deposited near or on stream banks, lake shorelines, or other water course perimeters where they could be washed away by high water or storm runoff or can in any way encroach upon the actual water source itself. As required by state agencies, the contractor shall comply with all NPDES requirements and obtain the appropriate permits.

Table B.1. Western Standard Construction Project Practices and Mitigation (Continued)

Mitigation Action Identifier	Mitigation Action
WATER-3	Waste waters from construction operations shall not enter streams, water courses, or other surface waters without use of such turbidity control methods as settling ponds, gravel-filter entrapment dikes, filter fences, approved flocculating processes that are not harmful to fish, recirculation systems for washing of aggregates, or other approved methods. Any waste waters discharged into surface waters shall be essentially free of suspended material. These actions shall comply with all applicable NPDES permitting requirements.
AIR-1	The construction contractor shall use such practicable methods and devices as are reasonably available to control, prevent, and otherwise minimize atmospheric emissions or discharges of air contaminants. This includes particulates from soil disturbance and construction activities, excessive exhaust from internal combustion engines, etc.
AIR-2	Equipment and vehicles that show excessive emissions of exhaust gases due to poor engine adjustments, or other inefficient operating conditions, shall not be operated until corrective repairs or adjustments are made.
WASTE-2	Burning or burying of waste materials on the ROW or at the construction site is not allowed. The construction contractor shall remove all waste materials from the construction area. All materials resulting from the contractor's clearing operations shall be removed from the ROW and disposed of in accordance with applicable regulations.
GEN-6	The construction contractor shall make all necessary provisions in conformance with safety requirements for maintaining the flow of public traffic and shall conduct construction operations so as to offer the least possible obstruction and inconvenience to public traffic. At no time shall obstruction of emergency vehicles be permitted.
EMF-1	Western and the Project proponent would design and include necessary mitigation to eliminate problems of induced currents and voltages onto conductive objects sharing a ROW, to the mutual satisfaction of the parties involved. Western and the Project proponent would install fence grounds on all fences that cross or are parallel to the proposed line and in which induced currents are a potential problem.
WATER-4	Western and the Project proponent shall minimize activities in riparian areas or span riparian areas and avoid disturbance to riparian vegetation whenever practical. The crossing of riparian areas by equipment and vehicles during construction and maintenance activities shall be minimized.
WILDLIFE-1	Western and the Project shall design transmission lines in conformance with the 1994 *Suggested Practices for Protection of Raptors on Power Lines,* which was subsequently amended to include other avian species in addition to raptors as *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (APLIC 2006).

Appendix C

CUMULATIVE ACTIONS

Table C.1. Cumulative Actions

Project	Project Description	Location	Resources Affected
Past and Present (5 years to present)			
Grand Canyon Railway	Constructed in the early 1900s and reopened in 1989. Today, the railway carries over 200,000 people annually.	Williams to Tusayan, AZ	Socioeconomics (Tourism)
Highway 180	Improved to mitigate traffic and provide multimodal opportunities. Bicycle/Pedestrian paths have been developed along Highway 180 all the way to Snow Bowl Road and plans to continue the path even further are in the works. Pedestrian crossings have been added at several locations along Highway 180 to allow community residents better access. Many neighborhood roads have been improved through improvement districts either with paving or dust mitigation measures. Coconino County has completed the re-addressing program within the Fort Valley area and uniform street signage has been installed.	Flagstaff to Grand Canyon	Transportation and Access
Flagstaff Pulliam Airport	As the region experiences growth, the airport would likely be expanded to accommodate growth.	Flagstaff (38.6 miles from Williams)	Land Use/ Socioeconomics
Cinder Lake Landfill	Provides disposal services to Flagstaff and Coconino County.	Flagstaff (38.6 miles from Williams)	Land Use
Flagstaff Coconino County Public Library	Provides a branch facility, the East Flagstaff Community Library located at the Mt. Elden Middle School; a library at the Coconino County Correctional Facility; as well as two bookmobiles.	Flagstaff (38.6 miles from Williams)	Land Use
Coconino National Forest			
Buckhorn Range Allotment EA	Re-authorize livestock grazing in a manner that maintains and/or moves the area toward Coconino National Forest's Land and Resource Management Plan (Forest Plan) objectives and desired condition. Implementation: December 2010.	Unit - Mogollon Rim Ranger District, Red Rock Ranger District. State - Arizona. Coconino - Coconino. Located on the Red Rock Ranger District (70%) and Mogollon Rim Ranger District (30%), East of Camp Verde. (Within 145 miles from Williams)	Grazing
Hilltop Road Permit Categorical Exclusion	Proposal for road access to private land located within the Peaks Ranger District/Hilltop Partners. Implementation: December 2010.	Unit - Peaks Ranger District. State - Arizona. County - Coconino. Legal - Sec. 15, T21N, R9E. Approximately 1 mile southwest of Winona - a portion of Forest Road 745 (within 50 miles from Williams)	Transportation and Access
NPG Cable of Arizona Issuance of 10 Year Permit CE	Proposal to re issue a permit to NPG Cable for existing aerial and buried television cable lines on the Red Rock and Peaks Ranger Districts. Implementation: February 2011.	Unit - Peaks Ranger District, Red Rock Ranger District. State - Arizona. County - Coconino, Yavapai. Several locations on the Peaks and Red Rock Districts (within 50 miles from Williams)	Land Use/Utilities

Table C.1. Cumulative Actions (Continued)

Project	Project Description	Location	Resources Affected
Past and Present (5 years to present)			
Coconino National Forest, continued			
Walker Basin Range Allotment EA	Re-authorization of livestock grazing in a manner that maintains and/or moves the area toward Forest Plan objectives and desired conditions. Implementation: March 2011.	Unit - Mogollon Rim Ranger District, Red Rock Ranger District. State - Arizona. County - Coconino. Located on the Red Rock Ranger District (70%) and on the Mogollon Rim Ranger District (30%). Approximately 1 mile east of Camp Verde and 1 mile south of Rimrock (within 55 miles from Williams)	Grazing
Permit Reissuances Mogollon Rim District 2010 Categorical Exclusion	Proposal to reissue expired permits for Coconino County Sheriff's Office communication site, Northern Arizona University research, University of Montana research, Jack Lodge sign, ADOT camp and cinder storage and Collins research permit. Implementation: March 2011.	Unit – Mogollon Rim Ranger District. State – Arizona. County – Coconino. Various locations on the Mogollon District (within 145 miles from Williams)	Land Use
Grapevine Interconnect (Grapevine Canyon Wind Project) Environmental Impact Statement	Approximately 9 miles of new 34-5kV electric transmission line connecting a new wind park located on Flying M Ranch private property to the existing Western Area Power Administration (Western) 345kV line. Western would be taking lead on NEPA.	Unit - Mormon Lake Ranger District. State - Arizona. County - Coconino. Legal - T18N, R10E and T18N, R11E. Anderson Mesa. Proposed new utility corridor located along Forest Road 125 from the eastern Forest boundary to the existing 345-kV transmission line (61 miles from Williams)	Land Use/Utilities
Recreational Residences 1-year Permit Reissuance (87 separate permits) Categorical Exclusion	This includes separate reissuances of 1-year recreational residence permits for 87 residences near Mormon Lake. Implementation: July 2010.	Unit - Mormon Lake Ranger District. State - Arizona. County - Coconino. The north and west sides of Mormon Lake (61 miles from Williams)	Recreation
McCormick Pit Native Material Site Categorical Exclusion	Proposal by Coconino County obtain a permit to continue disposing of native dirt and rock flood debris in the McCormick Pit. Implementation: February 2011.	Unit – Peaks Ranger District. State – Arizona. County – Coconino. Legal – Section 8, T23N, R8E. Along Highway 89 north of Sunset Crater (within 50 miles from Williams)	Land Use
Schultz Fire Precipitation Gauges Categorical Exclusion	Proposal by Coconino County to install several precipitation gauges for early warning of flood events (ALERT devices) at various locations along Waterline Road. Implementation: November 2010.	Unit - Peaks Ranger District. State - Arizona. County - Coconino. Legal – Sec. 2, T22N, R7E and Sec. 26 and 36, T23N, R7E. Locations along the Waterline Road (within 50 miles from Williams)	Land Use/Water Resources

Table C.1. Cumulative Actions (Continued)

Project	Project Description	Location	Resources Affected
Past and Present (5 years to present)			
Coconino National Forest, continued			
Schultz Fire Precipitation Gauges Categorical Exclusion	Proposal by Coconino County to add an additional precipitation (ALERT) gage along the Weatherford Trail north of Schultz Pass. Implementation: January 2011.	Unit - Peaks Ranger District. State - Arizona. County - Coconino. Legal - Sec. 15, T22N, R7E. Location along the Weatherford Trail (within 50 miles from Williams)	Land Use/Water Resources
Arizona Water Company Water Storage Tanks EA	Proposal to construct two 1-million-gallon water storage facilities in the Chapel/Broken Arrow area of Sedona. Expected implementation: May 2011.	Unit - Red Rock Ranger District. State - Arizona. County - Coconino. In the Broken Arrow Trail/Chapel area adjacent to private property (within 85 miles from Williams)	Land Use
Kaibab National Forest			
Greenway Trail and Parking Lot Categorical Exclusion	Allow the National Park Service to construct and maintain a parking lot and trailhead on USFS lands at the north end of Tusayan. Construction would also include building approximately 1 mile of non-motorized trail from the new trailhead to Grand Canyon National Park.	Tusayan Ranger District (50 miles from Williams)	Transportation and Access/Recreation
Hat Allotment EA	Reauthorize grazing on the Hat Allotment Project	Williams Ranger District (within 5 miles of Williams)	Grazing
Tusayan Travel Mgmt EA	Evaluate the transportation system for the Tusayan Ranger District in conjunction with the Travel Management Rule.	Tusayan Ranger District (50 miles from Williams)	Transportation and Access
Williams Travel Mgmt EA	Identify and designate a transportation system that provides safe and efficient forest access in compliance with 36 CFR 212.	Williams Ranger District (within 5 miles of Williams)	Transportation and Access
Reasonably Foreseeable (1–20 years)			
ADOT Projects			
Street Widening	Widen I-40 from I-17 to Country Club	Within 40 miles from Williams	Transportation and Access
Street Widening	Widen I-17 from Kachina Village to I-40	38.6 miles from Williams	Transportation and Access
SR 64	Street improvement project that includes constructing a new roundabout, curb and gutter, sidewalks, and landscaping. Construction is slated to begin in 2011 and end prior to 2013.	Tusayan, immediately south of the Grand Canyon, 52.6 miles from Williams	Transportation and Access

Table C.1. Cumulative Actions (Continued)

Project	Project Description	Location	Resources Affected
Reasonably Foreseeable (1–20 years)			
ADOT Projects, continued			
The Arizona Trail	The Arizona Trail, a cross-state multiple-use trail, would form a loop through Flagstaff when complete. Traveling north-south, the trail now passes Marshall Lake and splits at Fisher Point. The Flagstaff segment would then travel north through the city, utilizing the Flagstaff Urban Trails System (FUTS) to connect to Buffalo Park and the USFS system trails. The alternate route, the Flagstaff Bypass, heads east from Fisher Point past Walnut Canyon, crossing I-40 near Cosnino and would then loop back north, crossing Highway 89 near Elden Pueblo to connect with the existing USFS system trails. These two routes would meet at Schultz Pass where the trail would then continue to the Utah border.	Flagstaff (35.6 miles from Williams)	Recreation
Coconino County Future Trail Needs	The Coconino County Parks and Recreation Department has recently created a trails program and would develop a Coconino County Trails and Greenways Plan. This plan would be a cooperative effort between the county and local, state, and federal land managers. The plan would identify trails and greenway corridors, inter-agency trail linkages, and trail user education and volunteer programs. Coconino County would extend the FUTS system to communities outside the city limits. For example, the Sinclair Wash FUTS Trail now ends within Fort Tuthill County Park. Coconino County intends to extend this trail to Kachina Village and Mountainaire. The Trails Plan would identify other potential trail connections.	Between 40 and 45 miles from Williams	Recreation
Railroad Corridor	Implement alternatives to reduce the impact of the rail corridor on mobility in Flagstaff, which would also affect mobility in other parts of Coconino County.	Flagstaff (35.6 miles from Williams)	Transportation and Access
Kachina Village Multimodal Transportation Study (5–20 years)	To document current and future multimodal mobility needs, recommended winter maintenance best management practices and a program of projects that would improve multimodal mobility and safety in Kachina Village.	Six miles south of Flagstaff in unincorporated Coconino County, 40 miles from Williams.	Transportation and Access/Recreation
Harrenburg Wash	Trail improvements.	Six miles south of Flagstaff in unincorporated Coconino County, 40 miles from Williams.	Recreation
Tovar Trail	Easement acquisition to create an unpaved multi-use pathway separated from the roadway.	Six miles south of Flagstaff in unincorporated Coconino County, 40 miles from Williams.	Recreation
Unauthorized Social Trail (Kona Trail to the Harrenburg Wash)	Trail improvements and easement acquisition.	Six miles south of Flagstaff in unincorporated Coconino County, 40 miles from Williams.	Recreation
Connection to Flagstaff Urban Trail System from Kachina Village	Trail improvements.	Six miles south of Flagstaff in unincorporated Coconino County, 40 miles from Williams.	Recreation

Table C.1. Cumulative Actions (Continued)

Project	Project Description	Location	Resources Affected
Reasonably Foreseeable (1–20 years)			
ADOT Projects, continued			
Pinon Trail	Trail improvements.	Six miles south of Flagstaff in unincorporated Coconino County, 40 miles from Williams.	Recreation
Kona Trail	Extend the existing sidewalk up Kona Trail to Pinon Trail.	Six miles south of Flagstaff in unincorporated Coconino County, 40 miles from Williams.	Recreation
Kachina Trail	Improve existing space into a parking area.	Six miles south of Flagstaff in unincorporated Coconino County, 40 miles from Williams.	Recreation/ Transportation and Access
Tovar Trail	Construct pullouts for motor vehicles to pull out of travel lanes to view wildlife in the Pumphouse Natural Area.	Six miles south of Flagstaff in unincorporated Coconino County, 40 miles from Williams.	Recreation
Pinon Trail	Improve the roadway to a total of 28 feet wide to accommodate 10-foot travel lanes and a 4-foot white striped shoulder.	Six miles south of Flagstaff in unincorporated Coconino County, 40 miles from Williams.	Transportation and Access
Kachina Trail at Kachina Blvd	Construct a single lane roundabout at the intersection of Kachina Blvd. and Kachina Trail.	Six miles south of Flagstaff in unincorporated Coconino County, 40 miles from Williams.	Transportation and Access
Kachina Trail	Improve the roadway to include a 4-foot white-striped shoulder, a possible two-way center left turn lane, and a side pathway or sidewalk along Kachina Trail.	Six miles south of Flagstaff in unincorporated Coconino County, 40 miles from Williams.	Transportation and Access
Coconino National Forest			
Supervisor's Office	Relocate Supervisor's Office and consolidate with the Grand Canyon National Park Service somewhere in the greater Flagstaff area within the next two to three years.	Flagstaff (35.6 miles from Williams)	Other
Coconino National Forest Motorized Travel Management Plan Environmental Impact Statement	Recreation management. Designate a system of roads, trails, and areas that would be open to public motorized use on the Coconino National Forest. Expected implementation: May 2011.	Unit - Coconino National Forest All Units. State - Arizona. County - Coconino, Gila, Yavapai. Coconino National Forest	Recreation/ Transportation and Access
Forest-wide Visitor Information Kiosks Project Categorical Exclusion	Recreation Management. Provide visitor information about motorized travel on the Coconino National Forest through a system of new kiosks constructed throughout Coconino National Forest. Expected implementation: June 2011.	Unit - Coconino National Forest All Units. State - Arizona. County - Coconino, Gila, Yavapai. Legal - Forest-wide. New kiosks would be constructed along major roads and entry points across the Coconino National Forest	Recreation

Table C.1. Cumulative Actions (Continued)

Project	Project Description	Location	Resources Affected
Reasonably Foreseeable (1–20 years)			
Coconino National Forest, continued			
Plan Revision for the Coconino National Forest Environmental Impact Statement	Revision of the Coconino National Forest's Land and Resource Management Plan (Forest Plan). The Forest Plan guides the management activities on the Coconino National Forest such as recreation and the maintenance and improvement of ecosystem health. Expected implementation: October 2012.	Unit - Coconino National Forest All Units. State - Arizona. County - Coconino, Gila, Yavapai. Coconino National Forest	Recreation
Clints Well Forest Restoration Project EA	Fuel reduction and ecosystem restoration over approximately 16,809 acres within and adjacent to the wildland urban interface of Clints Well; within the Windmill Draw-Jacks Canyon, Long Valley Draw, Clover Creek, and East Clear Creek-Blue Ridge Reservoir watersheds. Expected implementation: December 2011.	Unit - Mogollon Rim Ranger District. State - Arizona. County - Coconino. Legal – Sect 1–4, 10–14 T13N R9E; Sec 5–9, 17–18, T13N R10E; Sec 15, 21–27, 33–35, T14N R9E; Sec 4–9, 16–22, 26–30, 32–34, T14N R10E; Sec 31–33, T15N R10E; Sec 36, T15N R9E (within 145 miles from Williams)	Vegetation/Fire
Improvements at Blue Ridge (C.C. Cragin) Reservoir Categorical Exclusion	Recreation management. Proposal is to upgrade boat ramp surfacing, stabilize rock slopes, install guardrails, improve surface drainage on the ramp, and install a new floating boat dock at Blue Ridge Reservoir. Expected implementation: October 2011.	Unit - Mogollon Rim Ranger District. State - Arizona. County - Coconino. Legal - T14N, R11 E, Sec. 33, SW 1/4 Blue Ridge Reservoir 7.5-minute quadrangle. Blue Ridge (C. C. Cragin) Reservoir Boat Ramp, Mogollon Rim Ranger District (within 145 miles from Williams)	Recreation
Long Valley Experimental Restoration Project EA	Conduct experimental studies to further knowledge and practice of ecological restoration treatments in southwestern ponderosa pine ecosystems, reduce hazardous fuel accumulations, create a demonstration area over about 1,100 acres. Expected implementation: June 2011.	Unit - Mogollon Rim Ranger District. State - Arizona. County - Coconino. Legal - T14N, R9E, Sec. 36; T14N, R10E, Sec. 31, Long Valley Quad, Gila and Salt River B&M. Long Valley Experimental Forest, located on the Mogollon Rim Ranger District, administered by Rocky Mountain Research Station (within 145 miles from Williams)	Vegetation
Year-round Recreation Site Access Points (Mogollon Rim Ranger District) EA	Project proposal is to provide new public access and parking areas with various levels of amenities on major forest travel routes for purposes of accommodating winter recreation and increased year-round recreation. Expected implementation: June 2012.	Unit - Mogollon Rim Ranger District. State - Arizona. County - Coconino. Legal - Various sites. Mogollon Rim Ranger District (within 145 miles from Williams)	Transportation and Access/Recreation

Table C.1. Cumulative Actions (Continued)

Project	Project Description	Location	Resources Affected
Reasonably Foreseeable (1–20 years)			
Coconino National Forest, continued			
APS Sandvig-Youngs Powerline EA	Proposal by APS to expand existing power line corridors to allow construction of a new 69-kV power line between the Sandvig and the new Youngs substation east of Flagstaff. Along the existing APS and WAPA line approx 40 feet width. Expected implementation: August 2011.	Between the Sandvig and the new Youngs substation east of Flagstaff (40 miles from Williams)	Land Use/Utilities
West Fork Bridge Replacement Project EA	Replacement of a structurally deficient bridge on USFS Systems Lands while maintaining the natural flow regime and allowing for unhindered aquatic organism passage. Expected implementation: May 2011.	Unit - Peaks Ranger District. State - Arizona. County - Coconino. West Fork Bridge is located on Forest Service Road 231 approximately 18 miles southeast of Flagstaff. (within 50 miles from Williams)	Water Resources/Biological Resources
Wing Mountain Fuels Reduction and Forest Health Restoration EA	This project is designed to reduce hazardous fuels and improve forest health in the Wing Mountain area. Project activities would include thinning of small- and medium-diameter trees and prescribed fire treatments. Expected implementation: August 2011.	Unit - Peaks Ranger District. State - Arizona. County - Coconino. Legal - Portions of T 22 N, R 6 E, Sec. 1–4, 7–21, 28–30. Northwest of Flagstaff between Wing Mountain and the Kachina Peaks Wilderness, on both sides of Highway 180 (within 50 miles from Williams)	Vegetation/Fire
Tobias/Flynn Road Access EA	Proposal to construct a road from SR 179 to private property across Oak Creek from Poco Diablo and Chavez Crossing Group Campground in Sedona. Proposal is the result of litigation requiring the USFS to provide an easement. Expected implementation: January 2012.	Unit - Red Rock Ranger District. State - Arizona. County - Coconino, Yavapai. Area near Chavez Crossing Group Campground in Sedona (within 85 miles from Williams)	Transportation and Access
Four Forest Restoration Initiative Environmental Impact Statement: South Kaibab and Coconino Environmental Impact Statement	Implementation of forest restoration activities including thinning of trees and prescribed fire treatments within 724,000 acres on the Kaibab and Coconino national forests. Expected implementation: June 2012.	Unit - Williams Ranger District, Tusayan Ranger District, Peaks Ranger District, Mormon Lake Ranger District, Mogollon Rim Ranger District. State - Arizona. County - Coconino, Yavapai. All ponderosa pine habitat on the South Kaibab and Coconino National Forests	Vegetation/Fuel Management/ Watershed Management
Rock Pit Development: Coconino and Kaibab Forests EA	Development of a number of rock pits on the Coconino National Forest and south Kaibab National Forest to provide materials for surfacing roads to maintain safe and sustainable road conditions. Expected implementation: May 2012.	Unit - Williams Ranger District, Tusayan Ranger District, Coconino National Forest All Units. State - Arizona. County - Coconino, Yavapai. Locations throughout the Coconino and Kaibab national forests.	Transportation and Access

Table C.1. Cumulative Actions (Continued)

Project	Project Description	Location	Resources Affected
Ongoing			
Arizona Game and Fish Department			
Condor Studies	In order to be downlisted from endangered to threatened, the Recovery Goals of the California Condor Program are as follows: maintenance of at least two wild populations; maintenance of one captive population; each population must number at least 150 individuals, must contain at least 15 breeding pairs, be reproductively self sustaining and have a positive rate of population growth; non-captive populations must, be spatially disjunct and non-interacting and contain descendents from each of the 14 founders.	General Coconino County	Wildlife - Raptors

Appendix D

SUMMARY OF CULTURAL RESOURCES IN THE PROJECT AREA OF POTENTIAL EFFECTS

Table D-1. Summary of Project Results and NRHP-Eligibility Determinations

Property No.	Description	NRHP Eligibility & Criterion	Land Jurisdiction	In APE?
AZ H:11:48(ASM)	A single Clovis point preform	Eligible, D	Private	No
AZ H:11:49(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	ASLD	Yes
AZ H:11:50(ASM)	Prehistoric flaked stone scatter without diagnostic artifacts	Ineligible, D	ASLD	No
AZ H:11:51(ASM)	Cohonina artifact scatter with associated rock features	Eligible, D	ASLD	No
AZ H:11:52(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	ASLD	No
AZ H:11:53(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	ASLD	No
AZ H:11:54(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	Private	Yes
AZ H:11:55(ASM)	Prehistoric flaked stone scatter without diagnostic artifacts	Ineligible, D	Private	No
AZ H:11:56(ASM)	Historical can and glass scatter with diagnostic artifacts	Ineligible, D	Private	Yes
AZ H:11:57(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	Private	No
AZ H:11:58(ASM)	Cohonina artifact scatter with associated rock features	Eligible, D	Private	No
AZ H:11:59(ASM)	Rock rings without diagnostic artifacts	Ineligible, D	ASLD	No
AZ H:11:60(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	Private	No
AZ H:11:61(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	ASLD	No
AZ H:11:62(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	ASLD	No
AZ H:11:63(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	ASLD	No
AZ H:11:64(ASM)	Prehistoric flaked stone and ground stone scatter without diagnostic artifacts	Eligible, D	ASLD	No
AZ H:11:65(ASM)	Cohonina artifact scatter with associated rock features	Eligible, D	ASLD	No
AZ H:11:66(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	Private	No
AZ H:11:67(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	Private	No
AZ H:11:68(ASM)	Cohonina artifact scatter with associated rock features	Eligible, D	ASLD	No
AZ H:11:69(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	ASLD	No
AZ H:11:70(ASM)	Cohonina artifact scatter with associated rock features	Eligible, D	Private	No
AZ H:11:71(ASM)	Historical corral and fence line without diagnostic artifacts	Ineligible, D	ASLD	No
AZ H:11:72(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	Private	Yes
AZ H:11:73(ASM)	Prehistoric flaked stone scatter with diagnostic artifacts	Eligible, D	Private	No
AZ H:11:74(ASM)	Cohonina artifact scatter with associated rock features	Eligible, D	Private	No
AZ H:11:75(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	Private	No
AZ H:11:76(ASM)	Prehistoric flaked stone scatter without diagnostic artifacts	Ineligible, D	Private	No
AZ H:11:77(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	Private	No
AZ H:11:78(ASM)	Prehistoric flaked stone scatter without diagnostic artifacts	Eligible, D	Private	No
AZ H:11:79(ASM)	Cohonina artifact scatter with associated rock features	Eligible, D	Private	No
AZ H:11:80(ASM)	Prehistoric flaked stone scatter with diagnostic artifacts	Eligible, D	Private	No
AZ H:11:81(ASM)	Prehistoric flaked stone scatter with associated rock features	Eligible, D	Private	No
AZ H:11:82(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	Private	No
AZ H:11:83(ASM)	Cohonina artifact scatter with a rock feature	Eligible, D	ASLD	No
AZ H:11:84(ASM)	Prehistoric flaked stone scatter without diagnostic artifacts	Ineligible, D	ASLD	No
AZ H:11:85(ASM)	Prehistoric flaked stone scatter with diagnostic artifacts	Eligible, D	ASLD	Yes

Table D-1. Summary of Project Results and NRHP-Eligibility Determinations (Continued)

Property No.	Description	NRHP Eligibility & Criterion	Land Jurisdiction	In APE?
AZ H:11:86(ASM)	Prehistoric flaked stone scatter with diagnostic artifacts	Ineligible, D	Private	Yes
AZ H:11:87(ASM)	Prehistoric flaked stone scatter without diagnostic artifacts	Ineligible, D	Private	Yes
AZ H:11:88(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	ASLD	No
AZ H:11:89(ASM)	Cohonina artifact scatter with associated rock features	Eligible, D	ASLD	No
AZ H:11:90(ASM)	Cohonina artifact scatter with a rock feature	Eligible, D	ASLD	No
AZ H:11:91(ASM)	Cohonina artifact scatter with a rock feature	Eligible, D	ASLD	No
AZ H:11:92(ASM)	Prehistoric flaked stone scatter without diagnostic artifacts	Ineligible, D	ASLD/Private	Yes
AZ H:11:93(ASM)	Prehistoric flaked stone scatter without diagnostic artifacts	Eligible, D	Private	No
AZ H:11:94(ASM)	Prehistoric flaked stone scatter without diagnostic artifacts	Ineligible, D	Private	Yes
AZ H:11:95(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	ASLD/Private	No
AZ H:11:96(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	Private	No
AZ H:11:97(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	ASLD	No
AZ H:11:98(ASM)	Historical mining feature with artifact scatter	Ineligible, D	ASLD	Yes
AZ H:11:99(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	Private	No
AZ H:11:100(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	ASLD	No
AZ H:11:101(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	Private	Yes
AZ H:11:102(ASM)	Historical artifact scatter with diagnostic artifacts	Ineligible, D	Private	No
AZ H:11:103(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	ASLD	No
AZ H:11:104(ASM)	Cohonina scatter with diagnostic artifacts	Eligible, D	Private	No
AZ H:11:105(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	ASLD	No
AZ H:11:106(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	ASLD	Yes
AZ H:11:107(ASM)	Cohonina artifact scatter with associated rock features	Eligible, D	ASLD	No
AZ H:11:108(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	Private	No
AZ H:11:109(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	Private	No
AZ H:12:56(ASM)	Cohonina artifact scatter with associated rock features	Eligible, D	Private	Yes
AZ H:12:69(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	Private	No
AZ H:12:70(ASM)	Prehistoric flaked stone scatter with diagnostic artifacts	Eligible, D	ASLD	No
AZ H:12:72(ASM)	Prehistoric flaked stone scatter with diagnostic artifacts	Eligible, D	Private	No
AZ H:12:73(ASM)	Cohonina artifact scatter with associated rock feature	Eligible, D	Private	No
AZ H:12:74(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	ASLD	No
AZ H:12:75(ASM)	Historical fence line and a tobacco tin	Ineligible, D	Private	Yes
AZ H:12:76(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	Private	Yes
AZ H:12:77(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	Private	Yes
AZ H:12:78(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	ASLD	Yes
AZ H:12:79(ASM)	Cohonina artifact scatter with associated rock features	Eligible, D	ASLD	Yes
AZ H:12:80(ASM)	Cohonina artifact scatter with diagnostic artifacts	Eligible, D	Private	Yes
AZ H:12:81(ASM)	Cohonina artifact scatter with associated rock features	Eligible, D	Private	Yes
IOs 1–337	Various prehistoric and historical artifacts and features	Ineligible, D	ASLD/Private	Yes/No

Appendix E

COCONINO COUNTY RESOLUTION NO. 2011-04

When recorded, please return to:
BOARD OF SUPERVISORS
Clerk of the Board
219 East Cherry Avenue
agstaff, AZ 86001-4695

Official Records of Coconino County
Candace Owens - Recorder 03/03/2011 08:30 AM
COCONINO COUNTY BOARD OF SUPERVISOR GA
3589227
Pgs: 8
$13.50

RESOLUTION NO. 2011-04

A RESOLUTION OF THE COCONINO COUNTY BOARD OF SUPERVISORS MODIFYING A DECISION BY THE PLANNING AND ZONING COMMISSION IN RESPONSE TO TWO APPEALS AND APPROVING A CONDITIONAL USE PERMIT FOR A WIND ENERGY PARK ON PERRIN RANCH ON ASSESSOR'S PARCEL NUMBERS 500-03-001, 500-04-003, & 202-01-001

WHEREAS, an application was filed by Perrin Ranch Wind, LLC, Juno Beach, Florida (Case No. UP-10-063), for a conditional use permit for a wind energy park consisting of 62 wind turbines with a maximum height of 405 feet, a 4.5 mile above-ground transmission line, two electric substations, two 80-meter meteorological test towers, and a 10-acre maintenance facility with three buildings on property consisting of 64,000 acres in the General Zone, both state and private, located on both sides of Espee Road, and identified as Sections 7, 18, 19, and 31 in T24N R2E, Sections 3, 4, 6 through 11, and 17 through 20 in T23N R1E, Sections 1, 3, 4, 7, 8, 10, 15, 17, 18, 19, 22, 30, 33, and 36 in T24N R1E, and identified as Assessor's Parcel Numbers 500-03-001, 500-04-003, and 202-01-001; and

WHEREAS, the Planning and Zoning Commission held a duly noticed public hearing on December 16, 2010, and approved the conditional use permit; and

WHEREAS, two appeals were filed, one by the applicant Perrin Ranch Wind, LLC, and the other by Canyon Country Coalition for Responsible Renewable Energy, Save Our Wide Open Spaces, and Coconino County Citizens for Responsible Wind Energy within 15 days of the Planning and Zoning Commission hearing; and

WHEREAS, the Board of Supervisors has held a duly noticed public hearing on February 7 and 8, 2011; and

WHEREAS, the Board of Supervisors has determined that the findings for the granting of a conditional use permit have been met, as follows:

The Board of Supervisors finds that:

1. The location of the conditional use is in accord with the objectives of the Zoning Ordinance and the purpose of the zone in which the site is located because:

The purpose of the general zone, where the Project may be located, is to promote rural living, preserve the exiting rural environment, minimize traffic congestion, and reserve areas for agricultural pursuits. The Project preserves open space and allows the cattle ranch on the property to be economically viable.

2. The location of the conditional use and the conditions under which it would be operated or

maintained will not be detrimental to the public health, safety, or welfare, or materially injurious to properties or improvements in the vicinity because:

The Board has visited other wind projects and determined that the residents' concerns could be mitigated through conditions of approval. Noise and dust can be addressed through conditions. Potential harm to wildlife can be reduced by the required cooperation between the Applicant and Arizona Game and Fish. Noise and other impacts from the turbines are greatly diminished beyond 1.5 miles.

3. The conditional use will comply with each of the applicable provisions of the Zoning Ordinance because:

This project is located in the General Zone. The project is in the same category as public utility installations that are a conditional use in the General Zone (Section 9.1.C.9 of the Ordinance). The definition of public utility installation in Section 8 of the Ordinance supports this conclusion. Some waivers from the ordinance are required for height, paving, and outdoor storage. Those waivers may be granted consistent with Section 20.3-6 of the Zoning Ordinance.

4. The conditional use is consistent with and conforms to the goals, objectives, and policies of the Comprehensive Plan and the Red Lake Area Plan because:

Comprehensive Plan:

A. The Comprehensive Plan supports preservation of open spaces. Some of the policies are as follows: 1) work with landowners and agencies to protect open lands for the purposes of preserving scenic viewsheds, preventing the fragmentation of open lands, preserving important wildlife habitat, protecting watersheds, providing buffers between developed areas, and protecting environmentally sensitive lands; 2) preserve working ranches, unfragmented landscapes, and the county's natural character; 3) work with property owners using a variety of strategies to maintain working ranches as a viable method of land management to maintain open space and preserve landscape integrity; 4) private and state lands in checkerboard areas shall be considered in a regional context in order to preserve unfragmented landscapes and to address environmental concerns.

The project supports the continuation of the Perrin Ranch, although it does not assure it. The project preserves open space and makes subdivision less likely. The Project preserves open space for all of us.

B. Guideline G of the Conservation Guidelines that form the framework of the Comprehensive Plan calls for conserving the use of nonrenewable resources.

The Project conserves nonrenewable resources by providing needed energy from a renewable source.

C. The Natural Environment element of the Comprehensive plan sets the goal of promoting renewable sources of energy and creates policies in favor of pursuit of renewable energy alternatives such as wind power.

The Project meets this goal by using wind power for energy.

D. In the Community Services element of the Comprehensive Plan, the goal under Utility Services and Corridors is to promote the installation of utilities in a manner compatible with community character, scenic resources, and ecological conditions.

By setting the turbines sufficiently back from the highway and residential areas, this goal is met by the Project. The viewshed along Highway 64 is built up with commercial and residential uses. The Project is less intrusive than a gravel pit, and the lights are dimmer than other tower lighting. The Project is better for animals than solar projects as it allows for grazing.

E. The Comprehensive Plan subsections for Community Character entitled Scenic Vistas and Viewsheds and Scenic Corridors sets a goal of protecting and enhancing scenic corridors and scenic resources. Policies supporting the goal include: 1) favoring the underground placement of utilities, wherever feasible and in coordination with ACC guidelines, in all major developments and subdivisions; 2) reducing impacts on views from surrounding open space, recreation sites, and residential areas; 3) planning and building structures and infrastructure in a manner that minimizes visual impacts on important horizon and ridgelines; 4) maintaining the County's unique natural beauty through protection of undeveloped ridgelines and hillsides through the use of sensitive design and development technique; and 5) encouraging the preservation of natural vegetation and materials and re-vegetation with indigenous plants on sites disturbed by development projects.

The Project does impact the viewsheds, but less so than lot splits or other development. The position of the turbines minimizes impacts on ridgelines and other important features to the extent practicable considering the need for adequate wind.

Red Lake Area Plan:

The eastern three miles of the project are within the Red Lake planning area. The plan was written before wind energy projects such as these were contemplated, but the plan does consider aesthetics.

A. The first policy under aesthetics is: because of the importance of Highway 64 as a scenic gateway corridor to the Grand Canyon, visual appearance shall be an important consideration during the review and approval process for new subdivisions and other development projects.

The Project impacts Highway 64, but generally would be viewed at a very high rate of speed. The Project is less intrusive than other development.

NOW THEREFORE BE IT RESOLVED that the Coconino County Board of Supervisors hereby denies both appeals and approves the conditional use permit for the wind energy park on the above-described properties subject to the following conditions:

1. The project shall be built in substantial conformance to the site plan dated January 14, 2011, and identified as Site Plan v.6 except as may be modified by the Board in conditions listed below. Alternate turbine locations 6, 7, and 8 shall be removed, but may be relocated within or near existing turbine arrays as long as the new locations are not within two miles of the north boundary of the ranch. The remainder of the final tower sites shall not deviate from the site plan locations by more than 500 feet. Changes greater than this shall require modification of the use permit. The location of the laydown yard and substation will be addressed in a modification of this conditional use permit following approval by the Arizona Corporation Commission siting committee and transmission studies and design, but may be located in the general area shown on Site Plan v.6. The project substation shall be located so that it is not visible from Espee Road.

2. In accordance with Section 20.3-11, a building permit shall be issued for the first phase of the project within one year of approval. If a building permit is not issued, the use permit shall lapse and become void unless a renewal application is submitted and approved.

3. The height of the turbines shall not exceed the height as requested in the application, which is 262 feet to the hub and 405 feet to the tip of the blade when in a vertical position. Height is measured from pre-existing grade.

4. The access roads to each of the tower sites shall be constructed with an all-weather ABC surface. A grading permit issued by the Department of Public Works is required. Dust control measures acceptable to the Public Works and Community Development Department shall be implemented during construction.

5. Prior to the initiation of any construction or any grading or site disturbance, the following approvals shall be in place: decision document from a representative agency of the Federal Government in accordance with the National Environmental Policy Act; approval of the Arizona Corporation Commission for the tie-in line and the interconnect with the high voltage line; and special use permit granted by the Arizona State Land Department for roads and turbine locations.

6. An erosion control plan, a noxious weed management plan, and a native plant revegetation plan shall be submitted prior to or in conjunction with the submittal for any county permits. The native plant revegetation plan shall address road shoulders, the disturbed area around the towers, and any other disturbed areas. The noxious weed plan shall include provisions for preventing the spread of noxious weeds during construction and throughout project operation. The applicant shall develop a noxious weed management plan for construction, operation, and post operation (five years) phases. The plan will begin with a preconstruction noxious weed survey. The goal of the plan will be to maintain noxious weed conditions at preconstruction conditions or better. The plan will consist of annual noxious weed monitoring and annual

mitigation programs. A summary of conditions and mitigation efforts will be delivered annually to the Coconino County Planning Department.

7. Approval of this use permit does not include the relocation of Espee Road. After completion of the project Espee Road shall be returned to at least the same standard that exists now.

8. There shall be no signage associated with the project with the possible exception of one or more interpretive signs, either in conjunction with ranch entrance kiosks or at the proposed Highway 64 information kiosk.

9. The applicant shall use lighting that is not on all the time but is aircraft or radar activated. The system shall be installed during course of construction of the project and activated when approved by the FAA. The minimum number of lights on top of the towers shall be used, the intensity of the lights shall be as low as possible, and the longest duration between flashes as permitted by the FAA shall be utilized. Strobe lighting shall not be used. Other outdoor lighting, for example, at the maintenance building, shall be fully shielded and shall conform to Section 17 of the Zoning Ordinance.

10. All collection lines between the towers shall be underground.

11. Facilities will be designed to limit perching or nesting activities by birds. All meteorological test tower guy wires shall have bird diverters on them.

12. The project developer shall adhere to Recommendations 1-13 in the comment letter to the Department of Community Development from Mark Ogonowski, Wildlife Specialist with the Arizona Game and Fish Department, dated December 8, 2010. The recommendations include the following:
    a. Continued monitoring and studies related to raptors, golden eagles, California condor.
    b. Installation of bat monitoring and continued bat research.
    c. Development of an avian and bat protection plan in consultation with U.S. Fish and Wildlife and supported by AGFD. The bat protection plan may include cessation of turbine operation during those nighttime periods of the year during which bats are known to migrate through the project area.
    d. Development of a post construction monitoring plan.
    e. With AGFD and the property owner, work on a mutually agreed upon hunter access plan.
    f. For the two met towers, install bird flight diverters, paint the tops of the towers orange and white, avoid wildlife attractants such as stock tanks, and include bat monitoring devices.
    g. Install bird flight diverters on the overhead tie-in line.
    h. Develop a noxious weed management plan for both construction and operation phases.

i. Use the minimum number and intensity of lights with the longest duration between flashes as allowed by the FAA.
j. Continue to coordinate with the Arizona Game and Fish Department and U.S. Fish and Wildlife Service.

13. The developer shall form a Technical Advisory Committee (TAC) to propose and coordinate appropriate biological studies, monitoring efforts, mitigation measures, and to address issues that arise regarding wildlife impacts during operation of the wind project. This Committee may include, but is not limited to, representatives from the Fish and Wildlife Service, Arizona Game and Fish Department, Northern Arizona University Landsward Institute, Northern Arizona Audubon Society, Coconino County, project land owners, project owner/operator, and a community member recommended by the Community Development Department. A post-construction habitat restoration plan should be developed in coordination with the Technical Advisory Committee.

14. A baseline survey will be completed by the project developer and/or project owner to identify active raptor nests in the project area and all other information needed for micro-siting of the towers.

15. Protocols will be established and maintenance personnel shall be trained in the appropriate handling of injured raptors, as well as for contacting appropriate raptor rescue organizations and transfer of injured raptors. All expenses for raptor handling, transportation, and rehabilitation shall be borne by NextEra.

16. During construction, Perrin Ranch Wind is responsible for posting a maximum speed limit of 25 mph on all project roads and ensuring that the speed limit is adhered to by employees and contractors of NextEra.

17. Future conditional use permits or modifications of this conditional use permit are required for the maintenance site and associated storage areas and for the proposed information kiosk near Highway 64. Temporary use permits are required for any temporary buildings such as office trailers.

18. In the event the towers become obsolete or are out of use for a period of more than 180 consecutive days, or this use permit is not renewed, or if the leases and/or power agreement are not continued, then the project owner/operator shall decommission the project by removing the improvements, grinding the foundations to three feet below existing grade, and restoring the lands to a final condition consistent with the character of the surrounding area. "Out of use" shall not include any days where non-use is due to, but not limited to, the following: acts of God, acts of war, epidemics, terrorist acts, strikes, lockouts, labor troubles, civil disorder, inability to procure materials or labor, or failure of 500 KV equipment. In the event of an outage of longer than 30 days, the applicant will notify the Coconino County Department of Community Development. Prior to the issuance of building permits for the first

turbine location, the project owner/operator shall provide to the County adequate financial assurance in the form of a bond or irrevocable letter of credit that demonstrates financial ability to decommission the project. The project owner/operator and the County Community Development Director may arrange for an alternative financial instrument. The instrument shall include the costs of restoring the land to its natural state and shall be transferrable to cover the activities of any other entity company which may have acquired the project prior to its decommissioning.

19. The applicant/developer shall enter into an agreement with a fire service entity to ensure adequate fire protection within the project boundary. As proposed by the applicant, $1 million shall be provided in fire fighting equipment.

20. The use permit shall be valid for a period of 30 years to expire December 16, 2040. If continuation of the use is desired after this date, a new application for renewal shall be submitted prior to the expiration date. The Owner or Operator shall provide a formal report to the County every five years regarding the electrical generating performance of the project, status of the various plans and procedures outlined in the CUP, relations and/or issues to be resolved with the adjacent community, and other information necessary for the County to successfully apply this knowledge to other or future projects of a similar nature. The report shall be reviewed and concurred in by the Technical Advisory Committee.

21. The developer shall make a good faith effort to consult with the immediately adjacent developed property owners regarding creation of a Property Value Assurance Guarantee document similar to those provided by NextEra and/or its parent company elsewhere in the U.S.

22. The developer must establish a process to receive complaints, establish a complaint resolution process, as well as a reporting process to the Department of Community Development. Complaints about noncompliance with any of the conditions of approval of this conditional use permit shall be reported to the DCD.

PASSED and ADOPTED this 8th day of February 2011.

AYES: 3
NOES: 2
ABSENT: 0

COCONINO COUNTY BOARD OF SUPERVISORS

Mandy Metzger

Mandy Metzger, Chair

ATTEST:

Wandy E. [illegible]

Clerk of the Board

APPROVED AS TO FORM:

Jean E. Wilcox

Deputy County Attorney

Appendix F

AVIAN AND BAT PROTECTION PLAN

Avian and Bat Protection Plan for the Proposed Perrin Ranch Wind Facility

Prepared for

U.S. Fish and Wildlife Service

Arizona Game and Fish Department

Prepared by

SWCA Environmental Consultants

April 2011

AVIAN AND BAT PROTECTION PLAN FOR THE PROPOSED PERRIN RANCH WIND FACILITY

Prepared for

U.S. Fish and Wildlife Service
323 North Leroux
Flagstaff, Arizona 86001

Arizona Game and Fish Department
3500 Lake Mary Road
Flagstaff, Arizona 86001

Project Proponent

Perrin Ranch Wind, LLC
700 Universe Boulevard
Juno Beach, Florida 33408

Prepared by

SWCA Environmental Consultants
7373 Peak Drive, Suite 170
Las Vegas, Nevada 89128

April 29, 2011

CONTENTS

Appendices

A. Golden Eagle Use Studies Related to the Avian and Bat Protection Plan for the Proposed Perrin Ranch Wind Facility

Figures

Tables

1.0 INTRODUCTION

This Avian and Bat Protection Plan (ABPP) has been voluntarily prepared as a good-faith effort by Perrin Ranch Wind, LLC (Perrin Ranch Wind), a wholly owned subsidiary of NextEra Energy Resources (NextEra), in order to proactively address potential avian and bat impacts resulting from the construction and operation of the Perrin Ranch Wind Facility. The plan includes information about the proposed project, existing site characteristics, results from pre-construction studies, golden eagle study objectives and field methods, proposed conservation measures to avoid and minimize impacts, and adaptive management and mitigation measures to address impacts that may occur.

While it is not possible for the U.S. Fish and Wildlife Services (USFWS) to absolve individuals, corporations, or agencies from liability, the USFWS Office of Law Enforcement (OLE) focuses its resources on investigating and prosecuting individuals and companies that take migratory birds without regard for their actions or without taking effective steps to avoid or minimize take. There is no formal threshold for the number of birds or other animals taken at wind energy sites beyond which the USFWS will initiate enforcement action; however, project-specific mortality thresholds are fundamental to this ABPP's goal of avoiding and minimizing impacts to migratory birds and other species covered by the document and are an important part of the ABPP's transparent approach. This ABPP represents an agreed-upon understanding and commitment between Perrin Ranch Wind, the USFWS, and the Arizona Game and Fish Department (AGFD) designed to minimize impacts to avian and bat species and effectively address impacts that may occur as a result of the project.

Although this document represents the final ABPP, the adaptive processes set forth throughout the plan allow for wildlife management to be adjusted based on site-specific data and new species to be added and removed from mitigation thresholds (Section 5), and they include a technical advisory committee (TAC) for review of data and input on wildlife management and mitigation measures.

1.1 Project Overview

Perrin Ranch Wind is proposing to build a 99.2-megawatt (MW) nameplate capacity wind-energy facility approximately 14 miles north of the city of Williams in Coconino County, Arizona (Figure 1). The proposed wind-energy project is called Perrin Ranch Wind Facility. The project area encompasses approximately 39,833 acres of land, a small percentage of which would be occupied by permanent and temporary project infrastructure, including meteorological towers (MET towers), approximately sixty-two 1.6-MW wind turbines and foundations, buried electrical collection lines, access roads, laydown areas, a small operations and maintenance (O&M) building collocated with a project substation, a switchyard at the point of interconnection, and an overhead generation tie transmission line. The project is located within portions of Townships 23 and 24 North, Ranges 1 and 2 East, Gila and Salt River Baseline and Meridian (SWCA Environmental Consultants [SWCA] 2010a). The project area is located entirely within Perrin Ranch, which is a checkerboard pattern of private ranch land and Arizona State Land Department State Trust land. Agency project coordination letters were sent to the AGFD and the USFWS on April 26, 2010. A Preliminary Site Screening Report (SWCA 2010a) and Pre-construction Study Plan (SWCA 2010b) for the proposed Perrin Ranch Wind project were submitted to AGFD on July 21 and August 10, 2010, respectively. A revised Pre-construction Study Plan (SWCA 2010c) was submitted to AGFD on October 15, 2010; revisions included additional studies and extended sampling periods.

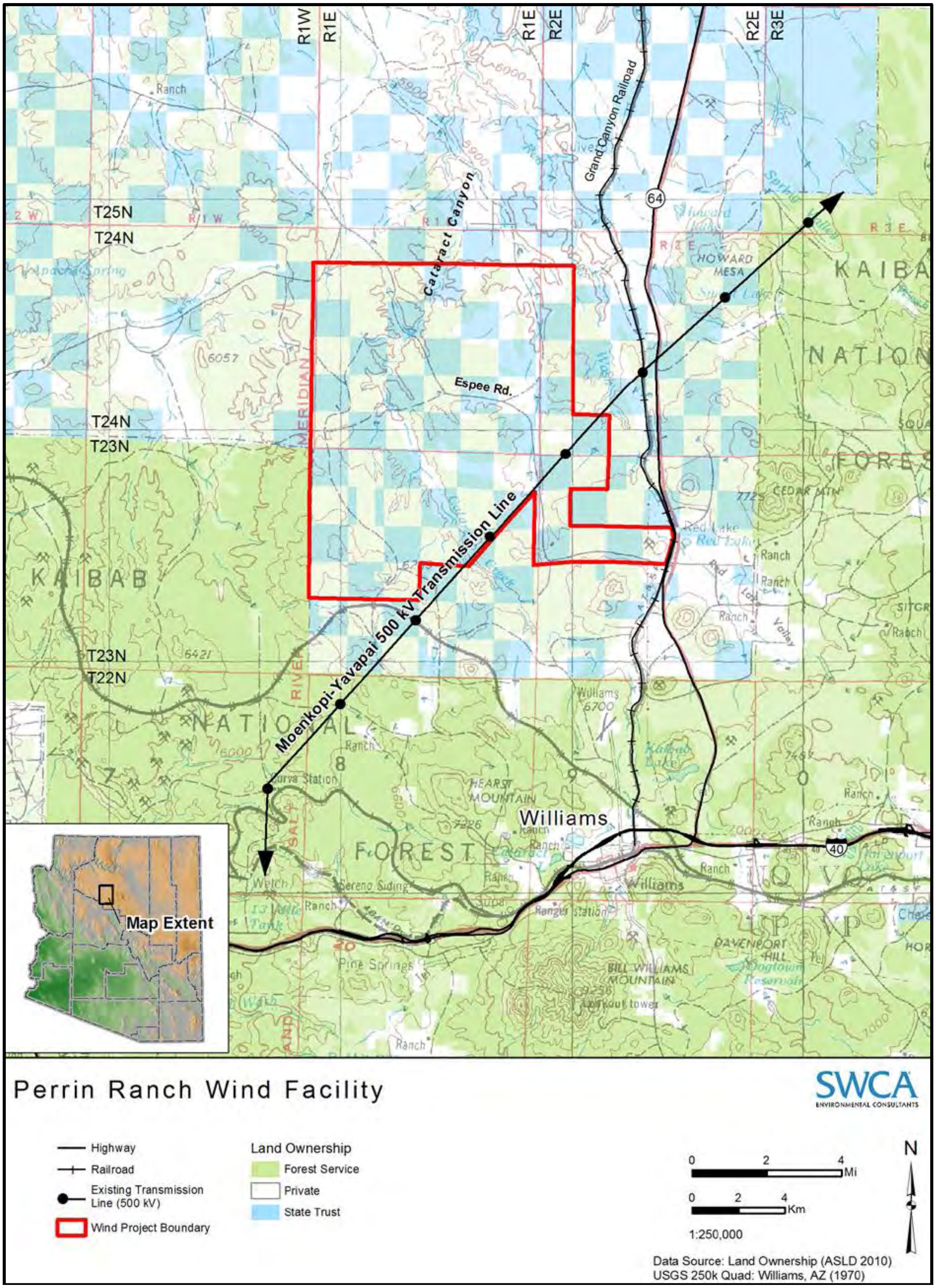

Figure 1. Project location.

1.2 Purpose and Goal of the Avian and Bat Protection Plan

The goal of this ABPP is to meet the intent of the Migratory Bird Treaty Act of 1918, as amended (MBTA), the Bald and Golden Eagle Protection Act of 1940, as amended (BGEPA), and state wildlife guidelines (AGFD 2009) by reducing and managing risk to avian and bat species. It is Perrin Ranch Wind's goal to have an environmentally sustainable project, which means ensuring that project-specific impacts do not lead to population-level declines for bird and bat species.

The specific purpose of the ABPP is to provide a mechanism by which Perrin Ranch Wind can voluntarily implement specific commitments to address wind/wildlife interactions that have been reviewed in coordination with federal and state wildlife management agencies. The commitments include the following:

- initial project design with impact-reducing conservation measures (Section 3.0);
- monitoring and reporting (Section 4.0); and
- mitigation and adaptive management (Section 5.0).

Section 1.0 provides a project overview, and Section 2.0 discusses site suitability.

1.3 Legal Drivers and Permit Compliance

The regulatory framework for protecting birds includes the Endangered Species Act of 1973, as amended (ESA), the MBTA of 1918, as amended, the BGEPA of 1940, as amended, and Executive Order 13186. No birds or bats protected under the ESA occur in the project area. However, the proposed project is within the California condor (*Gymnogyps californianus*) 10(j) "nonessential" population area, and individuals could enter the project area in the future. Unlike the protection for threatened or endangered species, federal agencies are only required to consult with the USFWS if their actions are likely to jeopardize a nonessential experimental population, unless the population is located on a national wildlife refuge or national park (some other individual agency policies require a conference at the "may affect" level).

There are no federal regulatory protections for any bat species occurring in the project area; however, they are covered under Arizona Revised Statutes 17-102. All migratory birds are covered under the MBTA, while the BGEPA specifically protects bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*). The BGEPA prohibits anyone without a permit from "taking" bald eagles and golden eagles, their parts, eggs, or nests. "Take" is defined by the BGEPA as "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb;" it differs from the ESA in that it does not include habitat destruction or alteration, unless such damage "disturbs" an eagle. "Disturb" is defined as "to agitate or bother 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." The MBTA prohibits incidental "take" of migratory birds—more than 1,000 species (*Federal Register*; 50 Code of Federal Regulations [CFR] 10 and 21), including the golden eagle—their parts, eggs, or nests "at any time, by any means." "Take" is defined by the MBTA as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out these activities." A "take" does not include habitat destruction or alteration, as long as it does not involve a known direct taking of birds, nests, or eggs.

On September 11, 2009 (*Federal Register*; 50 CFR 13 and 22), the USFWS set in place rules establishing two new permit types under the BGEPA: (1) take of bald and golden eagles that is associated with, but not the purpose of, the activity; and (2) purposeful take of an active or inactive nest where necessary to alleviate a safety emergency; an inactive eagle nest when the removal is necessary to ensure public health and safety; an inactive nest that is built on a human-engineered structure and creates a functional hazard that renders the structure inoperable for its intended use; or an inactive nest, provided the take is necessary to protect an interest in a particular locality and the activity necessitating the take or the mitigation for the take will, with reasonable certainty, provide a clear and substantial benefit to eagles. The USFWS has not yet developed a process for issuing the new permits for take of bald and golden eagles at wind energy facilities (*Federal Register*; 50 CFR 13 and 22) but recommends that in the interim project proponents prepare an ABPP to avoid, minimize, and otherwise mitigate project-related impacts to birds and bats and specifically golden eagles to ensure no net loss to the golden eagle population. The project is subject to all relevant federal, state, and local statutes, regulations, and plans. Table 1 presents the key federal, state, and local agency approvals, reviews, and permitting requirements that are anticipated for the project.

Table 1. Key Laws, Regulations, and Authorizations

Authorization	Agency Authority	Statutory Reference	Status
Federal			
National Environmental Policy Act (NEPA) Compliance to Grant Interconnection	Western Area Power Administration	NEPA (Public Law [PL] 91-190, 42 United States Code [USC] 4321−4347, January 1, 1970, as amended by PL 94-52, July 3, 1975, PL 94-83, August 9, 1975, and PL 97-258, §4[b], Sept. 13, 1982)	In progress; document completion slated for summer 2011; compliance ongoing
ESA Compliance	USFWS	ESA (PL 93-205, as amended by PL 100-478 [16 USC 1531 *et seq*.]); 50 CFR 402	Informal conference on 10(j) population of Condor in progress
MBTA	USFWS	16 USC 703–711; 50 CFR 21 Subchapter B	ABPP Complete; Compliance ongoing
BGEPA	USFWS	16 USC 668−668(d)	ABPP Complete; Compliance ongoing
State			
State Lands Right-of-way	Arizona State Land Department	Arizona Revised Statutes 37-461	In progress; completion slated for summer 2011
Guidelines for Reducing Impacts to Wildlife from Wind-Energy Development in Arizona	AGFD	No statutory requirement	Compliance ongoing
Coconino County Conditional Use Permit	Coconino County	Zoning Code 20.3	Approved by full Commission on December 16, 2010

1.4 Corporate Policy

It is the intent of NextEra and Perrin Ranch Wind to conduct its business in a manner that is consistent with responsible avian and bat protection, including compliance with applicable regulations and demonstrated proven design recommendations and standards. In order to achieve this goal, Perrin Ranch Wind has developed this ABPP with specific methods, approaches, and directives to minimize avian and bat electrocutions and collisions. These include, but are not limited to, the following:

- Proper siting of wind turbines and electric utility structures based on comprehensive, site-specific studies
- Use of approved avian-adapted construction design standards

- Micrositing of structures
- Employee training in avian and bat awareness and protection
- Mitigation and monitoring
- Adaptive management
- Enhanced coordination with regulatory agencies
- Notification processes for enhanced interaction with regulatory agencies

NextEra continues to work on improving avian and bat protection in recognition and support of the fact that providing renewable energy can be accomplished in a manner that also protects avian and bat species.

2.0 SITE SUITABILITY

Perrin Ranch Wind is committed to building its facility in the most environmentally responsible way possible. The Perrin Ranch Wind Facility was carefully sited to best achieve that commitment, based on intensive pre-site assessment, literature searches, and field studies, as described below. These studies show that bird and bat population-level risk for this site is low, relative to other existing and potential wind sites. With respect to the golden eagle, implementation of species-specific conservation measures will ensure no net loss of the species and contribute to a net benefit for the population.

2.1 Pre-site Assessment

2.1.1 Special Designations

No Critical Habitat for any federally listed species is present within the project area. The project area does not contain Important Bird Area designation, is not a Ramsar Convention site or Western Hemisphere Shorebird Reserve Network site, and is not within any specially designated state or federal management area.

2.1.2 Important habitats, sensitive species, and other environmental issues within the proposed project area

Multiple site reconnaissance and habitat assessment surveys were conducted on and within 2 miles of the project area (for a total survey area of 67,927 acres) to identify and document plant communities, topography, and habitat features to provide the basis for predictions about the potential for occurrence of federally listed and special-status avian species at the site (SWCA 2010a).

Two dominant vegetation assemblages occur within the greater project area: grasslands interspersed with rabbitbrush (*Chrysothamnus* ssp.), juniper (Utah juniper [*Juniperus osteosperma*]; one-seed juniper [*J. monosperma*]), and cliffrose (*Purshia mexicana*) in the lower elevations; and pinyon-juniper (Rocky Mountain pinyon [*Pinus edulis*]), in the higher elevations. Ponderosa pine (*P. ponderosa*) occurs only within Cataract Canyon and has a scattered distribution. The habitat within the project area primarily comprises monotypic pinyon-juniper, which results in relatively low avian species diversity, compared with other habitat types found in the Southwest (Rich 2005).

The California condor (see below) is federally listed as an endangered species under the ESA and designated as a species of special concern by the AGFD. The California condor is being reintroduced in Coconino County as a “non-essential/experimental population” under Section 10(j) of the ESA. The project area occurs within the established 10(j) area (*Federal Register*; 50 CFR 17.84[j]). This designation provides greater management flexibility and exempts individuals from the ESA Section 9 “take” prohibitions, provided that any take is unavoidable and unintentional and incidental to an otherwise lawful activity (*Federal Register*; 50 CFR 17.84[j]).

2.1.2.1 RIPARIAN AND WETLAND HABITATS

No natural wetland basins occur within the project area. Therefore, no federally listed or special-status riparian- or wetland-obligate species are likely to occur. Several stock ponds and tanks are within and adjacent to the project area. However, the tanks and stock ponds are subject to landowner manipulation, are ephemeral, and do not support dense vegetation, trees, or fish. Cataract Creek is an ephemeral watercourse that bisects the proposed project area and is not associated with riparian or wetland habitats.

2.1.2.2 RAPTOR HABITAT AND POTENTIAL RAPTOR NESTING HABITAT

Woody vegetation and/or tree snags throughout the project area, along with rock ledges in Cataract Canyon and other small canyons, provide potential substrates for raptor nests. Based on incidental observations, forage resources required for most large raptors or that could attract raptors appear typical for ranchlands in north-central Arizona, with ground squirrels (*Spermophilus* spp., *Xerospermophilus* spp., *Ammospermophilus* spp.), black-tailed jackrabbit (*Lepus californicus*), and cottontail rabbit (*Sylvilagus* spp.) occurring in the project area. However, observations during site surveys indicated a low presence of black-tailed jackrabbit and cottontail rabbit. As “boom/bust” species, rabbits can be scarce in any one year but abundant in subsequent years.

2.1.2.3 AREAS OF POTENTIALLY HIGH PREY DENSITY

Observations during site surveys indicated a low potential presence of prairie dog colonies or other colonial rodents, such as ground squirrels, that may attract raptors to the area to forage (SWCA 2010a, 2010c). No prairie dog colonies were observed within the project area, and this may be the result of heavy cattle and sheep ranching over many years (SWCA 2010a, 2010c). Although observations during site surveys indicated a low presence of black-tailed jackrabbit and cottontail rabbit, as noted above, they are “boom/bust” species that can be scarce in any one year but abundant in subsequent years.

2.1.2.4 CATARACT CANYON

Whereas Cataract Canyon is the most prominent of the shallow canyons within the project area, Cataract Creek is an ephemeral waterway characterized by rounded, limestone geomorphology with few vertical cliff faces and ledges; this is very different from its characteristic steep vertical cliffs found farther north as it nears the Grand Canyon. Although several large stock tanks exist within the canyon, these features are human made and frequented often by livestock, resulting in very little adjacent vegetation. In arid habitats stock ponds can be used by local bats as their primary source of drinking water (Taylor 2007; Taylor and Tuttle 2007). Elsewhere along its length within the project area, this ephemeral creek does not support riparian or wetland habitats (e.g., habitats that support hydrophytic shrub and/or tree species such as willow [*Salix* spp.] and cottonwood [*Populus* spp.]) that would concentrate avian species [SWCA 2010a]).

Regarding Cataract Creek as an avian migratory corridor, it must be noted that this shallow canyon becomes shallower and less vegetated and is bisected by numerous unnamed washes and drainages immediately north of the project area. Intensive raptor migration studies have been conducted within the project area, with survey points strategically located to determine raptor migration use along Cataract Canyon (SWCA 2010c). Results of raptor migration studies show no difference in migrant raptor numbers detected at points located outside and immediately adjacent to Cataract Canyon (SWCA 2010c).

Bats have been observed foraging in Coconino County by the AGFD, and these foraging areas usually include the presence of surface water and are identified where bats have been netted in high concentrations, usually with multiple species. Potential bat foraging areas in the project area include Cataract Canyon and stock tanks and ponds. The site reconnaissance showed the majority of tanks and stock ponds observed were ephemeral, with the exception of one human-made stock pond, and are therefore likely only used on a seasonal basis.

2.1.2.5 FEDERALLY LISTED AND SENSITIVE SPECIES

The USFWS and AGFD have provided lists of special-status avian and bat species that have the potential to occur within Coconino County. Table 2 presents the 93 species (79 birds and 14 bats) with the potential to occur in the project area, listed by common name, scientific name, USFWS and Arizona State Wildlife Action Plan (AZSWAP) protection status, and potential for occurrence in the proposed project area.

Table 2. Special-Status Avian and Bat Species with the Potential to Occur in the Proposed Project Area

Species		Protection Status		Potential for Occurrence in the Project Area
Common name	Scientific name	USFWS	AZSWAP	
Birds				
Acorn woodpecker	*Melanerpes formicivorus*		1C	**Unlikely to occur. May wander.** Although there is no suitable breeding habitat within the project area, the species may wander into the project area.
American bittern	*Botaurus lentiginosus*	BCC±	1B	**Unlikely to occur.** The project area does not contain marshes or other wetland habitat.
American peregrine falcon	*Falco peregrinus anatum*	DM* SC* BCC±	1A	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
American pipit	*Anthus rubescens*		1C	**Unlikely to occur.** Although the project area is outside the breeding and wintering range of the species, the species may migrate through or winter in the project area.
Baird's sparrow	*Ammodramus bairdii*	SC*	1C	**Unlikely to occur.** Although the project area is outside the breeding and wintering range of the species, the species may migrate through the area. The project area does not contain any suitable breeding habitat for the species.
Bald eagle – wintering population	*Haliaeetus leucocephalus*	SC* BGEPA BCC±	1A	**Likely to occur.** The project area is within the known geographic and elevational range of the bald eagle wintering population. Although there is potentially suitable roosting and winter foraging habitat within the project area, no breeding habitat is present. This species has been documented within the project area.
Band-tailed pigeon	*Patagioenas fasciata*		1C	**Unlikely to occur. May wander.** Although the project area does not contain suitable habitat for the species, the species may wander through the project area.
Belted kingfisher	*Megaceryle alcyon*		NA	**Unlikely to occur.** The project area does not contain any suitable aquatic habitat for the species.
Bendire's thrasher	*Toxostoma bendirei*	BCC±	1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Black-chinned sparrow	*Spizella atrogularis*		1C	**Unlikely to occur. May wander.** Although the project area does not occur within the species' range, the species may wander through the project area.

Table 2. Special-Status Avian and Bat Species with the Potential to Occur in the Proposed Project Area (Continued)

Species		***Protection Status***		***Potential for Occurrence in the Project Area***
Common name	**Scientific name**	**USFWS**	**AZSWAP**	
Black-throated gray warbler	*Dendroica nigrescens*		1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Brewer's sparrow	*Spizella breweri*	BCC±	1C	**May occur.** Although the project area lies between the breeding and wintering range of the species, the species may occur, especially during winter.
Brown-crested flycatcher	*Myiarchus tyrannulus*		1C	**Unlikely to occur. May wander.** Although the project area lies just north of the species' range, the species may wander through the project area.
Bullock's oriole	*Icterus bullockii*		1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
California condor	*Gymnogyps californianus*	E*† EXPN*†	1A	**May occur.** Condors are known to fly long distances in search of carrion, with the southern extent of the species' current range reaching Grand Canyon. Long-term movement studies using telemetry show that the species does not use the project area. Historically, the species has been documented within 5 miles of the project area and could enter the project area in the future.
Cassin's finch	*Carpodacus cassinii*	BCC±		**May occur.** The project area occurs within the species' wintering range.
Chestnut-collared Longspur	*Calcarius ornatus*	BCC±	1C	**Unlikely to occur.** Although the project area is outside the breeding and wintering range of the species, the species may migrate through the area.
Common black hawk	*Buteogallus anthracinus*		1C	**Unlikely to occur.** The project area does not contain riparian forest and is well outside the known geographic range of the species.
Common nighthawk	*Chordeiles minor*		1B	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented within the project area.
Common poorwill	*Phalaenoptilus nuttallii*		1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Cordilleran flycatcher	*Empidonax occidentalis*		1C	**Unlikely to occur. Migration only.** Although the project area is within the known geographic and elevational range of the species, no suitable breeding habitat is present within the project area. The species may migrate through the area.
Dusky flycatcher	*Empidonax oberholseri*		1C	**Unlikely to occur. Migration only.** Although the project area is outside the known range of the species, the species may migrate through the project area.
Eastern meadowlark	*Sturnella magna*		1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Evening grosbeak	*Coccothraustes vespertinus*		1B	**Likely to occur.** The project area is within the known geographic and elevational range of the species.

Table 2. Special-Status Avian and Bat Species with the Potential to Occur in the Proposed Project Area (Continued)

Species		***Protection Status***		***Potential for Occurrence in the Project Area***
Common name	**Scientific name**	**USFWS**	**AZSWAP**	
Ferruginous hawk	*Buteo regalis*	SC* BCC±	1B	**Unlikely to occur.** There are no documented occurrences of the species within 5 miles of the project area (according to AGFD). Although the project area is within the known geographic range of the species, there is no known breeding activity in the general area of the project. The species may migrate through the area.
Flammulated owl	*Otus flammeolus*	BCC±	1C	**Unlikely to occur.** The project area does not contain montane forest habitat with brushy understory, which is typical habitat for this species.
Golden eagle	*Aquila chrysaetos*	BGEPA BCC±	1B	**Likely to occur.** The project area is within the known geographic and elevational range of the species. There is potentially suitable nesting habitat within the project area. This species has been documented during site-specific surveys.
Golden-crowned kinglet	*Regulus satrapa*		1C	**May occur. May wander.** Although the project area is within the range of the species, the project area does not contain suitable habitat. The species may wander through the project area.
Grace's warbler	*Dendroica graciae*	BCC±	1C	**Unlikely to occur. May migrate/wander.** Although the project area is within the breeding range of the species, the project area does not contain suitable habitat. The species may migrate through the project area.
Gray catbird	*Dumetella carolinensis*		1B	**Unlikely to occur.** Although the project area is outside the breeding and wintering range of the species, the species may migrate through the area. The project area does not contain any suitable breeding habitat for the species.
Gray flycatcher	*Empidonax wrightii*		1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Gray vireo	*Vireo vicinior*	BCC±	1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Hooded oriole	*Icterus cucullatus*		1C	**Unlikely to occur. May wander.** Although the project area lies just north of the species' range, the species may wander through the project area.
Juniper titmouse	*Baeolophus ridgwayi*	BCC±	1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Lazuli bunting	*Passerina amoena*		1C	**Unlikely to occur. Migration only.** Although the project area lies just south of the species' range, the species may migrate through the project area.
Lewis's woodpecker	*Melanerpes lewis*	BCC±	1C	**Unlikely to occur. May wander.** Although there is no suitable breeding habitat within the project area, the species may wander into the project area.
Lincoln's sparrow	*Melospiza lincolnii*		1B	**May occur.** The project area occurs within the species' range.

Table 2. Special-Status Avian and Bat Species with the Potential to Occur in the Proposed Project Area (Continued)

Species		***Protection Status***		***Potential for Occurrence in the Project Area***
Common name	**Scientific name**	**USFWS**	**AZSWAP**	
Long-eared owl	*Asio otus*		1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
MacGillivray's warbler	*Oporornis tolmiei*		1B	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
McCown's longspur	*Rhynchophanes mccownii*		1C	**Unlikely to occur. Migration only.** Although the project area is not within the breeding or wintering range of the species, the species may migrate through the area.
Mexican spotted owl	*Strix occidentalis lucida*	T*†	1A	**Unlikely to occur.** Although the project area is within the known geographic and elevational range of the species, there is no suitable breeding habitat within the project area.
Mexican whippoorwill	*Caprimulgus arizonae*		1C	**Unlikely to occur. May wander.** The project area lies just north of the known geographic and elevational range of the species. Therefore, the species may wander into the project area.
Mountain bluebird	*Siala currucoides*		1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Northern goshawk	*Accipiter gentilis*	SC*	1B	**Unlikely to occur. May Wander.** Although the project area is within the geographic and elevational range of the species, and the species has been documented within 5 miles of the project area (according to AGFD), suitable breeding habitat does not occur within the project area.
Northern pygmy owl	*Glaucidium gnoma californicum*		1C	**May occur.** The project area is within the known geographic and elevational range of the species. There is potentially suitable nesting habitat within the project area.
Northern saw-whet owl	*Aegolius acadicus*		1C	**May occur.** The project area is within the known geographic and elevational range of the species. There is potentially suitable nesting and wintering habitat within the project area.
Olive-sided flycatcher	*Contopus cooperi*	SC*	1C	**Unlikely to occur.** Although the project area is within the known geographic and elevational range of the species, no suitable breeding habitat is present within the project area. The species may migrate through the area.
Osprey	*Pandion haliaetus*		1B	**May occur.** Although the project area is within the known geographic and elevational range of the species, no suitable breeding or foraging habitat occurs within the project area. This species has been documented within 5 miles of the project area (according to AGFD).
Phainopepla	*Phainopepla nitens*		1C	**Unlikely to occur. May wander.** Although the project area occurs within the species' range, no suitable habitat for the species is present. The species may wander through the project area.

Table 2. Special-Status Avian and Bat Species with the Potential to Occur in the Proposed Project Area (Continued)

Species		***Protection Status***		***Potential for Occurrence in the Project Area***
Common name	**Scientific name**	**USFWS**	**AZSWAP**	
Pine grosbeak	*Pinicola enucleator*		1B	**Unlikely to occur.** The project area is outside the known geographic range of the species, and no suitable habitat is present within the project area.
Pinyon jay	*Gymnorhinus cyanocephalus*	BCC±	1B	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Prairie falcon	*Flaco mexicanus*	BCC±	1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented as a migrant during site-specific surveys.
Red crossbill	*Loxia curvirostra*		1C	**May occur. May wander**. The project area is within the known geographic and elevational range of the species. Although there is no potentially suitable breeding habitat within the project area, the species is highly irregular in its wanderings.
Red-naped sapsucker	*Sphyrapicus nuchalis*		1C	**Unlikely to occur. May wander.** Although the project area is within the range of the species, the project area does not contain suitable habitat. The species may wander through the project area.
Sage sparrow	*Amphispiza belli*		1C	**Unlikely to occur.** Although the project area is within the wintering range of the species, the project area does not contain suitable habitat. The species may migrate through the project area.
Sage thrasher	*Oreoscoptes montanus*		1C	**Unlikely to occur. May wander. Migration only.** Although the project lies within the winter range of the species, the project area does not contain suitable wintering habitat. The species may migrate and/or wander through the project area.
Savannah sparrow	*Passerculus sandwichensis*		1B	**May occur. Winter/Migration only.** Although the project area lies just outside the breeding and wintering range of the species, the species may occur, most likely during winter.
Scott's oriole	*Icterus parisorum*		1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Southwestern willow flycatcher	*Empidonax traillii extimus*	E*† BCC±	1A	**Unlikely to occur.** The project area does not contain any suitable riparian habitat.
Sprague's pipit	*Anthus spragueii*	C*†	1A	**Unlikely to occur.** Although the project area is outside the breeding and wintering range of the species, the species may migrate through the area. The project area does not contain any suitable breeding habitat for the species.
Swainson's hawk	*Buteo swainsoni*		1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented as a migrant during site-specific surveys.
Swainson's thrush	*Catharus ustulatus*		1B	**Unlikely to occur.** Although the project area is outside the breeding and wintering range of the species, the species may migrate through the area.

Table 2. Special-Status Avian and Bat Species with the Potential to Occur in the Proposed Project Area (Continued)

Species		***Protection Status***		***Potential for Occurrence in the Project Area***
Common name	**Scientific name**	**USFWS**	**AZSWAP**	
Varied bunting	*Passerine versicolor*		1C	**Unlikely to occur.** The project area does not occur within the species range.
Veery	*Catharus fuscescens*	BCC[±]		**Unlikely to occur.** Although the project area is outside the breeding and wintering range of the species, the species may migrate through the area. The project area does not contain any suitable breeding habitat for the species.
Vermilion flycatcher	*Pyrocephalus rubinus*		1C	**Unlikely to occur. May wander.** The project area is within the known geographic and elevational range of the species. Although this species has been documented during site-specific surveys, the sighting is considered rare, with the individual recorded as a vagrant.
Virginia’s warbler	*Oreothlypis virginiae*		1C	**May occur.** The project area is within the known geographic and elevational range of the species.
Western burrowing owl	*Athene cunicularia hypugaea*	SC* BCC[±]	1B	**Unlikely to occur.** Suitable breeding habitat does not occur within the project area.
Western grasshopper sparrow	*Ammodramus savannarum*	SC* BCC[±]	1B	**Unlikely to occur.** Although the project area is outside the breeding and wintering range of the species, the species may migrate through the area.
Western purple martin	*Progne subis arboricola*		1C	**Unlikely to occur. May wander/Migration only.** Although the project area does not contain suitable breeding habitat, the species may migrate and/or wander through the area.
Western screech-owl	*Megascops kennicottii*		1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species. There is potentially suitable nesting habitat within the project area.
Western scrub-jay	*Aphelocoma californica*		1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Western snowy plover	*Charadrius alexandrinus nivosus*	E*[†] BCC[±]	1B	**Unlikely to occur.** Although the project area is outside the breeding and wintering range of the species, the species may migrate through the area. The project area does not contain any suitable breeding habitat for the species.
White-crowned sparrow	*Zonotrichia leucophrys*		1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
White-faced ibis	*Plegadis chihi*	SC*	NA	**Unlikely to occur.** The project area does not contain riparian habitat. In addition, the project area is outside the known geographic range and is above the known elevational range of the species.
White-throated swift	*Aeronautes saxatalis*		1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.

Table 2. Special-Status Avian and Bat Species with the Potential to Occur in the Proposed Project Area (Continued)

Species		***Protection Status***		***Potential for Occurrence in the Project Area***
Common name	**Scientific name**	**USFWS**	**AZSWAP**	
Williamson's sapsucker	*Sphyrapicus thyroideus*		1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species. This species has been documented during site-specific surveys.
Yellow warbler	*Dendroica petechia*		1B	**May occur. Migration only.** Although the project area is within the breeding range of the species, the project area does not contain suitable habitat. The species may migrate through the project area.
Yellow-billed cuckoo	*Coccyzus americanus*	C*† BCC±	1A	**Unlikely to occur.** The project area does not contain riparian woodland vegetation (cottonwood, willow, or saltcedar).
Yellow-breasted chat	*Icteria virens*		1C	**Unlikely to occur. May wander.** Although the project area occurs within the species' range, no suitable habitat for the species is present. The species may wander through the project area.
Bats				
Allen's lappet-browed bat	*Idionycteris phyllotis*	SC*	1B	**Likely to occur.** The project area is within the known geographic range of the species, and it has been acoustically detected on-site in relatively low amounts.
Arizona myotis	*Myotis occultus*	SC*	1B	**May occur.** The project area is within the known geographic and elevational range of the species. In addition, some suitable foraging and roosting habitat is present within the project area, and 40k myotis species, which may include this species, have been acoustically detected on-site.
Big free-tailed bat	*Nyctinomops macrotis*	SC*	1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species, and it has been acoustically detected on-site in relatively low amounts.
Cave myotis	*Myotis velifer*	SC*	1B	**Unlikely to occur.** The project area is outside the known geographic range of the species and is above the species' elevational range.
Fringed myotis	*Myotis thysanodes*	SC*	NA	**Likely to occur.** The project area is within the known geographic and elevational range of the species, and it has been acoustically detected on-site in relatively low amounts.
Long-eared myotis	*Myotis evotis*	SC*	1C	**Likely to occur.** The project area is within the known geographic and elevational range of the species, and it has been acoustically detected on-site in relatively low amounts.
Long-legged myotis	*Myotis volans*	SC*	NA	**May occur.** The project area contains some suitable habitat and is within the known geographic range of the species. Also, 40k myotis species, which may include this species, have been acoustically detected on-site.
Mexican free-tailed bat	*Tadarida brasiliensis*		1B	**Likely to occur.** The project area is within the known geographic and elevational range of the species, and it has been acoustically detected on-site.
Mexican long-tongued bat	*Choeronycteris mexicana*		1C	**Unlikely to occur. May wander.** The project area is outside the known geographic range of the species; however, it has been identified at the Grand Canyon. There is no suitable habitat within the project area.

Table 2. Special-Status Avian and Bat Species with the Potential to Occur in the Proposed Project Area (Continued)

Species		***Protection Status***		***Potential for Occurrence in the Project Area***
Common name	**Scientific name**	**USFWS**	**AZSWAP**	
Pale Townsend's big-eared bat	*Corynorhinus townsendii pallescens*	SC*	1B	**May occur.** The project area is within the known geographic range and elevational range for the species. In addition, some suitable foraging and roosting habitat is present within the project area.
Spotted bat	*Euderma maculatum*	SC*	1B	**Likely to occur.** The project area is within the known geographic range of the species, and it has been acoustically detected on-site in relatively low amounts.
Western red bat	*Lasiurus blossevillii*		1B	**May occur.** The project area has very limited suitable habitat for the species.
Western small-footed myotis	*Myotis ciliolabrum*	SC*	NA	**Unlikely to occur.** The project area does not contain suitable habitat for the species.
Yuma myotis	*Myotis yumanensis*	SC*	1B	**May occur.** The project area is within the known geographic and elevational range of the species. In addition, 50k myotis species, which may include this species, have been acoustically detected on-site.

Notes:

BCC = USFWS Bird of Conservation Concern for Bird Conservation Region 16

BGEPA = Bald and Golden Eagle Protection Act

C = Candidate

DM = Delisted, Being Monitored

E = Endangered

EXPN = Experimental Population/Non-essential

SC = Species of Concern

T = Threatened

WSC = Wildlife of Special Concern

* AGFD (2010).

† 50 CRF 10 and 22

± USFWS (2008).

With respect to the California condor, range-wide movement studies conducted from 1996 to 2006 (Hunt et al. 2007; Southwest Condor Review Team 2007) indicate that species occurrence within the project area would be rare (SWCA 2010c). Recent (2009) condor movement data obtained via satellite telemetry from 12 individuals have been obtained from the Peregrine Fund (personal communication, Chris Parrish, Northern Arizona Condor Reintroduction Program Lead, Peregrine Fund, October 1, 2010; SWCA 2010c). The 2009 data are consistent with those from 1996 to 2006, with no locations recorded near the proposed facility (SWCA 2010c). Furthermore, according to Peregrine Fund, 2007 to 2010 movement data indicate that it is unlikely condors will occur near Williams, Arizona, as the species is using higher-quality habitat from Grand Canyon northwest to southern Utah (personal communication, Chris Parrish, September 3, 2010; SWCA 2010c). However, although current telemetry shows that condors do not use the project area and habitat appears to be lower quality than in other areas, they are a wide-ranging species that can travel long distances and may expand beyond their current range during the life of this project. Therefore, there is the potential for the species to occur in the project area in the future.

2.2 Pre-construction Studies and Risk Assessment

2.2.1 Bird Use Studies and Assessment of Risk

2.2.1.1 LARGE-BIRD USE STUDIES—SPRING, SUMMER, FALL, AND WINTER

Large-bird surveys were completed in spring/summer 2010 following AGFD guidelines. Large birds were recorded at 24 point locations (800-m radius) for 20 minutes once per week from April through August. Points were located at vantage points that offered unobstructed views of the surrounding terrain and corresponding airspace. The number of selected points was dependent on (1) the general locations of potential turbines/core turbine areas, (2) the ability of avian surveyors to observe several potential turbine locations from a single point, and (3) the heterogeneity of the terrain and habitats. Sequence observation times covered most daylight hours and different weather conditions, such as windy days. Large birds sampled included raptors, ravens, waterfowl, water birds, and nighthawks.

There were no discernible patterns of large-bird species diversity observed across the site during any season. Additionally, there was no geographic correlation between species diversity and proximity to Cataract Creek (SWCA 2010c).

Common raven and turkey vulture had the highest Risk Indices (RIs) during large-bird sampling periods from spring through fall (SWCA 2010b). However, because both species show a disproportionately low number of mortalities relative to how common the species is and how much time it spends in the turbine rotor-swept area (RSA), risk to the species as part of proposed project activities is low (SWCA 2010c). The remaining large-bird species had low RIs across sampling periods (SWCA 2010b). Although specific nocturnal surveys for avian species were not completed, point-count surveys extended into the late afternoon, capturing some crepuscular species' activity, such as common nighthawk.

Winter use avian studies following AGFD guidelines (2009) were completed from mid-November 2010 through mid-March 2011, which includes recording incidental observations of large birds. Data analysis suggests that large bird species diversity is lower during winter months.

2.2.1.2 SMALL-BIRD USE STUDIES—SPRING, SUMMER, FALL, AND WINTER

Before the onset of spring migration, eight small bird sample locations were strategically located throughout the project area. Additionally, all 24 large-bird count locations (see Section 2.2.1.1 above) were used for conducting small-bird counts, totaling 32 small-bird use count sample locations. Small-bird counts consisted of an 80-m radius and were located within the general locations of turbines/core turbine areas, with sampling intensity adequately estimating spring migrant, summer resident, post-breeding, and fall migrant relative species abundance. Small-bird counts were conducted at approximately two-week intervals from April through July, with surveys conducted no earlier than 30 minutes before and no later than four hours after sunrise whenever logistically practicable. Small-bird counts were not conducted for nocturnal migrants.

Only one species, cliff swallow, had a comparatively high RI during small-bird sampling from spring through summer. The remaining three species recorded within the RSA (violet green swallow, Cassin's kingbird, and horned lark) had very low RIs (SWCA 2010c). Given that 98% of small-bird observations were recorded below the RSA, risk for passerines (small birds) is very low (SWCA 2010c).

Winter use avian studies following AGFD (2009) guidelines were completed from mid-November 2010 through mid-March 2011 for small birds. Data analysis suggests that small-bird species diversity is lower during winter months.

2.2.1.3 DIURNAL RAPTOR STUDIES—SPRING, SUMMER, FALL, AND WINTER

Intensive aerial/helicopter raptor nest searches and ground-based surveys were conducted in spring 2010 (SWCA 2010c) and again in winter/spring 2011. The main objective of surveys was to document diurnal raptor nesting within and adjacent to the project area; under AGFD (2009) guidelines, no nocturnal raptor (i.e., owls) surveys are required for wind-energy-related projects. Although surveys focused on diurnal raptor nests only, great horned owl (*Bubo virginianus*) regularly use nests of raptor species, preferentially red-tailed hawk (*Buteo jamaicensis*) (Houston et al. 1998).

In 2010, surveys documented 43 nests located within 2 miles of the project area (SWCA 2010c). Of the 43, four were active red-tailed hawk nests, and one was an occupied golden eagle nest (see Section 2.2.1.4). The majority of nests located (37) were inactive raptor or common raven nests for which raptor species were undetermined (SWCA 2010c). In 2011, surveys conducted out to 10 miles of the project area documented 97 nests. Of the 97 nests, one was an occupied red-tailed hawk nest, one was an occupied common raven nest, and 14 were golden eagle nests of varying conditions (see Section 2.2.1.4); the remaining nests were raptor or common raven for which raptor species were undetermined.

Nest densities within the project area are low relative to the 10-mile survey area. For example, red-tailed hawk nest density was 0.047 nest per square mile in the project area, and golden eagle nest density was 0.013 nest per square mile in the project area and 0.032 nest per square mile between 2 and 10 miles from the project area. Because nest densities are low and siting wind turbines away from nests will lower the risk of raptors colliding with turbine blades (SWCA 2010c), the risk to nesting raptors, including eagles, from proposed project activities appears to be low (SWCA 2010c).

Hawkwatch International has identified a major raptor flyway at Grand Canyon National Park. However, topographic features and poor deflective updrafts within the project area (rounded hills, gently rolling plains, and small, shallow canyons) are not conducive to mass movement by raptors (SWCA 2010c). Although southbound migrating raptors do concentrate north of the project site when crossing the Grand Canyon in the fall, data collected for the project indicate that the concentration of birds quickly disperses, resulting in a broad migration front (i.e., widely dispersed individuals) as individuals move south (SWCA 2010c). Furthermore, results of intensive fall raptor migration studies within the greater project area indicate that the area is not a concentration area for fall migrating raptors; overall, risk to migrating raptors as part of the proposed project activities is low (SWCA 2010c).

Habitat assessment surveys have shown a low presence of prairie dogs and other colonial burrowing rodents, like ground squirrels, that may attract raptors to the area to forage; this may be attributable to intensive cattle and sheep ranching over the past 100 years (SWCA 2010c). Specifically, ranchers typically actively remove prairie dogs from ranch lands, including from this area. As stated above, observations during site surveys indicated a low presence of black-tailed jackrabbit and cottontail rabbit, which typically are important prey for large species of raptors. However, as a “boom/bust” species, rabbits can be scarce in any one year but abundant in subsequent years.

Some wintering raptors will likely use the project area; however, use is not expected to be concentrated or high in most years, based on the low presence of a small-mammal prey base such as prairie dogs, other colonial burrowing rodents, and rabbits (SWCA 2010c).

Winter use avian studies following AGFD (2009) guidelines were completed from mid-November 2010 through mid-March 2011, which includes recording incidental observations of large birds. Bald eagle observations increase during the winter; however, data from point-counts suggest that the project area is not a concentration area for raptors during winter, including bald eagles.

2.2.1.4 GOLDEN EAGLE

In early May 2010, aerial raptor nest searches within the project area and within 2 miles outside the project area located two adult golden eagles, presumably a male and female, perched near a decorated (i.e., fresh greenery) stick platform nest situated in the mast of a ponderosa pine snag. No birds were present during subsequent 2010 monthly nest/territory monitoring (conducted in accordance with the methods of Pagel et al. 2010), with the decorative nest lining dead/withered on subsequent visits (SWCA 2010c). Therefore, the nest was occupied during 2010, but with no young produced (SWCA 2010c).

In late January and early February 2011, an aerial eagle nest inventory survey was conducted within the project area and within a 10-mile radius of the project area. In late March 2011 all golden eagle nests and undetermined raptor nests exhibiting potential golden eagle characteristics were visited by helicopter at a peak time in the eagle nesting cycle to determine occupancy and/or identify them to species. By March 2011, 14 golden eagle nests were located within 10 miles of the project area, including the one known nest from 2010 (Figure 2). Seven of the 14 nest structures ascribed to golden eagles were occupied (i.e., contained fresh greenery) by the species; three of the seven were active (i.e, contained an incubating adult, egg(s), or nestling(s)). Five nests remained as undetermined raptor nests because they were either too structurally deteriorated to determine species or did not exhibit diagnostic characteristics of a specific species and a specific species was not observed at or near the nest.

Of golden eagle nests confirmed within 10 miles of the project area, all are at least 4.5 miles outside the project area, with the exception of two. The two nests situated within the project area include the nest observed in 2010 and the newly found nest in 2011, which is approximately 200 to 300 m east of the ponderosa pine nest identified in 2010. Both nests contained fresh greenery in 2011, although the nest found in 2011 was determined to be partially fallen down on March 17, 2011 since the initial discovery of the nest on January 27, 2011. These nests are 2 miles from the nearest proposed turbine. Two subadults (approximately four years old) have been identified during March 2011 observations as being associated with this nest territory.

Golden eagle territories often contain multiple, nearby alternate nests, with some territories containing up to 14 nests (Kochert et al. 2002). Given that both intensive aerial nest searches were conducted in 2010 and 2011 and that ground-based nest/territory monitoring was conducted in 2010, it can be asserted that the occupied territory located within the project area is the only known eagle nesting area present within 4 miles of the project area boundary.

Golden eagle home range, movement, occupancy, and productivity studies are being conducted within the greater project area (see Section 4.1.2.5). Four individuals (two resident subadults and two non-resident subadults) have been identified in the project area. By March 2011, the two non-resident subadults had been captured and affixed with telemetry units. One individual moved off-site toward Holbrook, Arizona (approximately 122 miles to the east); the other moved offsite toward Flagstaff, Arizona (approximately 42 miles to the east). These birds constitute the only eagles observed on-site not associated with nests. Capture and attachment of telemetry devices on the two resident birds is currently being attempted (between April and May, 2011).

A detailed turbine-by-turbine risk assessment will be completed separately as described in Appendix A. A brief assessment of turbine placement based on five factors is included below to describe the general risk to eagles:

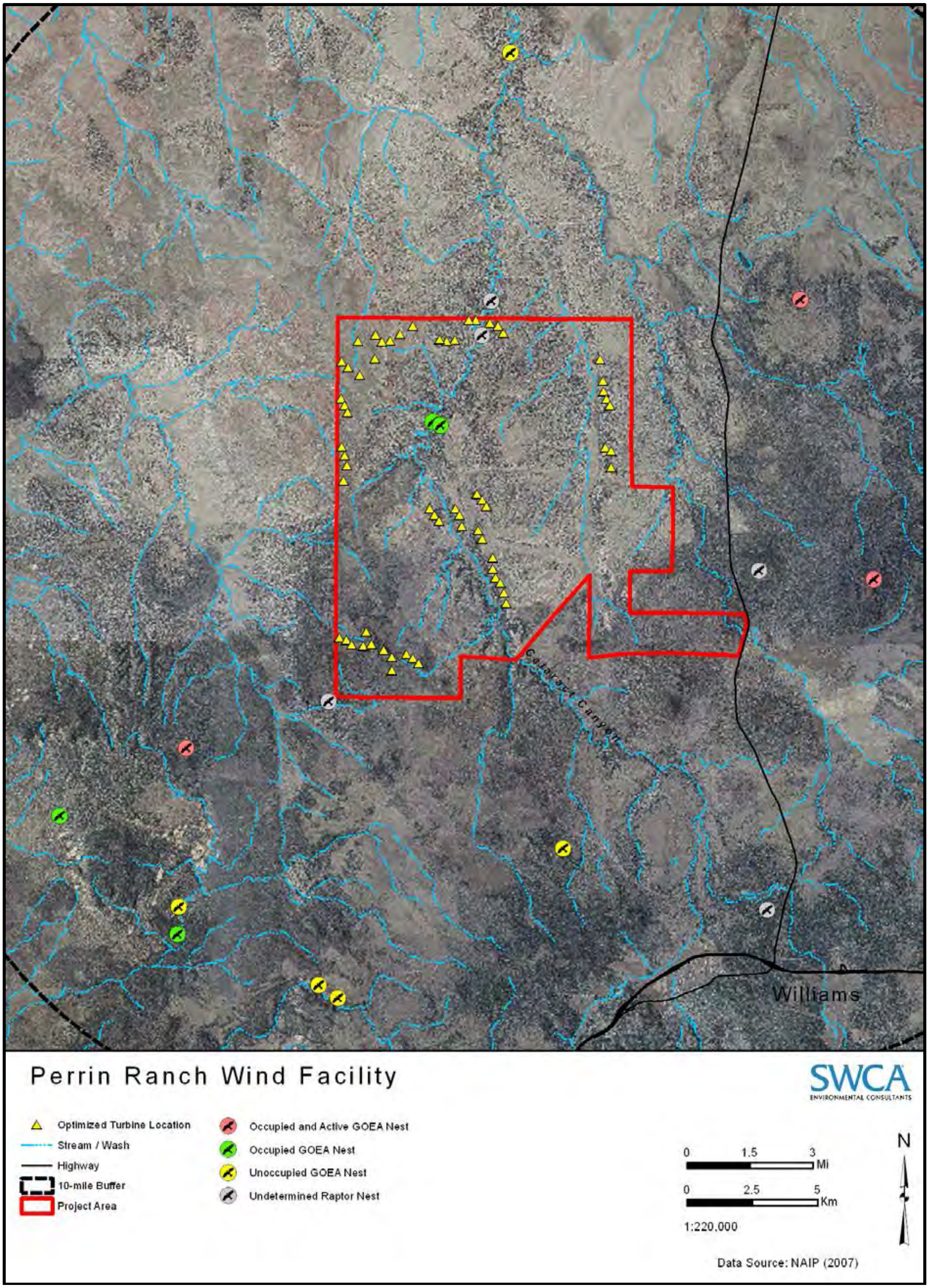

Figure 2. Eagle nests recorded in the study area (10-mile buffer).

1. Topographic features conducive to slope soaring
    a. Based on the 10-m digital elevation model (DEM) from the National Elevation Dataset, no turbines border the top of a slope (> 45 degrees) oriented perpendicular to the prevailing wind direction.
    b. No turbines are within 50 m of a ridge-crest or cliff edge.
2. Topographic features that create potential flight corridors
    a. No turbines are in a saddle or low point on a ridge line.
    b. No wetland areas or riparian corridors occur in the project area. Further, no turbines occur within 100 m of the ephemeral watercourse within Cataract Canyon.
3. Proximate to potential foraging sites
    a. No turbines are near perennial or ephemeral water sources that support a robust fishery or harbor concentrations of waterfowl.
    b. No turbines are near a prairie dog (*Cynomys* spp.) colony or area of high ground-squirrel density.
    c. The area within 150 m of each turbine will be cleared during construction and reseeded with native grasses. Therefore, no turbines will be near cover likely to support high abundance of rabbits or hares in at least two to three of every 10 years.
    d. The project occurs on a working ranch and turbines are near concentrations of livestock where carcasses and neonatal stock occur, which could attract eagles.
    e. Cattle and big-game carrion may be present throughout the project area at times.
    f. The project is not within or near a game dump or landfill, which could attract eagles.
4. Limited large ponderosa pine trees and extremely limited cliff habitat within Cataract Canyon occur in the project area. The majority of trees are too small to support nesting eagles, and in general, cliffs are not suitable.
5. In an area where eagles may frequently engage in territorial interactions
    a. Complete nest surveys, including follow-up visits, have not been completed to determine occupancy. This factor will be analyzed in the detailed turbine-by-turbine risk assessment completed following surveys.

Based on the general turbine risk assessment, the turbines have been well sited to avoid and minimize impacts to eagles and other avian species. The presence of carrion from dead livestock and big game also increases risk for eagles; however, that risk has been minimized though the implementation of an on-site large-animal carcass removal program (see Section 3.2.4).

2.2.2 Bat Use Studies and Assessment of Risk

2.2.2.1 ACOUSTIC MONITORING

AGFD’s (2003) Arizona Bat Conservation Strategic Plan and the AGFD (2010) species lists by county indicate that the distribution of 20 bat species coincides with the project area. A site characterization study using acoustic monitoring techniques for bats was prepared by Pandion Systems, Inc. (Pandion) (2011), and a supplemental study of bat use in Cataract Canyon is being completed by SWCA (2011a). These project-specific bat studies have recorded 15 species in the project area to date, one of which is a state wildlife species of special concern (see Table 2).

Fall bat activity at both MET tower monitoring stations is skewed (≥ 60%) toward the zone below the rotors, which is an area of low exposure. During the late summer and fall seasons (July 15 through October 31), 1,100 bat passes were detected at the upper detector. Two species known to be vulnerable to turbine mortality, the hoary (*Lasiurus cinereus*) and silver-haired bat (*Lasionycteris noctivagans*), were detected in low numbers. A single silver-haired bat pass was detected, and hoary bat activity accounted for only 8% of recorded activity. The bat activity in the RSA is heavily skewed toward Brazilian free-tailed bats (*Tadarida brasiliensis*), with 83% of recorded activity attributable to this species.

There is limited information on *Tadarida* mortality at wind facilities, in part because of the relatively few post-construction studies conducted at facilities within the core of this species' range. This species is highly colonial and forms maternity colonies that range from tens of thousands to more than 20 million individuals. They are also wide-ranging during foraging (up to 50 miles one way), capable of long-distance migrations, and high fliers (up to 1 mile above ground level).

The two species that are most abundant at the area of exposure are the Brazilian free-tailed bat and hoary bat. From the limited studies conducted to date, Brazilian free-tailed is not known to be susceptible to collision mortality in the fall, when the species is detected in relatively high numbers in the project area. The hoary bat is known to be highly susceptible to collision mortality in the fall, but this species constitutes only 8% of the activity, which suggests that total mortality will still be relatively low.

2.2.2.2 CAPTURE SURVEYS

Capture surveys were done on five consecutive nights at five different locations within Cataract Canyon from September 16 through 20, 2010. Two of these locations were also locations where AnaBat acoustic monitoring stations were installed. Four of the capture sites were located at water resources, while the fifth capture sight was located within the stream channel in Cataract Canyon between two areas of dense vegetation. Nets were placed near water as much as possible, except for the dry capture location, where the net was located across a likely flyway.

A total of nine individuals of four species of bats was caught during capture surveys, including big brown bat (*Eptesicus fuscus*), western small-footed myotis (*Myotis ciliolabrum*), fringed myotis (*M. thysanodes*), and Brazilian free-tailed bat. All the species observed during capture surveys had been previously documented with acoustic surveys at the site.

2.2.2.3 ROOST SEARCHES

Bat roost surveys were conducted along the length of Cataract Canyon within the project boundary (SWCA 2011a). The goal of these surveys was to locate major roosting locations within Cataract Canyon. Results suggest Cataract Canyon provides numerous dispersed roosting locations for a small number of bats in crevices, cracks, and fissures. However, there are no features such as caves or mines within the project boundary that would support a large colony of bats. A number of features within Cataract Canyon appeared substantial enough to warrant a closer external inspection. These features were examined for signs of bats, including staining and guano, and no evidence of bat activity was observed. Based on these observations, none of the areas searched provide a substantial roosting resource for bats.

2.2.3 Cumulative Impacts

The Council on Environmental Quality defines cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time" (*Federal Register*; 40 CFR 1508.7). Consistent with the Environmental

Assessment for this project, which is being completed for National Environmental Policy Act compliance, cumulative impacts are past projects that occurred within the past 5 years, current projects, and reasonably foreseeable future projects that are planned to occur within the next 20 years and that have an "official" application or other formal process in place that would define them as "reasonable."

The majority of past, present, and reasonably foreseeable projects in the area are roads, trails, and other similar projects that would result in minimal direct mortality to birds and bats. These projects do contribute to habitat loss and fragmentation; however, they occur at a more localized level (i.e., within and adjacent to the project area), and the additive impact is low, relative to the available high-quality habitat in the area.

One transmission line—a 9-mile-long, 345-kilovolt (kV) line approximately 61 miles away—is currently proposed. Transmission line impacts are more common for birds than bats and are primarily related to collision and electrocution; however, new transmission lines are typically built to Avian Power Line Interaction Committee (APLIC) standards, substantially reducing avian mortality associated with them. There would be an additive direct mortality impact associated with the cumulative projects, but it would be reduced through best management practices and mitigation measures.

The recent enactment of the Renewable Energy Standard and Tariff (RES), in Arizona requires that by 2025, 15% of Arizona's energy must come from renewable energy sources. One of the most efficient and cost-effective sources of renewable energy is large scale wind. The RES means that it is likely that wind development will occur through Arizona as well as on or near the Coconino Plateau. To date, only one wind facility, the Dry Lake Wind Facility, approximately 125 miles east-southeast of Perrin Ranch, is in operation. This facility currently has 60 operating turbines. Past and future wind development has contributed or will contribute to injury, mortality, loss of habitat, habitat fragmentation, avoidance, and displacement, but careful siting of these facilities and appropriate mitigation have been shown to substantially reduce impacts to avian and bat species. While the cumulative effects of additional wind development are difficult to measure, they would be reduced through compliance with all federal and state laws and the application of USFWS and AGFD guidelines for wind development. The Perrin Ranch Wind Facility has met those laws and followed appropriate guidelines, including preparation of this ABPP. Therefore, it is not anticipated to have a large additive effect when considered with other past and future wind projects.

3.0 PROJECT DESIGN AND IMPACT-REDUCING CONSERVATION MEASURES

3.1 Project Description

The project area encompasses approximately 39,833 acres of land, approximately 2% of which would be occupied by permanent and temporary project infrastructure, including MET towers, approximately sixty-two 1.6-MW wind turbines and foundations, buried electrical collection lines, access roads, laydown areas, a small O&M building collocated with a project substation, a switchyard at the point of interconnection, and an overhead generation tie transmission line. The project is located within portions of Townships 23 and 24 North, Ranges 1 and 2 East, Gila and Salt River Baseline and Meridian. The project area is located entirely within Perrin Ranch, which is a checkerboard pattern of private ranch land and Arizona State Land Department State Trust land.

The project footprint (i.e., the area to be directly disturbed by grading, vegetation removal, etc., during construction and throughout the 30-year life of the project) would be limited to the areas immediately adjacent to turbines, access roads, and other facilities. The short-term (the period from beginning of construction until reclamation) and long-term (the duration of the project) disturbance areas for this alternative are described in Tables 3a and 3b. Additionally, disturbance to wildlife (i.e., behavioral changes, fragmentation) may expand beyond the footprint to the entire project area, plus an area around it (Study Area; differs by species). The project consists of up to sixty-two 1.6-MW GE turbines made of conical tubular steel, with a hub height of up to 80 m (262 feet). The turbine begins operation in wind speeds of 3.5 meters per second (m/s) (or 7.8 miles per hour [mph]) and reaches its rated capacity (1.6 MW) at a wind speed of 17 m/s (55 mph).

Table 3a. Proposed Action Short-Term Disturbance Summary Table

Facility Component	Disturbance Length (feet)	Disturbance Width (feet)	Short-Term Disturbance (acres)	% Project Area
Turbine foundations and crane pads (×62)	300*	n/a	100.8	0.25%
138-kV substation, O&M building, and laydown	1200	896	24.8	0.06%
Secondary laydown	2000	590	30.0	0.08%
APS Corridor (500-kV step-up substation and 500-kV Switchyard)	2,800	1,300	80.0	0.20%
138-kV Gen-tie line and 21-kV backfeed line	16,020	75	27.7	0.07%
21-kV project power line	19,088	150	66.1	0.17%
Access roads only	89,861	60	124.7	0.31%
Access roads with adjacent collection system	120,820	60	167.4	0.42%
Collection system only	108,994	20	50.1	0.13%
Component overlap†	n/a	n/a	−23.7	−0.06%
Total			**647.9**	**1.63%**

* This measurement represents the diameter of the disturbance area.

† Overlap .is the intersection of two different component disturbance areas and is therefore removed from the total disturbance. For example, a temporary turbine work area may partially overlap the collection system. In that case, the overlapping turbine acreage has been subtracted in order to not double-count disturbance.

Table 3b. Proposed Action Long-Term Disturbance Summary Table

Facility Component	Disturbance Length (feet)	Disturbance Width (feet)	Long-Term Disturbance (acres)	% Project Area
Turbine foundations and crane pads (×62)	75*	N/A	6.3	0.02%
138-kV substation	410	320	3.1	0.01%
O&M building	355	270	2.2	0.01%
MET Towers (×5)	100[1]	N/A	.9	0.00%
500-kV step-up substation	240	600	2.0	0.01%
500-kV switchyard	400	800	7.3	0.02%
138-kV Gen-tie line and 21-kV backfeed line	16,020	50	18.4	0.05%
21-kV project power line	19,088	50	22.0	0.06%
Access roads only	89,861	34	70.4	0.18%
Access roads with adjacent collection system	120,820	34	94.6	0.24%
Component overlap†	N/A	N/A	−1.8	0.00%
Total			**225.4**	0.60%

* This measurement represents the diameter of the disturbance area.

† Overlap is the intersection of two different component disturbance areas and is therefore removed from the total disturbance. For example, a temporary turbine work area may partially overlap the collection system. In that case, the overlapping turbine acreage has been subtracted in order to not double-count disturbance.

In addition, five alternate turbine locations are included in the proposed action. These turbines are included in the event that geotechnical or resource issues arise during project planning that would prevent a proposed location from being used.

The turbines have supervisory control and data acquisition (SCADA) communication technology to allow control and monitoring of the wind farm. The SCADA communications system permits automatic, independent operation and remote supervision, thus allowing the simultaneous control of many wind turbines. Operations, maintenance, and service for the project would be structured to provide for timely and efficient operations. The computerized data network would provide detailed operating and performance information for each wind turbine. Perrin Ranch Wind would maintain a computer program and database for tracking the operational history of each wind turbine.

The five proposed MET towers would be 60 m (164 feet) high when installed with a 50-foot radii permanent disturbance footprint. In accordance with the Coconino County Conditional Use Permit (CUP), these towers would be guyed and would have measures put in place to reduce avian mortality. They would be 8 to 10 inches wide and secured with 24 guy wires (6 wires on 4 sides) anchored up to 165 feet away. The guy wires would be marked with aircraft warning markers and bird flight diverters alternated at 10-m intervals along the length of each wire, ensuring that aircraft warning markers are near the apex of the tower. Research shows the attachment of bird flight diverters can reduce bird collisions by as much as 86%–89% (AGFD 2009). Additionally, the top 30 feet of each tower would be painted in alternating orange and white stripes.

Approximately 39 miles of underground collection lines would be installed across the Perrin Ranch property. Each wind turbine would be interconnected with underground power and communication cables, called the collection lines. The underground collection lines would be placed in a trench and would connect each of the wind turbines to the project substation. All underground electrical collection lines would terminate at the project substation, and the ground disturbance would be revegetated following the project specific restoration plan. The project substation would include a power transformer, one 138-kV breaker and one 35-kV main breaker, five 35-kV feeder breakers, switches, a control house, and a substation superstructure. Approximately 3-mile-long 138-kV generation-tie (gen-tie) transmission line would be constructed to connect the project substation to the step-up substation, which would then connect to the APS switchyard and into the existing Moenkopi-Yavapai 500-kV transmission line.
The gen-tie transmission line pole towers would be permanent wood structures measuring approximately 80 feet tall, with 21 feet of temporary ground clearance at each pole.

3.2 Proponent-Committed Conservation Measures

The following measures are considered part of the proposed project and would be implemented to avoid and reduce potential impacts to birds and bats and their habitat. This section includes design, avoidance, and minimization measures that have been implemented as part of project design or that would be implemented during construction and operation to reduce potential impacts to all wildlife to the greatest extent practicable. These measures are based on current project data do not address potential changes in site use following completion of this document; those changes will be addressed though adaptive management measures described in Section 5.0. Detailed measures are also presented for bald and golden eagle and California condor to specifically address potential impacts to those species.

3.2.1 Design and Avoidance Measures

- The minimum number of lights will be installed to meet safety and Federal Aviation Administration (FAA) requirements as well as to reduce night sky lighting and bird and bat effects. FAA-approved lights with short flash durations that emit no light during the "off phase" will be used, i.e., those that have the minimum number of flashes per minute and the briefest flash duration allowable. Additionally, radar-activated lighting will be installed and if approved by FAA, will be used in place of continuously flashing lights. Auxiliary buildings will use lights are motion sensitive rather than steady burning, and light will be cast downward.

- All electrical collection will be buried underground. Only the transmission line from the collection substation to the existing 500-kV line will be aboveground, and it will include bird diverters in accordance with AGFD guidelines. All new aboveground poles and transmission lines installed will be constructed to APLIC (2005, 2006) standards to reduce the likelihood of collision and electrocution.
- Guy wires can be hazardous to avian species and therefore, permanent MET towers that require guy wires (per CUP) will have bird diverters installed on all guy wires to minimize collision risk.
- Turbines will be placed away from any "edge" of Cataract Canyon or similar ridgelines by at least 50 m.
- Where possible, turbines will be placed at least 0.5 mile from known diurnal raptor nests at the time of final turbine layout design. Because of the size of the project area and wind regime at the site, turbine locations are limited, and not all turbines can be placed 0.5 mile from nests; in those cases, turbines will be placed at least 0.25 mile from known raptor nests at the time of final turbine layout design.
- The USFWS has recommended that a 4-mile buffer be placed around golden eagle nests unless a study of home range use is completed that shows that eagles are not using the project footprint regularly (for example, that the footprint is outside of the eagle's 85% use "kernel"). In February 2011, golden eagle nest surveys were completed out to 10 miles from the project area boundary. One territory with two nest structure was and continues to be within the project area as described above (see Sections 2.2.1.3 and 2.2.1.4). No other occupied nests of golden eagles are located within 4 miles of any proposed, individual turbine locations. A 4-mile buffer would preclude construction and operation of most turbines and render the project economically unviable; therefore, no wind turbines will be constructed within 2 miles of the confirmed golden eagle nest identified in the project area. The 2-mile buffer would be used with the caveat that collision risk to golden eagles will (1) be minimal, based on best, most current available information, and (2) will be offset by up-front compensatory mitigation plus additional offsetting measures detailed in Section 5 of this document. This ABPP details an adaptive management approach that will allow project construction and operation to proceed in a way that is compatible with the preservation of the golden eagle, defined in 50 CRF Parts 13 and 22 as "consistent with the goal of increasing or stable breeding populations."
- No bald eagles nest on-site; therefore, a bald eagle nest buffer is not required.
- All wetlands will be avoided (none have been identified on-site), and impacts to jurisdictional waters will be minimized to the greatest extent practicable.

3.2.2 Construction and Operation Minimization Measures

- Construction vehicle movement within the project boundary would be restricted to pre-designated access, contractor-required access, and public roads.
- In temporary construction areas where ground disturbance is unavoidable, surface restoration would consist of recontouring and reseeding with an approved seed mix.
- Reduce fire hazards from vehicles and human activities (e.g., use spark arrestors on power equipment, avoid driving vehicles off road).

- Avoid management that indirectly results in attracting raptors to turbines, such as seeding forbs or maintaining rock piles that attract rabbits and rodents.
- Move stored parts and equipment, which may be used by small mammals for cover, away from wind turbines.

3.2.3 Worker Education Awareness Program

A worker education awareness program (WEAP) that gives instruction on avoiding harassment and disturbance of wildlife (including birds and bats), especially during reproductive (e.g., courtship, nesting) seasons, will be provided to all construction employees prior to groundbreaking activities. The WEAP will be provided in person, and there will be additional information and training available electronically and/or over the web. An environmental inspector will be on-site during construction activities to monitor the program and ensure compliance with the training.

A WEAP will also be implemented during operation of the Perrin Ranch Wind Facility for contractors, project operations staff, and other staff who will be on-site on a regular basis. This training will help teach them to identify bird and bat species that may occur in the project area, record observations of these species in a standardized format, and take appropriate steps when downed birds and bats are encountered. The program will be prepared by a qualified biologist. The program would include a bird and bat education component that consists of briefings for staff and others on-site, printed reference materials, and protocols for documenting and reporting downed birds and bats (see Section 4.2 for further details). As with the construction phase WEAP, this program will be provided in person, and there will be additional information and training available electronically and/or over the web.

3.2.4 Additional Bald and Golden Eagle Measures

Reducing impacts to sensitive birds such as bald and golden eagles begins with appropriate site selection. As discussed in Section 2, intensive studies have been completed for Perrin Ranch, and the site appears to have a relatively low potential for avian and bat impacts. However, to further address potential bald and golden eagle mortality associated with the Perrin Ranch Wind Facility, additional conservation measures have been developed. Although they were developed for eagles, many of these measures will also address potential impacts to other avian species.

- Although there may not be clear evidence from published data to support this notion, some researchers have observed that resident eagles habituate to and avoid wind turbines constructed in their territories. Therefore, all turbines within 4 miles of an occupied eagle nest will be installed last during construction to allow resident birds to first learn to avoid turbines that are farther away. While this measure is intended to reduce risk to resident birds, it may not reduce risk to non-resident eagles (i.e., subadults, floaters, migrants).
- In order to discourage eagles from nesting, potential woody nesting substrate on and within 2 miles of the project area may be removed, and nest deterrents may be placed on potential cliff roosts. While eagle use is primarily based on prey availability, removal of available nesting substrate may help reduce use in the area. No substrate will be removed that supports an existing eagle nest structure, regardless of whether such nests have been recently occupied, unless such nest structures naturally deteriorate to the point they can no longer support a nesting eagle or its eggs or young.
- An on-site carcass (i.e., large-animal carrion) removal program will be implemented in coordination with the landowner.

- Roads will be plowed during winter so as not to impede ungulate movement. Snow banks can cause ungulates to run along roads, resulting in their colliding with vehicles. Roadside carcasses attract eagles, subjecting them to collision as well.
- Bald and Golden Eagle Fund—Perrin Ranch Wind will provide $250,000 to address specific bald eagle and/or golden eagle issues that may arise from the project. Money would either be placed into an escrow fund or be deposited into an agreed-upon interest-bearing account and marked specifically for purposes of research, habitat improvements (on- or off-site), non-operational on-site mitigation, and/or compensatory mitigation. Through a Memorandum of Agreement (MOA), all TAC members (see Section 4.1.1) would develop a cooperative agreement setting forth rules about how the TAC would select funding needs and implement projects. Additionally, other wind-energy industries, USFWS, AGFD, and other participating agencies may elect to contribute funding. Examples of what funding may be used for are as follows:
    - As it is likely eagles are impacted from contaminants and lead shot, provide AGFD with funds to assist with implementing their lead-free shot program.
    - As approved and agreed upon by the appropriate entities (i.e., owners and operators), provide funding to install bird diverters and visual markers on existing power lines and retrofit distribution line poles with anti-perch and deterrent devices and anti-electrocution equipment in accordance with APLIC standards to reduce the potential for avian mortality. This could be on- or off-site, wherever the greatest benefit would be had.
    - Construct new eagle nesting substrate in unoccupied locales that have suitable resources appropriate for eagles (i.e., good food supply, appropriate habitat) but limited nest site availability.
    - Test and implement on-site deterrent devices.
- As described in Section 4.1.2.5 and detailed in Appendix A, a golden eagle habitat use and home range study using observational surveys, telemetry, nest surveys, and productivity studies within 10 miles of the project area will begin pre-construction and continue during post-construction monitoring (see Section 4.0) to assist with determining on-site and greater area use. Data collected will be used to help develop adaptive management measures for the species, as described in Section 5.0 and in the conclusion section of Appendix A. In addition to informing adaptive management, understanding habitat use and home range dynamics of eagles in northern Arizona may also help to determine appropriate avoidance strategies and on-site mitigation measures for future projects in the area, providing an overall benefit to the species.

3.2.5 Condor

Although current telemetry shows that condors do not use the project area, they are a wide-ranging species that can travel long distances and may expand beyond their current range during the life of this project. Therefore, there is the potential for the species to occur in the project area in the future.
The following measures would be implemented to address potential impacts to condors.

- Prior to the start of construction, Perrin Ranch Wind will contact Peregrine Fund personnel (telephone 928-355-2270) who are monitoring California condor locations and movements in the vicinity of the project area to determine the locations and status of condors in or near the project area.
- If a condor occurs at the construction site, construction activities that could result in injury to condors would cease until the condor leaves on its own or until techniques are employed by permitted personnel that results in the condor leaving the area.

- Construction workers and supervisors would be instructed to avoid interaction with condors and to immediately contact the Flagstaff Sub-office of the USFWS or Peregrine Fund personnel if condor(s) occur at a construction site.
- Non-permitted personnel cannot haze or otherwise interact with condors.
- The construction site would be cleaned up (e.g., trash removed, scrap materials picked up) at the end of each day that work is being conducted to minimize the likelihood of condors visiting the site.
- An on-site carcass (i.e., large-animal carrion) removal program will be implemented in coordination with the landowner.
- Perrin Ranch Wind will work with AGFD to support and encourage the use of non-lead ammunition by hunters within and adjacent to the proposed project area to minimize the effects of lead on condors and other raptors. Additionally, money from the Bald and Golden Eagle fund may be used to support the non-lead program, which would also help reduce impacts to condors.

3.2.6 Avian and Bat Fund

Perrin Ranch Wind will provide $250,000 ($150,000 spent to date) for an Avian and Bat Fund to address potential issues to birds and bats from construction and operation of the wind project. Money would either be placed into an escrow fund or be deposited into an agreed-upon interest-bearing account and marked specifically for purposes of bird and bat (separate from the Eagle Fund) research, habitat improvements (on- or off-site), non-operational on-site mitigation, and/or compensatory mitigation. Through an MOA, all TAC members (see Section 4.1.1) would develop a cooperative agreement setting forth rules about how the TAC would select funding needs and implement projects. Additionally, other wind-energy industries, USFWS, AGFD, and other participating agencies may elect to contribute funding. Examples of activities that may be funded through this program include the following.

On-site mitigation, such as but not limited to:

- study and implementation of deterrent devices; and
- study and implementation of bird flight diverting poles.

Research studies, such as but not limited to:

- population-level studies for wildlife impacted by wind-energy development in the region;
- Northern Arizona University's proposed regional bat migration study ($150,000 has been earmarked for this program and will be removed from the total $250,000);
- effects of increased recreational use of facility access roads on wildlife; and
- the ability of deterrent devices to reduce impacts to birds and bats at wind-energy facilities.

Habitat improvements or replacement, such as but not limited to:

- development of a conservation easement; and
- on- or off-site habitat restoration.

4.0 POST-CONSTRUCTION MONITORING AND REPORTING

This ABPP includes all available and viable measures to avoid and minimize impacts to bird and bat species prior to construction of the Perrin Ranch Wind Facility. However, as with any project, impacts that were not anticipated may occur following construction. This section provides methods to monitor and analyze impacts that occur during operation so that the best adaptive management strategies can be developed. Section 5 then provides the means and methods to mitigate for the impacts observed, ensuring that population-level effects do not occur.

4.1 Post-construction Monitoring

4.1.1 Technical Advisory Committee

To help ensure that negative impacts to avian and bat species do not reach levels of significance as a result of routine operations of the Wind Facility, a TAC will provide advice and recommendations for developing and implementing effective measures to monitor, avoid, minimize, and mitigate impacts to avian and bat species and their habitats related to operations. At a minimum, and to the extent they are willing to participate, the TAC will consist of a single resource specialist (two members may be appropriate if one person specializes in birds and the other in bats) from the USFWS, AGFD, Northern Arizona University, Northern Arizona Audubon Society, Coconino County, project landowner, Perrin Ranch Wind, and the lead environmental consultant. There are currently no wind facilities in Coconino County; therefore, a TAC does not exist in the area. Once formed, it may be appropriate for this TAC to address future wind projects, although the methods for doing so are not presented in this ABPP because of its project-specific nature.

An MOA will be signed by each party to ensure participation in the TAC. Unless there is a failure on the part of any of these representatives to respond or agree to participate, the TAC shall preferably be formed prior to project operations but under no circumstances later than 6 months after commencing operations.

The guiding principles, duties, and responsibilities of the TAC include the following:

- Approve TAC charter and sign MOA.
- Maintain confidentiality of information, as allowed by law.
- Make recommendations based on best available science to address specific issues resulting from this project.
- The TAC is only an advisory committee and cannot place requirements on Perrin Ranch Wind.
- Provide sufficient flexibility to adapt as more is learned about the project as well as strategies to reduce avian and bat impacts.
- Review monitoring protocols for mortality monitoring studies and provide recommendations.
- Review results of mortality monitoring.
- Review mortality thresholds (see Section 5.2) and provide recommendations to Perrin Ranch Wind regarding threshold adjustments. The final decision on any changes to thresholds would be the decision of Perrin Ranch Wind.
- Review annual report on post-construction monitoring.
- Develop and recommend additional mitigation measures or research if predetermined mitigation is outdated or deemed ineffective or if “unexpected fatalities” occur.

- The TAC will terminate when determined appropriate by the group (likely following the life of the project).

If possible, the TAC shall hold the first meeting prior to the commencement of operations but no later than 6 months after commencing operations. Thereafter, the TAC shall meet annually, unless data reveal that mortality thresholds (see Section 5.2) have been exceeded. The TAC may also choose to meet if new science regarding wind/wildlife interactions becomes available that warrants discussion. Attendance at TAC meetings shall be by invitation of its members only.

4.1.2 Initial post-construction monitoring

Post-construction monitoring for bats and birds is a critical component of this ABPP. The initial post-construction monitoring will be used to determine the actual level of mortality, compared with that evaluated in the pre-construction risk analysis. For quantitative pre-construction risk analyses methods for bats, see Pandion (2011); for all birds other than golden eagle, see SWCA (2011b); and for golden eagle, see Appendix A. These data will also be provided to the TAC for review. Post-construction monitoring will be completed for bats and birds concurrently, and detailed methods for these surveys are presented below. Perrin Ranch Wind may alter methods over time to incorporate new survey techniques and protocols as they become available.

Mortality surveys will be the primary method for evaluating any direct impact to birds and bats that may result from operation of wind turbines. Avian use surveys will also be used to evaluate any behavioral responses to wind turbines (i.e., avoidance of an area). Methods for completing post-construction surveys are described below.

4.1.2.1 AVIAN AND BAT MORTALITY SURVEYS

Surveys for bat and bird mortalities will be completed for 3 years following construction to evaluate mortality levels from operation of the wind facility. If results show that pre-determined thresholds (see Section 5.2) are exceeded, mitigation will be implemented in phases as described in Section 5.3. If mortality thresholds are being exceeded following the third year of study and not all post-construction mitigation phases (see Section 5.3) have been implemented, Perrin Ranch Wind will work with the TAC to determine whether additional years of monitoring are needed to evaluate the effectiveness of new mitigation. Perrin Ranch Wind is willing to voluntarily report birds injured or killed in association with project construction, infrastructure, and operation, as well as any actions taken to address such events to the USFWS Bird Injury and Mortality Reporting System (BIMRS), maintained by the USFWS OLE. Following the detailed three-year mortality survey period, NextEra's corporate Wildlife Response Reporting System (WRRS) will be implemented to track mortality through the rest of the life of the facility (see Section 4.2).

Consistent with other long-term post-construction mortality surveys at wind energy facilities (Erickson et al. 2003; Erickson et al. 2004; Young et al. 2003), these surveys will occur throughout the year to evaluate the overall impacts to birds and bats. In order to efficiently conduct these surveys, one-third of the operating turbines will be surveyed every other week. The Perrin Ranch Wind Facility has been sub-divided into six sample areas (Figure 3), and a stratified sample approach will be used in order to ensure that each sample area is surveyed with the same approximate intensity. The number of turbines surveyed within each sample area will be proportional to the number of turbines in that sample area relative to the other sample areas; the surveyed turbines will be randomly selected prior to the initial survey. The same turbines will be sampled each survey period to keep the survey time between searches at two weeks.

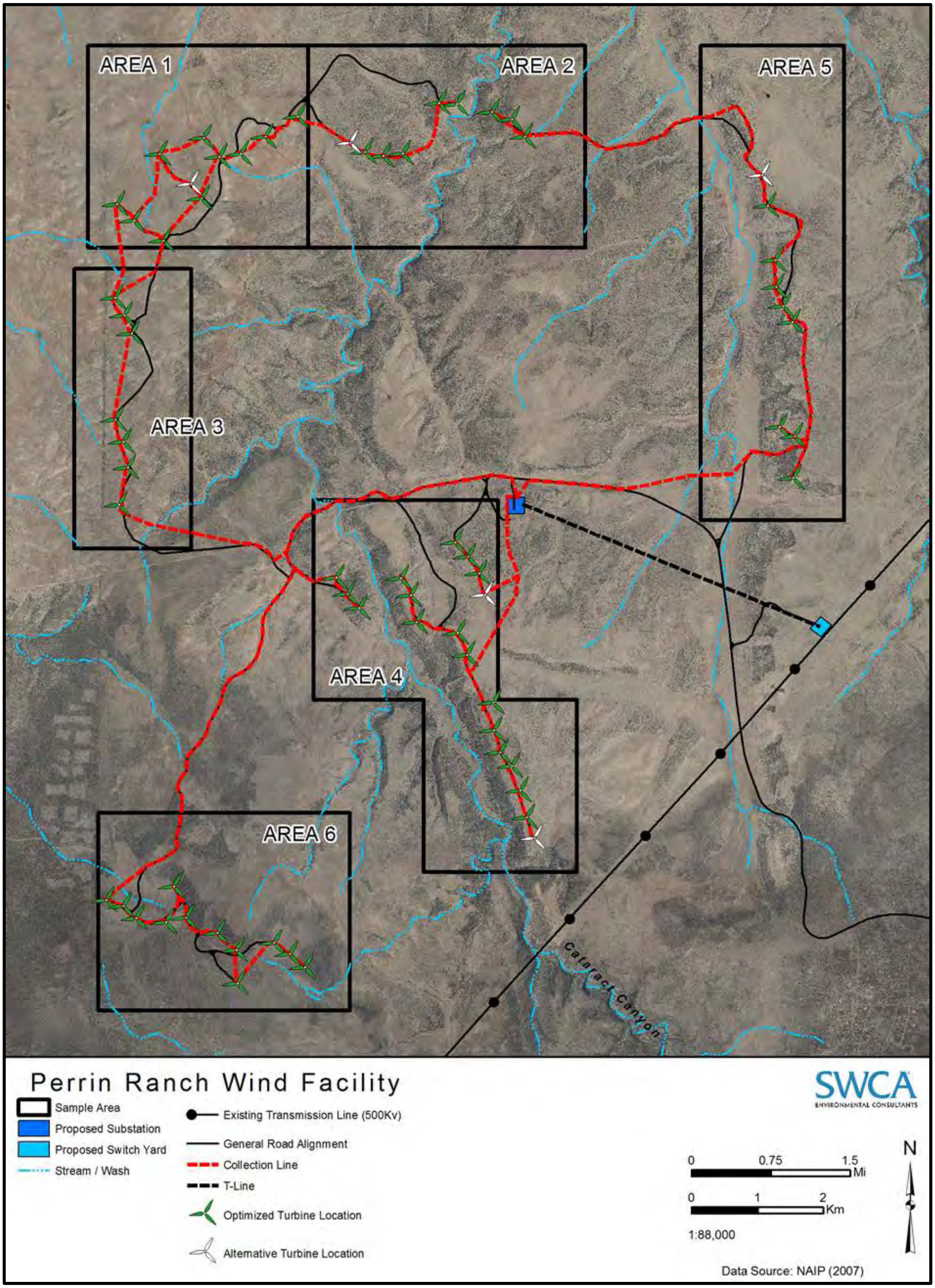

Figure 3. Mortality sample areas for the Perrin Ranch Wind Facility.

Survey plots will be 126 × 126 m (170,900 square feet), centered on the wind turbine mast. Most birds and bats killed by wind turbines are found within 63 m of the turbine (reviewed by Young et al. 2003); therefore, surveying a plot that measures 126 × 126 m will ensure that all areas within 63 m of the turbine will be surveyed. While circular survey plots have been used for other mortality surveys (Baerwald 2009; Kerns and Kerlinger 2004), Young et al. (2003) uses rectangular plots for ease of use, and Arnett et al. (2009) also uses a similar plot shape for mortality surveys (126 × 120 m). To improve searcher efficiency, and if compatible with ranching practices, the survey area will be cleared of brushy vegetation prior to surveys and maintained throughout the survey period. Transects will be spaced at 6-m (20-foot) intervals, with surveyors searching for 3 m (10 feet) of either side of each transect (Arnett et al. 2009; Erickson et al. 2003; Erickson et al. 2004). Large raptors tend not to be scavenged and are easily detected; therefore, because of the recent concerns over eagles, if a bald or golden eagle fatality is discovered, the remaining unsurveyed turbines will be searched for additional eagle fatalities during that survey period.

Additionally, daily searches of the representative turbines will be conducted for a seven-day period each season, corresponding to the timing for searcher efficiency (see Section 4.1.2.2) and carcass removal (see Section 4.1.2.3) trials. The seasonal daily data will provide additional mortality information that will help refine correction factors in order to provide more precise data.

Data collected for each carcass will include species, age, sex, estimated time since death, condition, type of injury, cover type, global positioning system (GPS) coordinates, distance to nearest wind turbine generator location, distance to nearest road, and distance to nearest structure.

All observed carcasses will be photodocumented and identified using *Key to the Bats of Arizona* (Hinman and Snow 2003) and *The Sibley Guide to Birds* (Sibley 2000) as primary references. All mortalities will be identified to lowest taxonomic level possible, based on field notes and photographs. Contingent upon approval and permit by the USFWS, it is recommended that carcasses be collected for use in searcher efficiency and scavenger removal trials or for the USFWS to perform DNA/forensic identification. With respect to eagles, the USFWS OLE sends these carcasses to the National Eagle Repository; therefore, a freezer will be available at the O&M building on-site and if any eagle carcasses are found, they will be frozen and stored on-site until OLE can retrieve them.

Searcher efficiency (see Section 4.1.2.2) and carcass removal (see Section 4.1.2.3) studies will be done to quantify searcher bias and determine the rate at which carcasses are removed by scavengers or other means. The results of these studies will be used to develop correction factors to estimate the actual number of mortalities for the facility and for each surveyed turbine, as appropriate. The data for surveyed turbines will be used to evaluate the mortality per turbine thresholds described in Section 5.2. Additionally, survey intervals may need to be adjusted based on the findings for these studies in order to ensure precise correction factors, using methods similar to those described by Huso (2008, 2010).

4.1.2.2 SEARCHER EFFICIENCY TRIALS

The approach will closely follow methods described in previous studies (Arnett et al. 2009; Erickson et al. 2003; Erickson et al. 2004), in which marked carcasses will be distributed throughout the project area, unknown to the searchers. For this project, a searcher efficiency plot will be completed for each sample area (i.e., six plots). Searcher efficiency trials will be conducted throughout the year to correct observed bat and bird mortalities for bias created by the ability of the surveyor to detect bat and bird carcasses. These will be conducted for each searcher to address differences between searchers. Searcher efficiency trials will be completed during each season to account for different field conditions (i.e., snow, dense spring vegetation, dry summer vegetation) that may affect the ability of the surveyor to locate carcasses. Seasons will be defined as described by Erickson et al. (2003): spring migration (March 16–May 15), breeding season (May 16–August 15), fall migration (August 16–October 31), and winter (November 1–

March 15). Although seasonal trials will not address fluke events, such as snow in June, they will address the overall time period.

Separate searcher efficiency rates will be determined for bats, large birds (defined here as: (1) raptor – Falconiformes (diurnal birds of prey) and vultures; (2) waterfowl – Anseriformes (ducks, geese, and swans); (3) waterbird – bitterns, herons, egrets, ibises, and cranes), and small birds (non-large bird species, primarily passerines). In order to have an adequate sample size, 50 carcasses will be used for each rate (Huso 2008). Fewer carcasses will be used for each rate if new statistics become available that would limit these searches. Bat carcasses collected from the Perrin Ranch Wind Facility will be used for bat searcher efficiency trials, as available. If an insufficient number of bat carcasses are available, carcasses of small, drab passerines (unprotected species such as house sparrows [*Passer domesticus*]) or brown mice carcasses will be used as substitutes. A minimum of two distinct sizes of bird carcasses will be used to determine searcher efficiency rates for passerines and larger birds (Erickson et al. 2000). As available, bird carcasses collected from the Perrin Ranch Wind Facility will be used in the searcher efficiency trials; however, substitute carcasses may be used as necessary. If necessary, substitute small-bird carcasses may be used (Erickson et al. 2003; Erickson et al. 2004; Young et al. 2003), including species such as house sparrows and European starlings. Carcasses substituted for the large-bird size class may include waterfowl, pheasants, rock doves, and domestic fowl. In all cases, carcasses used will either be non-native, non-protected species provided by an authorized agency or species collected and possessed through all appropriate permits.

Prior to initiating the searcher efficiency trial, carcass locations will be randomly generated but constrained so that no more than three carcasses will be located at any one turbine at a time. An additional biologist who is not participating in the searcher efficiency trials will plant carcasses in these pre-determined locations. Carcasses will be dropped from waist level so that they land in a random position and location. The position and location will be recorded for later comparison with actual mortalities.

Bat carcasses will be marked by means of pulling an upper canine tooth, as described by Arnett et al. (2009). Similarly, birds will be marked by notching the beak in order to avoid using chemically based marking methods, which may influence scavenger removal rates. When surveyors locate a marked carcass, they will note the finding and notify the biologist who planted the carcass. The percentage of planted bats and birds located by surveyors will be used to generate a correction factor (by turbine as appropriate) to estimate the actual number of bats or birds killed, based on the number of actual mortalities observed.

4.1.2.3 CARCASS REMOVAL TRIALS

Carcass removal trials will be completed seasonally and concurrently with the searcher efficiency trials described above in Section 4.1.2.1. Different seasonal rates for carcass removal are necessary to address changes in the scavenging throughout the season, as well as over time, as scavengers adapt to a novel food source. Carcasses will be placed as described for searcher efficiency trials. Carcasses will be checked at intervals similar to those used by Erickson et al. (2003) and Young et al. (2003) on days 1, 2, 3, 4, 5, 6, 7, 14, 21, and 28 following placement, or until they are all removed. Separate carcass removal rates will be determined for bats, small birds (passerines), and large birds (raptors). Carcasses used for scavenger trials will be obtained as described above in Section 4.1.2.1. All animals used in the carcass removal trials will be handled with disposable nitrile gloves or an inverted plastic bag to avoid leaving a scent on the carcasses and interfering with the scavenger removal trial (Arnett et al. 2009).

4.1.2.4 AVIAN USE COUNTS

To provide a quantitative comparison between avian pre-construction use and post-construction use at the site, avian point count surveys will be conducted twice each month during the first year of operation.

Point-count surveys (large- and small-bird use counts) will be completed using the same methods as pre-construction studies (SWCA 2011b), with frequency of observation of a species, or percentage of surveys during which a species was observed, serving as the baseline metric(s) to detect any species displacement post-construction. Point-count data will provide a quantitative comparison between pre- and post-construction avian use to inform our understanding of avian pre- and post-exposure to a wind-energy facility in northern Arizona.

4.1.2.5 GOLDEN EAGLE NEST/OCCUPANCY SURVEYS, PRODUCTIVITY, AND HOME RANGE/MOVEMENT STUDIES

To document eagle nesting and occupancy within and adjacent to the wind-energy facility prior to construction, all potentially suitable eagle nesting habitat will be surveyed via helicopter within a 10-mile radius of the project area. Within a 2-mile radius of the project area, all raptor nests will be recorded using geographic information system (GIS) software, in accordance with AGFD recommendations. Eagle nest productivity studies will be conducted by revisiting any eagle nests located during aerial surveys.

A golden eagle home range and movement study that uses telemetry and home range analyses will begin pre-construction to assist with determining on-site use. At least two adult individuals will be targeted for telemetry studies. The most frequently observed individuals within the closest proximity to the project area will be targeted for study. Targeted individuals may include residents, migrants, and floaters, including individuals of all age classes. The Cellular Tracking Technologies CTT-1100 transmitter will be used for tracking eagles. Transmitters will be programmed to record location every 15 minutes. Life expectancy of transmitters should be three to five years. Home range analyses will be conducted using standardized Kernel modeling methods.

Once captured, each eagle will be safely secured, hooded, and carefully handled by experts to avoid stress. The processing of each eagle captured will involve banding with a uniquely numbered federal band, recording morphological and plumage characteristics, drawing a blood sample from the brachial vein (3–5 cm^3 for gender confirmation, lead analysis, and contaminant studies), and transmitter attachment. Data from capture/eagle processing will be pooled with those of the hundreds of other eagles measured; lead and contamination data will compared on a regional scale, providing an overall benefit to the species.

Telemetry studies will continue for three years following construction or until transmitter equipment ceases to work, whichever comes first. Understanding the home ranges and movements of eagles in northern Arizona may also help to determine appropriate mitigation measures for future projects in the area, providing an overall benefit to the species.

Field observation studies using point-count based surveys will be conducted within and adjacent to the project area during pre-construction (see Appendix A for detailed description). Additionally, individual turbine risk assessments will be conducted prior to construction.

All components of these studies will be completed primarily in accordance with the most accepted USFWS and AGFD golden eagle study protocols (AGFD 2010; Pagel et al. 2010), the recommendations by the USFWS Migratory Birds Department, and the methods in Driscoll (2010). A complete description of this study is available in Appendix A.

4.1.3 Long-term project monitoring

Following the initial post-construction monitoring (see Section 4.1.2), Perrin Ranch Wind will implement an internal monitoring program (also known as the WRRS), which will be used by site personnel to record avian and bat mortalities over the long term of operation. The intent of this monitoring program will be to ensure that the turbines and the transmission line corridor at the site are frequently inspected for possible avian or bat impacts and that if impacts are identified they are recorded, agencies are notified, and mitigation measures are identified and implemented. The WRRS will be used for the life of the project beginning after the first three years of post-construction monitoring studies. The main purposes of the WRRS are as follows:

- To provide a means of recording and collecting information on incidental avian and wildlife species found dead or injured within the project area by site personnel.
- To provide a set of standardized instructions for site personnel to follow in response to wildlife incidents in the project.
- To keep site personnel mindful of wildlife interactions.

The following will occur prior to operation:

- As stated in Section 3.2.3, a WEAP will be provided to all contractors, project operations staff, and other staff who will be on-site on a regular basis. This training will help teach them to identify bird and bat species that may occur in the project area, record observations of these species in a standardized format, and take appropriate steps when downed birds and bats are encountered.
- Standardized WRRS data forms will be prepared and provided to on-site personnel.

The following will occur during operation, beginning the fourth year:

- Each time a turbine is visited by on-site personnel (typically at least once per month), it will be searched for carcasses.
- Carcass searches will be done using pedestrian surveys within the cleared area of the turbine.

The following will occur if dead or injured birds or bats are found at the wind facility by on-site personnel:

- The on-site Environmental Manager will be notified immediately. The on-site Environmental Manager will contact the Perrin Ranch Wind Facility Project Manager, who will in turn notify the USFWS and AGFD (an ESA-listed species or an eagle will be reported within five days, and other migratory bird species will be reported within 10 days).
- The animal will not be moved or removed by any individual who does not have the appropriate permits.
- The location will be marked using GPS.
- An Avian and Wildlife Reporting Form will be filled out, and photos will be taken. This information will be turned in to the on-site Environmental Manager and provided to the USFWS and AGFD.
- Permits are required to handle wildlife. The on-site Environmental Manager will coordinate with the USFWS to arrange transportation and treatment of an injured threatened or endangered species or eagle. At Perrin Ranch Wind's cost, animals that are approved for removal/relocation will be taken to a local USFWS- and AGFD-approved rehabilitation center such as Liberty Wildlife or disposed of as recommended by AGFD and USFWS. Non-eagle carcasses, and parts, would be legally distributed via licensed repositories such as Liberty Wildlife.

In addition to the WRRS, a formal survey will be completed every 10 years by qualified biologists following the initial three-year monitoring period (i.e., year 13, 23, etc.). The formal survey is intended to provide a more intensive study of mortality over time that would supplement the information recorded from the WRRS. The study would follow similar protocols to the initial three-year study and would specifically include the following:

- Avian and bat mortality monitoring using the same subset of turbines used during the initial study described in Section 4.1.2.1.
- Search protocols would follow the methods outlined in Section 4.1.2.1; however, turbines would be searched four times in the spring/summer and four times in the fall. Each survey season would be completed to correspond to the highest period of mortality recorded during the initial study for that season.
- Searcher efficiency (Section 4.1.2.2) and carcass removal (Section 4.1.2.3) trials would be completed for each season, and the time between turbine searches would directly correspond to the data collected for carcass removal. It is anticipated that surveys would be conducted every other week over an eight-week period each season.

4.2 Reporting

4.2.1 Initial Monitoring Reporting

Annual reports will be completed in the first quarter of each subsequent year and provided to the TAC for review. Reports will detail the findings of mortality surveys and avian use counts. Annual reports will also include a validation of risk assessments based on pre-construction data by comparison with post-construction data indicating realized impacts to birds and bats from facility operation.

Mortality data will first be assessed for bats, large birds, and small birds by sample area to determine the estimated mortality for the facility during that survey period using the following equation:

$$M_E = (M_O/T_S)(T_A)(C_E)(C_S)$$

M_E equals the total mortality for a sample area for bats, large birds, or small birds. M_O equals the actual mortality observed in a sample area. T_S is the number of turbines surveyed in a sample area. T_A equals the total turbines in a sample area. The searcher efficiency (C_E) and carcass removal rates (C_S) will be calculated for each sample area and applied. The most recent acceptable methods (such as Huso 2010) will be used to determine searcher efficiency and scavenger rate correction factors. Estimated mortality for the entire facility during a survey period would be calculated by adding the M_E values for all sample areas.

Overall mortality data for bats, large birds, or small birds will be presented per MW per year, per turbine per year, and per 100,000 m^2 RSA per year. Species-specific mortality data will be presented as raw data and will not be estimated based on correction factors. Correction factors are not used to adjust individual species numbers because those factors do not provide a way to correct for species-specific mortality. For example, if a searcher finds 50% of large bird carcasses searched for during trials and one eagle mortality is then discovered during post-construction mortality surveys, a correction factor would suggest that the searcher missed a second large-bird mortality. However, that does not shed light on whether the missed mortality is an eagle or not.

The USFWS will also set up an account in their BIMRS database to which documentation on bird mortalities will be submitted. The data will be entered into this system within five business days following completion of the survey round tracking sheets. If golden or bald eagle mortalities are recorded, the data will be reported to the USFWS and AGFD within 48 hours and entered into BIMRS within five days of observation. These data will be available for review and broad-scale evaluations by the USFWS OLE, as is done for the electric utility industry (APLIC 2006).

In addition to the formal annual reports, data forms and mortality tracking spreadsheets will be submitted to the TAC biannually to review existing practices and ensure quality control. The TAC will have the opportunity to conduct statistical analyses using the provided data, as desired. The biannual submittal will also describe any new adaptive management strategies that were implemented by Perrin Ranch Wind as a result of exceeding thresholds (see Section 5.2). A meeting will be held with the TAC within 30 days of submittal to discuss findings.

As allowed by law, confidentiality will be maintained between proponent and all agencies reviewing the project reports.

4.2.2 Long-Term Monitoring Reporting

The WRRS data will be logged in a tracking spreadsheet maintained by the on-site Environmental Manager and presented in annual reports to the USFWS and AGFD. As allowed by law, confidentiality will be maintained between the proponent and all agencies reviewing the project reports.

Results from the 10-year studies will be summarized in a report similar to the initial monitoring report and provided to the USFWS and AGFD after each study season.

5.0 POST-CONSTRUCTION MITIGATION AND ADAPTIVE MANAGEMENT

The Perrin Ranch Wind Facility site is well suited for development of a wind-energy site. No federally threatened or endangered bird or bat species are likely to be present on the Perrin Ranch Wind Facility site, although eagles and other protected species of migratory birds occur in the area. The habitat is largely a pinyon-juniper monotype, ubiquitous across northern Arizona, and has been used for intensive cattle and sheep ranching for more than 100 years. Nevertheless, Perrin Ranch Wind voluntarily proposes to undertake the following mitigation and adaptive management measures to ensure a net benefit to sensitive avian and bat populations.

5.1 Adaptive Management Process

The mitigation measures and adaptive management techniques described in this section have been developed to ensure effective mitigation to offset any bird or bat mortality associated with operation of the Perrin Ranch Wind Facility that could affect species' populations. Federally listed species (i.e., ESA listed or Birds of Conservation Concern [BCC] [USFWS 2008]) are considered the species most in peril; therefore, it is assumed that mortality of those species would have the greatest effect on populations and species' persistence. Similarly, state-listed species (in this case, AZSWAP species) have been identified as having the most conservation concern for that state and, like federally listed species, it is assumed that mortality would have greater implications on the persistence of those species' population. Therefore, addressing federally and state-listed species in this ABPP effectively ensures that population-level impacts to all avian and bat species would not occur. If at some time a new species becomes more imperiled, it would be added to the state, federal, or both lists and therefore added to this ABPP. Conversely, if a species is removed from listing because of its recovery, it would also be removed from the ABPP.

Further, to help ensure that this project does not contribute to the listing of new species, protective measures (shown as Low-2 in Table 4 for birds and Low-3 in Table 7 for bats) are provided for all non-listed migratory bird and bat species. Because of the species diversity of birds, it is expected that mortality in this group would not exhibit episodic patterns; therefore, compensatory mitigation is expected to be most effective to address impacts. Mortality among non-listed bats is primarily seen in two species (hoary bat and silver-haired bat) and is most often seen during periods of fall migration. Therefore, operational mitigation is expected to be most effective to address impacts to these bat species.

Mortality thresholds for birds and bats (see Section 5.2) have been developed as criteria for implementing phased mitigation measures (see Section 5.3). Each successive phase is more robust in mitigating (i.e., removing or reducing the impact) and/or compensating (i.e., providing improvements to adjust for loss somewhere else) for mortality thresholds being continually exceeded.

5.2 Avian and Bat Mortality Thresholds

Because of their sensitive nature, mortality thresholds have been developed for species known to occur or that may occur in the project area and that are either (1) USFWS federally listed (does not remove the need for ESA Section 7 or Section 10 consultation) or BCC species, or (2) bat or bird species in tiers 1A, 1B, or 1C of the AZSWAP (see Table 2). Owing to their protection under the BGEPA, a threshold has also been developed for bald eagles and golden eagles. Golden eagles and bald eagles are given additional protections and provisions under BGEPA so are treated separately from other species of migratory birds. Wind-energy developers may apply for a limited number of programmatic permits to take eagles incidental to construction and operation of a wind facility (*Federal Register*; 50 CFR 13 and 22). Regardless, the non-operational and operational threshold value for eagles for Perrin Ranch Wind will be one and two individual eagles (either species).

Currently, there are no federally listed species likely to occur in the project area, although the 10(j) population of condor is a wide-ranging species that can travel long distances and could expand beyond their current range into the project area during the life of this project. A federally listed species would be addressed through ESA Section 7 or Section 10 consultation. For this ABPP, species for which thresholds have been designated are provided protection by federal (ESA, MBTA, BGEPA) and/or state regulations (Arizona Revised Statutes 17-102) (AGFD 2011), which protect against unlawful take.

Observation of other federally listed or state sensitive (i.e., AZSWAP species) species not listed in the tables below or changes in federal listing status or state status for avian and bat species occurring within the project area may result in the addition, removal, or reclassification of species for mitigation thresholds. These thresholds do not permit take under any legal protections but have been developed to address the greater concern posed by potential population impacts to those species in order to ensure that impacts are not substantial.

Thresholds have been developed for implementation of non-operational mitigation as well as operational mitigation. Operational mitigation includes measures that change how turbines operate, such as delayed start-ups and temporary shutdowns. Non-operational mitigation includes measures that do not affect daily operation of the facility, such as compensatory mitigation and habitat enhancement (on- or off-site). Non-operational mitigation thresholds address mortality that may occur occasionally over several seasons or years, while operational mitigation thresholds address “extreme” or episodic mortality events. Either may lead to population-level impacts. Non-operational mitigation thresholds have been developed by assessing each species’ regulatory and conservation status and general vulnerability to population decline (Tables 4 and 5). If mortality thresholds are exceeded, phased mitigation as defined in Section 5.3 will be implemented.

Species-specific mortality thresholds will not have searcher efficiency or scavenger rate correction factors applied because the factors correct for observations of all species but do not provide a way to correct for species-specific mortality. For example, if a searcher finds 50% of large-bird carcasses searched for during trials and one eagle mortality is then discovered during post-construction mortality surveys, a correction factor would suggest that the searcher missed a second large-bird mortality. However, that does not shed light on whether the missed mortality is an eagle or not.

Table 4. Annual Non-operational Mitigation Thresholds for Mortality among Avian Species

Sensitivity	Threshold Species	Threshold Value*	
		Large Birds	Small Birds
High-1	Bald and golden eagles because of their status under the BGEPA.	1	N/A
High-2	Bird species categorized as Tier 1A under the AZSWAP. These species generally are rare, have small and/or isolated U.S. populations, and are exhibiting strong population declines.	3	9
Moderate	Bird species categorized as Tier 1B under the AZSWAP or included in the USFWS list of BCC for BCR 16 and not listed in the High category (e.g., western burrowing owl). These species are of special conservation concern at the state, region, and/or national level; generally occur at low densities, or at moderate densities with a localized distribution; are resident in the Southwest region but with small population sizes; and/or are uncommon and exhibiting small to moderate population declines.	6	18
Low-1	Bird species categorized as Tier 1C under the AZSWAP. Generally occur at higher densities than moderate-sensitivity species.	9	27
Low-2	All other species of migratory birds as defined by the USFWS (50 CFR 10 and 22); mainly species that are common and widespread over much or most of the U.S. and in generally high densities throughout their ranges, or medium-density species with localized distributions; however, they are still protected under the MBTA.	300 (small and large birds combined)	

* For a given species (or sensitivity category for Low-2), the number of individual birds (or group of birds for Low-2) killed or injured and non-releasable per 100 MW of nameplate capacity, rounded to the nearest integer, per year. Mortality thresholds for the Low-2 category are not species specific; therefore, correction factors will be used to assess whether thresholds have been exceeded.

Table 5. Annual Non-operational Mitigation Thresholds for Mortality among Bat Species

Sensitivity	Threshold Species	Threshold*
High	Species categorized as Tier 1A under the AZSWAP.	9
Moderate-1	Species categorized as Tier 1B under the AZSWAP and high/medium under the Western Bat Working Group (WBWG) species matrix.	15
Moderate-2	Species categorized as Tier 1B under the AZSWAP and low under the WBWG.	21
Low-1	Species categorized as Tier 1C under the AZSWAP and high/medium under the WBWG.	30
Low-2	Species categorized as Tier 1C under the AZSWAP and low under the WBWG.	45

* For a given species, the number of individual bats killed or injured and non-releasable per 100 MW of nameplate capacity, rounded to the nearest integer, per year.

Operational mitigation thresholds have been developed to address episodic mortality events. These events would either involve (1) a specific “problem” turbine where a high level of mortality (i.e., the threshold values in Table 6) occurs over a short time period (two weeks or less), or (2) a set of turbines where a high level of mortality (i.e., threshold values in Table 6) occurs in a certain season in consecutive years. The operational mitigation thresholds for birds and bats are described in Tables 6 and 7, respectively. As with non-operational mitigation, species-specific operational mortality thresholds will not have searcher efficiency or scavenger rate correction factors applied.

Table 6. Annual Operational Mitigation Thresholds for Mortality among Avian Species

Sensitivity	Threshold Value*	
	Large Birds	Small Birds
High-1	Two individuals at a single turbine over a short period OR 2 individuals at the facility in a given season in consecutive years (i.e., spring 2011 and spring 2012).	N/A
High-2	Three individuals at a single turbine over a short period OR 3 individuals at the facility in a given season in consecutive years (i.e., spring 2011 and spring 2012).	Nine individuals at a single turbine or group of adjacent turbines over a short period OR 9 individuals at the facility in a given season in consecutive years (i.e., spring 2011 and spring 2012).
Moderate	Six individuals at a single turbine over a short period OR 6 individuals at the facility in a given season in consecutive years (i.e., spring 2011 and spring 2012).	Eighteen individuals at a single turbine OR 18 individuals at the facility in a given season in consecutive years (i.e., spring 2011 and spring 2012).
Low	Nine individuals at a single turbine OR 9 individuals at the facility in a given season in consecutive years (i.e., spring 2011 and spring 2012).	Twenty-seven individuals at a single turbine OR 27 individuals at the facility in a given season in consecutive years (i.e., spring 2011 and spring 2012).

* For a given species, the number of individual birds killed or injured and non-releasable per 100 MW of nameplate capacity, rounded to the nearest integer, per year.

Table 7. Annual Operational Mitigation Thresholds for Mortality among Bat Species

Sensitivity	Threshold Value*
High	Nine individuals at a single turbine over a short period OR 9 individuals at the facility in a given season in consecutive years (i.e., spring 2011 and spring 2012).
Moderate-1	Fifteen individuals at a single turbine or group of adjacent turbines over a short period OR 15 individuals at the facility in a given season in consecutive years (i.e., spring 2011 and spring 2012).
Moderate-2	Twenty-one individuals at a single turbine over a short period OR 21 individuals at the facility in a given season in consecutive years (i.e., spring 2011 and spring 2012).
Low-1	Thirty individuals at a single turbine or group of adjacent turbines over a short period OR 30 individuals at the facility in a given season in consecutive years (i.e., spring 2011 and spring 2012).
Low-2	Forty-five individuals at a single turbine over a short period OR 45 individuals at the facility in a given season in consecutive years (i.e., spring 2011 and spring 2012).
Low -3[±]	Seventy-five individuals at a single turbine over a short period OR 75 individuals at the facility in a given season in consecutive years (i.e., spring 2011 and spring 2012).

* For a given species, the number of individual bats killed or injured and non-releasable per 100 MW of nameplate capacity, rounded to the nearest integer, per year.

[±] Low-3 species are all other species of bats not covered in another category. This category will be assessed as a group and not by species; therefore, correction factors will be used to assess if thresholds have been exceeded.

As described above, the adaptive management process has two separate mitigation tracks that work together to address long-term mortality (non-operational mitigation), as well as episodic events and general species mortality (operational mitigation). A flowchart depicting the mitigation process is presented in Figure 4. It should be noted that Figure 4 is a hypothetical example and does not reflect actual surveys or findings.

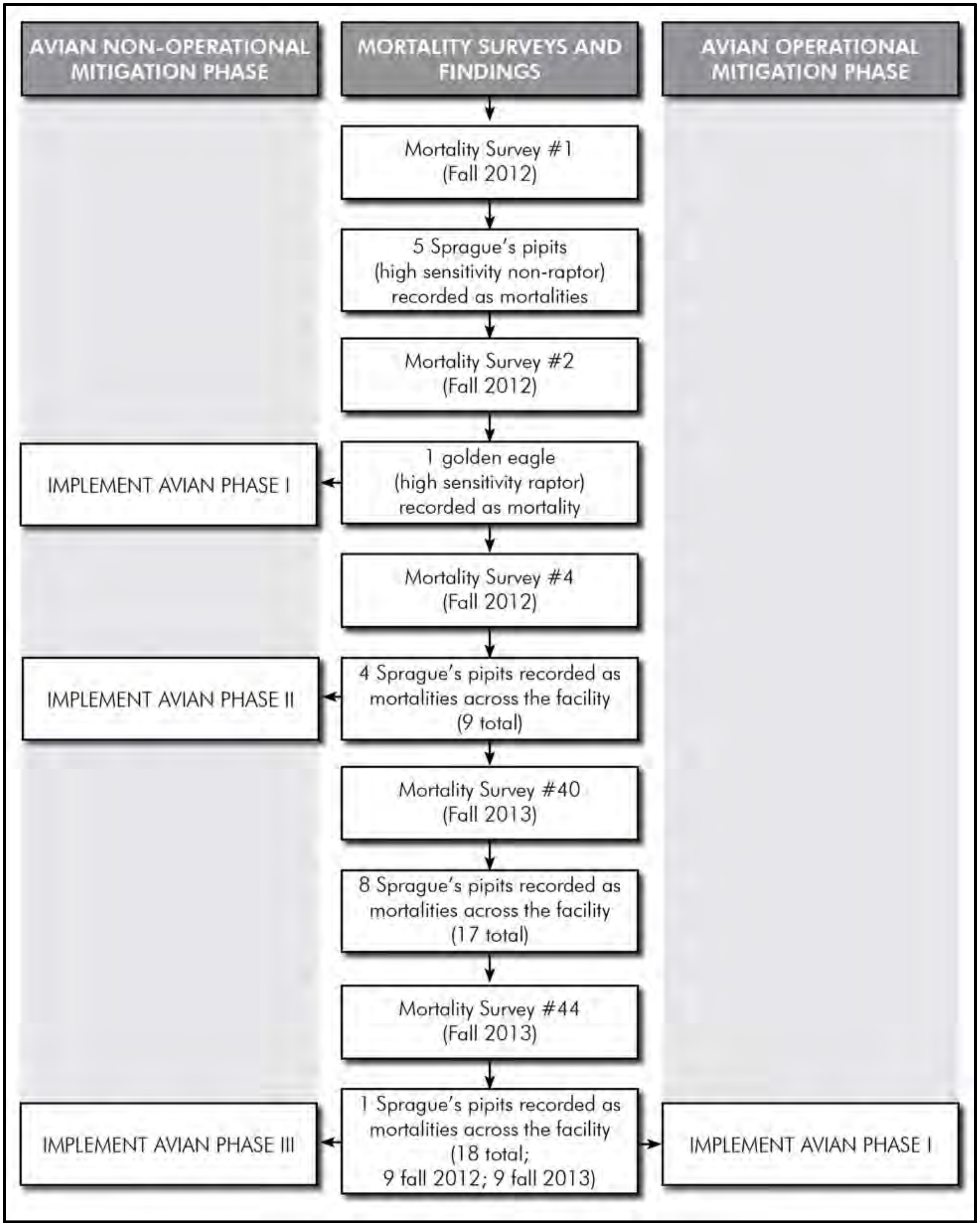

Figure 4. Mitigation process example flowchart.

5.3 Mitigation Measures and Adaptive Management

5.3.1 Non-operational Measures

The following mitigation measures shown in Table 8 and described in detail below will be applied each time non-operational mitigation thresholds (shown in Table 6) are exceeded for either a bird or bat species. Each time a threshold for that group is exceeded, the next phase will be implemented. For example, if the threshold for osprey is exceeded, Phase I for birds would be implemented. If 12 months later the threshold for peregrine falcon is exceeded, Phase II for birds would be implemented. If all three mitigation phases have been applied and thresholds continue to be exceeded, at Perrin Ranch Wind's decision, either a final habitat compensation payout would be made or Perrin Ranch Wind would work with the TAC to determine additional phases of mitigation.

Table 8. Non-operational Mitigation Phases

Mitigation Phase	Avian Species (Raptors and Non-Raptors)	Bats
Phase I	• Contribute $25,000 into the Avian and Bat Fund.	• Contribute $25,000 into the Avian and Bat Fund.
Phase II	• Contribute $50,000 into the Avian and Bat Fund.	• Contribute $50,000 into the Avian and Bat Fund.
Phase III	• Contribute $75,000 into the Avian and Bat Fund.	• Contribute $75,000 into the Avian and Bat Fund.
Final Measure	• Contribute $100,000 into the Avian and Bat Fund ($250,000 total contribution over all phases).	• Contribute $100,000 into the Avian and Bat Fund ($250,000 total contribution over all phases).

5.3.1.1 PHASE I MITIGATION

Birds and/or bats

An additional $25,000 would be deposited into the Avian and Bat Fund described in Section 3.2.6. As determined by the TAC, these funds can be used for either non-operational mitigation on-site or compensatory mitigation.

5.3.1.2 PHASE II MITIGATION

Birds and/or bats

An additional $50,000 would be deposited into the Avian and Bat Fund described in Section 3.2.6.

5.3.1.3 PHASE III MITIGATION

Birds and/or Bats

An additional $75,000 would be deposited into the Avian and Bat Fund described in Section 3.2.6.

5.3.1.4 FINAL MITIGATION

Final mitigation measures represent maximum response levels for this project based on models that have been completed to ensure a commercially viable project. Given these constraints, the proposed levels most optimally achieve reduced probability of mortality during time periods (daily and seasonally) of greatest concern, based on pre-construction data and most current knowledge of impacts at wind facilities.

Birds and/or bats

An additional $100,000 would be deposited into the Avian and Bat Fund described in Section 3.2.6.

5.3.2 Operational Measures

The following mitigation measures from the appropriate phase shown in Table 9 and described in detail below will be applied each time operational mitigation thresholds (shown in Table 7) are exceeded for either a bird or bat species. Each time a threshold for a group is exceeded, the next phase will be implemented, and phases previously applied will continue to be applied for the life of the project, as appropriate. For example, if a bat threshold is exceeded and Phase I cut-in speed curtailment is triggered, that curtailment measure will remain for the life of the project.

The determination of how to implement operational mitigation will be determined by the TAC. If a consensus cannot be made on how to implement operational mitigation, the USFWS will have final authority for species of birds protected under the MBTA and BGEPA and AGFD will have final authority for bats. If any bat species impacted by the project become(s) federally listed, final authority for bats would shift to the USFWS for the listed species.

If operational mitigation is triggered following the initial detailed three-year post-construction monitoring study (see Section 4.1.2), the TAC may determine whether to immediately implement the appropriate phase mitigation measure or to conduct additional focused monitoring. Focused monitoring would follow similar methods to the initial post-construction plan but would concentrate on determining which turbine(s) are problem turbines, when and why the problem is occurring, and possible solutions. This focused study would allow operational mitigation to better address specific problems, resulting in greater success in reducing mortality. Combined with results from wind energy projects elsewhere, these data could have significant inferential value in helping understand and reduce risk factors.

Table 9. Operational Mitigation Phases

Mitigation Phase	Avian Species	Bats
Phase I	• Implement shutdowns for up to 120 turbine hours annually	• Implement up to 112 facility hours of cut-in speed curtailment at 5.0 m/s annually
Phase II	• Implement shutdowns for up to an additional 120 turbine hours annually	• Implement up to an additional 56 facility hours of cut-in speed curtailment at 5.0 m/s annually
Final Measure	• Implement shutdowns for up to an additional 120 turbine hours annually	• Implement up to an additional 168 facility hours of cut-in speed curtailment at 5.0 m/s annually

5.3.2.1 PHASE I MITIGATION

Birds

Turbine Shutdowns

It may be appropriate to implement turbine shutdowns for problem turbines at specific times based on mortality monitoring. Therefore, shutdowns of up to 120 turbine hours (i.e., total for all turbines, not 120 hours per turbine) will be implemented annually at the appropriate seasonal and daily times as determined by the TAC. Shutdowns totaling 120 turbine hours are equivalent to, for example, one turbine shutdown for four hours per day for 30 days, or roughly the highest raptor migration period (midday in October).

However, any combination of shutdowns could be implemented within the maximum shutdown amount allowed, as determined by the TAC.

Bats

Delayed Cut-in Speed

Cut-in speed curtailment between 5.0 m/s and 6.5 m/s has been shown to be effective in reducing bat mortality by 53% to 87% at other wind facilities (Arnett et al. 2009). Because of the wind regime at the site, the maximum cut-in speed change tested (i.e., 6.5 m/s) is not viable. Therefore, cut-in speed curtailment at 5.0 m/s for up to four hours per night during the four most high-use weeks (i.e., 112 total hours) based on pre- and post-construction monitoring data will be applied to the project annually. The TAC may review the curtailment applied and recommend a different combination of hours per day, not to exceed 112 total hours (i.e., eight hours per day for 14 days) per year.

5.3.2.2 PHASE II MITIGATION

Birds

Turbine Shutdowns

An additional 120 turbine hours of shutdowns may be applied to the project annually. This would allow for an annual maximum shutdown of 240 turbine hours, which is the equivalent of two turbines for four hours per day for 30 days.

Bats

Delayed Cut-in Speed

Cut-in speed curtailment at 5.0 m/s for up to an additional 56 facility hours (two weeks) during the most high-use weeks (i.e., 112 hours Phase I + 56 hours Phase II = 168 total hours) based on post-construction monitoring data will be applied to the project annually. The TAC may review the curtailment applied and recommend a different combination of hours per day, not to exceed 168 total hours (i.e., the equivalent of six hours per day for four weeks) per year.

5.3.2.3 FINAL MITIGATION

Final mitigation measures represent maximum response levels for this project based on models that have been completed to ensure a commercially viable project. Given these constraints, the proposed levels most optimally achieve reduced probability of mortality during time periods (daily and seasonally) of greatest concern, based on pre-construction data and most current knowledge of impacts at wind facilities.

Birds

Turbine Shutdowns

An additional 120 turbine hours of shutdowns may be applied to the project annually. This would allow for a maximum shutdown of 360 turbine hours, which is the equivalent of three turbines for four hours per day for 30 days.

Bats

Delayed Cut-in Speed

Cut-in speed curtailment at 5.0 m/s for up to an additional 168 facility hours (i.e., 168 hours Phase I and II + 168 hours Final Phase = 336 total hours) will be applied to the project annually based on post-construction monitoring data. This would be equivalent to eight hours per night during the six most high-use weeks. The TAC may review the curtailment applied and recommend a different combination of hours per day, not to exceed 336 total hours (i.e., four hours per day for 12 weeks) per year.

6.0 GLOSSARY

Active nest – A nest used by eagles (or other species of raptors) in which an egg or eggs have been laid. An active nest also is, by definition, occupied, although the converse is not necessarily true. A nest in which an egg or eggs apparently have not been laid is considered an inactive nest.

Adaptive management – Iterative process of decision making considering uncertainty, with the goal of reducing that uncertainty over time.

Adult (with regard to bald eagles or golden eagles) – An individual of five or more years of age, typically when reaching sexual maturity.

Avoidance and minimization measures – Conservation actions targeted to remove or reduce specific risk factors.

Compensatory mitigation – The restoration, creation, enhancement, or in exceptional circumstances, preservation of resources for the purpose of compensating for unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Critical Habitat – Under the ESA: (1) the specific areas within the geographic area occupied by a federally listed species on which are found physical and biological features essential to the conservation of the species, and that may require special management considerations or protection; and (2) specific areas outside the geographic area occupied by a listed species when it is determined that such areas are essential for the conservation of the species.

Cut-in speed curtailment – Mitigation measure that reduces bat mortality by increasing the wind speed at which turbines being operating to avoid operation during high bat use time frames.

Ephemeral watercourse – Watercourse that contains running water only sporadically, such as during and following storm events.

Facility hours – Hours of operation for the entire facility.

Floater (floating adult) – An adult eagle that has not settled on a breeding territory.

Home range – The area traveled by an eagle in its normal activities of food gathering, mating, and caring for young. Breeding home range is the home range during the breeding season, and the non-breeding home range is the home range outside the breeding season.

Important Bird Area – Site that provides essential habitat for one or more species of bird; includes sites for breeding, wintering, and/or migrating birds.

Interest-bearing account – An account that pays interest on the money deposited.

Large bird – Either a (1) raptor – Falconiformes (diurnal birds of prey) and vultures; (2) waterfowl – Anseriformes (ducks, geese, and swans); or (3) water bird – bitterns, herons, egrets, ibises, and cranes.

Laydown area – area used to store construction materials and equipment during construction.

Likely to occur –Project area is either within the known geographic area or breeding range of the species, and species has been documented in the project area.

May occur – Project area is either within the known geographic area or breeding range of the species, and/or suitable foraging or roosting habitat is present, species may have been briefly documented within the project area vicinity.

May wander/migrate – The project area does not contain suitable habitat; however, the species may migrate and/or wander through the area.

MET tower – Meteorological tower.

Migration only – Project area may be outside of species habitat or geographic and elevational range; however, the species may migrate through the project area.

Migratory bird – A bird that makes yearly movements in response to changes in food availability, habitat, or weather. Currently, 1007 species of birds that occur in the United States—nearly all species of birds that exist in the wild—are considered migratory birds by the USFWS and are protected by the Migratory Bird Treaty Act (see http://www.fws.gov/migratorybirds/RegulationsPolicies/mbta/mbtintro.html for more information).

Mitigation – A measure to moderate or lessen impacts.

Mitigation phase – A predefined mitigation measure that is implemented after exceeding a predefined mortality threshold.

Mitigation threshold – A threshold that triggers a mitigation phase.

Monitoring – The process of collecting information to evaluate whether objectives and anticipated or assumed results of a management plan are being realized and whether implementation is proceeding as planned.

Mortality event – Either a specific turbine or set of turbines exhibiting mortality over a short period of time or a set of turbines where seasonal mortality occurs in consecutive years.

Mortality threshold – A predefined number of individual bird or bat mortalities that when exceeded triggers a mitigation threshold.

Non-operational mitigation – Any mitigation not involving cut-in speed curtailment, shutdowns, or other alterations to the operation of the wind facility.

Occupied nest (or occupied territory) – A nest (or territory) defended by what appears to be a mated pair or of "one or more adults engaged in territorial defense, nest affinity, or other reproductive-related activity" (Steenhof and Newton 2007). Among eagles and many other species of diurnal raptors, an occupied nest exhibits evidence of recent construction or repair and decoration with green sprigs. Presence of eggs or young indicates that an occupied nest is active, although a nesting attempt (defined by the laying of eggs) does not necessarily occur at a given occupied nest in a given year. An unoccupied nest or territory is an area not selected by raptors for use in the current nesting season.

Operational mitigation – Mitigation completed through turbine cut-in speed curtailment or shutdowns.

Project area – Project boundary around the wind facility.

Project footprint – Area on the ground directly disturbed by the wind facility.

Ramsar Convention Site – Wetlands designated as internationally important under the Convention on Wetlands.

Small bird – Any non-large bird species; primarily passerines.

Study Area – The project area, plus an area beyond the project area (differs by species) where species area directly or indirectly affected by the project.

Subadult – An eagle between one and four years old, typically not of reproductive age.

Turbine hours – Hours of operation for a single turbine.

Undetermined raptor nest – Nests that are either structurally deteriorated or do not exhibit diagnostic characteristics of one specific species and a specific species has not been observed at or near the nest.

Unlikely to occur – Project area is either outside the known geographic and elevational range and/or does not contain suitable habitat for the species.

Western Hemisphere Shorebird Reserve Network Site – An area of demonstrated importance to shorebirds.

Wetland – Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (U.S. Environmental Protection Agency 2009).

Wind turbine – A machine capable of converting wind energy into electricity by means of a wind-driven generator; usually mounted on a tower structure.

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APPENDIX A

Golden Eagle Use Studies Related to the Avian and Bat Protection Plan for the Proposed Perrin Ranch Wind Facility

Golden Eagle Use Studies Related to the *Avian and Bat Protection Plan for the Proposed Perrin Ranch Wind Facility*

As stated in the *Avian and Bat Protection Plan (ABPP) for the Proposed Perrin Ranch Wind Facility* (SWCA Environmental Consultants [SWCA] 2011), golden eagle (*Aquila chrysaetos*) home range and movement, nest occupancy, and productivity studies will be conducted. Studies will be completed primarily in accordance with the most accepted U.S. Fish and Wildlife Service (USFWS) and Arizona Game and Fish Department (AGFD) golden eagle study protocols (AGFD 2010; Pagel et al. 2010; personal communication, Dr. R.K. Murphy, USFWS Migratory Bird Department). This document was prepared prior to issuance of the Proposed Guidance for Eagle Conservation Plans (USFWS 2011) which provide draft guidance regarding golden eagle and wind-energy projects. However, in an effort to meet programmatic take permit requirements, this document includes essential components of the draft guidance, including a multi-agency agreement on eagle home range/use studies as related to a wind-energy project is critical in facilitating environmental studies.

SWCA and NextEra Energy Resources (NextEra) have convened multi-agency meetings (January 4, 11, and 19, 2011) composed of the USFWS Ecological Services and Migratory Bird Departments, AGFD, and Western Area Power Administration. One of the main objectives of the meetings was for NextEra to receive guidance and support for golden eagle studies by the agencies. SWCA presented details of initial study objectives and field methods and presented maps and figures of potentially suitable eagle habitat proposed for investigation. Of great importance is that SWCA and NextEra received field study recommendations from the agencies, and the proposed objectives and field studies detailed here have incorporated all recommendations.

The primary objectives of these studies include five tasks, as follows:

1) Conduct intensive (two helicopter surveys), aerial eagle nest searches during courtship and early nesting (late January to mid-February) and peak nesting (March) to document nest occupancy of the species within a 10-mile radius of the project area.
2) To obtain high-resolution eagle productivity data and complement occupancy data (Task 1), conduct subsequent aerial and ground-based nest monitoring of any nests located during aerial nest searches (Task 1), with nest monitoring visits timed based on stage of nest contents (e.g., presence of eggs, age of nestlings) during the second aerial survey.
3) To obtain eagle site use/exposure rate data to be included into models currently being developed by USFWS to predict expected eagle fatalities per year, conduct standardized 30-minute point-count surveys of eagles at 800-m-radius plots within and adjacent to the project area (in accordance with USFWS-recommended draft protocol, January 31, 2011). Eagle flight heights will be used to analyze potential risk of collisions with turbines.
4) To predict eagle risk to individual turbines ("per turbine risk"), conduct risk assessments at each proposed turbine location (in accordance with USFWS-recommended draft protocol, January 31, 2011). The objective of this risk analysis will assist in the prediction of the number of eagle fatalities to be expected for the particular siting and operational configuration at this wind-energy facility.
5) To supplement observational studies (Task 3) and further determine eagle use within and adjacent to the project area, target capture at least two adult individuals for telemetry studies, with the most frequently observed individuals (ideally, residents; also possibly migrants, subadults, and floaters) targeted for study. To estimate eagle home range configuration and the distribution of use, conduct kernel home range and turbine collision risk analyses of all eagles captured and tracked.

Golden eagle nest occupancy, breeding status, productivity, and home range and movement studies will be incorporated into the ABPP. These studies will be accomplished by completing the objectives and methods detailed below.

Task 1. Eagle Nest Searches

To document any eagle nesting and potential occupancy within and adjacent to the project area, intensive nest searches (two helicopter surveys) will be conducted during courtship and early nesting (late January to mid-February) and peak nesting (March). All potentially suitable nesting habitat (e.g., cliff faces, ridge lines, rocky outcrops, woody snags, and large trees) will be surveyed for eagle nests via helicopter on and within 10 miles of the project boundary. Within a 2-mile radius of the project area, nests of all raptor species will be recorded, in accordance with AGFD recommendations. Flight tracks/transects will be recorded using a global positioning system (GPS) device to ensure full coverage (AGFD 2010). All potential nest locations will be recorded using GPS and downloaded using geographic information system (GIS) software.

The first survey will be conducted during courtship and early nesting, when breeding pairs of eagles are mobile and conspicuous and nests may contain fresh greenery. For any historical eagle nest locations provided by AGFD, observers will revisit these nest locations. Observers will also carefully examine all potential eagle nesting habitat for additional nests that may have been historically overlooked or recently constructed (AGFD 2010). The second survey will be timed to best determine nest occupancy and non-occupancy during peak nesting (March). The breeding status of any nest located during the first survey or second survey will be based on the behavior of the adults, presence of eggs, and/or age of any young observed. Nest monitoring surveys will be sensitive to local nesting chronologies and disturbance at nests and will be conducted during weather conditions favorable for aerial surveys (in accordance with the methods of Pagel et al. 2010 and Driscoll 2010).

Nest occupancy is defined as observation of at least one of the following activity patterns: (1) nest contains fresh greenery (is “decorated”), (2) adult(s) are observed on the nest, perched, incubating or brooding, (3) one adult and one bird in immature plumage are at or near a nest, if mating behavior was observed (e.g., display flight, nest repair, copulation), or (4) there is a recently repaired nest with fresh sticks, or fresh boughs on top, and/or droppings and/or molted feathers on its rim or underneath (Postupalsky 1974, 1983; Steenhof and Kochert 1982; Steenhof et al. 1997).

A helicopter vendor experienced with these types of surveys will be used. Two avian ecologists experienced in surveying for eagle/raptor nests and one GIS specialist will conduct the nest surveys.

Task 2. Eagle Productivity Studies

Eagle productivity studies will be conducted by revisiting any occupied eagle nests located during initial aerial surveys (Task 1). Breeding studies will be completed primarily using the methods of AGFD (2010), Driscoll (2010), and Pagel et al. (2010), with nests revisited via helicopter or on foot a third time and with visits timed to correlate with a period within the nesting cycle that would yield metrics of productivity. Aging of young will be based on Driscoll (2010), Hoechlin (1976), and Watson (1997). A nest containing a nestling deemed >52 days old will be considered a successful nest. Fifty-two days is equivalent to 80% of average first flight age, which is the criterion typically used to determine raptor nest success (average first flight age for golden eagle is 65 days [Kochert et al. 2002; Steenhof and Newton 2007]). Number of suspected and confirmed fledglings will be recorded per occupied breeding area (AGFD 2010). Pending landowner permission and access, additional monitoring visits by foot will be conducted as necessary, as recommended by AGFD (2010). As with Task 1, intervals between observations will be flexible and based on the behavior of the adults, presence of eggs, and/or age of any young observed to best determine nest occupancy and success.

A helicopter vendor experienced with these types of surveys will be used. One avian ecologist experienced in surveying for eagle/raptor nests and one GIS specialist will conduct the productivity surveys.

Task 3. Eagle Observational Studies Using Fixed-Radius Point-Counts

These studies follow the recommendations provided by the USFWS Migratory Birds Department in January 2011.

Data collected in this task will be used to generate model-based predictions of annual eagle fatalities for the project area; models are currently being developed by the USFWS. Fatality predictions will be generated with models ideally using survey data collected from the project locale following the standardized approach outlined below. These studies will yield data that will satisfy adaptive management requirements as outlined in the ABPP.

The metric that will feed into models used to predict the number of expected eagle fatalities per year is eagle exposure rate, expressed as eagle exposure minutes (flight minutes) per daylight hour within the area of the project, averaged over daylight hours and over the annual cycle. Estimating eagle exposure rate will be based on 30-minute point count surveys of eagles at 800-m-radius plots within and adjacent to the project area. Point-count surveys of birds on fixed-radius plots were described by Hutto et al. (1986). Use of large-plot, long-duration point-counts, most typically 20- or 30-minute counts at 800-m-radius plots, appears to be standard in pre- and post-construction assessment of use of wind-energy projects by large (crow size or greater) species of birds (Hoover and Morrison 2005; Johnson et al. 2000; Smallwood et al. 2009).

Point-count plots will be distributed across the project area such that all parts of the project area are represented in proportion to their areal cover. Approximately 24 point-count plots will be surveyed every week during the pre-construction period. The two-dimensional area sampled at each 800-m-radius plot is $\pi 800^2$ = 201 hectares, and the total area sampled within the project area will be the sum of the area sampled across all points. Exposure rate will be estimated based on data from sampling points that are not independent of one another, with points separated by at least 1,600 m to avoid overlap among the 800-m-radius plots that are centered on the points. Observers will use the most efficient, logical route to move among sampling points, changing the starting point with the beginning of each survey cycle such that each point is surveyed during a range of daylight hours.

The likelihood of detecting eagles during these point-count surveys will likely be low during the first and last two to three hours of the day, with detections increasing midday, when eagles are most active. Therefore, a temporally stratified sampling approach will be used, allocating most survey effort to the midday period to reduce sampling variance and improve the precision of estimates while maximizing the opportunity for detections. Surveying will be conducted under all weather conditions except if visibility approaches 0 (blinding snow or fog), or where visibility is less than 800 m horizontally and 200 m vertically.

At each survey visit, the observer will remain at the point for a set time (30 minutes) and record the total number of minutes of eagle flight activity within an 800-m radius, except that eagle flight activity more than 175 m aboveground will not be recorded. Thus, the "plot" actually is three-dimensional, forming a cylinder. The total sample interval will be divided into 1-minute intervals, recording the number of birds in flight within the plot in each interval (such that one eagle in flight in the cylinder in a given minute = one exposure minute; two eagles in flight in the cylinder in a given minute [or the same eagle in flight continuing into a second one-minute interval] = two exposure minutes, and so on). One exposure minute will be ascribed to an eagle perched within a plot during the entire 30-minute survey, but perched birds will be noted as such so that this can be taken into account in the analyses. Because counts will be repeated, each point will be permanently marked. Topography, forest cover, and anthropogenic structures may obstruct views of portions of some plots. In such cases, observers will estimate the percentage of the plot area that is visible and factor this into the calculation of area surveyed.

Field data forms will include a large circle representing the point-count plot on which the observer will record approximate flight paths and heights of eagles plus ancillary notes on general behavior and activity. Behavior prevalent during each one-minute interval will be recorded as either soaring flight (circling broadly with wings outstretched), flapping-gliding, kiting-hovering, stooping or diving at prey, stooping or diving in an agonistic context with other eagles or other bird species, being mobbed, undulating/territorial flight, or perched. Observations of eagles outside the plot will also be recorded. Age of each eagle will be categorized as either juvenile (recently fledged or fledged the previous year), subadult, adult, or unknown. An eagle's aboveground height will be estimated for each one-minute interval record, using broad categories relevant to the height of the rotor-swept zone and other risk-specific considerations (e.g., 1–41 m, 41–121 m, and so forth) (Walker et al. 2005). Weather data will also be recorded, i.e., wind direction and speed, extent of cloud cover, precipitation (if any), and temperature.

Task 4. Risk Analyses of Individual Turbines

The objectives of this risk analysis will assist in the prediction of the number of eagle fatalities to be expected for the particular siting and operational configuration at this wind-energy facility. The project proponent will work in coordination with USFWS to determine and build on the risk factors, outlined below, associated with each turbine in the facility. Then, an annual predicted mortality rate for the project will be calculated by using the estimated annual eagle exposure rate generated from Task 3 (see above) assessment and using explicit models currently being developed by the USFWS (2011).

Risk of collision varies from turbine to turbine in a wind-energy facility based on the presence of one or more risk factors. For this risk factor analysis, each turbine will be evaluated to determine which of these site-based factors might be present (USFWS 2011):

1. Topographic features conducive to slope soaring

    a. On or bordering the top of a slope oriented perpendicular to the prevailing wind direction

    b. Near (within 50 m) of a ridge crest or cliff edge

2. Topographic features that create potential flight corridors

    a. In a saddle or low point on a ridge line

    b. Near a riparian corridor, at a forest or wetland edge, or near shorelines of large water bodies that eagles are reluctant to traverse

3. Proximate to potential foraging sites

    a. Near perennial or ephemeral water sources that support a robust fishery or harbor concentrations of waterfowl

    b. Near a prairie dog (*Cynomys* spp.) colony or area of high ground-squirrel density

    c. Near cover likely to support rabbits or hares

    d. Near concentrations of livestock where carcasses and neonatal stock occur

    e. Near sources of carrion

    f. Near game dumps or landfills

4. Near likely perch structures or roost sites

5. In an area where eagles may frequently engage in territorial interactions

   a. At about one-half of the mean project area inter-nest distance (based on Stage 2 surveys) from an eagle nest site.

6. Other risk factors not identified above

Results of the risk factor analysis for each turbine will be compiled, along with the specific location (decimal-degree latitude longitude or Universal Transverse Mercator [UTM] coordinates) of each turbine and its number or other identifier. This information will assist in generating predictions of eagle fatality rates via models currently being developed by the USFWS. Eagle risk modeling will be completed, provided that models to be developed by the USFWS are compatible with these data collection methods.

Task 5. Golden Eagle Home Range and Movement Analyses Using Cellular GPS-Telemetry

To determine eagle home-range estimates and movements within and adjacent to the project area, at least two adult individuals will be targeted for cellular GPS-telemetry studies. The most frequently observed individuals within the closest proximity to the project area will be targeted for study. Targeted individuals may include residents, migrants, or floaters and could include individuals of any age class. Capture will take place over a six-week period beginning in mid-March 2011. If no individuals are captured during the first capture period, a second period will be attempted in spring 2011, just prior to construction. The Cellular Tracking Technologies CTT-1100 transmitter will be used for tracking eagles. The CTT-1100 is a solar powered battery GPS-GSM telemetry system designed for large birds, such as eagles or herons. The transmitter is a backpack-style unit that weighs 100 g and will be attached with Teflon ribbon. The device is designed for operation over long periods of time with adequate lighting conditions and can operate at different sample rates, depending on defined geofences. Transmitters will be programmed to record locations every 15 minutes. Life expectancy of transmitters is expected to be three to five years. GPS data will be received as batched packets, made available to SWCA by Cellular Tracking Technologies. Eagle location data can be uploaded every 24 hours.

Cellular technology allows the device to update frequent batches of telemetry data at considerably low cost, compared with satellite devices. If cellular coverage is unavailable for any period of time, the transmitter will store data points until it returns to a coverage area. Although unlikely, if the device cannot charge as a result of extended periods of unfavorable weather, it will enter a “power save” mode, recharging until it is safe to operate again.

Eagle Capture Methods

SWCA will retain Mr. Daniel E. Driscoll, bald and golden eagle biologist, and his selected field team of raptor biologists to capture and fit golden eagles with transmitters. Mr. Driscoll possesses all required state and federal permits to cover activities. Mr. Driscoll and his field team are with the American Eagle Research Institute (AERI), which has more than 25 years of experience in the capture and handling of golden eagles of all age classes. The field methods described herein have been field tested and perfected over many years. Capture scenarios vary in different habitats, and some techniques require specific conditions to maximize success rates. Capture success rates are influenced by a variety of factors including, but not limited to, the following: (1) age class of the target animal; (2) resident or migrant status; (3) previous exposure to capture attempts and/or human presence; (4) abundance and availability of prey; and (5) breeding status. The primary method of capture for golden eagles will involve a radio-controlled bownet. Other methods to be used include a radio-controlled power-snare, an eagle dho-gaza, and net-launchers. These are described below.

<u>Radio-controlled Bownet</u> – The radio-controlled eagle bownet is a semicircular steel channel that contains an aircraft aluminum bow, with netting between. The channel is buried in the ground, and the bow (when

triggered) comes over the target animal, enclosing it in a dome of net. The radio-controlled bownet is an extremely effective eagle trapping technique that allows for the selective capture of target birds.

<u>Radio-controlled Power-Snare</u> – The radio-controlled power-snare is useful in capturing eagles in remote areas where rugged terrain and hiking distances preclude transport of the bownet. The radio-controlled power-snare is based on a manually operated snare system. The snare is a nylon-coated fishing leader that closes around the eagle's legs when triggered.

<u>Eagle Dho-gaza</u> – The eagle dho-gaza is composed of a 5 × 10–m Spiderwire net suspended between two 6-m camouflaged extension poles. The dho-gaza is most successful when young are in the nest and is used with a conspecific lure bird.

<u>Net-Launchers</u> – The net-launcher is a system that uses small-caliber charges (.22 magnum blank charges) to launch a lightweight net with sufficient distance and spread to capture multiple eagles simultaneously. The Coda system uses a .308 caliber blank charge, which can launch a heavier net than the .22 caliber system.

Eagle Processing Methods

Once captured, each eagle will be safely secured, hooded, and carefully handled to avoid stress. The processing of each eagle captured will involve banding with a uniquely numbered federal band, recording morphological and plumage characteristics, drawing a blood sample from the brachial vein (3–5 cm^3 for gender confirmation, lead analysis, and contaminant studies), and transmitter attachment. Morphological characteristics to be collected will include hallux length, culmen length, beak depth, wing chord length, eighth primary length, tail length measurements (length of the central rectrices from the distal end to the sheath), foot pad and tarsus length, and tarsus width (dorsal/ventral and lateral). Coloration of the iris, feet, beak, and cere will be noted and eagle plumage photographed. Factors indicative of physical condition will be collected, including crop condition (full, partial, empty), body condition, and weight (Pesola scale to 0.1 kg). Body condition will be specifically measured using a five-point scale of breast muscle and sternum keel protrusion: (1) keel bladed with minimal breast muscle; (2) keel bladed with more prominent breast muscle; (3) keel protrudes slightly above breast muscle (normal); (4) keel flush with breast muscle; and (5) keel inundated in breast muscle.

Attachment of backpack transmitters will use 1.3-mm (0.5-inch) Teflon ribbon and waxed cotton thread, with 3.5-cm spacing between the transmitter and the eagle. The Teflon ribbon is stitched with waxed cotton thread at the carina so that when the thread decomposes the harness will separate and the transmitter will fall off. AERI has used this method with little variation (other than the number of stitches used to secure the Teflon ribbon) on hundreds of eagles with no known problems. Preferably, the telemetry unit should fall off shortly before the projected battery life, with the unit then retrieved in the field.

Data Analysis

Data collected via transmitter units will provide temporal and spatial (vertical and horizontal) patterns of use within and near the project area by individual eagles. Transmitters will collect location data every 15 minutes, yielding approximately 96 locations per individual per day; data will be downloaded and entered into a GIS (ArcGIS 10) every 24 hours. Location data will be sub-sampled for analyses (e.g., one-hour intervals) to avoid temporal autocorrelation. Home ranges will be calculated and mapped (using Home Range Tools for ArcGIS) for each individual based on minimum convex polygons and adaptive kernel methods (50% and 85% isopleths), with an overlay of turbine locations to analyze collision risk (Nygard et al. 2010; Rogers and Kie 2010; Walker et al. 2005). Note: the 85% kernel predicts the centrally located area where eagles concentrate 85% of their time. Least-squares cross-validation will be used to determine appropriate smoothing factors (Pruett et al. 2009). In addition to geographic location data, altitudinal data will allow assessment of three-dimensional (rotor-swept area) collision risk, provided that appropriate standard deviation criteria are met. Following is a discussion of the various applications of the data collected.

Nesting Locations – Eagle location data obtained during the nesting season will provide spatial information, allowing for the identification of potential nest sites not identified during aerial surveys. Clustering of locations by individual eagles indicates potential nesting activity and follow-up visits to those sites will occur to further determine breeding activity.

Foraging Locations – Eagle location data will be used to determine core foraging areas within and adjacent to the project area. The density of GPS locations will be used to map areas most frequently used by eagles.

Winter/Communal Roosting Locations – GPS data collected during winter months will assist in the identification of important roosting and foraging areas and identify movement patterns of birds during winter months.

As detailed above, project area-specific information on eagle seasonal home ranges and use, movements, flight heights, as well as nesting, foraging, and winter/communal roosting locations, will be collected. Combined, data on use of the project area by eagles will be used to calculate probabilities of eagle use near turbine locations and at the rotor-swept height. These data will inform timing of installation of turbines (install closest to eagles last), as well as on-site mitigation measures (SWCA 2011), if needed. For example, golden eagle nest location data will dictate temporal placement of turbines: turbines within 4 miles of an active eagle nest will be installed last during construction to allow resident birds to first habituate to turbines that are farther away. Because home range and use data are limited to a few months (mid-March through June), during pre-construction, there will be some limitations and uncertainty in applying the data. However, additional data will be provided later, during and after construction. There will be almost no opportunity to apply knowledge from these data to project design and mitigation in the form of avoidance and/or minimization of eagle risk.

Spatial patterns of eagle home-ranges and movements, density of the species in the greater geographic area, body condition, and lead and contamination data will add to our knowledge of golden eagle ecology in northern Arizona and may aid in identifying nearby habitat restoration opportunities, as well as appropriate locations for future wind projects. Collection of nest occupancy, breeding status, productivity, and home range data will undoubtedly add research questions aimed at addressing golden eagle impacts from wind energy. These questions may be funded via the Avian and Bat Fund described in the Perrin Ranch Wind Facility ABPP (SWCA 2011). Pertinence of other compensatory measures (e.g., contributions to AGFD's lead-free shot program) may be guided by these proposed studies. Data collected post-construction will dictate additional adaptive management efforts (e.g., curtailment) outlined in the ABPP.

All eagle home-range, movement, nest location, and breeding data will be provided in a report with maps; GIS data will be included. NextEra is conducting site assessments for wind-energy developments at four other sites in relatively close proximity to Perrin Ranch. Similar studies are likely to be proposed for each. However, sampling effort at each of the other sites is currently being considered. If eagle studies were conducted at all proposed sites, a vast amount of eagle natural history data would be collected for a relatively large, well-defined area of the Coconino Plateau, providing a net benefit to the species.

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Appendix G

PERRIN TRIBAL GOVERNMENT CONTACTS

Perrin Ranch Wind Energy Interconnection Project
Tribal Government Contacts
M Bilsbarrow
4/26/2011

Date/Time (MST)	Contact Type	Tribal Government	Name	Phone Number	Result
All					
1/20/2011	Letter Sent	Havasupai, Hopi, Hualapai, Navajo, Yavapai-Apache, Yavapai-Prescott	Chairperson and Cultural Contact		Letter initiating government-to-government, describing the project, and asking about information availability and resource issues; Class I Cultural Resource Literature Review report sent with letter to cultural contact.
3/30/2011	Letter Sent	Havasupai, Hopi, Hualapai, Navajo, Yavapai-Apache, Yavapai-Prescott	Chairperson and Cultural Contact		Letter updating the project description and schedule and request for assistance; a Class III cultural resources surveys and avoidance plan sent with letter to cultural contact.
Havasupai					Travis Hamidreek at 928 448 2161; Edmund Tilousi 928 448 2271 or maybe (Roland Manakaja)
4/14/11 13:30	called	Havasupai	Edmund Tilousi	928 448 2271	No answer; no opportunity to leave voice mail
4/14/11 13:50	emailed	Havasupai	Edmund Tilousi	htenviron0@havasupai-nsn.gov htnatural0@havasupai-nsn.gov	1) I called earlier this afternoon, but there was no answer. I'm following up with this email. 2) At the end of March, Western Area Power Administration sent your government a letter along with cultural resource survey reports for the Perrin Ranch Wind Energy Interconnection Project located along Cataract Canyon, 13 miles north of Williams. A private company applied to Western to connect a proposed wind turbine farm to the Moenkopi-Yavapai 500-kV Transmission Line. 3) Has your government received the documents, and are there any questions, concerns or comments? Would a field visit be helpful? Who is the best person or phone number for Western to follow up with? 4) Western plans to finish the environmental review process by 6/30/11. The private company plans to start construction 7/1/11.
4/14/11 14:30	called	Havasupai	Edmund Tilousi	928 448 2271	No answer; no opportunity to leave voice mail
4/14/11 15:30	called	Havasupai	Edmund Tilousi	928 448 2271	No answer; no opportunity to leave voice mail
4/15/11 10:20	called	Havasupai	Edmund Tilousi	928 448 2271	No answer; no opportunity to leave voice mail
4/15/11 10:30	called	Havasupai	general contact	928 448 2731	Receptionist said that the Tribe's cultural resources contact is Travis Hamidreek at 928 448 2161.
4/15/11 10:35	called	Havasupai	Travis Hamidreek	928 448 2161	Left message with answerer. Left my name, number, project name, and brief description. He confirmed that Travis Hambrieek is the cultural resource contact. TH is out of the office right now, but is present in the community.

Date/Time (MST)	Contact Type	Tribal Government	Name	Phone Number	Result
4/15/11 14:30	called	Havasupai	Travis Hambrieek	928 448 2161	Left message on voicemail. Western Area Power Administration sent your government a letter along with cultural resource survey reports for the Perrin Ranch Wind Energy Interconnection Project located along Cataract Canyon, 13 miles north of Williams. Has your government received the documents, and are there any questions, concerns or comments? Would a field visit be helpful?
4/18/11 10:00	Call received	Havasupai	Ron Manakaja	MHB	Travis asked RM to look into the wind project. Q: What is the deadline for comments? A: Applicant plans to start construction 7/1/11, and we would like your comments well before them to included in the Environmental Assessment. Q: What would happen in case of the discovery of human remains, would the project shut down, did not see discovery procedures in documents? A: Discovery are discussed in the Avoidance plan; Work would stop within 50 feet of a discovery and Western would consult with tribes and SHPO; the whole project would not stop. Q: Would like field visit to AZ H:12:56(ASM) because of the impacts there; are you digging? Are you available 5/15-21, or weekends? A: No digging is planned at AZ H:12:56(ASM), but may used existing dirt road under the power line; Western requests a visit earlier than 5/15, we can meet on weekends, LJ at Hualapai would like to join the visit and she is available 5/5, 5/6 & 5/10. RM: lets tentatively plan a field visit for either 5/5 or 5/6 as there may be some conflicts.
4/26/11 11:30	called	Havasupai	Travis Hamidreek	928 448 2161	Confirmed field visit date for Thursday 5/5/11 and meeting at 1 pm at the Williams Visitors Center. If interested in travel reimbursement from the project proponent, contact Suzanne Griset (520 444 5725); she needs advance notice of the attendees. Western would like to have a representative from the project proponent present to answer project-specific questions-is that ok? Response:-Yes. Western would like to have a representative of the environmental consultant present to handle logistics-is that ok? Response: Yes. The land owner and rancher would like to attend as well-he is an excellent guide and considers himself to be a caretaker of the land-is this ok? Response: Yes. Is this the best number to reach you at? Response: Yes.
Hopi Tribe					Terry Morgart 928 734 3619
2/8/11	Letter received	Hopi	Leigh Kuwanwisiwma	MHB	This proposal is likely to result in adverse effect to cultural resources. Please send cultural resource survey and draft EA. Please contact Terry Morgart regarding this project.
4/14/11 14:40	called	Hopi	Terry Morgart	928 734 3619	Left message on voice mail: Did your government receive the letter and cultural survey reports? Any concerns or issues? Would you like a field visit?

Date/Time (MST)	Contact Type	Tribal Government	Name	Phone Number	Result
4/15/11 11:00	Called received	Hopi	Terry Morgart	MHB	1) TM hasn't gotten the survey report yet, but expects to receive it shortly. MHB said that if you don't get it in the next week, please let me know and I'll re-send it. MB summarized the survey results: 75 sites and all will be avoided with 2 possible exceptions: a historic period fence and a Cohonino site where the impact may be the use of an existing access road; no improvements planned. Western proposed no historic properties affected. The avoidance plan was sent along with the survey report. TM is interested to see how the sites will be avoided. 2) With wind farms, Hopi is concerned about birds and eagles. Hopi is concerned about impacts to bird populations at regional as well as local levels. Hopi requested a copy of the project Avian Bird Protection Plan (ABPP). 3) Discussed BLM and DOE Solar and Wind EISs, generic PAs and the need for consultation. Hopi is concerned about impacts to landscapes; traditional cultural properties are imbedded in landscapes. Need to study the whole footprint not just the individual component locations because of indirect impacts.
4/18/11	mailed	Hopi	Terry Morgart		At Western's request, SWCA overnight mailed a copy of the final draft Avian and Bird Protection Plan for Perrin per 4/15/11 phone call. [SWCA reported that Hopi received the package 4/20/11 based on tracking data]
Hualapai Nation					Loretta Jackson-Kelly 928 769 2234
4/14/11 14:40	called	Hualapai	Loretta Jackson Kelly	928 769 2234	Loretta requests a field visit that includes Havasupai. She is available 5/5, 5/6, or 5/10 with 5/5 being preferred because she will be in Flagstaff 5/4.
4/18/11 11:30	Email sent	Hualapai	Loretta Jackson Kelly	lorjac@frontiernet.net	Are you available for a field visit to the Perrin Ranch Wind Energy Project area located 13 miles north of Williams, AZ on either Thursday 5/5 or Friday 5/6? Roland Manakaja, calling on behalf of Travis Hamidreek, with Havasupai Tribe requested a field visit and tentatively identified these dates.
4/18/11 11:30	Email received	Hualapai	Loretta Jackson Kelly		May 5th will be available.
4/21/11 11:30	Email received	Hualapai	Loretta Jackson Kelly		We will be travelling from Zuni on the 4th and spend night in Flagstaff. so we could meet in the AM on the 5th. Thanks.
4/26/11 13:00	Called	Hualapai	Loretta Jackson Kelly	928 769 2234	Left message with secretary.

Date/Time (MST)	Contact Type	Tribal Government	Name	Phone Number	Result
4/26/11 13:25	Email sent	Hualapai	Loretta Jackson Kelly	lorjac@frontiernet.net	1) Western can conduct a half-day field visit to Perrin Ranch with your government's representatives in the morning of Thursday 5/5/11 if you wish. I suggest starting at 8 am at the Williams Visitors Center, 200 West Railroad Avenue in Williams. 2) If you are available in the afternoon instead, Western scheduled a field visit with Havasupai government representatives starting at 1pm that you're welcome to join. They were not able to meet earlier in the day. 3) The project proponent offers to reimburse travel expense for government representatives attending the field visit. You will need to contact, in advance, Suzanne Griset (520 444 5725 cell or <sgriset@swca.com>) with SWCA to make arrangements. SWCA is the project proponent's environmental consultant for this project. 4) Western would like to include on the field visit, a representative from the project proponent, who is familiar with the project details and a representative from the environmental consultant for logistics and communication purposes. Is this ok? 5) The land owner/rancher, who is a guide and caretaker of the land, asked to attend the field visit as well. Is it ok? 6) Any other details or concerns?
Navajo Nation					Alan Downer 928 871 7198
4/14/11 15:00	called	Navajo Nation	Alan Downer	928 871 7198	Dr. Downer took down my name, phone number, project name and said that someone from his office would get back to me. His office receives over 5000 projects a year. If you don't hear back, then assume you're good to go.
Yavapai-Apache					Chris Coder 928 567 7026 or 525 3035
4/14/11 14:00	called	Yavapai-Apache	Chris Coder	928 567 7026	Left message on voice mail; Did your government receive the letter and cultural survey reports? 75 sites were identified and the project proponent prepared an avoidance plan for them. Any concerns or issues? Is there another person in your government that I should contact?
4/15/11 14:45	called	Yavapai-Apache	Chris Coder	928 567 7026	Left message on voice mail: Did your government receive the letter and cultural survey reports and avoidance plan? The project is located 13 miles north of Williams. Any concerns or issues? Would you like a field visit?
4/18/11 9:00	message left	Yavapai-Apache	Chris Coder	MHB	Message left on voice mail: Got your message regarding the wind farm. No problems or concerns. If other tribes have issues we would defer to them.
Yavapai Prescott					Greg Glassco 928 445 8790 x135
4/14/11 14:15	Called	Yavapai Prescott	Greg Glassco	928 445 8790 x135	He did receive the letter dated 3/30/11 with the reports, and plans to review them in the next couple of days. MB provided a summary survey results and impacts. GG said that they would not ask for a field visit, but if Havasupai requests a field visit, they would like to be invited.

Date/Time (MST)	Contact Type	Tribal Government	Name	Phone Number	Result
4/18/11 11:40	Email sent	Yavapai Prescott	Greg Glassco	gglassco@ypit.com	Western tentatively scheduled a field visit to the Perrin Ranch Wind Energy project area located 13 miles north of Williams for either Thursday 5/5 or Friday 5/6. Government representatives from both the Havasupai Tribe and Hualapai Nation requested a visit. Please let me know if your government plans to attend.
4/18/11 16:40	Email received	Yavapai Prescott	Greg Glassco	MHB	Our Cultural Director won't let us attend. She won't let us go anywhere. Thanks for inviting us, wish we could have attended. Good luck, will look over the papers you sent.
4/26/2011 13:40	Email sent	Yavapai Prescott	Greg Glassco	gglassco@ypit.com	1) The project proponent offers to reimburse travel expenses for government representatives attending the Perrin field visit. You will need to contact, in advance, Suzanne Griset (520 444 5725 cell or <sgriset@swca.com>) with SWCA to make arrangements. SWCA is the project proponent's environmental consultant for this project. 2) Western scheduled a field visit with Havasupai government representatives starting at 1pm on Thursday 5/5/11 that you're government representatives are welcome to join. Western is also discussing a morning meeting with Hualapai government representative if they can't make the afternoon meeting. Please let me know if your government plans to attend.
4/26/11 16:00	Email received	Yavapai Prescott	Greg Glassco	MHB	Thank you very much for the information below. I know Scott and I would love to attend, but we are not allowed to leave the reservation. Without seeing the project area and resources we can't really consult effectively, but that is the way our boss wants it. Please keep us posted on the results of the meeting.