FINAL
ENVIRONMENTAL ASSESSMENT
DOE/EA-1853

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
ADMMR	Arizona Department of Mines and Mineral Resources
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
ARS	Arizona Revised Statutes
ASLD	Arizona State Land Department
ASM	Arizona State Museum
AZPDES	Arizona Pollutant Discharge Elimination System
AZ SWAP	Arizona State Wildlife Action Plan
BCC	Birds 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
Census Bureau	U.S. Census Bureau
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
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
ESA	Endangered Species Act
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
Forest Service	U.S. Forest Service
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 occurrence
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	mile(s) per hour
MVZ	Museum of Vertebrate Zoology
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NextEra	NextEra Energy Resources, LLC
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
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. Bureau of Reclamation
ROW	right-of-way
rpm	revolution(s) 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
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.

EXECUTIVE SUMMARY

PROJECT LOCATION

The Perrin Ranch Wind Energy Center (the project) would be constructed on private and State Trust 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), 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 Power, 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 responding to Perrin Ranch Wind's application for interconnection.

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 applies 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 the 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. During the meteorological (MET) tower sitings, NextEra 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 topographic conditions) at the project location. The interconnection is 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. Because of the wind regime at the site, the average MW output is anticipated to be 50% of 99.2 MW at any given time.

In addition, the project includes the following components: six MET 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. 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 standard 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 (60 acre-feet one-time use) 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, or 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 MET 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 that would be 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 construction 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, 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 or, 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 would be 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.

Recreation. The Proposed Action does not include disturbances to the existing campgrounds within the project Area;. 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,would be temporarily displaced during construction as a result of 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 temporary hunting restriction would result in the possible displacement of up to 550 to 600 hunters per month during the 2011 fall hunt season from the Perrin Ranch to other areas within Game Management Unit (GMU) 10 (personal communication, Macauley 2011). The Perrin Ranch boundary of 43,715 acres is 3.1% of the total area of GMU 10. Therefore, because of the small relative percentage reduction in hunting area and the short time frame, it is anticipated that hunters in GMU 10 would be able to hunt in other areas of the GMU during the 2011 season and would return to using the ranch in 2012.

Human Health and Safety. There are few existing risks to human health and safety in the study area. Wildland fire is the primary existing health and safety risk. Thus, the discussion regarding human health and safety is focused on fire risks. There are possible risks to human health and safety if the Proposed Action were implemented. The project includes several protection measures designed to minimize these risks (see Section 2.2.7 and Appendix E). As a result, direct or indirect impacts to human health and safety are expected to be minor.

Geology and Soils. The project area is within the Colorado Plateau physiographic province, which is characterized by generally horizontally stratified sedimentary rocks that have eroded into numerous incised canyons and high desert plateaus. Construction of the project would not directly or indirectly affect local geology and geologic events. Shallow disturbances for roadways and foundations would have a negligible effect on local geology. Earth grading and excavation activities would be shallow and would not contribute to an increased probability or magnitude of seismic or geological hazards in the project area. With the exception of cinders, no salable mineral resources are known to occur on the project area. Direct and indirect impacts to mineral resources from construction of the Proposed Action would be long term, localized, and negligible. The proposed project is located in northern Arizona, a region populated with numerous cinder cones. The most common soils on the project area, within the areas that would be impacted, are Deama-Rock outcrop complex (8%–30% slopes), Showlow gravelly fine sandy loam (8%–30% slopes), and Tusayan-Lynx association (gently sloping). Direct and indirect impacts to soil resources from construction of the Proposed Action would be long term and short term, local, and minor. During construction of the project, short-term disturbance of soils would occur on approximately 648 acres (1.63% of the project area), resulting in a conversion from natural soils to construction rights-of-way, laydown areas, turbine foundations, and other related infrastructure. Direct impacts would result from clearing of vegetation, grading, compaction, and installation of project components.

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 whether a resource either would not be affected or would sustain negligible impacts from the project, or are beyond the agency's control. Impacts to resources that are too small to meaningfully

analyze are also dismissed. 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, hazardous materials, intentional destructive acts, and land use.

CUMULATIVE IMPACTS

No major cumulative impacts were identified for aesthetics and visual resources, noise, water resources, vegetation, or 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, 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.

Chapter 1

INTRODUCTION

1.1 BACKGROUND

Perrin Ranch Wind, LLC (Perrin Ranch Wind), a subsidiary of NextEra Energy Resources, LLC (NextEra), 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 State Trust land managed by the Arizona State Land Department (ASLD) and on 39,833 acres owned by one private landowner. The proposed project would be located approximately 13 miles north of the town of Williams, Arizona, on the west side of and adjacent to State Route (SR) 64 (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 Power, 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 in accordance with 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 (ESA), the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act.

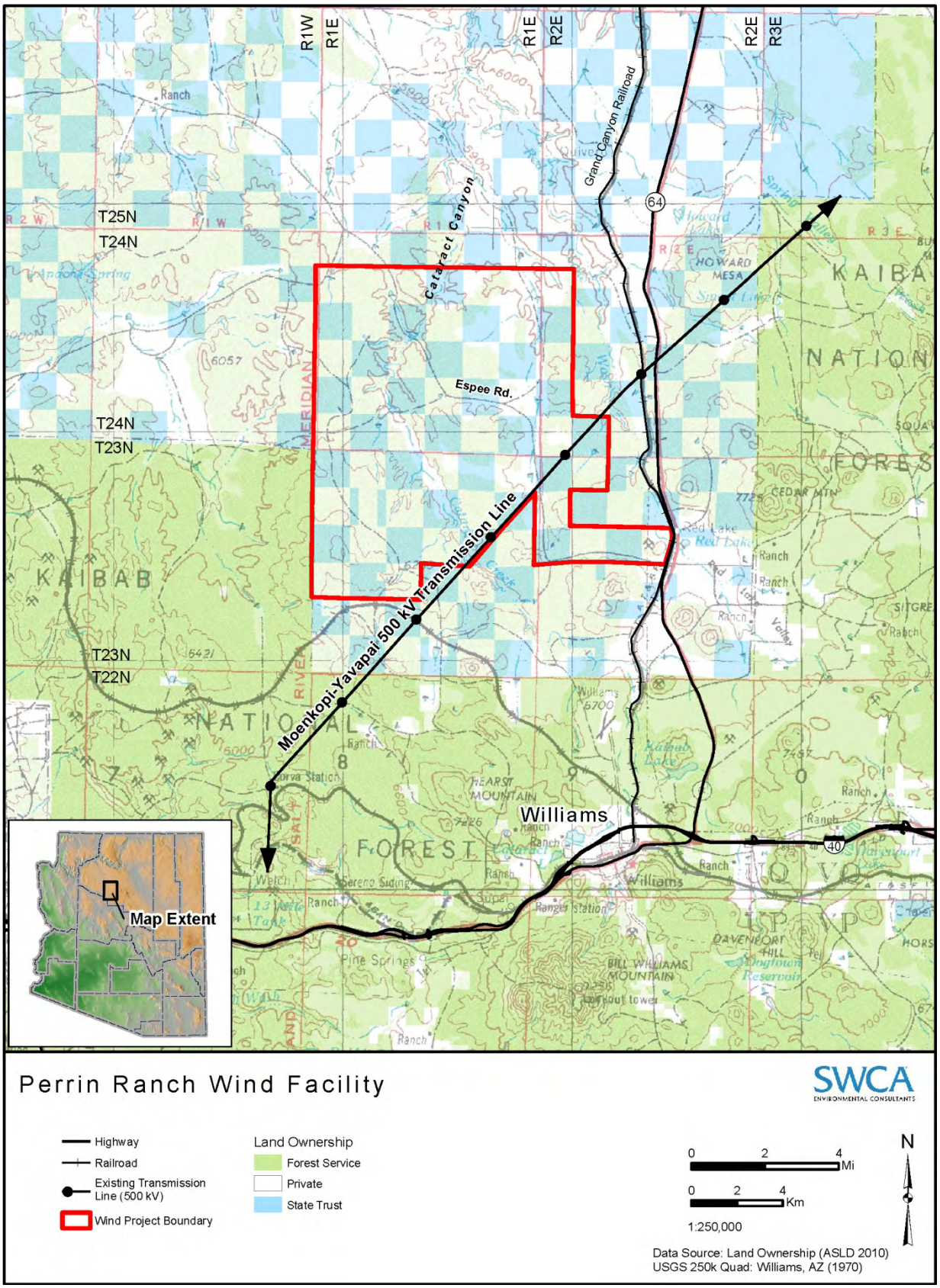

Figure 1.1. General location of the project area.

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's) responsibilities in providing all project-related materials and documents to the cooperating agency (Reclamation). Western's NEPA responsibilities, in accordance with the MOU, also include coordinating information exchange among any third-party contractors, providing progress updates, leading ESA 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 applies 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. It is not within the decision-making authority of Western to determine the suitability of the wind resources at the proposed project site. 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 U.S. 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 U.S. 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 in accordance with the DOE NEPA-implementation regulations and rules. Reclamation is delegating the approval of the proposed interconnection 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. 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. In accordance with 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 (ACC) 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.

1.3.1 Wind Resource

Although Arizona does not have the wind power resources of many other central or western states, wind resources are developable, particularly along the Mogollon Rim and the southern rim of the Colorado

Plateau (Bureau of Land Management [BLM] 2005; Northern Arizona University Sustainable Energy Solutions 2007). According to the National Renewable Energy Laboratory (NREL) and Northern Arizona University Sustainable Energy Solutions, the proposed project is located within wind power class "1+" area. Wind power classes range from 1 to 6, with 6 being the windiest. These evaluations were done at a regional level, not a project-specific level.

NextEra has conducted wind energy resource (pre-NEPA) studies at Perrin Ranch. These studies indicate favorable conditions (including but not limited to wind presence, existing energy transmission availability, and topographical conditions) at Perrin Ranch. The siting of large-scale wind energy facilities is constrained by the need for a location with sufficient wind speeds on a regular enough basis throughout the year, given current turbine technologies. Despite these constraints, NextEra's studies indicate that the wind potential of the Perrin Ranch site is an econonmically viable energy source and that the proposed site can be commercially developed. Additionally, this project has sufficient resources to have won the APS 2010 In State Wind Request for Proposals against a field of 14 projects bid by 10 different companies.

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 (ADEQ)
Utility Occupancy Agreement	Arizona Department of Transportation
Easement Grants and Road Crossing Permits	Arizona Department of Transportation, Coconino County Public Works Department
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	ADEQ, Arizona Division of Water Quality, Storm Water Program
Pesticide General Permit	ADEQ, Arizona Division of Water Quality, Arizona Pollutant Discharge Elimination System 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 (USFWS), Western
Bald and Golden Eagle Protection Act	USFWS, Western
ESA	USFWS, Western
Certificate of Environmental Compatibility	ACC

Table 1.1. Proposed Action Permit/Authorizing Responsibilities (Continued)

Authorizing Action/Applicable Regulation	Responsible Agency
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.

1.5.1 Scoping

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 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. The public comments noted during the public scoping comment period, from January 17 to February 16, 2011, are summarized below.

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 as a result of the presence of the wind energy facility. Existing real estate brokers stated that there has already been a marked decrease in interest in 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 area because of the presence 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 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*). Concerns that the turbines would kill such raptors and disrupt current conservation efforts were prevalent, along with concerns that there might be an overall decrease in the presence of big-game species, which in turn would 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 because of their 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 over potential congestion and increases in traffic volume along 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.

1.5.2 Availability of Draft Environmental Assessment

On May 6, 2011, Western sent letters to the public announcing the availability of the draft EA for the project and inviting the public to review and provide comment; the draft EA comment period was initially published as beginning on May 6, 2011 and ending on June 6, 2011. Additionally, a notice of availability was published in the *Arizona Daily Sun* in Flagstaff on May 9, 2011, and in the *Williams-Grand Canyon Newspaper* on May 11, 2011. Electronic versions of the draft EA were posted on DOE and Western websites. Copies of the EA also made available at the Williams Public Library, as well as to anyone who requested a print copy. The letter was sent to adjacent landowners, interested parties who commented during scoping and requested they be added to the project mailing list, and state and local government agencies and officials.

During the comment period, members of the public requested that the comment period be extended. Western considered this request and extended the comment period to June 23, 2011. A notice of extension was published in the *Arizona Daily Sun* in Flagstaff on June 6, 2011, and in the *Williams-Grand Canyon Newspaper* on June 8, 2011.

Comments from these individuals and groups, like scoping comments, are considered in this EA. A total of 50 unique comment submittals was received during the comment period. A table of all comments received during the comment period, along with responses to these comments, is provided in Appendix A.

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 Avoidance Plan were sent with a letter to these same tribes on March 31, 2011.

Western extended an invitation to the tribes to visit the project site. Representatives from the Havasupai and Hualapai tribes visited the site on May 6, 2011, accompanied by representatives from Western, SWCA Environmental Consultants (SWCA), and the project proponent and landowner. During the visit, the Hualapai requested that 1) a formal presentation about the project be made to the Hualapai Cultural Department in Peach Springs and extended the invitation to the Havasupai to attend the presentation; 2) a formal Burial Agreement be drafted by the Arizona State Museum (ASM) and incorporated into the Avoidance Plan; 3) Red Mesa be analyzed as a key observation point (KOP) and included in the presentation at Peach Springs; and 4) copies of the plant and biology inventories be provided. Both tribes requested copies of the EA and Avian and Bat Protection Plan (ABPP), which were provided on the May 6, 2011, site visit. The Hopi Tribe also requested a copy of the ABPP, which was provided on June 6, 2011.

Western met with the Hualapai Tribe, along with NextEra, SWCA, and the ranch owner, on May 26, 2011, at Peach Springs, Arizona, to discuss the project and the draft EA. Presentations were made about the proponent, the project, the archaeological survey and results, devleopment and contents of the ABPP, and the visual impacts of the project from the vantage of Red Mesa, Arizona, a sacred site for the Hualapai and Havasupai tribes. The Havasupai representatives were unable to attend the meeting. Western and the Hualapai Tribe agreed that if the project goes forward, 1) tribal monitors will be present during construction, 2) the Hualapai will be contacted directly in the event of a discovery of cultural resources, and 3) the Hualapai will be able to participate in the treatment of a discovery. The Hualapai requested an extension to the comment period on the Class III report, Avoidance Plan, and EA. Western extended the deadline for tribal comment to June 23, 2011.

The ASM submitted a draft Burial Agreement on June 6, 2011, to the Fort Mojave, Havasupai, Hopi, Hualapai, Navajo, and Yavapai-Apache cultural representatives. They have a 30 day review/comment period. The final Burial Agreement will be incorporated into the Avoidance Plan for the project.

The Arizona State Historic Preservation Office (SHPO) has not yet concurred or commented on Western's March 29, 2011, letter, which contains determinations of eligibility or findings of effect for the project, pending completion of the tribal consultation. Western is keeping the SHPO apprised of the ongoing consultation.

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.

All project components described below would be privately funded. No federal or state funding would be used to construct, operate, maintain, or decommission the project.

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;

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

- 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.

The following sections describe these project components, along with the 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-term disturbances (Figures 2.1a–f) and long-term disturbances (Figures 2.2a–f) are shown below in Tables 2.1 and 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 Proposed 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%

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

Facility Component	Disturbance Length (feet)	Disturbance Width (feet)	Long-term Disturbance (acres)	% Project Area
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%
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); the turbines can 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 that it provides 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 the following:

- 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. As required by Coconino County Resolution 2011-04, Condition No. 9 (Appendix B), 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; however, it would only be activated once the FAA approves it. As of the publication of this EA, the OCAS has not been approved by the FAA.

As required by the county, the minimum number of lights on top of the towers would be used, the intensity of the lights would be as low as possible, and the longest duration between flashes as permitted by the FAA would be used. No strobe lighting would be permitted. 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 that determines 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 to 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. Four of the six MET towers have been installed during the pre-NEPA feasibility studies. Four additional sites—two primary and two alternative sites—have been selected for the remaining two MET towers, as discussed in the CUP (CUP 10-063).

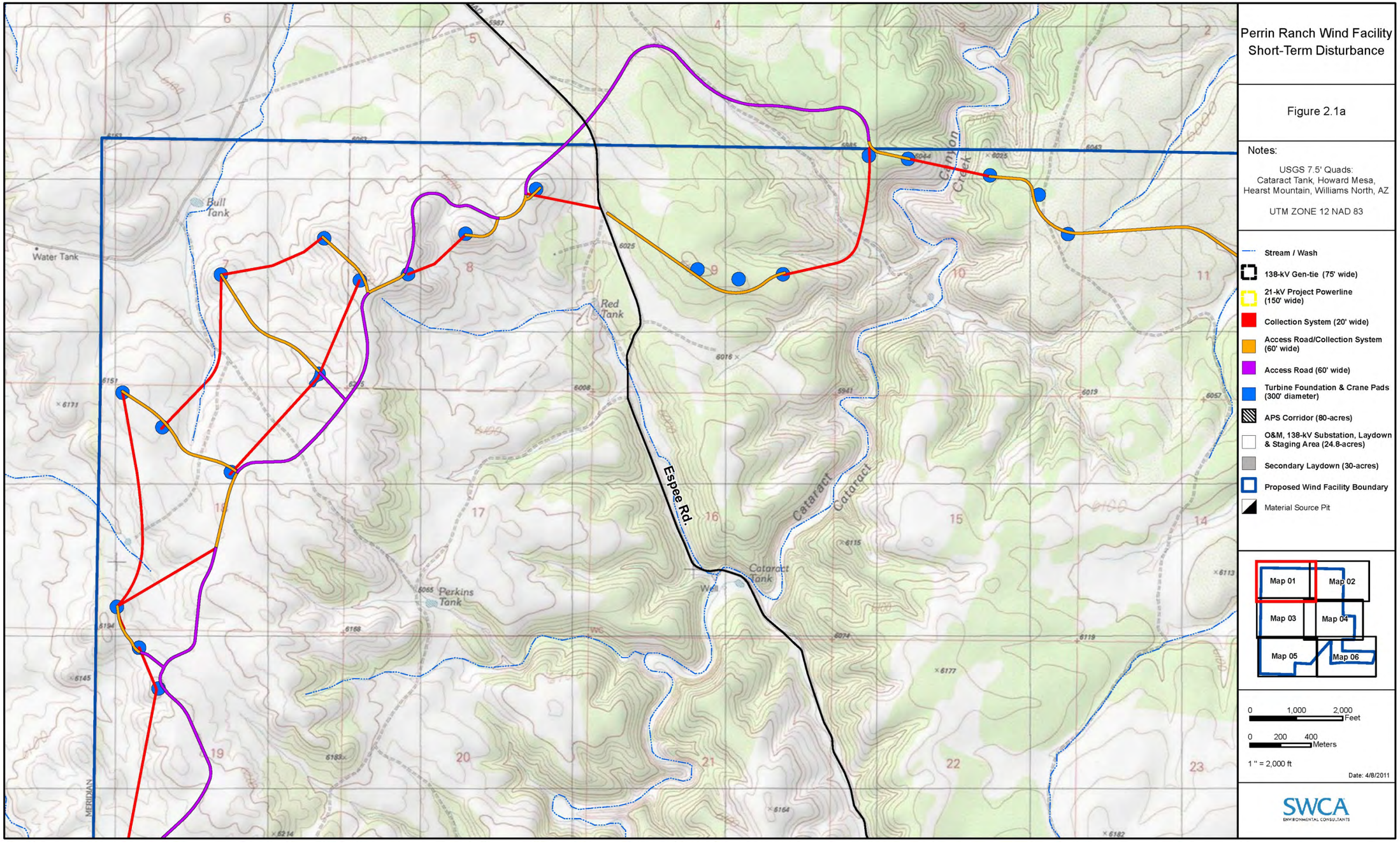

Figure 2.1a. Short-term disturbance in the project area (map 1 of 6).

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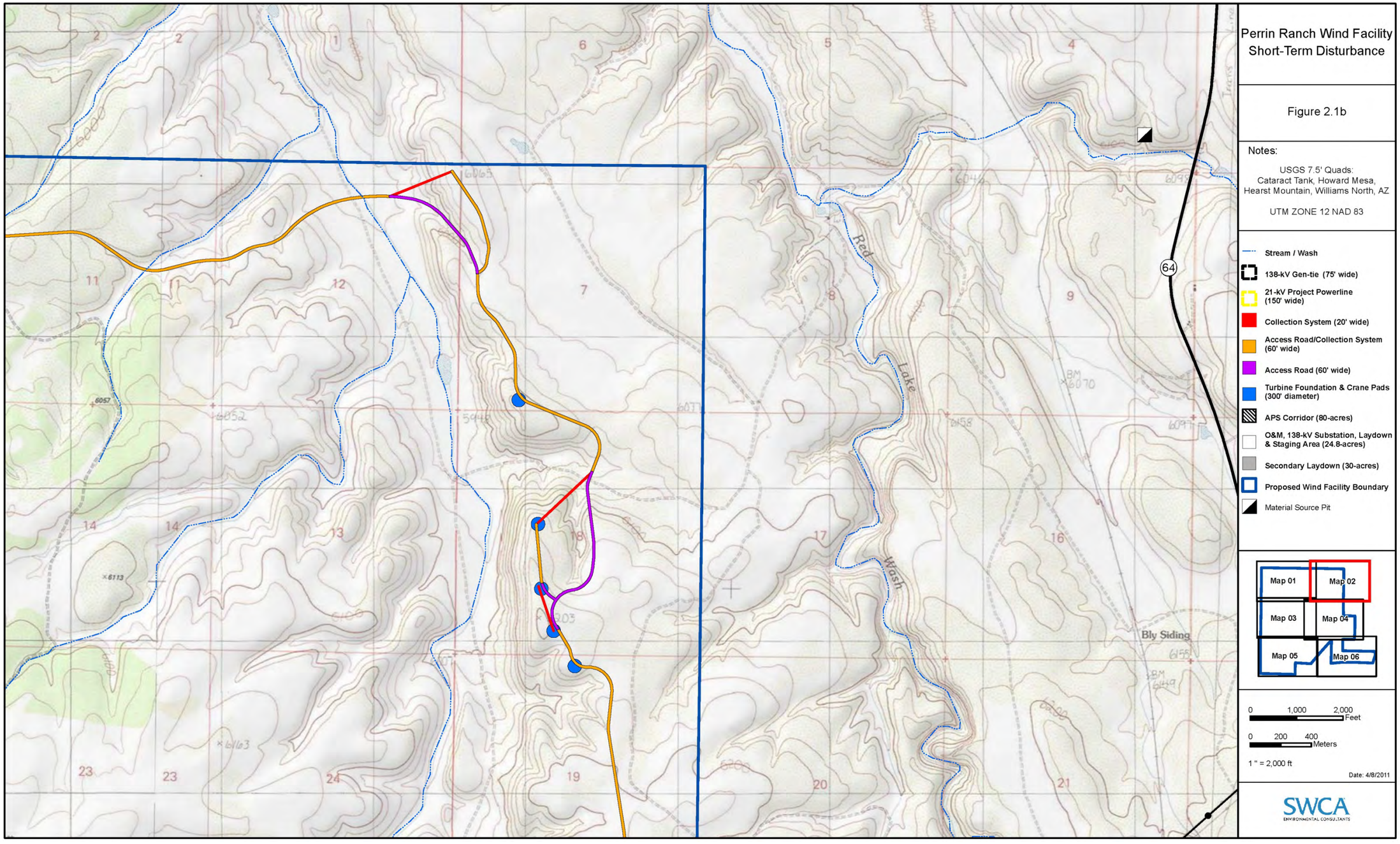

Figure 2.1b. Short-term disturbance in the project area (map 2 of 6).

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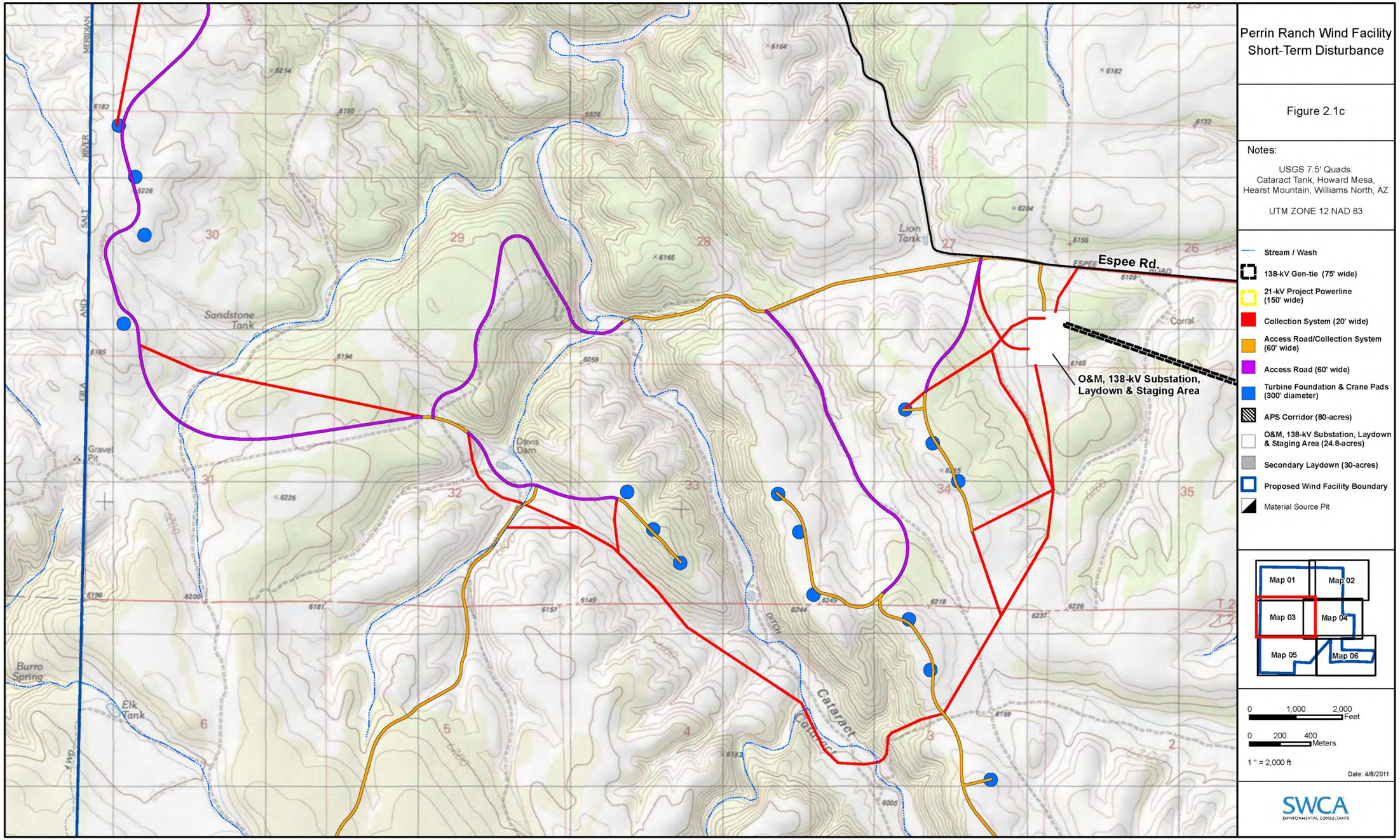

Figure 2.1c. Short-term disturbance in the project area (map 3 of 6).

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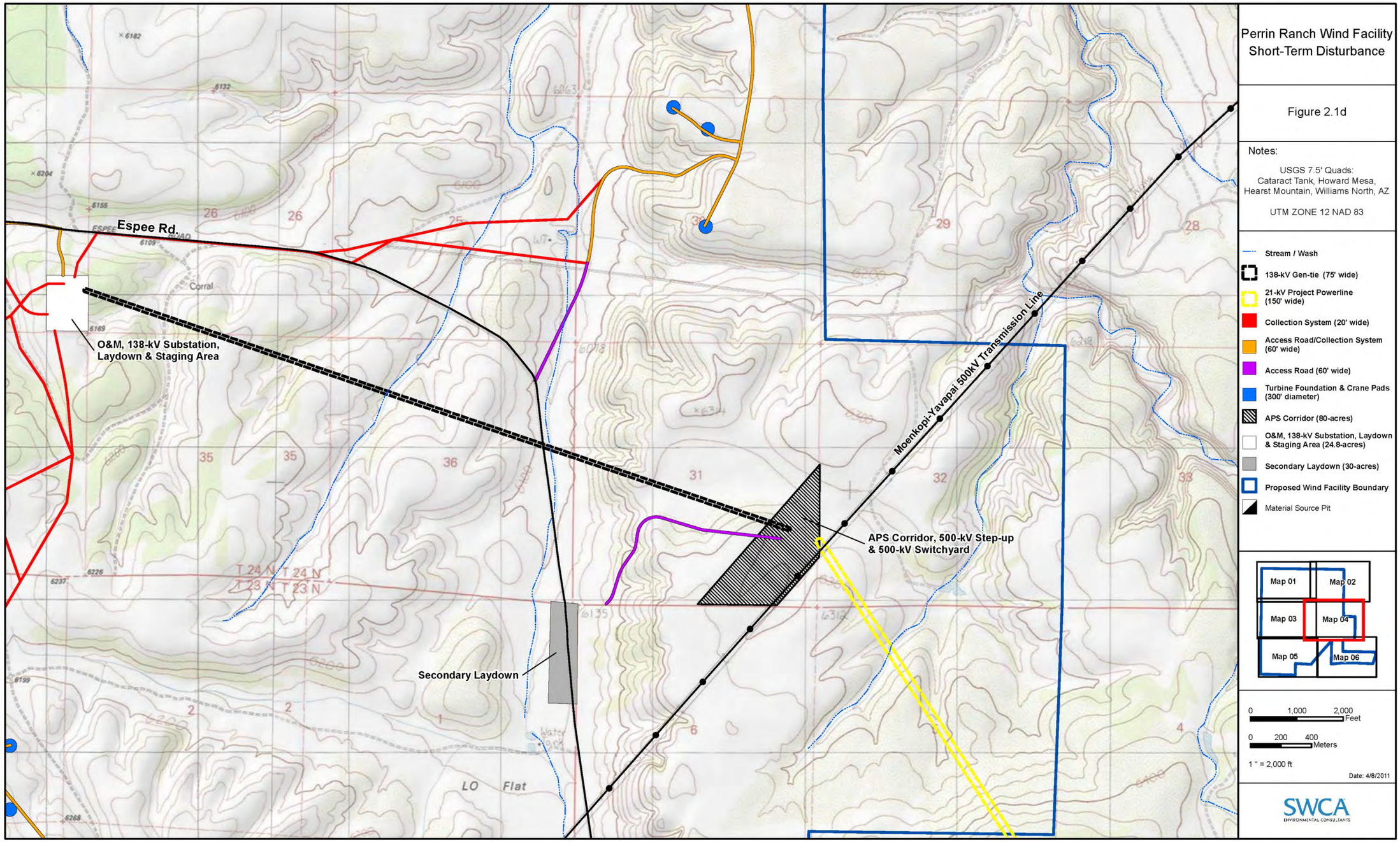

Figure 2.1d. Short-term disturbance in the project area (map 4 of 6).

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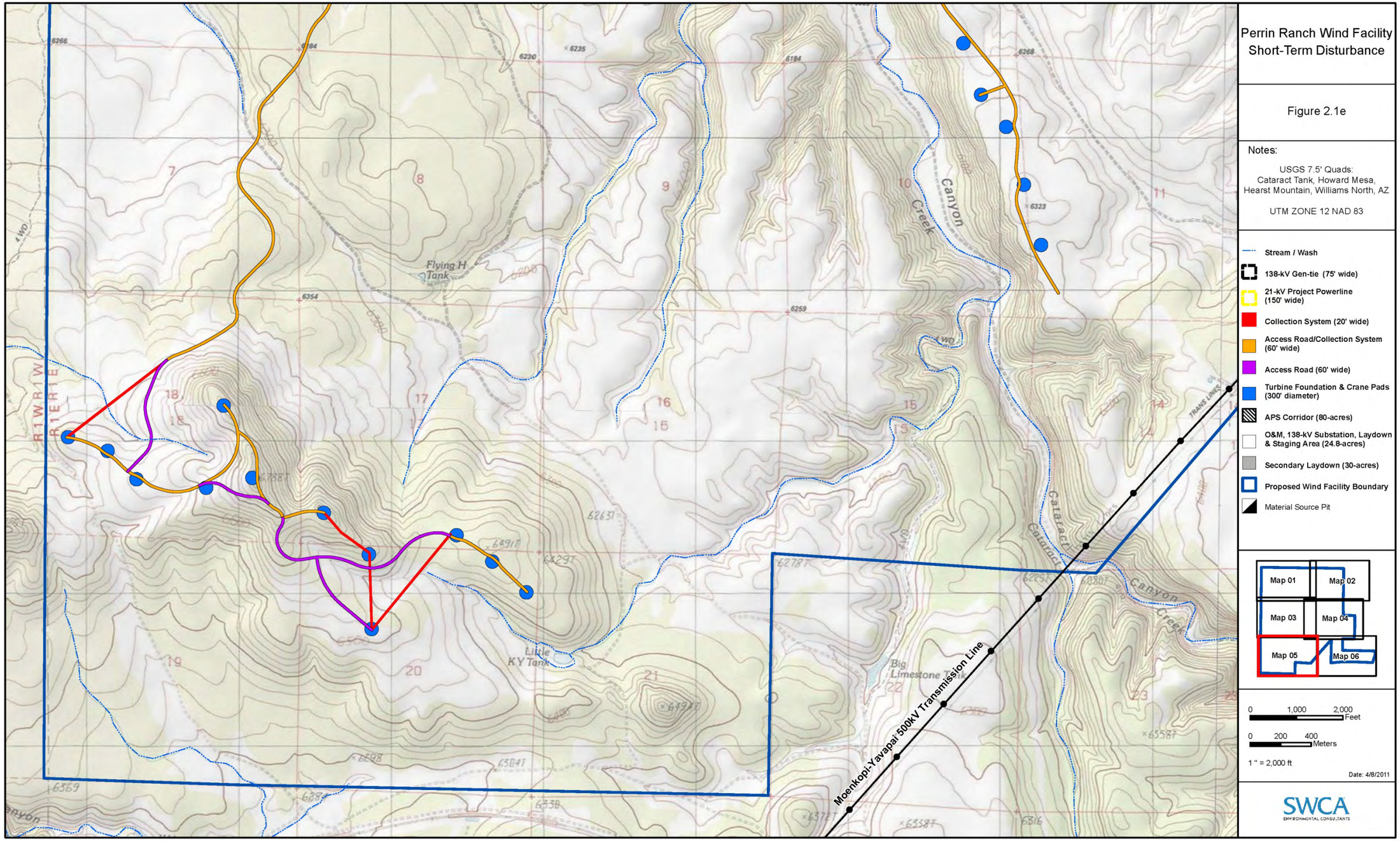

Figure 2.1e. Short-term disturbance in the project area (map 5 of 6).

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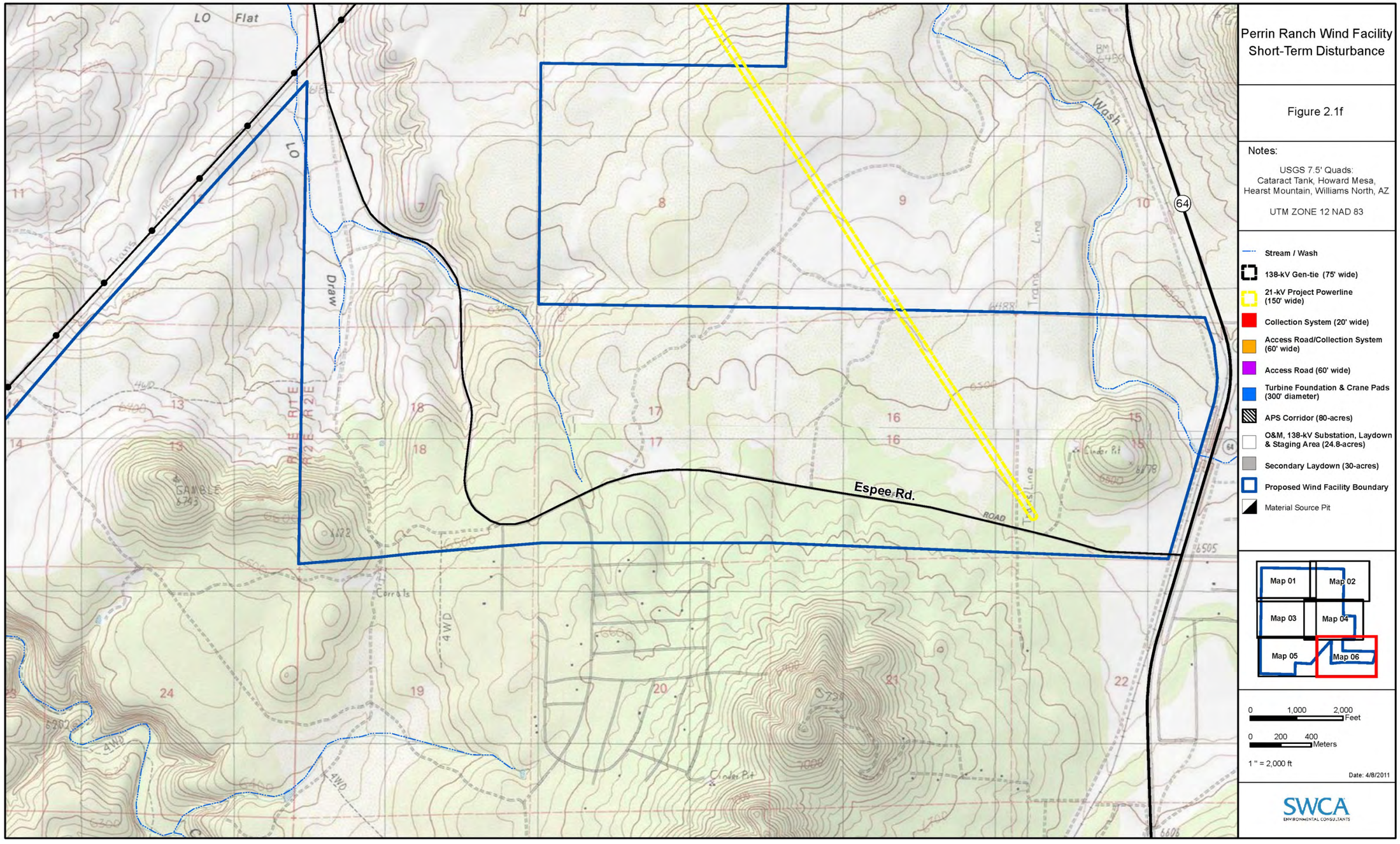

Figure 2.1f. Short-term disturbance in the project area (map 6 of 6).

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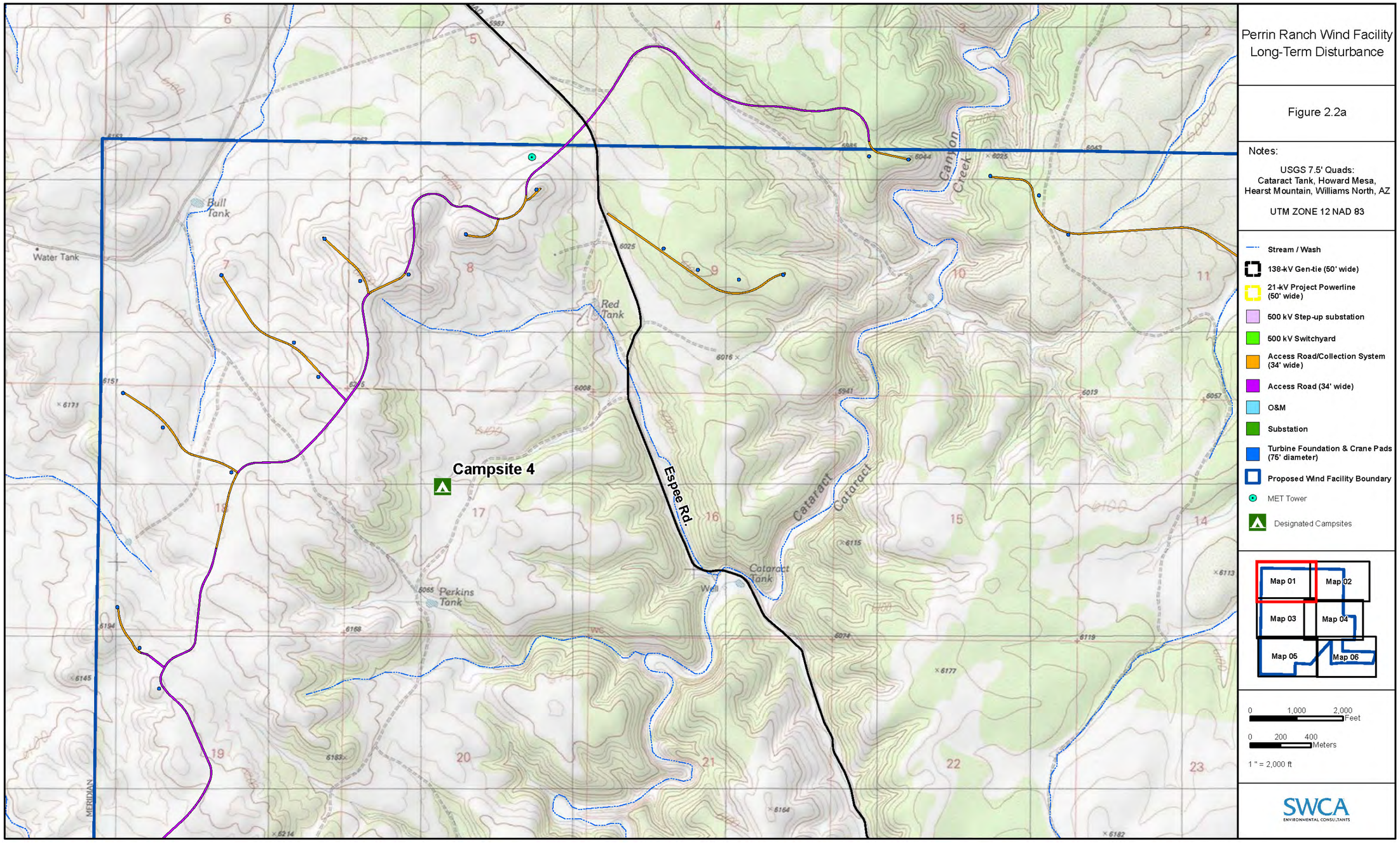

Figure 2.2a. Long-term disturbance in the project area (map 1 of 6).

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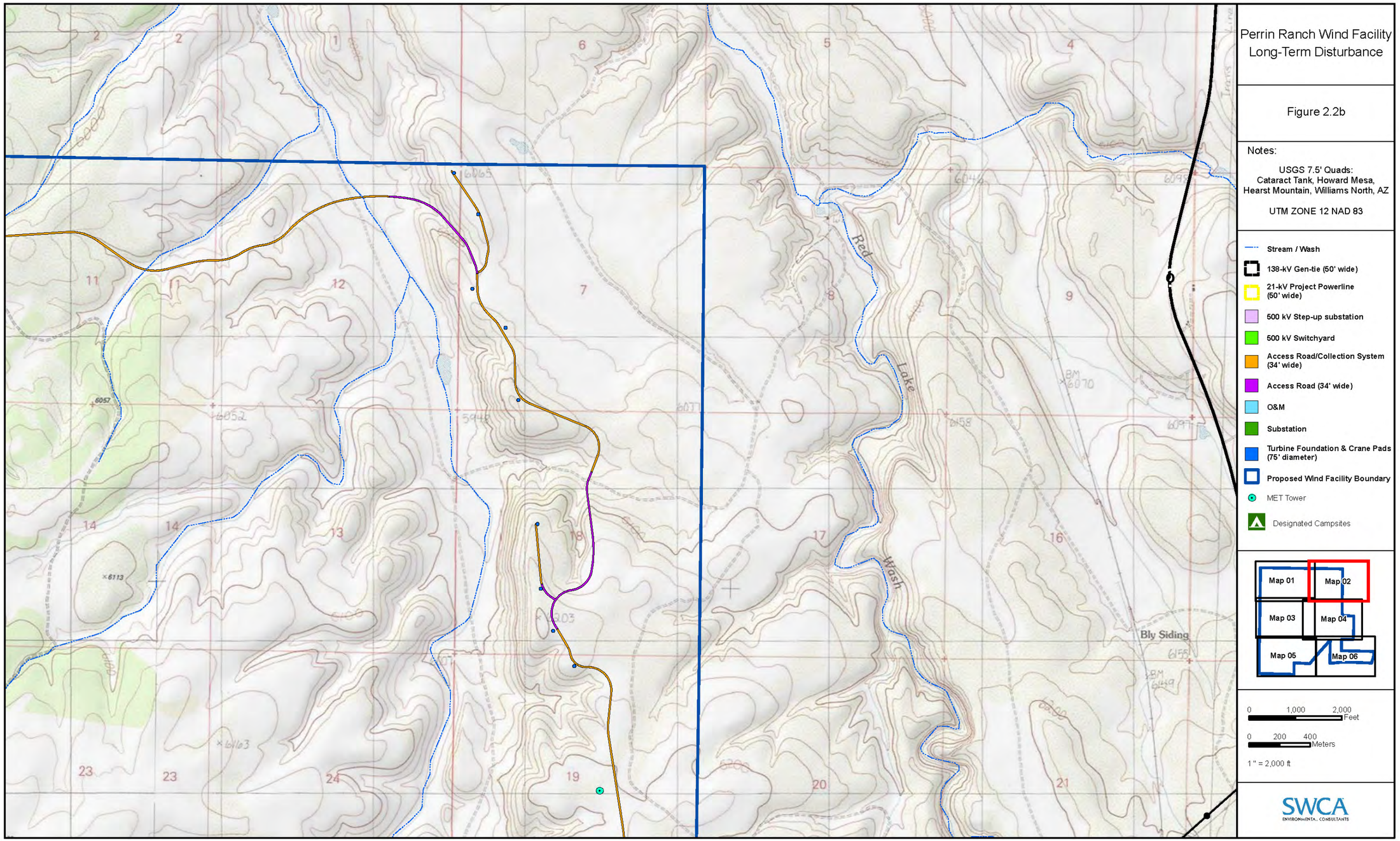

Figure 2.2b. Long-term disturbance in the project area (map 2 of 6).

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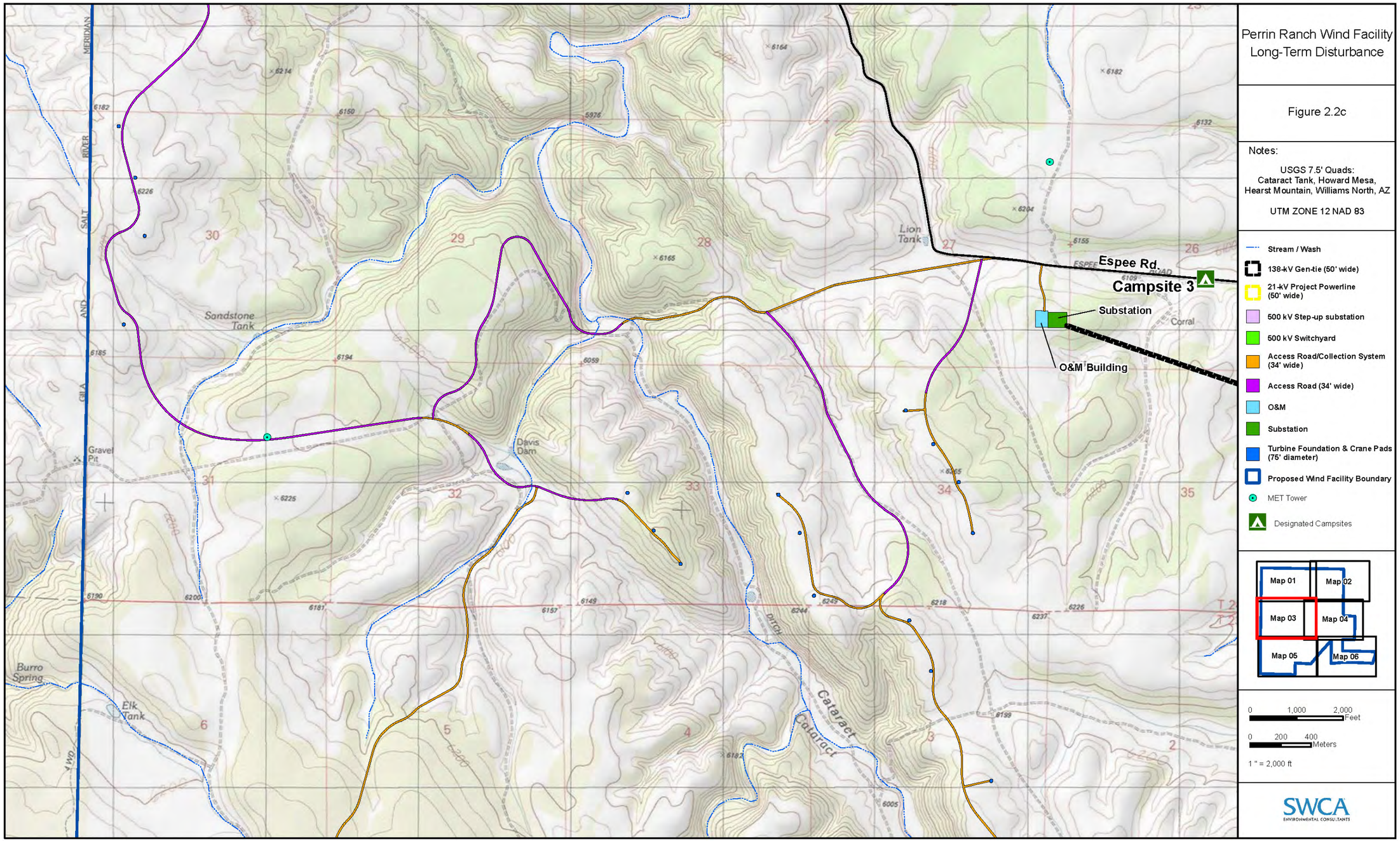

Figure 2.2c. Long-term disturbance in the project area (map 3 of 6).

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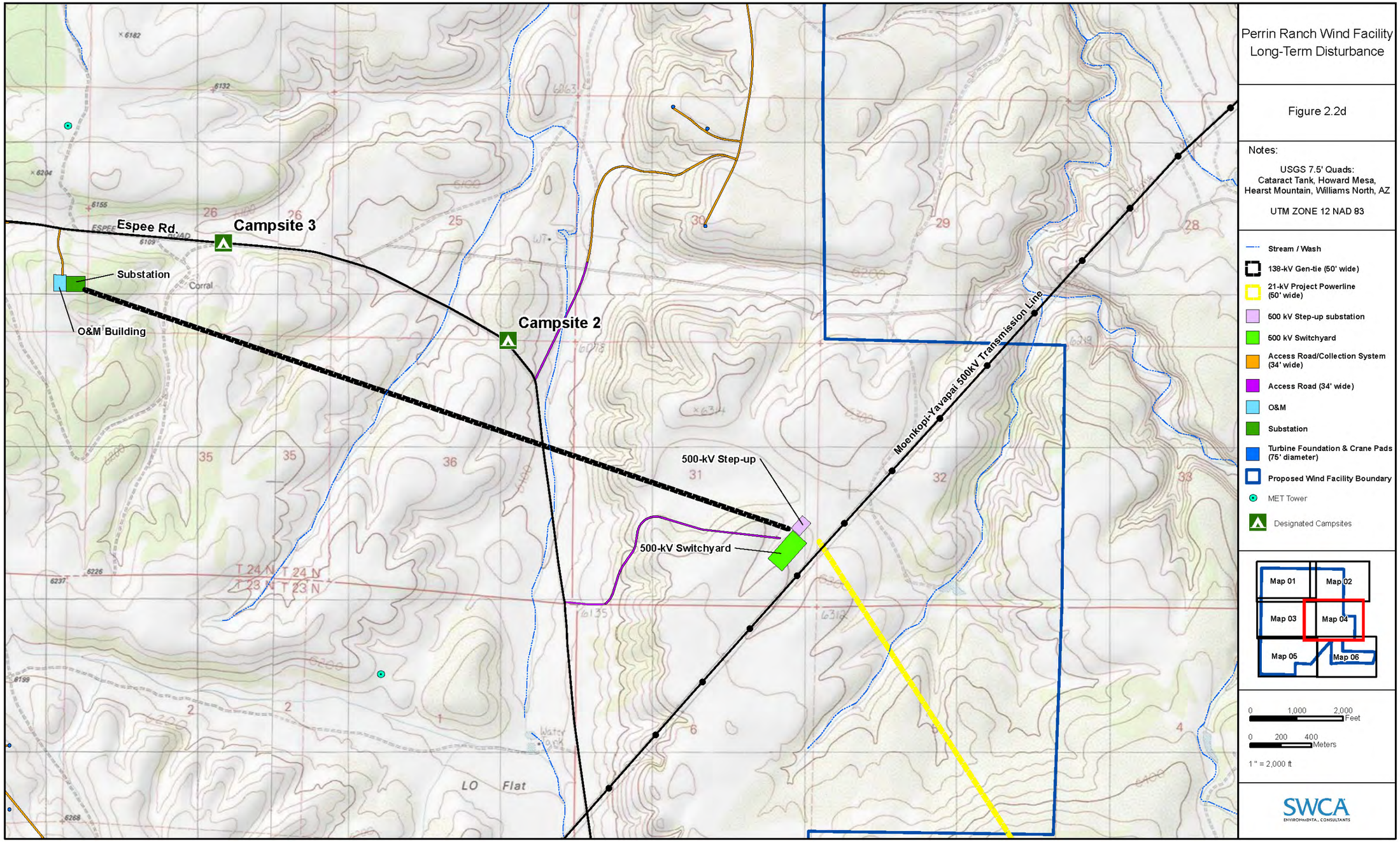

Figure 2.2d. Long-term disturbance in the project area (map 4 of 6).

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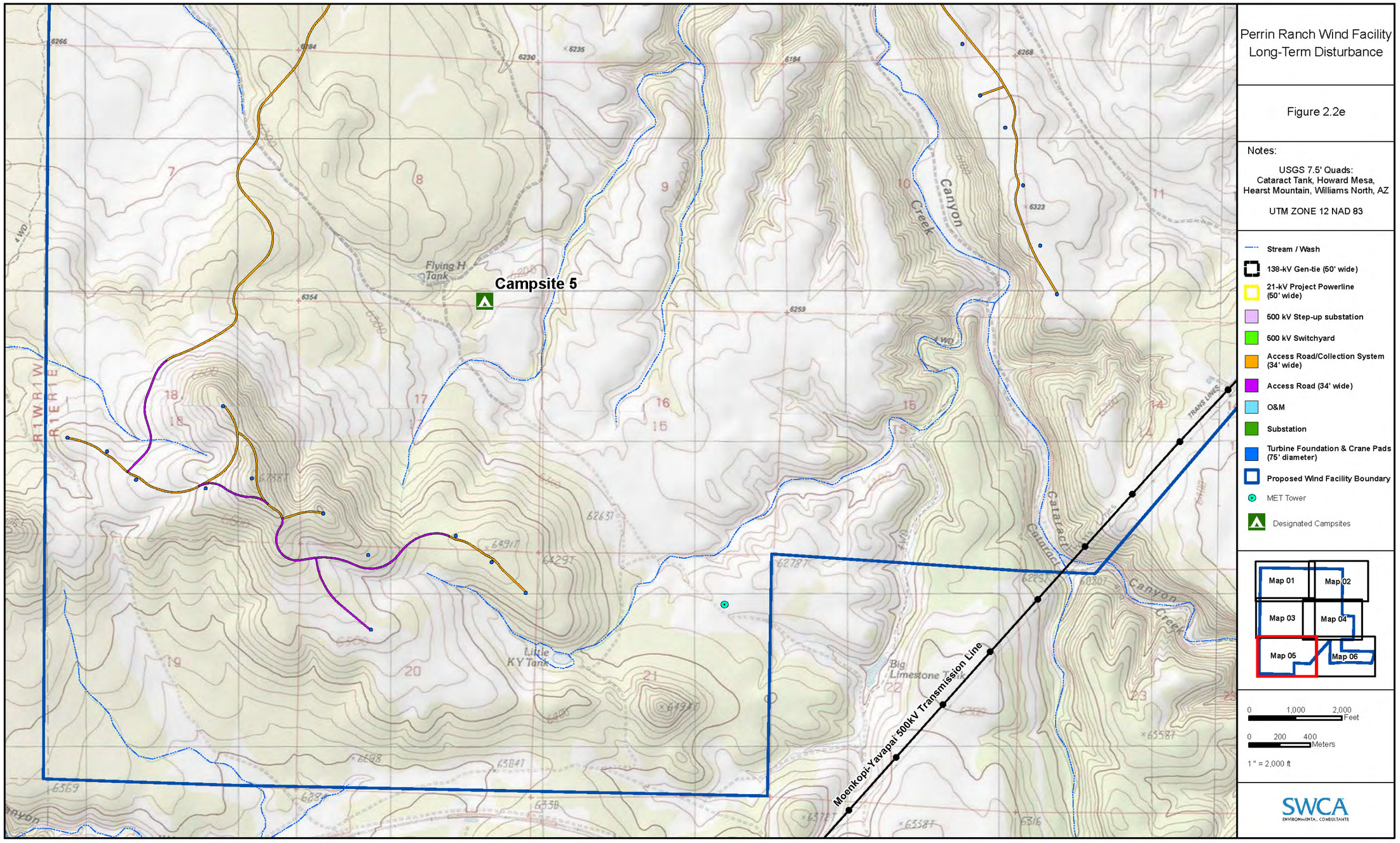

Figure 2.2e. Long-term disturbance in the project area (map 5 of 6).

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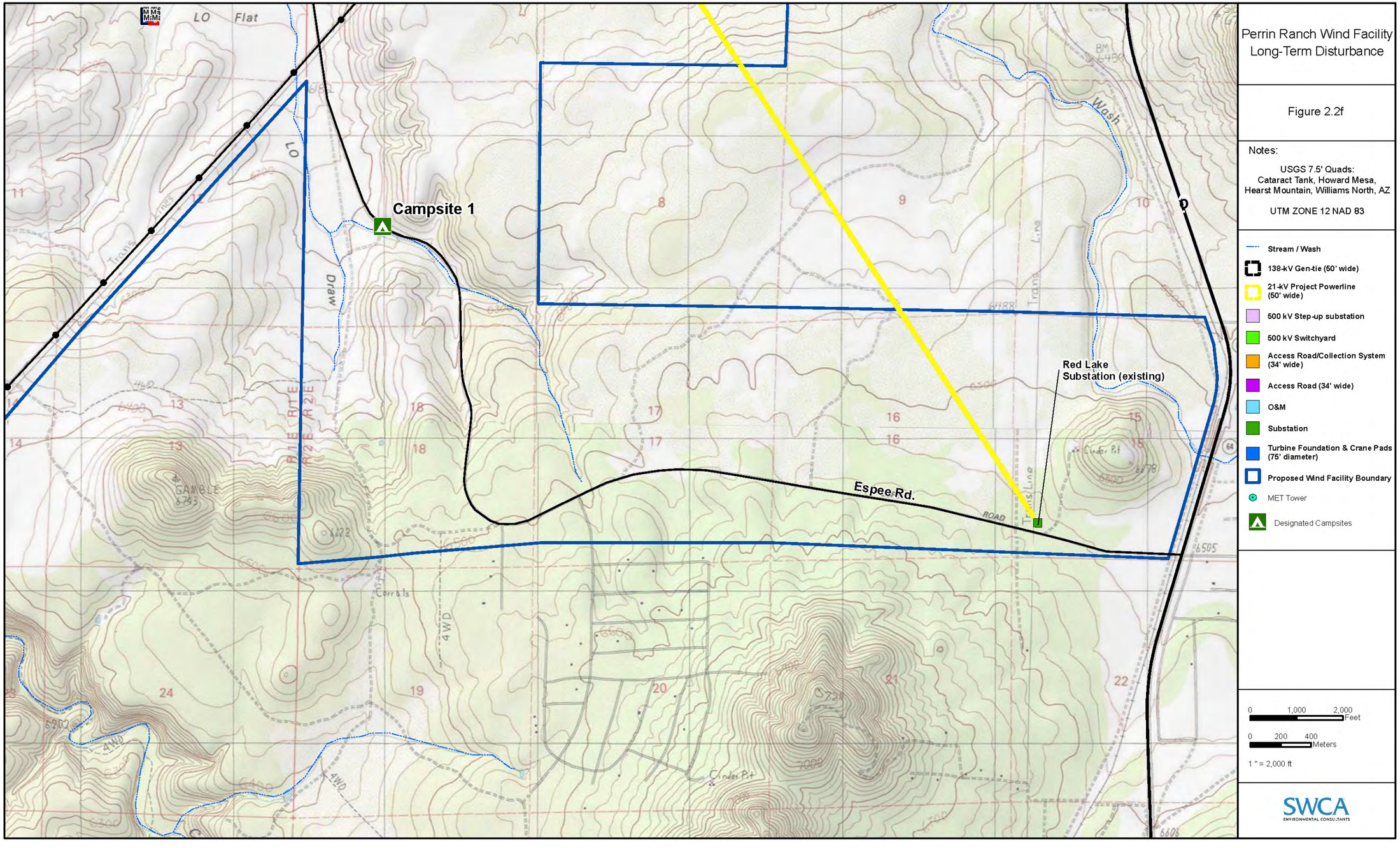

Figure 2.2f. Long-term disturbance in the project area (map 6 of 6).

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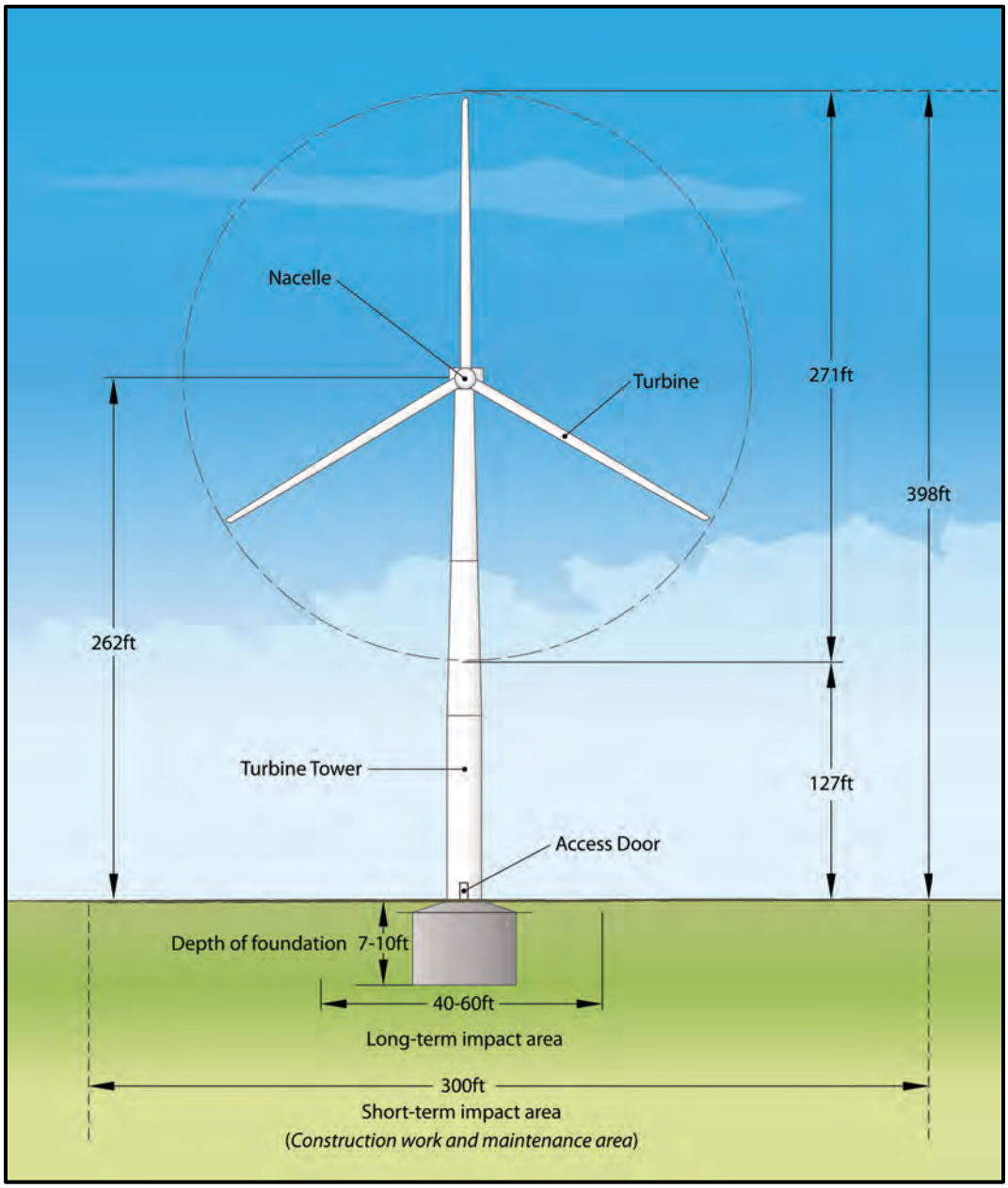

Figure 2.3. Conceptual design of the General Electric 1.6-MW XLE turbine (from NextEra 2010).

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 Native Plant Revegetation and Noxious Weed Management Plan, provided in Appendix C (see also Figures 2.1a–f).

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 all-weather aggregate base-course (ABC) surface, and would be adequate to support the size and weight of maintenance vehicles. Primary access to the proposed project would be via Espee Road from SR 64. 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).

Arizona Public Service 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 ACC 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 ACC approved the Perrin Ranch Wind PPA stating 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 enroachment 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. A septic tank, the septic drain field, and the associated piping would constitute the complete septic system; the septic system would be located within the O&M facility footprint. The O&M facilities would be enclosed by an 8-foot-tall chain-link fence with three-strand barbed wire on top and would be 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 facilities 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 facilities footprint; the batch plant would thus not cause additional disturbance beyond what is described above for the O&M facilities. Runoff associated with generation of concrete would be managed and mitigated through the Stormwater Pollution Prevention Plan (SWPPP).

Temporary Laydown Areas

Two temporary laydown areas would be used for the project. The primary laydown area would be part of the O&M facilities 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 D). These measures are part of Perrin Ranch Wind's proposed project and Western's Proposed Action and are considered in the impact analysis in this EA.

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 and approximately 40 to 60 feet across at the base, and they extend 7 to 10 feet below grade. The area would be cleared with a bulldozer and/or road grader and excavated with a backhoe to prepare for each concrete foundation. Blasting would be conducted for all 62 turbine foundation holes, along with some select areas of the roads and collection trenches, if the subsurface is too hard to excavate. The General Contractor would have a blasting plan in place prior to any blasting. Each blast would last approximately 1.5 seconds; these would occur 2 to 4 times per day over a 40- to 50-day time frame. Noise levels from blasting would be an estimated 125 A-weighted decibels (dBA) for 1.5 secconds if the listenter is 250 feet away; this would be an estimated 87 dBA if the listener is 1.5 miles away (i.e. at the nearest residence).

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 would be installed and concrete placed into the hole. Approximately 150 CY of concrete would be 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 8 feet 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 facilities 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 for 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 two existing sign-in kiosks, located on Espee Road. 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 and 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 because of 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 would 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 (approximately 19.5 million gallons) 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 workaround 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.
- The turbine manufacturer, and its transportation company, would be required to obtain the appropriate permits necessary for transport of oversized loads on ADOT's roads and bridges.

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. The general contractor would subcontract numerous tasks throughout the job to local companies, as appropriate. The general contractor would bring in key supervisory personnel and a few key employees. Local subcontractors would include surveyors, clearing and grubbing, water supply, all trucking, rock crushing, etc. The general contractor would also hire local employees, as available, laborers, concrete workers, and operators.

In general, construction crews would not be working at night unless required by the construction schedule. 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, because of the multiple employers who 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 Native Plant Revegetation and Noxious Weed Management Plan, provided in Appendix C). 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 ensure 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, would be 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 as follows:

- 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 MET 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 would include eight 4-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 40 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 verify 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-year service inspection; and
- five-year 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-Year Service Inspection. The two-year service inspection consists of the annual inspection, plus checking and tightening of terminal connectors.

Five-Year Service Inspection. The five-year 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 the following:

- 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 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 for dust abatement and daily operation at the O&M facility, such as water in the rest rooms and wash basin. 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 0.06 to 0.07 acre-feet (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 structure (i.e., turbine, switchyards, O&M facility, substations). 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 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.

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.

SPCC Plans are designed to help prevent discharges of oil into navigable waters or adjoining shorelines. The U.S. Environmental Protection Agency (EPA) and Coast Guard are granted authority to regulate such discharges by Section 311 of the Clean Water Act (CWA). In contrast to response measures found in Oil Spill Contingency Plans, the purpose of SPCC regulation is prevention.

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.

Emergency Response

As described in the Fire Protection and Emergency Response Plan (see Appendix E), a seven-step emergency notification procedure, along with an evacuation procedure, is in place. These steps include 1) notifying 911 immediately, 2) describing the type of emergency situation (i.e. medical, fire, extreme weather, etc.), 3) providing the location of the emergency, 4) notifying the nearest site supervisor, 5) notifying Perrin Ranch Wind, 6) coordinating with emergency response to locate the incident site, and 7) accompanying emergency response to the incident site, as appropriate. The evacuation procedure includes 1) empowering personnel to order evacuation/shutdown of the site, 2) meeting at the designated evacuation meeting site, and 3) performing a headcount of all personnel following evacuation.

Additionally, as described in the Fire Protection and Emergency Response Plan (see Appendix E), area jurisdictions currently have wildland fire emergency procedures in place. The procedures generally include management actions to protect values (homes, businesses, watersheds) and to diminish risk and consequences of severe wildfires. Perrin Ranch Wind would employ a strategy of appropriate management response to all wildland fire starts, in cooperation with local fire departments. Selected management strategies will consider public and firefighter safety as the first priority. Tactics will consider values at risk as well as the effects to lands adjacent to the project area.

Additionally, landowners around the project area, local fire departments, and the Coconino County Sheriff's Office would all 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.

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.

Disposal of hazardous materials is not applicable for this project; no hazardous materials regulated by the EPA under the Resource Conservation and Recovery Act (RCRA) or the Comprehenisive Environmental Response, Compensation, and Liability Act (CERCLA) will be used. Coconino County Department of Environmental Services is responsible for permitting septic systems. The authority is granted by Arizona Department of Environmental Quality (ADEQ), provided that waste facilities meet General Permit IV conditions of the Aquifer Protection Permit. The county also handles solid waste disposal.

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 SWPPP's soil stabilization (which may included reseeding) under the National Pollutant Discharge Elimination System/Arizona Pollutant Discharge Elimination System (NPDES/AZPDES). Coverage under the AZPDES Pesticide General Permit may also be required when the draft mandate takes effect. 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 repowered (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

- The project shall be built in substantial conformance to the site plan from the CUP dated January 14, 2011 (see Appendix B, Condition No. 1).
- If a building permit is not issued for the first phase of the project within one year of approval, the CUP shall lapse and become void unless a renewal application is submitted and approved (see Appendix B, Condition No. 2).

- The height of the turbines shall not exceed the height as requested in the CUP, which is 262 feet to the hub and 405 feet to the tip of the blade when in a vertical position (see Appendix B, Condition No. 3).
- New access roads to each of the tower sites shall be constructed with an all-weather ABC surface (see Appendix B, Condition No. 4).
- Prior to the initiation of any construction, the following approvals shall be in place: NEPA decision document, ACC approval for interconnection, and a special use permit granted by the ASLD (see Appendix B, Condition No. 5).
- An erosion plan, a noxious weed management plan, and a native plant revegetation plan shall be submitted prior to or in conjuction with the submittal for any county permits (see Appendix B, Condition No. 6).
- After completion of the project, Espee Road shall be returned to at least the same standard that exists now (see Appendix B, Condition No. 7).
- There shall be no signage associated with this project with the possible exception of one or more interpretive signs, either in conjunction with ranch entrance kiosks or at the proposed SR 64 information kiosk (see Appendix B, Condition No. 8).
- The applicant shall use lighting that is not on all the time but is aircraft or radar activiated (see Appendix B, Condition No. 9).
- All collection lines between the towers shall be underground (see Appendix B, Condition No. 10).
- Facilities will be designed to limit perching or nexting activities by birds. All MET test tower guy wires shall have bird dirverters on them (see Appendix B, Condition No. 11).
- The project shall adhere to the recommendations provided from the Arizona Game and Fish Department (AGFD) on December 8, 2010 (see Appendix B, Condition No. 12).
- Perrin Ranch Wind shall form a Technical Advisory Committee (TAC) to propose and coordinate appropriate studies, monitoring efforts, mitigation measures, and to address issues that arise during operation of the project (see Appendix B, Condition No. 13).
- A baseline survey will be completed to identify active raptor nests in the project area and all other information needed for micro-siting of the towers (see Appendix B, Condition No. 14).
- 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 rehabilitiation shall be borne by NextEra (see Appendix B, Condition No. 15).
- 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 (see Appendix B, Condition No. 16).
- Future CUPs or modifications of this CUP are required for the maintenance site and associated storage areas and for the proposed information kiosk near SR 64. Temporary use permits are required for any temporary buildings such as office trailers (see Appendix B, Condition No. 17).
- In the event the towers become obsolete or are out of use for a period of more than 180 consecutive days, or this CUP is not renewed, of if the leases and/or PPA are not continued, then the Perrin Ranch Wind shall decommission the project by removing the improvements, grinding the foundations to 3 feet below existing grade, and restoring the lands to a final condition consistent with the character of the surrounding area (see Appendix B, Condition No. 18).

- Perrin Ranch Wind shall enter into an agreement with a fire service entitity to ensure adequate fire protection within the project boundary (see Appendix B, Condition No. 19).
- The CUP shall be valid for a period of 30 years to expire December 16, 2040 (see Appendix B, Condition No. 20).
- The developer shall make a good faith effort to consult with the immediately adjacent developed property owners regarding creation of a Property Value Assurance Gurantee document similar to those provided by NextEra elsewhere in the United States (see Appendix B, Condition No. 21).
- 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 (see Appendix B, Condition No. 22).
- Existing roads, such as Espee Road, would be used as much as possible to reduce the need for additional disturbance.
- Water would be used in the construction of the turbine tower and substation foundations and for dust control during construction.
- 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, at least 2 miles from the Perrin Ranch boundary, and at least 1.5 miles from any residence (see Appendix B, Condition No. 1).
- 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.
- A Fire Protection and Emergency Response Plan (see Appendix E) has been developed in coordination with the Williams Fire Department and would be adhered to.

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.
- 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.
- In accordance with 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 that provides 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 ABPP (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.
- In accordance with 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.

[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 (NRHP), 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.

- 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 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 [ARS] 5 3-901 *et seq*.) would be followed, and the destruction of native plants would be minimized to the extent feasible during construction.

2.2.8 Mitigation Measures

In addition to the applicant-committed BMPs and conservation measures, following is a list of mitigation measures developed by Western, as well as agency comments during review of the draft EA.

- AGFD: AGFD would participate in the project TAC, required to be formed per Coconino County Resolution No. 2011-04 (see Appendix B). Through the TAC, AGFD would propose and coordinate appropriate biological studies, monitoring efforts, mitigation measures, assist in addressing issues that arise regarding wildlife impacts during operation of the wind project. AGFD believes that adaptive management strategies, set up through the TAC, would ensure that negative impacts to wildlife can be avoided or sufficiently mitigated.
- ASLD: To ensure that NRHP-eligible cultural resources located on State Trust land would be avoided during any permanent and temporary project infrastructure, including MET towers, wind turbines and foundations, buried electrical lines, access roads, laydown areas, operations and maintenance buildings, substation, switchyard, or any other ground disturbing activities associated with Perrin Ranch Wind Application 14-115497, or any related construction activities, and would not be disturbed as a result of maintenance during the term of the requested ROW or any subsequent renewal periods, ASLD granted ROW 14-115497. The ROW was granted with the condition that except for archaeological investigations that are properly authorized under a project-specific Arizona Antiquities Act permit issued by the ASM pursuant to ARS 41-842, Grantee, or assigns, shall not cause nor allow any ground-disturbing activity within the boundaries of the archaeological sites without first obtaining written permission from Grantor. Grantee, or assigns, would be required provide ASLD with any archaeological plans, studies, or reports that may be needed for Grantor's use in considering Grantee, or assigns, request for permission to disturb the ground..
- ADEQ: To reduce disturbance of particulate matter, including emissions caused by strong winds as well as machinery and trucks tracking soil off the construction site, ADEQ recommended the following measures:
    - Site Preparation and Construction
        - Minimize land disturbance;

- Suppress dust on traveled paths which are not paved through wetting, use of watering trucks, chemical dust suppressants, or other reasonable precautions to prevent dust entering ambient air;
- Cover trucks when hauling soil;
- Minimize soil track-out by washing or cleaning truck wheels before leaving construction site;
- Stabilize the surface of soil piles; and
- Create windbreaks.

o Site Restoration

- Revegetate any disturbed land not used;
- Remove unused material; and
- Remove soil piles via covered trucks.

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 considered multiple factors in the evaluation of potential project sites, the 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 Turbine 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 from the nearest occupied structure (i.e., residence). The northern project boundary was moved 1 mile south of its original location, resulting in the adjustment of 12 turbines to ensure that 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 area 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 and step-up substation and an alternative alignment for the gen-tie transmission line were also considered during the 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 NW ¼ of Section 35, located to the south of Espee Road.
- The step-up substation would be located in one of two locations in the SE ¼ 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; 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, operation, and maintenance. Impacts are described according to type (beneficial, adverse, direct, and/or indirect), context, duration (short term, 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 F 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 F), along with the impacts of the Proposed Action and the interaction of the combined impacts.

3.2 RESOURCE 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 include whether a resource either would not be affected or would sustain negligible impacts from the project, or are beyond the agency's control. Impacts to resources that are too small to meaningfully analyze are also dismissed. 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, hazardous materials, intentional destructive acts, and land use. Therefore, these resource areas are briefly discussed in this section, and a rationale is provided for 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 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 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 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. The ASLD archaeologist reviewed and approved the plan (Barr and Hesse 2011) as it relates to cultural resources on State Trust lands within the project area. The ASLD approval of the plan is based on avoidance of cultural resources on state lands during ground-disturbing activites, except for archaeological investigations that are properly authorized under a project-specific Arizona Antiquities Act permit issued by the ASM, pursuant to ARS 41-842.

Cultural resources surveys resulted in the documentation of 412 cultural properties, of which 75 properties were assigned ASM site numbers and 337 were designated isolated occurrences (IOs). Table G-1 in Appendix G summarizes the resources and their status in terms of the NRHP eligibility criteria. None of the properties had been previously evaluated. The IOs and 16 of the sites are determined ineligible 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. One property has indeterminate temporal and cultural affiliation.

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 on cultural resources from construction or operation and maintenance are expected if the project is implemented.

Environmental Justice: Using the same 10-mile study area as 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. U.S. Census Bureau (Census Bureau) data from the 2005–2009 American

Community Survey (Census Bureau 2009a, 2009b, 2009c) is used in Table 3.1 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: 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.

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.

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 trust 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 state trust 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) ROWs and utility corridors (the Moenkopi-Yavapai 500-kV transmission line, Southern Trails Pipleline, livestock watering pipelines, and the AT&T Transcontinental Fiber-Optic Cable). No conflicts with these land uses are anticipated.

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 B). The conditional use approved by Coconino County (Resolution No. 2011-04) states that the project is consistent with and conforms to the goals, objectives, and policies of the Comprehensive Plan and the Red Lake Plan. Because use of lands in the project area has been approved for the proposed Perrin Ranch facility, land use conforms to area plans.

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 the alternatives 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 may have an impact on these resources that was either minor, moderate, or major, and if mitigation did not reduce or eliminate these impacts. Each resource area also considers an appropriate study area in which to analyze the existing conditions and anticipated 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 in

which potential impacts to the landscape from the project may be discerned; the study area 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 State Trust land, private land owned by Perrin Ranch, LLC, the U.S. Forest Service (Forest Service) 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).

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 (Forest Service 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, contributes 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, 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 they have expectations of an undeveloped landscape of the Colorado Plateau. The South Rim of the Grand Canyon is more than 35 miles from the project; turbines in the project area would not be visible from the Grand Canyon. 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 mph. Passengers on 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. KOPs are the most critical viewpoints and typically consist of commonly traveled routes or other likely observation points. Although there are numerous locations both within and surrounding the project area from which elements of the Proposed Action would be visible, six KOPs were identified (see Figure 3.1) to represent critical views of the project area. Those six representative KOPs include residential areas, commonly traveled routes, and backcountry recreation sites.

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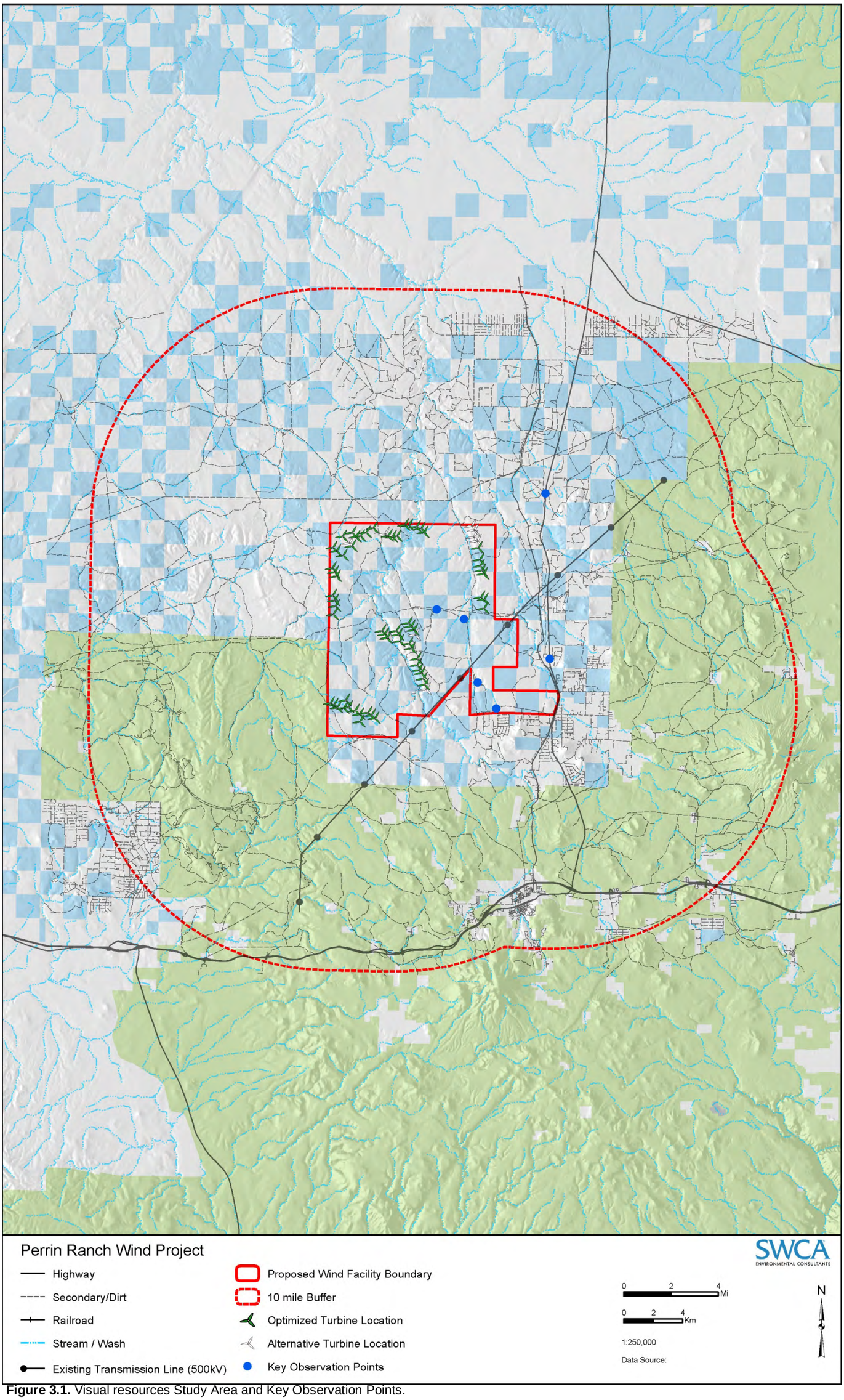

Figure 3.1. Visual resources Study Area and Key Observation Points.

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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, views of people traveling both directions along SR 64, and views 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 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 people traveling in both directions along SR 64.

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

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 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 people traveling along Espee Road through the project area.

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 Espee Road. From this location, the view of the project area is in all directions. Views of the project area are screened by taller pinyon 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 people traveling along Espee Road through the project area.

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 pinyon 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 people traveling along Espee Road through the project area.

Figure 3.5. Designated Campsite 1 KOP; view facing northwest.

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

Figure 3.7. Designated Campsite 3 KOP; view facing east.

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.

NIGHTTIME LIGHTING AND SKY GLOW

Light pollution is defined as the illumination of the night sky caused by artificial light (Bortle 2001). The effects of light pollution consist of a decrease in the visibility of stars and other natural night sky features, as well as a disruption of 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, the largest source of artificial nighttime light and sky glow in the region, is approximately 7 miles south of the project area's southernmost boundary. Other nearby sources of artificial light include traffic on SR 64 east of the project area, area residences, and development near the South Rim of the Grand Canyon.

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., BLM, National Park Service, Forest Service).
- 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, 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 farther 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, the types of visual contrasts that would be apparent from Designated Campsites 4 and 5 in Perrin Ranch, as well as the Perrin Ranch Headquarters, would be similar to those contrasts described for the three recreation KOPs. Passengers of the Grand Canyon Railway would have intermittent views of 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 approximately 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 3.2). Direct and indirect impacts from operation of the Proposed Action on aesthetics and visual resources would be local, minor, long term, and adverse.

Table 3.2. 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, which 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 1) the areas from which an observer at a KOP may theoretically be able to see elements of the project; and 2) 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 does 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.

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, open plateau would continue to dominate the views from Red Lake Mountain Ranch.

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 more than 5 miles away from Howard Mesa Ranch.

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 seven 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.

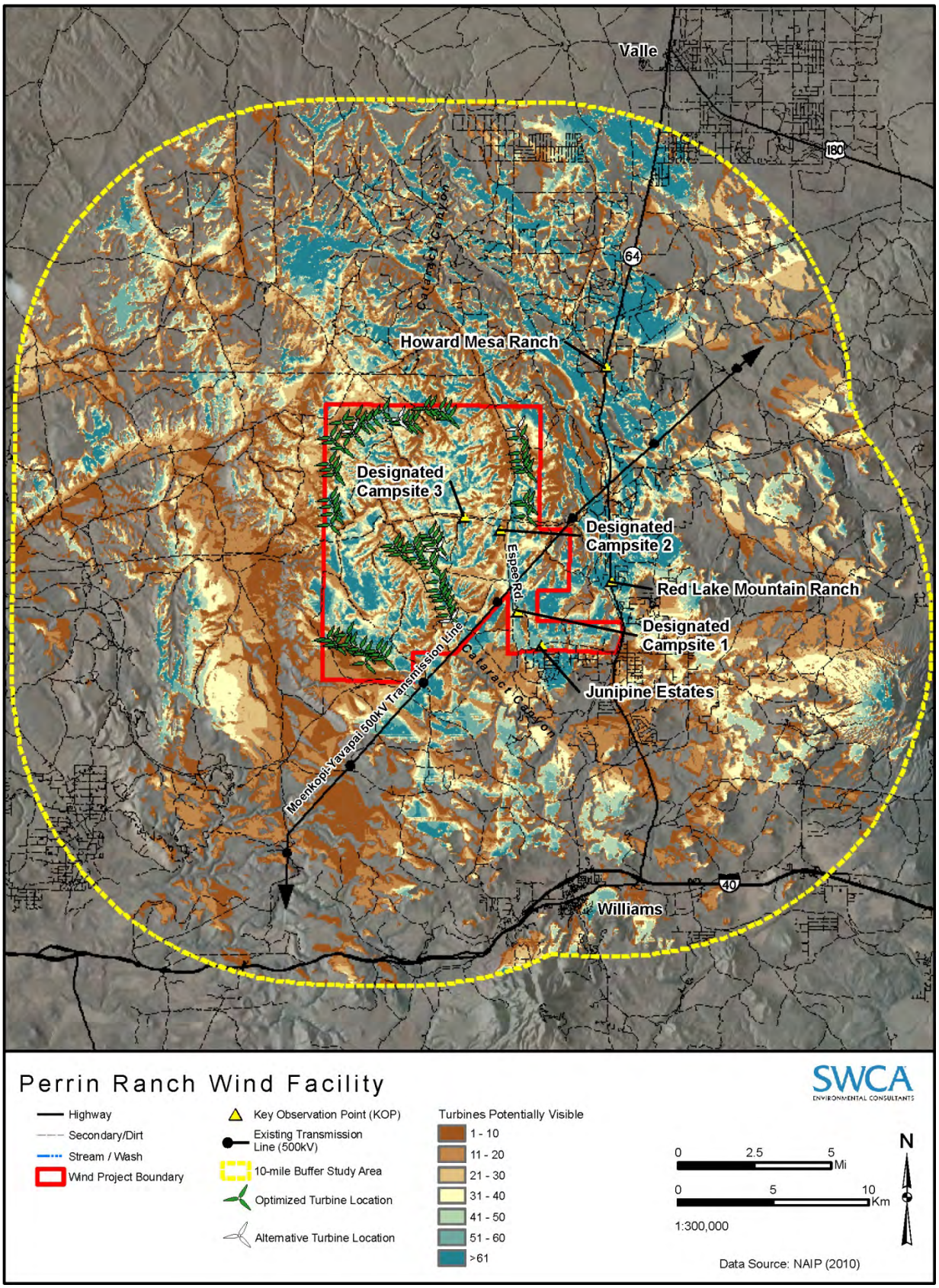

Figure 3.8. Viewshed delineation.

Figure 3.9. Junipine Estates photographic simulation.

Figure 3.10. Red Lake Mountain Ranch photographic simulation.

Figure 3.11. Howard Mesa Ranch photographic simulation.

Figure 3.12. Designated Campsite 1 photographic simulation.

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 farther away the turbines are from the KOP, and the majority of the turbines would be between 3 and 5 miles away.

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 four turbines (including 1 alternate turbine location) within 1.5 miles 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 3.14). 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 farther 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, the types of visual contrasts that would be apparent from Designated Campsites 4 and 5 in Perrin Ranch, as well as the Perrin Ranch Headquarters, would be similar to those contrasts described for the three recreation KOPs—Designated Campsites 1, 2, and 3. 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 5 minutes 35 seconds. However, passengers on 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 that delineates 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, although at 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 people traveling by road through the areas of shadow effect or people standing within the shadowed area of a wind turbine blade. Thus, direct impacts to people 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, LLC, state trust lands, Forest Service 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, agricultural residential development, and general zoning land use classifications. “Agricultural residentrial” and “general” are zoning classifications determined by Coconino County. Agricultural Residential includes low-density residential use on 1 acre or more, and general zoning includes very low-density residential, 10 acres or more per lot. 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

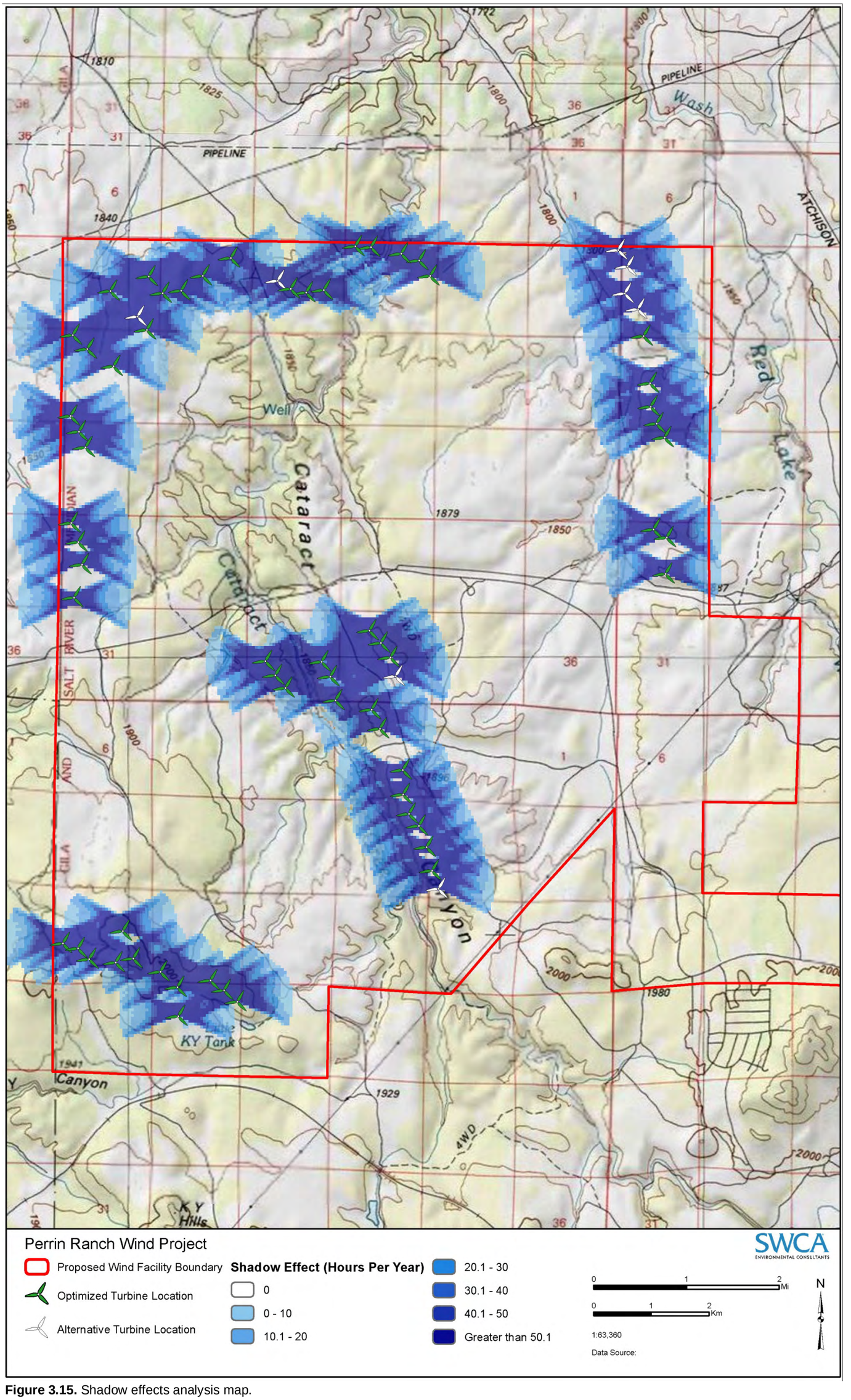

Figure 3.15. Shadow effects analysis map.

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land and its character. 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 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 which noise from the project would be audible (Figure 3.16). The study area for noise is a mixture of undeveloped, vacant State Trust land and private land owned by Perrin Ranch, LLC, 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 in which 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 3.3 provides examples of typical A-weighted sound pressure levels for various indoor and outdoor noise sources.

Table 3.3. 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.

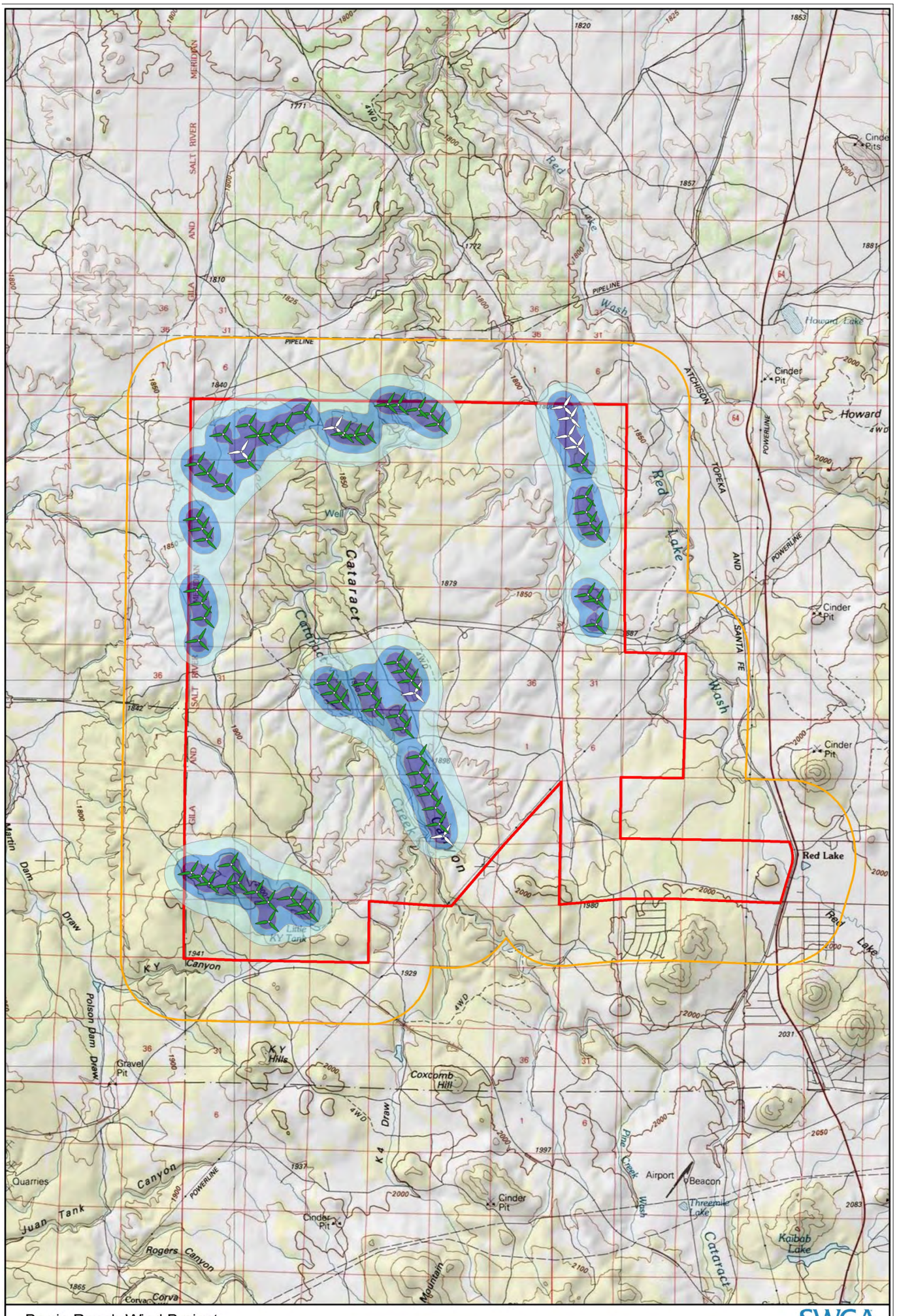

Figure 3.16. Noise analysis study area.

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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. In general, 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 3.4). The nearest residence occurs at Howard Mesa Ranch, which is approximately 2 miles from the nearest turbine location at which 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).

Additionally, blasting would be conducted for all 62 turbine foundation holes, along with some select areas of the roads and collection trenches, if the subsurface is too hard to excavate. Each blast would last approximately 1.5 seconds; these would occur 2 to 4 times per day over a 40- to 50-day time frame. Noise levels from blasting would be an estimated 125 A-weighted decibels (dBA) for 1.5 secconds if the listenter is 250 feet away (i.e. construction crews); this would be an estimated 87 dBA if the listener is 1.5 miles away (i.e. at the nearest residence).

During construction, increased vehicle traffic, equipment used for assembly and erection of structures, wire pulling and splicing, and intermitten blastingwould result in increased ambient noise levels. Table 3.4 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 3.4. 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 in Table 3.4 indicate that there would be a temporary increase in ambient noise within 45 feet of construction activities. Additionally, blasting would be required for turbine foundation holes, along with some select areas of the roads and collection trenches, however these blasts would no last longer than 1.5 seconds and to a listener at the nearest residence, these sounds would add to the temporary increase in ambient noise. Noise from construction activities would be audible to recreationists in the area, but construction would generally 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 near 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 the 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). A dBA of 50 is roughly the equivalent of audible light auto traffic from 50 feet away or the level of casual conversation at approximately 1 m, or arm's length (Colby et al. 2009). Noise from the turbines would diminish with distance. The nearest residence occurs at Howard Mesa Ranch, which is 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 is 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 represent a negligible increase in ambient noise levels.

Regarding potential public health effects from turbine related noise, OSHA states that noise induced hearing loss begins at about 85 dBA, for an 8-hour day, over a 40-year career (Colby et al. 2009) and that levels below 75 dBA do not pose risk of hearing loss. Additionally, according to the EPA, sleep interference begins when indoor day-night-level noises exceed 35 to 45 dBA (Colby et al. 2009). Finally, annoyance or stress as an effect of wind turbine noise is not considered an adverse health effect (Colby et al. 2009).

Finally, research by O'Neal et al. 2009 indicates that no adverse public health effects would result from turbine-related low-frequency noise or infrasound (vibrations) at distances greater than 1,000 feet from turbines (O'Neal et al. 2009). There are no residences, campsites, or other occupied structures within 1,000 feet of any proposed turbine location.

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 and 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 or 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 as far as 500 feet from the transmission line. During fair weather, the audible noise as far as 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 with 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 met. 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 are based on the portion of the sub-watershed that receives discharge from the project area. In the Cataract Creek watershed, this includes Cataract Creek downstream from the project area to its confluence with Red Lake Wash; in the Verde Valley watershed, this includes KY Canyon to its confluence with Martin Dam Draw.

Affected Environment

Section 404 of the 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 coverage under Section 404 nationwide permit (NWP) 12 and NWP 14 would be needed for the proposed project. Because of the limited amount of potential WUS near project activities, the temporary nature of the proposed road and collector line construction impacts within potential WUS, and the fact that the combined total of permanent impacts will be less than 0.1 acre, the project qualifies as non-notifying. However, compliance with the terms of NWPs 12 and 14 is required, and associated permit conditions would apply.

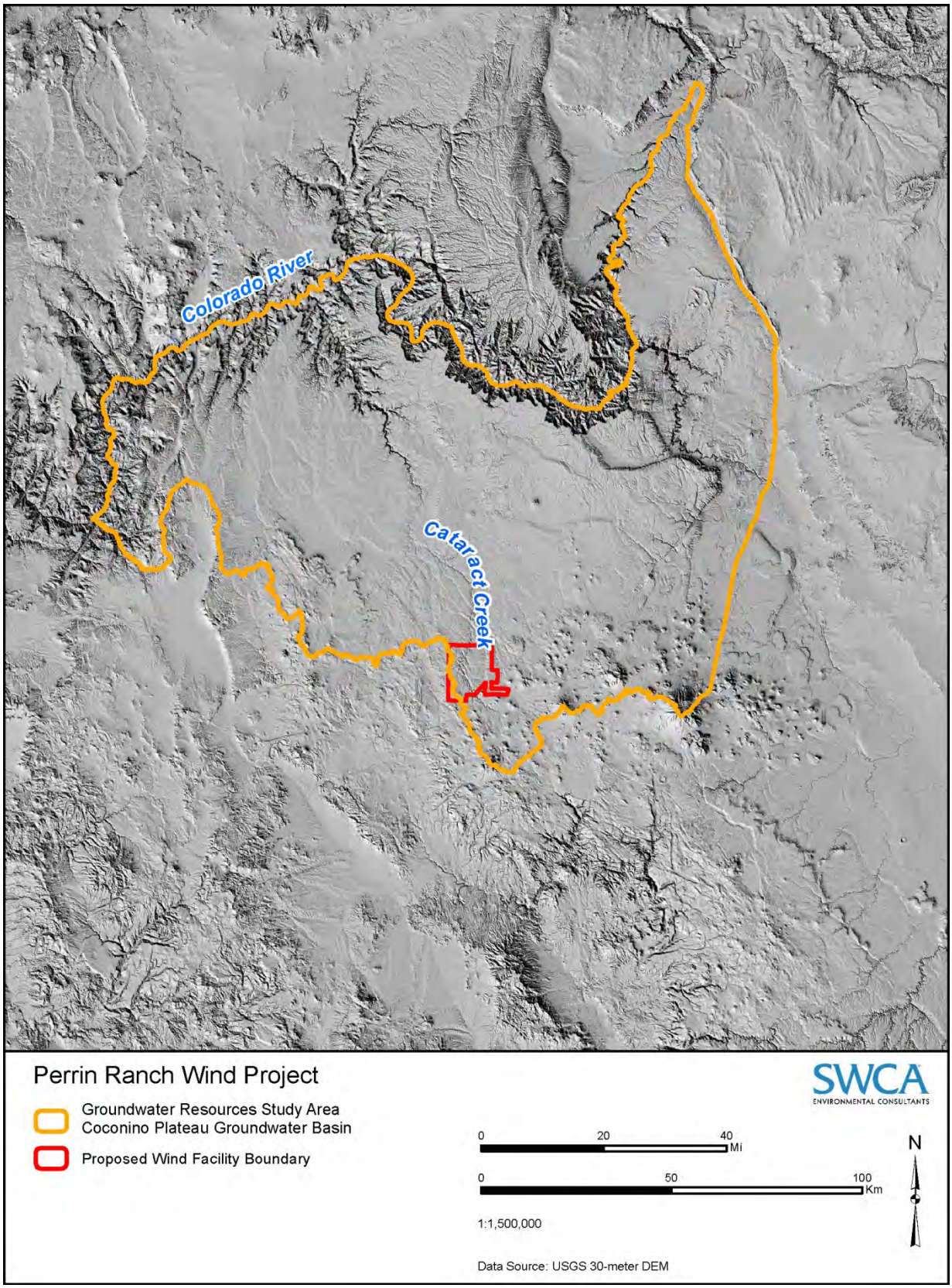

Figure 3.17. Groundwater study area map.

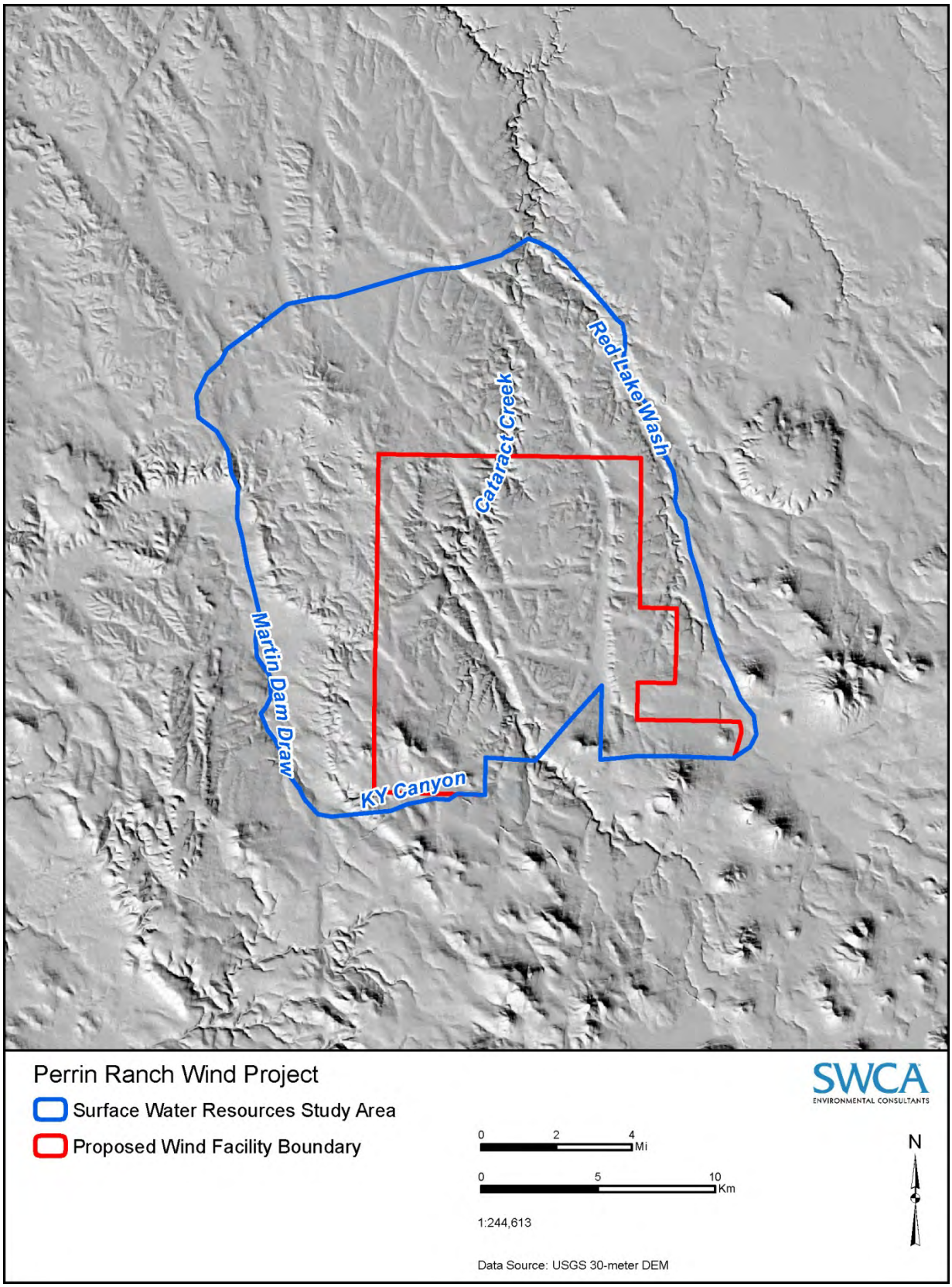

Figure 3.18. Surface water study area map.

Section 401 of the CWA requires Water Quality Certification from the state when a proposed activity may result in a discharge to WUS. Section 401 certification would be required from the 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.

The Federal Emergency Management Agency (FEMA) is the agency charged with maintaining and updating the National Flood Insurance Program maps. These maps are the official maps of a community and depict delineated floodplains and special hazard areas. The current FEMA Flood Insurance Rate Maps (FIRMs) indicate that the project area is located in an area with no special flood hazard (FEMA 2011).

As part of project implementation, a SWPPP must be developed and implemented to comply with conditions of the AZPDES CGP. A SWPPP is derived from Section 402 of the CWA, which includes provisions that regulate pollutants discharged from facilities during their construction phase. This is a federal law, although most states are granted authority to regulate facilities following EPA approval. All construction facilities 1 acre or larger are subject to a general permit developed by the state or federal regulatory agency (for Arizona, ADEQ). A plan to implement BMPs with respect to staging areas and control of erosion and pollutants (from land clearing, concrete batch facilities, construction materials, vehicles, etc.) must be developed for the entire construction period. 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 AAC Title 18, Chapter 11, Article 1.

Additionally, a general permit for discharges to WUS from the application of pesticides is currently being developed byADEQ under the AZPDES Permit Program. The ADEQ Pestiside General Permit is expected to be issued sometime in late 2011 and is based on the EPA's draft general permit. Once the Pesticides General Permit is approved and the mandate takes effect, permit coverage may need to be obtained before the application of pestisides is used for project vegetation control management.

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, 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. Based on a recent Natural Resources Conservation Service (NRCS) study, the project is located in an area that receives an averge of 17 to 19 inches of precipitation a year (NRCS 2010).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. Groundwater is the primary water source for domestic, industrial, and agricultural uses in the region and is obtained from two main aquifer systems, the R-aquifer and the C-aquifer (Reclamation 2006). 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. Although 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. It is mostly a confined aquifer, and water recharge occurs where it crops out or through downward leakage from the overlying aquifer through faults, fractures, and breccia pipes. Most groundwater from the R-aquifer discharges as springs along the Mogollon Rim or from canyon walls of the Colorado and Little Colorado rivers (Pool et al. 2011). 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 (977.5 billion gallons) of water is stored in the major aquifers of the Coconino Plateau Basin (ADWR 2009). Other estimates of groundwater storage in the C-aquifer range from 400 million up to 1 billion acre-feet (Reclamation 2006). One acre-foot of water is enough water to service 2.5 average households for one year (ADWR 2011a). Regional water supply for municipal, industrial, and agricultural use is for the most part derived from groundwater and long-term groundwater mining would have an impact on stream base flows and springs (Reclamation 2006). Total groundwater usage in the Coconino Plateau Basin averaged about 6,000 acre-feet per year between 2001 and 2005 (ADWR 2009).The C-aquifer is most heavily used by the Hopi and Navajo people. Havasu Springs, which is supported by the R-aquifer, is the primary water source for the Havasupai people (Reclamation 2006).

There are no springs located within the project area. Well data from ADWR indicate that there is one well within the project area, and it is owned by 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 2011b).

SURFACE WATER

The project area is located for the most part in the Cataract Creek watershed, with the exception of a small, approximately 2,900-acre portion in the southwest corner of the project area that is situated in the upper Verde River watershed. 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 major wash on the property is Cataract Creek, which drains northward in Cataract Canyon. Several tributaries, including Lo Draw and K Four Draw, 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. Approximately 2,900 acres 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 project area.

No stream flow data are available for the project area, and publicly 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 and 62 cfs) (USGS 2011a). Because of its sparse vegetation and steep landscape, the region is proen to flash flooding, and at least 16 floods have occurred over the past 100 years (NRCS 2010). As a result, the gage on Cataract Creek near Valle and another below Heather Wash were installed for the purpose of floodwarning for Supai Village. The gage near Valle submits a warning when flows reach 3,000 to 4,000 cfs, and the gage below Heather Wash submits a warning when flows reach 4,000 cfs, giving 4 hours of warning time.

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. Nineteen stock tanks were identified to be within the project area and are summarized in Table 3.5; data were obtained from USGS topographic maps and the USGS Geographic Names Information System database.

Table 3.5. Stock Tanks Located within the Project Area

Stock Tank Name	Cadastral Location
Bull Tank	T24N R01E Section 7
Davis Dam	T24N R01E Section 32
Flying H Tank	T23N R01E Section 8
Perkins Tank	T24N R01E Section 17
Sandstone Tank	T24N R01E Section 30
Cataract Tank	T24N R01E Section 16
Red Tank	T24N R01E Section 9
Lion Tank	T24N R01E Section 27
Elk Tank	T23N R01E Section 6
Little KY Tank	T23N R01E Section 21
Unnamed tank	T24N R01E Section 10
Unnamed tank	T24N R01E Section 12
Unnamed tank	T24N R01E Section 24
Unnamed tank	T24N R01E Section 25
Unnamed tank	T24N R01E Section 33
Unnamed tank	T24N R02E Section 32
Unnamed tank (2 tanks)	T23N R01E Section 1
Unnamed tank	T23N R02E Section 18
Unnamed tank	T23N R01E Section 14

Environmental Impacts

SIGNIFICANCE CRITERIA

Groundwater

A significant impact on groundwater would result if either of 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.

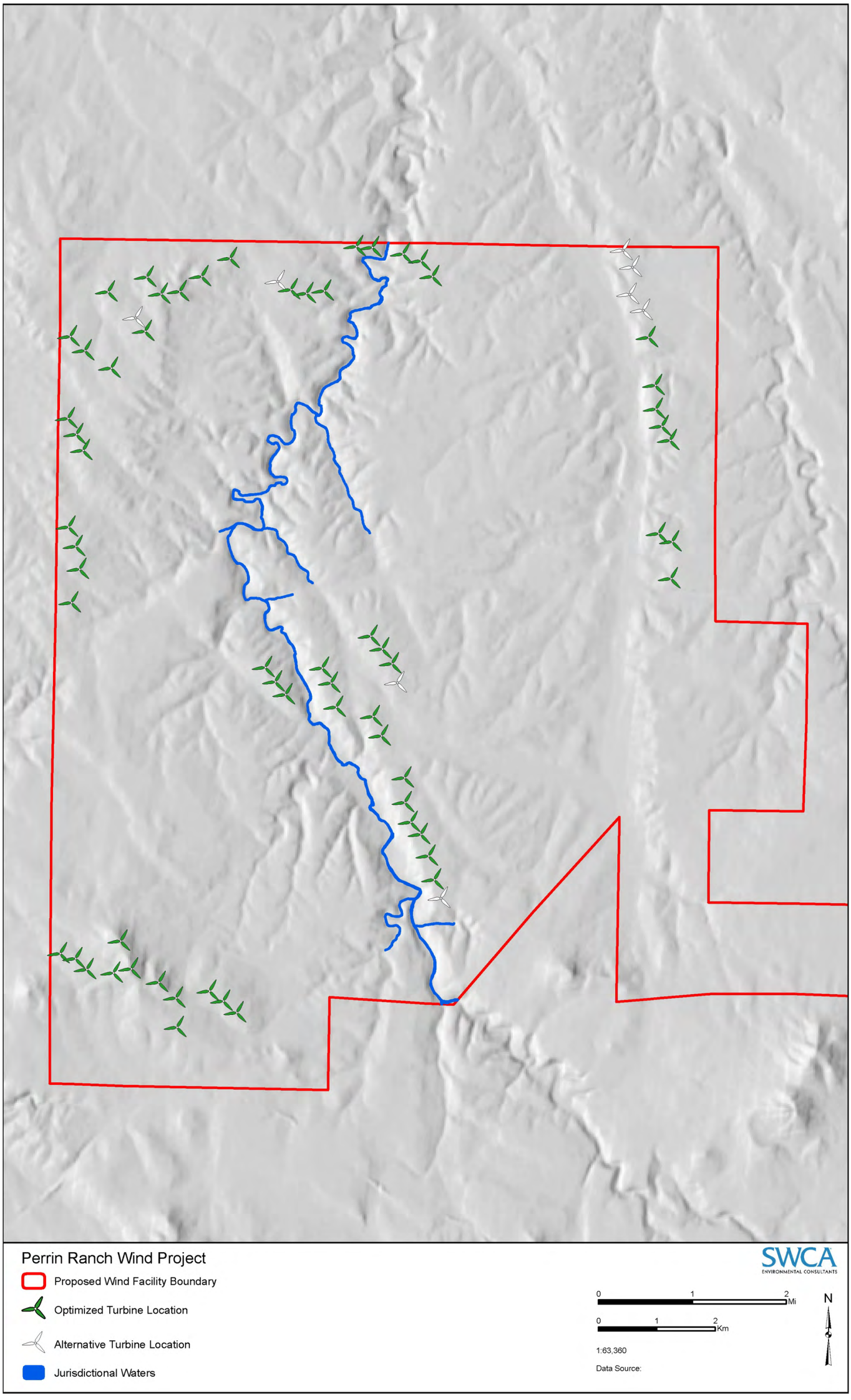

Figure 3.19. Jurisdictional waters within the project area.

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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. A total of 50 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 60 acre-feet (19.6 million gallons) of water would be needed during the construction phase to make concrete and for dust suppression. No new water source would be developed or water right obtainedfor 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 an existing water source 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 would be 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 60 acre-feet, or significantly less than 0.001% of the total groundwater available in storage for the basin and approximately 1% of the annual water use in the region, direct impacts to local groundwater quantity for construction of the project are considered to be insignificant.

In preparation for construction of turbine foundations, short-duration blasts will be used to break up rock prior to excavating and pouring concrete.With respect to groundwater quality, because the areas of

excavation will be closed with concrete when the foundations are poured, this method of breaking up the rock for excavation is not expected to provide a conduit through which contaminations could enter groundwater. Additionally, the propagation of fractures is well studied by the oil and gas industry and pressure on surrounding rock from near surface explosion such that will be used for the excavation do not appear to be of the same magnitude and duration of pressure from intended hydraulic fracturing. Effects from blasting decrease with distance and are dependent on the intensity of the blast. Blast effects (i.e., cracking of surrounding earth materials) from small-hole construction blasting can be present up to 7 feet away, while large-hole mining blasts can be present cracking up to 70 feet away (Dowding 1992). 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

Disturbance during the construction phase of the project totals approximately 650 acres (see Table 2.1), the majority of disturbance (627 acres) lies in the Cataract Creek watershed and the reminder (23 acres) lies in the upper Verde River watershed. With regard to the Catract Creek watershed, 0.04% of the 2,535-square-mile contributing drainage area of the Cataract Creek watershed above Supai, Arizona (USGS Gage No. 09404107 Cataract Creek below Heather Wash near Supai, Arizona). With respect to the Verde River watershed, 0.002% of the 2,150-square-mile contributing drainage area of the the Big Chino watershed near its confluence with the Verde River (USGS Gage No. 09503700 Verde River near Paulden, Arizona). Because the area of disturbance in the project area is very low (0.04% and 0.002%), compared with the entire contributing area of the affected watersheds, impacts to surface water or flooding in the Cataract Canyon and upper Verde Riverwatersheds are likely to be negligible and below the level of measurable effects.

Construction of the project would not directly disturb any stock tanks or 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 WUS 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 WUS 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 that they 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 AZPDES 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. Additional measures to control spills and waste management during construction will also be identified in the SWPPP. 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

It is assumed that approximately 0.07 acre-feet (24,000 gallons) of water will be used each year during the operational phase of the project for purposes such as water in the wash basins and restrooms and potable water for staff. Because there would be only negligible water demands during the operational phase of the project, no impacts to groundwater quantity are anticipated.

With respect to groundwater quality, the on-site septic system will require Type 4 General Permit coverage through Coconino County. Before construction of the septic system can begin, a Notice of Intent to Discharge from On-Site Wastewater Treatment Facility Serving Other Than a Single Family Dwelling will be filed with the County Public Health Services District, along with associated supporting documents. Supporting documents include such items as construction plans, soil reports, and percolation tests. Discharge Authorization to operate the facility is received only after the county performas a post-construction review and inspection.

Because the on-site septic system will be permitted through and inspected by Coconino County Public Health Services District and will meet the requirements of the Arizona General Aquifer Protection Permit, the potential for impacts to groundwater quality from the septic system during the operational phase of the project would be minor.

Surface Water

Disturbance during the operational phase of the project totals approximately 225 acres (see Table 2.2), the majority of disturbance (211 acres) lies in the Cataract Creek watershed, and the remainder (14 acres) lies in the upper Verde River watershed, which is 0.6% of the total project area or 0.01% and 0.001%, respectively, of the contributing drainage area to each watershed. 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, including species of concern, 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. Special-status plant species are subject to regulations under the authority of federal and state agencies. Federal special-status species include threatened and endangered species protected pursuant to the ESA of 1973, Section 4, as amended. Species designations prior to 1973 were originally appointed by the law that preceded the ESA, the Endangered Species Preservation Act of 1966. Additional U.S. Fish and Wildlife Service (USFWS) designations include Proposed, Candidate, Species of Concern, and Delisted Monitoring. Additional special-status species include Arizona Department of Agriculture (ADA) Highly Safeguarded or Salvage Restricted Native Plants; regulatory protection for these species does not apply to private land. The study area includes the project area and a surrounding 5-mile buffer (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).

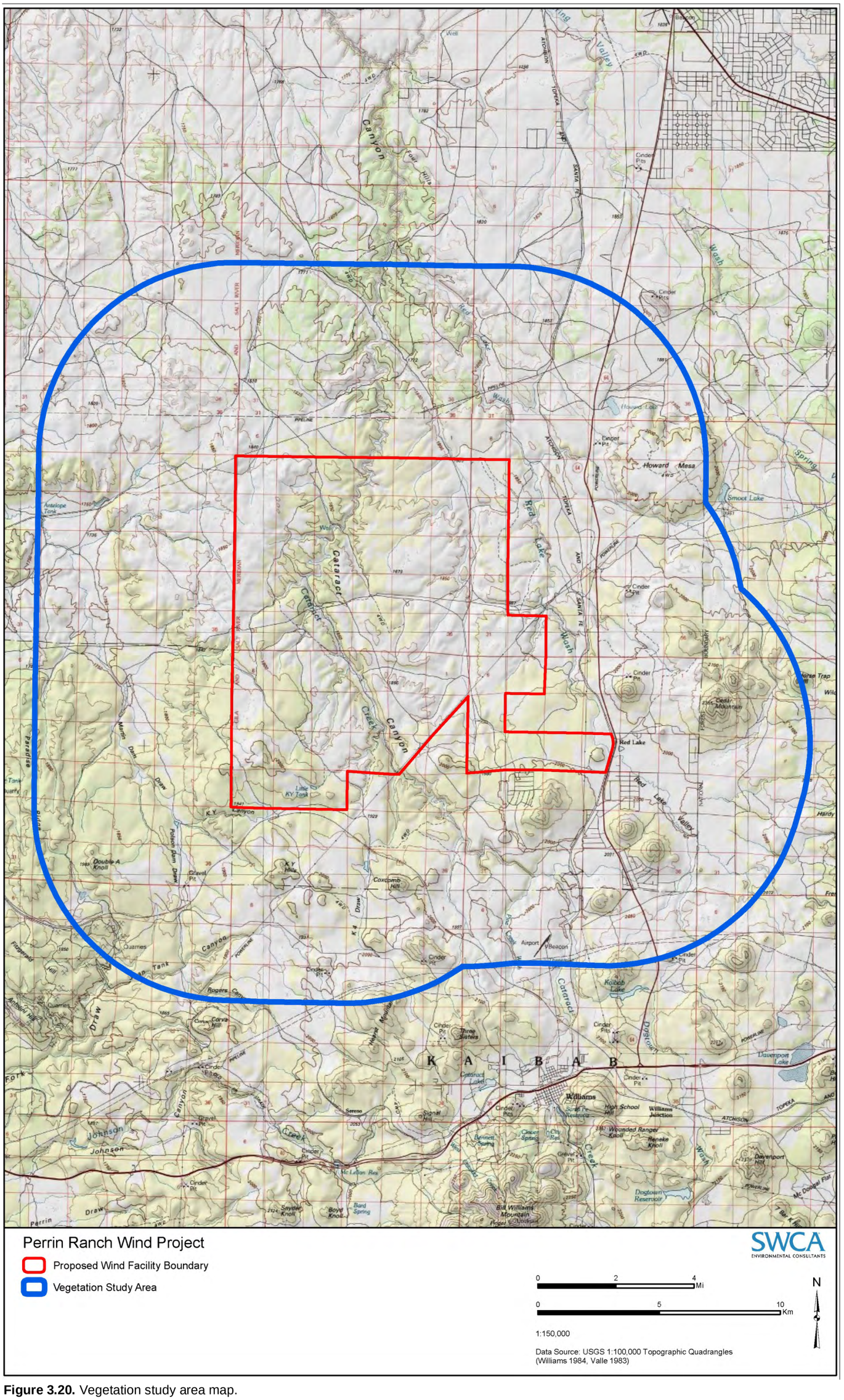

Figure 3.20. Vegetation study area map.

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Table 3.6. SWReGAP Land Cover Classes Found 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-Mountain 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-Mountain 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 geographic area, from western Colorado, northwest New Mexico, northern Arizona, and 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-Mountain 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 (*Artemisia* spp.), saltbush (*Atriplex* spp.), snakeweed, and winterfat (USGS 2004).

The Inter-Mountain 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 (*Artemisia 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 (*Achnatherum* 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

The USFWS (2010) and AGFD (2010a) have identified 56 plants with special status that have the potential to occur within Coconino County (Table 3.7). Species abstracts were reviewed to evaluate habitat requirements, species characteristics, and the potential for occurrence at or near the project area; the results of the review indicate that Tusayan rabbitbrush (*Chrysothamnus molestus*), Fickeisen plains cactus (*Pediocactus peeblesianus* var. *fickeiseniae*), our lords candle (*Yucca whipplei*), and green deathcamas (*Zigadenus virescens*) may occur in the project area. To help determine whether rare plant populations are present in the study area, AGFD's HDMS online tool was queried on April 12, 2010 (AGFD 2010a). This query did not result in identification of any state or federally protected plant species within the study area. Native plant surveys using ASLD protocol-level sample plots throughout State Trust land portions of the footprint were completed in spring 2011 in order to determine the appropriate fees for removal of native plants on lands administered by the ASLD, as well as to look for special-status plants. No special-status plant species were identified during those surveys. Additionally, surveys of the project footprint on all state lands for the four special-status plants that may occur were completed in spring 2011, and no special-status plants were observed. Although there is no regulatory protection on private lands for these species, most portions of the project on private land were also surveyed because of the need to cross them to access state lands. No special-status plants were observed on private lands during surveys.

Table 3.7. Sensitive Plant Species with Potential to Occur in the Project Area

Species Common name	Species Scientific name	ESA (protection Status)	State* (protection Status)	Potential for Occurrence in the Project Area
Grand Canyon century plant	*Agave phillipsiana*		HS	**Unlikely to occur.** Known from only four sites within Grand Canyon National Park, all of which are found on terraces along permanent waterways; also, there is no suitable habitat in the project area.
Bigelow's onion	*Allium bigelovii*		SR	**Unlikely to occur.** The project area does not contain suitable habitat or the plant species associated with Bigelow's onion.
Mogollon columbine	*Aquilegia desertorum*		SR	**Unlikely to occur.** The project area is well outside the known geographic range of the species.
Roaring springs prickly-poppy	*Argemone arizonica*	SC*		**Unlikely to occur.** The project area is well outside the known geographic range of the species.
Welsh's milkweed	*Asclepias welshii*	T*	HS	**Unlikely to occur.** There is no suitable habitat within the project area.
Gumbo milk vetch	*Astragalus ampullarius*	SC*		**Unlikely to occur.** There is no suitable habitat within the project area.
Sentry milk vetch	*Astragalus cremnophylax* var. *cremnophylax*	E†		**Unlikely to occur.** The proposed project area is below the elevational range for this species, does not contain the plant species associated with Sentry milk vetch, and is outside the species' known range.
Cliff milk vetch	*Astragalus cremnophylax* var. *myriorrhaphis*	SC*	SR	**Unlikely to occur.** The project area is well outside the known geographic range of the species.
Gladiator milk vetch	*Astragalus xiphoides*	SC	SR	**Unlikely to occur.** The project area is well outside the known geographic range of the species. In addition, the project area does not contain plant species associated with gladiator milk vetch.
Crenulate moonwort	*Botrychium crenulatum*	SC		**Unlikely to occur.** The project area is well outside the known geographic range of the species.
Western fairy slipper	*Calypso bullosa*		SR	**Unlikely to occur.** The project area is well outside the known geographic range of the species.
Slender evening-primrose	*Camissonia exilis*	SC	SR	**Unlikely to occur.** The project area does not contain suitable habitat or any plant species associated with the slender evening-primrose. In addition, the project area is outside the known geographic range of this species.
Grand Canyon evening-primrose	*Camissonia specuicola* ssp. *hesperia*	SC		**Unlikely to occur.** The project area is well outside the known geographic and elevational range of the species.
Navajo sedge	*Carex specuicola*	T*†	HS	**Unlikely to occur.** The project area does not contain suitable habitat for the species.
Tusayan rabbitbrush	*Chrysothamnus molestus*	SC*		**May occur.** The project area contains suitable open pinyon-juniper habitat and is within the known geographic range of the species.
Arizona bugbane	*Cimicifuga arizonica*	CA†	HS	**Unlikely to occur.** The project area is outside the known geographic range of the species.
Mogollon thistle	*Cirsium parryi* ssp. *mogollonicum*	SC	SR	**Unlikely to occur.** The project area is outside the known geographic range and is below the elevational range of the species. In addition, the project area does not contain plant species associated with the Mogollon thistle.
Missouri corycactus	*Coryphantha missouriensis*		SR	**Unlikely to occur.** The project area does not contain suitable habitat for the species.

Table 3.7. Sensitive Plant Species with Potential to Occur in the Project Area (Continued)

Species Common name	Species Scientific name	ESA (protection Status)	State* (protection Status)	Potential for Occurrence in the Project Area
Cameron water-parsley	*Cymopterus megacephalus*	SC		**Unlikely to occur.** The project area is not within the species' ecoregion (Great Basin desertscrub and desert-grassland).
Clustered barrel cactus	*Echinocactus polycephalus* var. *polycephalus*		SR	**Unlikely to occur.** The project area occurs outside the known geographic range of this species. The clustered barrel cactus occurs in the Sonoran and Mohave desert.
Grand Canyon cotton-top cactus	*Echinocactus polycephalus* var. *xeranthemoides*		SR	**Unlikely to occur.** The project area occurs outside the known geographic range of the species. In addition, the project area does not contain plant species associated with the Grand Canyon cotton-top cactus.
Ripley wild-buckwheat	*Eriogonum ripleyi*	SC*	SR	**Unlikely to occur.** The project area does not contain suitable habitat for the species.
Roundleaf errazurizia	*Errazurizia rotundata*		SR	**Unlikely to occur.** The project area is outside the known geographic range of the species.
Desert barrel cactus	*Ferocactus cylindraceus*		SR	**Unlikely to occur.** The species is found in the Mohave and Sonoran deserts. The project area is above the elevational range for this species.
Grand Canyon flaveria	*Flaveria mcdougallii*		SR	**Unlikely to occur.** The project area is outside the known geographic and elevational range of the species.
Flagstaff false pennyroyal	*Hedeoma diffusa*		SR	**Unlikely to occur.** The project area is outside the known geographic range of the species. The project area does not contain plant species associated with the Flagstaff false pennyroyal.
Kaibab bladderpod	*Lesquerella kaibabensis*	SC*		**Unlikely to occur.** The project area is outside the known geographic and elevational range of the species.
Broadleaf twayblade	*Listera convallarioides*		SR	**Unlikely to occur.** The project area is outside the known geographic range of the species. In addition, the project area does not contain plant species associated with the broadleaf twayblade.
Purple adder's mouth	*Malaxis porphyrea*		SR	**Unlikely to occur.** The project area is outside the geographic range and is below the elevational range of the species.
Yellow beavertail	*Opuntia basilaris* var. *aurea*		SR	**Unlikely to occur.** The project area is outside the known geographic and elevational range of the species.
Grand Canyon beavertail cactus	*Opuntia basilaris* var. *longiareolata*		SR	**Unlikely to occur.** The project area is outside the known geographic and elevational range of the species.
Navajo bridge cactus	*Opuntia polyacantha* var. *nicholii*		SR	**Unlikely to occur.** The project area is outside the known geographic and elevational range of the species.
San Francisco Peaks ragwort	*Packera franciscana*	T†		**Unlikely to occur.** The project area is outside the known geographic and elevational range of the species.
Brady pincushion cactus	*Pediocactus bradyi*	E*,†	HS	**Unlikely to occur.** The project area is outside the known geographic range of the species.

Table 3.7. Sensitive Plant Species with Potential to Occur in the Project Area (Continued)

Species Common name	Species Scientific name	ESA (protection Status)	State* (protection Status)	Potential for Occurrence in the Project Area
Paradine (Kaibab) plains cactus	*Pediocactus paradinei*	CA†, SC*	HS	**Unlikely to occur.** The proposed project area does not contain the habitat constituents known to support this species and is outside the geographic range where this species is known to occur.
Fickeisen plains cactus	*Pediocactus peeblesianus* var. *fickeiseniae*	C*†	HS	**May occur.** The project area is within the known geographic range of this species. In addition, the project area contains plant species associated with the fickeisen plains cactus.
Siler pincushion cactus	*Pediocactus sileri*	T*†	HS	**Unlikely to occur.** There is no suitable habitat within the project area.
Mountain ball cactus	*Pediocactus simpsonii*		SR	**Unlikely to occur.** The project area does not contain suitable habitat for the species.
Sunset crater beardtongue	*Penstemon clutei*	SC*	SR	**Unlikely to occur.** The project area does not contain any cinder fields and is outside the known geographic range of the sunset crater beardtongue.
Cinder phacelia	*Phacelia serrata*	SC*		**Unlikely to occur.** The project area does not contain suitable habitat and is outside the known geographic range of the species.
Welsh phacelia	*Phacelia welshii*	SC*		**Unlikely to occur.** The project area is outside the known geographic range of the species.
Rocky mountain bristlecone pine	*Pinus aristata*		SR	**Unlikely to occur.** The project area is outside the known geographic range and is below the elevational range of the species.
Alcove bog-orchid	*Platanthera zothecina*	SC*		**Unlikely to occur.** The project area does not contain suitable habitat for the species.
Grand Canyon primrose	*Primula specuicola*		SR	**Unlikely to occur.** The project area does not contain suitable habitat for the species and is outside the known geographic range of the species.
Parish alkali grass	*Puccinellia parishii*	SC*	HS	**Unlikely to occur.** The project area is outside the known geographic range of this species. In addition, the project area does not contain plant species associated with Parish alkali grass.
Grand Canyon rose	*Rosa stellata* ssp. *abyssa*	SC*	SR	**Unlikely to occur.** The project area is outside the known geographic range of this species. In addition, the project area does not contain plant species associated with the Grand Canyon rose.
Blumer's dock	*Rumex orthoneurus*	SC*	HS	**Unlikely to occur.** The project area does not contain suitable habitat for the species and is outside the known geographic range of this species.
Intermediate fishhook cactus	*Sclerocactus parviflorus* ssp. *ontermedius*		SR	**Unlikely to occur.** The project area does not contain suitable habitat for the species and is outside the known geographic range of this species.
Smallflower fishhook cactus	*Sclerocactus parviflorus* ssp. *parviflorus*		SR	**Unlikely to occur.** The project area does not contain suitable habitat for the species and is outside the known geographic range of this species.
House Rock Fishhook cactus	*Sclerocactus sileri*		SR	**Unlikely to occur.** The project area does not contain suitable habitat for the species and is outside the known geographic range of this species.
San Francisco Peak groundsel	*Senecio franciscanus*	T*	HS	**Unlikely to occur.** The project area is outside the known geographic range of this species.
Grand Canyon catchfly	*Silene rectiramea*	SC*		**Unlikely to occur.** The project area is outside the known geographic range of this species.

Table 3.7. Sensitive Plant Species with Potential to Occur in the Project Area (Continued)

Species Common name	Species Scientific name	ESA (protection Status)	State* (protection Status)	Potential for Occurrence in the Project Area
Tusayan flame flower	*Talinum vaildulum*	SC*	SR	**Unlikely to occur.** The project area does not contain suitable habitat for the species and is outside the known geographic range of this species.
Mazatzal triteleia	*Triteleia lemmoniae*		SR	**Unlikely to occur.** The project area does not contain suitable habitat for the species and is above the elevational range of the mazatzal triteleia.
Our lords candle	*Yucca whipplei*		SR	**May occur.** The project area is within the known geographic range of this species.
Green deathcamas	*Zigadenus virescens*		SR	**May occur.** The project area is within the known geographic range of this species.

Sources: AGFD (2011)

Notes: C = Candidate, CA = Categorical Agreement, E = Endangered, HS = Highly Safeguarded, SC = Species of Concern, SR = Salvage Restricted, T = Threatened

* AGFD (2009b).† USFWS (2010).

Noxious and Invasive Weeds

Three species of noxious weeds are known to occur within the project area (Table 3.8) (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 included in Table 3.8, although the containment or control of these plants is not regulated. The 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 3.8. 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 that 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 Native Plant Revegetation and Noxious Weed Management Plan (see Appendix C). The Native Plant Revegetation and Noxious Weed Management Plan details the types of impacts that would occur from disturbance to native vegetation communities and provides methods and techniques for returning impacted areas to pre-disturbance conditions. Included in the Native Plant Revegetation and Noxious Weed Management 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, or 0.6% of the project area. Long-term disturbance would extend throughout the life of the project and would 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 3.9. 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 is common and well distributed in the western United States.

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 Native Plant Revegetation and Noxious Weed Management Plan. No significant impacts to vegetation communities are anticipated to occur, as described by significance criteria above.

Table 3.9. 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**

Rare Plants

No state or federally protected plant species are known to occur within the project area; however, potential habitat is available for four special-status plant species. Surveys of the project footprint on all state lands and most private lands for the four special-status plants were completed in spring 2011, and no special-status plants were observed. 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 by 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 (unpermitted harvesting of native plants under ARS 37-481 and 37-502) of native 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 Native Plant Revegetation and Noxious Weed Management Plan (see Appendix C) would address the control and treatment of noxious weeds in the project area. The Native Plant Revegetation and Noxious Weed Management Plan includes methods for 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 by significance criteria above.

Rare Plants

No state or federally protected plant species are known to occur within the project area; however, potential habitat is available for four special status plant species. Operation and maintenance would not include vegetation removal or habitat loss; therefore, there would be no impacts to rare plants resulting from operation and maintenance of the Proposed Action. No significant impacts to rare plants are anticipated to occur, as described by significance criteria above.

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 consist of 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 would 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. Precipitation trends on the Coconino plateau over the past decade suggest that the climate may become drier over the next several decades (USGS 2002). The effects of this potential climate change may result in a reduction in overall plant cover, as well as changes to the existing vegetation communities across the Colorado plateau. Although the effect of climate change on vegetation in the project area is uncertain and may take decades to manifest, it is assumed there will be some contribution to changes in overall plant cover and species composition in the project area over the long term. 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 Native Plant Revegetation and Noxious Weed Management Plan (see Appendix C) provides all the necessary mitigation for vegetation resources. Nno 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. Vegetation conditions would continue, as described in the affected environment.

3.3.5 Wildlife

This section describes wildlife, including special-status species, 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. Special-status wildlife species are subject to regulations under the authority of federal and state agencies. Federal special-status species include threatened and endangered species protected pursuant to the ESA of 1973, Section 4, as amended. Species designations prior to 1973 were originally appointed by the law that preceded the ESA, the Endangered Species Preservation Act of 1966. Additional USFWS designations include Proposed, Candidate, Species of Concern, and Delisted Monitoring. Additional special-status species include AGFD Wildlife of Special Concern. The study area for all wildlife species includes a 3-mile buffer (i.e., the extent of the HDMS search request [AGFD 2010a]) 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 include general wildlife and species that are protected through state and federal regulations.

Affected Environment

RAPTORS

Raptors include diurnal birds of prey (Order Falconiformes) and nocturnal birds of prey or owls (Order Strigiformes). The 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 in Table 3.10. 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/or 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.

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 ARS 17-102 and 17-236.

SWCA initiated site-specific raptor surveys in spring 2010, and these are still underway. Survey methods have followed those identified by the AGFD (2009a) guidelines, 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 because of 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 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 in Table 3.11.

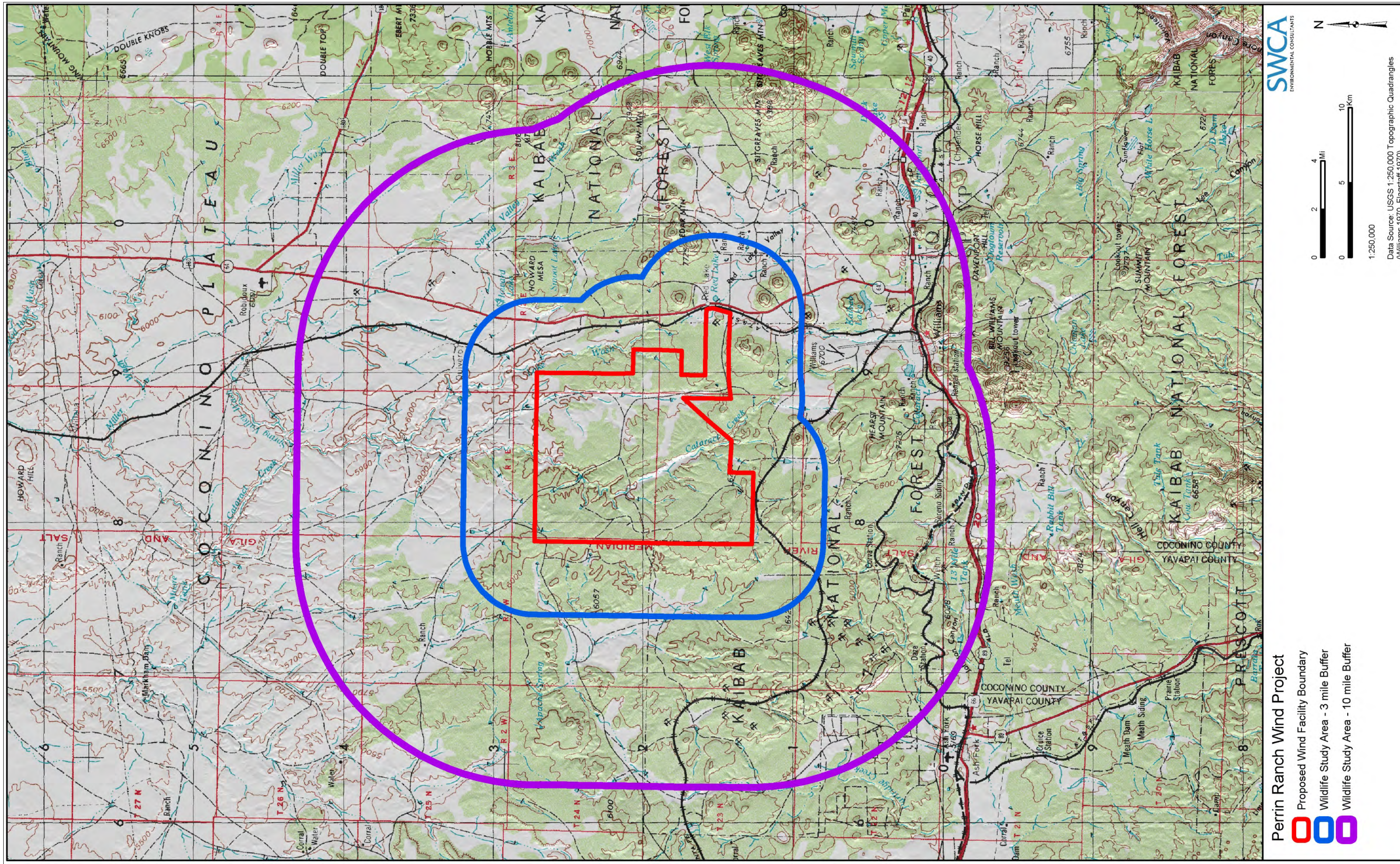

Figure 3.21. Wildlife study area map.

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Table 3.10. Raptor 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
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.
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.

Table 3.10. 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
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, Forest Service, National Park Service, or other sensitive species; 1C = Species was identified as vulnerable but did not meet criteria identified for 1A or 1B.

* AGFD (2010a).

† USFWS (2010).

± USFWS (2008).

Table 3.11. Non-raptor Avian 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
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.

Table 3.11. Non-raptor Avian Species with Potential to Occur in the Project Area (Continued)

Species Common Name	Species Scientific Name	USFWS (protection status)	AZ SWAP (protection status)	Potential for Occurrence in the Project Area
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.
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.

Table 3.11. Non-raptor Avian Species with Potential to Occur in the Project Area (Continued)

Species Common Name	Species Scientific Name	USFWS (protection status)	AZ SWAP (protection status)	Potential for Occurrence in the Project Area
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.
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.

Table 3.11. Non-raptor Avian Species with Potential to Occur in the Project Area (Continued)

Species Common Name	Species Scientific Name	USFWS (protection status)	AZ SWAP (protection status)	Potential for Occurrence in the Project Area
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*	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.

Table 3.11. Non-raptor Avian Species with Potential to Occur in the Project Area (Continued)

Species Common Name	Species Scientific Name	USFWS (protection status)	AZ SWAP (protection status)	Potential for Occurrence in the Project Area
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.
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; C = Candidate; E = Endangered; 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, Forest Service, National Park Service, or other sensitive species; 1C = Species was identified as vulnerable but did not meet criteria identified for 1A or 1B.

* AGFD (2010a).

† USFWS (2010).

± USFWS (2008).

BATS

The USFWS and 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 in Table 3.12. In accordance with AGFD guidelines (AGFD 2009a), a year-long site-specific acoustic bat study was initiated by Pandion Systems, Inc. (Pandion), in May 2010, using ReBAT acoustic detectors (Pandion 2011). Detectors were placed on MET towers just above ground level and at the top of towers approximately 60 m above the ground, within the rotor swept area. A ground unit was also placed at the top of Cataract Canyon to help identify bats using the canyon system. Detectors ran every night, from just before dusk to after dawn. The Pandion study resulted in the identification of 18 bat species, including many of those identified in Table 3.12, with the exception of 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 in September and October 2010 within Cataract Canyon and six weeks of acoustic surveys and five mist-net capture surveys in May and June 2011. AnaBat acoustic and mist-net capture

surveys confirmed the presence of 14 of the 18 species observed by Pandion, as well as the western red bat (less than 1% of acoustic detection), bringing the total species' count to 19 (SWCA 2011). 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 3.12. 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	N/A	**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	N/A	**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	**Likely to occur.** The project area has very limited suitable habitat for the species, but the species has been acoustically detected in very low amounts.
Western small-footed myotis	*Myotis ciliolabrum*	SC	N/A	**Unlikely to occur.** The project area does not contain suitable habitat for the species.

Table 3.12. Sensitive Bat Species with Potential to Occur in the Project Area (Continued)

Species Common name	Species Scientific name	USFWS (protection status)	AZ SWAP (protection status)	Potential for Occurrence in the Project Area
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, Forest Service, National Park Service, or other sensitive species; 1C = Species was identified as vulnerable but did not meet criteria identified for 1A or 1B. N/A = not applicable.

Sources: AGFD (2010a); 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 because of 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 more than 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. While a limited number of studies have been done within the range of the Mexican free-tailed bats, it may be assumed that this species is susceptible to mortality, based on their flight characteristics. Mexican free-tailed bats are likely to be at greatest risk of collision during the fall migratory period (Pandion 2011). 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), a time when its numbers are lower than other bat species in the project area..

BIG GAME

According to 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 general reptiles and amphibians were not performed within the project area. Because of 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).

The USFWS and AGFD have identified four amphibians and two reptiles with special status that have the potential to occur within Coconino County (Table 3.13; AGFD 2010a; USFWS 2010). Species abstracts were reviewed to evaluate habitat requirements, species characteristics, and the potential for occurrence at or near the project area. The results of the review indicate that those species are unlikely to occur in the study area, except for the narrow-headed gartersnake (*Thamnophis rufpunctatus*). Further, AGFD's HDMS online tool was reviewed on April 12, 2010, and no special-status reptile or amphibian species were identified within 5 miles of the study area (AGFD 2009a).

Table 3.13. Sensitive Reptile and Amphibian Species with Potential to Occur in the Project Area

Species Common name	Species Scientific name	ESA (protection Status)	State* (protection Status)	Potential for Occurrence in the Project Area
Amphibians				
Arizona toad	*Anaxyrus microscaphus*	SC*		**Unlikely to occur.** The project area is outside the known geographic range of the species.
Chiricahua leopard frog	*Rana chiricahuensis*	T*†	WSC	**Unlikely to occur.** The project area is well outside the known geographic range of the species.
Northern leopard frog	*Rana pipiens*		WSC	**Unlikely to occur.** The project area is outside the known geographic range of the species.
Lowland leopard frog	*Rana yavapaiensis*	SC*	WSC	**Unlikely to occur.** The project area is well outside the known geographic range of the species.
Reptiles				
Northern Mexican gartersnake	*Thamnophis eques megalops*	C*†	WSC	**Unlikely to occur.** The project area is well outside the geographic range of the species.
Narrow-headed gartersnake	*Thamnophis rufipunctatus*	SC*	WSC	**May occur.** The project area is within the geographic range and elevational range of this species. The project area contains suitable habitat for the narrow-headed gartersnake.

Sources: AGFD (2011).

Notes: C = Candidate, SC = Species of Concern, T = Threatened, WSC = Wildlife of Special Concern.

* AGFD (2009b).† USFWS (2010).

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).

The USFWS (2010) and AGFD (2010a) have identified five small mammals with special status that have the potential to occur within Coconino County (Table 3.14). Species abstracts were reviewed to evaluate habitat requirements, species characteristics, and the potential for occurrence at or near the project area. The results of the review indicate that those species are unlikely to occur in the study area, except for the Navajo Mexican vole (*Microtus mexicanus navaho*) and the Wupatki Arizona pocket mouse (*Perognathus amplus cineris*). Further, AGFD's HDMS online tool was reviewed on April 12, 2010, and no special-status small-mammal species were identified within 5 miles of the study area (AGFD 2009a).

Table 3.14. Sensitive Small-Mammal Species with Potential to Occur in the Project Area

Species Common name	Species Scientific name	ESA (protection Status)	State* (protection Status)	Potential for Occurrence in the Project Area
Houserock Valley chisel-toothed kangaroo rat	*Dipodomys microps leucotis*	SC*	WSC	**Unlikely to occur.** The project area is well outside the known geographic range of the species.
Hualapai Mexican vole	*Microtus mexicanus hualpaiensis*	E*	WSC	**Unlikely to occur.** The project area is outside the known geographic range of the species.
Navajo Mexican vole	*Microtus mexicanus Navaho*	SC*	WSC	**May occur.** The project area is within the geographic and elevational range of the species. There is suitable habitat within the project area for this species.
Black-footed ferret	*Mustela nigripes*	E† EXPN†		**Unlikely to occur.** The project area is outside the current geographic range of the species.
Wupatki Arizona pocket mouse	*Perognathus amplus cineris*	SC*		**May occur.** The project area is within the known geographic range of the species.

Sources: AGFD (2011).

Notes: E = Endangered, EXPN = Experimental Population/Non-essential, SC = Species of Concern, WSC = Wildlife of Special Concern

* AGFD (2009b).† USFWS (2010).

In addition to the list generated by USFWS and AGFD, Gunnison's 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), which may attract raptors to the area to forage; this may be to the result of 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 *v*. 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 (compared with 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 3.15. 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 3.15. 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.

Table 3.15. Potential Construction Impacts on Wildlife (Continued)

Wildlife Impact	Potential Effect and Likely Wildlife Affected	Effect Intensity and Duration
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, which 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; therefore, direct 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, which 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 to the amount of potential habitat within the project area; therefore, these actions are anticipated to have a minor adverse impact. Furthermore, the limited amount of habitat that would be lost would not differ in quality from the expanse of habitat that would remain in the project area.

In accordance with 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 Native Plant Revegetation and Noxious Weed Management Plan (see Appendix C). 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 are anticipated to occur from construction of the Proposed Action, as described by significance criteria above.

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. In accordance with 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 Native Plant Revegetation and Noxious Weed Management Plan (see Appendix C). No significant adverse impacts to non-raptor avian species are anticipated to occur from construction of the Proposed Action, as described by significance criteria above.

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 are anticipated to occur from construction of the Proposed Action, as described by significance criteria above.

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 are anticipated to occur from construction of the Proposed Action, as described by significance criteria above.

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 more likely that reptiles and amphibians would be directly killed from construction activities as a result of ground-disturbing activities. These species are highly mobile, and most will temporarily move to avoid crushing by equipment. However, reptiles in particular may seek refuge within burrows that could be crushed during construction activities. As described in Section 2.2.7, a 25-mph speed limit would be enforced, which would allow animals to move out of the way and help reduce the potential for crushing. Further, the worker education awareness plan would teach workers to watch for and avoid wildlife, and the on-site biological monitor would enfore those actions. The reptiles and amphibians that are expected to occur in the project area are relatively common, and the loss of some individuals is unlikely to affect local populations, especially with the conservation measures that are in place. No significant impacts to reptiles and amphibians are anticipated to occur from construction of the Proposed Action, as described by significance criteria above.

Small Mammals

Potential adverse impacts to small mammals resulting from construction of the Proposed Action would predominantly be the same as those described for reptiles. The small mammals that are expected to occur in the project area are relatively common, and the loss of some individuals is unlikely to affect local populations. No significant impacts to small mammals are anticipated to occur from construction of the Proposed Action, as described by significance criteria above.

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 barotrauma 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 3.16 and are described in relation to the wildlife group that may be affected.

Table 3.16. 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 bird 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 H). 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 impact 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 H). The 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 H). Therefore, no significant impacts to raptors are anticipated to occur from operation and maintenance of the Proposed Action, as described by significance criteria above.

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 H). 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 H). Therefore, no significant impacts to non-raptor avian species are anticipated to occur from operation and maintenance of the Proposed Action, as described by significance criteria above.

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 (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 H). 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.

Current literature does not support or deny the potential for wind facilities to change bat movement patterns, although at this time it does not appear that bats habituate to wind projects over time and learn to avoid collisions. 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 (see Appendix H). Therefore, no significant impacts to bats are anticipated to occur from operation and maintenance of the Proposed Action, as described by significance criteria above.

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. Although no studies have been published related to noise from wind turbines affecting prey species' ability to hear predators, it is possible that a minor impact could occur. However, if it occurs, it is only expected to have localized effects where noise is greatest around turbines. The potential area affected would be small relative to the area used by big game and would not substantially increase mortality from predators.

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 are anticipated to occur from operation and maintenance of the Proposed Action, as described by significance criteria above.

Reptiles and Amphibians

Direct, long-term, adverse impacts may occur on 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 are anticipated to occur from operation and maintenance of the Proposed Action, as described by significance criteria above.

Small Mammals

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

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 on 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.

Precipitation trends on the Coconino Plateau over the past decade suggest that the climate may become drier over the next several decades (USGS 2002). The effects of this potential climate change may result in a reduction in groundwater recharge, loss of plant cover, increased erosion, changes to existing vegetation communities, and changes to species composition across the Colorado Plateau. In addition, the effects of climate change would contribute to reduction in available wildlife habitat and changes to wildlife species composition. Although the effect of climate change on wildlife in the project area is uncertain and may take decades to manifest, it is assumed there will be some contribution to changes in habitat and wildlife species composition in the project area over the long term.

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 mean 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 contributed or would contribute to injury, mortality, loss of habitat, habitat fragmentation, avoidance, and displacement, but careful siting of these facilities and appropriate mitigation are important factors 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 project is located completely within the Williams Unified School District.

DEMOGRAPHICS

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; 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; 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; Census Bureau 2009c). No census or demographic data are available for the small private subdivisions in the study area. Additionally, the most recent data on urban and rural population distribution are from 2000; at that time, all of Williams was considered 100% rural (Census Bureau 2000).

ECONOMIC ACTIVITY

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, with small contributions made by the Forest Service, a manufacturer, and a mining company (Arizona Department of Commerce 2008). In 2004, the accommodation and food services sectors provided the most employment of any sector in Williams in terms of overall employment. Williams, like many area communities, benefits from visitors to the region, who book hotel rooms, eat, purchase gas, and shop, among other activities.

The Grand Canyon Railway is the single largest employer for Williams (Arizona Department of Commerce 2008). Per capita employment is more than "6 times higher than the national average in the accommodation subsector and twice the national average in the food services subsector. Williams had very little employment in the other sectors with a significant basic component, including manufacturing and wholesale trade" (Arizona Department of Commerce 2008:4). Additionally, Williams has a relatively low per capita employment figure (342 for every 1,000 residents), indicating that many residents of Williams commute to jobs in other communities (i.e., Flagstaff, etc.).

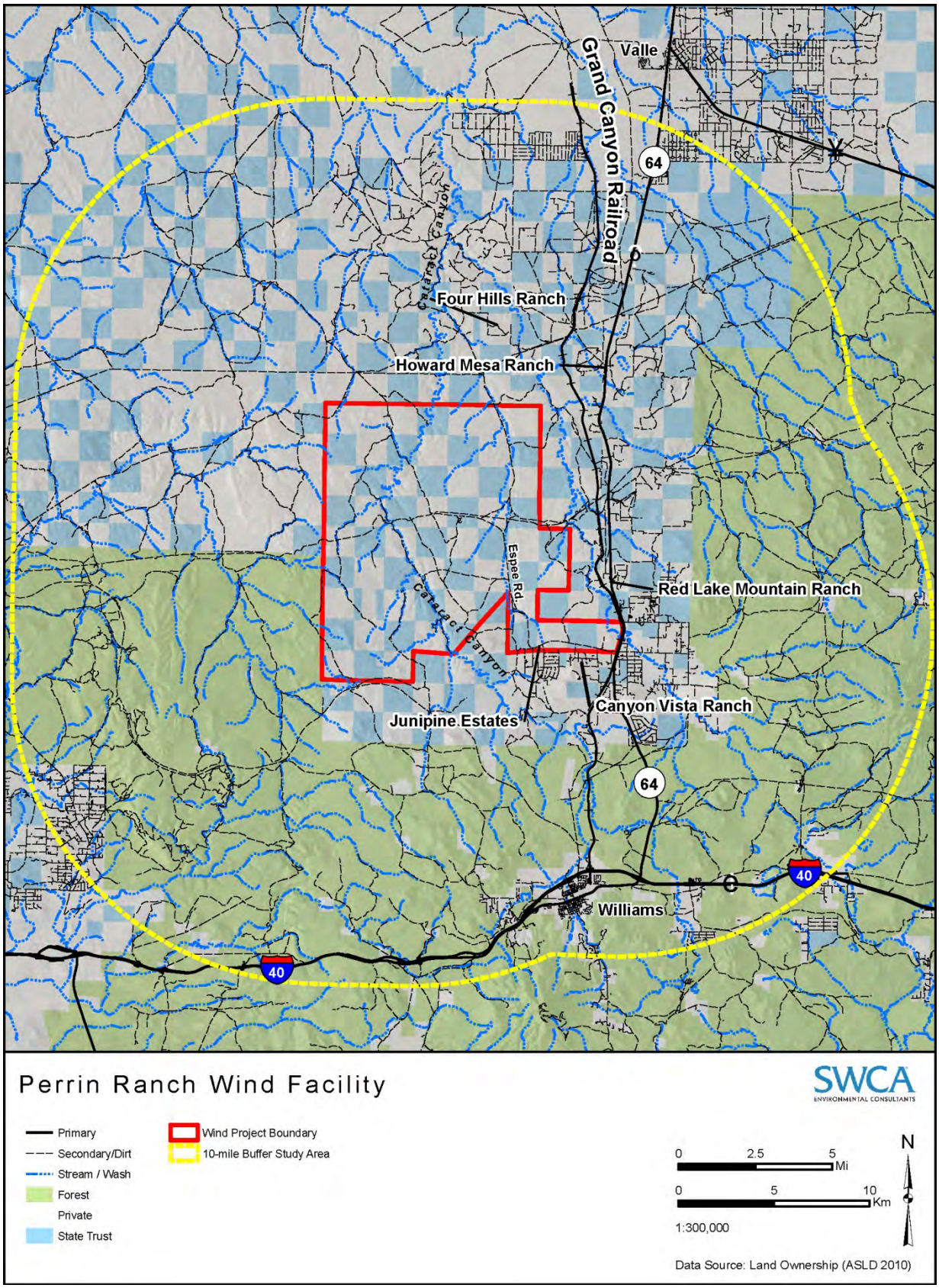

Figure 3.22. Study area for socioeconomics, transportation, and human health and safety.

Among the tourism-related activities, big game hunting is very popular within the study area. As presented in Table 3.17, between 2005 and 2009, hunter days in GMU 10 averaged 7,120 (AGFD 2010b). In terms of the economic activity generated by hunting in GMU 10, using the state average value of hunting of $125 per day (USFWS 2006), the estimated economic value of big game hunting in the 1.4-million-acre GMU 10 is $890,025.

Table 3.17. 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 (2010b)

It is important to note that the worldwide recession and 2008 financial crisis have resulted in a national decrease in tourism-related activity. In Arizona, travel spending declined by 10.2% between 2008 and 2009, compared with a 7.7% decline for the U.S. over the same time period (Runyan 2010).

QUALITY OF LIFE

Common social trends in the western United States include rapidly growing urban populations, increased concern over loss of open space, increasingly transformed landscapes, continued and increasing loss of biodiversity, increased pressures for uses of all types (in particular, strong trends in recreation uses, such as hiking, biking, off-highway vehicle and sport utility vehicle use, camping, picnicking, etc.), rising pressures for preservation and conservation, and increased feelings of loss associated with public and private lands, including lost access to public lands and recreation.

Increased growth in northern Arizona exerts environmental pressures on surrounding areas as development moves closer to public lands. As growth continues and development increases, the demand for access to and use of open space and recreation areas will also increase.

Williams and the surrounding area 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. Many people live in this area because of the undisturbed vistas and quiet. Landscape appearance and scenery can be important amenities, not just as recreation opportunity settings, but also as elements of the region's identity.

PROPERTY VALUE

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.

PROPERTY TAXES

State property tax in Arizona, collected by county treasurers, is based on property value (ad valorem). In general, revenue from primary property tax collections helps fund state and local government budgets in terms of local government operating budgets and school and fire districts. Counties can use their allocation of property taxes to fund superior court systems, sheriff's departments, transportation projects, and emergency services. Because property taxes are based on property value, as values fluctuate, so do assessments and tax collections. In 2010, Coconino County levied $86.85 million from primary property taxes, up from $76.38 million in 2009 (Arizona Department of Revenue 2010). Property tax revenue reported for Williams was $558,396 in 2010, up from $506,155 in 2009 (Arizona Department of Revenue 2010). In 2010, property tax revenue represented 7.88% of the total revenue for the City (Arizona Department of Revenue 2010).

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. Both Coconino County and the Williams Unified School District would receive tax revenues from the project. The project would generate sales and use taxes for goods and services purchased during construction (and operation and maintenance, see below).

Table 3.18 below was prepared by the Renewable Energy Program Coordinator at Northern Arizona University for the proponent's CUP application (NextEra 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 3.18).

Table 3.18. NREL JEDI Model Results of 99-MW Wind Development in Arizona for the Construction Phase

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

Source: Adapted from NextEra (2010).

* 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. Overall recreation use of, and tourism acitivity within, the study area is not expected to decline or result in a decrease in visitor spending during the construction phase of the project. Construction traffic, visual changes, and increased noise and dust may affect tourists and recreationists; however, recreationists and area users are expected to avoid the project site during construction, but are not expected to stop recreating in the region altogether.

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 adverse 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 3.19). Local revenue and supply chain impacts includes property tax revenue.

Table 3.19. NREL JEDI Model Results of 99-MW Wind Development in Arizona for the Operation Phase

Project Component	Earnings*	Output*
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**

Source: Adapted from NextEra (2010).

* Annual impact.

As during construction, overall tourism acitivity within the study area is not expected to decline or result in a decrease in visitor spending during the operation and maintenance phase of the project. The hunting and tourism experience in and adjacent to the projet may change as the landscape changes; however, recreationists and hunters would still have the ability to hunt on Perrin Ranch, and tourists would still travel on SR 64 to access the South Rim of the Grand Canyon.

Additionally, as previously noted (see Section 3.3.1, "Aesthetics and Visual Resources"), travelers on the Grand Canyon Railway 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.Although the project would be visible, Xanterra Parks and Resorts, operators of the Grand Canyon Railway has expressed public support for the project, stating that "it can actually help to provide visitors to the Grand Canyon with the first-hand opportunity to understand the benefits that renewable energy has on our environment and the preservation of our National Parks" (personal communication, Lane 2010). Xanterra has also suggested it would include a discussion of the project, the participants, and its benefits to tourists on the train (personal communication, Lane 2010).

In terms of quality of life, residents often move to the region because of the rural, undeveloped landscape; a shift from this landscape expectation to a more industrialized landscape would negatively impact local residents who are seeking a rural residential community.

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 be affected by the stigma associated with the general area around the energy facility appearing more developed and less rural, with a change in the area landscape because of the energy facility, and because of concerns for nuisances such as noise, shadow flicker, etc. 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.

Like Sterzinger et al. (2003), a study conducted by the Lawrence Berkeley National Laboratory (LBNL) (Hoen et al. 2009) examined the effects of wind energy projects on residential property values using a hedonic pricing model. LBNL (Hoen et al. 2009) examined the potential effect of wind energy projects in terms of area stigma, scenic vista stigma, and nuisance stigma. This analysis (Hoen et al. 2009) researched several questions, including (1) all else being equal, do homes near wind facilities sell for prices different than for homes located farther away? And (2) all else being equal, do homes near wind facilitates that sell after the construction of the wind facility sell for prices different from similar homes that sold before the announcement and construction of the facility? Based on the model by LBNL, no statistical evidence was revealed to suggest that home prices surrounding wind facilities are consistently, measurably, or significantly affected by either the view of the facility, or the distance from the facility. Although this analysis, like Sterzinger et al. (2003), cannot dismiss the possibility that individual homes could be negatively impacted, there is no evidence to suggest that these impacts would be statistically observable. It is important to note that the Hoen et al. (2009) study did not include an analysis of the Perrin project or Arizona home prices; however, the authors stated that the results of the 2009 (Hoen et al. 2009) study are expected to be transferrable to other areas. Thus, construction and operation of the project could result in direct and indirect adverse impacts to individual homes; however, property value is not expected to be measurably impacted within the study area.

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 2010). Annual property tax payments of $140,000 would represent a 0.16% increase in county property tax collections over 2010 property tax levies.

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.). As noted previously, power from the project would be purchased by APS; electricity rates for APS are regulated by the ACC. The end recipient or user of power is not known at the wholesale level.

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

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 3.19), 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. Past and present actions have resulted in the current socioeconomic conditions in the analysis area, as described in the "Affected Environment" part of this section. Past and present actions that influence socioeconomic conditions include hunting, grazing, residential growth, and urban development.

Although reasonably foreseeable actions in the study area include additional urban and rural growth and the associated increase in pressure on the recreational and tourism experiences in the study area, the rural nature of the 11.95 million acre Coconino County is unlikely to change at a landscape level. Coconino National Forest is located wholly within Coconino County and itself covers 1.86 millon acres, in addition to portions of Kaibab and Apache-Sitgreaves National Forest and Grand Canyon National Park. Thus, there are vast areas of federal lands that would not be subject to residential and industrial development and the associated pressures.

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.

Mitigation Measures

According to Condition No. 21 of Coconino County Resolution No. 2011-04 (see Appendix B), "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."

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. Within these traditional use areas, Red Butte, which is regarded as a sacred site by several tribes, is one the most notable features on the Coconino Plateau.

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 I).

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 the tribe updated with the results of the meeting. The field visit with government representatives of the Havasupai Tribe and Hualapai Nation, accompanied by representatives from Western, SWCA, and the project proponent and landowner, was conducted on May 6, 2011. Results of this field visit are provided in Section 1.6 of this EA.

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, then 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 of the ABPP (SWCA 2011; see Appendix H), 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.

The project area is located between 25 and 34 miles southwest of Red Butte. Although there is a clear line of site from Red Butte to the project area, and turbines within the project Area are potentially visible, at these distances, any visual contrasts would be negligible and the form, line, and color of the turbines would be difficult to see. Additionally, there are 12- to 15-foot-tall juniper trees along the southern edge

of the Red Butte that would screen those views to the southwest. Any potential visual dispruptions to Red Butte during operations would be negligible (Figure 3.23).

Figure 3.23. Photographic simulation from Red Butte.

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 Interstate 40 (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 SR 64, 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 earth-moving 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 25 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 40 mph during operation and maintenance of the project.

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 F, 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 following:

- 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.

3.3.9 Recreation

This section provides an overview of existing recreation resources and opportunities and a description of the proposed changes that would result during construction and operation of the project. The study area for recreation includes the Perrin Ranch and AGFD GMU 10 (Figure 3.24). The GMU is used to account for hunting opportunities in the area.

Affected Environment

The primary recreation opportunity in the study area is big-game hunting. 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 (see Table 3.17) (AGFD 2010b). 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 2010b).Turkey and mountain lion are also hunted in GMU 10 in the fall, although no months are provided.

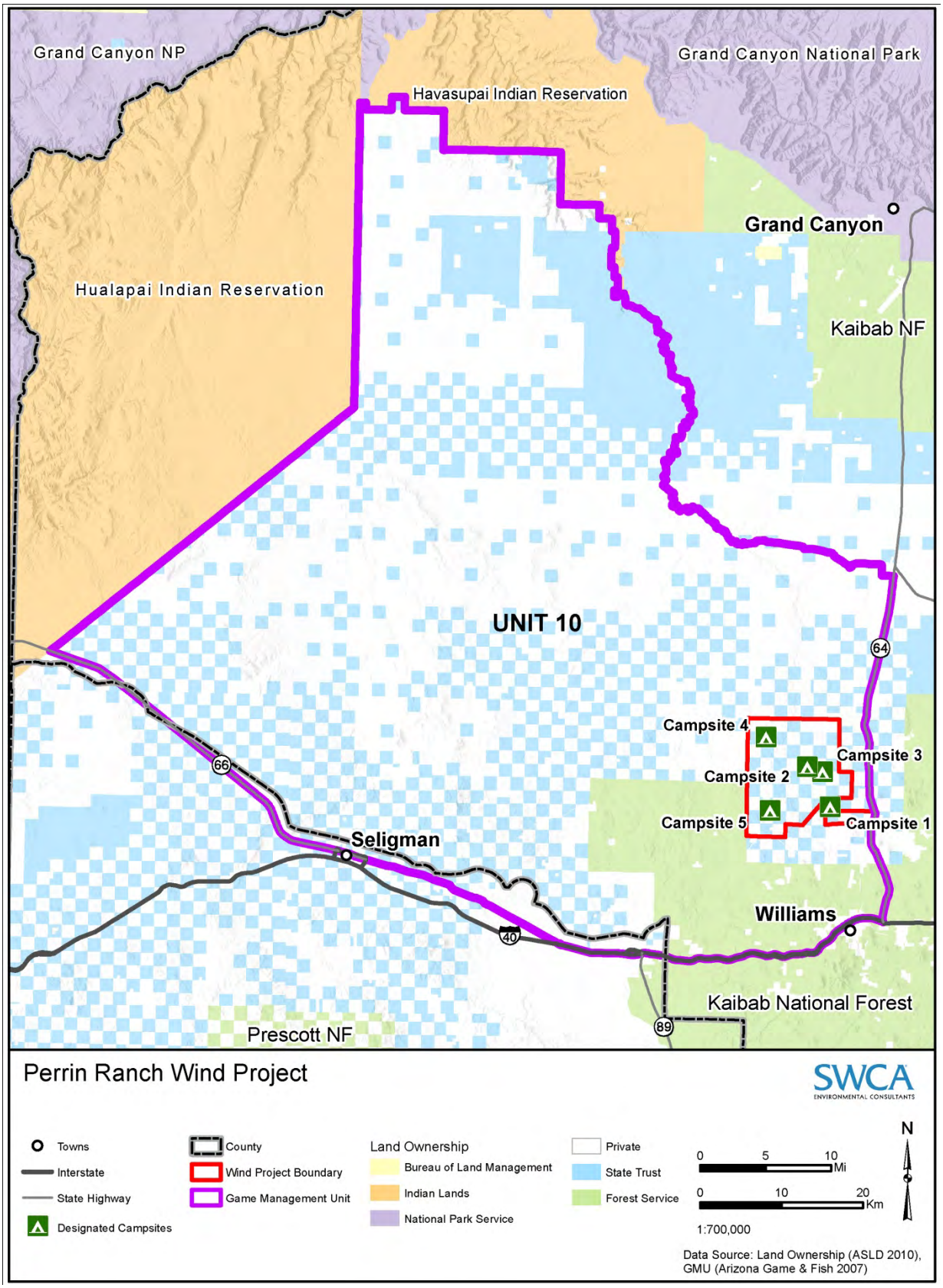

Figure 3.24. Study area for recreation.

The AGFD, together with private landowners, administers a program called Adopt-A-Ranch, which allows public use of private land. Perrin Ranch, LLC, the owners of the private land on which the project would be constructed, participates in an Adopt-A-Ranch program with AGFD (AGFD 2009b). 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 43,715-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 who 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 2009b).

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 four locations within the Perrin Ranch: Espee Road and SR 64, the K-4 tank entrance, the boundary between Perrin Ranch and the Aja Ranch, and the northern Perrin Ranch boundary on Espee Road. 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). Other ranches in the southeastern portion of GMU 10 are currently closed to public access and hunting and include the Oden, Aja, Goldtrap, and Blair ranches.

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 campsites. Further, these campsites are not designated for a specific recreational experience, but rather for use by people hunting on Perrin Ranch.

Environmental Impacts

SIGNIFICANCE CRITERIA

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

- Increased demand for recreation activities due to the influx of people during construction and operation of the proposed project would exceed capacity for that activity in a given area such as a campground, wilderness, hunting area and/or trails.
- Conflicts with established recreational areas.
- Project-related changes that alter or otherwise physically affect established, designated or planned recreation areas or activities.
- Decreased accessibility to areas established, designated, or planned for recreation.

DIRECT AND INDIRECT IMPACTS OF THE PROPOSED PROJECT

Construction

To maintain public safety during construction activities, AGFD would temporarily restrict hunting with firearms during the 2011 fall hunt season within the Perrin Ranch project area; however, archery hunting would continue to be allowed. To implement the restriction, AGFD would not reduce the overall number of permits issued for GMU 10, but would send a mailing to individuals with hunting permits for GMU 10, including information on the restriction. Individuals with hunting permits for firearms in GMU 10 may

elect to hunt with a bow in the project area rather than move to a different area within the GMU. The temporary restriction would be lifted for the 2012 fall hunting season after construction activities are completed. Perrin Ranch would remain open to the public during construction activities for all other authorized uses.

The temporary restriction would result in the possible displacement of up to 550 to 600 hunters per month during the 2011 fall hunt season from the Perrin Ranch to other areas within GMU 10 (personal communication, Macauley 2011). The Perrin Ranch boundary of 43,715 acres (see Figure 3.24) is 3.1% of the total area of GMU 10. Therefore, due to the small relative percentage reduction in hunting area and the short timeframe, it is anticipated that hunters in GMU 10 would be able to hunt in other areas of the GMU during the 2011 season and would return to using the ranch in 2012.

The Proposed Action would not result in direct disturbances to the five designated campsites within the project area; these designated camping areas are not located within short- or long-term disturbance areas, and no closures or restrictions would be implemented. Workers involved with construction activities would not be allowed to camp on site and therefore would not affect availability of the designated campsites in the Ranch.

In terms of the four significance criteria described for recreation, the project area would remain open and accessible, and the temporary limitation on hunting with firearms would only affect one fall hunting season. None of these criteria would be met during construction activities; thus, none of the project impacts would be significant.

Operation and Maintenance

The presence of turbines and other structures in the project area would result in some limitations on hunting opportunities as a result of the potential for damage to facilities and infrastructure from discharging firearms. Under Arizona Game and Fish laws and rules, established in ARS Title 17, Chapter 3, “Game and Fish,” Article 17-309. It is unlawful for a person to discharge a firearm within 0.25 mile of an occupied farmhouse or other residence, cabin, lodge, or building without permission of the property owner or resident. A 0.25-mile buffer around each of the proposed 62 turbines would total 5,525.7 acres where this restriction would occur, which represents 12.6% of the 43,715 acres Perrin Ranch and 0.39% of the 1.4-million-acre GMU 10.

As described in Section 3.3.5, “Wildlife,” big-game species are expected to return to the site during operations in similar numbers and would therefore not result in an impact to the quality of hunting opportunities in the project area. Operation and maintenance would result in negligible changes to the baseline conditions for recreation opportunities and resources in the project area. In terms of the four significance criteria described for recreation, the project area would remain open and accessible. None of these criteria would be met by the operation and maintenance of the turbines; thus, none of the project impacts would be significant.

CUMULATIVE IMPACTS

The cumulative impacts study area for recreation is GMU 10. Projects that would contribute impacts to recreation opportunities and resources in GMU 10 include the Coconino National Forest Motorized Travel Management Plan Environmental Impact Statement, Williams Travel Management EA, the Tusayan Travel Management EA, Forest wide recreation information kiosks, and Coconino County Trails and Greenways plan. The implementation of these plans and projects would contribute to greater recreation opportunities and to a designated system of roads and trails that would be open to public access for recreation opportunities, including hunting activities, throughout the cumulative impacts study area.

Because the Proposed Action would result in short-term impacts to hunting opportunities, there would be no cumulative change to recreation opportunities in GMU 10.

Mitigation Measures

In accordance with the Coconino County Resolution No. 2011-04, Condition No. 12e (see Appendix B), Perrin Ranch Wind would work with AGFD and the Perrin Ranch landowner to develop a "hunter access plan" to ensure continued access by hunters to the ranch.

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. Recreation opportunities and resources would continue as described in the affected environment.

3.3.10 Human Health and Safety

This section provides an overview of the existing human health and safety conditions, and a description of the changes to these conditions that would result from the construction and operation of the project. The study area for human health and safety 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 police, fire, and safety officers would originate. (See environmental impacts discussions below.)

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 (Williams also has the most advanced fire department in the study area); however, several small private subdivisions exist within 1.5 miles of the project area. 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. Concerns for human health and safety within the project area would extend to these surrounding communities primarily for the safety concerns regarding wildfire. Beyond the 10-mile study area boundary the land is mostly Kaibab National Forest to the west, south, and east, and additional "checkerboard" private/ASLD land to the north.

Affected Environment

There are few existing risks to human health and safety in the study area. Wildland fire is the primary existing health and safety risk; thus, the discussion regarding human helath and safety is focused on fire risks. As discussed throughout this EA, the predominant activities that currently occur within the project footprint include grazing and hunting, and associated vehicular travel. Activities that occur in the study area but outside the project footprint also include travel on SR 64 and the Grand Canyon Railway, residential living and ranching at nearby communities (i.e., Junipine Estates and Howard Mesa Ranch), driving for pleasure/off-highway-vehicle use on Forest Roads, and fuel wood cutting.

Vegetation of the project area ranges from grasslands to pine-woodlands. Fire activity for different vegetation types normally will increase in response to seasonally declining moisture and humidity levels combined with winds. Table 3.20 describes the total acreages and respective fire risk of project area vegetation types.

Table 3.20. Fuel hazards of the Perrin Ranch Wind Project

Vegetation Type	Total Acreage	Fuel Hazard
Colorado Plateau Pinyon-Juniper Woodland	30,527	High
Inter-Mountain Basins Semi-Desert Shrub Steppe	4,462	Moderate
Inter-Mountain Basins Juniper Savanna	2,091	Moderate
Inter-Mountain Basins Semi-Desert Grassland	1,388	Low
Inter-Mountain Basins Big Sagebrush Shrubland	1,001	Moderate
Rocky Mountain Ponderosa Pine Woodland	172	Extreme
Inter-Mountain Basins Mixed Salt Desert Scrub	128	Moderate

As previously mentioned, the City of Williams Fire Department is the most advanced (fire-fighting equipment and ambulance transport) fire department in the study area. However, several volunteer fire departments also exist in the study area, including the Red Lake Fire Department and Junipine Volunteer Fire Department, each located approximately 2 miles from the project area. These two fire departments do not have ambulance-transport services, but would offer basic life support and fire-fighting engines. In addition, the Parks/Bellemont Fire District and Sherwood Forest Volunteer Fire Department are located in Williams and offer basic life support and fire-fighting engines.

The City of Flagstaff Fire Department is located outside the study area.

An established transportation and utility network provides access and necessary emergency services to the surrounding communities.

Environmental Impacts

As described below, there are possible risks to human health and safety if the Proposed Action were implemented. The project includes several protection measures designed to minimize these risks; as a result, direct or indirect impacts to human health and safety are expected to be minor.

SIGNIFICANCE CRITERIA

A significant impact to human health and safety would result if any of the following were to occur from construction or operation of the proposed project:

- Interference with emergency response capabilities or resources.
- Creation of worker health hazard(s) beyond limits set by health and safety regulatory agencies or that endangers human life and/or property.
- Serious injuries to workers, visitors to the area or area land users.
- Creation of electric and magnetic fields near an existing or proposed sensitive land use, such as schools or hospitals, which would pose a plausible risk to human health.
- Creation of substantial interference and disruption of emergency communications and electronic health/safety devices that results in substandard performance.
- Changes in traffic patterns that result in hazardous situations for motorists or pedestrians.

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. 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.

The risks associated with wildfire increase when humans move into a previously unoccupied area. 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.

In addition, the hazardous materials described in Section 3.2 would be contained within the project structures (nacelle, O&M facility, Perrin Ranch Wind vehicles) and would not be exposed to wildfire unless the wildfire or an electrical malfunction came within contact of a structure. As described below, efforts to extinguish fires before they reach uncontrollable levels would be implemented immediately upon the discovery of the fire, provided that there is no danger to life or personal safety. Methodology to contain environmental contaminants within structures that have been burned would be in compliance with applicable local, state, and federal laws and regulations; however, due to the limited amount of hazardous materials (coolants, fuels, and lubricants) that is expected to be on-site, the risk of environmental contamination is minor.

Although the construction would be short term, the increase in human activity would increase the likelihood of wildfire ignition from vehicle and equipment sparks, combustible fuel spills, electrical currents, and human negligence. Thus, construction of the project would result in a short-term increase to the risk of wildfire. Because the study area includes up to five fire departments, the increase in risk to wildfire during construction would not necessitate a separate fire department on-site. The local fire departments would be made aware of all project construction schedules and activities. Short-term travel restrictions resulting from construction (temporary changes in access and moderate increases in traffic) would be coordinated with local fire and safety officers. In addition, a Fire Protection and Emergency Response Plan would be provided to all local fire departments, and maps and copies of the Fire Protection and Emergency Response Plan would be posted at construction work trailers and the O&M facility.

Landowners around the project area and the Coconino County Sheriff's Office (and other emergency officials, as appropriate) 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.

The increases in traffic during construction are not anticipated to change Level of Service (LOS) (see Section 3.3.8, "Transportation"); however, the slight increase in traffic would increase the risk of safety on project area roads to all users from existing conditions. The increase in risk to roadway safety would be short-term but negligible. Since all project-related traffic during construction would be limited to 25 mph and since all construction activities would be coordinated with local safety officials (fire, police, and emergency), no interferences with the ability of the local safety officers to respond would occur.

All project construction activities would be in conformance with relevant safety laws, such as OSHA, to prevent serious injuries. Therefore, the construction of the project would not create work hazards beyond the limits established by relevant safety regulations.

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 risk to human health and safety would be significantly lower during operation and maintenance than construction, primarily due to the reduction in human activity, as described under construction.

The risk of wildfire would also be reduced during operation and maintenance, but would still be present since the presence of electrical currents, combustible fuels, and human activity would persist during operation and maintenance. The long-term risk to human health and safety from wildfire potential would be minor, compared with the general overall risk to wildfire in the study area due to the dry and windy conditions.

The ability for local emergency responders would return to existing conditions during operation and maintenance of the project, since no roads or access would be closed, traffic would return to existing conditions, and Perrin Ranch Wind would continue to coordinate maintenance activities, as appropriate, with local emergency officials.

Wind turbines manufactured today incorporate the highest quality and safety standards, but the potential for a fire always exists when electronics and combustible fluids such as lubricants exist in the same enclosure.

All hazardous material storage and dispensing areas, as well as waste storage areas, would be equipped with secondary containment features. Likewise, fluid-containing transformers or generators would also be installed within seconday containment features or be designed in such a way that their outer cases serve as containment devices.

CUMULATIVE IMPACTS

The cumulative impacts study area for human health and safety is Coconino County. The additive or synergistic effects of the projects listed in Appendix F, when analyzed with the Proposed Action, are generally minor. The existing environmental conditions in the study area reflect the natural and anthropogenic changes brought on by long-term human occupancy and use of the study area. In addition to the specific cumulative actions provided in Appendix F grazing practices; resource extraction (timber cutting); vehicle travel along gravel and paved forest, county, and state roadways; railroad operation and use; operation of existing transmission facilities; hunting and camping improvements; and drainage improvements are the general activities that have occurred and are presently occurring in the study area. Given the overall risk of wildfire to Coconino County, the Proposed Action would make a minor and long-term contribution to the cumulative human health and safety impacts that would result from construction and operation; however, these cumulative impacts are not expected to change the overall risk to human health and safety in the cumulative study area.

Mitigation Measures

To avoid and minimize potential impacts on human health and safety, Perrin Ranch Wind developed a Fire Protection and Emergency Response Plan (Fire Protection Plan) to protect both workers and the general public during construction, operation, and decommissioning of the project. The Fire Protection Plan identifies safe work practices for each task, and a training program would be included for all

contractors working during construction. Documentation of training and mechanism for reporting serious accidents to appropriate agencies would be established. As an added precaution, all operational vehicles and facilities within the project area would contain firefighting equipment. The nacelles would be equipped with fire suppression systems and alert mechanisms. Additionally, Perrin Ranch Wind is committed to providing funding to the local fire department to increase firefighting response capabilities.

ENVIRONMENTAL IMPACTS OF THE NO ACTION ALTERNATIVE

Under the No Action Alternative there would be no changes to existing human health and safety conditions.

3.3.11 Geology, Mineral Resources and Soils

Following is an overview of the physical features of the project area's geology, mineral resources, and underlying soils, and an analysis of the environmental consequences of project implementation on these resources. The scope of the analysis for geology, mineral resources, and soils includes a review of available data relevant to the scope of the project within the project area. The study area for analysis of these resources is defined as the project area footprint (see Figure 1.1). The environmental consequences were analyzed in terms of 1) how construction and operation of the project could affect these resources, and 2) how mitigation measures implemented during construction and operation could prevent or minimize these impacts.

This analysis assumes that a variety of relevant plans, programs, and BMPs would be implemented to prevent damage to the environment. Relevant BMPs such as erosion control and sediment retention measures, topsoil conservation, and reseeding protocols would be detailed in the SWPPP and Native Plant Revegetation and Noxious Weed Management Plan (see Appendix C).. These plans would ensure that proper measures are planned in advance for procedures to be implemented during construction, reclaiming disturbed land after construction, and long-term stability during operation of the project.

Geotechnical testing has been performed, and engineers have determined that geologic and soil conditions on the project area are suitable for supporting the proposed project infrastructure.

Affected Environment

GEOLOGY

The project area is located near the southernmost area of the Coconino Plateau Basin and is within the ADWR Western Plateau Planning Area. The planning area covers about 13,700 square miles and is bounded on the north by the state of Utah, on the east by the Eastern Plateau Planning Area, on the south by the Central Highlands and Upper Colorado River Planning Area, and on the west by the state of Nevada (ADWR 2009). The portion of the planning area that contains the project area is within the Colorado Plateau physiographic province, which is characterized by generally horizontally stratified sedimentary rocks that have eroded into numerous incised canyons and high desert plateaus.

The Western Plateau Planning Area is generally characterized by flat-lying alternating sequences of sandstones, limestones, and shales. Mesozoic to Paleozoic sedimentary and volcanic rocks cover most of the planning area. Faults and folds in these rocks affect groundwater movement along the regional gradient (ADWR 2009).

Additional geological information was obtained from the USGS Mineral Resources On-Line Spatial Data website's State Geologic Map Compilation (USGS 2011b), and the Arizona Geological Survey Geologic

Map of Arizona (Map 35) (Richard et al. 2000). The majority of the subject property is mapped in an area of Permian sedimentary rocks consisting of gray to tan, cherty limestone of Kaibab and Toroweap Formations, and underlying white to tan, fine-grained Coconino Sandstone. The limestone was deposited in a shallow sea, and sandstone was deposited in near-shore dunes and beach settings. Limestone and sandstone are the primary and secondary rock types, with some gypsum, mudstone, dolomite, and orthoquartzite.

The southwest and southeast corners of the subject property are mapped as Pliocene to late Miocene basaltic rocks and Holocene to middle Pliocene basaltic rocks. They are mostly dark, inconspicuously flat, low-lying or mesa-forming basalt deposited as lava flows. Basaltic lava and cinders may be young enough that some original volcanic landforms are still apparent. The primary rock types are basalt and alkaline basalt.

The southeast tip of the subject property is mapped as Quaternary surficial deposits, undivided. These are unconsolidated to strongly consolidated alluvial and eolian deposits, and include coarse, poorly sorted alluvial fan and terrace deposits on middle and upper piedmonts and along large drainages; sand, silt and clay on alluvial plains and playas; and wind-blown sand deposits.

The Triassic Moenkopi Formation is mapped in the northwest corner of the subject property. This feature is dark red sandstone and mudstone, and may include gypsum beds, that were deposited on a low-relief coastal plain. Within this feature an area is mapped as Oligocene to Paleocene sedimentary rocks. These are light colored, weakly to moderately consolidated conglomerate and sandstone deposited largely or entirely before mid-Tertiary volcanism and extensional faulting. Most sediment was deposited by early Cenozoic streams that flowed northeastward onto the Colorado Plateau from areas to the southwest that are now lower in elevation than the Plateau. Sediments of this map unit are commonly referred to as ”rim gravels” because they now rest on or near the Mogollon Rim, which is the southwestern edge of the Colorado Plateau (Richard et al. 2000; USGS 2011b). No areas of geological importance (those types defined in the North American Stratigraphic Code [North American Commission on Stratigraphic Nomenclature 2005]), unique geological features (as defined by due process), or important state-identified rock outcroppings are known to occur on the project area.

Land subsidence and earth fissures are known to occur in the basins of Arizona. Land subsidence is generally due to compaction of the alluvium caused by lowering of the water table, and is generally limited to the lower elevation alluvial valleys of Arizona. No land subsidence areas are mapped on or in the vicinity of the project area by the Geophysics/Surveying Unit of the ADWR Hydrology Division (ADWR 2011c).

Earth fissures are associated with basin subsidence that accompanies extensive ground water mining in alluvial basins of the arid valleys of central and southeastern Arizona. In Arizona, they are concentrated in areas of the main alluvial valleys where groundwater withdrawal for highly populated areas and/or agriculture is high. Mapping provided by the Arizona Geological Survey (AGS) Earth Fissure Mapping Program was reviewed to determine whether fissures have been reported or confirmed in the vicinity of the project. The project is not located within one of the AGS study areas, and a review of the mapping indicates that ground fissures have not been reported or confirmed in the vicinity of the project (AGS 2011).

Mapping provided by the USGS Earthquake Hazards Science Center was reviewed to determine whether fault lines have been reported or confirmed in the vicinity of the project. A number of geological faults are mapped on and in the vicinity of the project area. These are located primarily along and parallel with the overall alignment of the Cataract Creek basin. The project is located in the Cataract Creek Fault Zone (USGS 2011c). Numerous normal faults cut an erosion surface formed on Paleozoic rocks between the southern margin of the Colorado Plateau (the Mogollon Rim) and the Grand Canyon. The faults are west

of the Pliocene-Quaternary San Francisco volcanic field, and Quaternary deposits are very sparse. The Cataract Creek faults trend mainly northwest. The term Cataract Creek fault system has been used to encompass a fairly broad, northwest-trending zone of faults and historical seismicity that extends from the Grand Canyon southwest to the Winslow, Arizona, area (Pearthree 1998). Figure 3.25 below shows mapped fault lines on the footprint of the project area and vicinity.

A number of earthquakes have been reported north of the project area between 1990 and 2006 (USGS 2011c); however, data from the USGS Earthquake Hazards Program indicate that the project area has only a 2% probability of exceeding peak ground accelerations of 14 to 18 %g (where 1 g = 9.81 m/s^2) in 50 years (USGS 2011d, 2011e).

MINERAL RESOURCES

Information regarding mineral resources in the project area was obtained from the Arizona Department of Mines and Mineral Resources (ADMMR), which was made a branch of the Arizona Geological Survey in 2011. On the project area, an active cinder mine exists on Perrin Ranch property approximately 2,000 feet west of SR 64 and approximately 1,700 feet north of Espee Road. The few mineral producers in the region of the project produce dimension stone, pumice, and cinders (ADMMR 2002a). No major mines or copper resources were identified on or in the vicinity of the project area (ADMMR 2002b, 2010). Areas of uranium production and occurrence were identified north of the project area, closer to the Grand Canyon, but not on the project area (ADMMR 2008). With the exception of cinders, no saleable mineral resources are known to occur on the project area. The proposed project is located in northern Arizona, a region populated with numerous cinder cones. Cinders are not a rare or difficult to obtain commodity in northern Arizona.

SOILS

Soil data were compiled from mapping on the NRCS Web Soil Survey (NRCS 2011). Although many soil types are mapped on the project area, a few generalizations can be made about the primary soils and where they are encountered.

The most common soils on the project area, within the areas that would be impacted, are Deama-Rock outcrop complex (8%–30% slopes), Showlow gravelly fine sandy loam (8%–30% slopes), and Tusayan-Lynx association (gently sloping). Deama soils are shallow and very shallow, well-drained soils with moderately slow permeability above a very slowly permeable limestone bedrock. They formed in colluvium mainly from limestone and are found on hills, ridges, plateaus, and mesas. Runoff is high on slopes less than 1% and very high on slopes greater than 1%. This complex includes rock outcroppings.

Showlow soils consist of very deep, well drained soils that formed in mixed gravelly alluvium and colluvium from pyroclastics, basalt, sandstone, sandy shale, limestone, and granite. These soils are on fan terraces, hills, and plateaus, and may consist of 0% to 35% gravel and cobble, and 0% to 15% stones. This soil exhibits medium to rapid runoff, and slow or very slow permeability.

Tusayan soils are moderately deep, well-drained soils that formed in alluvium and eolian deposits from limestone and calcareous sandstone. Lynx soils are deep, well-drained soils that formed in mixed alluvium and are found on floodplains and alluvial fans in slightly convex positions. Although this soil complex is generally found on hills, plateaus, and mesas, it is mapped in wide washes on the subject property. This soil series may ranges from 20% to 80% gravel content. This soil series exhibits slow or medium runoff, and moderate permeability.

Winona stony loam (0%–8% slopes) is found on the plateaus and hills of the subject property. Winona soils are very shallow and shallow well-drained soils that formed in eolian deposits over alluvium from

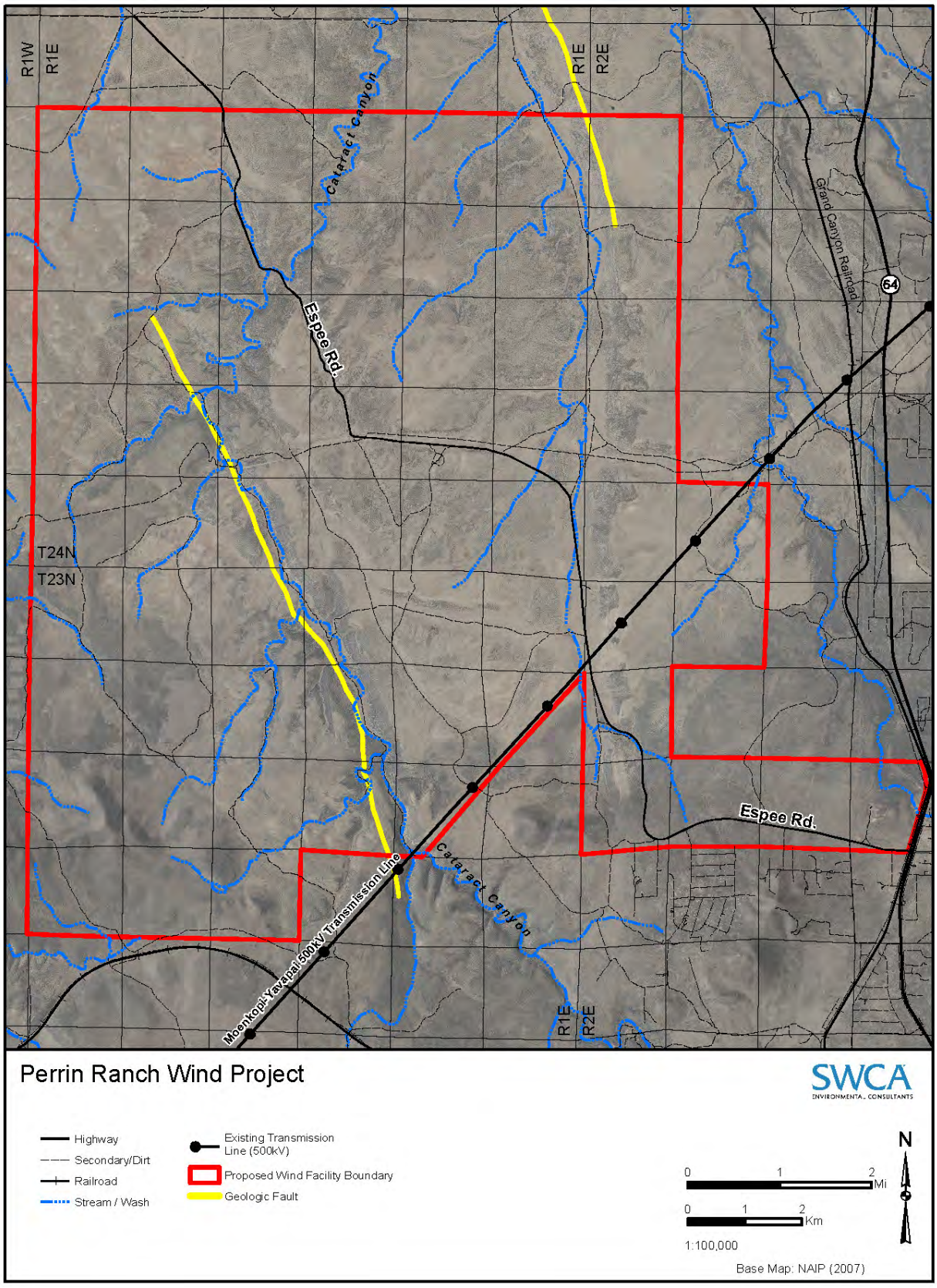

Figure 3.25. Mapped fault lines on the project footprint and vicinity.

limestone and calcareous sandstone. There may be 35% to 70% limestone and chert gravel, channers, cobble, and flagstones within this soil type. This soil series exhibits slow to rapid runoff and moderate permeability.

Soils mapped in washes and draws are primarily Paymaster-Lynx association (gently sloping) and Tusayan-Lynx association (gently sloping). Paymaster soils are very deep, well-drained soils that formed in stratified alluvium from granite, limestone, basalt, and acid igneous rock. They are found on floodplains and alluvial fans, and exhibit medium runoff and moderately rapid permeability. Lynx soils are deep, well-drained soils that formed in mixed alluvium and are found on floodplains and alluvial fans. Lynx soils exhibit slow runoff and moderately slow permeability.

Soils mapped in the deeper canyons and the steep edges of washes are Winona-Rock outcrop complex (30%–70%) slopes. Winona soils are described above, and this complex includes rock outcroppings.

Hills in the south of the subject property are mostly mapped as Ziegler-Wilaha association (strongly sloping). Ziegler soils are deep, well-drained soils that formed in pyroclastics and basalt. They are found on hillslopes and fan terraces. Wilaha soils are shallow, well-drained soils that formed from pyroclastics and are found on hills and fan terraces (NRCS 2011).

None of the soils described above are known to uniquely support threatened or endangered plant species. Figure 3.26 depicts the various soil associations overlaid on the project area.

For soils in the project area, soil series descriptions and their engineering and management characteristics were reviewed to determine whether sensitive soils were present. All soil reclamation efforts on the project will be limited by the region's dry climate. All soils in the project area are low in content of organic matter, and generally have poor tilth. Most soils in arid regions such as this contain soluble salts and in places those salts may be concentrated. Fertilizer is generally required to obtain better yields in local soils (U.S. Department of Agriculture [USDA] 1983).

The capability classes and capability subclasses of soils in the project area were reviewed to identify potential limitations to reclamation efforts and sensitivity to erosion. Capability classes, which range from Class I to Class VIII, are the broadest classification and indicate progressively greater limitations and narrower choices for practical use. All soils in the project area fall under capability Classes VI and VII. Capability Class VI is important in its natural state as grazing land, but cannot be cultivated for agriculture due to soil and/or climate limitations. Class VII soils have no capability for soil-bound agriculture and are described as having "very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife" (USDA 1983). Capability subclasses indicate the main limitation of that soil, such as erosion, low fertility, or shallowness. Soils in the project area fall into a variety of capability subclasses, as indicated in Table 3.21, below.

The primary limitation on project area soils is shallowness, droughtyness, and stonyness (capability subclass *s*). Dryness (*c*) and erosion (*e*) are much less of a factor. Although not listed as specific limitations, soils in the project area generally have limited depth of topsoil, low organic content, and droughty nature. The effects of these limitations on soil resources would be increased potential for small amounts of erosion to amount to a larger percentage of the soil column, and a much longer time period for revegetation to occur. Properly implemented BMPs for soil stabilization, along with a revegetation plan, would serve to minimize these effects.

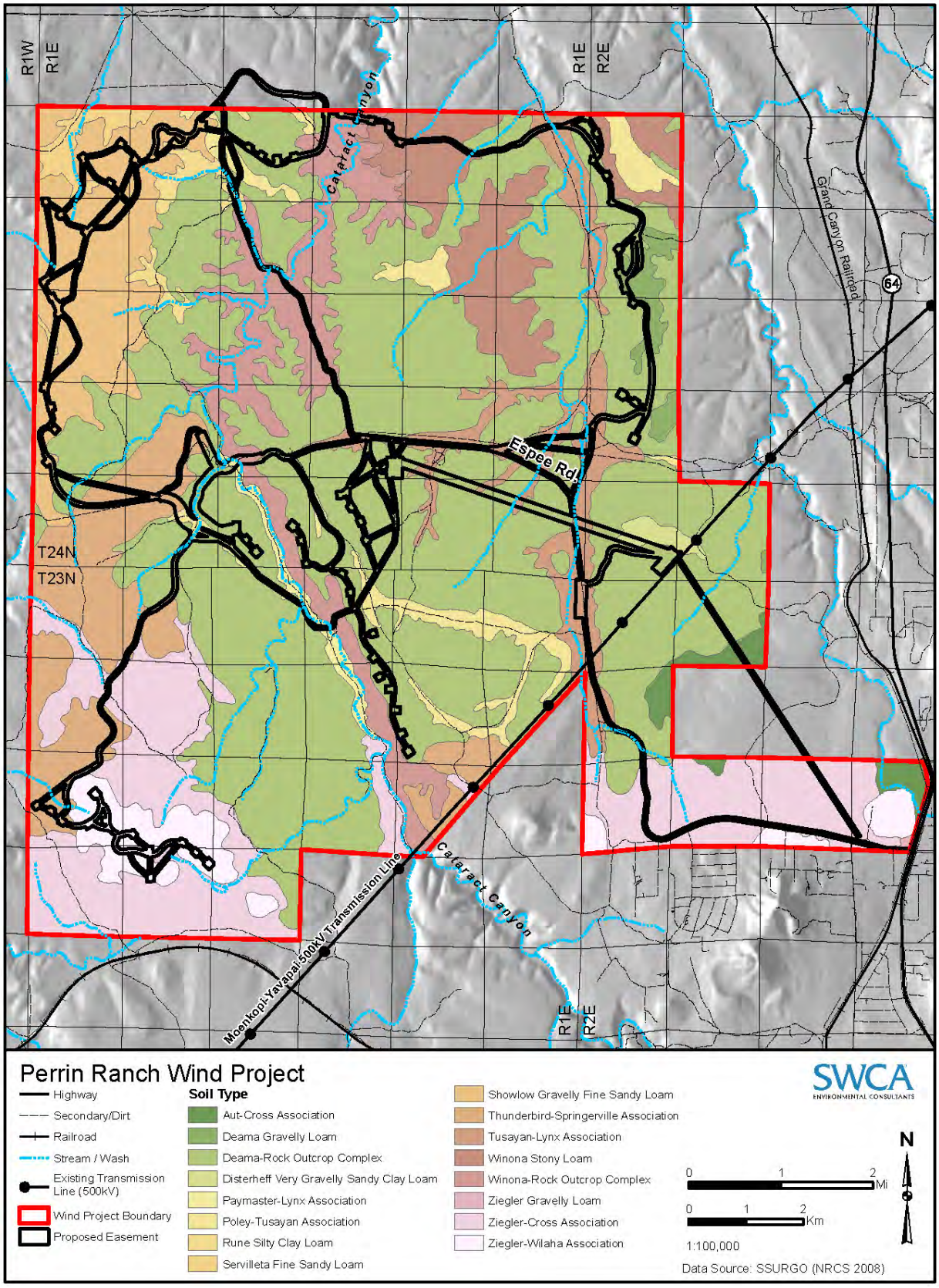

Figure 3.26. Soils mapped within the project area.

Table 3.21. Soil Capability Classes and Subclasses (Non-Irrigated) of Project Area Soils

Soil Series	VIs	VIc	VIe	VIIs
Aut		X		
Cross	X			
Deama	X			X
Disterheff	X			
Lynx			X	
Paymaster		X		
Poley	X			
Rune	X		X	
Servilleta	X			
Showlow	X			
Springerville	X			
Thunderbird	X			X
Tusayan	X			
Wilaha	X			X
Winona	X			X
Ziegler	X			

Source: USDA (1983)

Capability Classes VI and VII indicate soils with severe limitations for cultivation and restrict their use largely to pasture, range, woodland, or wildlife. Subclasses indicate the main limitation is: *s* – too shallow, droughty, or stony; *c* – too cold or too dry; or *e* – risk of erosion.

Environmental Impacts

SIGNIFICANCE CRITERIA

A significant impact to geological and mineral resources would result if any of the following were to occur from construction or operation of the proposed project:

- Areas of geological importance are lost or made inaccessible for future use. (Areas of geological importance are those types defined in the North American Stratigraphic Code or unique geological features as defined by due process, e.g., a cave area that is declared a recreational site under the jurisdiction of a government agency.)
- Known mineral resource of economic value to the region and the residents of the state are lost or made inaccessible for future use.
- Increases in the probability or magnitude of mass geological movement (e.g., slope failures, slumps and rockfalls).
- Important state-identified rock outcroppings are adversely affected.
- Soil loss or accelerated erosion due to disturbance that results in the formation of rills and/or gullies, or that results in sediment deposition in downgradient lands or water bodies to the extent that existing uses cannot be maintained.
- Structures fail or create hazards to adjacent property due to slope instability, effects of earthquake or adverse soil conditions (such as compressible, expansive, or corrosive soils).

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

- Severe erosion due to disturbance of areas of steep slopes (greater than 20%).
- Compaction or mixing of soils that would result in long-term loss of productivity or significantly alters current use or revegetative growth.
- Loss of soils that uniquely support threatened or endangered plant species, or contamination of soils that support an existing sensitive ecosystem.

DIRECT AND INDIRECT IMPACTS OF THE PROPOSED PROJECT

The following narrative describes the potential for consequences to geological, mineral, and soil resources from the construction and operation of the project. The potential for the project to increase geological risks, the potential for preclusion of access to mineral resources, and potential risks to soil resources such as loss of topsoil and erosion are discussed below.

Geological hazards generally include natural occurrences such as earthquakes, ground subsidence, fault lines, and fissures. These geological factors are taken into consideration with regard to development in the area, in particular with respect to engineered structures.

Consideration for identified mineral resources of economic value to the region and the residents of the state should be considered as it relates to removal of, or preclusion of access to, those resources.

Areas in which soils are highly erodible or difficult to reclaim present special problems for surface-disturbing activities and may require additional stabilization and reclamation efforts. Sensitive soils include those with physical and/or chemical characteristics that could exacerbate the rate of soil erosion from disturbed areas and/or inhibit or limit successful stabilization and revegetation in the reclamation of areas disturbed by construction of roadways and staging areas. Both sensitive and non-sensitive soils require the application of appropriate reclamation/revegetation measures to ensure successful stabilization and revegetation of disturbed locations. It is assumed that a soil reclamation plan, which would include measures for topsoil conservation and proper reseeding protocols, will be in place prior to construction activities.

Construction

Geology

Construction of the project would not directly or indirectly affect local geology and geological events. Shallow disturbances for roadways and foundations would have a negligible effect on local geology. Earth grading and excavation activities would be shallow and would not contribute to increased probability or magnitude of seismic or geological hazards in the project area. Blasting would be conducted for all 62 turbine foundation holes, along with some select areas of the roads and collection trenches, if the subsurface is too hard to excavate. The general contractor would have a blasting plan in place prior to any blasting. Blasting will impact the immediate foundation areas to loosen rock for digging, but charges would be small and of short duration and would not affect geology outside the immediate foundation area. The project does not include groundwater withdrawal and is not located in an alluvial basin; therefore, the project will not contribute to accelerated land subsidence or the creation of fissures in the project area. No areas of geological importance, unique geological features, or important state-identified rock outcroppings are known to occur on the project area and thus would not be affected.

Structures would not be located on unstable slopes, and structures have been engineered to meet the geotechnical qualities of the project area. Geotechnical surveys would be conducted to confirm that geotechnical conditions would be suitable for long-term stability of the structures. Geotechnical surveys, turbine tower load specifications, and cost considerations would dictate final design parameters of the foundations.

Mineral Resources

Direct and indirect impacts to mineral resources from construction of the Proposed Action would be long-term, localized, and negligible. With the exception of cinders, no salable mineral resources are known to occur on the project area (ADMMR 2008). Other than localized preclusion of access to cinder reserves underneath the access roads, transmission corridor, and structure footprints, there would be no short-term or long-term impacts to mineral resources of economic value from construction of the wind facility. Operation of the on-site cinder mine would not be disrupted by the project. Direct and indirect impacts to mineral resources from construction of the Proposed Action would be long-term, localized, and negligible.

Soils

Direct and indirect impacts to soil resources from construction of the Proposed Action would be long-term and short-term, local, and minor. During construction of the project, short-term disturbance of soils would occur on approximately 648 acres (1.63% of the project area), resulting in a conversion from natural soils to construction rights-of-way, laydown areas, turbine foundations, and other related infrastructure. Direct impacts would result from clearing of vegetation, grading, compaction, and installation of project components. Indirect impacts to soils within the project area are not anticipated if proper BMPs and the SWPPP are implemented to avoid potential damage from soil erosion.

Approximately 65% of the area disturbed during construction would be reclaimed, resulting in long-term impacts to approximately 225 acres (0.60% of the project area), which includes access roads and structure footprints. Long-term impacts to soils would include the loss of soil productivity within the access road corridor and structure footprints due to preclusion of access to the soil.

Areas of steep slopes (greater than 20%) are not expected to be disturbed, thus eliminating the hazard of severe erosion in those areas. Additionally, only Lynx and Rune soils were identified as being erosion risks. Both of these soils are found on floodplains and alluvial fans (USDA 1983). These low-slope geographic settings make erosion hazards much easier to mitigate when proper BMPs are implemented, as opposed to the difficulties of implementing and maintaining BMPs in high-slope areas.

Because none of the soils on the project area are known to uniquely support threatened or endangered plant species, there would be no direct or indirect effects on these species from soil disturbance. A properly implemented SWPPP would ensure that on-site soils would not be contaminated by hazardous materials during construction.

As described in Chapter 2, reclamation would be conducted on all temporarily disturbed areas to comply with contract agreements and the SWPPP. All temporarily disturbed areas of the project area would be permanently stabilized by measures set forth in the SWPPP, which may include tilling and ripping to de-compact compressed soils, reseeding, permanent matting, and/or pavement. Reclamation would consist of grading to the approximate original contour and drainage of disturbed areas; then, 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. The ultimate goal is to return the temporarily disturbed areas of the project area to approximate pre-disturbance stable conditions. Properly implemented BMPs would limit soil erosion to prevent the

formation of rills and gullies, which could otherwise contribute to accelerated sedimentation of downstream land and waterbodies.

All soil reclamation efforts on the project will be limited by the droughty climate, poor tilth, shallow soils, and low organic matter content of local soils (USDA 1983). The effects of these limitations on soil resources would include increased potential for erosion and a longer time period for revegetation to occur. Properly implemented BMPs for soil stabilization, along with implementation of a Native Plant Revegetation and Noxious Weed Management Plan (see Appendix C)., would serve to minimize these effects.

Structures would not be located on unstable slopes, and structures have been engineered to meet the geotechnical qualities of the project area. Geotechnical surveys would be conducted to confirm that soil conditions would be suitable for long-term stability of the structures. Geotechnical surveys, turbine tower load specifications, and cost considerations would dictate final design parameters of the foundations.

Operation and Maintenance

Geology

Operation of the project would not directly or indirectly affect local geology and geological events. There will be no short-term or long-term impacts to geological resources from operation of the project. Earth grading and excavation activities would be complete, and no part of the project operations would contribute to increased seismic hazards in the project area. Operation of the project does not include groundwater withdrawal and is not located in an alluvial basin; therefore. operation of the project would not contribute to accelerated land subsidence or the creation of fissures in the project area.

Mineral Resources

Operation of the wind facility would not directly or indirectly affect mineral resources. Mineral resources under the access roads, transmission corridor, and structure footprints could not be accessed. However, no salable mineral resources are known to occur on the project area except for cinders (ADMMR 2008), and no active mining claims exist in the project footprint. Operation of the on-site cinder mine would not be disrupted by the project. There would be negligible long-term, localized impacts to mineral resources from operation of the project.

Soils

Once construction and reclamation efforts are completed, operation of the project would not directly or indirectly affect soil resources. Other than preclusion of access to soils within the access road corridor and structure footprints, there would be no short-term or long-term impacts to soil resources from operation of the project. Proper soil reclamation according to the Native Plant Revegetation and Noxious Weed Management Plan (see Appendix C).in other disturbed areas would have ensured that soil integrity and tilth would be maintained for the long-term stability of soil and topsoil and that erosion hazards would be minimized or eliminated. A properly implemented SWPPP would ensure that on-site soils would not be contaminated by hazardous materials during construction.

Based on our analysis, none of the nine significance criteria described for geological, mineral, and soil resources would be met by implementation of the Proposed Action.

CUMULATIVE IMPACTS

The cumulative impacts area of analysis for geological, mineral, and soil resources is Coconino County, versus the project area for direct and indirect effects. The county represents a reasonable region in which existing resources, when assessed in combination with other past, present, or foreseeable cumulative actions, could be impacted if the project were implemented. This project, in conjunction with the cumulative actions listed in Appendix F, would not result in cumulative impacts to geological, mineral, or soil resources in Coconino County.

Mitigation Measures

Soil reclamation and revegetation plans will be in place before construction begins and will include measures to salvage topsoil and biological soil crusts for use in restoration activities. A blasting plan will be in place prior to any blasting activities. Additional mitigation measures for soil erosion may be needed in areas where Lynx and Rune soils are present. On-site evaluation of this need would be required at the time of BMP installation to identify specific areas where erosion may be a factor (i.e., where natural rills or gullies may have already formed). No additional mitigation measures are suggested beyond these plans and those mitigation measures discussed in Chapter 2.

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 geological, mineral, or soil resources in the project area. Under the No Action Alternative, these resources would continue to exist 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, Phoenix	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
Other			
Macauley, Mike	Perrin Ranch, LLC	4/26/11	Hunting data for the ranch

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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, Environmental Planner

Ryan Rausch – Environmental Planner

Christina White – Environmental Planner

Steve Leslie – Environmental Planner

David Barr – Archaeologist

Suzanne Griset – Archaeologist, Tribal Consultation Specialist

Tom Koronkiewicz – Biologist

Matt Villaneva – Biologist

Eleanor Gladding – Biologist

DeAnne Rietz – Environmental Specialist

Devin Keane – Environmental Specialist

Steve O'Brien – Environmental Specialist

Glenn Dunno – Geographic Information System Specialist

Heidi Orcutt-Gachiri and Danielle Desruisseaux – Technical Editors

Jessica Maggio and Shari Bell – Publication Specialists

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Chapter 6

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Appendix A

DRAFT EA RESPONSE TO COMMENTS

ID	Contact ID	Comment Type	Change in Final EA Required (Yes/No)	Resource Code	Letter No.	Comment No.	Comment Text	Response	Response Type
1	Macauley, Mike	Phone	Yes	LAND USE	1	1	The EA says "state land" when it should say "state trust land." "State land" is land owned by any state agency. "State Trust Land" is managed by the Arizona State Land Department for designated beneficiaries.	References to "state land" have been edited to "state trust land." Thank you for your comment.	4. Make factual corrections.
2	Macauley, Mike	Phone	No	NAT AMER	1	2	Has ASLD been informed about tribal consultation-something like half this project is on their land?	Western is keeping the State Historic Preservation Office informed of our tribal consultation efforts. Western received a copy of ASLD's internal approval of the cultural resources surveys.	5. Explain why the comments do not warrant further agency response.
3	Sizemore, Gloria	Phone	No	NS-N/A	2	1	She owns a little piece of property in Kaibab Estates	Thank you for your comment.	6. Other, general statement; non-substantive
4	Sizemore, Gloria	Phone	No	NS-N/A	2	2	She thinks that the project's environmental review and public access is a wonderful thing.	Thank you for your comment.	6. Other, general statement; non-substantive
5	Sizemore, Gloria	Phone	No	NS-N/A	2	3	I'm interested in selling my property; if you know anyone who is interested my number is 928 243 1281.	Thank you for your comment.	6. Other, general statement; non-substantive
6	Lara, Kathy	Email	Yes	PROCESS	3	1	On behalf of the Canyon Country Coalition, LLC members I respectfully request that the public comment period be extended from June 6th, 2011 to June 30th, 2011.	The comment period on the draft EA was extended to June 23, 2011. This information was included in the Final EA in new section (1.5.2) within Section 1.5 "Public Participation."	4. Make factual corrections.
7	Lara, Kathy	Email	Yes	VISUAL	3	2	There is a very important reason for this that would have impact on the EA. On page 12, Chapter 2, Lighting - 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. At the Coconino County Planning & Zoning Public Hearing on April 26th, 2011 Perrin Ranch Wind, LLC a subsidiary of NextEra Energy Resources, LLC applied for Case No. CUP-11-019: A request for Conditional Use Permit modification (of CUP-10-063) to delete the requirement that radar-activated lights be installed at the time of construction, but only be required after FAA approval. This request was denied by Planning & Zoning and has been appealed, by Perrin Ranch Wind, LLC a subsidiary of NextEra Energy Resources, LLC., to the Board of Supervisors. The Director of Coconino County Community Development, Mr. Bill Towler, has stated that this appeal will be heard by the Board of Supervisors on June 21st, 2011. The decision made by the Board of Supervisors could have direct impact on what is written in the EA. That is why we are asking for the public comment period to be extended to June 30th, 2011.	The "Lighting" section of the Final EA (in Section 2.2.2 for "Proposed Facilities") has been updated to reflect the details of the County's conditions in Resolution 2011-04. The appeal by NextEra was denied on June 22, 2011.	4. Make factual corrections.
8	Kriner, Lynn	Phone	Yes	WIND RESOURCE	4	1	I've hunted deer and elk and fished in 50 square miles around the Perrin Ranch area and never noticed that there was that much wind, especially wind that could turn 62 turbines, so how will this project be beneficial? It doesn't seem windy like Palm Springs.	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Section 1.3.1 has been added to the Final EA discussing the wind potential of the site.	3. Supplement, improve, or modify its analyses.
9	Kriner, Lynn	Phone	Yes	SOCIO	4	2	Will the project pay taxes to the Williams School District? Mr. Bilsbarrow replied that he did not know where the district boundaries were located.	The project is located within the Williams Unified School District. Section 3.3.6, Socioeconomics, of the Final EA has been updated to include this information, as well as the general destination of tax revenue from the project.	3. Supplement, improve, or modify its analyses.
10	Kriner, Lynn	Phone	No	LAND USE	4	3	How will the project deal with state land?	Arizona State Land Department (ASLD) would authorize new rights-of-way (ROWs) leases for access roads that cross state trust land; consultation with ASLD has been ongoing.	5. Explain why the comments do not warrant further agency response.
11	Kriner, Lynn	Phone	Yes	WATER	4	4	How much water will the project use?	As discussed in the Draft EA, "During construction, less than 60 acre-feet of water would be required" (page 43, Section 2.2.3). Further, the Draft EA states that "It is estimated that 20,000 to 24,000 gallons of water per year would be used at the facility (page 47, Section 2.2.4).	5. Explain why the comments do not warrant further agency response.

ID	Contact ID	Comment Type	Change in Final EA Required (Yes/No)	Resource Code	Letter No.	Comment No.	Comment Text	Response	Response Type
12	Kriner, Lynn	Phone	No	TRANSP	4	5	What roads will be used?	The Draft EA discloses proposed access road use in Section 2.2.2, under "Access Roads," on page 37.	5. Explain why the comments do not warrant further agency response.
13	Kriner, Lynn	Phone	Yes	WIND RESOURCE	5	1	I own one acre east of the highway near Perrin Ranch, and my access is a rough road by the power line. I've hunted the Perrin Ranch country for years, and I've noticed some things: 1) I don't think the wind is that prevalent to sustain the operation.	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Section 1.3.1 has been added to the Final EA discussing the wind potential of the site.	3. Supplement, improve, or modify its analyses.
14	Kriner, Lynn	Phone	No	LAND USE	5	2	2) every other acre is state and private land, so how will that work?	The applicant has applied for a right-of-way with the Arizona State Land Department. Permission to cross state lands is one of many permits and authorizations for the project (see Draft EA, Table 1.1, Section 1.4).	5. Explain why the comments do not warrant further agency response.
15	Kriner, Lynn	Phone	Yes	TRANSP	5	3	How many access roads from 64 will be used?	Primary access to the proposed Project would be via Espee Road from SR 64. The Final EA has been updated, see Section 2.2.2, under "Access Roads."	1. Modify alternatives including the proposed action.
16	Macauley, Mike	Phone	No	NS-N/A	6	1	1) His last name only has one "C" not two as shown on the mailing address of the EA notice letter. Please correct in future correspondence.	Thank you for your comment.	6. Other, general statement; non-substantive
17	Macauley, Mike	Phone	No	NS-N/A	6	2	2) Do not use the Ranch address. Use the Home address 3445 North Schaeffer Lane Flagstaff, AZ 86004.	Thank you for your comment.	6. Other, general statement; non-substantive
18	Macauley, Mike	Phone	No	NS-N/A	6	3	3) He requests a printed copy of the EA; his computer is not working so a CD would not be useful.	A printed copy of the EA was mailed on 5/19/11.	5. Explain why the comments do not warrant further agency response.
19	Lovell, Mel	Email	No	NS-N/A	7	1	The document comes up as damaged and can not be downloaded to be read.	The two web addresses for Department of Energy and Western Area Power Administration were checked and the links were active. The commenter was informed.	5. Explain why the comments do not warrant further agency response.
20	Hays, James R.	Email	No	LAND USE	8	1	Should those sections of State Trust land within the affected area be leased or sold to the developer, for their maximum benefitted use?	The applicant has applied for a right-of-way with the Arizona State Land Department. Permission to cross state lands is one of many permits and authorizations for the project (see Draft EA, Table 1.1, Section 1.4).	5. Explain why the comments do not warrant further agency response.
21	Suttle, Sandra	Phone	No	SOCIO	9	1	This project is not fair to people who pay taxes. I've paid taxes on my property up there for 21-22 years.	Thank you for your comment.	6. Other, general statement; non-substantive
22	Suttle, Sandra	Phone	No	PROCESS	9	2	What is the name and title of the person making the decision?	Darrick Moe, Regional Manager, Desert Southwest Region, Western Area Power Administration will oversee the final decision.	6. Other, general statement; non-substantive
23	Dean, Peggy	Phone	No	NS-N/A	10	1	My name is Peggy Dean. I got your letter today regarding the Perrin Ranch Wind Energy Project. My husband and I are all for this. It needs to be done.	Thank you for your comment.	6. Other, general statement; non-substantive
24	Suttle, Sandra	Phone	No	NS-N/A	11	1	Ms. Sandra Suttle received the Notice of Availability letter today (5/11/11) regarding the draft EA for the Perrin Ranch Wind Energy Interconnection Project. She stated that she is a grandmother living in Cordes Lake who owns property in Junipine Estates. She has owned that property for 21 years and improved it by paying for electric service and a septic system.	Thank you for your comment.	6. Other, general statement; non-substantive

ID	Contact ID	Comment Type	Change in Final EA Required (Yes/No)	Resource Code	Letter No.	Comment No.	Comment Text	Response	Response Type
25	Suttle, Sandra	Phone	No	SOCIO	11	2	She prefers not to look at wind turbines (or flour/flower mills she calls them) like Palm Springs and thinks that they will drive property values down. She strongly suggests finding another location.	The Draft EA discusses the potential impact of the project on property values (see Section 3.3.6, "Socioeconomics," pages 125-126). Additionally, as discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine other locations for the project.	5. Explain why the comments do not warrant further agency response.
26	Suttle, Sandra	Phone	Yes	VISUAL	11	3	Her 10 reasons for opposing the project are: 1) The industrial towers will ruin the view of the Grand Canyon.	The south rim of the Grand Canyon is located roughly 35-miles from the proposed Project site; the towers would not be visible from the Grand Canyon. The Draft EA notes that passengers of the Grand Canyon Railway 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 (see Section 3.3.1, page 63).	5. Explain why the comments do not warrant further agency response.
27	Suttle, Sandra	Phone	Yes	SOCIO	11	4	2) The project will increase electric bills for those living in Arizona.	Thank you for your comment. As described in the Draft EA, APS would purchase power from the project (see page 3, Section 1.3). Information has been added to the Final EA (in Section 3.3.6) regarding electricity rate approval by the Arizona Corporation Commission.	3. Supplement, improve, or modify its analyses.
28	Suttle, Sandra	Phone	Yes	WATER	11	5	3) It takes millions of gallons of water to keep those things running.	As discussed in the Draft EA, "During construction, less than 60 acre-feet of water would be required" (page 43, Section 2.2.3). Further, the Draft EA states that "It is estimated that 20,000 to 24,000 gallons of water per year would be used at the facility (page 47, Section 2.2.4). The Final EA now includes the acre-feet and gallon equivalents for clarity.	3. Supplement, improve, or modify its analyses.
29	Suttle, Sandra	Phone	No	SOCIO	11	6	4) The people with money in Williams don't want it in their backyard, so why should the poor folks on the outskirts have to look at it?	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the proposed project site.	5. Explain why the comments do not warrant further agency response.
30	Suttle, Sandra	Phone	Yes	SOCIO	11	7	5) The energy will be sold out of state. [When I informed that the proposed project's power would be purchased by APS, she said APS were crooks and requested to know who would receive the project's power. I told her that Western did not know and that at the wholesale level one generally doesn't know who the end user is.]	Thank you for your comment. As described in the Draft EA, APS would purchase power from the project (see page 3, Section 1.3) . Information has been added to the Final EA (in Section 3.3.6) regarding electricity rate approval by the Arizona Corporation Commission.	3. Supplement, improve, or modify its analyses.
31	Suttle, Sandra	Phone	No	SOCIO	11	8	6) Property values will go down. My property was already gone down from $70,000 to $40,000 she thinks.	As discussed in the Draft EA, "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%."	5. Explain why the comments do not warrant further agency response.
32	Suttle, Sandra	Phone	Yes	VISUAL	11	9	7) In Hawaii there are abandoned wind turbines falling over. The people left them behind when they were down. I don't want to look at that.	Per Condition No. 18 of Coconino County Resolution No. 2011-04 (see Appendix E of the Draft EA), "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 fina1 condition consistent with the character of the surrounding area. This condition has been added to Section 2.2.7 of the Final EA.	1. Modify alternatives including the proposed action.

ID	Contact ID	Comment Type	Change in Final EA Required (Yes/No)	Resource Code	Letter No.	Comment No.	Comment Text	Response	Response Type
33	Suttle, Sandra	Phone	Yes	MITIGATION	11	10	8) The rancher is leasing his land to get money; We should get money because we have to look at it.	Per Condition No. 21 of Coconino County Resolution No. 2011-04 (see Appendix E of the Draft EA), "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." A mitigation measure with this language has been added to the Final EA (see Section 3.3.6, "Socioeconomics").	3. Supplement, improve, or modify its analyses.
34	Suttle, Sandra	Phone	Yes	MITIGATION	11	11	9) The government should offer us money to compensate us for taking our land.	Per Condition No. 21 of Coconino County Resolution No. 2011-04 (see Appendix E of the Draft EA), "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." A mitigation measure with this language has been added to the Final EA (see Section 3.3.6, "Socioeconomics").	1. Modify alternatives including the proposed action.
35	Suttle, Sandra	Phone	No	LAND USE	11	12	10) There is a lot of land in Northern Arizona. I don't want the project to go near my land.	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the proposed project site.	5. Explain why the comments do not warrant further agency response.
36	Suttle, Sandra	Phone	Yes	PROCESS	11	13	Q: When is a decision being made? A: Western is taking comments on the draft EA until 6/6/11. Western will make a decision at the end of June, 2011.	The comment period on the draft EA was extended from June 6, 2011 to to June 23, 2011.This information was included in the Final EA in new section (1.5.2) within Section 1.5 "Public Participation." Western will make a decision in early July, 2011 about the project.	4. Make factual corrections.
37	Suttle, Sandra	Phone	No	NS-N/A	11	14	Would your Regional Manager like to trade his land for my land if this project is approved?	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1).	5. Explain why the comments do not warrant further agency response.
38	Suttle, Sandra	Phone	No	NS-N/A	11	15	I'm mad as hell, and I will fight this.	Thank you for your comment.	6. Other, general statement; non-substantive
39	Boruff, Paul	Phone	No	NS-N/A	12	1	Mr. Paul Boruff received in the mail today (5/11/11) the notice of availability for the draft EA for the Perrin Ranch Wind Energy Project and called Mr. Bilsbarrow at the Western Area Power Administration.He stated that he owns 5, two-acre lots located on the east side of SR 64, 10-13 miles north of Williams.	Thank you for your comment.	6. Other, general statement; non-substantive
40	Boruff, Paul	Phone	Yes	LAND USE	12	2	Q: What side of the highway the project was located on? He couldn't tell from the maps in the draft EA. A: On the west side	Section 1.1 of the Final EA was revised to indicate the cardinal direction the project is located from SR 64.	4. Make factual corrections.
41	Boruff, Paul	Phone	Yes	LAND USE	12	3	Q: How far from the highway? A: 1 mile	Section 1.1 of the Final EA was revised to indicate the cardinal direction of and distance the project is located from SR 64.	4. Make factual corrections.
42	Boruff, Paul	Phone	Yes	TRANSP	12	4	Q: where were the access roads coming from? SR 64? A: Access roads are off of Espee Road.	Primary access to the proposed Project would be via Espee Road from SR 64. The Final EA has been updated to include a statement to this affect, see Section 2.2.2, under "Access Roads."	1. Modify alternatives including the proposed action.
43	Boruff, Paul	Phone	No	PROCESS	12	5	Q: Is DOE in favor of the proposal? A: It would be premature to decide prior to public input on the EA.	Western will make a decision in early July, 2011 about the project.	5. Explain why the comments do not warrant further agency response.
44	Boruff, Paul	Phone	Yes	SOCIO	12	6	Q: Will this project make my property taxes go up or down? A: I don't know.	Residential property taxes in Arizona are levied based on the assessed value of the property; the specific property tax rates are determined by cities, schools, water districts, community colleges, and/or bond issues. As discussed in Section 3.3.6 of the Draft EA, "Socioeconomics," if property values decrease, conceivably residential property taxes could decrease.	5. Explain why the comments do not warrant further agency response.

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45	Boruff, Paul	Phone	No	NS-N/A	12	7	He doesn't think the project will be a problem for him. He would like power to his property, but the project is on the wrong side of the road.	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the location of the proposed project site.	5. Explain why the comments do not warrant further agency response.
46	Lara, Kathy	Email	Yes	PROCESS	13	1	Mr. Bilsbarrow - I first found the draft EA online yesterday, Monday May 10th, 2011. I went into Williams and checked at the library and they did not have a notice posted for this. As you can appreciate, because there is a timeline set for public comment, appropriate notice is very important. When will the 30 day public comment period begin and end? How will people know where to send their comment?	The comment period on the draft EA began May 6, 2011 and was extended from June 6, 2011 to June 23, 2011. This information was included in the Final EA in Section 1.5 "Public Participation."	4. Make factual corrections.
47	Lara, Kathy	Email	No	NS-N/A	13	2	These questions are very important. The courtesy of your response (or lack thereof) will be noted.	Thank you for your comment.	6. Other, general statement; non-substantive
48	Lara, Kathy	Email	No	PROCESS	14	1	Good Morning Mr. Bilsbarrow - since my last email response from you I have had a few thoughts regarding communication with the residents surrounding this project.	Thank you for your comment.	6. Other, general statement; non-substantive
49	Lara, Kathy	Email	Yes	PROCESS	14	2	I do think that posting the draft EA in the library in Williams may not be helpful to our community. Not many of us actually living out here may frequent the library. I would like to suggest to you that you take out space in the Williams News to state that the draft is open for review and public comment. List the website and how to get to the draft as well as list a phone number that people may call to obtain a copy of the draft if they do not have computer access. Also - perhaps contact those that attended the WAPA open house and provided their email or mailing address.	Copies of the Draft EA were made available at the Williams Library, as well as to anyone who requested a printed copy. This information was included in the Final EA in new section (1.5.2) within Section 1.5 "Public Participation."	4. Make factual corrections.
50	Lara, Kathy	Email	Yes	PROCESS	14	3	I know that when I attended the open house a representative of SWCA stated to me that if I turned in written comment I would be notified when the draft EA was available. Perhaps that was not the correct information.	A letter notice of availability was mailed to all members of the public who provided an address. This information was included in the Final EA in new section (1.5.2) within Section 1.5 "Public Participation."	4. Make factual corrections.
51	Lara, Kathy	Email	No	NS-N/A	14	4	Thank you for your time and consideration.	Thank you for your comment.	6. Other, general statement; non-substantive
52	Braswell, Jim	Letter	No	NS-N/A	15	1	Dear Mr. Bilsbarrow: In reference to our conversation last week regarding the above report, thank you for sending it on CD. As of this writing, I haven't received it, but it will be here shortly I'm sure. I'm having problems with my computer, but should be resolved shortly. I went to the Williams Public Library to obtain a "hard copy" - they oinly had 3 and was told that I had to return it within 1 week from Friday. Not to be given away. I really would like to have a "Hard Copy". It is a very detailed, complex report that is impossible to digest in 1 week. Anything you can do to send me this report will be greatly appreciated. Thank you very much!	A printed copy of the EA was mailed on 5/17/11.	6. Other, general statement; non-substantive
53	Landin-Erdei, Mireya	Letter	No	WILDLIFE	16	1	I welcome wind turbines provided they are not environmentally destructive, which they are because they are killing birds and bats by the thousands.	The potential impacts to wildlife (including birds and bats) is evaluated in Section 3.3.5 of the Draft EA (see pages 102-122).	5. Explain why the comments do not warrant further agency response.
54	Landin-Erdei, Mireya	Letter	No	WILDLIFE	16	2	Sooner or later, but rather sooner, and now, wind turbines must be provided with a protective device such as a screen of some sort to prevent the unacceptable killing of avian creatures. I realize this might result in a slightly significant cost, but it should start being implemented right away. Wind turbines are becoming more and more numerous and the mortality of birds and bats will increase exponentially. It would be good if the Arizona Coconino County becomes a world leader on this vital environmental issue. We cannot afford further delays in adding protecting devices.	Many mitigation measures for avian and bat species are currently being tested including deterrent devices; however, at this time the technology does not exist. The project Avian and Bat protection plan includes implementation of state of the art avoidance, minimization, and mitigation measures, including adaptive management techniques to keep impacts to those species low.	5. Explain why the comments do not warrant further agency response.

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55	Ross, Stephen (ASLD)	Letter	No	LAND USE	17	1	Perrin Ranch Wind, LLC, filed an application (14-I 15497) with the Arizona State Land Department (ASM) for a 50-year Right-of-Way across State Trust land in Coconino County. The Applicant (Perrin Ranch) plans to use State Trust land to construct wind generation facilities. According to ASLD's responsibility to the Arizona State Historic Preservation Act (A.R.S. § 861en seq), ASLD asked Perrin Ranch to arrange for the subject property to be inspected for cultural resources which may be included on or may qualify for inclusion on the Arizona register of historic places. This inspection was completed by SWCA Environmental Consultant (SWCA) and is documented in SWCA Technical Report No. 11-62 entitled Archaeological Survey for the Proposed Perrin Ranch Wind Facility near Williams, Coconino County, Arizona (February 20 II, Revised March 20 I I). Therefore, per the 2006 Interagency Service Agreement (ISA) between the State Historic Preservation Office (SHPO) and ASLD, I have reviewed SWCA's report and have the following comments and recommendations. The report indicates SWCA inspected 2,323 acres and recorded 406 cultural resources. According to the report, SWCA's inspected 1,155 acres ofland administered by ASLD, and 1,168 acres of privately owned land. Within the 1,155 acres of State Trust land, SWCA documented 35 cultural resources. Eight (8) of the 35 sites are located within an Area of Potential Effect (APE), and of those eight only five (5) sites are recommended as Register eligible. Although ASLD agrees with SWCA's register eligibility recommendations, ASLD will not comment on all remaining sites not located on State Trust land. Recorded sites on State Trust land: AZ H: 11 :49(ASM), AZ H: II :50(ASM), AZ H: II :51 (ASM), AZ H: II :52(ASM), AZ H:II:53(ASM), AZ H:II :59(ASM), AZ H:II :61(ASM), AZ H:II:62(ASM), AZ H: II :63(ASM), AZ H: II :64(ASM), AZ H: II :65(ASM), AZ H: II :68(ASM), AZ H:II:69(ASM), AZ H:11:71(ASM), AZ H:11 :83(ASM), AZ H:II:84(ASM), AZ H: II :85(ASM), AZ H: II :88(ASM), AZ H: II :89(ASM), AZ H: II :90(ASM), AZ H:II:91(ASM), AZ H:II:92(ASM), AZ H:II :95(ASM), AZ H:II:97(ASM), AZ H: II :98(ASM), AZ H: II: 100(ASM), AZ H: II: I 03(ASM), AZ H: II: 105(ASM), AZ H:II:106(ASM), AZ H:11:107(ASM), AZ H:12:70(ASM), AZ H:12:74(ASM),AZ H:12:78(ASM), AZ H:12:79(ASM), and lOs 1-333. Register eligible sites on State Trust land: AZ H:Il:49(ASM), AZ H:Il:50(ASM), AZ H:II :5 I (ASM), AZ H:II:52(ASM), AZ H:II:53(ASM), AZ H:II:61(ASM), AZ H:II :62(ASM), AZ H:II:63(ASM), AZ H: II :64(ASM), AZ H: II :65(ASM), AZ H: II :68(ASM), AZ H: II :69(ASM), AZ H: II :83(ASM), AZ H: II :84(ASM), AZ H: II :85(ASM), AZ H: II :88(ASM), AZ H: II :89(ASM), AZ H: 11 :90(ASM), AZ H: 11 :91(ASM), AZ H: 11 :92(ASM), AZ H: II :95(ASM), AZ H: II :97(ASM), AZ H: II: 100(ASM), AZ H: II: 103(ASM), AZ H:Il:105(ASM), AZ H:11:106(ASM), AZ H:II:I07(ASM), AZ H:12:70(ASM), AZ H: 12:74(ASM), AZ H: 12:78(ASM), and AZ H: 12:79(ASM). Sites not eligible on State Trust land: AZ H:II :59(ASM), AZ H:II:71(ASM), AZ H:II:98(ASM), and lOs 1-333.	Thank you for your comment.	6. Other, general statement; non-substantive
56	Ross, Stephen (ASLD)	Letter	No	CULTURAL	17	2	The following two additional reports were also submitted to ASLD: Archaeological Survey of96 Acres: An Addendum to the Archaeological Survey for the Proposed Perrin Ranch Wind Facility near Williams, Coconino County, Arizona (March 2011; revised). SWCA inspected 96 acres and recoded two register eligible archaeological sites (AZ H: II: 108(ASM) and AZ H: II: 109(ASM). However, these two sites are located on private land; therefore, ASLD will not comment on these sites.	Thank you for your comment.	6. Other, general statement; non-substantive
57	Ross, Stephen (ASLD)	Letter	Yes	CULTURAL	17	3	Cultural Resources Avoidance and Unanticipated Discoveries Plan for the Perrin Ranch Wind Facility Project, near Williams, Coconino County, Arizona (March 2011). SWCA recommends archaeologist monitor archaeological sites for avoidance when the possibility arises that might cause inadvertent damage to them, and ASLD agrees. As a result, SWCA has submitted this plan for avoidance and unanticipated discoveries. Therefore, ASLD has reviewed this plan and finds it acceptable.	Statement added to the Final EA in the "Cultural Resources" discussion of Section 3.2.	3. Supplement, improve, or modify its analyses.
58	Ross, Stephen (ASLD)	Letter	Yes	CULTURAL	17	4	To ensure that the above-reference register eligible cultural resources located on State Trust land will be avoided during any permanent and temporary project infrastructure, including meteorological towers, wind turbines and foundations, buried electrical lines, access roads, laydown areas, operations and maintenance buildings, substation, switchyard, or any other ground disturbing activities associated with Perrin Ranch Wind Application 14-115497, or any related construction activities, and will not be disturbed as a result of maintenance during the term of the requested right-of-way or any subsequent renewal periods, I am recommending that ASLD grant Right-of-Way 14-115497 with the following condition: Except for archaeological investigations that are properly authorized under a project specific Arizona Antiquities Act permit issued by the Arizona State Museum pursuant to A.R.S. § 41-842, Grantee, or assigns, shall not cause nor allow any ground disturbing activity within the boundaries of the archaeological sites recorded at the Arizona State Museum as AZ H:II:49(ASM), AZ H:II:50(ASM), AZ H:II:51(ASM), AZ H:II:52(ASM), AZ H:II:53(ASM), AZ H:II:61(ASM), AZ H:II:62(ASM), AZ H: II :63(ASM), AZ H: II :64(ASM), AZ H: II :65(ASM), AZ H: II :68(ASM), AZ H: II :69(ASM), AZ H: II :83(ASM), AZ H: II :84(ASM), AZ H: II :85(ASM),AZ H:II :88(ASM), AZ H:II:89(ASM), AZ H:II :90(ASM), AZ H:II :91(ASM), AZ H: II :92(ASM), AZ H: II :95(ASM), AZ H: II :97(ASM), AZ H: II: 100(ASM),AZ H:II:I03(ASM), AZ H:II:I05(ASM), AZ H:II:I06(ASM), AZ H:Il:107(ASM), AZ H:12:70(ASM), AZ H:12:74(ASM), AZ H:12:78(ASM), and AZ H:12:79(ASM) without first obtaining written permission from Grantor. Grantee, or assigns, shall provide Grantor with any archaeological plans, studies, or reports that may be needed for Grantor's use in considering Grantee, or assigns, request for permission to disturb the site. I appreciate your continued cooperation in considering the potential for impacts to Arizona's cultural resources that might result from ASLD's plans and actions.	The conditions of ASLD approval have been summarized and added to the cultural resources discussion in Section 3.2 of the Final EA.	3. Supplement, improve, or modify its analyses.

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59	Lee, John	Letter	No	PROCESS	18	1	My feelings about the handling of this Wind Farm Project on Perrin Ranch, is that the whole process has been slam dunked from the beginning. My main concern by being a resident of Junipine Estates which borders the Ranch where this project is proposed is	The decision has not been made yet. Western will make a decision in early July, 2011 about the project.	5. Explain why the comments do not warrant further agency response.
60	Lee, John	Letter	Yes	FIRE	18	2	Nextera ,when making this contract with Coconino County Officials never had any consideration for the residents of our community, about a fire protection plan, which in my view should have been first priority before ever discussing anything else. It was not. The only mention of fire protection in the contract is that Nextera would furnish a fire truck and some equipment.	A Fire Protection and Emergency Response Plan has been drafted and is included as an Appendix to the Final EA (see Appendix E). Additionally, a new section has been added to the EA to address Human Health and Safety, specifically fire hazards (see Chapter 3).	3. Supplement, improve, or modify its analyses.
61	Lee, John	Letter	No	WATER	18	3	I don't know how aware you are of our situation but we have no available water. Everyone here hauls their water from outside the area. This is another reason that a project like this should never have been approved, that poses a real fire threat for a residential area.	As discussed in the Draft EA, "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" (page 97, Section 3.3.3).	3. Supplement, improve, or modify its analyses.
62	Lee, John	Letter	Yes	FIRE	18	3	I don't know how aware you are of our situation but we have no available water. Everyone here hauls their water from outside the area. This is another reason that a project like this should never have been approved, that poses a real fire threat for a residential area.	A Fire Protection and Emergency Response Plan has been drafted and is included as an Appendix to the Final EA (see Appendix E).	3. Supplement, improve, or modify its analyses.
63	Lee, John	Letter	Yes	FIRE	18	4	To have a realistic fire protection plan for an area like ours, you need full time Trained fire personnel available because, when one of these turbines catch fire, the height causes embers to blow hundreds of feet into trees and underbrush and can get totally out of control in a matter of minutes and could easily threaten our whole community .No one here ever wants to see that happen.	A Fire Protection and Emergency Response Plan has been drafted and is included as an Appendix to the Final EA (see Appendix E).	3. Supplement, improve, or modify its analyses.
64	Lee, John	Letter	Yes	FIRE	18	5	I brought this issue up at the last Planning and Zoning commission meeting and Nextera's reply was that they hadn't had time to put a fire plan together. This is an unacceptable excuse, as this project has been in the works for over a year. This should all be worked out, and in place, before any construction begins. If not then we will be requesting a moratorium on this project until such time that these issues are met. Thank you	A Fire Protection and Emergency Response Plan has been drafted and is included as an Appendix to the Final EA (see Appendix E).	3. Supplement, improve, or modify its analyses.
65	Buss, John and Linda	Letter	No	NS-N/A	19	1	This letter is in response to your letter regarding the Perrin Ranch Wmd Project Moenkopi Yavapai TL. My husband and I own ten acres near Espee Road, which is off of Highway 64. We have plans to place a home on that property soon. This project has given us questions regarding that decision. The following issues and questions are important to us as property owners and consumers.	Thank you for your comment.	6. Other, general statement; non-substantive
66	Buss, John and Linda	Letter	No	TRANSP	19	2	Traffic on Espee Road. We know that extremely large equipment will be transported down that road for at least a year. What kind of impact will that be on the local residents.	As discussed in the Draft EA (see Section 3.3.8, "Transportation," "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." The Draft EA further states that " access for residents, recreational users, and emergency vehicles on roads to be used by the Project would be maintained at all times."	5. Explain why the comments do not warrant further agency response.
67	Buss, John and Linda	Letter	Yes	SOCIO	19	3	Noise Level. During my own research I have found there will be different noise levels. This noise will be constant and has effects on the quality of living near these wind turbines. There will be different levels of noise depending on the wind, however disturbs the surrounding area.	Additional information was added to the Environmental Consequences Section 3.3.6 in the Final EA regarding impacts to area quality of life in terms of impacts from noise, however as noted in the Draft EA (see section 3.3.2, "noise resulting from the operation of turbines would not be audible at residents at Junipine Estates or Howard Mesa Ranch" (pages 84-85).	3. Supplement, improve, or modify its analyses.
68	Buss, John and Linda	Letter	No	VEG	19	4	Clear Cut. We understand there will be a cutting of trees and all brush one mile around each wind turbine. This is sixty-one miles of clear cut due to sixty-one wind turbines, leaving large areas of scaring the landscape.	As discussed in the Draft EA (see Section 2.2, "Proposed Facilities, page 12"), "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." Vegetation would not be cleared any further than described in the Draft EA.	5. Explain why the comments do not warrant further agency response.
69	Buss, John and Linda	Letter	Yes	FIRE	19	5	Fire danger. This entire area has high danger of lightening strikes four to five months out of the year. The area is extremely dry most of the time. What type of fire protection will you give in the probability of forest fires?	A Fire Protection and Emergency Response Plan has been drafted and is included as an Appendix to the Final EA (see Appendix E).	3. Supplement, improve, or modify its analyses.

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70	Buss, John and Linda	Letter	No	WILDLIFE	19	6	Wild life. Right now the wild life is plentiful. There are elk, deer, mule deer, mountain lion, cougar and other various smaller animals. How will these giant wind turbines interfere with this wild life? How will that effect this area in the long term?	All short and long term impacts to wildlife are discussed in the Draft EA (see Section 3.3.5 on "Wildlife.).	5. Explain why the comments do not warrant further agency response.
71	Buss, John and Linda	Letter	Yes	SOCIO	19	7	Distribution of Wind Power. All of the residents of this area will (if these wind turbines go up) will not only have the negative impact of the above issues, but will not receive any compensation or power from this project. We understand this power will be going to California, Nevada and other areas, not Northern Arizona.	As described in the Draft EA, APS would purchase power from the project (see page 3, Section 1.3). Additionally, per Condition No. 21 of Coconino County Resolution No. 2011-04 (see Appendix E of the Draft EA), “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.” A mitigation measure with this language has been added to the Final EA (see Section 3.3.6, "Socioeconomics").	3. Supplement, improve, or modify its analyses.
72	Buss, John and Linda	Letter	No	LAND USE	19	8	We appreciate your reviewing our concerns. We believe this project should be placed in another area that does not have as much effect on the environment. These wind turbines have no benefit for our area in any way.	As discussed in the Draft EA, "Western’s decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western’s transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the proposed project site.	5. Explain why the comments do not warrant further agency response.
73	Kriner, Lynn	Letter	Yes	WIND RESOURCE	20	1	In response to the Perrin Ranch project, I'm confused about several things. I've hunted and fished alll over that area, north and south of highway 40, east and west of Hwy 69 and I've never noticed the wind being sufficent to sustain this kind of project.	As discussed in the Draft EA, "Western’s decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western’s transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Section 1.3.1 has been added to the Final EA discussing the wind potential of the site.	5. Explain why the comments do not warrant further agency response.
74	Kriner, Lynn	Letter	Yes	TRANSP	20	2	My land is down toward where the large power line crosses over Hwy 69 and the road I use is very close to the Perrin Ranch, and this road will be very close to the project as I understand it. My question is how many of th roads off of Hwy 69 are going to be used and to what extend will they worked on to handle the traffice until the project is complete	Primary access to the proposed Project would be via Espee Road from SR 64. The Final EA has been updated to include a statement to this affect, see Section 2.2.2, under "Access Roads."	3. Supplement, improve, or modify its analyses.
75	Kriner, Lynn	Letter	No	LAND USE	20	3	Also as I understand it, the land in question is part Perrin Ranch and leased land from the government, so who authorizes the use going onto the government land.	The applicant has applied for a right-of-way with the Arizona State Land Department. Permission to cross state lands is one of many permits and authorizations for the project (see Draft EA, Table 1.1, Section 1.4).	5. Explain why the comments do not warrant further agency response.
76	Kriner, Lynn	Letter	Yes	WIND RESOURCE	20	4	I didn't know how much studying went into this project but there is much better land and wind east of there approxiamtely 15 mi. with substantially more wind.	As discussed in the Draft EA, "Western’s decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western’s transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Section 1.3.1 has been added to the Final EA discussing the wind potential of the site.	3. Supplement, improve, or modify its analyses.
77	Kriner, Lynn	Letter	Yes	SOCIO	20	5	I sincerely hope the Williams School District really benefits from this. Also has there been any estimates on how much money the School District will actually get from this, and I understand it would only be an estimate. Thank You	The project is located within the Williams Unified School District. Section 3.3.6, Socioeconomics, of the Final EA has been updated to include this information, as well as the general destination of tax revenue from the project.	3. Supplement, improve, or modify its analyses.
78	Arnst, Diane (ADEQ)	Letter	No	AIRQ	21	1	The ADEQ Air Quality Division has reviewed your letter dated May 6, 2011, concerning your request for a scoping letter for the Perrin Ranch Wind Energy Interconnection Project. Your project is not located in a nonattainment area or a maintenance area for regulated air pollution and, as described, may have a de minimis impact on air quality. Disturbance of particulate matter, however, is anticipated during the construction phase. Considering prevailing winds, to comply with other applicable air pollution control requirements and minimize adverse impacts on public health and welfare, the following information is provided for consideration:	Thank you for your comment	6. Other, general statement; non-substantive

ID	Contact ID	Comment Type	Change in Final EA Required (Yes/No)	Resource Code	Letter No.	Comment No.	Comment Text	Response	Response Type
79	Arnst, Diane (ADEQ)	Letter	Yes	MITIGATION	21	2	REDUCE DISTURBANCE of PARTICULATE MATTER during CONSTRUCTION This action, plan or activity may temporarily increase ambient particulate matter (dust) levels. Particulate matter to microns in size and smaller can penetrate the lungs of human beings and animals and is subject to a National Ambient Air Quality Standard (NAAQS) to protect public health and welfare. Particulate matter 2.5 microns in size and smaller is difficult for lungs to expel and has been linked to increases in death rates; heart attacks by disturbing heart rhythms and increasing plaque and clotting; respiratory infections; asthma attacks and cardiopulmonary obstructive disease (COPD) aggravation. It is also subject to a NAAQS. The following measures are recommended to reduce disturbance of particulate matter, including emissions caused by strong winds as well as machinery and trucks tracking soil off the construction site:I. Site Preparation and Construction A. Minimize land disturbance; B. Suppress dust on traveled paths which are not paved through wetting, use of watering trucks, chemical dust suppressants, or other reasonable precautions to prevent dust entering ambient air; C. Cover trucks when hauling soil; D. Minimize soil track-out by washing or cleaning truck wheels before leaving construction site; E. Stabilize the surface of soil piles; and F. Create windbreaks.	These have been added to Chapter 2, in a new section (2.2.8 Mitigation Measures).	1. Modify alternatives including the proposed action.
80	Arnst, Diane (ADEQ)	Letter	Yes	MITIGATION	21	3	II. Site Restoration A. Revegetate any disturbed land not used; B. Remove unused material; and C. Remove soil piles via covered trucks. The following rules applicable to reducing dust during construction, demolition and earth moving activities are enclosed: o Arizona Administrative Code RI8-2-604 through -607 o Arizona Administrative Code R 18-2-804	These have been added to Chapter 2, in a new section (2.2.8 Mitigation Measures).	1. Modify alternatives including the proposed action.
81	Belghaus, Helmut	Email	No	NS-N/A	22	1	I'm Helmut Belghaus' (property owner) daughter and have power of attorney for him. We have no concerns or comments regarding the wind energy connection. In fact, I'm a firm believer in wind energy.	Thank you for your comment.	6. Other, general statement; non-substantive
82	Taunt, Linda (ADEQ)	Email	Yes	WATER	23	1	We received the May 6,2011 Notice of the Environmental Assessment for the Western Area Power Administration's Perrin Ranch Wind Energy Interconnection Project, located in Coconino County. In addition to our comments submitted on February to, 2011, the Arizona Department of Environmental Quality, Water Quality Division (ADEQ) is developing a general permit under the Arizona Pollutant Discharge Elimination System (AZPDES) Permit Program for discharges from the application of pesticides on and near waters of the U.S. ADEQ's permit is based on the U.S. Environmental Protection Agency's draft general permit. ADEQ expects to issue its AZPDES pesticides general permit sometime in late 2011. The proposed project may require coverage under the AZPDES pesticides general permit. We appreciate the opportunity to review and provide comments.	The Final EA was revise to include the draft Pesticide General Permit (PGP) in the permit table (Table 1.1) and discussion of the draft PGP in Section 3.3.3.	3. Supplement, improve, or modify its analyses.
83	Jackson, Glenn and Mary Lou	Letter	Yes	WIND RESOURCE	24	1	As a retired electrical engineer and property owner in the affected area I claim both the expertise and standing to generate this letter of objection to the Perrin Ranch Wind project. This letter is intended to highlight some of the technical issues that are associated with the project.	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Section 1.3.1 has been added to the Final EA discussing the wind potential of the site.	3. Supplement, improve, or modify its analyses.
84	Jackson, Glenn and Mary Lou	Letter	Yes	WIND RESOURCE	24	2	While environmental assessment studies generally address the effects that an industrial system will have on the surrounding area of installation my basic premise is that the ENVIRONMENT may not support the proposed wind farm. It can be argued that the absence of wind energy in the area should be enough to refuse approval of the subject project and thereby negate even the requirement for an EA. Indeed Department Of Energy studies and documents show that wind energy in the area will not support a wind farm. (Ref. I) (See the highlighted area in the enclosed excerpts from this document.) Certainly no one would want a failed or marginally productive system that would need to be dismantled at some future time with the cost inevitably falling on either the APS rate payers, county tax payers or both.	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Section 1.3.1 has been added to the Final EA discussing the wind potential of the site.	3. Supplement, improve, or modify its analyses.

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85	Jackson, Glenn and Mary Lou	Letter	No	WILDLIFE	24	3	The information I have is that there are only 3 meteorological stations on the property. Other large projects (i.e. the Lee Ranch project in Colorado) monitored wind speed and turbulence over several years with many more stations disbursed over the area before installation. In addition we have been told that the measurements that have been/are being made are proprietary to the developer. I believe such data (and a lot more) should be collected and made available to your organization as part of the EA. As already mentioned the damage to flora and fauna as well as the contamination of the viewscape would be large and all for naught if the system is not viable.	NextEra has completed studies on the property that indicate favorable conditions for a wind energy development, and they have a power purchase agreement in place with APS to provide that wind energy. NextEra's wind energy data is not required to support the analysis in the EA. The potential impacts to wildlife (fauna) are evaluated in Section 3.3.5 of the Draft EA (see pages 102-122).	5. Explain why the comments do not warrant further agency response.
86	Jackson, Glenn and Mary Lou	Letter	No	VEG	24	3	The information I have is that there are only 3 meteorological stations on the property. Other large projects (i.e. the Lee Ranch project in Colorado) monitored wind speed and turbulence over several years with many more stations disbursed over the area before installation. In addition we have been told that the measurements that have been/are being made are proprietary to the developer. I believe such data (and a lot more) should be collected and made available to your organization as part of the EA. As already mentioned the damage to flora and fauna as well as the contamination of the viewscape would be large and all for naught if the system is not viable.	NextEra has completed studies on the property that indicate favorable conditions for a wind energy development, and they have a power purchase agreement in place with APS to provide that wind energy. NextEra's wind energy data is not required to support the analysis in the EA. The potential impacts to vegetation (flora) are evaluated in Section 3.3.4 of the Draft EA (see pages 95-102).	5. Explain why the comments do not warrant further agency response.
87	Jackson, Glenn and Mary Lou	Letter	No	VISUAL	24	3	The information I have is that there are only 3 meteorological stations on the property. Other large projects (i.e. the Lee Ranch project in Colorado) monitored wind speed and turbulence over several years with many more stations disbursed over the area before installation. In addition we have been told that the measurements that have been/are being made are proprietary to the developer. I believe such data (and a lot more) should be collected and made available to your organization as part of the EA. As already mentioned the damage to flora and fauna as well as the contamination of the viewscape would be large and all for naught if the system is not viable.	The visual impact of the proposed project is evaluated in Section 3.3.1 of the Draft EA (see pages 60-79).	5. Explain why the comments do not warrant further agency response.
88	Jackson, Glenn and Mary Lou	Letter	Yes	WIND RESOURCE	24	3	The information I have is that there are only 3 meteorological stations on the property. Other large projects (i.e. the Lee Ranch project in Colorado) monitored wind speed and turbulence over several years with many more stations disbursed over the area before installation. In addition we have been told that the measurements that have been/are being made are proprietary to the developer. I believe such data (and a lot more) should be collected and made available to your organization as part of the EA. As already mentioned the damage to flora and fauna as well as the contamination of the viewscape would be large and all for naught if the system is not viable.	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Section 1.3.1 has been added to the Final EA discussing the wind potential of the site.	3. Supplement, improve, or modify its analyses.
89	Jackson, Glenn and Mary Lou	Letter	Yes	WIND RESOURCE	24	4	An accepted minimum average wind velocity for an operable wind farm is 4 meters/second (9 mileslhour) with 6 to 7 meters/second (13 to 15 Mph) being a more practical minimum range. The National Renewable Energy Laboratory (NREL) has a "wind atlas" which shows wind velocities in the Perrin Ranch area at 5.5 to 6.5 meters/sec. Clearly this is on the low end of an operable range for a wind farm.	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Section 1.3.1 has been added to the Final EA discussing the wind potential of the site.	3. Supplement, improve, or modify its analyses.
90	Jackson, Glenn and Mary Lou	Letter	Yes	WIND RESOURCE	24	5	Many additional monitoring stations should be used to determine wind variability factors such as wind shear and the turbulence intensity (TI). Since the terrain in the area is quite rough these factors may be severe. Wind velocity may be different at different altitudes (wind shear) so data are desirable to determine wind mill height. Turbulence is theswirling associated with rough terrain and pressure differentials and can hinder the development of a steady wind. The terrain in this part of Arizona is not at all similar to the Great Plains states of Wyoming, Nebraska, Kansas or Oklahoma where steady winds can develop over many miles of very flat land. Indeed the terrain at Perrin Ranch may not be suitable for a wind farm of the size being proposed	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Section 1.3.1 has been added to the Final EA discussing the wind potential of the site.	3. Supplement, improve, or modify its analyses.
91	Jackson, Glenn and Mary Lou	Letter	Yes	WIND RESOURCE	24	6	Another issue is the use of the generator nameplates to define the power output of a wind farm and help justify installation. The nameplate only identifies the maximum power that can be generated under ideal conditions with optimum wind velocity and consistency at sea level. Clearly this is almost never the case. The industry has developed a term known as "capacity factor" to help determine the actual output of a system. It is the ratio of actual electrical production in one year to the theoretical (nameplate) output. Typically this ratio is in the range of 0.2 to 0.4 (20 to 40 percent). Do we have an estimate of this factor for the Perrin ranch system?	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Section 1.3.1 has been added to the Final EA discussing the wind potential of the site.	3. Supplement, improve, or modify its analyses.

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92	Jackson, Glenn and Mary Lou	Letter	No	VISUAL	24	7	Still another concern is the expected penetration into the APS electrical grid. Penetration is a measure of how much (and when) power is actually needed by and inserted into the grid. Clearly the penetration must be sizeable enough over large blocks of time or the wind mills will sit idle. While APS has apparently agreed to buy power from the project we don't have an estimate of how much and when. The uselessness of idle wind mills on the viewscape would add to the irritation of their presence.	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Further, the visual impact of the proposed project is evaluated in Section 3.3.1 of the Draft EA (see pages 60-79). Finally, as described in the Draft EA, APS would purchase power from the project (see page 3, Section 1.3).	3. Supplement, improve, or modify its analyses.
93	Jackson, Glenn and Mary Lou	Letter	No	VISUAL	24	8	In closing we hope to depend upon your agency to insist that the developer provide the necessary wind energy data as well as the other items mentioned above. Before allowing many square miles of landscape (environment) to be contaminated with unsightly 250 to 400 foot towers the project managers should be required to prove that a wind farm at this location would be a truly viable and valuable asset to the region. While we are certainly proponents of "green energy" the problems and uncertainties mentioned above force us to most strongly object to the furtherance of this project at the present time. Since Northern Arizona has many hours of strong unrestricted sunlight a better use of the property may be the installation of a solar electric farm.	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Further, the visual impact of the proposed project is evaluated in Section 3.3.1 of the Draft EA (see pages 60-79).	5. Explain why the comments do not warrant further agency response.

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94	Livingston, R.A.	Letter/ Email	No	HHS (human health and safety)	25	1	If you would indulge me a few comments on the general issues associated with the above numbered file ... which would be associated with the general issues of projects like this all over the world! It is not hard for anyone to imagine that the Department of Energy, as an integral part of the United States Government, could still be enamored by the "theories" relative to "Sustainable and Green Energy". It also does not surprise that" Wind Energy" could be a part of that concept. After all, when you are searching for a better, more efficient, sustainable and more environmentally friendly alternative energy source for the future of this country, how would the Wind Turbine appear, in its final stage, to be anything less than what you have been looking for! Who could even look at a wind farm, and not be impressed by the sheer beauty of it! Part of the problem, I think, is that your people have not kept apace with information and statistics compiled in all the literature published after the first experimental installation of these projects, years ago! Your involvement was rather to look at the exaggerated information that manufacturer and investors supplied to you in the "sales pitch" and "brochures" and from that information only, you have based an assessment and then moved on to the next project! Also, that you are typically not there to watch them being installed, or operated. Provable research now shows that from the very Foundation of these machines (125,000 cubic feet of disturbed soil, concrete and rebar), all the way to their Electro Magnetic Fields, and grinding gears, to the tips of the Blades with their noise cavitations, shuttering oflight, and pretty dramatic and conunon mechanical failures, now shows that each one of these machines has created a bigger carbon footprint, even before being brought on line, than it can ever generate itself out of1 That single fact before we even consider fires, explosions, and other mechanical shortcomings that they are now known for. All of us should be aware, by now, that the "Carbon Footprint" has become the standard by which everything on the planet is gauged, and quite simply, these machines do not even remotely fit the description of how they are represented! The manufacturer and investors in these projects, which now circle the globe, want all of us, including the DOE (because that's who makes the U.S. funding decisions), to believe that every one of these "wind farms" is a blessing. That's where all of their money is made, in the sale, engineering, construction and installation phase. Of course, these salesmen would profess a 96% efficient "green" and "sustainable" power from each and every turbine! But, we now know statistically, what has been presented for years on paper is not anywhere close to the base reality of this technology. In fact, the best of the turbines at times may come close to 25% efficiency. Quite simply, the amount of factual information, now coming to light after the "experimental years" does not support the idea that this technology, in it's present form is either efficient or green! People worldwide are now becoming aware, that these wind power projects are "boondoggles" engineered by "snake oil salesmen" to make the original parties lots of money and then not to do very much thereafter. All the aspects and actual studies of both sides of this issue are pretty readily available for anyone who wants to look for it! My brief comments here will not even delve into the remaining issues of the sheer volume oflost land area, wit it's archaeology, and the other natural resources that are lost or dramatically affected with the installation of every one of these projects! Nor can I effectively address all of the negative effects that wind turbine projects may inflict on the nearby residents, as well native plants and wildlife species, or the effects of frequent fires and mechanical failures, oh yes, and for those who think it is tantamount... that darned view! It will be years before some of these studies will be able to give us a complete picture! That I think is the real tragedy ... the huge investment of tax payer dollars, in such bad times, where every saved dollar counts as well as the ignorance of the total impact of these projects with such incomplete long term data! Bottom line is that you people have heavily invested the money of the taxpayers of this country in a costly unproven science of an industrial nature, based mostly on "theory" and "sales pitches", even before any completed research was available! Time for you to take another look!	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Additionally, as stated in the Draft EA (see page 51, Section 2.4, "Alternatives Considered but Eliminated from Further Consideration," DOE's loan guarantee program (LGP) was considered as a funding option for the Project prior to submitting the interconnection request. Perrin Ranch Wind did not pursue the application process for the LGP, therefore no government funding is being used to finance this project.	5. Explain why the comments do not warrant further agency response.

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95	Livingston, R.A.	Letter/ Email	No	VISUAL	25	1	If you would indulge me a few comments on the general issues associated with the above numbered file ... which would be associated with the general issues of projects like this all over the world! It is not hard for anyone to imagine that the Department of Energy, as an integral part of the United States Government, could still be enamored by the "theories" relative to "Sustainable and Green Energy". It also does not surprise that" Wind Energy" could be a part of that concept. After all, when you are searching for a better, more efficient, sustainable and more environmentally friendly alternative energy source for the future of this country, how would the Wind Turbine appear, in its final stage, to be anything less than what you have been looking for! Who could even look at a wind farm, and not be impressed by the sheer beauty of it! Part of the problem, I think, is that your people have not kept apace with information and statistics compiled in all the literature published after the first experimental installation of these projects, years ago! Your involvement was rather to look at the exaggerated information that manufacturer and investors supplied to you in the "sales pitch" and "brochures" and from that information only, you have based an assessment and then moved on to the next project! Also, that you are typically not there to watch them being installed, or operated. Provable research now shows that from the very Foundation of these machines (125,000 cubic feet of disturbed soil, concrete and rebar), all the way to their Electro Magnetic Fields, and grinding gears, to the tips of the Blades with their noise cavitations, shuttering oflight, and pretty dramatic and conunon mechanical failures, now shows that each one of these machines has created a bigger carbon footprint, even before being brought on line, than it can ever generate itself out of1 That single fact before we even consider fires, explosions, and other mechanical shortcomings that they are now known for. All of us should be aware, by now, that the "Carbon Footprint" has become the standard by which everything on the planet is gauged, and quite simply, these machines do not even remotely fit the description of how they are represented! The manufacturer and investors in these projects, which now circle the globe, want all of us, including the DOE (because that's who makes the U.S. funding decisions), to believe that every one of these "wind farms" is a blessing. That's where all of their money is made, in the sale, engineering, construction and installation phase. Of course, these salesmen would profess a 96% efficient "green" and "sustainable" power from each and every turbine! But, we now know statistically, what has been presented for years on paper is not anywhere close to the base reality of this technology. In fact, the best of the turbines at times may come close to 25% efficiency. Quite simply, the amount of factual information, now coming to light after the "experimental years" does not support the idea that this technology, in it's present form is either efficient or green! People worldwide are now becoming aware, that these wind power projects are "boondoggles" engineered by "snake oil salesmen" to make the original parties lots of money and then not to do very much thereafter. All the aspects and actual studies of both sides of this issue are pretty readily available for anyone who wants to look for it! My brief comments here will not even delve into the remaining issues of the sheer volume oflost land area, wit it's archaeology, and the other natural resources that are lost or dramatically affected with the installation of every one of these projects! Nor can I effectively address all of the negative effects that wind turbine projects may inflict on the nearby residents, as well native plants and wildlife species, or the effects of frequent fires and mechanical failures, oh yes, and for those who think it is tantamount... that darned view! It will be years before some of these studies will be able to give us a complete picture! That I think is the real tragedy ... the huge investment of tax payer dollars, in such bad times, where every saved dollar counts as well as the ignorance of the total impact of these projects with such incomplete long term data! Bottom line is that you people have heavily invested the money of the taxpayers of this country in a costly unproven science of an industrial nature, based mostly on "theory" and "sales pitches", even before any completed research was available! Time for you to take another look!	The visual impact of the proposed project is evaluated in Section 3.3.1 of the Draft EA (see pages 60-79).	5. Explain why the comments do not warrant further agency response.

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96	Livingston, R.A.	Letter/ Email	No	CULTURAL	25	1	If you would indulge me a few comments on the general issues associated with the above numbered file ... which would be associated with the general issues of projects like this all over the world! It is not hard for anyone to imagine that the Department of Energy, as an integral part of the United States Government, could still be enamored by the "theories" relative to "Sustainable and Green Energy". It also does not surprise that" Wind Energy" could be a part of that concept. After all, when you are searching for a better, more efficient, sustainable and more environmentally friendly alternative energy source for the future of this country, how would the Wind Turbine appear, in its final stage, to be anything less than what you have been looking for! Who could even look at a wind farm, and not be impressed by the sheer beauty of it! Part of the problem, I think, is that your people have not kept apace with information and statistics compiled in all the literature published after the first experimental installation of these projects, years ago! Your involvement was rather to look at the exaggerated information that manufacturer and investors supplied to you in the "sales pitch" and "brochures" and from that information only, you have based an assessment and then moved on to the next project! Also, that you are typically not there to watch them being installed, or operated. Provable research now shows that from the very Foundation of these machines (125,000 cubic feet of disturbed soil, concrete and rebar), all the way to their Electro Magnetic Fields, and grinding gears, to the tips of the Blades with their noise cavitations, shuttering oflight, and pretty dramatic and conunon mechanical failures, now shows that each one of these machines has created a bigger carbon footprint, even before being brought on line, than it can ever generate itself out of1 That single fact before we even consider fires, explosions, and other mechanical shortcomings that they are now known for. All of us should be aware, by now, that the "Carbon Footprint" has become the standard by which everything on the planet is gauged, and quite simply, these machines do not even remotely fit the description of how they are represented! The manufacturer and investors in these projects, which now circle the globe, want all of us, including the DOE (because that's who makes the U.S. funding decisions), to believe that every one of these "wind farms" is a blessing. That's where all of their money is made, in the sale, engineering, construction and installation phase. Of course, these salesmen would profess a 96% efficient "green" and "sustainable" power from each and every turbine! But, we now know statistically, what has been presented for years on paper is not anywhere close to the base reality of this technology. In fact, the best of the turbines at times may come close to 25% efficiency. Quite simply, the amount of factual information, now coming to light after the "experimental years" does not support the idea that this technology, in it's present form is either efficient or green! People worldwide are now becoming aware, that these wind power projects are "boondoggles" engineered by "snake oil salesmen" to make the original parties lots of money and then not to do very much thereafter. All the aspects and actual studies of both sides of this issue are pretty readily available for anyone who wants to look for it! My brief comments here will not even delve into the remaining issues of the sheer volume oflost land area, wit it's archaeology, and the other natural resources that are lost or dramatically affected with the installation of every one of these projects! Nor can I effectively address all of the negative effects that wind turbine projects may inflict on the nearby residents, as well native plants and wildlife species, or the effects of frequent fires and mechanical failures, oh yes, and for those who think it is tantamount... that darned view! It will be years before some of these studies will be able to give us a complete picture! That I think is the real tragedy ... the huge investment of tax payer dollars, in such bad times, where every saved dollar counts as well as the ignorance of the total impact of these projects with such incomplete long term data! Bottom line is that you people have heavily invested the money of the taxpayers of this country in a costly unproven science of an industrial nature, based mostly on "theory" and "sales pitches", even before any completed research was available! Time for you to take another look!	The potential impacts to cultural resources (archaeology) are discussed in Section 3.2 "Resource Areas Dismissed from Further Consideration" of the Draft EA (see pages 55-60).	5. Explain why the comments do not warrant further agency response.

ID	Contact ID	Comment Type	Change in Final EA Required (Yes/No)	Resource Code	Letter No.	Comment No.	Comment Text	Response	Response Type
97	Livingston, R.A.	Letter/ Email	No	AIRQ	25	1	If you would indulge me a few comments on the general issues associated with the above numbered file ... which would be associated with the general issues of projects like this all over the world! It is not hard for anyone to imagine that the Department of Energy, as an integral part of the United States Government, could still be enamored by the "theories" relative to "Sustainable and Green Energy". It also does not surprise that" Wind Energy" could be a part of that concept. After all, when you are searching for a better, more efficient, sustainable and more environmentally friendly alternative energy source for the future of this country, how would the Wind Turbine appear, in its final stage, to be anything less than what you have been looking for! Who could even look at a wind farm, and not be impressed by the sheer beauty of it! Part of the problem, I think, is that your people have not kept apace with information and statistics compiled in all the literature published after the first experimental installation of these projects, years ago! Your involvement was rather to look at the exaggerated information that manufacturer and investors supplied to you in the "sales pitch" and "brochures" and from that information only, you have based an assessment and then moved on to the next project! Also, that you are typically not there to watch them being installed, or operated. Provable research now shows that from the very Foundation of these machines (125,000 cubic feet of disturbed soil, concrete and rebar), all the way to their Electro Magnetic Fields, and grinding gears, to the tips of the Blades with their noise cavitations, shuttering oflight, and pretty dramatic and conunon mechanical failures, now shows that each one of these machines has created a bigger carbon footprint, even before being brought on line, than it can ever generate itself out of1 That single fact before we even consider fires, explosions, and other mechanical shortcomings that they are now known for. All of us should be aware, by now, that the "Carbon Footprint" has become the standard by which everything on the planet is gauged, and quite simply, these machines do not even remotely fit the description of how they are represented! The manufacturer and investors in these projects, which now circle the globe, want all of us, including the DOE (because that's who makes the U.S. funding decisions), to believe that every one of these "wind farms" is a blessing. That's where all of their money is made, in the sale, engineering, construction and installation phase. Of course, these salesmen would profess a 96% efficient "green" and "sustainable" power from each and every turbine! But, we now know statistically, what has been presented for years on paper is not anywhere close to the base reality of this technology. In fact, the best of the turbines at times may come close to 25% efficiency. Quite simply, the amount of factual information, now coming to light after the "experimental years" does not support the idea that this technology, in it's present form is either efficient or green! People worldwide are now becoming aware, that these wind power projects are "boondoggles" engineered by "snake oil salesmen" to make the original parties lots of money and then not to do very much thereafter. All the aspects and actual studies of both sides of this issue are pretty readily available for anyone who wants to look for it! My brief comments here will not even delve into the remaining issues of the sheer volume oflost land area, wit it's archaeology, and the other natural resources that are lost or dramatically affected with the installation of every one of these projects! Nor can I effectively address all of the negative effects that wind turbine projects may inflict on the nearby residents, as well native plants and wildlife species, or the effects of frequent fires and mechanical failures, oh yes, and for those who think it is tantamount... that darned view! It will be years before some of these studies will be able to give us a complete picture! That I think is the real tragedy ... the huge investment of tax payer dollars, in such bad times, where every saved dollar counts as well as the ignorance of the total impact of these projects with such incomplete long term data! Bottom line is that you people have heavily invested the money of the taxpayers of this country in a costly unproven science of an industrial nature, based mostly on "theory" and "sales pitches", even before any completed research was available! Time for you to take another look!	The potential impacts to air quality are discussed in Section 3.2 "Resource Areas Dismissed from Further Consideration" of the Draft EA (see pages 55-60).	5. Explain why the comments do not warrant further agency response.

ID	Contact ID	Comment Type	Change in Final EA Required (Yes/No)	Resource Code	Letter No.	Comment No.	Comment Text	Response	Response Type
98	Livingston, R.A.	Letter/ Email	No	LAND USE	25	1	If you would indulge me a few comments on the general issues associated with the above numbered file ... which would be associated with the general issues of projects like this all over the world! It is not hard for anyone to imagine that the Department of Energy, as an integral part of the United States Government, could still be enamored by the "theories" relative to "Sustainable and Green Energy". It also does not surprise that" Wind Energy" could be a part of that concept. After all, when you are searching for a better, more efficient, sustainable and more environmentally friendly alternative energy source for the future of this country, how would the Wind Turbine appear, in its final stage, to be anything less than what you have been looking for! Who could even look at a wind farm, and not be impressed by the sheer beauty of it! Part of the problem, I think, is that your people have not kept apace with information and statistics compiled in all the literature published after the first experimental installation of these projects, years ago! Your involvement was rather to look at the exaggerated information that manufacturer and investors supplied to you in the "sales pitch" and "brochures" and from that information only, you have based an assessment and then moved on to the next project! Also, that you are typically not there to watch them being installed, or operated. Provable research now shows that from the very Foundation of these machines (125,000 cubic feet of disturbed soil, concrete and rebar), all the way to their Electro Magnetic Fields, and grinding gears, to the tips of the Blades with their noise cavitations, shuttering oflight, and pretty dramatic and conunon mechanical failures, now shows that each one of these machines has created a bigger carbon footprint, even before being brought on line, than it can ever generate itself out of1 That single fact before we even consider fires, explosions, and other mechanical shortcomings that they are now known for. All of us should be aware, by now, that the "Carbon Footprint" has become the standard by which everything on the planet is gauged, and quite simply, these machines do not even remotely fit the description of how they are represented! The manufacturer and investors in these projects, which now circle the globe, want all of us, including the DOE (because that's who makes the U.S. funding decisions), to believe that every one of these "wind farms" is a blessing. That's where all of their money is made, in the sale, engineering, construction and installation phase. Of course, these salesmen would profess a 96% efficient "green" and "sustainable" power from each and every turbine! But, we now know statistically, what has been presented for years on paper is not anywhere close to the base reality of this technology. In fact, the best of the turbines at times may come close to 25% efficiency. Quite simply, the amount of factual information, now coming to light after the "experimental years" does not support the idea that this technology, in it's present form is either efficient or green! People worldwide are now becoming aware, that these wind power projects are "boondoggles" engineered by "snake oil salesmen" to make the original parties lots of money and then not to do very much thereafter. All the aspects and actual studies of both sides of this issue are pretty readily available for anyone who wants to look for it! My brief comments here will not even delve into the remaining issues of the sheer volume oflost land area, wit it's archaeology, and the other natural resources that are lost or dramatically affected with the installation of every one of these projects! Nor can I effectively address all of the negative effects that wind turbine projects may inflict on the nearby residents, as well native plants and wildlife species, or the effects of frequent fires and mechanical failures, oh yes, and for those who think it is tantamount... that darned view! It will be years before some of these studies will be able to give us a complete picture! That I think is the real tragedy ... the huge investment of tax payer dollars, in such bad times, where every saved dollar counts as well as the ignorance of the total impact of these projects with such incomplete long term data! Bottom line is that you people have heavily invested the money of the taxpayers of this country in a costly unproven science of an industrial nature, based mostly on "theory" and "sales pitches", even before any completed research was available! Time for you to take another look!	The potential impacts to land use are discussed in Section 3.2 "Resource Areas Dismissed from Further Consideration" of the Draft EA (see pages 55-60).	5. Explain why the comments do not warrant further agency response.

ID	Contact ID	Comment Type	Change in Final EA Required (Yes/No)	Resource Code	Letter No.	Comment No.	Comment Text	Response	Response Type
99	Livingston, R.A.	Letter/ Email	No	WILDLIFE	25	1	If you would indulge me a few comments on the general issues associated with the above numbered file ... which would be associated with the general issues of projects like this all over the world! It is not hard for anyone to imagine that the Department of Energy, as an integral part of the United States Government, could still be enamored by the "theories" relative to "Sustainable and Green Energy". It also does not surprise that" Wind Energy" could be a part of that concept. After all, when you are searching for a better, more efficient, sustainable and more environmentally friendly alternative energy source for the future of this country, how would the Wind Turbine appear, in its final stage, to be anything less than what you have been looking for! Who could even look at a wind farm, and not be impressed by the sheer beauty of it! Part of the problem, I think, is that your people have not kept apace with information and statistics compiled in all the literature published after the first experimental installation of these projects, years ago! Your involvement was rather to look at the exaggerated information that manufacturer and investors supplied to you in the "sales pitch" and "brochures" and from that information only, you have based an assessment and then moved on to the next project! Also, that you are typically not there to watch them being installed, or operated. Provable research now shows that from the very Foundation of these machines (125,000 cubic feet of disturbed soil, concrete and rebar), all the way to their Electro Magnetic Fields, and grinding gears, to the tips of the Blades with their noise cavitations, shuttering oflight, and pretty dramatic and conunon mechanical failures, now shows that each one of these machines has created a bigger carbon footprint, even before being brought on line, than it can ever generate itself out of1 That single fact before we even consider fires, explosions, and other mechanical shortcomings that they are now known for. All of us should be aware, by now, that the "Carbon Footprint" has become the standard by which everything on the planet is gauged, and quite simply, these machines do not even remotely fit the description of how they are represented! The manufacturer and investors in these projects, which now circle the globe, want all of us, including the DOE (because that's who makes the U.S. funding decisions), to believe that every one of these "wind farms" is a blessing. That's where all of their money is made, in the sale, engineering, construction and installation phase. Of course, these salesmen would profess a 96% efficient "green" and "sustainable" power from each and every turbine! But, we now know statistically, what has been presented for years on paper is not anywhere close to the base reality of this technology. In fact, the best of the turbines at times may come close to 25% efficiency. Quite simply, the amount of factual information, now coming to light after the "experimental years" does not support the idea that this technology, in it's present form is either efficient or green! People worldwide are now becoming aware, that these wind power projects are "boondoggles" engineered by "snake oil salesmen" to make the original parties lots of money and then not to do very much thereafter. All the aspects and actual studies of both sides of this issue are pretty readily available for anyone who wants to look for it! My brief comments here will not even delve into the remaining issues of the sheer volume oflost land area, wit it's archaeology, and the other natural resources that are lost or dramatically affected with the installation of every one of these projects! Nor can I effectively address all of the negative effects that wind turbine projects may inflict on the nearby residents, as well native plants and wildlife species, or the effects of frequent fires and mechanical failures, oh yes, and for those who think it is tantamount... that darned view! It will be years before some of these studies will be able to give us a complete picture! That I think is the real tragedy ... the huge investment of tax payer dollars, in such bad times, where every saved dollar counts as well as the ignorance of the total impact of these projects with such incomplete long term data! Bottom line is that you people have heavily invested the money of the taxpayers of this country in a costly unproven science of an industrial nature, based mostly on "theory" and "sales pitches", even before any completed research was available! Time for you to take another look!	The analysis in the EA is based on best available data and information. As discussed in the Draft EA (see Section 2.2, "Proposed Facilities," page 12), "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." Vegetation would not be cleared any further than described in the Draft EA. The potential impacts to vegetation (flora) and wildlife (fauna) are evaluated in Sections 3.3.4 and 3.3.5 of the Draft EA.	5. Explain why the comments do not warrant further agency response.
100	Livingston, R.A.	Letter/ Email	Yes	FIRE	25	2	# 1- As far as I can tell, there has been a lot of non-specific discussion, relative to Fire Suppression on this project, from installation to the maintenance afterwards, with no "real" proposal, or solution as to how exactly this is going to take place! Since all of the Fire Departments in this area are volunteer, including the majority of the City of Williams, there should be a written and accepted plan, acknowledged by all parties, and made public in order to facilitate a complete understanding of exactly how this is to be implemented and managed for the long term. Due to the fact that water is tantamount in this area, this plan should include adequate water storage, onsite, for the duration!	A Fire Protection and Emergency Response Plan has been developed and is included as an Appendix to the Final EA (see Appendix E). Language regarding adherence to the plan has been added to the Final EA in section 2.2.7 "Applicant-committed Best Management Practices and Conservation Measures"	3. Supplement, improve, or modify its analyses.
101	Livingston, R.A.	Letter/ Email	Yes	MITIGATION	25	2	# 1- As far as I can tell, there has been a lot of non-specific discussion, relative to Fire Suppression on this project, from installation to the maintenance afterwards, with no "real" proposal, or solution as to how exactly this is going to take place! Since all of the Fire Departments in this area are volunteer, including the majority of the City of Williams, there should be a written and accepted plan, acknowledged by all parties, and made public in order to facilitate a complete understanding of exactly how this is to be implemented and managed for the long term. Due to the fact that water is tantamount in this area, this plan should include adequate water storage, onsite, for the duration!	A Fire Protection and Emergency Response Plan has been developed and is included as an Appendix to the Final EA (see Appendix E). Language regarding adherence to the plan has been added to the Final EA in Section 2.2.7 "Applicant-committed Best Management Practices and Conservation Measures"	3. Supplement, improve, or modify its analyses.

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102	Livingston, R.A.	Letter/ Email	Yes	MITIGATION	25	3	#2- Due to the high projected amounts of commercial and construction traffic on Espee Road, during the construction phase of this project I propose that the entire road be upgraded, and paved, from the intersection of Highway #64 all the way out to the interconnect site, in order to keep the dust and noise at acceptable and enforceable levels for the residents of the area.	Per Coconino County Resolution 2011-04, Condition No. 4, "The access roads to each of the tower sites shall be constructed with an all-weather ABC surface" (see Appendix E of the Final EA). Language regarding adherence to this condition has been added to the Final EA in Section 2.2.7 "Applicant-committed Best Management Practices and Conservation Measures." Additionally, during review of the Draft EA, ADEQ provided mitigation recommendations for minimizing particular matter (see Section 2.2.8 Mitigation Measures in the Final EA).	1. Modify alternatives including the proposed action.
103	Livingston, R.A.	Letter/ Email	Yes	MITIGATION	25	4	#3- Due to the close proximity of residents, the construction phases of this project should be limited to some reasonable daily time frame ... no 24 hours a day for traffic on Espee Road!	As discussed in the Draft EA, "Construction crews would likely work 8- to 12-hour work days, six days per week, depending on the weather" (see page 44, Section 2.2.3, "Construction." The Final EA discussion of "workforce" has been updated to clarify that crews would generally not be working at night, but that depending on conditions, it may be necessary.	1. Modify alternatives including the proposed action.
104	Livingston, R.A.	Letter/ Email	No	PROCESS	25	5	#4- A double check on the DOE's part, that ALL of the aviation, environmental, archaeological, biological, agricultural, wildlife, and local (inclusive of the original Grand Canyon Corridor Agreement) conditions have been met 100%, in order to proceed! We already are aware that the Grand Canyon Corridor Agreement has been breached by allowing industrial development!	Thank you, the Environmental Assessment (EA) was prepared in accordance with the National Environmental Policy Act to assess the human and environmental impacts of constructing and operating the wind Project, which would be enabled by Western's execution of the interconnection agreement (see Draft EA, page 1).	5. Explain why the comments do not warrant further agency response.
105	Livingston, R.A.	Letter/ Email	Yes	WIND RESOURCE	25	6	May I offer one last comment before closing? These projects are a "forever" thing ... much like introducing a dam on a river in order to gather its resources. In the past, we have indiscriminately (albeit using the sciences that we currently possessed at the time) caused irreversible damages, which we can only ascertain, by the passage of a measure of time. These "Wind Turbine Projects" should be approached with the very same prospects. They are a lot easier to install upon incomplete or theoretical data, than they will be to remove when the facts are finally looked at! With all this evidence before us, we probably have no accurate account of how many of the turbines in the Tehachapi area are STILL a viable energy source, if they ever were!	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Section 1.3.1 has been added to the Final EA discussing the wind potential of the site.	3. Supplement, improve, or modify its analyses.
106	Harper, John (ADO)T	Email & fax	No	NS-N/A	26	1	Thank you for allowing us to comment on the Environmental Assessment of Western Area Power Administration's Perrin Ranch Wind Energy Interconnection Project (DOEIEA-1853, Date received: May 12th, 2011). The following are ADOT's Flagstaff District's comments inclusively. Other divisions of ADOT views or input are not included in this letter. Please include the following in your distribution list for future public notices, and, if other comments from ADOT are so desired, please contact: Todd Williams, Director - Office of Environmental Services 1611 West Jackson St., Mail drop EM04 Phoenix, AZ 85007 Office phone: (602)-712-8272 Email: twilliams2(a),azdot.gov	Thank you for your comment.	6. Other, general statement; non-substantive
107	Harper, John (ADO)T	Email & fax	Yes	TRANSP	26	2	ADOT's Flagstaff District supports the proposed action for Perrin Ranch Wind Energy' Interconnection Project to use northem Arizona's great wind energy potential to generate clean energy. ADOT's greatest concem regarding this project is the potentialfor adverse impacts to Interstate 40, State Route 64, and Espee Road interchange. This includes adjacent Right of Way areas with fencing; as well as any adverse impacts to bridges used in the transportation of equipment or materials. Please be aware of ADOT's requirements for an encroachment permitfor any potential activities within Right of Way. Please consider the comments and concems in order to maintain, protect, and serve the traveling public and ADOT roadway functions.	Thank you for your comment. NextEra has submitted an application for potential ROW encroachment at the intersection of Espee Road and State Route 64. No other roadway ROW are anticipated to be encroached upon.	5. Explain why the comments do not warrant further agency response.
108	Harper, John (ADO)T	Email & fax	Yes	TRANSP	26	3	The following is the contact for utility/drainage easement potential resultant impacts (temporary or permanent) from the Perrin Ranch Wind Energy IntercOlmection Project: Dennis Johnson, ADOT Maintenance Supervisor 140B MP 165.5 /P.O. Box 606 Williams, AZ 86046 Office phone: (928)-635-4301 Office fax: (928)-635-9314 Email: djohnson(a),azdot.gov Please contact the following for traffic impacts or unforeseen maintenance resulting from the Perrin Ranch Wind Energy Interconnection Project: Kent Link, PE 1801 S. Milton Rd Flagstaff, AZ 86001 Office phone: (928)-779-7570 Office fax: (928)-779-5905 Email: wlink@azdot.gov Please contact the following for potential Encroachn1ent Permits required to enter or do activities within Al)OT right of way trom the. Perrin RanchWiJJ.d Energy Interconnection Proj ect: Warren Sutphen 1801 S. Milton Rd Flagstaff, AZ 86001 Office phone: (928)-779-7520 Office fax: (928)-779-5905 Email: wstuphen@azdot.gov .... -Please contact the ·following in-order to-obtain-appropriate.permits-requiredf01: transport. of oversized loads using ADOT's roads and bridges (1-40, SR 64, & Espee Road): Chris Pippin, Class C Supervisor 1739 W Jackson St. Phoenix, AZ 85007 office phone: (602) 712-8280 Email: pippen@azdot.gov	Thank you for your comment.	6. Other, general statement; non-substantive

ID	Contact ID	Comment Type	Change in Final EA Required (Yes/No)	Resource Code	Letter No.	Comment No.	Comment Text	Response	Response Type
109	Bahr, Sandy (Sierra Club)	Email	No	PROCESS	27	1	Thank you for the opportunity to provide comments on the Draft Environmental Assessment (EA) for Perrin Ranch Wind Energy Interconnection Project (DOE/EA-1853). Please accept these comments on behalf of the Sierra Club's Grand Canyon Chapter and our 12,000 members in Arizona. The Sierra Club's mission is "to explore, enjoy, and protect the wild places of the earth; to practice and promote the responsible use of the earth's ecosystems and resources; and to educate and enlist humanity to protect and restore the quality of the natural and human environments." The Grand Canyon Chapter has long been committed to protection of Arizona's lands, wildlife, water, and communities. We are also strong supporters of renewable energy and energy efficiency as necessary means to reduce greenhouse gas emissions and other pollutants and curb global climate change. We strongly believe that properly planned and sited renewable energy resources are essential for addressing this challenging issue. We are supportive of appropriately sited wind and solar projects in Arizona. The EA addressed many of the issues we described in our scoping comments, but several questions and concerns remain and are discussed below.	Thank you for your comment.	6. Other, general statement; non-substantive
110	Bahr, Sandy (Sierra Club)	Email	Yes	WILDLIFE	27	2	Wildlife. Our primary concern is the effect on wildlife species. We appreciate the efforts to reduce wildlife injury and mortality through various plans and programs, including the Avian and Bat Protection Plan (ABPP). However, some additional measures and more flexible adaptive management are needed for this project. Construction. With regards to construction, the EA states that direct mortality to reptiles, amphibians, and small mammals may occur due to collisions with vehicles, crushing in burrows and trenches, and other ground-disturbing activities. In order to reduce these impacts, we recommend that surveys be conducted just prior to development in any area and that any wildlife observed be moved out of harm's way (as permitted) or that construction seek to avoid those animals, either by waiting until that animal has moved or by slightly altering the construction site, as appropriate. Similarly, because wildlife may be present in trenches, burrows, and other depressions, these areas should be thoroughly scouted before filling or crushing. Additionally, all trenches should include escape ramps that will allow any wildlife that crawl or fall into them to get out. The EA states that if construction is planned during typical avian breeding season, avoidance measures would be implemented. Rather than seeking to avoid nests, we recommend that construction not take place during this sensitive time. Human disturbance during breeding season can have significant negative impacts to birds, including abandonment of or reduced care for nests or young, reduced quality of food ingested by adults or provided to young, and more.1,2	The ABPP includes adaptive management techniques to address any impact that may be observed. These measures have been developed in coordination with USFWS and AGFD and are considered appropriate for this project. Regarding, surveys for and moving of small mammals, reptiles, and amphibians; section 3.3.5 of the EA has been clarified to state that those species are highly mobile and most would temporarily move from the immediate area to avoid crushing, although some individuals may seek shelter in burrows and would be crushed. The low speed limit as described in section 2.2.7 would help reduce this impact. These impacts are typical of any construction project and would not constitute a significant impact to those species. Relocation of these species is not feasible or considered necessary for a project of this nature; however, the EA includes a worked education program that would include informing workers on best management practices to avoid harming wildlife on site. A biological monitor would be on site to enforce those measures. Regarding Avian breeding season, construction is not planned during that time; however, in the event that it is necessary wildlife management agency accepted avoidance strategies will be implemented to reduce or eliminate potential impacts.	3. Supplement, improve, or modify its analyses.

ID	Contact ID	Comment Type	Change in Final EA Required (Yes/No)	Resource Code	Letter No.	Comment No.	Comment Text	Response	Response Type
111	Bahr, Sandy (Sierra Club)	Email	Yes	WILDLIFE	27	3	Bats. The EA discusses surveys conducted for bats in the project area. It mentions that long-term acoustic studies were initiated by Pandion Systems, Inc., and that SWCA conducted additional acoustic and capture surveys in the fall. However, the EA does not detail how the long-term studies were conducted, including locations within the project area, length of surveys (months or years?), or if these surveys were conducted at different times of the year and at different times of the night. In order to adequately determine what species are present in the project area, surveys must be conducted yearround, during different seasons, at varying times of night, and in various locations throughout the project area. Different bat species are more active at different times of night and during particular times of the year, so surveys only occurring at particular times may not be able to identify that species' presence. Similarly, different species may be more prevalent in certain localities in the project area, even if the habitat is fairly uniform; without conducting surveys throughout the project area, it may not be possible to determine which species are actually present. The EA also contains conflicting information about possible effects on bats. In several places, such as on page 113 and in the ABPP, it states that only two species known to be vulnerable to turbine mortality are found in the area – the hoary bat (Lasiurus cinereus) and silver-haired bat (Lasionycteris noctivagans) – and that because these two species have a relatively low occurrence in the project area, effects are expected to be minimal. It also states that Mexican free-tailed bats (Tadarida brasiliensis) were the most common bat species identified during surveys, making up 83% of the identified bats. Page 113 provides studies that have shown that Mexican free-tailed bats have been reported as mortalities at wind energy facilities in various states, and page 119 contains the following language: "…some species, such as migratory and tree-roosting species like western red bats, hoary bat, silverhaired bats, and Mexican free-tailed bats, are more likely to be injured or killed at wind energy facilities…especially during the fall migratory period" (emphasis added). Yet the following statement appears on page 20 of the ABPP: "…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." These statements are in direct contradiction of each other. Based on the information provided by the studies discussed, the EA and the ABPP seem to significantly downplay potential impacts to bats. According to these studies and the information provided, over 91% of the bat population is at high risk (83% Mexican free-tailed – the most abundant species, 8% hoary – the second most abundant species, plus a small percentage of silver-haired). This information needs to be acknowledged, and suitable and effective mitigation measures to significantly reduce potential effects to these species need to be put in place. 1 Steidl, R.J., and R.G. Anthony. 2000. Experimental effects of human activity on breeding bald eagles. Ecological Applications 10: 258–268. 2 Blumstein, D.T., E. Fernández-Juricic, P.A. Zollner, and S.C. Garity. 2005. Inter-specific variation in avian responses to human disturbance. Journal of Applied Ecology 42: 943–953. The EA also mentions that this project is not expected to affect regional movements of bats, but that local movements may change as bats "are anticipated to fly around the new structures or over the facility" (page 120). However, studies have shown that bats may not echolocate during migration, or only echolocate periodically, making them particularly susceptible to collisions with wind turbines.3,4 Studies have also shown that bats concentrate along select routes during migration, rather than dispersing across the landscape or shifting to avoid obstacles. 5 Researchers highly recommended that surveys of bat migration routes be completed and that wind facilities be placed accordingly so as to avoid these routes and minimize bat fatalities.6 Based on the information provided by the Pandion and SWCA studies, this area is used as a migration pathway for bats, and appropriate measures need to be taken to avoid or minimize injuries and mortalities, including limiting turbine placement to areas where bats are known not to migrate.	This section has been updated to describe the bat studies in more detail. Reports for these studies are cited in the EA and provide full details of methods and findings. Regarding conflicting information for bats, there is no page 113 of the ABPP, therefore, it is assumed the comment should read 113 of the EA. The EA states that two species known to be vulnerable were detected in low numbers; not that they are the only susceptible species. The statement regarding free-tailed risk in the fall on page 113 was a misprint and has been revised. Regarding bat risk, not all species are equally vulnerable, so the bat population should not be measured as all bat species combined, but the potential to impact each population of bat species. Second, being at risk does not directly correlate to mortality. The ABPP includes many specific avoidance, minimization, and mitigation measures for bats to reduce risk. These measures include operational changes based on site-specific data that have shown to be up to 87% effective. Re; bat movement, it has been acknowledged in the EA that morality is a risk. This section is meant to discuss potential disruption of large-scale movement patterns. This has been clafified.	3. Supplement, improve, or modify its analyses.
112	Bahr, Sandy (Sierra Club)	Email	Yes	WILDLIFE	27	4	Reptiles and Amphibians. The EA states that surveys were not conducted for reptiles and amphibians in the project area. Instead, it relies on the assumptions that "reptile and amphibian species diversity is likely low relative to warmer regions of the state" (page 113, emphasis added) and that "reptiles and amphibians that are expected to occur in the Project Area are relatively common" (page 116, emphasis added). Based on these assumptions, it is expected that no significant impacts will occur. However, without knowledge of what species actually inhabit the project area, effects are unknown. The assumption that species diversity is low relative to other areas does not mean that impacts will be minor. In fact, it could mean quite the opposite. Different species occur in different areas, dependent on habitat and resources available.7,8 Generalizations can be made based on habitat type, but species occurrence and abundance varies within much smaller localities, even across what appears to be relatively uniform habitat. Even if species diversity is relatively low in the project area (which has not been demonstrated through targeted surveys), sensitive species may occur in this area. Thorough, targeted surveys should be completed throughout the project area and the surrounding area in order to adequately determine the effects of this project and suitable mitigation efforts.	A more detailed description of replies and amphibians and their potential to occur based on available information has been added to section 3.3.5 of the Final EA. Species-specific surveys are not required for any of the species with potential to occur on site; however, an analysis of potential impacts to those species is included in the EA, along with conservation measures to reduce impacts.	3. Supplement, improve, or modify its analyses.

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113	Bahr, Sandy (Sierra Club)	Email	Yes	WILDLIFE	27	5	Small Mammals. The EA does not mention whether or not surveys were completed for small mammals. Based on the statement, "[s]mall mammal species likely to occur within the Project Area" (page 114, emphasis added), it can be assumed that surveys have not been completed. In fact, the EA only mentions a small 3 Baerwald, E.F., and R.M.R. Barclay. 2011. Patterns of activity and fatality of migratory bats at a wind energy facility in Alberta, Canada. The Journal of Wildlife Management 75: n/a. doi: 10.1002/jwmg.147. 4 Kunz, T.H., E.B. Arnett, W.P. Erickson, A.R. Hoar, G.D. Johnson, R.P. Larkin, M.D. Strickland, R.W. Thresher, and M.D. Tuttle. 2007. Ecological impacts of wind energy development on bats: questions, research needs, and hypotheses. Frontiers in Ecology and the Environment 5: 315–324. 5 Baerwald, E.F., and R.M.R. Barclay. 2009. Geographic variation in activity and fatality of migratory bats at wind energy facilities. Journal of mammalogy 90 (6): 1341–1349. 6 Ibid. 7 Olden, J.D., M.K. Joy, and R.G. Death. 2006. Rediscovering the species in community-wide predictive modeling. Ecological Applications 16: 1449–1460. 8 Tews, J., U. Brose, V. Grimm, K. Tielborger, M.C. Wichmann, M. Schwager, and F. Jeltsch. 2004. Animal species diversity driven by habitat heterogeneity/diversity: the importance of keystone structures. Journal of Biogeography 31(1): 79–92. assemblage of species that might be in the area: desert cottontail (Sylvilagus audobonii), white-throated woodrat (Neotoma albigula), deermouse (Peromyscus maniculatus), Gunnison's prairie dog (Cynomys gunnisoni), and ground squirrels (family Sciuridae). It is highly unlikely that these are the only species present in the area. As with reptiles and amphibians, the EA assumes that no significant impacts will occur. Without a thorough understanding of what species occur in this area, however, this statement is not supported. As with reptiles and amphibians, thorough surveys must be completed to determine what species inhabit the project area as well as the surrounding area. These surveys should be completed and analyzed and appropriate mitigation efforts put in place. Additionally, the EA notes that the status of Gunnison's prairie dogs within the project area is unknown. Considering the pressures on this species in the region through habitat loss, shooting, and intentional removal by ranchers – and also considering that petitions have been filed calling for listing of this species under the Endangered Species Act – Perrin Ranch Wind should seek to understand the abundance and dispersal of this species in the project area and should seek to avoid negative impacts to it.	A more detailed description of small mammals and their potential to occur based on available information has been added to section 3.3.5 of the Final EA. Species-specific surveys are not required for any of the species with potential to occur on site; however, an analysis of potential impacts to those species is included in the Final EA, along with conservation measures to reduce impacts.	3. Supplement, improve, or modify its analyses.

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114	Bahr, Sandy (Sierra Club)	Email	Yes	WILDLIFE	27	6	Avian and Bat Protection Plan. As mentioned above, we very much appreciate inclusion of the Avian and Bat Protection Plan. This is a good step toward reducing impacts to birds and bats. However, we do have some concerns and would like to see additional actions taken. As discussed above, the EA and ABPP seem to grossly underestimate potential impacts to bats. Not only are effects to Mexican free-tailed bats overlooked, thus not acknowledging that over 90% of the bat populations in the area could be significantly affected by this project, but the effects to species that are recognized as being highly susceptible to collision mortality (i.e. hoary bat and silver-haired bat) are not taken into account. The EA states that the hoary bat's activity "constitutes only 8% of the activity, which suggests that total mortality will still be relatively low" (page 20). Perhaps total mortality among all species will be low (not taking into account effects on Mexican free-tailed bats), but mortality within hoary bats has the potential to be quite high. The EA needs to consider speciesby-species impacts, rather than the entire order of bats, in order to determine population-level impacts. When considering effects to individual species, significance criteria, as discussed on page 114 of the EA, may be met (i.e. "Loss to any population of sensitive wildlife that would jeopardize the continued existence of that population."). Potential impacts to each species need to be re-evaluated, and adjustments to the ABPP should be made based on that information. Also regarding bats, some of the information provided in the ABPP is unclear. Section 2.2.2.1 (page 19) says that 15 bat species have been recorded in the project area, and one of these is a state wildlife species of special concern; it refers us to Table 2. However, Table 2 only shows 14 bat species, none of which are shown as a species of state concern. Instead, 9 species that are "likely to occur" or "may occur" are listed as Species of Concern by the U.S. Fish and Wildlife Service (USFWS). Additionally, two species that were noted as having been located in the project area – the hoary bat and silver-haired bat – are not listed in this table. This information is confusing and does not allow for an adequate assessment of what species are in the area as well as risks to those species. We commend Perrin Ranch Wind for providing a worker education awareness program to minimize employee interactions with and disturbance to wildlife. The ABPP says that this program will be prepared by a biologist. We encourage Perrin Ranch Wind to also use a qualified biologist or representative to provide training in order to provide adequate instruction as well as answer any questions or address any issues. We appreciate that Perrin Ranch Wind is planning to conduct post-construction surveys to identify and estimate avian and bat mortality. However, it is important to conduct these surveys more frequently than every other week and for more than a third of the operating turbines. Because scavenging can quickly remove evidence of a mortality, especially for small animals such as bats and small birds, surveys that occur only once every other week may significantly underestimate the number of mortalities as well as the species that are affected, even after carcass removal corrections are applied. Surveys at this relatively infrequent level may also miss the effects of short-term modifiers, such as a strong wind storm or other weather-related event that occurs shortly after a survey is completed; evidence of impacts from these events may be gone by the time the next survey is completed. Additionally, by only surveying a third of the turbines – and the same turbines each time – micro-scale effects and turbine-by-turbine impacts may not be noticed. Placement of individual turbines may affect different species in different ways. Due to localized use of wildlife, one turbine may have significantly higher effects than the turbine on either side of it. Also, the plan does not mention if a correction factor will be applied that will estimate mortality among all turbines, rather than just mortalities at the third that are surveyed. It is important for all turbines to be surveyed on a regular basis in order to fully realize the effects on wildlife and to modify operation of individual turbines as needed. The long-term monitoring following the initial three years of post-construction monitoring will help provide information for better understanding and minimizing the impact of these projects. We suggest that formal surveys be scheduled more frequently than every 10 years, however. There can be significant changes and impacts within 10 years, including changes in species presence and abundance in the area and, thus, impacts of the project on populations. In order to better understand the long-term impacts of this project on avian and bat populations, we encourage Perrin Ranch Wind to conduct formal mortality surveys annually, as well as to conduct surveys of wildlife populations – including species presence and abundance – every couple of years.	The statement that 90% of the bat populations in the area could be significantly affected by this project is incorrect. Presence is not a direct correlation to mortality (NWCC 2010), therefore, the mere presence of species does not translate into mortality. The EA discusses species-specific impact potential for the most vulnerable species, such as hoary bat and red bat. The ABPP was prepared based on specific site-specific data and includes mitigation measures to address specific findings. The text in section 2.2.2.1 was a misprint and has been corrected. Hoary bat and silver-haired bat are not special status species and are therefore not included in table 2. We have added that the WEAP will also be provided by a qualified biologist. Regarding mortality surveys, the study has been designed using currently accepted methods, including those described in the USFWS draft wind guidelines. Specific searcher efficiency and scavenger rate studies are used to correct for missed and scavenged carcasses. The ABPP discusses methods on how correction factors will be used for both searcher efficiency and scavenger rate, as well as to correct for sample size. Further, the ABPP states that survey intervals may need to be adjusted based on data collected to ensure precise correction factors. Formal mortality surveys for the life of the project are not viable for a commercial scale project; however, as determined appropriate by state and federal wildlife agencies, long-term monitoring is described for the facility on an annual basis by on-site staff as well as formal survey every 10 years.	3. Supplement, improve, or modify its analyses.

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115	Bahr, Sandy (Sierra Club)	Email	Yes	WILDLIFE	27	7	We have several concerns regarding the annual operational and non-operational mitigation thresholds. Our primary concern is that the threshold values for almost all of the species categories (all but the bald and golden eagles) are very high. For example, 75 individuals of a Low-3 bat species or 27 individuals of a Low avian species need to be identified at a single turbine over a short period or at the facility in a given season in consecutive years before operational mitigation occurs. Similarly, 45 Low-2 bats or 300 Low-2 birds need to be found for non-operational mitigation to occur. These numbers are high and such levels of mortality can have significant impacts on populations in the area. These numbers are especially problematic considering that they are based only on ndividual mortalities discovered without searcher efficiency and carcass removal corrections factored in. The ABPP admits that only a portion of mortalities will likely be discovered and identified. This portion could, in fact, be quite small in relation to the total number of individuals injured or killed. If only two individuals of a High-2 large bird species are identified as mortalities, it can be assumed that significantly more have been injured or killed, especially considering that only a third of the turbines are surveyed. However, because the correction factors are not applied at a species level, no mitigation will occur. Perrin Ranch Wind must determine a suitable correction factor to apply toward species impacts. This correction factor should take into account searcher efficiency, carcass removal, and turbines that were not surveyed. Without applying such a correction factor, effects to individual species will be underestimated, significance criteria will not be realized if they are met, and the fact that threshold values have been met will not be recognized even though considerably more individuals of that species have been killed. The mitigation measures do not provide adequate protection to the species that would be affected. For example, if operational thresholds are met, shutdowns would occur for only 120 turbine hours for birds. If only one turbine is determined to be the problem, this could potentially be enough. However, if mortalities were dispersed across the landscape, this small decrease would not have a positive effect – shutdown of every turbine for only two hours in one day out of a full year would be considered appropriate, as described in the plan, yet this would likely not decrease bird mortalities. With regards to bats, implementing a cut-in speed curtailment of 5.0 m/s for 112 facility hours per year also will have little impact. The timing concerns are the same as described for birds above. Also, we are disappointed that Perrin Ranch Wind has chosen the minimal possible cut-in speed curtailment that Arnett et al.9 recommend to reduce bat mortality. This study recommends 5.0–6.5 m/s; in our scoping comments, we recommended 6.0 m/s. If a 5.0 m/s cut-in speed curtailment is not determined adequate based on bat mortalities, we strongly encourage Perrin Ranch Wind to increase this to more appropriate levels, as well as increase the duration this curtailment is used. We recommend that Perrin Ranch Wind utilize adaptive management in order to address bird and bat mortality as a result of this project. Rather than providing maximum allowable shutdown times or cutin speed curtailment, Perrin Ranch Wind should determine what makes sense for the area based on corrected observations to individual species and species classifications. This will be critical for reducing mortalities and effects to species and populations. We also question what will happen if the “Final Measure” has been implemented, yet mortalities that reach the threshold values continue to occur. Does Perrin Ranch Wind have a contingency plan?	These thresholds are meant to address population-level impacts. and were determined through substantial coordination with USFWS, AGFD, and other wildlife experts based on best available data related to populations of those species. Further, thresholds have been misunderstood in some cases. For example 300 Low-2 birds is the combination of all remaining species, not each species, and include correction factors. Therefore, based on best available data, including site-specific data, and professional opinion, these numbers are appropriate and will ensure significant impacts are not reached on populations. It is incorrect to assume that more of a specific species have been killed than have been identified, therefore, correction factors for specific species are not applied. It is also incorrect to assume that mitigation will not occur due to the lack of correction factors; mitigation will occur any time thresholds are exceeded. At this time, there are not available methods for species-specific correction factors; therefore, they cannot be utilized. Further, as stated in the ABPP section 3.2.6, thresholds may be changed as new data is collected. The development of curtailment and other mitigation measures is based on site specific data of bird and bat use and current understanding of avian and bat interactions at other wind facilities. Based on that, these mitigation measures are considered suitable to ensure population level effects do not occur. Adaptive management is a primary component of the ABPP. The plan allows for the development of mitigation measures to address specific problems as they are observed, within a phase approach. The proposed mitigation levels most optimally achieve reduced probability of mortality during time periods (daily and seasonally) of greatest concern; however, if threholds are still exceeded, the USFWS has the ability to further address the situation though legal means related to the Migratory Bird Treaty Act and/or Bald and Golden Eagle Protection Act.	3. Supplement, improve, or modify its analyses.
116	Bahr, Sandy (Sierra Club)	Email	Yes	VEG	27	8	Plants. The EA says that the Arizona Game and Fish Department’s Heritage Data Management System (HDMS) was used to determine if rare plants are present in the project area. However, this system is not completely reliable as much of the data is from incidental observations. Have thorough vegetation surveys been completed in this area? We recommend a more thorough vegetation survey be done prior to completion of the Final EA in order to adequately assess impacts to this area and determine appropriate mitigation. The EA also says that indirect adverse impacts to vegetation communities may occur, including increased legal and illegal take of plants. However, the EA does not indicate what constitutes an “illegal take” of plants, considering that no rare plants are known to occur in this area. We would appreciate clarification on this issue.	A more detailed analysis has been included in the vegetation section of the EA to better describe survey efforts. Illegal take of native plants has been clarified in the EA.	3. Supplement, improve, or modify its analyses.
117	Bahr, Sandy (Sierra Club)	Email	Yes	VEG	27	9	Restoration and Reclamation Plan. We commend Perrin Ranch Wind for seeking to minimize impacts to plants and for implementing a Restoration and Reclamation Plan. This plan will help stabilize soils in the area, reduce wildlife impacts, and assist proper ecosystem functioning. Appendix A states that the services of a subcontractor who specializes in reclamation may be used (page 1). We strongly encourage such a professional be retained in order to ensure proper implementation of this plan. The restoration and reclamation options detailed in this plan will help to significantly mitigate potential impacts on soils, waterways, and other resources, but only if properly implemented. Having a knowledgeable subcontractor available will help ensure that this plan is fully utilized and implemented. We want to stress the importance of monitoring to ensure that this plan is effective. The EA says that “it is anticipated that post-construction reclamation monitoring will occur concurrent with weed control efforts” (page 1). Such monitoring should be included in the plan to ensure that it is carried out. We appreciate the use of native seed mix in the restoration plan. Table 6 (page 10) shows the species that will be seeded. Are each of these species currently found in the project area, or are they just native to the region? Any native species not endemic to the area should not be seeded. We also encourage Perrin Ranch Wind to not use chemical controls during pre- and post-construction weed control efforts. Due to the hazards posed by chemical controls, alternative methods, such as mechanical removal, should be considered and used.	The plan has been updated to state that a professional who is knowledgeable about restoration and reclamation activities will be used (see Appendix C of the Final EA; please note the plan is now called the Native Plant Revegetation and Noxious Weed Management Plan). An updated seed mix has been prepared by a professional botanist and seed company and reviewed and approved by the Arboretum at Flagstaff to ensure the most appropriate seed mix is used. In some cases chemical controls are the most effective measure to address weeds and are therefore included in the potential control methods.	3. Supplement, improve, or modify its analyses.

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118	Bahr, Sandy (Sierra Club)	Email	Yes	CUMULATIVE	27	10	Cumulative Impacts. The cumulative impacts sections in the EA and Appendix C are incomplete as they do not take into account all reasonably foreseeable future actions. In terms of development, the EA lists specific projects that have been proposed and also mentions that additional roads, trails, and transmission lines would be constructed. However, it does not consider other types of development, such as expansion of residential developments in the nearby vicinity; growth of nearby cities, such as Williams and Flagstaff; various land clearing activities; and more. Each of these will have significant effects on some of the resources discussed in the EA, such as water and wildlife. As more people move into these areas and the communities grow, additional pressures will be placed on water resources, and more and more habitat will be cleared. The EA frequently comments that high quality or suitable habitat is available for species outside of the project area, but it does not take into consideration that continued development of nearby areas will further reduce or even eliminate the available habitat. Related to development, the EA also does not consider recreational pressures on this area. As cities and towns continue to grow and push out farther into natural landscapes, recreational pressures in surrounding areas are increasing. These activities can have a significant effect on soils, water resources, vegetation, wildlife and habitat, cultural resources, and more. Finally, the EA does not mention climate change. According to the scientific community, climate change is reasonably foreseeable and has the potential to affect many of the resources identified in the EA, especially waters, vegetation, and wildlife. Renewable energy projects such as this are necessary to help reduce the effects of climate change, but they also must be considered in relation to the cumulative impacts of climate change on the surrounding area.	In the Final EA, Appendix F, Cumulative Impacts, has been revised to include additional foreseeable future actions. These actions have been considered in the wildlife (see Section 3.3.5) and vegetation (see Section 3.3.4) discussion of the Final EA as well.	3. Supplement, improve, or modify its analyses.
119	Bahr, Sandy (Sierra Club)	Email	No	PROCESS	27	11	Schedule. The EA states that construction of the project is proposed to begin in July 2011. We are concerned that this does not provide adequate time to review all comments, address concerns and make changes to the plan, as appropriate, and issue a Final EA and Record of Decision. As it is already June, this plan provides only a month to complete final arrangements and to determine if this project should move forward.	As discussed in the draft EA, "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)" (see page 1, "Background). The EA itself analyzes the project impacts; Western's decision will summarize these impacts and any required mitigation.	5. Explain why the comments do not warrant further agency response.
120	Bahr, Sandy (Sierra Club)	Email	No	MITIGATION	27	12	Summary. We want to reiterate our support for clean, renewable energy sources such as wind and the overall positive aspects of this project. With implementation of our recommendations above, as well as with proper monitoring, mortality estimates, and mitigation options, this project can provide a viable source of clean energy with minimal impacts to important resources. Thank you again for the opportunity to comment on this proposal. We appreciate your consideration of our comments.	Thank you for your comment.	6. Other, general statement; non-substantive
121	Schumann, RC and S G	Email	No	REC	28	1	Perrin Ranch Windfarm will negatively impact the Catarct Creek watershed, populations of elk, deer, pronghorn and smaller animals. It will seriously interfere with the bird flocks by killing those flying into the blades and by diverting migration routes. Thousands of birds will be lost every year to the windmills. Also.one of the best hunting areas in Arizona, will be forever spoiled and our area lose the $500,000 plus annual revenue resulting from that very hunting.	As discussed in the Draft EA, see Section 3.2, "Resource Areas Dismissed from Further Analysis" (pages 55-60), "Lands within the Project Area would remain open to hunting during construction and operation of the Project." Further, impacts to recreation are expected to be negligible as a result.	5. Explain why the comments do not warrant further agency response.
122	Schumann, RC and S G	Email	No	WILDLIFE	28	1	Perrin Ranch Windfarm will negatively impact the Catarct Creek watershed, populations of elk, deer, pronghorn and smaller animals. It will seriously interfere with the bird flocks by killing those flying into the blades and by diverting migration routes. Thousands of birds will be lost every year to the windmills. Also.one of the best hunting areas in Arizona, will be forever spoiled and our area lose the $500,000 plus annual revenue resulting from that very hunting.	Impacts to wildlife are disclosed in section 3.3.5 of the Draft EA. Impacts to hunting were considered as part of Recreation in Section 3.2 of the Draft EA and were dismissed from detailed analysis because hunting would remain open.	5. Explain why the comments do not warrant further agency response.
123	Schumann, RC and S G	Email	Yes	WATER	28	1	Perrin Ranch Windfarm will negatively impact the Catarct Creek watershed, populations of elk, deer, pronghorn and smaller animals. It will seriously interfere with the bird flocks by killing those flying into the blades and by diverting migration routes. Thousands of birds will be lost every year to the windmills. Also.one of the best hunting areas in Arizona, will be forever spoiled and our area lose the $500,000 plus annual revenue resulting from that very hunting.	As discussed in the Draft EA, the project will permanently impact approximately 225 acres [of the watershed] (Section 2.2.1 and Table 2.1). The Final EA was revised to include the percentage of the Cataract watershed that will be disturbed during construction (0.04%) and operational (0.01%) phases of the project (Section 3.3.3). Potential effects to animal and bird populations are detailed in the Draft EA Section 3.3.5 (pages 102-122). Further, the Draft EA states "Lands within the Project Area would remain open to hunting during construction and operation of the Project" (page 61).	3. Supplement, improve, or modify its analyses.
124	Schumann, RC and S G	Email	No	VEG	28	2	Native flora will never recover from the construction and maintenace caused destruction.	A Reclamation and Restoration plan was prepared for the project (see Appendix A of the Draft EA), which includes seeding with native species and weed management to ensure native flora is restored.	5. Explain why the comments do not warrant further agency response.

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125	Schumann, RC and S G	Email	No	VISUAL	28	3	Perhaps even worse will be the damage done to the scenery so admired by tourists traveling from Williams, to the Grand Canyon, by auto, bus, and train. The 'dark skies' will just be a memory when there are hundreds of blinking red lights all over the area.	The Draft EA analyzes visual impacts to visitors traveling along SR 64 (see Section 3.3.1, page 63). Additionally, impacts to night skies are evaluated in the Draft EA on page 76.	5. Explain why the comments do not warrant further agency response.
126	Schumann, RC and S G	Email	Yes	SOCIO	28	4	The very reason that many of us live in this area are the vistas and quietude, both of which will be forever gone if this project is allowed to be started and completed. Real estate values dropped 27% the day this possible project was announced. If built, the home values will diminish even more. Many of us are retired and can't afford to take a huge loss on our homes to get away from the windfarm and all of the negative aspects of it.	The Draft EA discusses the potential impact of the project on property values (see Section 3.3.6, "Socioeconomics," pages 125-126). Additional information was added to the Environmental Consequences Section 3.3.6 in the Final EA regarding impacts to area quality of life in terms of impacts to vistas and quietude.	3. Supplement, improve, or modify its analyses.
127	Schumann, RC and S G	Email	No	VISUAL	28	4	The very reason that many of us live in this area are the vistas and quietude, both of which will be forever gone if this project is allowed to be started and completed. Real estate values dropped 27% the day this possible project was announced. If built, the home values will diminish even more. Many of us are retired and can't afford to take a huge loss on our homes to get away from the windfarm and all of the negative aspects of it.	The Draft EA discusses the potential impact of the project on property values (see Section 3.3.6, "Socioeconomics," pages 125-126).	5. Explain why the comments do not warrant further agency response.
128	Schumann, RC and S G	Email	Yes	WIND RESOURCE	28	5	Next Era, when pressed, will admit that the output power of the turbines is a small percentage of the rated capaity they are so fond of quoting. Too, it is my undersyanding that residents will not reap any benefit from said power, all of it to be sent to southern areas of California.	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Section 1.3.1 has been added to the Final EA discussing the wind potential of the site.	3. Supplement, improve, or modify its analyses.
129	Schumann, RC and S G	Email	No	SOCIO	28	6	Next Era keeps saying how many local jobs they will create. This is a gross falsehood. The great majority of these workers will be brought in until the project is completed, then depart to the next site. At best, three (3) jobs will be permanent.	As discussed in the Draft EA, "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." Further, "During operation of the Project, nine full-time personnel would be required to oversee Project operation." (see Section 3.3.6, pages 124-126).	5. Explain why the comments do not warrant further agency response.
130	Schumann, RC and S G	Email	Yes	TRANSP	28	7	Roads would have to be built to support very heavy loads and we, the taxpayers, are expected to subsidize that.	All project components described in the Final EA would be privately funded; no federal or state funding would be used to construct, operate, maintain or decommission the project. This information has been included in Section 2.2.1 of the Final EA.	1. Modify alternatives including the proposed action.
131	Schumann, RC and S G	Email	Yes	CUMULATIVE	28	8	Too make matters even worse is the already stated intent of another 'wind power' firm to build more wind turbines a few niles closer to the Grand Canyon, if Perrin Ranch windfarm goes forward.	In the Final EA, Appendix F, Cumulative Impacts, has been revised to include additional foreseeable future actions.	3. Supplement, improve, or modify its analyses.
132	Lovell, Mel	Letter	No	SOCIO	29	1	We are engineers, school teachers, professional-level civil servants, college professors, accountants, and a myriad of Williams' business owners. It would probably take my husband's salary, mine, and one more person of our earning capacity to be at your economic level---but we are not poor. Many of us are retired, however, so are incapable of losing everything and "starting over". How did my husband and I "get" a $500,000 house? We both worked full-time for 35 years to amass $300,000, and then took out a $200,000 mortgage. With the recession, our property dropped to $400,000. When NextEra announced its project, it became unsaleable, and is now worth less than its mortgage.	The Draft EA discusses the potential impact of the project on property values (see Section 3.3.6, "Socioeconomics," pages 125-126).	5. Explain why the comments do not warrant further agency response.
133	Lovell, Mel	Letter	Yes	SOCIO	29	2	The population of the Williams community is 5,800, with 2,500 living in the city and another 100 living to the south. The remaining 3,200 live to the north. Half of those, 1,600 people, own properties that completely surround the Perrin Ranch. See p. 76 of the Public Draft EA. Our community is termed "low density". How few residents is the norm for determining a community "low density", and thus worth destroying?	The Final EA has been revised to indicate the percent urban and rural population of the study area (see Section 3.3.6, "Affected Environment."). Additionally, low density residential is categorized and defined by Coconino County zoning classifications; clarification added to the Final EA in Section 3.3.1, "Visual Resources."	3. Supplement, improve, or modify its analyses.

ID	Contact ID	Comment Type	Change in Final EA Required (Yes/No)	Resource Code	Letter No.	Comment No.	Comment Text	Response	Response Type
134	Lovell, Mel	Letter	No	LAND USE	29	3	P. 6, Introduction, of the Public Draft EA indicates "concerns" from the public. We did not voice concerns. We voiced facts. Those facts are: The project is an industrial complex proposed for an area that is zoned for residential and agricultural use.	As discussed in the Draft EA, "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." (see Section 3.2, "Resource Areas Dismissed from Further Consideration," page 59.	5. Explain why the comments do not warrant further agency response.
135	Lovell, Mel	Letter	Yes	WIND RESOURCE	29	4	The turbines would not give the 50 MW of power stated in DOE's letter to us for the public scoping "open house". It will produce a miserable 24 MW, and not in the peak summer months when needed, but only during the peak wind months of December, January, and February.	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Section 1.3.1 has been added to the Final EA discussing the wind potential of the site.	3. Supplement, improve, or modify its analyses.
136	Lovell, Mel	Letter	Yes	NS-N/A	29	5	NextEra's business is so worthless it cannot sustain itself, but requires 30% federal subsidy and a 10% state subsidy, all taxpayer money.	All project components described in the Final EA would be privately funded; no federal or state funding would be used to construct, operate, maintain or decommission the project. This information has been included in Section 2.2.1 of the Final EA.	1. Modify alternatives including the proposed action.
137	Lovell, Mel	Letter	No	SOCIO	29	6	It has already destroyed the entire area's property values. NO realtor is now able to sell land or houses in the site area. Buyers refuse properties here. Plenty of other wind energy debacles across this country are already proof of decimated property values from turbine projects.	The Draft EA discusses the potential impact of the project on property values (see Section 3.3.6, "Socioeconomics," pages 125-126). Additionally, as discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine other locations for the project.	5. Explain why the comments do not warrant further agency response.
138	Lovell, Mel	Letter	No	SOCIO	29	7	The "250 jobs" touted by NextEra was a vast misrepresentation. Those jobs would be taken by NextEra's camp-follower construction company. It has the equipment and experience for industrial construction which neither Williams nor Flagstaff has. The six months that they would be here would merely supplant 250 tourists who would be in the hotels and restaurants here, anyway. Following construction, the permanent employees to operate the complex would number 3 or 4.	As discussed in the Draft EA, "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." Further, "During operation of the Project, nine full-time personnel would be required to oversee Project operation." (see Section 3.3.6, pages 124-126).	5. Explain why the comments do not warrant further agency response.
139	Lovell, Mel	Letter	No	WATER	29	8	The project would be sited directly in the center of the state's largest watershed ... actually straddling Havasu/Cataract Creek for about ten miles.	As stated in the Draft EA "The only named wash on the property is Cataract Creek, which drains northward in Cataract Canyon" and "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" (page 94 Section 3.3.3).	5. Explain why the comments do not warrant further agency response.
140	Lovell, Mel	Letter	Yes	WATER	29	9	NextEra claims that its company would not damage the watershed in any way. Stop insulting our intelligence. The site is a FLOODPLAIN. Even without severe terrain disturbance, it flooded Supai in August 2008 and in October 2010.	As stated in the Draft EA, "All construction staging areas, substations, and transmission pole towers would be located outside washes. The access roads cross several washes that are potentially WUS [waters of the U.S.]. Approximately 0.13 acre of potentially jurisdictional waters would be impacted during construction, of which 0.09 acre are temporary, short-term impacts " (Page 98 and Figure 3.4, Section 3.3.3). Section 3.3.3 of the Final EA was revised to include information on FEMA floodplain mapping of the Project Area.	3. Supplement, improve, or modify its analyses.
141	Lovell, Mel	Letter	No	WATER	29	10	Excavations for 62 turbine pads/footings means digging 62 holes which are 40' in diameter and 10' to I8' deep---the size of 1,600 sq. ft. houses. That, plus clearing all vegetation and excavating for 35 miles of roads connecting the turbines will concentrate the water flow. NextEra's "plan" to "re-seed" volcanic "soil" is ridiculous; it will not work, nor will their "erosion control".	Thank you for your comment. As discussed in the Draft EA, the project will permanently impact approximately 225 acres including all turbines and access roads (Section 2.2.1 and Table 2.2).	5. Explain why the comments do not warrant further agency response.

ID	Contact ID	Comment Type	Change in Final EA Required (Yes/No)	Resource Code	Letter No.	Comment No.	Comment Text	Response	Response Type
142	Lovell, Mel	Letter	No	VEG	29	10	Excavations for 62 turbine pads/footings means digging 62 holes which are 40' in diameter and 10' to I8' deep---the size of 1,600 sq. ft. houses. That, plus clearing all vegetation and excavating for 35 miles of roads connecting the turbines will concentrate the water flow. NextEra's "plan" to "re-seed" volcanic "soil" is ridiculous; it will not work, nor will their "erosion control".	Both the Reclamation and Restoration plan (now called the Native Plant Revegetation and Noxious Weed Management Plan, see Appendix C of the Final EA) and the SWPPP are prepared by professionals qualified to develop such plans. Additionally, NEPA impact analyses are not done under the assumption that a plan will fail or that a proponent would violate existing laws. It is the responsibility of those federal, state, and municipal agencies having regulatory authority to ensure operations are monitored and to enforce existing law where necessary.	5. Explain why the comments do not warrant further agency response.
143	Lovell, Mel	Letter	Yes	GEO-SOILS	29	11	NextEra's "plan" to "control" the concrete slurry run-off from 20,000 tons of concrete is unbelievable. There is no way to be "careful" with concrete slurry. That, and the slurry washed out of trucks on site, would go into the ground, and the Havasu/Cataract watershed, its chemicals migrating into the Colorado River.	Runoff associated with generation of concrete would be managed and mitigated through the SWPPP. This has been added to the Final EA (see "Temporary Concrete Batch Plant" description in Section 2.2.2. Additionally, the Draft EA discusses how the SWPPP would 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 (see Section 3.3.3, page 86).	3. Supplement, improve, or modify its analyses.
144	Lovell, Mel	Letter	No	WATER	29	11	NextEra's "plan" to "control" the concrete slurry run-off from 20,000 tons of concrete is unbelievable. There is no way to be "careful" with concrete slurry. That, and the slurry washed out of trucks on site, would go into the ground, and the Havasu/Cataract watershed, its chemicals migrating into the Colorado River.	Thank you for your comment. As discussed in the Draft EA, "Impacts must also meet state and federal water quality standards, which are administered by ADEQ. During construction, BMPs [best management practices] would be in place so as to prevent accidental spills, construction debris, or contaminants from entering washes and to prevent erosion" (Page 98 Section 3.3.3).	5. Explain why the comments do not warrant further agency response.
145	Lovell, Mel	Letter	Yes	WATER	29	12	NextEra "plans" to control the solvents from entering the watershed, by placing collars" on turbines to keep the power-washing substances used on the turbines out of the watershed. Power-washing is done with high-pressure hoses, forcing wastewater 260' feet into the air. How could "collars" capture this water?	The Final EA (see Section 2.2.4) has been revised to omit turbine washing, including the use of solvents and collars, as an operational need.	4. Make factual corrections.
146	Lovell, Mel	Letter	Yes	HAZMAT	29	13	NextEra "plans" to use non-hazardous solvents to remove transformer oils and bird blood for power-washing. What solvents are non-hazardous? Solvents, oils, wastewater, and the medical waste of bird blood would all go into the watershed.	Section 301 of the Resources Conservation and Recovery Act (RCRA) required EPA to identify and list those wastes that must be managed as hazardous waste under RCRA. Though the solvents themselves are listed as hazardous, the resultant solvent waste not already managed as hazardous pose little to no risk to human health or the environment. (EPA 530-F-98-032). Non-hazardous solvents, though not recognized by the EPA, are available in today's market. Section 2.2.4 of the Final EA has been updated to clarify this information. Additionally, the Final EA (see Section 2.2.4) has been revised to omit turbine washing, including the use of solvents and collars, as an operational need.	1. Modify alternatives including the proposed action.
147	Lovell, Mel	Letter	No	SOCIO	29	14	The project's target site is a wildlife corridor. Despite SWCA's doing everything possible to negate this, with a poorly done census and misrepresentations of facts, it is teeming with wildlife, enough to bring over $800,000 hunting revenue annually to Williams. We would lose that, with this project.	As discussed in the Draft EA, see Section 3.2, "Resource Areas Dismissed from Further Analysis" (pages 55-60), "Lands within the Project Area would remain open to hunting during construction and operation of the Project." Further, impacts to recreation are expected to be negligible as a result.	5. Explain why the comments do not warrant further agency response.
148	Lovell, Mel	Letter	No	WILDLIFE	29	14	The project's target site is a wildlife corridor. Despite SWCA's doing everything possible to negate this, with a poorly done census and misrepresentations of facts, it is teeming with wildlife, enough to bring over $800,000 hunting revenue annually to Williams. We would lose that, with this project.	The potential impacts to wildlife are evaluated in Section 3.3.5 of the Draft EA (see pages 102-122).	5. Explain why the comments do not warrant further agency response.

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149	Lovell, Mel	Letter	Yes	PROCESS	29	15	SWCA has been paid twice for their flawed and biased "studies", once by NextEra, and again by NEPA, all on the backs of the taxpayers! Can't any agency find its own consultants, preferably one that isn't on NextEra 's payroll?	All project components described in the Final EA would be privately funded; no federal or state funding would be used to construct, operate, maintain or decommission the project. This information has been included in Section 2.2.1 of the Final EA. SWCA was approved as a third party NEPA consultant. Third-party NEPA consulting is commonly used, across the nation, for applicant projects requiring lead agency approvals. Many lead agencies rely on the experience and expertise of environmental consultants to assist in NEPA document preparation. Contractors are often used because lead agencies do not have the staff expertise, staff resources or time to conduct the technical analysis necessary to comply with NEPA. Contractors can provide valuable assistance in NEPA process management, as well as technical study preparation. Additionally, ultimately the NEPA documents and the content of the documents (i.e. an EA) are the responsibility of the lead federal agency; the third party NEPA consultant is an extension of the lead federal, even though they are paid by the applicant. The EA is required to be an objective, good faith attempt at full disclosure.	1. Modify alternatives including the proposed action.
150	Lovell, Mel	Letter	Yes	SOCIO	29	16	At the end of the recession, the community will recover its economic base. It this project is built, however, the community will die from a severely diminished tax base, ruined property values, and removal of the hunting revenue. People here are already abandoning their properties. Another 1,600 more taxpayers will have no incentive to stay, and pay on worthless properties. Collectively, our property taxes alone already bring far more revenue than taxes from NextEra's one project would produce. Without NextEra, we could recover from the recession. With NextEra, we would not. Why is this happening?	The Final EA has been revised to include a discussion of hunting revenue and the economic importance of tourism related activities in the study area, as well as property taxes, in Section 3.3.6.	3. Supplement, improve, or modify its analyses.
151	Lovell, Mel	Letter	No	NS-N/A	29	17	Obama is making political payoffs to NextEra, and to General Electric, the largest corporation on the planet. They support his campaign; he makes payoffs to them through wind "energy". Take a look at his Council on Jobs and Competitiveness. Two of the members are JeffImmelt, GE's CEO, and Lewis Hay, NextEra's CEO. Wind "energy" is a minuscule 1.3% of all energy sources. It's worthless, a fraud that produces nothing, while using our tax dollars for political payoffs. Everyone connected to this project, from the rancher selling out his neighbors, to NextEra's moguls, plans to profit by taking our biggest investments-our homes. They will live like kings, build bigger houses for themselves, and send their kids to college, while we face ruin. What a nasty, greedy bunch of pigs they are. If this project is done, DOE will go down in history for two things: (I) the most worthless energy boondoggle of the century and (2) for raping the land and the taxpayers in one fell swoop.	Thank you for your comment.	6. Other, general statement; non-substantive
152	Maeda, Judith	fax	No	NS-N/A	30	1	Dear Sir: Thank you for allowing me to voice my concerns regarding the Perrin Ranch project. I reside in Junipine Estates, a small development that is adjacent to the proposed project.	Thank you for your comment	6. Other, general statement; non-substantive
153	Maeda, Judith	fax	No	NS-N/A	30	2	As the proposal now stands I am opposed to it. I am not categorically opposed to that type of project but the environmental studies have not been completed. Once the final report is presented, I will read it and reach my conclusion.	Thank you for your comment.	6. Other, general statement; non-substantive
154	Maeda, Judith	fax	Yes	FIRE	30	3	I also have problems with the lack of a fire suppression plan. As the proposal now reads it is not feasible. We are a rural area with NO full time fire departments. If a fire were to occur, I fear much damage would occur before adequate resources would be on the scene. Please note the current wildfore occuring throughout the State of Arizona.	A Fire Protection and Emergency Response Plan has been drafted and is included as an Appendix to the Final EA (see Appendix E).	3. Supplement, improve, or modify its analyses.
155	Maeda, Judith	fax	No	WATER	30	4	Another problem is the amount of water needed to build the project. We have a severe lack of water. There are no wells available and water would need to be transported to the work site. Where would the water come from? If millions of gallons of water are to be removed from our aquifer, how does it get replenished? I believe water cannot be imported from other counties to the work site.	As discussed in the Draft EA, "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" (page 97, Section 3.3.3). Also discussed in the Draft EA is the amount of water needed for construction and operation, "During construction, less than 60 acre-feet of water would be required" (page 43, Section 2.2.3) and during operation of the project "It is estimated that 20,000 to 24,000 gallons of water per year would be used at the facility (page 47, Section 2.2.4).	5. Explain why the comments do not warrant further agency response.

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156	Maeda, Judith	fax	No	NS-N/A	30	5	In addition, this project was a secret. Suddenly Next Era was around with poster presentations touting how great it would be for the area. Once a concerned group of local citizens began investigating the proposal it was demonstrated that it is no so great.	Thank you for your comment.	6. Other, general statement; non-substantive
157	Maeda, Judith	fax	No	NS-N/A	30	6	Therefore, you can put my name on the nay side of the column when it comes to tallying the opinions of local citizens.	Thank you for your comment.	6. Other, general statement; non-substantive
158	Rogers, Andi (AGFD)	Letter/ Email	No	PROCESS	31	1	The Arizona Game & Fish Department (Department) has reviewed the Draft Environmental Impact Statement (DEIS) for the proposed Perrin Ranch Wind Energy Project. The Department generally supports the development of wind energy as a viable source of clean and renewable energy. We believe with proper site placement and safeguards, the benefits of utilizing wind energy outweigh the potential for negative effects to wildlife populations. While we believe that wind can be a viable option for energy, we are concerned that specific sites may have an increased potential for negative impacts to certain breeding, migratory, and wintering species. To address these concerns and to facilitate working relationships with project partners, the Department has created Wind Energy Guidelines entitled Guidelines for Reducing Impacts to Wildlife from Wind Energy Development in Arizona. As you are aware, these guidelines can be found on our website at http:www.azgfd.gov/hgis/guidelines.aspx. We appreciate your willingness to implement the Guidelines thus far. Should the project go forward, we look forward to continued discussions regarding wildlife and habitat issues related to potential wind energy development on Perrin Ranch. Below are the Department's comments on the DEIS for the Perrin Ranch Wind project:	Thank you for your comments. The NEPA document prepared is actually an environmental assessment (EA), not an Environmental Impact Statement (EIS).	5. Explain why the comments do not warrant further agency response.
159	Rogers, Andi (AGFD)	Letter/ Email	No	MITIGATION	31	2	General: The Department is pleased that majority of major construction will take place outside of the early breeding seasons for wildlife. This timing will reduce displacement from construction activities.	Thank you for your comment.	6. Other, general statement; non-substantive
160	Rogers, Andi (AGFD)	Letter/ Email	Yes	MITIGATION	31	3	The Departments looks forward to engaging in the 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. The Department believes that adaptive management strategies, set up through the Technical Advisory Committee, will ensure that negative impacts to wildlife can be avoided or sufficiently mitigated.	These have been added to Chapter 2, in a new section (2.2.8 Mitigation Measures).	1. Modify alternatives including the proposed action.
161	Rogers, Andi (AGFD)	Letter/ Email	No	WILDLIFE	31	4	Also related to the TAC, the Department recommends that any funds "generated" from eagle mortality go directly toward research or mitigation on eagles. The document does not state that eagle funds would be treated separately from the avian and bat fund and it is important, in order to stay in compliance of no-net- loss, that funds generated by eagles be used on eagle-related management.	The ABPP has been revised to reflect this request (see SWCA 2011).	3. Supplement, improve, or modify its analyses.
162	Rogers, Andi (AGFD)	Letter/ Email	No	WILDLIFE	31	5	Big Game: The DEIS states that big game are expected to return to the site and use the site over time. The Department asks WAPA to be advised that there is very little data on the use of wind farms by big game species. These data that do exist are limited in scope, and no studies are from Arizona. Recently, the Department engaged in research on the Dry Lake Wind Farm to determine effects of that wind facility on pronghorn movements. Results from this study will inform what we know and don't know about how wind energy affects some game species.	Thank you for your comment. The analysis in the Draft EA is based on best available data.	5. Explain why the comments do not warrant further agency response.
163	Rogers, Andi (AGFD)	Letter/ Email	Yes	PROCESS	31	6	Coconino Resolution 2011-04 states in part 12e that the developer will work with AGFD and land owner to develop a mutually agreed upon hunter access plan. While initial conversations have taken place regarding this manner, the Department requests a meeting with NextEra soon to finalize steps that need to be taken prior to the fall 201 1 hunting season.	Information regarding this Coconino County resolution and the hunter access plan has been added to the Recreation discussion in Section 3.2 of the Final EA.	3. Supplement, improve, or modify its analyses.
164	Rogers, Andi (AGFD)	Letter/ Email	Yes	MITIGATION	31	7	Birds and bats: The Department is encouraged to see that NextEra is willing to put aircraft warning markers (AWM's) on guy wires of the met towers. As per the Department guidelines, we also ask that bird flight diverters be used on the outer wires (see guidelines for more specifications) to aid in visibility for birds. Also, in discussions with our pilots we have learned that while the orange balls help with visibility, the flashing of the diverters is more visible from the aircraft than the AWM's.	Utilization of AGFD and USFWS approved bird diverters are described in Section 3.3.4 of the Final EA. In addition, bird deterrents are included in section 2.2.7 of the Final EA, Resource Conservation Measures.	3. Supplement, improve, or modify its analyses.
165	Rogers, Andi (AGFD)	Letter/ Email	No	MITIGATION	31	8	The Department asks that all permanent met towers within the site be unguyed towers.	The use of un-guyed towers is not currently permitted in the CUP for the project. Use of bird diverters per AGFD stipulations is included as a mitigation measure.	5. Explain why the comments do not warrant further agency response.
166	Rogers, Andi (AGFD)	Letter/ Email	Yes	MITIGATION	31	9	Within the Avian and Bat Protection Plan process it was agreed that the listing of the Western Bat Working Group would be utilized to further refine mitigation thresholds for bats. While this is mentioned in the text of the document, it is not reflected in Table 2 of the ABPP. The Department request a column titled WBWG listing and the rankings listed for appropriate bat species.	Table 2 of the ABPP (see Appendix H of the Final EA) lists protection status for species and because the working group does not provide protection status it is not included. However, Table 5 of the ABPP (see Appendix H of the Final EA) cites Western Bat Working Group species and a citation for that list has been added.	3. Supplement, improve, or modify its analyses.

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167	Rogers, Andi (AGFD)	Letter/ Email	Yes	WILDLIFE	31	10	With respect to Mexican free-tailed bats, little is known about their movement pathways, nor the heights in which they forage andlor migrate in AZ. The ABPP states that these species are not vulnerable in the fall without a scientific citation, yet lists Arnett 2008 in which they are listed as "more likely to be killed" at wind farms. The Departments asks WAPA to take a careful approach to making claims about vulnerability to a particular bat species, especially when so little is known. The Department remains concerned over the possibility of Mexican free-tailed bats being struck by turbine blades as they have proven to be the second most common bat on Perrin ranch	The statement regarding lack of free-talied bat vulnerability in Fall was a misprint and has been revised in the Final EA and ABPP (see Appendix H of the Final EA).	4. Make factual corrections.
168	Rogers, Andi (AGFD)	Letter/ Email	Yes	WILDLIFE	31	11	The DEIS states that the project is not likely to change regional bat movements (pg 120). The Department would argue that this statement may be premature as so little data has been collected on bats in the area. Specifically, because we know that Mexican free-tailed bats fly through the site during migration periods, it is plausible that this site may be serving as a migratory area. If in fact this area is used as a regional fly-way for bats we have no idea at this time how many of these highly colonial bats may be using this area.	The statement in the Draft EA is not related to the number of bats using the area, but rather changes to use. There is no current literature showing that wind farms change regional patterns of bat movements. This section has been revised in the Final EA to clarify.	3. Supplement, improve, or modify its analyses.
169	Rogers, Andi (AGFD)	Letter/ Email	No	MITIGATION	31	12	Weeds: While cheatgrass is listed as a weed within this restoration plan, it is our observation that often this invasive grass does not remain a priority for treatment. Because this grass spreads rapidly due to disturbance, and has the potential to drastically alter fire regimes, we urge NextEra to treat cheatgrass is as a serious weed in need of likely chemical treatment. While we don't expect the developer to eradicate existing cheatgrass on the ranch, keeping tabs (through monitoring) that it is not spreading as a result of activity is crucial	While noxious weeds are the priority for treatment, all invasive weeds will be treated as described in the Restoration and Reclamation, now 'Native Plant Revegetation and Noxious Weed Management Plan" (see Appendix A of the Draft EA).	3. Supplement, improve, or modify its analyses.
170	Rogers, Andi (AGFD)	Letter/ Email	Yes	MITIGATION	31	13	Although it appears that the Public Works Department encourages the use of fertilizer within their seeding standards, be advised that fertilizer can encourage the proliferation of some weedy species due to increases in the availability of nitrogen. Cheat grass is one of those species. We encourage the County and NextEra to do a full literature review on the use of fertilizer in order to avoid unexpected negative results	The Restoration and Reclamation plan, now titled the "Native Plant Revegetation and Noxious Weed Management Plan" (see Appendix C of the Final EA) has been clarified to state that slow release fertilizer that won't assist in the growth of the non-natives will be utilized.	3. Supplement, improve, or modify its analyses.
171	Rogers, Andi (AGFD)	Letter/ Email	No	NS-N/A	31	14	The Department appreciates the diligent efforts by NextEra, SWCA, and Western Area Power Administration (WAPA) in putting the DEIS and Avian and Bat Protection Plan together. To date, this ABPP is the most comprehensive, data driven, reasonable ABPP that we have helped craft. The Department is committed to assisting WAPA in designing a project that can both generate renewable energy and avoid or minimize impact to AZ wildlife. Thank you for your time, and please feel free to contact me with any questions you may have.	Thank you for your comments.	6. Other, general statement; non-substantive
172	Rodriguez, Robin	Letter	No	NS-N/A	32	1	I am against wind project. do not want those things by me	Thank you for your comment.	6. Other, general statement; non-substantive
173	Kack, Henry	Letter	No	NS-N/A	33	1	To Whom It May Concern: I am writing this letter in opposition of the proposed Industrial Wind Turbine Fam that is to be constructed north of Williams, Arizona. I am a property owner in the Four Hills Ranch area just north of Williams. I have not had the luxury of reading the 303 page Environmental Assessment (EA) in its entirety as few people have. My comments are as follows:	Thank you for your comment.	6. Other, general statement; non-substantive
174	Kack, Henry	Letter	Yes	WIND RESOURCE	33	2	It is a fact that the state of Arizona already produces more energy than it uses. To build a energy producing plant that most people in the adjacent area are opposing to provide energy for another state is a criminal act as far as I am concerned! I am well aware of the rubber stamp justification stating "It is for the greater good."	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Section 1.3.1 has been added to the Final EA discussing the wind potential of the site.	3. Supplement, improve, or modify its analyses.
175	Kack, Henry	Letter	No	WILDLIFE	33	3	It is a fact that the elk and deer populations in the area use the canyon bottoms (Cataract Canyon and Red Lake Wash) as corridors to move fiom one grazing area to another. All the proposed sites of these wind turbines are going to be along the ridges just above these two canyons. The noise that the wind turbines create will give the predators of the elk and deer an unnatural advantage because the elk won't be able to hear mountain lions stalking them before it is too late. Whenever it is so easy for big cats to take their prey they won't eat all of their catch and leave much behind. They will make more kills and eat less of each one. I don't know if the EA has addressed ths unintentional outcome. There are much more appropriate places to site a wind farm and even places in California where most of the energy is going to be used.	Wind turbines have been placed off of ridgelines. Noise from turbines is analyzed in the Draft EA in Section 3.3.2 and impacts to wildlife are analyzed in section 3.3.5 of the Draft EA.	5. Explain why the comments do not warrant further agency response.

ID	Contact ID	Comment Type	Change in Final EA Required (Yes/No)	Resource Code	Letter No.	Comment No.	Comment Text	Response	Response Type
176	Kack, Henry	Letter	No	PROCESS	33	4	It is a fact that Next Era Energy Resources simply looked to find an area adjacent to major power transmission lines with a somewhat sparse population so hopefully fewer people would object. This is not the criterion that should be used to site a wind farm!	As stated in the Draft EA, "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" (see page 51, Section 2.4 of the Draft EA).	5. Explain why the comments do not warrant further agency response.
177	Kack, Henry	Letter	No	WILDLIFE	33	5	It is also a fact that there is a rather large bat population in this area that helps to control the populations of flying insects including mosquitoes. It is my understanding that because bats use sonar to navigate the noise and wind disturbances that are common to wind turbines, there is a high percentage of bat kills. I don't know if the EA has addressed this unintentional consequence.	The potential impacts to wildlife (including, bats) is evaluated in Section 3.3.5 of the Draft EA (see pages 102-122).	5. Explain why the comments do not warrant further agency response.
178	Kack, Henry	Letter	No	PROCESS	33	6	It is unfortunate that the Coconino County Planning and Zoning Department granted a CUP when they did little to no research into the consequences of industrial wind farms when placed adjacent to residential populations and wildlife habitats. I find it to extremely irresponsible and I am very much opposed to this project.	Thank you for your comment. As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1).	5. Explain why the comments do not warrant further agency response.
179	Mayerski, Alfred	Letter	No	NS-N/A	34	1	Dear Sir/Madam: We have reviewed the Environmental Assessment report for the Perrin Ranch Wind Energy project, as much of it was of interest to us. We own 40 acres about two miles south of Junipine Estates, the residential area that is well within the ten-mile study perimeter of this project.	Thank you for your comment.	6. Other, general statement; non-substantive
180	Mayerski, Alfred	Letter	No	PROCESS	34	2	It seems absolutely futile for us to comment or criticize any aspect of your analysis because it is very evident that the die is cast and this project will go forward. This is in spite of the many adverse aspects that are cited in the report itself, such as:	The decision has not been made yet. Western will make a decision in early July, 2011 about the project.	5. Explain why the comments do not warrant further agency response.
181	Mayerski, Alfred	Letter	No	VISUAL	34	3	1. A ten-mile radius reaches almost to the city of Williams, and on a clear day and with some high-rise altitudes, these towers of almost 400 feet to tip of blade could be visible.	As stated in the Draft EA, "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 (see Section 3.3.1, page 60).	5. Explain why the comments do not warrant further agency response.
182	Mayerski, Alfred	Letter	Yes	SOCIO	34	4	2. The Grand Canyon Railway route is only supposed to view these towers for a total of five minutes of a 30-minute trip. These five minutes are at the beginning and ending of this train experience and will not be forgotten by the viewer as part of their Grand Canyon experience. In fact, these towers could become a very mentionable and objectionable part for the millions of foreign tourists that are expected to come and enjoy one of the Seven Wonders of the World.	As stated in the Draft EA, "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" (see page 63 in Section 3.3.1). Additionally, Xanterra Parks and Resorts, who operate the Grand Canyon Railway, has expressed public support for the project (see revised section in the Final EA, Section 3.3.6, Environmental Consequences).	3. Supplement, improve, or modify its analyses.
183	Mayerski, Alfred	Letter	No	VISUAL	34	5	It isn't just the Grand Canyon that these visitors relish, but the pristine nature of the Coconino Forest. It may very well end up as a mockery of American esthetics. I doubt the Chinese would be so crass as to erect 400' wind turbines near the great wall of China, or that the Swiss would allow wind turbines near their famous mountain resorts.	Thank you for your comment.	6. Other, general statement; non-substantive
184	Mayerski, Alfred	Letter	Yes	WIND RESOURCE	34	6	3. As to the viability of these wind turbines, a Wall Street Journal article of Oct. 20, 2010, laid out the statistics. Heretofore, these wind towers have been a boondoggle costing the U. S. Government much more than the energy they produce. It was quoted that wind power turbines only supply about 1% of the U.S. energy needs and a great percentage of the monstrosities lie idle and have contributed little except as a blight to their environment.	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Section 1.3.1 has been added to the Final EA discussing the wind potential of the site.	3. Supplement, improve, or modify its analyses.

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185	Mayerski, Alfred	Letter	Yes	SOCIO	34	7	4. The paucity of the project's contribution to the local economy is shameful to defend. A few local landowners or businesses could contribute that much so as not to have their property and environment devalued. Even local property owners will in no way benefit from any energy allocation to either offset their electric bills substantially or to be able to source electric power for their individual use.	Thank you for your comment. The economic contribution of the project is described in the Draft EA (see Section 3.3.6, pages 122-127). Information has been added to the Final EA (in Section 3.3.6) regarding the uncertainty of end recipients of power, as well as the % change in economic activity from the project.	3. Supplement, improve, or modify its analyses.
186	Mayerski, Alfred	Letter	No	PROCESS	34	8	We have no doubt that all of the above issues will not sway the U.S. Dept. of Energy nor stay the project's blunt intrusion into this pristine area of Coconino County as long as it conforms to the agenda of developing "green" energy no matter what the cost, habitat blight or local property owners' opposition.	As stated in the Draft EA, "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)" (see page ES-1).	5. Explain why the comments do not warrant further agency response.
187	Olsen, Jack	Letter	No	NS-N/A	35	1	This letter is to voice my objections to the Perrin Wind Farm project. There are many objections but I will stick to those that bother me the most.	Thank you for your comment	6. Other, general statement; non-substantive
188	Olsen, Jack	Letter	No	SOCIO	35	2	First is the invasion of industry into our pristine natural environment, the reason most of us are living here. This is a beautiful corner of the world and we want to keep it that way without any monstrosity of massive industry taking over.	As stated in the Draft EA, "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" (see page 122, Section 3.3.6).	5. Explain why the comments do not warrant further agency response.
189	Olsen, Jack	Letter	No	WILDLIFE	35	3	We have a wonderful array of birds here from smallest to largest and they visit and perform for us daily - a true delight. Also, animals of all kinds make their homes among us chipmonks, rabbits, skunks, coyotes, foxes, mt. lions, deer, elk, bear, etc. Nature is so rich in so much especially plant life, an endless wonder. All these things will be affected by wind turbines on so grand a scale + 40 stories high.	The potential impacts to wildlife are evaluated in Section 3.3.5 of the Draft EA (see pages 102-122).	5. Explain why the comments do not warrant further agency response.
190	Olsen, Jack	Letter	No	VEG	35	3	We have a wonderful array of birds here from smallest to largest and they visit and perform for us daily - a true delight. Also, animals of all kinds make their homes among us chipmonks, rabbits, skunks, coyotes, foxes, mt. lions, deer, elk, bear, etc. Nature is so rich in so much especially plant life, an endless wonder.	The potential impacts to vegetation are evaluated in Section 3.3.4 of the Draft EA (see pages 95-102).	5. Explain why the comments do not warrant further agency response.
191	Olsen, Jack	Letter	Yes	NOISE	35	4	They also will affect us humans especially the elderly, which are many, who have delicate health conditions, me included; there are expected noise and vibrations driving continuous headaches, heart problems, sleep difficulties, high blood pressure, depression and just plain aggravation that doesn't stop, etc. These are recorded and true Exterra does not deal with truth!	As discussed in Section 3.3.2 of the Draft EA, "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." Information on thresholds for, and the potential health effects of, exposure to sound has been included in the Noise discussion of Section 3.2.2 of the Final EA.	3. Supplement, improve, or modify its analyses.
192	Olsen, Jack	Letter	No	SOCIO	35	5	We don't want to lose our precious paradise.	Thank you for your comment.	6. Other, general statement; non-substantive
193	Lee, John	Letter	No	WILDLIFE	36	1	I would like to take this time to address the issue of the avian study done by Az. Game and Fish. The only things I seen that were studied was the migratory paths, and whether or not any eagles are still nesting and populating in the area of the proposed wind farm (which I might add has not been concluded as yet) There is another issue that I found through researching the behavior of Eagles that I believe will show how these wind turbines can be an immediate danger to the bald eagle and the golden eagle which are throughout this area. That is, when they are searching for prey they are circling high in the sky. When they spot their prey from sometimes a mile high, they go into a long dive and their concentration on the prey distracts them from the danger of the long blades they will be coming in contact with. This has been proven to be factor in several Eagle fatalities. Since they are both on the endangered protected list, and they are plentifbl in the area, I would suggest that if this project were to go forward, it would be endangering both species	Section 3.3.5 of the Draft EA discloses the impacts to wildlife, including bald and golden eagles. Those impacts include collisions with turbines, electrocution from transmission, changes to behavior, and disturbance from noise and maintenance activities. Those impacts are mitigated though the project Avian and Bat protection plan which includes avoidance and minimization measures as part of the project design and operation as well as adaptive management to address issues as they occur. The ABPP has been prepared in close coordination with the USFWS and AGFD and both agencies consider it an appropriate plan for the protection of all avian and bat species.	5. Explain why the comments do not warrant further agency response.

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194	Lee, John	Letter	No	PROCESS	36	2	I believe that a lot has been left to assumption in an effort to speed this project through with little regard to a lot of important facts that deal with wild life, communities and peoples livelihoods. It is my sincere wishes that everything be reviewed, and considered, in this context so as to be justly fair to all concerned.	As discussed in the Draft EA, "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)" (see page 1, "Background). The EA itself analyzes the project impacts; Western's decision will summarize these impacts and any required mitigation.	5. Explain why the comments do not warrant further agency response.
195	Lee, John	Letter	No	NS-N/A	37	1	I thank you for the opportunity to respond to the issues of Perrin Ranch Wind Farm, as there are many.	Thank you for your comment.	6. Other, general statement; non-substantive
196	Lee, John	Letter	Yes	SOCIO	37	2	I live in Junipine Estates next to where Nextera wants to install this industrial complex. You can dress it up as a Wind Farm but in reality, it is Industrializing our neighborhood. We didn't work all these years building our home in a quiet, country landscape setting to expect that anyone would have the idea that they could just park their development on our door step. If we had wanted to live in an industrial zone, we would have built next to one. These Corporations have no respect for people's private lives, which is obvious by the number of coalitions across our great country and even in countries overseas, which are in battle with the same kind of people who are pushing into their homesteads. It is staggering to see how many families lives our being uprooted by Greedy Corporations such as this And at the same time enjoying Corporate Welfare on the backs of the very people they are trying to destroy for personal gain.	Additional information was added to the Environmental Consequences Section 3.3.6 in the Final EA regarding impacts to area quality of life in terms of impacts to vistas and quietude.	3. Supplement, improve, or modify its analyses.
197	Lee, John	Letter	No	WILDLIFE	37	3	They tell you that the wild life will only be disturbed temporarily through the construction phase. This is not true. Wild life like Deer, Elk, Antelope are used to living in the quiet surroundings of the forests where if a predator approaches they have advance wdng to protect themselves. This is not going to happen, when now they have the whooshing of the blades and the shadow flicker distractions. They will move to another area and once again try to readapt to new situations in hopes that someone won't uproot them again.	While limited, current data show that big game species such as deer and antelope will leave a site during construction but return during operation. There are no available studies that show long-term displacement of these species. A full discloser of potential impacts to all wildlife is available in the Draft EA in Section 3.3.5, including impacts from visual and auditory impacts.	5. Explain why the comments do not warrant further agency response.
198	Lee, John	Letter	No	NS-N/A	37	4	Is there no common decency and respect for other people any more? Why does $$$$$ always take precedence over peoples livelihood? It is even more disturbing to see our elected officials sitting back and allowing this travesty on to the very people who put them in office. We would like to see someone sit up and take notice of what is happening to our country and say enough is enough!	Thank you for your comment.	6. Other, general statement; non-substantive
199	Rodgers, Kathleen	Letter	No	PROCESS	38	1	Thank you so much for extending the opportunity to comment on the above referenced project to June 23, 201 1. 1 am a land owner north west of the proposed project and only recently became aware of the project and its location. While a public meeting was held in February, mailed notice to out of state landowners was not provided; hence my delayed response.	A letter notice of availability was mailed to all members of the public who provided an address, or for which there was contact information from Coconino County. Section 1.5 of the Final has been updated with this information.	3. Supplement, improve, or modify its analyses.
200	Rodgers, Kathleen	Letter	Yes	PROCESS	38	2	While I have a number of concerns as a landowner regarding the brevity of the review and seeming lack of involvement of affected community, I will leave my husband to provide comments regarding that to the responsible politicianslparties so I do not detract from my concern of a professional nature.	The public has been provided several opportunities to comment on the project. A summary of public involvement efforts is provided in Section 1.5 of the Final EA.	3. Supplement, improve, or modify its analyses.
201	Rodgers, Kathleen	Letter	Yes	NS-N/A	38	3	As way of background, I am a diplomat of the American Board of Toxicology, a trained environmental toxicologist and professor, Only yesterday, I became aware of the environmental assessment EA-1853 [EA]) provided by SWCA Environmental Consultants of Phoenix regarding this project. While I have a number of concerns regarding the superficial nature of this review, I am going to focus 'on my area of expertise, namely environmental concerns.	The public has been provided several opportunities to comment on the project. A summary of public involvement efforts is provided in Section 1.5 of the Final EA.	3. Supplement, improve, or modify its analyses.
202	Rodgers, Kathleen	Letter	Yes	HAZMAT	38	4	Having reviewed a number of Environmental Impact Statements, I believe a project with the potential impact of this Wind Energy Project to the local area with so little in potential benefit to those likely to be affect should require a full review of hazard identification and risk assessment. While a few potential concerns, such as storage of gasolines, solvents and wash materials have been raised and minimally addressed, the concern 1 would like to focus upon is the hazard of fires and release of environmental contaminants as a result of electrical malfunctions or lightning strikes to the turbines.	A new section has been added to the Final EA to address Human Health and Safety (see Chapter 3); particularly an analysis of the potential for the Project to change the risk of wildfires, as well as disclosures of the risks that environmental contaminants could be released during malfunctions, fires, or lightning strikes. The Final EA (see Section 2.2.4) has also been revised to omit turbine washing, including the use of solvents and collars, as an operational need.	3. Supplement, improve, or modify its analyses.
203	Rodgers, Kathleen	Letter	Yes	FIRE	38	5	Having spent a number of summers in north east Arizona, I am well aware that summer thunder storms are frequent and lightning activity is substantial. The proposed turbines will be up to 405 feet in the air and will be on ridges to allow maximal wind exposure. This makes these pieces of equipment ideal foci for lightning strikes. While it is stated in the EA that the turbines will be equipped with a lightning protection system (not fully described in the document), these systems are not fail safe and the potential still exists.	A Fire Protection and Emergency Response Plan has been developed and is included as an Appendix to the Final EA (see Appendix E). Language regarding adherence to the plan has been added to the Final EA in Section 2.2.7 "Applicant-committed Best Management Practices and Conservation Measures"	3. Supplement, improve, or modify its analyses.

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204	Rodgers, Kathleen	Letter	Yes	HAZMAT	38	6	In my cursory search of web, I could not find an assessment of the released toxicants in the event of a fire. However, given the materials that are a part of the turbine including flammable fluids, I would expect inclusion of polyaromatic hydrocarbons as well as other potential toxicants. Therefore, I request and expect that a full hazard assessment of the toxic components that are generated and released upon a turbine fire be performed. Without such an assessment, the risks to the wildlife and residents cannot be evaluated and the EA is incomplete.	A new section has been added to the Final EA to address Human Health and Safety (see Chapter 3). Potential mitigation measures of installing fire suppression systems within the nacelle has been added to the Final EA (see Chapter 3).	3. Supplement, improve, or modify its analyses.
205	Rodgers, Kathleen	Letter	Yes	PROCESS	38	7	The EA states that, to mitigate the possible consequences of failure of the protection system, the fire departments (a public fire department does not exist in the area of the turbines) and residents will be notified.	A Fire Protection and Emergency Response Plan has been developed and is included as an Appendix to the Final EA (see Appendix E). Language regarding adherence to the plan has been added to the Final EA in section 2.2.7 "Applicant-committed Best Management Practices and Conservation Measures"	3. Supplement, improve, or modify its analyses.
206	Rodgers, Kathleen	Letter	Yes	PROCESS	38	8	As a resident that was not even notified of the possible building of this project, I respectfully request that the notification process to the residents be detailed in an Environmental Impact Statement.	The public has been provided several opportunities to comment on the project. A summary of public involvement efforts is provided in Section 1.5 of the Final EA. Additionally, a Fire Protection and Emergency Response Plan has been developed and is included as an Appendix to the Final EA (see Appendix E). Language regarding adherence to the plan has been added to the Final EA in section 2.2.7 "Applicant-committed Best Management Practices and Conservation Measures"	3. Supplement, improve, or modify its analyses.
207	Rodgers, Kathleen	Letter	Yes	HAZMAT	38	9	Particularly, I request that the builders and maintainers of this project state how individuals will be advised of the hazards and risks that exist in a manner that would allow them to evacuate before substantial exposure. I expect this would be impossibte given the remoteness of most residents and the distribution of the smoke by wind.	A Fire Protection and Emergency Response Plan, detailing emergency notification, has been developed and is included as an Appendix to the Final EA (see Appendix E). Language regarding adherence to the plan has been added to the Final EA in section 2.2.7 "Applicant-committed Best Management Practices and Conservation Measures"	3. Supplement, improve, or modify its analyses.
208	Rodgers, Kathleen	Letter	Yes	FIRE	38	10	A further hazard, beyond the release of toxic components, is that of fire. Once the turbine starts to burn, the potential exists for sparks to cause forest fires endangering residents immediately beneath and downwind of the damaged turbine. Again, this hazard is to be borne by those receiving not benefit from the project (no energy generated will be used locally). Even if the energy to be generated was to be used in the local area, the majority of the residents downwind of the proposed project generate their own energy on the properties as they are not connected to the grid.	A Fire Protection and Emergency Response Plan has been drafted and is included as an Appendix to the Final EA (see Appendix E).	3. Supplement, improve, or modify its analyses.
209	Rodgers, Kathleen	Letter	No	PROCESS	38	11	In summary, there are a number of potential risks (only one concern outlined above) to the community that are long term and potentially substantial that have not been adequately considered or addressed in the current EA. Such a superficial review as provided in the current document does not fulfill the responsibilities of NextEra Energy, the company proposing the Perrin Ranch Wind Project, to the community or the government.	The Council on Environmental Quality provides guidance for contracting EA's and EIS's (40 CFR 1506.5b and c). A federal agency, such as Western, may permit an applicant (such as NextEra) to prepare the EA, however the federal agency must independently review and evaluate the information submitted and its accuracy. The federal agency, in this case Western, is ultimately responsible for the scope and content of the EA.	5. Explain why the comments do not warrant further agency response.
210	Iddings, Rose	Letter	No	SOCIO	39	1	I have property in Junipine Estates, The area of the Perrin Ranch Wind Farm. I have not liked the idea of this industrial complex in my neighborhood from the 1" day I heard of it. I would have attended a lot of the meetings was it not for living in Phoenix? I plan to move to my place in Junipine in the future but I am heartbroken about what they (Nextera)Are doing to my plans. I don't believe it is fair for corporations to invade people's private lives like this. I would sell and move if it wasn't for having to start over so late in life.	Thank you for your comment.	6. Other, general statement; non-substantive
211	Iddings, Rose	Letter	No	WILDLIFE	39	2	I also am an avid admirer of the beautifid Golden Eagles and Bald Eagles that I see every time I come up. I have heard horror stories about the turbines killing these precious. Birds.	The potential impacts to wildlife, including eagles, are evaluated in Section 3.3.5 of the Draft EA (see pages 102-122).	5. Explain why the comments do not warrant further agency response.
212	Iddings, Rose	Letter	Yes	WIND RESOURCE	39	3	Can't we go to a different type of energy that doesn't destroy like Wind Energy?	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the type of generation at the project site.	3. Supplement, improve, or modify its analyses.

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213	Iddings, Rose	Letter	No	PROCESS	39	4	Please leave our community in the peaceful state it has been for years. Surely this thing has not been thoroughly researched as to the many negative aspects it brings. Disappointed.	The EA is required to be an objective, good faith attempt at full disclosure. Western will make a decision in July 2011 based on the environmental analysis.	5. Explain why the comments do not warrant further agency response.
214	Harmeyer, Allan C.	Letter	Yes	SOCIO	40	1	I own three properties on Howard Mesa Ranch,/Four Hills Ranch. Like many other land owners in this area, I am very concemed about the Perrin Ranch Wind Farm, which if completed, will be just a couple of miles from our ranch properties	The Socioeconomics discussion (Section 3.3.6) of the Final EA has been revised to include a quality of life discussion.	3. Supplement, improve, or modify its analyses.
215	Harmeyer, Allan C.	Letter	Yes	SOCIO	40	2	My first concern is the environmental blight that these huge 400 foot structures will cast on this pristine landscape. Many of us purchased our land because of tbe clear and unobstructed views of the mountains and surrounding vistas. These monstrous turbine towers will be easily seen for many miles, and at night, flashing lights connected to the turbine towers will disrupt views of the upper atmosphere.	The Draft EA discusses the potential impact of the project on property values (see Section 3.3.6, "Socioeconomics," pages 125-126). Additional information was added to the Environmental Consequences Section 3.3.6 in the Final EA regarding impacts to area quality of life in terms of impacts to vistas and quietude. Additionally, the visual impact of the proposed project is evaluated in Section 3.3.1 of the Draft EA (see pages 60-79).	3. Supplement, improve, or modify its analyses.
216	Harmeyer, Allan C.	Letter	No	WILDLIFE	40	3	I am also greatly concemed about the effect on birds (especially raptors) and bats that are an important part of the ecological chain. I really question whether adequate studies were done to fully understand the impact on migratory birds and bats m this area. I attended several public meetings held in December 2010, and February, 2011, and it seemed to me that the studies presented by NextEra were short-term and did not take into account seasonal migration pattern.	NextEra developed an Avian and Bat Protection Plan, which has been developed in coordination with USFWS and AGFD. Additionally, the potential impacts to wildlife, including bats and birds, are evaluated in Section 3.3.5 of the Draft EA (see pages 102-122).	5. Explain why the comments do not warrant further agency response.
217	Harmeyer, Allan C.	Letter	No	WATER	40	4	As you know, Arizona is still recovering from a drought cycle that bas greatly affected forest and high desert vegetation in that region. It is my understanding that this project will require over 17 million gallons of water just to get the turbines up and running. A is also my understanding that the huge turbine blades will need to be cleaned as part of normal monthly maintenance. Considering that this is a dusty area, the long term water usage for this project must be considerable. I also question the impact of this project on air quality throughout the surrounding area.	As discussed in the Draft EA, "During construction, less than 60 acre-feet of water would be required" (page 43, Section 2.2.3). Further, the Draft EA states that "It is estimated that 20,000 to 24,000 gallons of water per year would be used at the facility (page 47, Section 2.2.4). The Final EA now includes the acre-feet and gallon equivalents for clarity.	3. Supplement, improve, or modify its analyses.
218	Harmeyer, Allan C.	Letter	Yes	FIRE	40	5	Finally, I also am concerned about the potential for fires, caused by sparks fiom mechanical parts or cables. Again, his region has been greatly compromised by long term drought conditions. Sparks from a turbine in windy conditions could carry for a considerable distance, possibly compromising thousands of acres of forested private and state trust lands.	An "Emergency Response" description, based on the added Fire Prevention and Emergency Response Plan, has been added to Section 2.2.4 (Operation and Maintenance) of the Final EA. Additionally, a prevention discussion of the potential fire risk has been added to the Final EA in the Human Health and Safety discussion, see Section 3.3.9.	1. Modify alternatives including the proposed action.
219	Harmeyer, Allan C.	Letter	No	NS-N/A	40	6	Thank you very much for your time and your consideration of the issues I have raised.	Thank you for your comment.	6. Other, general statement; non-substantive
220	Harger, Scott	Letter	No	NS-N/A	41	1	Please forgive the hand-written comments made necessary by my remote location. Attached are my comments written as a representative of CNRCD and San Francisco Peaks Weed Management Area (SFPWMA).Beginning with a summary of my comments, I am going to restrict them mainly to the issues of rehabilitation and revegetation of construction disturbances, and to the ongoing weed and restoration monitoring and abatement:	Thank you for your comment.	6. Other, general statement; non-substantive
221	Harger, Scott	Letter	Yes	VEG	41	2	1. Page 40 material source pit. The EA is specific about using Read Lake Quarry for material. While the best mgmt practices for this project are well-chosen, a BMP needs needs to be in place for ensuring that material from this pit does not include seeds or vegetative mat'l from noxious or non-native invasive plants. Coconino and Kaibab NF's have such BMPs for you to incorporate. Vehicle washing is not sufficient to mitigate this particular source.	The Final EA has been revised to incorporate the additional BMP "Maintain stockpile materials in a weed-free condition."	1. Modify alternatives including the proposed action.
222	Harger, Scott	Letter	Yes	VEG	41	3	2. Page 46 General Maintenance Duties, Bullet 9 Cooperation must be expanded to include: Reporting, Monitoring, and Mitigation; specifically weed abatement.	The Final EA has been revised to state "Meeting stipulations from the ABPP, Native Plant Revegetation and Noxious Weed Management Plan, and other environmental plans for the project, including monitoring, mitigation, and reporting."	1. Modify alternatives including the proposed action.
223	Harger, Scott	Letter	Yes	VEG	41	4	3. Page 49. Construction, Operation, and Decomm Commitments Bullet 4. An environmental monitor must be assigned for regular and periodic monitoring and abatement during and throughout operations and decommissioning, in order to comply with Coconino County use permit and SFPWMA opinion regarding the necessary action to mitigate the adverse effects of construction. And operation of the proposed action (pp ES-3, ES-4).	General monitoring is not required for operation and decommissioning, only monitoring specific to resources such as wildlife and weeds. Those monitoring activities are described in their respective resource plans included as appendices to the Final EA	5. Explain why the comments do not warrant further agency response.

ID	Contact ID	Comment Type	Change in Final EA Required (Yes/No)	Resource Code	Letter No.	Comment No.	Comment Text	Response	Response Type
224	Harger, Scott	Letter	Yes	VEG	41	5	4. Page 49. Construction, Operation, and Decomm Commitments Bullet 4. An environmental monitor must be assigned for regular and periodic monitoring and abatement during and throughout operations and decommissioning, in order to comply with Coconino County use permit and SFPWMA opinion regarding the necessary action to mitigate the adverse effects of construction. And operation of the proposed action (pp ES-3, ES-4). Page 50 Resource Conservation Measures. Measures for reducing the spread and establishment of noxious and invasive weeds are mostly admirable and serve to mitigate impacts. However, there are two unacceptable deficiencies: A. The project-specific weed mgmt plan (and the restoration component component as well) must include regular monitoring for weeds and, if persistent or increasing above baseline, must include an abatement component for the duration of operations, not just construction, nor an arbitrary period post construction. B. A bullet must be included to Wit: “Off-site fill or construction material source pits will be weed-free, or made weed-free (including viable seed) prior to movement of material into or about the project are of the proposed alternative.	General monitoring is not required for operation and decommissioning, only monitoring specific to resources such as wildlife and weeds. Those monitoring activities are described in their respective resource plans included as appendices to the EA	5. Explain why the comments do not warrant further agency response.
225	Harger, Scott	Letter	Yes	VEG	41	6	5. Page 101 Operation and Maintenance. It should be noted that adverse impacts to vegetation resources can be anticipated to be minimal if and only if mitigation steps are completed and adequate and appropriate to the construction and operation stages. The site of the proposed action is, and expected to remain as operating grazing land. This requires that mitigation must be short term, long term, adaptive, and responsive to less than 100% effective at six years from start and weed abatement that is less than 100% effective annually.	Impacts to vegetation are anticipated to be minimal due to the small percentage of vegetation removed relative to the amount of similar vegetation in the area. The impacts would be further reduced through implementation of the restoration plan. These impacts are disclosed in Section 3.3.4 of the Draft EA.	5. Explain why the comments do not warrant further agency response.
226	Harger, Scott	Letter	No	VEG	41	7	6. Page 102. Cumulative Impacts. By definition invasive weeds utilize disturbance to soils to establish colonies, opportunistically spread to other locations in the vicinity, often to include soils that are NOT disturbed by construction, but by other proximal causes, or simply to occupy bare soils. Failure to abate invasives when they are local and legible is the recipe for widespread and severe impacts. Perrin Ranch Restoration and Reclamation Plan, SWCA Project No. 16440, May 2011:	The cumulative impact of noxious weed invasions will still be localized and minor due to the implementation of the noxious weed management plan guidelines.	5. Explain why the comments do not warrant further agency response.
227	Harger, Scott	Letter	Yes	VEG	41	8	Perrin Ranch Restoration and Reclamation Plan, SWCA Project No. 16440, May 2011: 7. Page 1. State control of noxious weeds pertains only to transportation and harbor of noxious species, not to vegetative control. Invasive species listed are controlled to the same standards as noxious weeds with regard to vegetative control. Your tables and data regarding target species is acceptable, but only as actionable, not “purely in-formational”.	In the Final EA, Appendix C, that statement has been removed and the Plan (now titled the “Native Plant Revegetation and Noxious Weed Management Plan”) now covers noxious and invasive weeds.	3. Supplement, improve, or modify its analyses.
228	Harger, Scott	Letter	Yes	VEG	41	9	Perrin Ranch Restoration and Reclamation Plan, SWCA Project No. 16440, May 2011: 8. Regarding Coconino County seeding standards, the county is commended on its standards as guidelines, however, much more specific seeding information is available from NRCS based on soil types and promising much higher probability of success. Please amend plan to incorporate these seed lists, available from the NRCS area office, Gary Parrot, or from Perrin Ranch, LLC.	In the Final EA, Appendix C, the Plan (now titled the “Native Plant Revegetation and Noxious Weed Management Plan”) has been revised to indicate a seed mix was developed for this project in coordination with Granite Seed and Flagstaff Arboretum.	3. Supplement, improve, or modify its analyses.
229	Harger, Scott	Letter	Yes	VEG	41	10	Perrin Ranch Restoration and Reclamation Plan, SWCA Project No. 16440, May 2011: 9. Page 1, Section 1.1 Responsible Parties, refers to construction and post-construction only. The responsible party must be identified for operation and post-operation, that is, for the duration of the proposed action. This should be corrected in this section.	In the Final EA, Appendix C, the plan (now titled the “Native Plant Revegetation and Noxious Weed Management Plan”) has been revised to include "Project proponent, any contractors or subcontractors, and also any future owners" as responsible parties.	3. Supplement, improve, or modify its analyses.
230	Harger, Scott	Letter	Yes	VEG	41	11	Perrin Ranch Restoration and Reclamation Plan, SWCA Project No. 16440, May 2011: 10. Page 2, Section 1.2. The paragraph describing Resolution cc Bos Res No. 2011-04 is essentially correct and an important basis for most of the comments herein. Comments 1-9 are in large part intended to make the EA and the Restoration Plan consistent with the Purpose and Intent of this resolution.	In the Final EA, Appendix C, the plan (now titled the “Native Plant Revegetation and Noxious Weed Management Plan”) addresses all aspects of the resolution in terms of revegetation and noxious weeds.	3. Supplement, improve, or modify its analyses.
231	Harger, Scott	Letter	Yes	VEG	41	12	Perrin Ranch Restoration and Reclamation Plan, SWCA Project No. 16440, May 2011: 11. Page 5, Section 2.2.2. Non-native invasive species are actionable, not informational, and must be treated the same as listed noxious weeds. Time point of this programming is not to meet regulatory requirements only, but to mitigate the impacts of the proposed action.	In the Final EA, Appendix C, the plan (now titled the “Native Plant Revegetation and Noxious Weed Management Plan”) has been revised to include "Project proponent, any contractors or subcontractors, and also any future owners" as responsible parties.	3. Supplement, improve, or modify its analyses.
232	Harger, Scott	Letter	Yes	VEG	41	13	Perrin Ranch Restoration and Reclamation Plan, SWCA Project No. 16440, May 2011: 12. Page 5, Section 2.2.2. The definition and abatement of invasive species is not controlled by how widespread they are. However, baseline survey and abatement assessment is. Non-native invasive weeds must be mapped, regardless of listing status.	In the Final EA, Appendix C, that statement has been removed and the Plan (now titled the “Native Plant Revegetation and Noxious Weed Management Plan”) now covers noxious and invasive weeds.	3. Supplement, improve, or modify its analyses.
233	Harger, Scott	Letter	Yes	VEG	41	14	Perrin Ranch Restoration and Reclamation Plan, SWCA Project No. 16440, May 2011: 13. Page 8, Section 3.1.1 through 3.2.1. Although not necessarily necessary or required for language regarding material source pits to be included herein, it would be a good idea for that sake of consistency.	In the Final EA, Appendix C, the plan (now titled the “Native Plant Revegetation and Noxious Weed Management Plan”) has been updated, a seed mix was developed for this project in coordination with Granite Seed and Flagstaff Arboretum.	3. Supplement, improve, or modify its analyses.

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234	Harger, Scott	Letter	Yes	VEG	41	15	Perrin Ranch Restoration and Reclamation Plan, SWCA Project No. 16440, May 2011: 14. Page 9, Section 3.2.2. Seeding. See comment # 8 above.	In the Final EA, Appendix C, that statement has been removed and the Plan (now titled the "Native Plant Revegetation and Noxious Weed Management Plan") now covers noxious and invasive weeds.	3. Supplement, improve, or modify its analyses.
235	Harger, Scott	Letter	Yes	VEG	41	16	Perrin Ranch Restoration and Reclamation Plan, SWCA Project No. 16440, May 2011: 15.Page 11, Section 4.1.1 Adaptive Management. See comment #'s 7, 11, 12.	In the Final EA, Appendix C, the plan (now titled the "Native Plant Revegetation and Noxious Weed Management Plan") addresses all aspects of the resolution in terms of revegetation and noxious weeds.	3. Supplement, improve, or modify its analyses.
236	Harger, Scott	Letter	Yes	VEG	41	17	Perrin Ranch Restoration and Reclamation Plan, SWCA Project No. 16440, May 2011: 16. Page 12, Numbered Paragraph 5. It is not acceptable to send bagged weed seed-containing material to a landfill in Coconino County. These sealed bags must be burned. The County maintains a facility for this in Flagstaff, AZ, but they may be burned elsewhere.	The plan (now titled the "Native Plant Revegetation and Noxious Weed Management Plan," see Appendix C) has been updated.	3. Supplement, improve, or modify its analyses.
237	Harger, Scott	Letter	Yes	VEG	41	18	Perrin Ranch Restoration and Reclamation Plan, SWCA Project No. 16440, May 2011: 17. Page 12, Section 4.1.3 Monitoring. The plan cites Monsen et al, 2004 giving that establishment may take up to 6 years. In the following sentence, then recommends monitoring for a maximum of 5 years. This is inconsistent and insufficient. The plan should require monitoring for at least 7 years to be consistent with its model source.	In the Final EA, Appendix C, the Plan (now titled the "Native Plant Revegetation and Noxious Weed Management Plan") has been revised to include 7 years of monitoring.	3. Supplement, improve, or modify its analyses.
238	Harger, Scott	Letter	Yes	VEG	41	19	Perrin Ranch Restoration and Reclamation Plan, SWCA Project No. 16440, May 2011:18. Chapter 4 Consultation and Coordination. Based on Table 4.1, SWCA failed to consult or coordinate with the following local agencies: Coconino County, San Francisco Peaks Weed Management Area. SWCA failed to consult with the following state agencies: Coconino National Resource Conservation District. SWCA appears to have failed to consult with the following federal agencies: Natural Resources Conservation Service, USDA.	Although not noted in the Draft EA, all of these entities were contacted by SWCA in order to request information. Only 3 responses were received. Table 4 of the plan (now titled the "Native Plant Revegetation and Noxious Weed Management Plan," see Appendix C of the Final EA) has been updated.	3. Supplement, improve, or modify its analyses.
239	Mackin, Tom	Email	No	PROCESS	42	1	We appreciate the opportunity to review and comment on this Draft EA. We have followed the public participation process on this proposal.	Thank you for your comment.	6. Other, general statement; non-substantive
240	Mackin, Tom	Email	No	WILDLIFE	42	2	The Arizona Wildlife Federation is interested in wildlife and wildlife habitat and our review and comments are focused on the portions of the EA related to these topics.	Thank you for your comment.	6. Other, general statement; non-substantive
241	Mackin, Tom	Email	No	WILDLIFE	42	3	There appears to have been a detailed and fairly comprehensive inventory and analysis on the presence of, and habitat for, relevant wildlife species. Much of the portions regarding wildlife in the EA are a summary of more detailed discussion in the Avian and Bat Protection Plan (ABPP).	Thank you for your comment.	6. Other, general statement; non-substantive
242	Mackin, Tom	Email	No	PROCESS	42	4	We support the formation of 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 condition of the Coconino County conditional use permit provides an opportunity to bring expertise to bear in interpreting the results of monitoring the effects of project operations on bird and bat populations. However, we also note the language in the ABPP that the committee is strictly advisory and Perrin Ranch is under no obligation to follow the TAC's recommendations.	Thank you for your comment.	6. Other, general statement; non-substantive
243	Mackin, Tom	Email	No	PROCESS	42	5	We note in the ABPP that there are detailed protocols for pre-construction inventory and for post-construction mortality monitoring. We also note the upfront financial contributions of $250 thousand dollars for eagle impact mitigation, research, habitat enhancement, et al and a similar amount for avian and bat purposes. We applaud these upfront commitments. We would hope that the research and monitoring portions of these funds be focused on issues that may be important at other wind farm facilities in northern Arizona – where consistent with meeting the objectives for this project. And we suggest that a mechanism be developed to share in a timely manner the relevant non-proprietary information gained from research and monitoring overseen by the TAC.	Thank you for your comment.	6. Other, general statement; non-substantive

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244	Mackin, Tom	Email	No	WILDLIFE	42	6	Section 5 of the ABPP addresses post-construction mitigation and adaptive management. We recognize that there are many unknowns which will have to be faced and we understand the appropriateness of phased mitigation and monitoring. However, we question the cap or limit placed for mitigation of episodic mortality. Under the most extreme conditions (Final Mitigation 5.3.2.3) the maximum reduction in turbine hours is 360 turbine hours (aggregated among all turbines adjusted in timing). The text states that this constitutes "maximum response levels for this project based on models that have been completed to ensure a commercially viable project." We have difficulty understanding how reducing turbine hours within the project area by less than 1/10th of one percent would threaten the commercial viability. In other words if having only 99.93 percent turbine availability threatens the commercial viability it suggests that the project is extremely precarious from an economic standpoint. We do not know what the eventual mitigation for episodic mortality may need to be. That will be determined through experience and should rely heavily on the analysis and evaluation by the TAC. However, we seriously question this preimposed limitation on operational mitigation.	There are many factors that go into the viability of a project and the operational mitigation measures have been assessed along with all other factors in determining amounts of operational changes that allow for a viable project. Further, the proposed operational changes were determined by assessing data for the site to select timing that would correspond to the highest use times for species more likely to be impacted, considering episodic events will likely be limited to one or a few turbines. For example, 360 hours would allow shutdowns during peak migration for raptors during the highest use times of the day for up to 3 turbines. Not all turbines will exhibit similar mortality and this allows a set of "problem" turbines to be adjusted if necessary. Further, these operational changes work in conjunction with the "up-front" avoidance and minimization measures and non-operational mitigation measures to cumulatively mitigate for impacts using different means and methods.	5. Explain why the comments do not warrant further agency response.
245	Mackin, Tom	Email	No	NS-N/A	42	7	We will be interested in the results of implementing this project. We expect there to be other proposals for wind farm operations and we hope to follow the information gained by implementation of the Avian and Bat Protection Plan portion of the project.	Thank you for your comment.	6. Other, general statement; non-substantive
246	Webb, Ernest	Letter	No	NS-N/A	43	1	My comments to the Draft Environmental Assessment DOE/EA- 1853, Perrin Ranch Wind Energy Interconnection Project, Coconino County, AZ are as follows:	Thank you for your comment.	6. Other, general statement; non-substantive
247	Webb, Ernest	Letter	Yes	PROCESS	43	2	1. Study Area for Environmental Effects. 40 CFR Sec. 1508.27 (b) (7) states the following when evaluating intensity (severity of impacts) to determine whether a Finding of No Significant Impact (FONSI) can be made: . . . Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts. Defining the study area as a 10 mile buffer is an arbitrary selection that breaks the impact down and avoids having to deal with environmental issues outside this area. In particular, it avoids having to deal with environmental concerns in the entire Cataract Canyon/Havasu Canyon Watershed.	Each resource area in Chapter 3 has a defined study area, based on the extent of potential impacts. Clarification has been added to the Final EA, see Section 3.3.	3. Supplement, improve, or modify its analyses.
248	Webb, Ernest	Letter	Yes	WATER	43	3	Defining the study area as a 10 mile buffer is an arbitrary selection that breaks the impact down and avoids having to deal with environmental issues outside this area. In particular, it avoids having to deal with environmental concerns in the entire Cataract Canyon/Havasu Canyon Watershed. The project is located in the Cataract Canyon section, upstream of the vast majority of the watershed area. Consequently, any activity within this area could have an impact as far downstream as the Havasu Canyon drainage into the Colorado. In addition to surface water concerns, the project lies directly above a portion of the R-M Aquifer which is the primary source of water for the Havasupai Tribe.	discussed in the Draft EA the study area for each resource is different, "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. " The Final EA has been revised to better describe the extents of the surface water Study Area , "Downstream surface water drainages within the Study Area is based on the portion of the sub-watershed that receives discharge from the Project Area. In the Cataract Creek watershed this includes Cataract Creek downstream from the project area to its confluence with Red Lake Wash; in the Verde Valley watershed this includes KY Canyon to its confluence with Martin Dam Draw" (Section 3.3.3)	3. Supplement, improve, or modify its analyses.

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249	Webb, Ernest	Letter		EJ	43	4	2. Environmental Justice. Page ES -5 states that environmental justice was dismissed fkom detailed analysis because the impacts would be unaffected or negligible. Sec. 3.2 of the EA eliminates the Havasupai fkorn environmental justice consideration strictly on the basis of their location outside the defined 10 mile area, in violation of the above cited CFR. For this project, the environmental justice issue involves the potential negative impact of construction directly above the R-M Aquifer, and the potential withdrawal of 17 million gallons of water fkom it. Ref (1), Sect V.3 Social and Environmental Justice Analysis, addresses the Havasupai Tribe's concern that they "cannot tolerate any decrease in the natural flow of Havasu Springs and other canyon springs and seeps". "Any withdrawal from the R-M Aquifer is considered by the Havasupai Tribe to have an impact on its water rights and water resources." This section goes on to say that: "It is the disproportionate disruption of the environmental populations without benefit to them that is disproportionately adverse, and to be avoided." This project provides no benefit whatsoever to the Havasupai Tribe. There is no indication in this Draft EA that the Havasupai have even been apprised of the potential withdrawal of millions of gallons, or the potential risk of aquifer damage from construction activities. If this 2006 US Dept. of Interior report considers any risk to the flow of this aquifer as an environmental justice issue for the Havasupai, then there is no justification for failing to address it in this draft EA. This is a violation of the intent of Executive Order 12898 and the guidelines for including environmental justice issues in the NEPA process.	As disclosed in Appendix G of the Draft EA, Western has consulted with the Havasupai since January 2011. The Final EA (see Section 1.5 and Appendix I) has been updated to include additional details on tribal consultation and coordination.	3. Supplement, improve, or modify its analyses.
250	Webb, Ernest	Letter	No	WATER	43	5	3. R-M Aquifer Issues. Page ES-5 states that geology and soils were dismissed fiom detailed analysis because the impacts would be unaffected or negligible. In fact, geology and soil issues are critical elements with respect to the potential effects on the Cataract Canyon/ Havasu Canyon Watershed and the R-M Aquifer. Ref (1) makes the following observations: a. Sect 11.2 - 98% of the R-M Aquifer discharge occurs at Havasu Springs Sect II.3 - north of Bill Williams Mountain, numerous fault systems cut through the area, and near vertical faults provide near vertical flows into the aquifer. c. Sect 11.4.4 - the hydrogeology of the aquifer is not well understood, and the hydraulic conductivities are largely unknown.	Thank you for your comment. The Final EA now includes analysis of the geology and soils resources. Additionally, impacts to the aquifer are discussed in the Draft EA Groundwater Resources Section and soil erosion impacts are discussed in the Surface Water Resources Section. As discussed in the Draft EA, "Because the total amount of water need for this [construction] phase of the Project is 60 acre-feet , or significantly less than 0.001% of the total groundwater 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" (see Section 3.3.3). Additionally, as discussed in the Draft EA, " [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" (see Section 3.3.3).	5. Explain why the comments do not warrant further agency response.
251	Webb, Ernest	Letter	Yes	WATER	43	6	Page 14 of the Conditional Use Permit (CUP) states that digging and blasting will be used in the construction process. The use of explosives and hydraulic hammering equipment has the potential to close off or divert water flowing through the fault systems cited above. The damage risk is unknown because the exact locations and hydrologic flow characteristics of the fault systems are unknown. Geology and hydrogeology studies are required throughout the entire project area to identify the all the fault systems that feed the R-M Aquifer, and their proximity to all potential areas of construction. Modeling would then be required to assess the vulnerability of the faults to shock levels anticipated during construction. If these studies are not done, there is a isk that project construction could do irreparable damage to the fault systems feeding the aquifer, and significantly reduce the water output at Havasu Springs. A major reduction in the output could jeopardize the Havasupai's ability to exist in that area. The loss of springs could adversely impact tourist visitation, which is an important part of their economy. Without study data, these risks cannot be quantified. A finding of no significant impact cannot be made where there the risks cannot be quantified due to insufficient data. Consequently, an Environment Impact Statement is required. A failure to conduct an unbiased, comprehensive study of the fault system and aquifer prior to project approval would, in and of itself, constitute an act of environmental injustice towards the Havasupai.	Thank you for your comment. The Final EA now includes analysis of the effects of blasting on the propagation of fractures and groundwater resources. Additionally, a discussion of Geology and Soils has been added to Chapter 3 of the Final EA.	3. Supplement, improve, or modify its analyses.

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252	Webb, Ernest	Letter	Yes	WATER	43	7	4. Cataract Canyon/Havasu Canyon Watershed Issues. Pr Ref (2), Fig. 2.8, the annual precipitation in the project area of the watershed, (1 5 - 19 inches avg 196 1 - 1990), is higher than that received in most of the downstream portion. In addition to the Havasupai, there are ranches north of the project area that utilize and have rights to surface water collected in tanks. A portion of this water consists of runoff that originates from the heavier rainfall in the project area. In addition, flooding of areas from Howard Mesa north to the Colorado can often originate from heavy rain in the south, where the project is located. Project construction will alter the landscape and impact the flow of water to the north. Ref (3) analyzed the 2008 Havasu flood and showed that the floodwaters resulted from heavy rainfall primarily in the area between the northern section of Per& Ranch and Valle. Replacing existing vegetation with hard packed roads, drainage ditching, turbine foundations, maintenance yards9 and other facilities may intensify. the runoff in periods of heavy rainfall. Conversely, attempts to mitigate high volume runoff may cut off the downstream flow to the extent that the Havasupai and downstream ranchers are deprived of their rightful supply of surface water. A reduction in flow may also occur as a consequence of the many wash crossings required for the project. The crossings divert the annual flow of water, and may restrict the downstream flow. The impacts of project construction on surface water flow cannot be addressed without a thorough understanding of the pre-construction water flow baseline. This is basic science. Once a baseline is established by monitoring existing flow conditions in all locations where construction will occur9 then modeling can be applied to assess the effects of varying amounts of rainfall in the project area. If modeling indicates the likelihood of an increased flood risk, then mitigation measures can be specifically designed to meet the threat. If the designed measures significantly reduce the downstream flow or if the modeling predicts an overall decrease in downstream flow, the Havasupai and ranchers downstream should be compensated for their losses over the lifetime of the project. By arbitrarily applying a 10 mile boundary, this EA fails to address potentially significant negative economic impacts to people dependent on rainfall from the upper portion of the watershed. There is insufficient information upon which to base a FONSI with respect to the downstrearn water flow and associated water rights of ranchers and the Havasupai. An Environmental Impact Statement is required.	The Final EA was revised to include a percentage of the contributing area in the watershed that will be disturbed during construction (0.04%) and operational (0.01%) phases of the project, including all roads, turbines, and facilities (Section 3.3.3). Further, as discussed in the Draft EA, access roads would be designed in a manner that would allow natural surface flows to be maintained at all wash crossings and storm runoff would be retained on the substation sites (Section 3.3.3, Page 98).	3. Supplement, improve, or modify its analyses.
253	Vaughn, Elizabeth	Letter	No	NS-N/A	44	1	As this is an Environmental Assessment, I'd like to speak directly to the impact this project will have on the environment.	Thank you for your comment.	6. Other, general statement; non-substantive
254	Vaughn, Elizabeth	Letter	Yes	OTH	44	2	I am very concerned about soil erosion, air quality, and the invasion of noxious and invasive plants as well as the death of thousands of bats and birds, and the impact on other wildlife in the area of this project.	The Draft EA analyzes impacts to soils (see Geology and Soils, page 57) and air quality (see Climate and Air Quality page 55) in Section 3.2.2, the spread of noxious and invasive weeds in Section 3.3.4 (Vegetation, pages 95-102), and bats and birds in Section 3.3.5 (Wildlife, pages 102-122). The Final EA has been revised to include an analysis of geology and soils in detail (see Chapter 3).	3. Supplement, improve, or modify its analyses.
255	Vaughn, Elizabeth	Letter	No	PROCESS	44	3	I feel this EA is not nearly comprehensive enough for this project to move forward, and that a full Environmental Impact Study is in order.	Thank you for your comments. The NEPA document prepared is actually an environmental assessment (EA), not an Environmental Impact Statement (EIS).	5. Explain why the comments do not warrant further agency response.
256	Vaughn, Elizabeth	Letter	Yes	OTH	44	4	I would like to first reference "The Rapid Watershed Assessment of the Havasu Canyon Watershed, Report of June 2010". The Perrin Ranch Wind Farm lies in the Havasu Canyon Watershed. The project will lie across two resource areas within the watershed: Colorado Plateau Woodland - Grasslands, and Colorado Plateau Mixed Grass Plains. This document mentions specifically "Resource concerns in the watershed include soil erosion (sheet and rill and streambank), water quantity (runoff and flooding), noxious and invasive plants, and inadequate quantities & quality of feed and water for both wildlife and domestic animals (NRCS, 2010). For the upland areas, the primary concern relates to maintaining and improving the condition and productivity of the land. This includes implementing conservation practices to protect soil from erosion and excessive runoff, improve the health of the vegetative communities, and enhance habitat for wildlife." Section 1, Page 1-3, Paragraphs 1 and 2.This and other statements within this document suggest that this area is a fragile ecosystem, that is already compromised and should be cared for and not abused.	The Draft EA analyzes impacts to soils (see Geology and Soils, page 57) and air quality (see Climate and Air Quality page 55) in Section 3.2.2, the spread of noxious and invasive weeds in Section 3.3.4 (Vegetation, pages 95-102), and bats and birds in Section 3.3.5 (Wildlife, pages 102-122). The Final EA has been revised to include an analysis of geology and soils in detail (see Chapter 3).	3. Supplement, improve, or modify its analyses.
257	Vaughn, Elizabeth	Letter	Yes	GEO-SOILS	44	5	In Section 3 - Resource Concerns, page 3-1, the author states: "Soil erosion from water and wind is a concern on rangelands within the watershed. The sandy soils of this watershed are highly susceptible to erosive forces. This condition is exacerbated in areas where vegetative cover has been reduced due to prolonged drought and other factors."	The Draft EA analyzes impacts to soils (see Geology and Soils, page 57) in Section 3.2.2. The Final EA has been revised to include an analysis of geology and soils in detail (see Chapter 3).	3. Supplement, improve, or modify its analyses.

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258	Vaughn, Elizabeth	Letter	Yes	VEG	44	6	The Perrin EA states 648 acres would be disturbed during the construction phase of the project. While they try to minimize the effect by stating that this is 1.6% of the project area (total 39,883 acres), 648 acres is a lot of land in this drought stricken, desert landscape. Here, where ranchers have to answer not how many head of cattle they can place on an acre (as they do in the Midwest and in Tallgrass Prairies), but how many acres per head of cattle the land can support; we cannot afford nor allow this destruction. This 648 acres will quickly become inundated with Russian Thistle (commonly "tumbleweed"), cheatgrass, and other non-native species. These plants do little to control soil erosion with their superficial root systems. The soil in this area is shallow and does not hold water well resulting in low native plant productivity.	A Reclamation and Restoration plan, was prepared for the project (see Appendix A of the Draft EA), which includes seeding with native species and weed management to ensure native flora is restored. Please note that the plan is now titled the “Native Plant Revegetation and Noxious Weed Management Plan” (see Appendix C of the Final EA).	5. Explain why the comments do not warrant further agency response.
259	Vaughn, Elizabeth	Letter	Yes	VEG	44	7	Wind erosion then becomes a problem as there will be little vegetative cover. Native plants have a difficult time grabbing hold in such disturbed areas. The dust that will be thrown into the air will then cause an air quality concern. The heavy rains that can occur in this area, especially during monsoon season will cause excessive runoff and flooding, further degrading the soil and making it even more difficult for re-vegetation. It would take decades to re-establish a native landscape here, and frankly- it would most likely never be the same.	A Reclamation and Restoration plan was prepared for the project (see Appendix A of the Draft EA), which includes seeding with native species and weed management to ensure native flora is restored. Further, dust control measures are in place as described in 2.2.7. Please note that the plan is now titled the “Native Plant Revegetation and Noxious Weed Management Plan” (see Appendix C of the Final EA).	5. Explain why the comments do not warrant further agency response.
260	Vaughn, Elizabeth	Letter	No	WILDLIFE	44	8	Keep in mind, also, that this 648 acres directly disturbed is not just a block of land. It is fragmented over 40,000 acres. The fragmentation and destruction of grazing area will then adversely affect our larger grazing mammals, specifically elk, deer and antelope. The Perrin EA states: "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." I don't see how this is possible as there will be such a lack of native vegetation, that they will seek other areas to browse. Unlike domestic cattle, these mammals do not typically adapt to eating non- native vegetation. They likely will not eat the invasive species that will take over the area.	Current literature as cited in the EA shows that big game will return to wind facilities following construction. A very small percentage of available vegetation will be removed for wildlife, as disclosed in chapter 3.3.4.	5. Explain why the comments do not warrant further agency response.
261	Vaughn, Elizabeth	Letter	No	WILDLIFE	44	9	Arizona Game and Fish has introduced guidelines for wind energy: "Guidelines for Reducing Impacts to Wildlife from Wind Energy Development in Arizona (Rev November 23,2009)". In it they state: "The purpose of the Guidelines for Reducing Impacts to Wildlife from Wind Energy Development in Arizona (Guidelines) is to outline Arizona Game and Fish Department's (AGFD) recommendations to lessen the potential impacts on wildlife by: 1) describing methods to assess and evaluate wildlife activity at proposed wind projects, 2) design pre-construction and post-construction monitoring plans, and 3) develop avoidance and mitigation measures. Using these Guidelines will promote scientifically sound cost-effective study designs, produce comparable data among studies within Arizona, allow for analyses of trends and patterns of impacts at multiple sites, and improve the ability to estimate and resolve impacts to wildlife populations locally and regionally. This document focuses primarily on bat and bird species because those species have been highly impacted by wind energy development. However, wind energy development may impact other wildlife species as well. For example, pronghorn antelope are particularly sensitive to human-caused habitat modifications and fragmentation (e.g. roads, mechanical movement) and they are listed as an AGFD Species of Greatest Conservation Need." [my emphasis in bold].	Impacts to big game, including pronghorn are disclosed in chapter 3.3.5 of the Draft EA.	5. Explain why the comments do not warrant further agency response.
262	Vaughn, Elizabeth	Letter	No	WILDLIFE	44	10	Arizona Game and Fish produced another document in March of this year entitled: "The Coconino County Wildlife Connectivity Assessment: Report on Stakeholder Input" that clearly defines the Perrin Ranch area as a "Potential Linkage Zone" for antelope from one "Habitat Block" to another.	Extensive coordination has been completed with AGFD regarding big game are Perrin Ranch. Impacts are described in chapter 3.3.5 of the Draft EA.	5. Explain why the comments do not warrant further agency response.
263	Vaughn, Elizabeth	Letter	No	WILDLIFE	44	11	The text "Mammology: Fifth Edition" (Vaughan, Ryan, Czaplewski) defines the Pronghorn Antelope's home range as 160-480 acres. The fracturing and loss of vegetation within the Perrin Ranch project would shift territories detrimentally. As we currently are losing more and more Antelope young to predators, drought and human impact; we honestly don't have the Pronghorns to lose. In addition, Pronghorn don't typically like to jump or crawl under fences. Fencing these animals in or out of such a large area would be devastating to our small population. We could be looking at a territory shift completely out of this area altogether.	Fencing of the wind facility is not proposed. As stated in Section 3.3.5, of the Draft EA based on the best available data, big game are expected to return to the site during operation.	5. Explain why the comments do not warrant further agency response.

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264	Vaughn, Elizabeth	Letter	No	WILDLIFE	44	12	Rocky Mountain Elk require large tracts of land to browse. The bulls need good quality vegetation to gain the nutrition needed to grow their very large antlers, which are essentially bone. Those that are younger and incapable of growing such impressive racks also must "fatten up" prior to the mating rut, as they often will go days or weeks without eating during the rut. The bulls must rely on fat reserves during these times as they are very active sparring, staking and marking territory. Many bulls will not live through the rut as it takes so much out of them- and they are less likely to survive if they.go into this trying time without adequate fat reserves. This requires large quantities of good quality food during the summer months. Again, the fracturing of this large tract of land, and the destruction of native vegetation will affect the health of the herd. Food shortages and lack of suitable cover can lead to disease and predation, reducing the population perhaps permanently in this area.	As stated in Sections 3.3.4 and 3.3.5 of the Draft EA, vegetation loss would be a small percentage of available habitat and best available data shows that big game will return to wind facilities during operation.	5. Explain why the comments do not warrant further agency response.
265	Vaughn, Elizabeth	Letter	No	WILDLIFE	44	13	And there are other species to consider. The Havasu Canyon Watershed Assessment states that the area "...contains 25 species of mammal, bird, plant, invertebrate or amphibian, that are listed as protected [my emphasis] under the U.S. Endangered Species Act (ESA), or by BLM, USFS, or the State of Arizona. The watershed contains two species, the Southwestern Willow Flycatcher (Empidonox troillii extimus) and the Hualapai Mexican Vole (Microtus mexicanus hualapaiensis), that are ESA listed as in imminent jeopardy of extinction. [My emphasis].	A full assessment of potential wildlife species in the project area is provided in chapter 3.3.5 of the Draft EA.	5. Explain why the comments do not warrant further agency response.
266	Vaughn, Elizabeth	Letter	No	WILDLIFE	44	14	Knowing this, I find it incredible that the Perrin Ranch EA would also directly contradict the Arizona Game and Fish Departments own "Guidelines for Reducing Impacts to Wildlife from Wind Energy Development in Arizona". In it, this document states: "The recommendations and protocols discussed in this report are intended to be guidance for developers and local permitting agencies to avoid, minimize, or mitigate [my emphasis] their impacts to Arizona's wildlife." It continues: " Assessing cumulative impacts to bats and birds is difficult because population viability data are not available for most species. furthermore, it is difficult to establish an appropriate geographic scope for a cumulative impact analysis, to secure comprehensive information on existing and planned projects, and to gauge the relative contribution of a project's impacts compared to past, present, and future projects. Cumulative impact analyses for wind energy projects should focus on potential impacts to bat or bird populations over the entire estimated operational life of the project. [my emphasis] The level of detail in a cumulative analysis does not need to be as great as the project's direct impact analysis, but should reflect the severity and likelihood of occurrence of the potential impacts. Standards of practicality and rationality should guide the cumulative impact discussion. While the cumulative impacts of a project may be difficult to determine, do not discount the impacts of a project based on relative size. The addition of one small wind energy project in an existing wind resource area may seem trivial, but requires evaluation of the potential cumulative impacts of an increasing number of projects, regardless of project size. [my emphasis].	Cumulative impacts to wildlife, including those to birds and bats, are disclosed in Section 3.3.5 of the Draft EA. Further, the ABPP (Appendix F of the Draft EA), which was prepared in close coordination with the AGFD, discloses cumulative impacts and provides adaptive management to address impacts over the life of the project.	5. Explain why the comments do not warrant further agency response.
267	Vaughn, Elizabeth	Letter	No	PROCESS	44	15	In summary, I feel it is of vital importance to order a full Environmental Impact Study to determine the true price that will be paid for the Perrin Ranch Wind project. In a world where over population and global warming are shrinking our wildlife habitats at an alarming rate, it only makes sense to pause and truly evaluate any industrial project fully, no matter how "green" the project proposes to be. Everything deserves a second look. Everything deserves due diligence. Please move forward with caution, and be sure this project truly makes good sense.	Thank you for your comments. The NEPA document prepared is actually an environmental assessment (EA), not an Environmental Impact Statement (EIS).	5. Explain why the comments do not warrant further agency response.
268	Paffrath, Lisa	Letter	No	PROCESS	45	1	Thank you for extending the Public Comment period on Environmental Assessment (EA-1856) on the Perrin Ranch Wind Energy Interconnection Project located in Williams, Arizona. Please accept the following comments and concerns from myself for this EA.	Thank you for your comment.	6. Other, general statement; non-substantive
269	Paffrath, Lisa	Letter	Yes	OTH	45	2	I would like to first comment that I was in attendance at the Western Area Power Administration's Public Forum in Williams, AZ on February 2, 201 I. Along with many other local citizens, I commented on my opposition and had submitted to SWCA a filled out form with said concerns on this project. However, as noted on page 5, Section 1.5 PUBLIC PARTICIPATION, it is noted that "Approximately 24 people were in attendance and were supportive of the Project". I was one of the 24 people in attendance, but was not in support of the project. I had personally spoken to you that night with numerous concerns as well as presented to you a booklet that I had researched on for months with another gentleman, Jim Braswell, stating all of our concerns and issues with this project. This booklet clearly states many of the concerns the community has with this project and with wind energy in general. It clearly states my opposition to this project as well.	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
270	Paffrath, Lisa	Letter	No	SOCIO	45	3	Many of the issues raised by the public and as stated on page ES-2 in the Environmental Assessment included concerns with property values, tourism, employment, visual impacts, noise impacts, wildlife impacts, hazardous materials, traffic and transportation, and project suitability. I would like to address, in what is my professional opinion, as an Arizona Licensed Real Estate Broker in this area, the property values and aesthetics, as well as comments on the project suitability and employment.	Thank you for your comment.	6. Other, general statement; non-substantive

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271	Paffrath, Lisa	Letter	No	LAND USE	45	4	Professional Opinion. My professional opinions are based on almost a decade of experience in real estate sales for both raw land, improved lots and residential housing in the Williams, Arizona area. Briefly stated, based upon my review of the proposed Perrin Ranch Wind Energy Facility, the location, the density, height, type and intensity of the proposed utility scale turbines proposed here, do not comply with the applicable Coconino County Zoning Codes nor is this proposed wind energy facility compatible with the adjacent residential and agricultural property uses and, specifically, wit1 have a significant adverse effect on the market value of the neighboring residential properties.	As stated in the Draft EA, "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 of the Draft EA). Because use of lands in the Project Area have been approved for the proposed Perrin Ranch facility, land use conforms with area plans." (see pages 58-59).	5. Explain why the comments do not warrant further agency response.
272	Paffrath, Lisa	Letter	Yes	SOCIO	45	5	Further, NextEra Energy has failed to attempt to mitigate the impact on aesthetics and values of residential properties, as could have been accomplished to some degree with the provision of an owner/developer Property Value Guarantee. Coconino County Board of Supervisors recommended to NextEra at the February 7, 201 1 meeting to show good faith and to contact the property owners closest to this project, and to show that NextEra could be a good neighbor. As of today, NextEra has shown no attempt whatsoever at attempting any resident of this area to mitigate this important community issue.	Per Condition No. 21 of Coconino County Resolution No. 2011-04 (see Appendix E of the Draft EA), “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.” A mitigation measure with this language has been added to the Final EA (see Section 3.3.6, "Socioeconomics").	3. Supplement, improve, or modify its analyses.
273	Paffrath, Lisa	Letter	No	LAND USE	45	6	NextEra proposes to develop and locate sixty-two (62) turbines of approximately 405 feet in height each (tip to blade) adjacent to single family homes, recreational and agricultural land. Wind Turbine projects of this magnitude are inherently zoned "industrial". The site proposed for the Perrin Ranch Wind Energy project is zoned general, 10 acre minimum with the primary use of this area being residential or agricultural. Currently, there is no industral zoned property or projects anywhere in the Route 64 corridor from city limits of Williams up to and including the Grand Canyon National Park (which encompasses the Perrin Ranch area). Most if not all of the residents of this area purchased homes and properties because this area was protected from commercial development and any industrial development would be "light industrial" in nature. Coconino County's Red Lake Area plan specifically limits commercial development and any industrial development would be light in nature and shielded from the residents and the Route 64 corridor.	As stated in the Draft EA, "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 of the Draft EA). Because use of lands in the Project Area have been approved for the proposed Perrin Ranch facility, land use conforms with area plans." (see pages 58-59 of the Draft EA).	5. Explain why the comments do not warrant further agency response.
274	Paffrath, Lisa	Letter	Yes	SOCIO	45	7	The issue of impact from industrial scale wind turbines on the property value of residential owners are an objective measure of the desirable characteristics of any community. The Red Lake area community, overall, and land uses nearest the wind facility have enjoyed the wide open spaces, visual aesthetics of this Northern Arizona area, as well as the protection from a County, who for years, has denied most commercial projects that have come to Planning and Zoning for approval. This industrial scale wind turbine project goes against everything the people of this community and the County has striven for years.	Section 3.3.6 of the Final EA has been revised to reflect additional information on potential impacts to property value.	3. Supplement, improve, or modify its analyses.
275	Paffrath, Lisa	Letter	Yes	SOCIO	45	8	The contrast of such man made towers with natural views and the highly valued amenity derived from these views is paramount to this area. People come from all over the world to enjoy the premium views of this area. It is important to understand that high quality or natural views are an asset to real estate market values and in particular, residential property and land. As a realtor in this area for the last decade, most individuals purchase land or a home here because of the view shed; open space and the wildlife would be second and third respectively. In Western Area Power Administration's Environmental Assessment (EA), one from ENONorthwest. from 2002, SUGGEST (not state with fact) that "there would not be measurable negative impacts" on property values due to wind power facilities. It is important to note that every area has its own unique features and reports out of one area cannot simplify the outcome of impacts on property values in another. Even the Department of Energy's funded report out of the Ernest Orlando Lawrence Berkeley National Laboratory, titled "The Impact of Wind Power Projects on Residential Properties Values in the United States", dated December 2009, acknowledges that nearby properties may experience losses and further recommends that more study in the immediate projects areas are needed". Ben Hoen, one of the authors of the LBNL report now recommends implementation of a Property Value Guarantee (PVG) in the context of wind energy project mitigation of impacts (June 2010).	Section 3.3.6 of the Final EA has been revised to reflect additional information on potential impacts to property value.	3. Supplement, improve, or modify its analyses.

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276	Paffrath, Lisa	Letter	Yes	SOCIO	45	9	Any realtor will tell you, that a premium vista adds value over and above the value of an average vista. Premium vistas in Coconino County include views of the San Francisco Peaks, and long range views (such as what we find here in the Williams area). This area indeed has a premium vista and sales over the last decade confirm this. A poor vista results in values 21 % below the base-line average vista. Less natural, industrialized vistas have inferior ratings and represent an extreme impairment of the existing neighborhood vista and the character of the changed landscape. At 405 feet in height, the view of the Perrin Ranch Wind Facility will be present at considerable distances, both during the day and particularly if a blinking red light is required at night for aviation safety purposes.	Section 3.3.6 of the Final EA has been revised to reflect additional information on potential impacts to property value.	3. Supplement, improve, or modify its analyses.
277	Paffrath, Lisa	Letter	Yes	SOCIO	45	10	There are numerous published studies in The Appraisal Journal that relate to value losses and impairment caused by industrial towers, such as cell towers and high voltage transmission lines. The Moenkopi-Yavapai line that runs from northeast to southwest through this area is proof of the effect of property values. There is a home that is located in Howard Mesa Ranch on the east side of Route 64 that has been on the market for almost 6 years. Even during the boom of the real estate market from 2004-2006, this home did not procure a buyer. It sits less than 2000 feet from the high voltage power lines and looks to the west as the lines travel away from this home. I showed this home numerous times from 2004-2006 and every comment was the same from prospective buyers. ..why would they want to look out on this beautiful landscape and look at power lines. If people have a choice between a view that is unmarred by wind turbines, and one that is left in it's natural state, you will not find one buyer whose first choice will be the view with industrial wind turbines. Time and time again in my business, since first learning about this project in September of 2010 and having to disclose this to prospective buyers, all have asked me "what else do you have available that will not have views of industrial wind turbines."	Section 3.3.6 of the Final EA has been revised to reflect additional information on potential impacts to property value.	3. Supplement, improve, or modify its analyses.
278	Paffrath, Lisa	Letter	Yes	SOCIO	45	11	There is current data available throughout this country and in Europe that associates the property value reduction as high as 34% due to industrial wind projects. The Southwest has the opportunity of being almost a decade behind other areas of the country as far as wind development. To simply state that this industrial scale wind turbine project will have no affect of property values is irresponsible of WAPA to say the least. It is clear that the community surrounding this project and as far away as 10-1 5 miles will be adversely impacted by this project. This project will have an undue adverse impact on scenic views and residential property values. This impact will not be LOCAL and MINOR but will be LONG TERM and ADVERSE financial and economic impacts to this community.	Section 3.3.6 of the Final EA has been revised to reflect additional information on potential impacts to property value.	3. Supplement, improve, or modify its analyses.
279	Paffrath, Lisa	Letter	Yes	SOCIO	45	12	The impacts of property values throughout the country are noted online and in numerous published documents. Community after community, as well as other real estate professionals, document the true effects of industrial wind complexes on the real estate market. Michael McCann, a real estate appraiser with over 30 years experience in the Illinois market, has in the last 6 years, documented the affects these industrial wind complexes have on property values in his home state. He also was critical of another report that NextEra presented to the Coconino County Planning & Zoning Commission in October of 201 0. This document, funded by the Department of Energy and written by the Lawrence Berkley National Laboratory (Hoen, et al) has been taken out of context by wind developers to show that "industrial wind complexes have no visible affect on property values." This study has been critically reviewed by Mr. McCann in a rebuttal letter to Mr. Hoen and the Lawrence Berkley National Laboratory about the inconsistencies and the flawed data in the report ... the same report that NextEra made available to the County to convince them that these industrial wind turbines will have no affect on property values. In February of 2010, Mr. Ben Hoen made a presentation to the Illinois Windworking Group - Property Value Guarantees Panel, to review the research findings -just 3 months after the publication of the LBNL report funded by the Department of Energy.	Section 3.3.6 of the Final EA has been revised to reflect additional information on potential impacts to property value.	3. Supplement, improve, or modify its analyses.
280	Paffrath, Lisa	Letter	Yes	SOCIO	45	13	In his presentation, Mr. Hoen states that the proximity to and views of environmental disamenities can impact property values. This has been well studied for environmental issues such as highways, transmission lines, power stations, etc. but has not been studied for wind facilities. Relatively few existing wind and properties studies have been done over the last decade here in the U.S. and that "results are diverse and in many instances the data is unpersuasive due to the limitations in data and methodotogy". He also shows from studies that when a home looks out onto green space, ocean front, quiet cul-de-sac, property values are impacted in a positive way. He also spoke about property value concerns with wind energy facilities and how they fall into three potential categories: I. Area Stigma: Concern that rural areas will appear more developed 2. Scenic Vista Stigma: Concern over decrease in quality of scenic vistas from homes 3. Nuisance Stigma: Concern that factors that occur in close proximity will have unique impacts.	Section 3.3.6 of the Final EA has been revised to reflect additional information on potential impacts to property value.	3. Supplement, improve, or modify its analyses.
281	Paffrath, Lisa	Letter	Yes	SOCIO	45	14	The area of this project will be impacted by all three of these categories. Mr. Hoen states that areas affected by these three categories could see an additional negative impact of property values by as much as 24-43%. Mr. Michael McCann, in a report written on January 6,201 1 regarding a proposed industrial wind project in Brewster, Massachusetts, also states "in project area residential locations with a premium vista, a turbine facility downgrading the amenity to a poor or below average vista will result in a value loss of 21 % to 34%".	Section 3.3.6 of the Final EA has been revised to reflect additional information on potential impacts to property value.	3. Supplement, improve, or modify its analyses.

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282	Paffrath, Lisa	Letter	Yes	SOCIO	45	15	Mr. Hoen also goes on to state that the research completed for the Department of Energy in his report from December 2009 had limitations. Finally, he recommends measuring, mitigating and managing property value risks. His recommendations as far as managing the impacts of property value loss is for the wind developers to offer "some combination of neighbor agreements and property value guarantees to nearby homeowners; conduct follow up studies (e-g., surveys, appraisals) realizing that cumulative impacts may exist and that real or perceived risks may increase/decrease as more/better information becomes available."	Section 3.3.6 of the Final EA has been revised to reflect additional information on potential impacts to property value.	3. Supplement, improve, or modify its analyses.
283	Paffrath, Lisa	Letter	Yes	SOCIO	45	16	Another critical review of the LBNL Report by Ben Hoen et at was documented on September 11,2009 by Lisa Linowes, President of the Industrial Wind Action Group. In her statement (attached for WAPA review), there was "no clear evidence the data used was checked for accuracy, nor was the LBNL report peer-reviewed". Though the study from LBNL attempts to use a recognized method of appraising properties, neither of the authors were certified appraisers nor had a background in real estate". Lisa goes on to state, "we believe the flaws we found in the methodology render the results of this study meaningless. More to the point, should an expert witness rely on this study to argue property values are not diminished by proximity to industrial scale turbines, it is likely a qualified appraiser with experience in regression techniques and the problems of hedonic analysis will counter such . assertions." Again, this LBNL report is what NextEra used to convince Coconino County Planning 8 Zoning as well as the Board of Supervisors that industrial wind turbine projects will have NO IMPACT ON PROPERTY VALUES.	Section 3.3.6 of the Final EA has been revised to reflect additional information on potential impacts to property value.	3. Supplement, improve, or modify its analyses.
284	Paffrath, Lisa	Letter	Yes	SOCIO	45	17	Lastly, in a conversation with Clif Schneider from New York State on April 12, 2010, Ben Hoen made another contradicting statement regarding the impact of industrial wind complexes on property values and Property Value Guarantees: "You might know about a Property Value Guarantee. It's a dicey situation and complicated, but I think homes that are close, there is just too much unknown right now; that seems reasonable. I think one of the things that often happens is that wind developers put our report forward and say look, property values aren't affected," and that's not what we would say specifically." "I'm not a lawyer and I'm not a developer, these Property Value Guarantees are just options in the tool kit. 1 don't know whether it's reasonable to put together, I have looked at one, I don't know if there is a better way to write it or whether the one I read from Illinois is good or bad. They have to be thought about, they all probably have cost implications, so the developer is not going to give away the house if they were too generous; on the other hand if they are not generous enough they don't have any impact. That's just one of the tools available, there are neighbor agreements that may be more applicable whether folks nearby get compensations, if they are not a participating land owner. One of the things I've always hoped is somebody would offer one or the other and see what landowners would do."	Section 3.3.6 of the Final EA has been revised to reflect additional information on potential impacts to property value.	3. Supplement, improve, or modify its analyses.
285	Paffrath, Lisa	Letter	Yes	SOCIO	45	18	As far as property value guarantees, though written in numerous areas of wind development, not many have been ratified by wind developers for local communities. In December 2010, Iberdrola Renewables threatened to pull the project out of Hammond, New York if the City Town Council passed a Residential Property Value Guarantee Agreement. Iberdrola considered the Agreement "unworkable". Town Supervisor Ronald W. Bettram stated "Personally, I believe it's vital in protecting the citizens of Hammond." The agreement would require Iberdrola to agree to compensate a property owner if he or she cannot get the appraised value in a sale because of the presence of wind turbines. If property values are NOT IMPACTED by industrial wind turbines, why wouldn't the wind developers agree to Property Value Guarantees?	Section 3.3.6 of the Final EA has been revised to reflect additional information on potential impacts to property value.	3. Supplement, improve, or modify its analyses.
286	Paffrath, Lisa	Letter	No	SOCIO	45	19	EMPLOYMENT: In the EA, it is stated that there will be nine full time positions created after the construction of this project. I had the opportunity to speak to the Project Manager of the Dry Lake Project located in Holbrook, AZ. Of the 7 positions created there, only 2 were hired from the local workforce. One position was the administrative assistant for the Project manager (paid $12 an hour) and the other was a local individual hired to be the "handyman" for the site building that housed the offices for the staff. The other positions, including the project manager, came from outside the area. The project manager himself relocated from California and was an experienced Wind Facility project manager (the highest paid position). The project manager also confirmed that other than the trucking company that hauled in cinders for building roads within the project, all of the other jobs were filled by a General Contractor from Minnesota (Blattner Energy) and no individuals were hired locally.	The Draft EA indicates that "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" (see page 125 of the Draft EA).	5. Explain why the comments do not warrant further agency response.
287	Paffrath, Lisa	Letter	Yes	SOCIO	45	20	Same holds true for the Perrin Ranch Project. NextEra, who supposedly is to start construction at this site on July 1st, 2011, has not posted ONE JOB on their website. Not only is this project not listed on their corporate website, Arizona is not on the drop down list as a state currently hiring for NextEra. I have also learned that a company from North Dakota, Wanzek General Contractors, will be on this project as the General Contractor and little or no jobs will be offered or created for the local workforce.	Wanzek General Contractors are not the General Contractors for the project. Information regarding how employment during construction is handled has been added to the Final EA (see Section 2.2.3).	3. Supplement, improve, or modify its analyses.

ID	Contact ID	Comment Type	Change in Final EA Required (Yes/No)	Resource Code	Letter No.	Comment No.	Comment Text	Response	Response Type
288	Paffrath, Lisa	Letter	Yes	SOCIO	45	21	Contrary to the EA statement on Page ES-5, "Economic impacts could be beneficial to local laborers," most of the jobs that are expected to be created will not go to the local work force. There will be short term economic benefits to a handful of businesses in the area including local general stores, gas stations, grocery stores, the landowner of the Perrin Ranch and tax revenue for the County. Otherwise, the economic impact will be devastating to the local land and home owner in a 10-20 mile radius of this project.	Information clarifying how employment during construction is handled has been added to the Final EA (see Section 2.2.3), however construction employment is still expected to draw from the local workforce, as discussed in the Draft EA.	1. Modify alternatives including the proposed action.
289	Paffrath, Lisa	Letter	Yes	SOCIO	45	22	PROJECT SUITABILITY: Coconino County is the largest county in the 48 Continental States. It is the size of the State of Massachusetts, yet only 7% of the land here is privately owned. With so little land available for growth, it concerns me that an industrial wind project of this magnitude has found it's way into the landscape and the lives of this small community.	The Draft EA discusses the potential impact of the project on property values (see Section 3.3.6, "Socioeconomics," pages 125-126). Additional information was added to the Environmental Consequences Section 3.3.6 in the Final EA regarding impacts to area quality of life in terms of impacts to vistas and quietude.	3. Supplement, improve, or modify its analyses.
290	Paffrath, Lisa	Letter	Yes	SOCIO	45	23	The aesthetics and visual resource of this area is a driving force for land and home sales in this area. In the last decade, I cannot tell you how many times in my real estate career that a home or property has sold for just those two reasons. Buyers come from all over the country to own a parcel of land or relocate here and purchase a home, looking past the issues associated with living here. Most of the area is without power. The lack of water and wells requires the local home owner to haul water in. Cindered and dirt roads which can be difficult in the winter and summer months to traverse. These buyers look past all of these issues for an opportunity to enjoy the open space of Northern Arizona, and the ability to see for 50+ miles, at a landscape not marred by city lights, paved roads and industry. These views and the open space, plus the fact that there is NO INDUSTRY is what keeps the area real estate alive. You cannot assume a study done close to 10 years ago in another area of this country will have the same affects on this local community.	The Draft EA discusses the potential impact of the project on property values (see Section 3.3.6, "Socioeconomics," pages 125-126). Additional information was added to the Environmental Consequences Section 3.3.6 in the Final EA regarding impacts from area stigma, scenic vista stigma, and nuisance stigma.	3. Supplement, improve, or modify its analyses.
291	Paffrath, Lisa	Letter	Yes	SOCIO	45	24	I attach here as Exhibit 1, an email I received the latter part of 2010. I had been working with a couple helping them locate a parcel of land here in Williams to build a home or cabin on. In their search online of the Williams area, they came upon a article in a local newspaper about a possibility of an industrial wind project coming to the Route 64 corridor. When they called me to see if this was true, as a realtor, I had to disclose to them that, if approved, this project will have sixty two 405' high wind turbines dotting the beautiful landscape. As you will see from this email, they wanted no part of buying here. I have spoken to numerous other individuals who were interested were interested in purchasing until it was disclosed to them about this industrial wind turbine project. No report can report in realistic terms and confirm what real life experience tells. This will, inevitably, have a huge impact on property values here in Williams.	Additional information was added to the Environmental Consequences Section 3.3.6 in the Final EA regarding property value impacts.	3. Supplement, improve, or modify its analyses.
292	Paffrath, Lisa	Letter	Yes	SOCIO	45	25	As less buyers come to purchase here, owners will have no other recourse then to lower the price of their properties to get them sold. I have numerous active clients who are sellers already lowering prices to get properties sold before the wind turbines go up.	Additional information was added to the Environmental Consequences Section 3.3.6 in the Final EA regarding property value impacts.	3. Supplement, improve, or modify its analyses.
293	Paffrath, Lisa	Letter	No	SOCIO	45	26	Another issue that must be raised here with regards to property values and visual resources is the Coconino County Red Lake Area Plan. This plan, though referenced in the EA but not thoroughly addressed, was put into place in 1998 after surveying the members of this community on what type of growth was desired. The Perrin Ranch Wind Project will sit within W of this protected area. This area plan specifically states: "Disallowing future strip commercial endeavors on Highway 64 is imperative" "It is the goal of the group to avoid future obvious scarring of the terrain.. ." "To protect a region which will be one of the few such remaining areas in the not so Distant future. "	As stated in the Draft EA, "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 of the Draft EA). Because use of lands in the Project Area have been approved for the proposed Perrin Ranch facility, land use conforms with area plans" (see pages 58-59 of the Draft EA).	5. Explain why the comments do not warrant further agency response.

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294	Paffrath, Lisa	Letter	No	SOCIO	45	27	In the Red Lake Area plan, under INDUSTRIAL USES for this area, "there is no industrially zoned land within the study area and no legally established industrial uses. The majority of respondents would be opposed to industrially-zoned land." Another point emphasized in this Area Plan is the environmental impacts shall be carefully considered when reviewing any commercial rezoning requests and if any area was rezoned to industrial use, would be light industrial and not along Highway 64 unless very significant landscaped buffers can be provided on all four sides. This plan was to protect this entire area and Route 64, the Highway to the Grand Canyon, from projects such as the one proposed at Perrin Ranch.	As stated in the Draft EA, "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 of the Draft EA). Because use of lands in the Project Area have been approved for the proposed Perrin Ranch facility, land use conforms with area plans" (see pages 58-59 of the Draft EA).	5. Explain why the comments do not warrant further agency response.
295	Paffrath, Lisa	Letter	No	SOCIO	45	28	Myself and other realtors have for years have quoted the Red Lake Area Plan to show prospective buyers that the natural resources and environmental quality of this land would be protected. This project is in direct conflict of the Red Lake Area Plan, and is unsuitable for this area.	As stated in the Draft EA, "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 of the Draft EA). Because use of lands in the Project Area have been approved for the proposed Perrin Ranch facility, land use conforms with area plans" (see pages 58-59 of the Draft EA).	5. Explain why the comments do not warrant further agency response.
296	Paffrath, Lisa	Letter	No	VISUAL	45	29	When you look out at the landscape of this area and at this county as a whole, the tallest objects in our horizons are usually ponderosa pines or a cinder cone. How does WAPA consider 405 foot high industrial wind turbines to be suitable for this area?	The Draft EA analyzes and discloses the rationale for impacts to visual resources (see Section 3.3).	5. Explain why the comments do not warrant further agency response.
297	Paffrath, Lisa	Letter	Yes	SOCIO	45	30	Another point to be made is the fact that the Grand Canyon Railway, which traverses through approximately 10 miles of the project area, is on the NATIONAL HISTORIC REGISTRY as a landmark, from Williams to the Grand Canyon. As stated on their website, the visitors to the Grand Canyon Railway ride the train for the experience of going back into time, to look out on the southwest landscape and be able to see for miles. These industrial wind turbines will be visible from the train and will mar the riders' experience.	As stated in the Draft EA, "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" (see page 63 in Section 3.3.1). Additionally, Xanterra Parks and Resorts, who operate the Grand Canyon Railway, has expressed public support for the project (see Section 3.3.6, Environmental Consequences in the Final EA).	3. Supplement, improve, or modify its analyses.
298	Paffrath, Lisa	Letter	Yes	SOCIO	45	31	FINAL COMMENTS None of the power that will be generated from this site will stay in this area to help individuals and the area to grow; little or no jobs can be expected since NextEra has already contracted Wanzek out of South Dakota to handle the construction of the job; decreased property values for an already economically devastated area; the destruction of the landscape and the view shed by 405 foot high industrial wind turbines; adverse impacts to the wildlife and the expected mortality of bat and birds; the minimal economic benefits to the local residents; the destruction of the ridgelines, hilltops and landscape; the question of where NextEra will get their water from, a very important question still unanswered ... the list goes on and on.	Wanzek General Contractors are not the General Contractors for the project. Information regarding how employment during construction is handled has been added to the Final EA (see Section 2.2.3). Information on project water sources has been added to the Final EA (see Section 2.2.3).Additionally, the Draft EA discusses impacts to visual resources (see Section 3.3.1), property values and the economy, (see Section 3.3.6) and wildlife (see Section 3.3.5).	3. Supplement, improve, or modify its analyses.
299	Paffrath, Lisa	Letter	No	PROCESS	45	32	The Environmental Assessment completed by your organization is inadequate and does not address the major issues and impacts that will occur to the people, the area and the wildlife. With so many unanswered questions, and the lack of thoroughness and information from NextEra and SWCA, it is imperative that WAPA complete a full Environmental Impact Study for this area and this project. There are too many unanswered questions, areas of concern that will have long term impacts and adverse effects for this entire project area to be ignored. We cannot allow a project that will change the landscape and this community for the next 30 or more years with an Environmental Assessment that is so unbelievably vague.	As discussed in the Draft EA, "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)" (see "Background" in the Draft EA). The EA itself analyzes the project impacts; Western's decision will summarize these impacts and any required mitigation.	5. Explain why the comments do not warrant further agency response.

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300	Paffrath, Lisa	Letter	Yes	SOCIO	45	33	People visit this area and move here to enjoy the Big Skies of Northern Arizona, to look out for miles and see just rolling hills and the southwestern landscape. We must protect this area, which is the corridor to one of the Seven Wonders of World for generations to come. This project will forever change the beauty of this area. Thank you for this opportunity.	The Draft EA discusses the potential impact of the project on property values (see Section 3.3.6, "Socioeconomics," pages 125-126). Additional information was added to the Environmental Consequences Section 3.3.6 in the Final EA regarding impacts to area quality of life in terms of impacts to vistas and quietude.	3. Supplement, improve, or modify its analyses.
301	Lara, Katherine	Letter	No	NS-N/A	46	1	Thank you for your time in allowing me to state my comments to you regarding the above captioned environmental assessment draft. Please note that pages 1 - 5 are my notes/comments on the draft itself. I have listed the page number of the draft, the draft language and my comment. Pages 6 - 10 list the 22 conditions approved by the Coconino County Board of Supervisors, Appendix E in the draft. Immediately below each condition I have listed the EA page number and language so as to clearly define the discrepency between the two.	Thank you for your comment.	6. Other, general statement; non-substantive
302	Lara, Katherine	Letter	No	NS-N/A	46	2	This EA is clearly demanding less from the applicant than what is conditioned and permitted by the county. In light of this I have to strongly question the intent of the preparer, SWCA, and their relationship to the applicant.	SWCA was approved as a third party NEPA consultant. Third-party NEPA consulting is commonly used, across the nation, for applicant projects requiring lead agency approvals. Many lead agencies rely on the experience and expertise of environmental consultants to assist in NEPA document preparation. Contractors are often used because lead agencies do not have the staff expertise, staff resources or time to conduct the technical analysis necessary to comply with NEPA. Contractors can provide valuable assistance in NEPA process management, as well as technical study preparation. Additionally, ultimately the NEPA documents and the content of the documents (i.e. an EA) are the responsibility of the lead federal agency; the third party NEPA consultant is an extension of the lead federal, even though they are paid by the applicant. The EA is required to be an objective, good faith attempt at full disclosure.	5. Explain why the comments do not warrant further agency response.
303	Lara, Katherine	Letter	No	NS-N/A	46	3	I also find that the EA is seriously deficient in finding of fact. That is a clear indication that this should move to a true Environmental Impact Study that should be conducted by an independent agency.	As discussed in the Draft EA, "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)" (see "Background" in the Draft EA). The EA itself analyzes the project impacts; Western's decision will summarize these impacts and any required mitigation.	5. Explain why the comments do not warrant further agency response.
304	Lara, Katherine	Letter	No	NS-N/A	46	4	Notes on NEPA Draft Environmental Assessment of May 201 1. Title Page: Prepared by SWCA - this consulting group has already been paid by NextEra. This assessment is compromised as it has not been performed by an independent, unbiased environmental consultant. This is evident by the EA granting the proponent requirements below CUP requirements.	SWCA was approved as a third party NEPA consultant. Third-party NEPA consulting is commonly used, across the nation, for applicant projects requiring lead agency approvals. Many lead agencies rely on the experience and expertise of environmental consultants to assist in NEPA document preparation. Contractors are often used because lead agencies do not have the staff expertise, staff resources or time to conduct the technical analysis necessary to comply with NEPA. Contractors can provide valuable assistance in NEPA process management, as well as technical study preparation. Additionally, ultimately the NEPA documents and the content of the documents (i.e. an EA) are the responsibility of the lead federal agency; the third party NEPA consultant is an extension of the lead federal, even though they are paid by the applicant. The EA is required to be an objective, good faith attempt at full disclosure.	5. Explain why the comments do not warrant further agency response.
305	Lara, Katherine	Letter	No	NS-N/A	46	5	Page ES-2: National Energy Policy Development Group 2001 - the world we live in is 24/7, not using energy only when the wind blows. We have advanced past wind energy. Just as we have advanced past the Model T Ford and land line phones.	Thank you for your comment.	6. Other, general statement; non-substantive

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306	Lara, Katherine	Letter	No	PROCESS	46	6	Page ES-2: Issues Raised by the Public - did not list concern over actual output of energy vs cost and government subsidies (tax dollars paid by the public).	All project components described in the Final EA would be privately funded; no federal or state funding would be used to construct, operate, maintain or decommission the project. This information has been included in Section 2.2.1 of the Final EA.	1. Modify alternatives including the proposed action.
307	Lara, Katherine	Letter	Yes	PROCESS	46	7	Page ES-2: Due to the wind regime at the site, the average MW output is anticipated at 50% of 99.2 MW at any given time. Wind speed can only be estimated. A true estimate of 49.6 is 50%. Per DOE implementing procedures for NEPA (1 0 CFR Part 1021) this project by DOE standards requires as EIS.	As discussed in the Draft EA (see Section 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)." The Department of Energy's guidelines for preparation of EA are based on the average annual output of the project, not the faceplate capacity of generators. Thus, preparation of an EA meets DOE's guidelines for NEPA documentation.	5. Explain why the comments do not warrant further agency response.
308	Lara, Katherine	Letter	No	TRANSP	46	8	Page ES-2: Access to Project Area via State Route 64 and Espee Road - neither of these are made for extreme industrial traffic. Neither is suited for this Project construction and operation.	As discussed in the Draft EA (see Section 2.2.2), Espee and area roads would include an aggregate surface cover, and would be adequate to support the size and weight of maintenance vehicles.	5. Explain why the comments do not warrant further agency response.
309	Lara, Katherine	Letter	No	PROCESS	46	9	Page ES-3: this is where the words used to measure impact of this Project are introduced - local, minor, longlshort term and adverse. The reality of this project will be - global, major, long term and adverse. These terms are not verified by facts and/or actual values. Without facts there cannot be a finding of no significant impact. An EIS should be the logical course of action. A shovel of dirt being relocated has an impact - this Project will have trillions of shovels of dirt being relocated. This land will never go back to what it is now. That is the truth.	In the Draft EA, the Executive Summary (ES1-ES5) is a summary of the analysis. Definitions for type, context, duration, and intensity are defined in Chapter 3 (see Section 3.1) of the Draft EA.	5. Explain why the comments do not warrant further agency response.
310	Lara, Katherine	Letter	No	WATER	46	10	Page ES-3: Water Resources - all impacts to water resources during construction would be short term and minor. So you are willing to supply water for this project at the expense and deprivation of the residents? Since you think water is so plentiful why will not just one but many sources have to be contracted? Why does every Arizona meteorologist state that we are in a drought?	Impacts to water resources, including groundwater and surface water, are analyzed in the Draft EA (see Section 3.3.3).	5. Explain why the comments do not warrant further agency response.
311	Lara, Katherine	Letter	Yes	NAT AMER	46	11	Have you checked the water agreement with the Havasupai?	As discussed in the Final EA, no new water source would be developed for this project and the amount of water needed for construction is significantly less than 0.001% of the total water available in storage for the basin (Section 3.3.3). Additionally, as discussed in Section 1.6 of the Final EA, the tribes, including the Havasupai, have been consulted on this project. Thus, impacts to ground water (see Section 3.3.3), and the specific concerns of the tribes (see Section 1.6), have been considered in the Final EA.	3. Supplement, improve, or modify its analyses.
312	Lara, Katherine	Letter	No	WILDLIFE	46	12	Page ES-4: Wildlife - please submit the survey you conducted of the big game. I am interested to see the actual documentation of the big game in this area, as well as documentation from other areas of similar impact the before and after construction documentation.	Thank you for your comment.	6. Other, general statement; non-substantive
313	Lara, Katherine	Letter	No	SOCIO	46	13	Page ES-4: Socioeconomics - Construction could also result in short-term impacts to area quality of life. How will I be compensated? Housing prices are not expected to be directly affected. The facts are the values have already been adversely affected. The impacts are listed as minor by you. Please present the survey of realators and residents that supports that.	Per Condition No. 21 of Coconino County Resolution No. 2011-04 (see Appendix E of the Draft EA), “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.” A mitigation measure with this language has been added to the Final EA (see Section 3.3.6, "Socioeconomics").	3. Supplement, improve, or modify its analyses.
314	Lara, Katherine	Letter	No	TRANSP	46	14	Page ES-4: Transportation - 39 miles of roads would be constructed. Please refer to the letter of October 20'", 2006 from the Arizona State Land Department re: Macauley Petition for Closure. The last paragraph of this letter states that the Land Department supports the Perrin Ranch/Macauley request for certain designated road closures on the Perrin Ranch. It is a reasonable means of protecting soil, vegetation and watershed, as well as providing continued public access. Building 39 miles of roads would not protect soil, vegetation and watershed. Nor will that provide continued public access. How will you compensate travelers for access delays on Espee Road?	Impacts to soils, vegetation, water resources and public access are analyzed in the Draft EA (see Chapter 3).	5. Explain why the comments do not warrant further agency response.

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315	Lara, Katherine	Letter	Yes	OTH	46	15	Page ES-5: Summary of Resources Dismissed From Detailed Analysis - Resource areas dismissed from fhther analysis include ... environmental justice, hazardous materials, human health and safety, intentional destructive acts, land use and recreation. There is NO justice for the environment from this Project. The turbine blades are made out of hazardous materials. You totally degrade and discard human health and safety. Exactly who gives you that authority?	The Final EA has been revised to consider resources such as Recreation, Human Health and Safety, and Geology and Soils in detail.	3. Supplement, improve, or modify its analyses.
316	Lara, Katherine	Letter	No	CUMULATIVE	46	16	Page ES-5: Cumulative Impacts - foreseeable projects in the area include roads, trails and other similar projects. It is unlikely that the rural character of the area would be affected in the long term. How do you equate 405 foot tall wind turbines with rural character?	Cumulative impacts analyze the proposed project in terms of other actions. See Chapter 3 of the Draft EA.	5. Explain why the comments do not warrant further agency response.
317	Lara, Katherine	Letter	No	PROCESS	46	17	Page 4: The Arizona Corporation Commission Line Siting Committee issued the Certificate of Environmental Compatibility for this Project - prior to the release of the final Environmental Assessment. This was based upon NextEra already having knowledge that there would not be a problem presented in this report. The public was not privy to that same knowledge. That is corrupt.	Thank you for your comment.	6. Other, general statement; non-substantive
318	Lara, Katherine	Letter	Yes	PROCESS	46	18	Page 6: Public Participation -Approximately 24 people were in attendance and were supportive of the Project. That is not true. My husband and I were there and submitted written public comment - we have copies. We did not state we supported the Project. Nor did any of our friends and neighbors that attended the February 2", 201 1 public meeting.	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
319	Lara, Katherine	Letter	Yes	PROCESS	46	19	Page 9: Overview of the Project - please submit actual reports that indicate the real capacity factor for the Project. The public is entitled to this information.	Section 1.3.1 has been added to the Final EA discussing the wind potential of the site. Please contact the applicant to request this information.	3. Supplement, improve, or modify its analyses.
320	Lara, Katherine	Letter	Yes	VISUAL	46	20	Page 12: Lighting - did you know that NextEra is trying to avoid a Superior Court filing by making a back door appeal to the Coconino County Board of Supervisors? Yes, NextEra does not want to install the OCAS lighting at this initial construction. Because ... it will cost them in dollars. They have no "green" concern about subjecting our dark night sky to pulsing red beacons. Fact - our local airports close very early in the evening. There is not enough air traffic at night to support being subjected to pulsing red beacons for even one second after the FAA approves the OCAS lighting.	The "Lighting" section of the Final EA (in Section 2.2.2 for "Proposed Facilities") has been updated to reflect the details of the County's conditions in Resolution 2011-04. The appeal by NextEra was denied on June 22, 2011.	1. Modify alternatives including the proposed action.
321	Lara, Katherine	Letter	No	TRANSP	46	21	Page 37: Access Roads - refer to comments for page ES-4	Impacts to soils, vegetation, water resources, and public access are analyzed in the Draft EA (see Chapter 3).	5. Explain why the comments do not warrant further agency response.
322	Lara, Katherine	Letter	No	OTH	46	22	Page 40: Material Source Pit - source-certified by ADOT in 2003. That is 8 (EIGHT) years ago! Definitely needs a new certification in view of this industrial Project.	ADOT certified, Contractor-Furnished Material Sources must go through a multiple-step process in order to obtain environmental clearance for use on ADOT projects. ADOT oversees this certification.	5. Explain why the comments do not warrant further agency response.
323	Lara, Katherine	Letter	Yes	TRANSP	46	23	Page 43: delivery of the oversized equipment and wind turbine generator components would be intermittent and cause only temporary traffic delays - define temporary as I would not want to be charged for a medical visit because I am not able to get to the appointment on time. I also would not want ANY emergency vehicle to be held up. A minute could mean a life. Oh wait - I forgot, per page ES-5 you have already dismissed human health and safety.	As discussed in the Draft EA, the public will be notified of construction dates and possible delays: "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" (see Section 2.2.2). The Final EA has been revised to consider Human Health and Safety in detail.	3. Supplement, improve, or modify its analyses.
324	Lara, Katherine	Letter	No	WATER	46	24	Page 47: Water Use - exactly where will the 20,000 to 24,000 gallons of water needed per year at this facility come from? Why do you not qualify this? THE WHOLE DRAFT IS UNSUBSTANTIATED. The printed bound document from NextEra: Presentation to the Coconino County Board of Supervisors, Matt Gomes-Project Director, February 7,201 1 on page 33 states, "Water use during operation is limited to the restrooms and wash basin at the Operations and Maintenance Building."	Thank you for your comment. As discussed in the Draft EA, "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" (page 97, Section 3.3.3).	5. Explain why the comments do not warrant further agency response.
325	Lara, Katherine	Letter	No	HAZMAT	46	25	Page 47: Hazardous Materials - Hazardous materials are not anticipated to be used or stored on-site with the exception of. ..you need to list the materials in the turbine blades.	The Draft EA lists the hazardous materials on page 47: "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).	5. Explain why the comments do not warrant further agency response.
326	Lara, Katherine	Letter	No	HAZMAT	46	26	Page 48: Restoration/Reclamation and Abandonment - If necessary ... waste concrete ... that has been temporarily stored within the corridor or within the temporary construction easements would be used for reclamation of the Project. Exactly where would waste concrete be used?	As discussed in the Draft EA (see Section 2.2.5), "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."	5. Explain why the comments do not warrant further agency response.

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327	Lara, Katherine	Letter	Yes	LAND USE	46	27	Page 49: Facility Commitments - Turbines would be set back ... at least 1.5 miles from any residence. How have you determined that is a safe distance? What gives you the right to dictate where an adjacent property owner may build a future residence? Oh wait - I forgot, per page ES-5 you have already dismissed human health and safety.	The setback between turbines and residents was determined by Coconino County (see Appendix E of the Draft EA) via resolution 2011-04, Condition No. 1. Clarification to the Final EA has been added to Section 2.2.7.	1. Modify alternatives including the proposed action.
328	Lara, Katherine	Letter	No	PROCESS	46	28	Page 52: Adjustments at This Location -Through the ACC process, the siting committee selected Option 1, the Proposed Action, and therefore Option 2 was eliminated from further consideration. This action takes away the rights of the county and thereby the people. This whole project is being dictated and forced upon the people at the people's expense.	Thank you for your comment. Decisions made by the ACC are not within the authority of Western Area Power Administration or the Department of Energy.	5. Explain why the comments do not warrant further agency response.
329	Lara, Katherine	Letter	No	PROCESS	46	29	Page 53: Introduction - this Project can only be described as: Adverse, Regional, Long-term and Major. By your own definitions that is the only way to describe this Project. Define the threshold you are using to judge impact.	Definitions for type, context, duration, and intensity are defined in Chapter 3 (see Section 3.1) of the Draft EA.	5. Explain why the comments do not warrant further agency response.
330	Lara, Katherine	Letter	Yes	OTH	46	30	Page 55: Resources areas dismissed from further consideration - Resource areas dismissed from further analysis include ... environmental justice, hazardous materials, human health and safety, intentional destructive acts, land use and recreation. There is NO justice for the environment from this Project. The turbine blades are made out of hazardous materials. You totally degrade and discard human health and safety. Exactly who gives you that authority?	The Final EA has been revised to consider resources such as Recreation, Human Health and Safety, and Geology and Soils in detail.	3. Supplement, improve, or modify its analyses.
331	Lara, Katherine	Letter	No	CULTURAL	46	31	Page 56: Paragraph 4 - Artifacts or features are not evident on the road surface. There could be artifacts and/or features beneath the road surface. The increased road usage could destroy these before they are seen.	As described in Section 2.2.7 of the Draft EA, " 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."	5. Explain why the comments do not warrant further agency response.
332	Lara, Katherine	Letter	No	SOCIO	46	32	Page 56: Environmental Justice - the Census Bureau data used is not accurate as to people living here at this time. Example: I completed the Census while living in another city. I live here now. Please submit statistics of people that own land here but are not presently residing here.	Census data is the most comprehensive set of data on population and demographics and is used because of its standardized methodology for data collection.	5. Explain why the comments do not warrant further agency response.
333	Lara, Katherine	Letter	No	GEO-SOILS	46	33	Page 57: Geology and Soils - Maximum surface disturbance 1.63% of the Project Area. Of this surface disturbance how much is in direct violation of the Red Lake Area Plan?	Perrin Ranch Wind applied for and received a CUP for the construction, operation, and maintenance of this Project (Resolution 2011-04, see Appendix E of the Draft EA). Because use of lands in the Project Area have been approved for the proposed Perrin Ranch facility, land use conforms with area plans" (see pages 58-59 of the Draft EA).	5. Explain why the comments do not warrant further agency response.
334	Lara, Katherine	Letter	Yes	FIRE	46	34	Page 58: Human Health and Safety - Please present actual data as to statistics documenting turbine fires. No established fire district in the area has been contacted regarding this Project. There is no plan established. How can you state human health and safety are negligible?	The Final EA has been revised to consider Human Health and Safety in detail (see Chapter 3).	3. Supplement, improve, or modify its analyses.
335	Lara, Katherine	Letter	No	LAND USE	46	35	Page 58: Land Use -The Red Lake Plan and the Coconino County Comprehensive plan do not allow for land use such as this Project. That is the truth and that is fact.	Perrin Ranch Wind applied for and received a CUP for the construction, operation, and maintenance of this Project (Resolution 2011-04, see Appendix E of the Draft EA). Because use of lands in the Project Area have been approved for the proposed Perrin Ranch facility, land use conforms with area plans" (see pages 58-59 of the Draft EA).	5. Explain why the comments do not warrant further agency response.
336	Lara, Katherine	Letter	Yes	REC	46	36	Page 59: Recreation - The Perrin Ranch owners allow limited vehicular access for hunting, camping and other recreational activities ... this project does not conform in any way with limited vehicular access.	The Final EA has been revised to consider Recreation in detail (see Chapter 3).	3. Supplement, improve, or modify its analyses.

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337	Lara, Katherine	Letter	No	PROCESS	46	37	Page 60: Resource Areas Considered in Detail - Western provided the consultant (SWCA) ... did Western or did NextEra who had already paid the consultant?	As discussed in the Draft EA, "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" (see Section 3.2.2). Additionally, SWCA was approved as a third party NEPA consultant. Third-party NEPA consulting is commonly used, across the nation, for applicant projects requiring lead agency approvals. Many lead agencies rely on the experience and expertise of environmental consultants to assist in NEPA document preparation. Contractors are often used because lead agencies do not have the staff expertise, staff resources or time to conduct the technical analysis necessary to comply with NEPA. Contractors can provide valuable assistance in NEPA process management, as well as technical study preparation. Additionally, ultimately the NEPA documents and the content of the documents (i.e. an EA) are the responsibility of the lead federal agency; the third party NEPA consultant is an extension of the lead federal, even though they are paid by the applicant. The EA is required to be an objective, good faith attempt at full disclosure.	5. Explain why the comments do not warrant further agency response.
338	Lara, Katherine	Letter	No	LAND USE	46	38	Page 60: The goal for Coconino County is to ensure the preservation of open space "for the purposes of preserving scenic viewsheds" That said, how can you state the Red Lake Plan and the County plan do not address policies for landscapes and open space?	Perrin Ranch Wind applied for and received a CUP for the construction, operation, and maintenance of this Project (Resolution 2011-04, see Appendix E of the Draft EA). Because use of lands in the Project Area have been approved for the proposed Perrin Ranch facility, land use conforms with area plans" (see pages 58-59 of the Draft EA).	5. Explain why the comments do not warrant further agency response.
339	Lara, Katherine	Letter	No	VISUAL	46	39	Page 63: Affected Environment -you have determined that disrupting visitors view for 20 minutes or 15% of travel time is O.K. You have determined that disrupting residents view 24/7 is O.K. What gives you that authority? Please present the surveys that support your findings. No one visited my property to make any assessment.	The Draft EA analyzes and discloses the rationale for impacts to visual resources (see Section 3.3).	5. Explain why the comments do not warrant further agency response.
340	Lara, Katherine	Letter	No	VISUAL	46	40	Page 66: Shadow Effects - please submit data that has been compiled that would document how much time shadow flicker would occur. 1 would think that a computer model of the turbines could be generated with exact topography and prior documented weather conditions.	The Draft EA analyzes and discloses the rationale for impacts to visual resources, including Shadow Flicker (see Section 3.3).	5. Explain why the comments do not warrant further agency response.
341	Lara, Katherine	Letter	No	VISUAL	46	41	Page 66: Nightime Lighting and Sky Glow - please submit the data you collected from astronomers. Or are you stating that you are taking this area out of any possible future plans for astronomy?	The Draft EA analyzes and discloses the rationale for impacts to visual resources, including Nighttime Lighting and Sky Glow (see Section 3.3).	5. Explain why the comments do not warrant further agency response.
342	Lara, Katherine	Letter	No	VISUAL	46	42	Page 69: Operation and Maintenance - Direct and indirect impacts from operation of the Proposed Action on aesthetics and visual resources would be local, minor, long term and adverse. Please submit the survey results you gathered that support this finding.	The Draft EA analyzes and discloses the rationale for impacts to visual resources (see Section 3.3).	5. Explain why the comments do not warrant further agency response.
343	Lara, Katherine	Letter	No	VISUAL	46	43	Page 79: 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. How do you compare a 405 foot tail industrial wind turbine to ranching and residential use?	The Draft EA analyzes and discloses the rationale for impacts to visual resources (see Section 3.3).	5. Explain why the comments do not warrant further agency response.
344	Lara, Katherine	Letter	No	OTH	46	44	Page 83: Direct and Indirect Impacts of the Proposed Project - you state, "it is assumed". Just as in this whole report you have made undocumented, unqualified assumptions I demand that you draft an EIS based on data and facts.	NEPA impact analyses are not done under the assumption that a plan will fail or that a proponent would violate existing laws. It is the responsibility of those federal, state, and municipal agencies having regulatory authority to ensure operations are monitored and to enforce existing law where necessary	5. Explain why the comments do not warrant further agency response.
345	Lara, Katherine	Letter	No	OTH	46	45	Page 84: impacts from noise of the construction of the Proposed Action would be local, minor, short term, and adverse. How do you plan to compensate us for this?	As discussed in the Draft EA, these impacts would cease after construction activities are completed. Further, as discussed in the Draft EA, "No mitigation measures specific to noise are necessary."	5. Explain why the comments do not warrant further agency response.

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346	Lara, Katherine	Letter	No	WATER	46	46	Page 94: Groundwater - please state the exact sources the water will be taken from.	Thank you for your comment. As discussed in the Draft EA, "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" (page 97, Section 3.3.3 of the Draft EA).	5. Explain why the comments do not warrant further agency response.
347	Lara, Katherine	Letter	No	WATER	46	47	Page 94: Operation and Maintenance - negligible use of water during the operational phase of the Project. Page 47: Water Use - exactly where will the 20,000 to 24,000 gallons of water needed per year at this facility come from? Why do you not qualify this? THE WHOLE DRAFT IS UNSUBSTANTIATED.	Thank you for your comment. As discussed in the Draft EA, "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" (page 97, Section 3.3.3 of the Draft EA).	5. Explain why the comments do not warrant further agency response.
348	Lara, Katherine	Letter	Yes	OTH	46	48	The printed bound document from NextEra: Presentation to the Coconino County Board of Supervisors, Matt Gomes-Project Director, February 7,201 1 on page 33 states, "Water use during operation is limited to the restrooms and wash basin at the Operations and Maintenance Building."	Thank you for catching this inaccuracy. The Final EA (see Section 2.2.4) has been revised to omit turbine washing as an operational use of water.	4. Make factual corrections.
349	Lara, Katherine	Letter	No	WILDLIFE	46	49	Page 105: Raptors - Bald Eagle, potential for occurrence in the Project Area likely to occur. You have determined that the Bald Eagle can only live here if there is breeding. What authority gives you that right?	The ABPP includes adaptive management techniques to address any impact that may be observed. These measures have been developed in coordination with USFWS and AGFD and are considered appropriate for this project. Regarding, surveys for and moving of small mammals, reptiles, and amphibians; section 3.3.5 of the EA has been clarified to state that those species are highly mobile and most would temporarily move from the immediate area to avoid crushing, although some individuals may seek shelter in burrows and would be crushed. The low speed limit as described in section 2.2.7 would help reduce this impact. These impacts are typical of any construction project and would not constitute a significant impact to those species. Relocation of these species is not feasible or considered necessary for a project of this nature; however, the EA includes a worked education program that would include informing workers on best management practices to avoid harming wildlife on site. A biological monitor would be on site to enforce those measures. Regarding Avian breeding season, construction is not planned during that time; however, in the event that it is necessary wildlife management agency accepted avoidance strategies will be implemented to reduce or eliminate potential impacts.	5. Explain why the comments do not warrant further agency response.
350	Lara, Katherine	Letter	Yes	SOCIO	46	50	Page 122: Socioeconomics, AEected Environment - housing prices have declined over 78%. This Project has already had a real impact and influenced further decline. Please submit documentation from local realators. I will not receive any compensation from this Project. My life and plans for my property here are destroyed.	Additional information was added to the Environmental Consequences Section 3.3.6 in the Final EA regarding property value impacts.	3. Supplement, improve, or modify its analyses.
351	Lara, Katherine	Letter	Yes	SOCIO	46	51	Page 125: Operation and Maintenance - 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. Perception does not matter - the truth matters and the truth is this Project is impacting my quality of life. I was here first - how do you plan to mitigate the perception of loss?	Additional information was added to the Environmental Consequences Section 3.3.6 in the Final EA regarding property value impacts.	3. Supplement, improve, or modify its analyses.
352	Lara, Katherine	Letter	No	SOCIO	46	52	Page 126: Please submit the math in real terms - $2.35 million for the LIFE of the Project - please put in writing a breakdown of per year and how that is dispersed.	As discussed in the Draft EA (see Section 3.3.6), $2.35 million is an annual impact. "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)."	5. Explain why the comments do not warrant further agency response.
353	Lara, Katherine	Letter	Yes	OTH	46	53	Page 128: The field visit with governmental representatives of the Havasupai Tribe and Hualapai Nation will be conducted on May 5,201 1. Results of the field visits will be provided in the final EA document. So - you are not allowing for time for public comment? Please submit for public comment the agreement between the Havasupai Tribe and the City of Williams regarding water.	The comment period on the draft EA was extended to June 23, 2011. This information was included in the Final EA in new section (1.5.2) within Section 1.5 "Public Participation."	3. Supplement, improve, or modify its analyses.

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354	Lara, Katherine	Letter	Yes	OTH	46	54	Conclusions: this assessment is not based on facts or truth. Statements are made and are not substantiated. A new EIS should be contracted and should be done by an independent agency not connected to NextEra. The time for public comment has been compromised to the advantage of the Project Participants.	The comment period on the draft EA was extended to June 23, 2011. This information was included in the Final EA in new section (1.5.2) within Section 1.5 "Public Participation." Additionally, as discussed in the Draft EA, "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)" (see page 1, "Background" in the Draft EA). The EA itself analyzes the project impacts; Western's decision will summarize these impacts and any required mitigation.	3. Supplement, improve, or modify its analyses.
355	Lara, Katherine	Letter	Yes	LAND USE	46	55	Approved conditions by the Coconino County Board of Supervisors February 8th, 2011: 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.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
356	Lara, Katherine	Letter	Yes	LAND USE	46	56	EA page 5 1 Other Locations second paragraph - The northern Project boundary ... closest turbine was approximately 2 miles from any occupied structure. This is below CUP requirement of not within two miles of the north boundary of the ranch. EA has not analyzed county requirement. Also, the EA does not require that final tower sites shall not deviate from the site plan locations by more than 500 feet.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
357	Lara, Katherine	Letter	Yes	OTH	46	57	2. In accordance with Section 20.3-1 1, 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.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
358	Lara, Katherine	Letter	Yes	OTH	46	58	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.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
359	Lara, Katherine	Letter	Yes	TRANSP	46	59	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.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
360	Lara, Katherine	Letter	Yes	TRANSP	46	60	EA page 37 Access Roads - roads ... would have an aggregate surface cover. The CUP states an all-weather ABC surface. The EA has not analyzed the county requirement. The EA is below CUP requirements.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
361	Lara, Katherine	Letter	Yes	TRANSP	46	61	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.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
362	Lara, Katherine	Letter	Yes	TRANSP	46	62	EA page ES-2 Proposed Action last paragraph - does not state that proposed access roads be established by use permit granted by the Arizona State Land Department. Thus the EA has not analyzed the county requirement. The EA is below CUP requirements.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
363	Lara, Katherine	Letter	Yes	GEO-SOILS	46	63	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.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.

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364	Lara, Katherine	Letter	Yes	GEO-SOILS	46	64	EA page 50 & 5 1 Resource Conservation Measures bullet point 9 - is below CUP requirements as does not require annual report to the county. EA has not analyzed county requirement	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
365	Lara, Katherine	Letter	Yes	TRANSP	46	65	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.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
366	Lara, Katherine	Letter	Yes	TRANSP	46	66	EA page 43 Transportation Planning - detailed route transportation study for the Project would be provided. Since this is not provided yet the EA cannot anaylze facts not submitted yet and cannot determine compliance with CUP requirements.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
367	Lara, Katherine	Letter	Yes	OTH	46	67	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.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
368	Lara, Katherine	Letter	Yes	TRANSP	46	68	EA page 42 Truck and Automobile Traffic first paragraph - EA has not analyzed the county requirement for the proposed Highway 64 information kiosk. EA is below CUP requirement.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
369	Lara, Katherine	Letter	Yes	VISUAL	46	69	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.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
370	Lara, Katherine	Letter	Yes	VISUAL	46	70	EA page 12 Lighting - OCAS lighting would be installed on the turbine towers ... The system would be installed and only activated once the FAA approves it. This EA requirement has been appealed to the County Board of Supervisors. The appeal hearing is scheduled June 21,20 11. At that hearing the Supervisors voted unanimously to deny the appeal. At this time it is not known if the applicant will appeal the decision to the Superior Court. EA may need amending.	The "Lighting" section of the Final EA (in Section 2.2.2 for "Proposed Facilities") has been updated to reflect the details of the County's conditions in Resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.. The appeal by NextEra was denied on June 22, 2011.	1. Modify alternatives including the proposed action.
371	Lara, Katherine	Letter	Yes	OTH	46	71	10. All collection lines between the towers shall be underground.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
372	Lara, Katherine	Letter	Yes	WILDLIFE	46	72	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.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
373	Lara, Katherine	Letter	Yes	WILDLIFE	46	73	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 8,201 0. 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	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
374	Lara, Katherine	Letter	Yes	WILDLIFE	46	74	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 fiom 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 ownerloperator, 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.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.

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375	Lara, Katherine	Letter	Yes	WILDLIFE	46	75	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.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
376	Lara, Katherine	Letter	Yes	WILDLIFE	46	76	EA page 107 Raptors second paragraph ... AGFD guidelines (AGFD 2009b) this is below CUP requirements per "Guidelines for Reducing Impacts to Wildlife from Wind Energy Development in Arizona (AZGF Dept. Revised Nov. 23,2009)	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
377	Lara, Katherine	Letter	Yes	WILDLIFE	46	77	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 EA page 122 Mitigation Measures -No mitigation measures for wildlife conditions are necessary. This is below CUP requirements. County requirement has not been analyzed in this EA.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
378	Lara, Katherine	Letter	Yes	TRANSP	46	78	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.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
379	Lara, Katherine	Letter	Yes	OTH	46	79	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 ofice trailers.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
380	Lara, Katherine	Letter	Yes	OTH	46	80	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 financia1 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.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
381	Lara, Katherine	Letter	Yes	OTH	46	81	EA page 48 Restoration/Reclamation and Abandonment second paragraph - Foundations would be abandoned ... unless allowed to remain in place by the landowner. This is below CUP requirement. The county requirement has not been analyzed in the EA.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
382	Lara, Katherine	Letter	Yes	FIRE	46	82	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. EA page 58 Human Health and Safety third paragraph - ... applicant is committed to providing finding to the local fire department ... This statement is below the CUP requirement. The county requirement has not been analyzed in the EA.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
383	Lara, Katherine	Letter	Yes	LAND USE	46	83	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/	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
384	Lara, Katherine	Letter	Yes	OTH	46	84	EA page 44 & 45 Operation and Maintenance; EA page 45 & 46 Maintenance Schedule: the EA is below CUP requirements as there is no requirement to provide a formal report to the County every five years.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
385	Lara, Katherine	Letter	Yes	SOCIO	46	85	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.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
386	Lara, Katherine	Letter	Yes	SOCIO	46	86	EA page 125 Operation and Maintenance last paragraph - In terms of residential property value, housing prices in the area are not expected to be directly affected ... This is below CUP requirement. County requirement has not been analyzed in this EA.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.

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387	Lara, Katherine	Letter	Yes	SOCIO	46	87	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.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
388	Webb, Linda	Letter	No	NS-N/A	47	1	Enclosures with this packet include: 1. Letter Requesting Full EIS of the proposed project. 2. Letter from David Dechambre, Northland Research 3. List of Assessment Flaws/Documentation for unsubstantiated or contradictory claims 4. Water Issues Documentation 5. Affidavits of Scoping Meeting Attendees	Thank you for your comments.	6. Other, general statement; non-substantive
389	Webb, Linda	Letter	No	NS-N/A	47	2	Rosalind Mayne signed an affidavit stating she was present at the Feb 2, 2011 meeting but was and is not supportive of the Project	Thank you for your comments.	6. Other, general statement; non-substantive
390	Webb, Linda	Letter	No	NS-N/A	47	3	Linda Webb signed an affidavit stating she was present at the Feb 2, 2011 meeting but was and is not supportive of the Project	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
391	Webb, Linda	Letter	No	NS-N/A	47	4	Ernest Webb signed an affidavit stating he was present at the Feb 2, 2011 meeting but was and is not supportive of the Project	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
392	Webb, Linda	Letter	No	NS-N/A	47	5	Pamelia La Paglia signed an affidavit stating she was present at the Feb 2, 2011 meeting but was and is not supportive of the Project	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
393	Webb, Linda	Letter	No	NS-N/A	47	6	Melvin D. Lovell signed an affidavit stating he was present at the Feb 2, 2011 meeting but was and is not supportive of the Project	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
394	Webb, Linda	Letter	No	NS-N/A	47	7	Lisa Lovell signed an affidavit stating she was present at the Feb 2, 2011 meeting but was and is not supportive of the Project	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
395	Webb, Linda	Letter	No	NS-N/A	47	8	Anne Wittke signed an affidavit stating she was present at the Feb 2, 2011 meeting but was and is not supportive of the Project	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
396	Webb, Linda	Letter	No	NS-N/A	47	9	Jack W. Olsen signed an affidavit stating he was present at the Feb 2, 2011 meeting but was and is not supportive of the Project	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
397	Webb, Linda	Letter	No	NS-N/A	47	10	Sharon E. Olsen signed an affidavit stating she was present at the Feb 2, 2011 meeting but was and is not supportive of the Project	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
398	Webb, Linda	Letter	No	NS-N/A	47	11	Bruni Iopreato signed an affidavit stating their presence at the Feb 2, 2011 meeting but was and is not supportive of the Project	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
399	Webb, Linda	Letter	No	NS-N/A	47	12	Donald Nutt signed an affidavit stating he was present at the Feb 2, 2011 meeting but was and is not supportive of the Project	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
400	Webb, Linda	Letter	No	NS-N/A	47	13	Carma Lee signed an affidavit stating she was present at the Feb 2, 2011 meeting but was and is not supportive of the Project	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
401	Webb, Linda	Letter	No	NS-N/A	47	14	John D. Lee signed an affidavit stating he was present at the Feb 2, 2011 meeting but was and is not supportive of the Project	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
402	Webb, Linda	Letter	No	NS-N/A	47	15	Judith Maeda signed an affidavit stating she was present at the Feb 2, 2011 meeting but was and is not supportive of the Project	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
403	Webb, Linda	Letter	No	NS-N/A	47	16	James R. Lara signed an affidavit stating he was present at the Feb 2, 2011 meeting but was and is not supportive of the Project	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
404	Webb, Linda	Letter	No	NS-N/A	47	17	Katherine Anne Lara signed an affidavit stating she was present at the Feb 2, 2011 meeting but was and is not supportive of the Project	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
405	Webb, Linda	Letter	No	NS-N/A	47	18	Teresa Schmidt signed an affidavit stating she was present at the Feb 2, 2011 meeting but was and is not supportive of the Project	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
406	Webb, Linda	Letter	No	NS-N/A	47	19	Lisa Paffrath signed an affidavit stating she was present at the Feb 2, 2011 meeting but was and is not supportive of the Project	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
407	Webb, Linda	Letter	No	NS-N/A	47	20	Jim Braswell attended the Feb 2, 2011 meeting	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
408	Webb, Linda	Letter	No	NS-N/A	47	21	Gary Wynn attended the Feb 2, 2011 meeting	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.

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409	Webb, Linda	Letter	No	PROCESS	47	22	The Canyon Country Coalition requests an Environmental Impact Statement for the Perrin Ranch Wind IntertieProject. The issuance of an Environmental Assessment (EA) is only appropriate for those projects that have been identified as having no major impacts and for which a Finding of No Significant Impact (FONSI) will be expected.	As discussed in the Draft EA, "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)" (see page 1, "Background" of the Draft EA). The EA itself analyzes the project impacts; Western's decision will summarize these impacts and any required mitigation.	5. Explain why the comments do not warrant further agency response.
410	Webb, Linda	Letter	No	CULTURAL	47	23	The EA contains insufficient infonnation regarding effects to historic/cultural resources and the nearby Grand Canyon National Park on which to base a FONSI in accordance with 40 CFR 1508.27 (b)(3) and (8). We have attached a letter from our independent consultant, whom we paid to review the EA, which cites the major factor that requires a full EIS for the Project.	As discussed in the Draft EA, "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."	5. Explain why the comments do not warrant further agency response.
411	Webb, Linda	Letter	No	CULTURAL	47	24	The Grand Canyon Railroad is on the National Register of Historic Places as a significant event in the area of engineering and transportation. NEPA Regulations require an EIS for any project that may significantly impact sites listed on the National Register. As the railway is within the 10 mile radius of the proposed APE (Area of Potential Effect) evaluation of the effect of the degradation of the unique viewshed encompassing the area must be considered. The visual effect from the historic railway perspective was never addressed. Part of the experience of riding the Historic Grand Canyon Railroad is an opportunity to travel to the park as those in a bygone era did. The anomaly of an industrial wind project has the potential to destroy the historic accuracy meant to be created. The original travelers by rail would have been journeying into an unspoiled western landscape not much different than it is today, that authenticity will be severely compromised by this Project.	As discussed in the Draft EA, "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."	5. Explain why the comments do not warrant further agency response.
412	Webb, Linda	Letter	Yes	SOCIO	47	25	Not only is the Historic Railroad affected by this proposed project, but the overall experience of multinational visitors to the Grand Canyon National Park is not considered. Most of the visitors to the Grand Canyon National Park arrive via Highway 64. Part of the visitor experience is a transition from modem life to a frame of reference of appreciation of the wilderness and the vastness of the Coconino Plateau, culminating in the arrival at the Grand Canyon. If this opportunity to reset one's perspective is lost by driving through industrialized energy complexes, an essential element of coming to the Grand Canyon is lost Both the railroad and the Highway 64 corridor have played significant roles in the development of our Country's National Park. system, in travel history, and in the lives of many notable people. Highway 64 is unique in its characteristics as the first paved road access to the Grand Canyon National Park and is an integral part of the Park's History. The document does not adequately disclose the impacts to the traveling public nor provide any information whether the wind farm, including nighttime lighting, can be observed from the Park. Therefore, there is insufficient information on which to base a finding of No Significant Impact on the Park	Although the project would be visible, Xanterra Parks and Resorts, operators of the Grand Canyon Railway has expressed public support for the project; stating that "it can actually help to provide visitors to the Grand Canyon with the first-hand opportunity to understand the benefits that renewable energy has on our environment and the preservation of our National Parks" (personal communication, Lane, 2010). Section 3.3.6 of the FINAL EA has been revised to reflect this information.	3. Supplement, improve, or modify its analyses.
413	Webb, Linda	Letter	No	PROCESS	47	26	In addition, projects with the capability of producing more than 50 MW require a full EIS by DOE Regulations. The stated output of Perrin Wind Ranch is 99.2 MW and with a net capacity of less than 50% would produce an average annual 49.6 MW. This average is extremely near the 50 MW threshold, and could meet or exceed the MW threshold based on how much the wind blows.	As discussed in the Draft EA (see Section 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)." The Department of Energy's guidelines for preparation of EA are based on the average annual output of the project, not the faceplate capacity of generators. Thus, preparation of an EA meets DOE's guidelines for NEPA documentation.	5. Explain why the comments do not warrant further agency response.
414	Webb, Linda	Letter	No	PROCESS	47	27	Finally, the fact of the matter is that the whole EA has been rushed through the process to give this project fasttrack status. One has only to look at the progress charts published by W APA to see that there is no other Project that has taken less than 2 years to complete. This EA was done in less than 3 months, and the flaws are extensive and throughout the document. As part of our review we noted every discrepancy along with the location of contradictory evidence.	As discussed in the draft EA, "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)" (see page 1, "Background" of the Draft EA). The EA itself analyzes the project impacts; Western's decision will summarize these impacts and any required mitigation.	5. Explain why the comments do not warrant further agency response.

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415	Webb, Linda	Letter	No	PROCESS	47	28	Based on these findings, we feel that a full EIS is warranted.	As discussed in the draft EA, "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)" (see page 1, "Background" of the Draft EA). The EA itself analyzes the project impacts; Western's decision will summarize these impacts and any required mitigation.	5. Explain why the comments do not warrant further agency response.
416	Webb, Linda	Letter	No	CULTURAL	47	29	I disagree with the definition of Area of Potential Effect (APE). The document states that only the areas to be disturbed are the APE. The APE should have been defined as all areas in the reasonable view shed of the project. I would estimate this to be at least 25 miles from the proposed tower locations. WIthin this APE falls the Grand Canyon Railroad. Research does not disclose whether the railroad right of way is listed on the National Register of Historic Places, but the Williams Station and associated Fray Marcos Hotel are listed on the Register.	As discussed in the Draft EA, "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."	5. Explain why the comments do not warrant further agency response.
417	Webb, Linda	Letter	No	CULTURAL	47	30	Within the park, the rail station and associated EI Tovar Hotel are also listed on the National Register of Historic Places. In addition, the Park depot is also a listed National Historic Landmark. It is therefore reasonable to assume that the original route of the railroad (which is in current use), is eligible for the National Register of Historic places, under criterion (a) "that are associated with events that have made a significant contribution to the broad patterns of our history;" and (b) "that are associated with the lives of persons significant in our past;" [36 CFR 60.4 (a) (b)]. The Perrin Wind Fann would be a negative effect to the setting of this Historic route. This effect of setting would negatively affect the anticipated "old west" experience for some 200,000 riders a year. The railroad pre-dates the park designation and is associated with numerous persons important in history.	As discussed in the Draft EA, "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."	5. Explain why the comments do not warrant further agency response.
418	Webb, Linda	Letter	No	CULTURAL	47	31	Red Butte is a known Traditional Cultural Property that will have an effect of setting caused by the Perrin Wind Fann. There are potentially many additional National Register eligible properties that will be affected, and without a comprehensive investigation, they cannot be identified. It is my opinion that a comprehensive Class III survey be required of an entire new definition of APE, which should include all areas of reasonable visibility. This would allow the Department of Energy to make an informed judgment of the negative effects to Historic properties, and thus meet their obligations under federal law. Short of this comprehensive approach, a finding of no significant impact is not possible.	As discussed in the Draft EA, "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."	5. Explain why the comments do not warrant further agency response.
419	Webb, Linda	Letter	Yes	CULTURAL	47	32	40 CFR Sec. 1508.27 (b) (8) requires consideration of the following when evaluating intensity (severity of impacts) to determine whether a Finding of No Significant Impact can be made: The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.	As discussed in the Draft EA, "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."	5. Explain why the comments do not warrant further agency response.
420	Webb, Linda	Letter	Yes	CULTURAL	47	33	The document does not provide sufficient information on which to base a FONSI for historic places. When a FONSI cannot be made, an Environment Impact Statement is required.	As discussed in the Draft EA, "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."	5. Explain why the comments do not warrant further agency response.

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421	Webb, Linda	Letter	No	PROCESS	47	34	Having SWCA preparing report based on their data does not seem to establish an unbiased perspective. While this is apparently common practice, it is a highly questionable process that places the report in an appearance of bias and rubber stamping. It appears that the majority of the EA is basically a rehash and re-presentation of everything SWCA put together previously. The paucity of references; lack of substantial data based on less than a year's worth of collection, and the fact that many significant studies were not used in preparation of the EA leaves questions regarding the validity of the document. We have listed references that should have been considered on preparation of this EA separately.	SWCA was approved as a third party NEPA consultant. Third-party NEPA consulting is commonly used, across the nation, for applicant projects requiring lead agency approvals. Many lead agencies rely on the experience and expertise of environmental consultants to assist in NEPA document preparation. Contractors are often used because lead agencies do not have the staff expertise, staff resources or time to conduct the technical analysis necessary to comply with NEPA. Contractors can provide valuable assistance in NEPA process management, as well as technical study preparation. Additionally, ultimately the NEPA documents and the content of the documents (i.e. an EA) are the responsibility of the lead federal agency; the third party NEPA consultant is an extension of the lead federal, even though they are paid by the applicant. The EA is required to be an objective, good faith attempt at full disclosure.	5. Explain why the comments do not warrant further agency response.
422	Webb, Linda	Letter	No	OTH	47	35	The following items either misrepresent the facts or are contradictory to other statements provided by the proponents in other documentation: 1. Number of people at seoping meeting that were against the project 2. Need for additional energy 3. Data on wind resource 4. Aesthetics & Visual Impact 5. Water Usage 6. Vegetation -Fire hazards 7. Environmental Impacts : Construction 8. Flood control! water Rights 9. Native Tribes involvement 10. Out of State Property owners	Thank you for your comments.	6. Other, general statement; non-substantive
423	Webb, Linda	Letter	Yes	PROCESS	47	36	#1 Position of Attendees at WAPA Public Scoping. We have provided a list of the people who attended the Public scoping meeting at the Williams High School on Feb. 2, 2011 regarding the Perrin Ranch Wind Project conducted by WAPA. We are also including signed statements verifying their attendance and their opposition to the proposed Perrin Ranch Wind Project. This list accounts for 22 of the 24 people who were cited as attending and "supporting" the Project. They were not in support of the wind complex. We cannot determine who the other 2 people were so they may have been in support. EA States 24 people attended and were in support of the Project. We have 18 attendees who have signed affidavits of attendance and opposition to the project.	Section 1.5 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
424	Webb, Linda	Letter	No	OTH	47	37	#2 Assertion of Need For Energy to Meet Customer Demand (ES-2). Support for the Project is provided by need for "efficient, inexpensive renewable power. This is contradicted by the APS request for a rate request citing reduced usage- due to increased efficiency.	Thank you for your comment.	6. Other, general statement; non-substantive
425	Webb, Linda	Letter	Yes	OTH	47	38	According to the published information from APS regarding their requested rate increase for 2012 there should be no demand for additional energy. Excerpts from the articles assert that the demand has decreased, efficiency has increased and the decoupled rate increase is needed to offset revenue losses due to reduced usage.	Thank you for your comment. As described in the Draft EA, APS would purchase power from the project (see page 3, Section 1.3). Information has been added to the Final EA (in Section 3.3.6) regarding electricity rate approval by the Arizona Corporation Commission.	3. Supplement, improve, or modify its analyses.
426	Webb, Linda	Letter	Yes	OTH	47	39	" ... decoupling would allow APS to collect a certain amount of revenue per customer regardless of how much energy was sold. Such plans essentially allow a company to earn more money for selling less electricity	Thank you for your comment. As described in the Draft EA, APS would purchase power from the project (see page 3, Section 1.3). Information has been added to the Final EA (in Section 3.3.6) regarding electricity rate approval by the Arizona Corporation Commission.	3. Supplement, improve, or modify its analyses.
427	Webb, Linda	Letter	Yes	OTH	47	40	The proponents of such plans say that decoupling saves customers money, too, because they are the ones that pay for new power plants to meet energy demand. Proponents say that conserving electricity is generally less expensive than building, fueling and running new plants to generate more electricity ..•. Wall Street analysts have taken note that without a decoupling rate plan, efficiency measures cut into the company's revenue." (APS to seek rate hike for 2012 by Ryan Randazzo - Feb. 18, 2011 04:21 PM The Arizona Republic) This being the case, why are we being asked to approve a wind energy complex expenditure for un-needed electricity?	Thank you for your comment. As described in the Draft EA, APS would purchase power from the project (see page 3, Section 1.3). Information has been added to the Final EA (in Section 3.3.6) regarding electricity rate approval by the Arizona Corporation Commission.	3. Supplement, improve, or modify its analyses.

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428	Webb, Linda	Letter	Yes	WIND RESOURCE	47	41	#3. Data on Wind Resource High Wind Presence (ES-2). The assertion is continually being made that this project location has Nhigh wind presence". According to the USOOE Wind Resource Maps this area has low wind resources and is marginally acceptable for wind energy production. To date NextEra has refused to allow access to their "proprietary data" to anyone, including the Coconino County planning & Zoning Commission, Board of Supervisors, or Community groups. We are being asked to make a decision based on their assertions that there is sufficient wind resource for this to be a viable wind project – and based on less than a year's worth of data collection from 3 meteorological towers. We question the viability of the project, we question the lack of data available to the public, who will be paying for it, and we demand full disclosure before the project is approved. The CEO of NextEra has asserted that these projects would not be built without Federal and State subsidies, which means we are paying for a project that we do not support and will receive no benefit from.	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Section 1.3.1 has been added to the Final EA discussing the wind potential of the site.	3. Supplement, improve, or modify its analyses.
429	Webb, Linda	Letter	Yes	WIND RESOURCE	47	42	Contradiction to Assertion of High Wind Resource (ES•2). The report itself contradicts the "high wind resource H assertion in its deSCription of the Proposed Action. II Due to the wind regime at the site, the average MW output is anticipated at 50% of the 99.2MW at any given time." In addition, the EA also states that most of the energy produced is expected to be during the 3-4 month spring "windy" season. So we need a wind complex that produces only half its stated capacity for 3 months a year? So we are installing and paying for a 99.2 MW facility that is projected to produce at best only 50% of its capacity. Furthermore, there is no evidence to back up even this assertion, and nowhere have we found any wind energy project that is producing more than 40% of capacity - the average being more on the order of 25%.	As discussed in the Draft EA, "Western's decision is limited to deciding if the specific wind Project proposed by the applicant can be interconnected with Western's transmission system" (page 3, Section 1.2.1). It is not within the decision making authority of Western to determine the suitability of the wind resources at the proposed project site. Section 1.3.1 has been added to the Final EA discussing the wind potential of the site.	3. Supplement, improve, or modify its analyses.
430	Webb, Linda	Letter	No	VISUAL	47	43	#4-Aesthetics and Visual Resources (ES_3) The assertion is made that the "direct and indirect impacts from operation of the Proposed Action would be local, MINOR, long term and adverse". Minor depends on your point of view. As year round residents we do not find the impacts to be minor. The effect they will have on our community is not minor. This reminds us of the old Joke-" What is a minor surgery? Something that the other guy hasl" The Impact to our community will be "local, Major, long term, and adverse." There is no evidence again presented to support this evaluation, it is totally subjective. In Section 2.2.7, pg 49 of the EA, it states that "turbines would be setback from SR64 at least 3 miles ... " Scaled measurements from NextEra County CUP Site Plan V.7 shows that at the closest point 8 turbines, numbers 55-62, are all closer than 3 miles to SR64. SR64 is the main route to the Grand Canyon, and heavily traveled by tourists. The location of the turbines will have an immense effect on the viewscape from this historic route, the first paved access to the park.	In the Draft EA, the Executive Summary (ES1-ES5) is a summary of the analysis. Definitions for type, context, duration, and intensity are defined in Chapter 3 (see Section 3.1) of the Draft EA.	5. Explain why the comments do not warrant further agency response.
431	Webb, Linda	Letter	No	WATER	47	44	#5 Water Usage - Ground Water Withdrawal from Local Aquifer(ES-3) (Water Use-47) "Because groundwater would be withdrawn from the local aquifer, the impacts to groundwater would be direct and local. 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" Reports generated over the last 7 years about water usage in Northern Arizona are available but not referenced in the EA. This is the first time any mention of using local water resources has been made. NextEra has repeatedly said they will get the water from "somewhere", even mentioned bringing it in by rail, and that the Project manager will arrange for it to be supplied. If water is to be withdrawn from the R-M Aquifer there needs to be involvement by all stakeholders that are dependent on this water resource. As to the "minor" amount needed during construction -17 million gallons does not seem minor when you consider that it will be withdrawn over a period of only 5-7 months, which happens to coincide with the period of peak local demand for water due to the tourist seasonal influx. Please refer to the North Central Arizona Water Supply Study-Report of Findings U.S. Department ofthelntertor Bureau of Reclamatton Denver, Colorado October 2006	As discussed in the Draft EA, the amount of water needed for construction is significantly less than 0.01% of the total water available in storage for the basin (Section 3.3.3, Page 99) .	5. Explain why the comments do not warrant further agency response.
432	Webb, Linda	Letter	Yes	WATER	47	45	There are also discrepancies in the amount of water needed during construction - 17 million gallons versus 25AF which equals 8.1 million gallons. In addition no mention has been made before this EA of the annual water usage or the need for water to clean turbine blades.	Thank you for your comment. The Final EA has been corrected to state the estimated water use during construction is 60 acre-feet.	4. Make factual corrections.
433	Webb, Linda	Letter	Yes	NAT AMER	47	46	"Ground water circulating within the Coconino Plateau is considered the "lifeblood of the earth and the Havasupai." Ninety-elght percent of the Redwall-Mauv(R-M) Aquifer discharge occurs at Havasu Springs. In addition, over three dozen other springs and seeps are present on the 185,000 acre reservation. These springs and seeps serve as the municipal and agricultural water supply for the tribe, are of paramount importance for cultural and religious purposes, and are the source of the waterfalls and pools which are the primary draw for tourism and are critical to the recreation-based economy of the tribe. The Havasupai's primary reason for partiCipating in this study is to ensure protection of these R-M Aquifer springs and seeps as the region develops plans for future water use. Any withdrawal from the R-M Aquifer is considered by the tribe to have an impact on its water rights and water resources. The tribe has stated that they "cannot tolerate any decrease in the natural flow of Havasu Springs and other canyon springs and seeps" {Shiel, 2002)."	As discussed in the Final EA, no new water source would be developed for this project and the amount of water needed for construction is significantly less than 0.001% of the total water available in storage for the basin (Section 3.3.3). Additionally, as discussed in Section 1.6 of the Final EA, the tribes, including the Havasupai, have been consulted on this project. Thus, impacts to ground water (see Section 3.3.3), and the specific concerns of the tribes (see Section 1.6), have been considered in the Final EA.	3. Supplement, improve, or modify its analyses.

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434	Webb, Linda	Letter	No	WATER	47	47	"Pierce (2001) conducted a structural evaluation of ground water conditions in the Bill Williams Mountain area near Williams, Arizona. The regional northwest trending Cataract Creek Fault system and the regional northeast trending Mesa Butte Fault system intersect in the study area. Additionally, local north-south fault systems cut through the area. The faults are nearly vertical in the study area. These fault systems provide near-vertical flow paths for water to enter the regional aquifer system (R-M Aquifer), and the radial nature of the intersecting fault systems provides a pathway for waters to travel away from the area. Migration of water through the R-M Aquifer may be enhanced by solution features along fractures in the limestone."	Thank you for your comments.	6. Other, general statement; non-substantive
435	Webb, Linda	Letter	Yes	NAT AMER	47	48	"The tribe is opposed to any importation of outside surface water into the study area unless it brings meaningful protections for permanent ground water limitations and management" (NRCE, 2005)	As discussed in the Final EA, no new water source would be developed for this project and the amount of water needed for construction is significantly less than 0.001% of the total water available in storage for the basin (Section 3.3.3). Additionally, as discussed in Section 1.6 of the Final EA, the tribes, including the Havasupai, have been consulted on this project. Thus, impacts to ground water (see Section 3.3.3), and the specific concerns of the tribes (see Section 1.6), have been considered in the Final EA .	3. Supplement, improve, or modify its analyses.
436	Webb, Linda	Letter	No	NAT AMER	47	49	"As discussed in the "Traditional Cultural Properties" subsection under Section V.4.3, ""Cultural Resources," the Grand Canyon area and the Colorado River are considered sacred by some tribes. Similarly, other waters (rivers, streams, and springs) are also considered sacred. Any alternative that could potentially affect the flow of a particular river or spring will be viewed as harmful by those tribes."	As discussed in the Final EA, no new water source would be developed for this project and the amount of water needed for construction is significantly less than 0.001% of the total water available in storage for the basin (Section 3.3.3). Additionally, as discussed in Section 1.6 of the Final EA, the tribes, including the Havasupai, have been consulted on this project. Thus, impacts to ground water (see Section 3.3.3), and the specific concerns of the tribes (see Section 1.6), have been considered in the Final EA .	3. Supplement, improve, or modify its analyses.
437	Webb, Linda	Letter	Yes	WATER	47	5	Obviously, this EA did not refer to the North Central Arizona Water Supply study-Report of Findings U.S. Department of the Interior Bureau of Reclamation Denver. Colorado October 2006.	Thank you for the reference. The Final EA has been revised to include data from the North Central Arizona Water Supply Study where appropriate.	3. Supplement, improve, or modify its analyses.
438	Webb, Linda	Letter	No	WATER	47	51	For a complete examination of the water issues please see additional comments in the separate Perrin Ranch Wind Project Water Impacts, enclosed.	Thank you for your comment.	6. Other, general statement; non-substantive
439	Webb, Linda	Letter	NO	HHS (human health and safety)	47	52	#6 Vegetation (E5-4) Related to Health & Safety Issues - Wildfires (PI 58) " Indirect adverse impacts to vegetation 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."	Thank you for your comment.	6. Other, general statement; non-substantive
440	Webb, Linda	Letter	No	HHS (human health and safety)	47	53	High winds, dense and dry vegetation, and lightning strikes on the turbines may combine to cause a potential fire hazard around the Project Area .... Fires can result if the protection system fails or is not properly installed .... "	Thank you for your comment.	6. Other, general statement; non-substantive
441	Webb, Linda	Letter	No	HHS (human health and safety)	47	54	"Landowners around the Project Area and the Coconino County Sheriffs Department would be notified immediately of any fire"	Thank you for your comment.	6. Other, general statement; non-substantive
442	Webb, Linda	Letter	Yes	HHS (human health and safety)	47	55	Community members have repeatedly asked about the fire hazards and the response to date has been that the GE turbines have never had a fire. While this is nice to say it is not borne out by available evidence. Likewise, no plan for dealing with a wildland fire created by wind turbine failure has been prepared, no local fire agencies have been contacted regarding such a plan, and the Project Area is not covered by any existing fire district. As to notifying landowners, we would like to know how they propose to do this quickly and effectively.	A Fire Protection and Emergency Response Plan has been drafted and is included as an Appendix to the Final EA (see Appendix E). Additionally, a new section has been added to the EA to address Human Health and Safety, specifically fire hazards (see Chapter 3).	3. Supplement, improve, or modify its analyses.
443	Webb, Linda	Letter	Yes	HHS (human health and safety)	47	56	The details of training personnel, both on site and through the volunteer Fire Companies have not been addressed. Neither has the process for notifying property owners been clarified. As any threat of potential fire endangers the lives and property in the community a fire plan is essential. This area is at risk for potential fire hazards because of the terrain, vegetation regime, and combinations of gusty winds, low humidity and dry lightning which lead to frequent Red Flag Warning days. These are closely related to atmospheric conditions in spring and early summer - the time of projected maximum production at Perrin ranch.	A Fire Protection and Emergency Response Plan has been drafted and is included as an Appendix to the Final EA (see Appendix E). Additionally, a new section has been added to the EA to address Human Health and Safety, specifically fire hazards (see Chapter 3).	3. Supplement, improve, or modify its analyses.

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444	Webb, Linda	Letter	No	FIRE	47	57	liability for fire damage to neighboring properties has not been addressed. If Perrin Ranch Wind, LLC is responsible for a fire start will they bear financial liability for the costs of firefighting equipment and response personnel? Who will bear financial liability for community property damage? Does the County bear liability for permitting an industrial energy project in a residential corridor?	These issues are considered beyond the scope of this EA, the purpose and need for which is "to approve or deny the interconnection request in accordance with its Tariff and the Federal Power Act, as amended" (Draft EA, page 4). Please note that the Final EA has been revised to consider Human Health and Safety (see Chapter 3) in detail, including a Fire Prevention plan (see Appendix E).	3. Supplement, improve, or modify its analyses.
445	Webb, Linda	Letter	No	OTH	47	58	# 7 Environmental Impacts (Direct and Indirect Impacts of the Proposed Project- Construction pg.124) II The Project workforce would be expected to draw from the existing local construction workforce, therefore generating 50-70 jobs .... Because the project is expected to draw from the existing workforce, there would be adequate housing and associated infrastructure to support construction workers. This can hardly be the case if Wanzek is the General Contractor and they are already contacting local realtors regarding housing rentals for 100 workers starting in June 2011	Wanzek General Contractors are not the General Contractors for the project. Information regarding how employment during construction is handled has been added to the Final EA (see Section 2.2.3).	1. Modify alternatives including the proposed action.
446	Webb, Linda	Letter	No	NS-N/A	47	59	Pamelia, Thank you for contacting me in regards to our housing needs. At this pOint we are not for sure if we will be in the area or not. But if we do mobilize we will have close to 100 guys looking for housing. What they will be looking at ranges from 1-bedrooms to 4-5 bedrooms and pricing up to $2500/month. If this project goes through we will be looking for housing in June. Please let me know if you have any more questions. Thanks again KYLE WALTER	Wanzek General Contractors are not the General Contractors for the project. Information regarding how employment during construction is handled has been added to the Final EA (see Section 2.2.3).	1. Modify alternatives including the proposed action.
447	Webb, Linda	Letter	No	NS-N/A	47	60	Dear Kyle, Your information was forwarded on to me from Francois Martinet. Please send me a list of your needs for rentals. I need to know the size of the homes, if they need to be furnished, how many homes you will need, and the price you are able to pay per month. I also need to know when you will need them by. Once I have the info I will see what I can do. I look forward to hearing from you. Blessings, Pamelia	Wanzek General Contractors are not the General Contractors for the project. Information regarding how employment during construction is handled has been added to the Final EA (see Section 2.2.3).	1. Modify alternatives including the proposed action.
448	Webb, Linda	Letter	Yes	WATER	47	61	8. Flood control/ water Rights. The entire issue of the potential for downstream impacts has been totally ignored in this EA and everywhere else. The National Weather service at Belmont identifies flooding issues at Supai as resulting from rainfall received in the upper portions of the watershed from Williams to Red lake. the APE for these Impacts should be the entire watershed. Obviously, insufficient research on this Impact has resulted in oversight of potential Impacts that are "regional" "significant" and log-term. Furthermore, nowhere does the EA indicate the involvement or response of a major stakeholder, the Havasupai Tribe. Every single other assessment done in the water shed identifies the Havasupai as stakeholders and the importance of involving them early in the process. There is no evidence that this was done.	The Final EA has been revised to include an analysis and discussion of Supai, Arizona. Additionally, as discussed in Section 1.6 of the Final EA, the tribes, including the Havasupai, have been consulted on this project. Thus, impacts to ground water (see Section 3.3.3), and the specific concerns of the tribes (see Section 1.6), have been considered in the Final EA .	3. Supplement, improve, or modify its analyses.
449	Webb, Linda	Letter	Yes	NAT AMER	47	62	9. Native Tribes Involvement. Letters asking for input regarding Cultural Heritage issues were sent in March to all tribes. Nothing was said to indicate that the Tribes were asked for input on Watershed impact. TCP Status request from Hopi Tribe and requests to visit are mentioned but there is no documentation to show their input to the Environmental Assessment. The Tribes have been under-represented throughout the entire process despite the fact that every document dealing with the Cataract Creek watershed recommends that the Havasupai be involved.	Tribes, including the Havasupai, were provided copies of the Draft EA for review. Section 1.6 of the Final EA has been updated.	3. Supplement, improve, or modify its analyses.
450	Webb, Linda	Letter	No	SOCIO	47	63	10. Out of State Property Owners. No effort has been made to inform the majority of the property owners in the affected community. The majority of them live out of state, and have had no opportunity to participate in the process. It is only due to the efforts of the local coalition and POAs that manyof these owners have been informed of the proposed Project at all. Disenfranchised by a process that only requires local notification, many landowners were still unaware of the Proposed Project and have had no direct communication from the proponents or the County Officials regarding it.	A letter notice of availability was mailed to all members of the public who provided an address, or for which there was contact information from Coconino County.	5. Explain why the comments do not warrant further agency response.
451	Webb, Linda	Letter	No	WATER	47	64	In reviewing the Environmental Assessment prepared by SWCA and WAPA we have noted a number of contradictory statements with regards to water and watershed related issues. Having compared the statements made in both documents with the assessments in several resource documents regarding the watershed and water supply, we have the following concerns which have not been adequately assessed.	Thank you for your comments.	6. Other, general statement; non-substantive

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452	Webb, Linda	Letter	Yes	WATER	47	65	Given the critical nature of water resources in Northern Arizona and the continuing drought conditions, we feel that the County needs to demand a more rigorous assessment and direct responses from the developer regarding water use, water resources, and potential impacts to the Cataract Canyon / Havasu Creek watershed areas. One of the major stakeholders in this area was not contacted about input into the project until January of this year, and the Environmental Assessment was prepared without their input included. All water impacts in this watershed are identified in every document as being important to the Havasupai Tribe, and part of their Cultural traditions. To date there has been no evaluation of the project that reflects their concerns with water management or potential Impacts to the R-M Aquifer.	As discussed in the Final EA, no new water source would be developed for this project and the amount of water needed for construction is significantly less than 0.001% of the total water available in storage for the basin (Section 3.3.3). Additionally, as discussed in Section 1.6 of the Final EA, the tribes, including the Havasupai, have been consulted on this project. Thus, impacts to ground water (see Section 3.3.3), and the specific concerns of the tribes (see Section 1.6), have been considered in the Final EA .	3. Supplement, improve, or modify its analyses.
453	Webb, Linda	Letter	Yes	WATER	47	66	Pg. 18 of CUP Proposal states ..... "Construction water will be purchased and transported from several sources that will be identified by the contract general contractor and concrete and road construction subcontractors. Pg 18 also states "'Because this project will replace existing or new generation, the water used during construction will be offset by water that will not be used in conventional generation'	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7.	1. Modify alternatives including the proposed action.
454	Webb, Linda	Letter	No	WATER	47	67	To date no conventional generation sources have been replaced by wind generation, nor are they likely to in this case as wind Is not a baseload provider. Therefore no significant amount of water will be saved	Thank you for your comment.	6. Other, general statement; non-substantive
455	Webb, Linda	Letter	Yes	WATER	47	68	Varying amounts of water necessary for construction have been cited.	The Final EA has been corrected to state the estimated water use during construction is 60 acre-feet.	4. Make factual corrections.
456	Webb, Linda	Letter	Yes	WATER	47	69	EA (pg E5-3) states "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 arid minor" No mention of the amount - just "small". However, in the information presented to the Arizona Line Siting Committee the following information was provided. "Perrin Wind Ranch will use no water resource to generate electricity. (approximately 17 million gallons equivalent to approximately 52 acre feet are expected to be used for construction purposes)." Application for a Certificate of Environmental Compatibility For the Perrin Ranch Wind Gen Tie•In Project (Pg 3) Likewise, the 17 million gallons was cited in the Minutes of the Planning & Zoning Commissioners Meeting- Dec. 18,2010. "Commissioner Sacher asked where the water will come from. Mr. Gomes explained water and gravel will be located by the EPC contractor. It will get delivered by railroad ... Commissioner Ontiveros verified it would take 17 million gallons of water and they did not know the source of the water. Mr. Gomes said that was correct. She asked about using reclaimed water. Mike Boggie with NextEra stated they could use reclaimed water for almost everything but the concrete production. They do not know where the reclaimed water would be coming from. "	Thank you for your comment. The amount of water to be used during the construction phase and the operational phase are presented in Sections 2.2.3 and 3.3.3 of the Final EA. The Final EA has been revised to include the amount of water in the Executive Summary as well.	4. Make factual corrections.
457	Webb, Linda	Letter	No	WATER	47	70	Water Use is addressed again on pg 47 of the EA in discussing the use of water during maintenance and operation of the project.	Thank you for your comment.	6. Other, general statement; non-substantive
458	Webb, Linda	Letter	Yes	WATER	47	71	"Water would be used to clean wind turbine blades." .. "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: "It is estimated that 20,000 to 24,000 gallons of water per year would be used at the facility' This is contrary to the information presented to the Board of Supervisors by Matt Gomes at the February 7, 2011 Hearing on pg. 3 of the Perrin Ranch Wind Presentation to The Coconino County Boord of Supervisors. "Water use during operation is limited to the rest rooms and wash basin at the Operations and Maintenance Building." Must be tricky washing those turbine blades in a wash basin.	Thank you for catching this inaccuracy. The Final EA (see Section 2.2.4) has been revised to omit turbine washing as an operational use of water.	1. Modify alternatives including the proposed action.
459	Webb, Linda	Letter	No	HAZMAT	47	72	Under Hazardous materials (pg 47) the EA discusses cleaning procedures and notes that Perrln 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: In the case of accidental leakage of hazardous materials Into the watershed It is too late - once a spillage occurs it can't be put back. Some of the hazardous materials on Site include; various oils, lubricants, fuels, coolants (ethylene glycol), and solvents.	Section 3.3.3 of the Final EA discusses the potential impacts of runoff into the watershed and the role of the Stormwater Pollution Prevention Plan in mitigation these impacts. The Final EA (see Section 2.2.4) has been revised to omit turbine washing, including the use of solvents and collars, as an operational need.	3. Supplement, improve, or modify its analyses.
460	Webb, Linda	Letter	Yes	WATER	47	73	The 17 million gallons used in the Construction phase of the Project would be being drawn during the same period of time as the peak draw from Williams- the tourist season. Can the Aquifer sustain these peak withdrawals without reducing the spring flows in the watershed? 17 million gallons is 12% of the 140 million gallons metered water used by Williams in 2000 data (latest available we could locate). The total water usage was 258million gallons which included 56 million gallons of non-potable water – most of which was used by the golf course.	As discussed in the Draft EA, "Total groundwater usage in the region averaged about 6,000 acre-feet per year between 2001 and 2005 (ADWR 2009)" (see Section 3.3.3, Page 94). The Final EA was clarified to add that the one-time water use for construction is approximately 1% of the annual water use of the region.	3. Supplement, improve, or modify its analyses.

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461	Webb, Linda	Letter	Yes	WATER	47	74	Chapter 1 (pg 7) of the EA states II Western Initiated consultation with Native American tribes with anotice of Project letter sent on January 21, 2011." "Once complete the Class III cultural resources survey report and project avoidance plan were sent with a letter to those same six tribes on March 31, 2011.' There is no mention of consulting with the tribes regarding Proposed Actions withdrawal of water from the R-M Aquifer. Nor is there any mention of consulting with them regarding potential spillage or leakage of contaminants into the watershed.	As discussed in the Final EA, no new water source would be developed for this project and the amount of water needed for construction is significantly less than 0.001% of the total water available in storage for the basin (Section 3.3.3). Additionally, as discussed in Section 1.6 of the Final EA, the tribes, including the Havasupai, have been consulted on this project. Thus, impacts to ground water (see Section 3.3.3), and the specific concerns of the tribes (see Section 1.6), have been considered in the Final EA .	3. Supplement, improve, or modify its analyses.
462	Webb, Linda	Letter	Yes	WATER	47	75	Several studies cite the Havasupai tribe as major stakeholders in watershed issues. None of these documents were referenced by SWCA in their review of materials nor was any of the data from them presented. All of these reports identify the watershed as of cultural importance as well as economic importance to the Tribe, and state a position of limiting use of the R-M Aquifer to protect the springs in the Cataract Canyon/Havasu Creek drainage. likewise, the position of "no importation of water unless it meets purity standards to prevent contamination" is expressed .• " The lifeblood of the Grand Canyon" is how water is referred to by the Tribe. (Reclamation Managing Water In the West: North Central Arizona Water Supply Study Report of Findings, Oct. 2006)	As discussed in the Final EA, no new water source would be developed for this project and the amount of water needed for construction is significantly less than 0.001% of the total water available in storage for the basin (Section 3.3.3). Additionally, as discussed in Section 1.6 of the Final EA, the tribes, including the Havasupai, have been consulted on this project. Thus, impacts to ground water (see Section 3.3.3), and the specific concerns of the tribes (see Section 1.6), have been considered in the Final EA .	3. Supplement, improve, or modify its analyses.
463	Webb, Linda	Letter	Yes	GEO-SOILS	47	76	In addition to these factors no mention is made in the EA about blasting as part of the construction process. This is mentioned in the CUP Proposal (pg 16). However this has the potential for significant impact to the rock strata of the aquifer. All references state that little is known about the "hydraulic conductivities of the R-M Aquifer (being) mostly unknown because of the relatively few number of wells completed in the formation". As noted is ,. the regional northwest trending Cataract Creek fault system and the regional northeast trending Mesa Butte Fault system intersect in the study area. The fault systems provide near vertical flow paths for water to enter the R-M Aquifer." Blasting has the potential to alter geologic structure in the Aquifer, but is never addressed in the EA.	Thank you for pointing this out. Section 2.2.3 of the Final EA has been revised to include information about blasting during construction.	1. Modify alternatives including the proposed action.
464	Webb, Linda	Letter	Yes	WATER	47	77	In addition, construction of roadways, drainages, buildings, and the increase of semi-impervious surface areas all affect run-off. Likewise, changes in vegetation affect run-off and absorption of water. The current pinyon-juniper vegetation tends to reduce flow as compared to grasslands. The potential effect of flooding events in the watershed is not addressed in the EA despite the fact that the flooding downstream is usually precipitated by excess rain events in the southern-most areas of the watershed.	Section 3.3.3 of the Final EA has been revised to include analysis of impervious areas and flooding potential.	4. Make factual corrections.
465	Webb, Linda	Letter	No	WATER	47	78	Another watershed issue of note is that the 10 mile APE (Area of Potential Effect) is an arbitrary number that has no rationale given for it. In Environmental science habitats are not fragmented but connected, particularly watersheds where what happens upstream affects all who are downstream. Throughout the EA the project area is treated as though it is totally disconnected from the rest of the watershed. The Rapid Assessment Report identifies 2S listed species within the watershed. Any disruption to the watershed area has the potential to affect downstream conditions and thereby impact the identified species.	As discussed in the Draft EA, "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." As discussed in the Final EA, no new water source would be developed for this project and the amount of water needed for construction is significantly less than 0.001% of the total water available in storage for the basin (Section 3.3.3). Impacts to vegetation (Section 3.3.4) and wildlife (Section 3.3.5) are considered in the Draft and Final EAs.	5. Explain why the comments do not warrant further agency response.
466	Webb, Linda	Letter	Yes	PROCESS	47	79	All in all, the EA is so full of errors, misrepresentations, and contradictory information as to make it worthless. The differences in information presented by the applicant in presentations to the various entities reviewing and approving the Project are inexcusable. Decisions were made based on the data presented, but if each entity was presented different or partial data how valid were the decisions rendered?	The Final EA has been revised to more accurately reflect the proposed project based on the Coconino County CUP and ACC Line Siting project details as previously presented to the public.	4. Make factual corrections.
467	Webb, Linda	Letter	No	NS-N/A	47	80	This review process reveals just as many contradictions and misrepresentations in every Potential Effect evaluated.	Thank you for your comment.	6. Other, general statement; non-substantive
468	Webb, Linda	Letter	No	NS-N/A	47	81	Additional References for Water:Havasu Creek Watershed Scoping Project Final Report, September 2009, Arizona Water Institute Havasu Canyon Watershed: Rapid Watershed Assessment Report June, 2010 USDA Natural Resources Conservation Service University of Arizona, Water Resources Research Center EcolOgical Assessment of Arizona's Streams and Rivers, 2000-2004 Anthony T. Robinson, Research Branch, Arizona Game and Fish Department; Nick V. Paretti, and Gail E. Cordy, U.S. Geological Survey, Arizona Water Science Center	Thank you for your comment.	6. Other, general statement; non-substantive

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469	Webb, Linda	Letter	No	OTH	47	82	Comments Prepared by Canyon Country Coalition, LLC in Response to the Environmental Assessment for Perrin Ranch Wind Energy Interconnection Project Prepared by SWCA Environmental Consultants For U.S. Department of Energy Western Area Power Administration	Thank you for your comment.	6. Other, general statement; non-substantive
470	Wittke, Anne	Email	Yes	CUMULATIVE	48	1	What are the cumulative impacts of the wind turbulence that will be generated by the wind turbines? At the Water Management and Climate Change in Northern Arizona conference held in Flagstaff on June 8, 2011, Christopher Castro of the University of Arizona discussed dynamical modeling vs. statistical modeling in conjunction with studying climate change, and concluded that dynamical modeling was better for predicting trends because it uses historical as well as location data. When asked if it has been done to model whether climate was affected by industrial size wind turbines, he said it hadn't been done to his knowledge but may be able to be done, and that would really be more of an EIS issue. Therefore I request that an EIS be done for this project, rather than an EA, and that this study be done.	In the Final EA, Appendix F, Cumulative Impacts, has been revised to include additional foreseeable future actions. However climate change is considered an existing condition to which the project is neither adding to nor subtracting from anything from, therefore the cumulative impacts are not considered. As discussed in the Draft EA (see Section 3.1.1), "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."	3. Supplement, improve, or modify its analyses.
471	Wittke, Anne	Email	No	FIRE	48	2	Studies should be done in dry and wet areas, with and without turbines, to see if rain patterns are affected in dry climates. This would be of great interest, both because of fire danger, and because Flagstaff and much of the surrounding area relies on precipitation for its water supply.	The analysis is based on best available science. Additionally, climate change is considered an existing condition to which the project is neither adding to nor subtracting from anything from.	5. Explain why the comments do not warrant further agency response.
472	Wittke, Anne	Email	No	AIRQ	48	3	On page 71 of 303, this assessment states 'nor is the Project expected to change climate'. No studies have been done, as detailed above, to determine whether or not the industrial wind turbines change the climate, so it is an act of hubris to state that they do not.	The analysis is based on best available science. Additionally, climate change is considered an existing condition to which the project is neither adding to nor subtracting from anything from.	5. Explain why the comments do not warrant further agency response.
473	Wittke, Anne	Email	Yes	EJ	48	4	On page 72 of 303, Environmental Justice is discussed. Disruption of 647.9 acres of groundcover in the Cataract Canyon watershed would have impacts on the Havasupai tribe, which is directly downstream of the project, because flooding could be more likely due to widespread disturbance of the soils. They have already experienced severe flooding in just the past few years. The tribe is 100% Native American, and is a low-income population.	As discussed in the Final EA, no new water source would be developed for this project and the amount of water needed for construction is significantly less than 0.001% of the total water available in storage for the basin (Section 3.3.3). Additionally, as discussed in Section 1.6 of the Final EA, the tribes, including the Havasupai, have been consulted on this project. Thus, impacts to ground water (see Section 3.3.3), and the specific concerns of the tribes (see Section 1.6), have been considered in the Final EA .	3. Supplement, improve, or modify its analyses.
474	Wittke, Anne	Email	Yes	VISUAL	48	5	On page 74 of 303, Land Use is discussed: Coconino County has regulations about lighting because of the importance of the area in astronomical studies, and although a CUP was approved, it was on the condition that a radar- activated HVAS would be installed at the time of construction, to be activated when approved by the FAA. Many amateur astronomers in the area use their land to do astronomy, and having a plethora of lights high in the air would definitely interfere with astronomical observing. This was not mentioned at all as an impact.	All conditions of the resolution 2011-04 (see Appendix B of the Final EA), have been included in the Final EA in Section 2.2.7. Additionally, the Draft EA analyzes and discloses the rationale for impacts to visual resources, including Nighttime Lighting and Sky Glow (see Section 3.3).	3. Supplement, improve, or modify its analyses.
475	Wittke, Anne	Email	No	NS-N/A	48	6	Thank you for the opportunity to comment on this issue.	Thank you for your comment.	6. Other, general statement; non-substantive
476	Macauley, Mike	Email		NS-N/A	49	1	I have received the Draft Environmental Assessment you sent me. Upon review, I found the information to be incomplete, inaccurate, misleading, and full of assumptions. I have the following issues, concerns, and suggestions for the document:	Thank you for your comment.	6. Other, general statement; non-substantive
477	Macauley, Mike	Email	Yes	LAND USE	49	2	Chapter 2, page 5, Table 1.1: Proposed Action Permit/Authorization Responsibilities. This table lists the Right-of-Way request regulation as the sole responsibility of the AZ State Land Department (ASLD). This is inaccurate. There are four other agencies involved: APS, as part of their agreement with Perrin Ranch Wind, LLC; Coconino County, specifically pertaining to the use of Espee Rd., which is a county right-of-way; AT&T, who has a buried fiber optic cable and access road right-of-way running through the Project Area, and Questar Pipeline Company, whose Southern Trails Pipeline runs across the northwestern corner of the Project Area.	Use of Espee Road is authorized under the Coconino County Conditional Use Permit (see Table 1.1 in the Draft EA). APS does not issue right-of-way permits. Questar no longer has an easement on this land. NextEra has been in communication with AT&T for a crossing agreement, if needed, however no impact to the AT&T fiber optic line is anticipated. This information has been added to Section 3.2 of the Final EA.	3. Supplement, improve, or modify its analyses.
478	Macauley, Mike	Email	No	OTH	49	3	Chapter 2, pages 10, 11, 13-37: My concern specifically addresses any information pertaining to access roads. To date there has been no final agreement made between Perrin Ranch, LLC, Perrin Ranch Wind, LLC, and ASLD as to the placement of project roads. Therefore, the lengths of access roads listed in tables 2.1 and 2.2 and the roads shown on the project maps are purely speculative and inaccurate.	The proposed facility footprint, including roads, has been approved by the Conditional Use Permit issued by Coconino County (see Resolution No. 2011-04, Appendix E of the Draft EA). Additionally, the landowner participated in the Conditional Use Permit process as part of the County approval. Finally, ASLD has received the right of way permit application and relevant archaeological report and has approved the road corridors.	5. Explain why the comments do not warrant further agency response.

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479	Macauley, Mike	Email	No	OTH	49	4	Chapter 1, page 4, Sec. 1.3, and Chapter 2, page 12, Sec. 2.2.2: Meteorological Towers. From Chap. 1: "NextEra Energy has conducted wind generation pre-NEPA studies at the Perrin Ranch location." From Chap. 2: "The Project includes six proposed MET towers that would measure the wind for speed and direction." This information needs some further clarification. As of April 2010, four of the six MET towers have been installed, hence Next-Era's ability to conduct "wind generation pre-NEPA studies". Additionally, four sites, two primary and two alternate, have been selected for the remaining two MET towers (reference CUP 10-063), but these have yet to be installed.	Thank you for your comments.	6. Other, general statement; non-substantive
480	Macauley, Mike	Email	Yes	OTH	49	5	Chapter 2, Sec. 2.2.3, page 42: Truck and Automobile Traffic. "Warning signs would be posted at the two existing sign-in kiosks, located at the entrances to the ranch." There are four sign-in kiosks: one at the Espee Rd./Hwy. 64 entrance (east), one at the K-4 tank entrance (south), one at the border between the Perrin Ranch and the Aja Ranch (west), and one at the northern ranch boundary on Espee Rd.	Section 2.2.3 in the Final EA has been revised.	4. Make factual corrections.
481	Macauley, Mike	Email	No	TRANSP	49	6	Chapter 2, Sec. 2.2.3, pages 43, 44: Transportation Planning. "Turbine equipment would eventually be delivered, which would warrant a separate and more detailed transportation plan, the dates and schedule of which have yet to be determined. A detailed transportation study for the Project would be provided by the turbine manufacturer once wind turbines are purchased. "	Thank you for your comment. Transportation Planning is discussed in the Draft EA (see Section 2.2.3).	5. Explain why the comments do not warrant further agency response.
482	Macauley, Mike	Email	No	TRANSP	49	7	To my knowledge, the turbines have been purchased; they were actually acquired two years ago, and are being housed in a warehouse in Indiana, per Matthew Gomes with NextEra. I have yet to see a transportation study, and would like to see it incorporated in detail in this EA. This study would relate directly to my above listed concerns about access roads and is needed for road planning. Additionally, since the project is "proposed to begin in July 2011", as per the Estimated Project Schedule on page 44, the date and schedule of this transportation study had better be determined, since the start of July 2011 is only 8 days away, as of the date of this letter.	NextEra holds a Master Purchase Agreement with GE for the purchase of turbines. All turbines for 2010 NextEra projects have been purchased, however the specific turbines to be used, and their location of storage, for this project have not been identified.	5. Explain why the comments do not warrant further agency response.
483	Macauley, Mike	Email	Yes	PROCESS	49	8	Also, this is a federally subsidized project. In my understanding, on any federally subsidized project, construction cannot begin until the final draft of the EA is approved and issued.	All project components described in the Final EA would be privately funded; no federal or state funding would be used to construct, operate, maintain or decommission the project. This information has been included in Section 2.2.1 of the Final EA.	3. Supplement, improve, or modify its analyses.
484	Macauley, Mike	Email	No	PROCESS	49	9	Furthermore, the ASLD is a principle player in this project and therefore must come to an agreement before any construction can begin. The ASLD board convenes quarterly and the next meeting is on August 11, 2011, which also affects the estimated project schedule.	As of this publication date, ASLD has approved the corridors for the roads and collector lines and a right of entry will be issued in July 2011. The layout of roads onsite would not change.	5. Explain why the comments do not warrant further agency response.
485	Macauley, Mike	Email	Yes	OTH	49	10	Chapter 2, Sec. 2.2.4, page 45, and Chapter 3, Sec. 3.3.8, page 131: Both of these sections reference the posted speed limit as 35 mph. The posted speed limit on Espee Rd. is 40 mph.	Sections 2.2.4 and 3.3.8 of the Final EA has been revised to correct this inaccuracy.	4. Make factual corrections.
486	Macauley, Mike	Email	No	OTH	49	11	Chapter 2, Sec. 2.2.4, page 47: Water Use. "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."	Thank you for your comment. Water use during operation is discussed in the Draft EA (see Section 2.2.4).	5. Explain why the comments do not warrant further agency response.
487	Macauley, Mike	Email	No	OTH	49	12	Who are these local retailers and delivery services? Where are they located? Most residents in the area haul their own water provided by either the City of Williams, private suppliers in Valle, Red Lake area, Bellemont, and/or Chino Valley. Is this the only option? On a sustainable note, the bottled water use is an interesting choice. If this is indeed the plan, then an addendum is necessary addressing collection, recycling, and disposal in detail.	Water retailers have not been determined as of this publication date.	5. Explain why the comments do not warrant further agency response.
488	Macauley, Mike	Email	Yes	HAZMAT	49	13	Chapter 2, Sec. 2.2.4, page. 47, 48: Hazardous Materials. This section starts with an outline of the hazardous materials to be housed at various locations within the Project Area. There is some discussion of actions to be taken in the event of a spill at a turbine site, however there is no discussion of actions to be taken in the event of a spill at the O&M buildings or substations. "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..." "Perrin Ranch Wind and its contractors... 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... development of applicable emergency response plans..."	Section 2.2.4 of the Final EA has been revised to indicate that the measures outlined for the Spill, Prevention, Control and Countermeasure Plan (SPCC Plan) would apply to the whole wind energy project, not just the turbines.	4. Make factual corrections.
489	Macauley, Mike	Email		HAZMAT	49	14	Both the SPCC Plans and the emergency response plans should be included in detail in this EA. To date, neither has been developed.	A Fire Protection and Emergency Response Plan has been drafted and is included as an Appendix to the Final EA (see Appendix E). Additionally, information has been added to the Proposed Action (Section 2.2 of the Final EA) describing what is included in a SPCC and SWPP. These plans are developed by the General Contractor in advance of construction.	3. Supplement, improve, or modify its analyses.

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490	Macauley, Mike		Email	WATER	49	15	“Any Project wastewater would be disposed of in accordance with federal, state, and county regulations.” This is the second mention of wastewater disposal, the first being in Chapter 2, page 39 with the O&M facilities, but I expected to see it addressed in both the construction and operations & maintenance sections. What plan is in place to deal with human waste during construction? Please specify which federal, state, and county regulations address wastewater disposal and how this is to be implemented for the life of the project. I will address further concerns in the Water Resources section of Chapter 3.	As discussed in Section 2.2.2 of the Draft EA, the O&M Building "would also include a septic drain-field appropriately sized for the O&M facilities and soil conditions." Clarification of the use of a septic system has been added to the Final EA (see Section 2.2.2, "Operations and Maintenance"). A description of the relevant federal regulations has been added to the proposed action (see Section 2.2).	1. Modify alternatives including the proposed action.
491	Macauley, Mike		Email	OTH	49	16	Chapter 2, Sec. 2.2.5, page 48: Construction Waste Management. Again, please specify which federal, state, and county regulations and plans are in place to handle this. What and where are the local appropriate disposal facilities? I will elaborate further in my comments on the Restoration and Reclamation Plan concerning utilization of removed vegetation	A description of the relevant federal regulations has been added to the proposed action (see Section 2.2).	1. Modify alternatives including the proposed action.
492	Macauley, Mike		Email	VISUAL	49	17	Chapter 3, Sec. 3.3.1, pages 61-67: Affected Environment. “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 as being representative of critical views of the Project Area and include residential areas, commonly traveled routes, and backcountry recreation sites.” I understand that these chosen sites are considered representative of similar sites in the area; however, I find it interesting that there is no mention of Campsites 4 and 5 (save as a side note in Chapter 2) or of the ranch headquarters at Red Dam (Township 24 North, Range 1 East, Sections 8 & 9), all of which fall directly within the Project Area. There is no discussion of the effects the wind turbines may have at the ranch headquarters. Also, the captions of two campsite photographs (Fig. 3.5 and Fig. 3.7) are incorrect. Fig. 3.5 is facing northwest, not north, and Fig. 3.7 is facing due east, not southwest.	Figures captions in Section 3.3.1 have been revised to correct these inaccuracies. Additionally, as discussed in the Draft EA (see Section 3.3.1), the KOPs were identified as being representative of critical views of the Project Area.	4. Make factual corrections.
493	Macauley, Mike		Email	WATER	49	18	Chapter 3, Sec. 3.3.3, page 86: Water Resources/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). It is anticipated that a Section 404 non- notifying nationwide permit would be needed for the proposed Project and associated permit conditions would apply." There may be a conflict (see Rapanos vs. United States (2006)). Within that case is a definition of WUS: "...includes only those relatively permanent, standing or continuously flowing bodies of water 'forming geographic features' that are described in ordinary parlance as 'streams[,]... oceans, rivers, [and] lakes.'" As non-point sources, agricultural storm water discharges and irrigation return flows were specifically exempted from permit requirements. Since the construction of the wind farm is not the result of agricultural activity, but, rather, industrial activity, I see a serious conflict and potential issues affecting the agricultural classification of the ranch. This issue is not addressed at all in the Draft EA.	The Final EA has been revised to clarify the CWA Section 404 permits that would apply to the Project, "Due to the limited quantity of potential WUS near Project activities, the temporary nature of the proposed road and collector line construction impacts within potential WUS, and the combined total of permanent impacts that will be less than 0.1 acre; the Project qualifies as non-notifying. However, compliance with the terms of NWP 12 and NWP 14 is required and associated permit conditions would apply" (Section 3.3.3).	3. Supplement, improve, or modify its analyses.
494	Macauley, Mike	Email	Yes	WATER	49	19	Chapter 3, Sec. 3.3.3, pages 86, 87, 89, 90, 93-95: Water Resources. The Perrin Ranch, and the Project Area, span two watersheds: the Verde River watershed and the Cataract/Havasu watershed. The Cataract/Havasu watershed covers 2966 sq. miles and is the primary watershed within the Project Area. The Verde River watershed covers 6,600 sq. miles, but only the southwest portion of the Perrin Ranch (about 11 sq. miles) and Project Area (about 8 sq. miles) fall within it. The Verde River watershed needs to be differentiated from the Cataract/Havasu watershed in the Draft EA.	The Final EA has been revised to distinguish between the two watersheds (Section 3.3.3).	3. Supplement, improve, or modify its analyses.
495	Macauley, Mike	Email	Yes	WATER	49	20	"No site-specific precipitation data [is] publicly available..." In fact, the Natural Resource Conservation Service (NRCS) and Perrin Ranch have conducted rangeland monitoring, including precipitation monitoring, for 15 years. This information was provided to NextEra Energy, but no reference has been made in the Draft EA. The Cataract/Havasu watershed has very few rain gauges. There are three flow gauges located in Cataract Canyon, but all are to the northwest of the Perrin Ranch and the Project Area. The gauges are intended to monitor water flow rates in Cataract Creek, not measure rain fall. There was a Rapid Watershed Assessment conducted in the area by the NRCS, but that is not referred to in the Draft EA.	The Section 3.3.3 of the Final EA has been revised using precipitation data and other information from the NRCS Rapid Watershed Assessment June 2010 report.	3. Supplement, improve, or modify its analyses.
496	Macauley, Mike	Email	Yes	WATER	49	21	Pertaining to groundwater, the Draft EA references two studies conducted by ADWR in 2009 and 2011 respectively. The map on page 87 reinforces the fact that the ranch and Project Area fall in two separate watersheds, as stated above, which was addressed by the ADWR, but not in the Draft EA. Also, for clarification, the ASLD well that falls within the Project Area was applied for on 06/14/1982, however, there is no pump or depth info because it is capped. At the time, the pumping costs far outweighed any benefit from the well. The flow was a mere 2 gpm, so it has not been used.	Section 3.3.3 of the Fina EA has been revised to better discribe the two watersheds in the Project Area, "The Project Area is located for the most part in the Cataract Creek watershed, with the exception of a small portion, approximately 2,900 acres in the southwest corner of the Project Area which is situated in the upper Verde River watershed."	3. Supplement, improve, or modify its analyses.
497	Macauley, Mike	Email	Yes	WATER	49	22	Pertaining to surface water, the tributaries that drain into Cataract Canyon in the Project Area are named, as indicated on most maps of the area. However, the drainages and washes named are not site-specific, but address the region. A discussion of the washes and drainages *within the Project Area* needs to be included. For example, LO Draw, a major drainage that runs through the Project Area and joins Cataract Canyon off-site, should be named in the EA as it will be directly affected by the project.	Section 3.3.3. of the Final EA has been revised to include Lo Draw and K Four Draw as tributary to Cataract Creek.	3. Supplement, improve, or modify its analyses.

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498	Macauley, Mike	Email	Yes	WATER	49	23	The last paragraph on page 90 refers to ten stocktanks within the Project Area, data “obtained from USGS topographic maps.” There are several more than that. For example, in Township 24 North, Range 1 E, Sections 7, 8,10, 12, 16, 17, 18, 24, 25, 27, 30, and 32 (an area entirely within the Project Area) there are 13 stocktanks. The remainder of the Project Area encompasses portions of Township 24 North, Range 2 East; Township 23 North, Range 2 East; and Township 23 North, Range 1 East, an area that has many more known surface water rights. It is important that the Draft EA has an accurate account of surface water rights within the Project Area, since water rights, along with archeological sites, take precedence over any project.	Additional publicly available sources were reviewed and Section 3.3.3 of the Final EA has been revised to state 19 stock tanks are within the Project Area and a table has been added with tank names and cadastral locations.	3. Supplement, improve, or modify its analyses.
499	Macauley, Mike	Email	Yes	WATER	49	24	From Chapter 2, page 39: "The Project would include O&M facilities... It would also include a septic drain-field appropriately sized for the O&M facilities and soil conditions." This statement is coupled with my concerns of wastewater disposal addressed earlier. I would have expected to see an elaboration of the percolation tests and other site-specific tests needed for wastewater processing in Chapter 3, Water Resources, Environmental Impacts. However, there is no mention of the effects this wastewater will have on groundwater or surface water resources in either the construction or operation & maintenance phase.	Section 3.3.3 of the Final EA has been revised to include discussion of the septic tank permit and submittal requirements that include percolation tests.	3. Supplement, improve, or modify its analyses.
500	Macauley, Mike	Email	No	VEG	49	25	Chapter 3, Sec. 3.3.4, pages 96, 99: USGS has not conducted a site-specific survey of the Project Area. The land cover classifications are very general and are meant to address an area much larger than the Project Area. Many of the vegetation lists, while representative of the land cover class, are not site-specific to the Project Area. For example, there is no big sagebrush (Artemisia tridentata) within the Project Area despite the fact that the dominant land cover class for the Project Area is listed as Colorado Plateau Pinyon-Juniper Woodland, which lists big sagebrush as a common species.	The USGS SWReGap vegetation data used in the Draft EA is the best available data and provides a general assessment of vegetation communities for the area. Vegetation presented in SWReGap is representative of a given landcover class and not site-specific. Site-specific native plant, sensitive-plant, and noxious weed surveys were completed and are described in Section 3.3.4 of the Draft EA.	5. Explain why the comments do not warrant further agency response.
501	Macauley, Mike	Email		OTH	49	26	Chapter 4, page 133: Consultation and Coordination. Some corrections and additions: Chuck Vencill is based in Phoenix, AZ, not Flagstaff. A personal communication with Macauley was referenced on pages 59 and 60 of Chapter 3, however, no Macauley is listed as a contact.	The Draft EA included Macauley 2011 in Literature Cited (see page 139). Table 4.1 in the Final EA has been revised.	4. Make factual corrections.

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502	Macauley, Mike	Email	Yes	VEG	49	27	Appendix A: Reclamation and Restoration Plan Sec. 2.1: General Vegetation Reiterating the concern from Chapter 3, Sec. 3.3.4: The land cover classes and vegetation communities are very general and are meant to address an area much larger than the Project Area. Site-specific analysis is needed. This includes, but is not limited to, all turbine sites (primary and alternate), all roads, all transmission lines, and all new building sites. As stated previously, rangeland monitoring has been conducted on the Perrin Ranch for 15 years in association with the NRCS, the Coconino Natural Resource Conservation District (CNRCD), Arizona Game and Fish Department, ASLD, US Forest Service, the Rocky Mountain Elk Foundation, the Williams Habitat Committee, the Arizona Elk Society, and the general public. There is also a conservation plan established for the Perrin Ranch, drafted in cooperation with NRCS. None of this information is referenced in the Draft EA. Sec. 2.2: Noxious Weeds "Wildfire can cause rapid and profound changes in the local native habitat... because many desert plants are not well adapted to large disturbances by fire." "Specific surveys for noxious weeds have not been conducted within the Project Area at the time of this writing." A site-specific study would indicate that this environment is actually a fire-dependent ecosystem. As such, fire has been incorporated as a tool in the land management practices of Perrin Ranch for over 100 years. Again, a site-specific analysis is needed to address existing plant communities, both native and non-native. Sec. 3.0: Restoration Actions General suggestions: Due to the high number of trees (pinyon/juniper) that will need to be removed from right-of-ways, turbine, and building sites it would be preferential to utilize the removed trees in restoration and rehabilitation of disturbed areas, thereby minimizing construction waste and incorporating an on-site resource. Removed trees can be used in the following ways: trees can be ground into mulch and incorporated into the revegetation/seeding process; or the entire carcass of the tree can be used as an erosion control/windbreak along roadways and on slopes. The tree mulch would be spread prior to seeding. The seed mix would be drilled through the mulch. It does not make sense to bring in straw mulch from outside sources. Despite the weed-free certification, there would no guarantee that no weed seeds are in the straw, and, additionally, the straw contains harmful pesticides and herbicides that would inhibit native seed growth once on the ground. Whole tree carcasses have been used on the ranch in other erosion control measures to great success. The trees have been placed in drainage ditches, which slows eroded sediment and allows for deposition and stabilization, providing a seed bed for native plants. Even left to lay, the carcasses provide seeds and plants protection from wildlife, livestock, and wind, allowing them to become fully established and healthy. Sec. 3.2.2: Revegetation/Seeding The seed mix listed in Table 6 is inadequate for the purposes of successful revegetation. A more site-specific survey of the Project Area would show several different soil types, each hosting a unique plant community. In order to ensure the success of revegetation efforts, this plan needs to be more detailed and incorporate the range of plant communities and soil types seen in the Project Area. The revegetation plan also needs to address the seasonal seeding requirements for each plant. So, in addition to using soil-specific seed mixes, seasonally-specific seed mixes for each soil type need to be developed. Attached is a preliminary seed list developed by NRCS, CNRCD, ASLD, and Arizona Game & Fish. Sec. 4.0: Noxious Weed Management Sec. 4.1.2: Prevention "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... 3) Locate equipment storage, machine, and vehicle parking... in areas that are relatively weed-free." Items 1 and 3 are in direct contradiction. Why park any equipment in an undisturbed area, cause disturbance, and invite potential infestation of noxious weeds? There are plenty of already disturbed sites that can be treated and used for parking. "4) Determine equipment-cleaning sites..." These sites should be located off the Perrin Ranch. Any runoff and debris should be confined to the cleaning site for collection. Disposal in the landfill is impractical, the seeds will just infest the landfill, attach to dumptrucks and be redistributed in the ecosystem. The EA needs to reference Coconino County regulations for proper disposal of noxious weed seeds, including incineration. This same stipulation applies to item 5 listed on page 12. Sec. 4.1.3: Monitoring "Establishing a strong monitoring program that can be easily followed and repeated will greatly assist in future efforts to make appropriate management decisions... Annual monitoring will continue for a minimum of three years, with an additional two years if restoration efforts are not successful." As stated previously, there has been a monitoring plan in place on the Perrin Ranch for 15 years. This monitoring has shown that the environment of the Perrin Ranch, including the Project Area, is "brittle", meaning recovery of disturbed plant communities and ecosystems takes much longer than in non-"brittle" environments. The monitoring plan suggested in the Draft EA is shortsighted and inadequate. In order to ensure success of the rehabilitation monitoring should occur for the life of the project plus 20 years. This monitoring plan also needs to specify individual monitoring sites that are representative of soil types, plant communities, human activities (wind farm, **(comment continued on next page)**	The Reclamation and Restoration Plan, now the Native Plant Revegetation and Noxious Weed Management Plan , has been revised in the Final EA (see Appendix C).	3. Supplement, improve, or modify its analyses.

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502	Macauley, Mike	Email	Yes	VEG	49	27	**(comment continued from previous page)** ranching, recreation), and wildlife activities in a given area. The monitoring also needs to occur on a seasonal basis, not an annual basis, to check the presence of appropriate warm and cool season plants and shrubs. Sec. 4.1.4: Control Of the three control mechanisms listed, only the hand removal control seems a viable option. Mowing is impractical on rangeland, and there is to be no use of chemical controls on Perrin Ranch. This includes chemical controls within straw mulches, as stated previously. The ranch, in its management plan, uses sheep as a control for noxious and invasive weeds. The ranch has also incorporated mechanical tools for the removal of invasive brush for the past 70 years. This needs to be addressed in the Draft EA. Appendix C: Soil Amendments Compost and fertilizer are unnecessary additions to the soil. There is no benefit to the native plants, and these will only encourage the growth of aggressive annuals, such as cheatgrass (*Bromus tectorum*).	**(see previous page for response)**	3. Supplement, improve, or modify its analyses.
503	Macauley, Mike	Email		NAT AMER	49	28	Miscellaneous comments: On May 26, 2011, a meeting was held in Peach Springs, AZ. Present were representatives from local tribes, NextEra, SWCA, Western Area Power Administration, and the Perrin Ranch. An issue was brought forth concerning employee policies during construction of the project. To reiterate, the Perrin Ranch states that there will be no camping (on or off-duty), no consumption of alcoholic beverages (on or off-duty), and adequate toilet facilities will be provided and used for the duration of the construction phase.	Thank you for your comment.	6. Other, general statement; non-substantive
504	Macauley, Mike	Email	Yes	LAND USE	49	29	There is no discussion of existing livestock pipelines that may be affected by various activities associated with construction of the project.	Information regarding existing land uses is discussed in Section 3.2 of the EA. Existing pipelines would not be eliminated if the Project were implemented; Project construction design would accommodate all existing land uses.	3. Supplement, improve, or modify its analyses.
505	Macauley, Mike	Email	Yes	LAND USE	49	30	There is no discussion of all existing right-of-ways, save for the APS transmission line. As stated at the beginning of this letter, AT&T has a buried cable and access right-of-way, and Questar Pipeline Company has an oil pipeline right-of-way.	Information regarding existing land uses is discussed in Section 3.2 of the EA, including AT&T and Questar. Existing right-of-ways would not be eliminated if the Project were implemented; Project design and construction would accommodate all valid and existing right-of-ways through avoidance or permitting.	3. Supplement, improve, or modify its analyses.
506	Macauley, Mike	Email	Yes	OTH	49	31	I noticed several instances throughout the document where Perrin Ranch Wind was named as the private landowner. Perrin Ranch, LLC is the private landowner. Perrin Ranch Wind, LLC is a subsidiary of NextEra Energy, who is leasing the Project Area from Perrin Ranch, LLC and ASLD.	The Final EA has been revised to correct these errors.	4. Make factual corrections.
507	Macauley, Mike	Email	Yes	PROCESS	49	32	As stated previously, this is a federally subsidized project. In my understanding, on any federally subsidized project, construction cannot begin until the final draft of the EA is approved and issued.	All project components described in the Final EA would be privately funded; no federal or state funding would be used to construct, operate, maintain or decommission the project. This information has been included in Section 2.2.1 of the Final EA.	4. Make factual corrections.
508	Macauley, Mike	Email	Yes	PROCESS	49	33	In summation, the Draft EA is incomplete, inaccurate and seems to indicate that very little fieldwork was conducted in the Project Area. Numerous sources with more in-depth information related to the Project Area, such as the NRCS, were not accessed or discussed. The Draft EA assumes many aspects of the project plan, such as the location of access roads, as established when much information has yet to be determined. Until more accurate and pertinent information is utilized, any management decision will be compromised and the project will be jeopardized.	The Final EA has been revised to more accurately reflect the proposed project based on the Coconino County CUP and ACC Line Siting project details as previously presented to the public.	4. Make factual corrections.
506	Kack, Henry	Letter	No	PROCESS	50	1	I am writing this letter in opposition of the proposed Industrial Wind Turbine Fann that is to be constructed north of Williams, Arizona. I am a property owner in the Four Hills Ranch area just north of Williams. I apologize for the late response but I just recently realized another possible detrimental environmental effect of an industrial wind farm.	Thank you for your comments.	6. Other, general statement; non-substantive
507	Kack, Henry	Letter	No	WILDLIFE	50	2	It is a fact that the elk and deer populations in the area use the canyon bottoms (Cataract Canyon and Red Lake Wash) as corridors to move from one grazing area to another. It is also a fact that snakes including rattlesnakes will vacate an area in which hoofed animals are present because of the threat of being trampled. Snakes are made aware of the presence of hoofed animals through sensing vibrations in the ground. The proposed wind turbines also transmit vibrations into the ground through the blades chopping motion through the air and the vibrations are telegraphed through their main support into the ground. gall the snakes vacated this area, the rodent population could skyrocket. I don't know if the EA has addressed this unintentional consequence.	Impacts to big game and their movement corridors are discussed in Section 3.3.5 of the Draft EA. There are no currently available data to support that snakes will vacate an area where wind turbines have been constructed.	5. Explain why the comments do not warrant further agency response.
508	Kack, Henry	Letter	No	PROCESS	50	3	It is unfortunate that the Coconino County Planning and Zoning Department granted a CUP when they did little to no research into the consequences of industrial wind farms when placed adjacent to residential populations and wildlife habitats. I find it to extremely irresponsible and I am very much opposed to this project.	The Draft EA analyzes impacts to vegetation (see Section 3.3.4) and wildlife (see Section 3.3.5).	5. Explain why the comments do not warrant further agency response.

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Appendix B

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 3589227
Candace Owens - Recorder 03/03/2011 08:30 AM Pgs: 8
COCONINO COUNTY BOARD OF SUPERVISOR GA $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, Chair

ATTEST:

Clerk of the Board

APPROVED AS TO FORM:

Jean Wilcox
Deputy County Attorney

Appendix C

NATIVE PLANT REVEGETATION AND NOXIOUS WEED MANAGEMENT PLAN

Perrin Ranch Native Plant Revegetation and Noxious Weed Management Plan

Prepared for

Coconino County

On behalf of

NextEra Energy Resources, LLC

Prepared by

SWCA Environmental Consultants

June 2011

PERRIN RANCH NATIVE PLANT REVEGETATION AND NOXIOUS WEED MANAGEMENT PLAN

Prepared for

Coconino County Community Development
2500 North Fort Valley Road, Building 1
Flagstaff, Arizona 86001

On behalf of

NextEra Energy Resources, LLC
1000 Louisiana, Suite 5500
Houston, Texas 77002

Prepared by

SWCA Environmental Consultants
7373 Peak Drive, Suite 170
Las Vegas, Nevada 89128
(702) 248-3880
www.swca.com

SWCA Project No. 16440

June 2011

CONTENTS

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 (the 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 (CUP) for the project, NextEra Energy is required to complete a Native Plant Revegetation and Noxious Weed Management Plan (plan) detailing the restoration, reclamation, and management of disturbed lands resulting from this Project. NextEra Energy (NextEra or project proponent) retained SWCA Environmental Consultants (SWCA) to complete this report in order to satisfy the conditions of the CUP.

This report summarizes the vegetation-related work that is expected to occur for the three phases of this project, including construction (6 months), operation (30 years), and post-operation (5 years), and provides specific restoration, reclamation, and management guidelines for contractors completing restoration and reclamation. This report includes an overview of acceptable restoration, reclamation, and management techniques and the criteria for selecting each technique; however, it is incumbent on the project proponent and/or selected contractor(s) to implement these techniques as appropriate. In addition, 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; in fact, the primary reason for replanting disturbed areas is to control noxious weeds. Note that the term "noxious weed" is a commonly used designation to refer to regulated invasive plants and/or non-native plant species; therefore, this plan covers all categories. However, for consistency purposes, the plan refers to all categories as "noxious weeds," and the responsible party is only statutorily required to treat and control species that are listed as noxious weeds.

1.1 Responsible Parties

The project proponent, NextEra, will have the overall responsibility of directing and monitoring the weed control and revegetation efforts as described in this plan for the project. However, the construction contractor may retain the services of a subcontractor who specializes in reclamation and restoration and/or noxious weed management to implement the protocols identified in this plan during construction, operation, and maintenance. Thus, the project proponent, any contractors or subcontractors, and also any future owners will be responsible for implementing 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 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.

Coconino County Requirements. 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 (5 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

This plan for the project provides site-specific guidelines for successful restoration and reclamation of impacted areas, which will include up to 648 acres for this project. In addition, all three phases of the project, including construction (approximately 6 months), operation (30 years), and post-operation (5 years), are addressed. The plan describes 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 developments.

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-Mountain 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-Mountain 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 geographic 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-Mountain 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-Mountain 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 at elevations ranging from approximately 6,293 to 9,186 feet above mean sea level (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 ecosystems. 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 some plants are not well adapted to large fire disturbances. 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 of these communities (Esque et al. 2003).

The National Invasive Species Council (2006) defines invasive species 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

Qualified SWCA biologists conducted a 100% clearance survey for noxious and invasive weed species within the disturbance footprint of the Project Area on June 7–10, 13–17, and 20, 2011. All occurrences of noxious weed species were mapped while invasive weed species were only mapped when either several individuals or a large patch occurred (e.g., 2-m radius). Using TopCon global positioning system (GPS) units, small occurrences (< 50-m radius) were recorded as a data point, whereas larger occurrences were mapped as a line or a polygon. Because of the abundance of cheatgrass (*Bromus tectorum*) in the project area, occurrences of this species were not mapped. Figure 1 depicts the weed infestations documented during the survey. In addition, Appendix A provides detailed data on the invasive and noxious weed infestations. These noxious weed location data will be useful for establishing a baseline understanding of the noxious weeds in the project area and for tracking the change in these populations and new infestations over time.

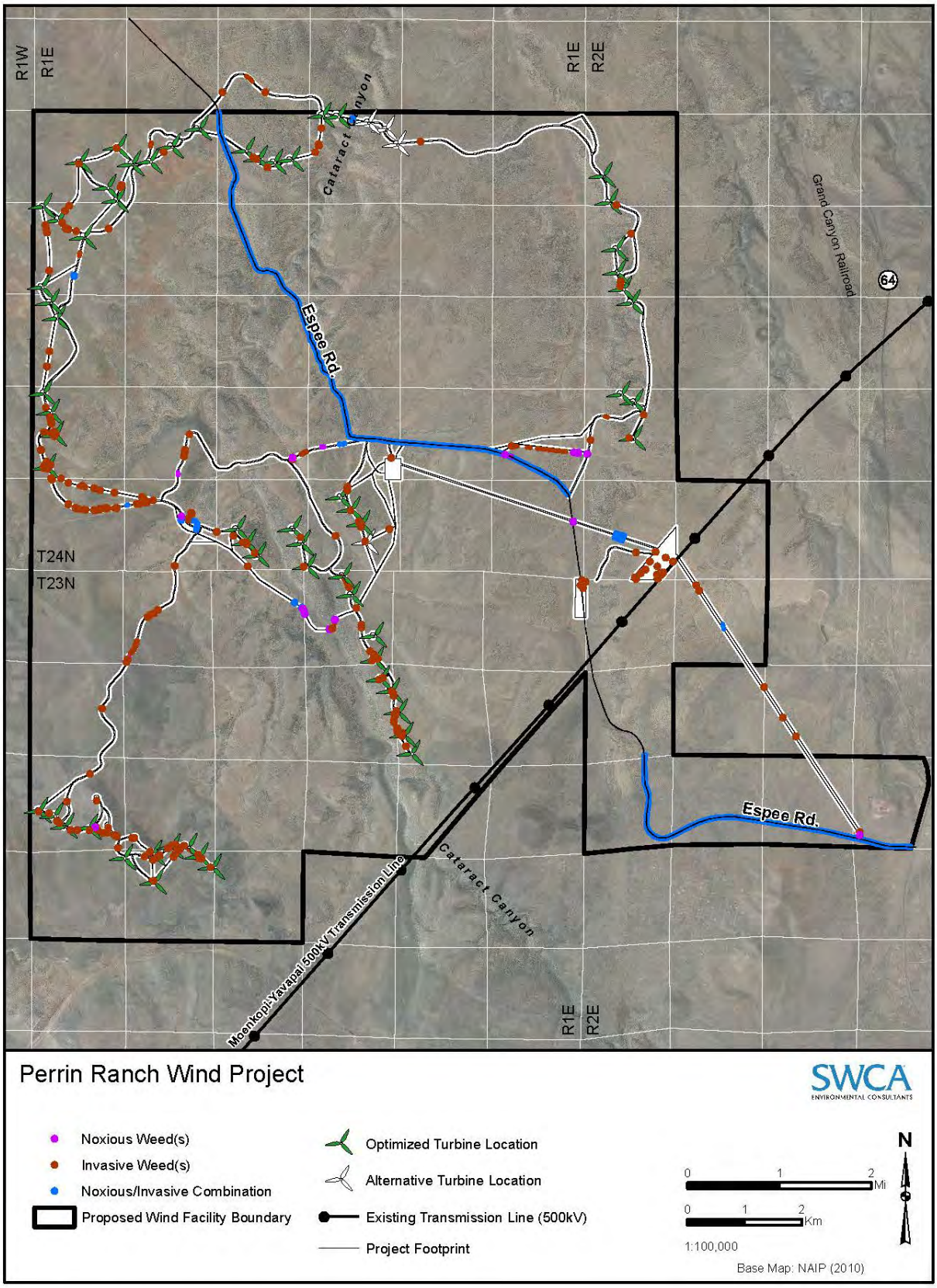

Figure 1. Pre-construction survey noxious and invasive weed locations.

2.2.2 Noxious and Invasive Weeds Present in the Project Area

In addition to the pre-construction noxious weed survey data, other data sources were investigated in order to obtain as much information as possible regarding the presence of noxious weeds in the project area and vicinity. The USGS (2007) maintains a database of noxious weed occurrences in Arizona. These data were useful for review prior to surveys to complete a baseline assessment of the noxious weeds within the project area. Table 2 below lists the seven noxious and invasive weeds that have been noted as being present within the project area. Multiple fact sheets are available in Appendix B for each noxious weed species.

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
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 the Arizona Wildlands Invasive Plant Working Group.

2.2.3 Noxious and Invasive Weeds Present in the Project Vicinity

In addition to the invasive and noxious weed mapping conducted for the project area, a data request was sent to federal, state, and local agencies and organizations soliciting any noxious weed data for the region. Only three responses were received. The most relevant and important information received was from the Williams Ranger District of the Kaibab National Forest, who provided their geographic information system (GIS) database, which contains mapped weed locations for the Kaibab National Forest. The following information was analyzed from these data:

- Weeds within 5 miles of project boundary included bull thistle (*Cirsium vulgare*), cheatgrass, common mullein (*Verbascum thapsus*), Dalmatian toadflax (*Linaria dalmatica*), diffuse knapweed (*Centaurea diffusa*), field bindweed (*Convolvulus arvensis*), horehound (*Marrubium vulgare*), London rocket (*Sisymbrium irio*), Mexican fireweed/kochia (*Bassia scoparia*), mottled tuberose (*Manfreda variegata*), prickly Russian thistle (*Salsola tragus*), saltcedar (*Tamarix* sp.), Scotch cottonthistle (*Onopordum acanthium*), Siberian elm (*Ulmus pumila*), and yellow sweetclover (*Melilotus officinalis*).
- Weeds mapped near KY Draw, which flows into Cataract Canyon, included common mullein, field bindweed, horehound, Siberian elm, and yellow sweetclover.
- Weeds mapped near Pine Creek Wash, which flows into Cataract Canyon, included bull thistle, diffuse knapweed, and prickly Russian thistle.
- Weed mapped near Cataract Canyon included bull thistle, common mullein, field bindweed, horehound, prickly Russian thistle, and Scotch cottonthistle.

These data are useful in the management of noxious weeds for the project because new infestations could spread from these nearby sources, and knowing which noxious weed species are present in nearby areas allows management to know which species should be looked out for as new infestations in the project area.

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) that correspond to the types of impacts that will occur during the construction phase. Anticipated disturbance levels for all project components are summarized in Appendix C. Before beginning an activity, all areas to be disturbed will have boundaries marked using stakes spaced to maintain a site line, and all disturbances will be confined to the marked areas. All project personnel will be instructed that their activities must be confined to 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 will be permanently altered as a result of removing vegetation, leveling the site, modifying natural drainages, erecting fencing, and 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[†]	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 (×5)	100[†]	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 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%**

Note: N/A = not applicable.

* 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.

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

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 remain in place. Some crushed vegetation would likely resprout after disturbance ceases. These activities would result in minimal to moderate disturbance and would 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 and 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[†]	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 and 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 with adjacent collection system	120,820	60	167.4	0.42%

Table 4. Proposed Action Temporary Disturbance Summary Table (Continued)

Facility Component	Disturbance Length (feet)	Disturbance Width (feet)	Short-Term Disturbance (acres)	% Project Area
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%**

Note: N/A = not applicable.

* 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.

† This measurement represents the diameter of the disturbance area.

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	×	×	×
Windrow vertical mulch and rocks alongside disturbance		×	×
Separate and windrow topsoil and subsurface soil			×
Post-construction			
Decompact terrain or erase tracks, as necessary	×		
Decompact terrain and restore natural drainages and contours		×	×
Replace subsurface soils (in proper order)			×
Stabilize soil surface	×	×	×
Replace vertical mulch and large rocks		×	×
Reseed	×	×	×
Install restoration signs	×	×	×
Monitor and apply contingency measures as necessary	×	×	×

3.0 REVEGETATION ACTIONS

3.1 Pre-construction

3.1.1 Pre-construction Weed Surveys and Control

Pre-construction surveys were completed by qualified biologists and helped in understanding the existing noxious and invasive weed infestations. The results of these surveys are provided in Appendix A of this document and are depicted in Figure 1. Weed treatment prior to earthwork or topsoil salvage will reduce the seedbank and will 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, clearing, and cutting 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. In addition, trees that are removed will be ground into mulch and incorporated into the revegetation/seeding process, as practicable.

3.1.3 Soil Salvage and Stockpiling

For areas that require grading, clearing, and cutting with soil excavation (D-2 and D-3), topsoil salvage should be conducted that should 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). In addition, stockpile materials will be maintained in weed-free condition.

3.2 Post-construction

The following is a description of the actions that will be implemented after the completion of construction activities; these 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 and subsurface soil (D-3), the segregated material will be placed back into the trench in the proper order. If significant caliche is encountered during the excavation, it will be crushed into fine material before placing it back into the trench. Small amounts of caliche may be placed back 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 placed on top of the area 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., this is 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 watered 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 soil with 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 moved 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, whereas 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 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, mulch, and compost are provided in Appendix D. In addition, trees that are removed will be ground into mulch and incorporated into the revegetation/seeding process, as practicable.

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. Table 6 presents a seed mix that was designed specifically for this project. SWCA coordinated with Granite Seed (a well-known, reputable seed company) and the Flagstaff Arboretum in order to design this seed mix. This mix contains species that are native to the region, that have readily available seed, and that are known to establish well in restoration circumstances. Substitution of seed may be allowable if the seed identified in Table 6 is unobtainable at the time at which seeding will be done or if seed from other native species is preferred.

Drill seeding has a relatively high success rate and is the preferred method of seeding in all areas in which 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 Revegetation within the Project Area

Common Name	Scientific Name	Pure Live Seed Application Rate (pounds per acre)
Bottlebrush squirreltail	*Elymus elymoides*	2.00
Bluebunch wheatgrass	*Pseudoroegneria spicata*	3.00
Indian ricegrass	*Achnatherum hymenoides*	3.00

Table 6. Seed Mix for Revegetation within the Project Area (Continued)

Common Name	Scientific Name	Pure Live Seed Application Rate (pounds per acre)
Sandberg bluegrass	*Poa sandbergii*	0.50
Western wheatgrass	*Pascopyrum smithii*	3.00
Sand dropseed	*Sporobolus cryptandrus*	0.25
Thickspike wheatgrass	*Elymus lanceolatus*	2.00
Palmer's penstemon	*Penstemon palmeri*	1.00
Western yarrow	*Achillea millefolium occidentalis*	0.10
Blue grama	*Bouteloua gracilis*	1.00
Rubber rabbitbrush	*Chrysothamnus nauseosus*	0.15
Fourwing saltbush	*Atriplex canescens*	1.00
Antelope bitterbrush	*Purshia tridentata*	2.00
Needle and thread grass	*Stipa comate*	1.00
Mexican cliffrose	*Purshia Mexicana*	1.00
Winterfat	*Krascheninnikovia lanata*	1.00

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 seeded via drilling or hydroseeding methods within 24 hours of being seeded. Straw mulch will either be stabilized via crimping or tacking on the same day 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 that exceed 3:1 and in 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. Additional information on mulch is provided in Appendix D.

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 seedlings without established root systems that are unable to withstand summer temperatures and the lack of precipitation.

ERECTING RESTORATION SIGNS

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

REVEGETATION MONITORING

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 efforts should include regular inspections of revegetated areas to inspect survival, assess whether additional plantings are needed, and check for the presence of and/or control noxious weeds. 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 five years, with an additional two years if restoration efforts are not successful (i.e., a total of 7 years). The criteria for success of the revegetated sites will include the establishment of the plant species used in the seed mix and that the area is noxious weed free.

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 for 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 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; these outcomes may require that changes in methods for prevention and suppression be made, and these would be 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 action 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 CIPM (2003:1),

> 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). Two of these noxious weed species are known to occur within the project area; all other non-native species identified in the project area are not listed as noxious weeds by the ADA. There are many preventive 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 area 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 (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 help control new and further establishments of noxious weeds in the project area.

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. Locate equipment storage, machine and vehicle parking, or any other area needed for the temporary placement of people, machinery, and supplies in one designated area. 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.
3. 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 prior to entering the project area at the contractor's storage facility or at the designated equipment-cleaning site. Seeds and plant parts will be collected, bagged, and deposited in dumpsters destined for local landfills, when practical.
4. Inspect, remove, and dispose of weed seed and plant parts found on their clothing and personal equipment, bag the product, and dispose of either by incineration on-site or at a site that accepts noxious weed materials, such as the Coconino County Weed Incinerator, located at the County

Yard off Railhead Avenue in Flagstaff. Disposal methods may vary, depending on the specific activity.

4.1.3 Monitoring

The data obtained prior to construction helped to determine the site-specific existing noxious weed infestations. Weed treatment prior to earthwork or topsoil salvage will help reduce the seedbank, and in addition, will help reduce weed infestations during construction and revegetation 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 start after the construction phase, will continue during the operation phase, and will end after the five-year post-operation phase. During this time, annual reports will be submitted to Coconino County. Use of photographic and GPS technology is recommended to enhance mapping efforts, capture abiotic factors, and monitor off-season conditions to better understand seasonal changes that may affect the control agents; this technology can provide insight into the best management techniques to combat the noxious and invasive weed population. Monitoring should include disturbance, treatment, and weed mapping and can have a variety of objectives, including the following:

- 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

Numerous methods of control exist for treating noxious weeds; however, it is important to remember that weed science is an ever-changing field, and new techniques and chemicals may be developed in the future that could be used in conjunction with this plan. Therefore, it is recommended that research be done throughout the life of this project in order to identify the best control method for each species. In addition, weed control for this project will focus on listed noxious weed species, as required by law, but other invasive, non-native species will be controlled as possible by the project proponent. The following section outlines common control techniques.

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; 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, 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 it can increase the effectiveness of other control efforts, such as herbicide application (Sheley 2002). Other limitations to mowing include the risk of spreading weed seeds and the high cost of equipment and labor. Mowing may be an effective form of ongoing weed control in recently disturbed roadsides that are the result of 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, Dalmatian toadflax, musk thistle (*Carduus nutans*), Scotch cottonthistle, and bull thistle. 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.

Perrin Ranch has historically used livestock (i.e. goats, sheep) for weed control. These methods may be used to control any weed occurrences associated with the project.

CHEMICAL

Chemical controls are not currently used by the ranch for weed management; however, weed management for a project such as this often requires different methods than standard ranching practices. Therefore, NextEra will work with the landowner or their representative to use non-chemical methods, but chemical treatments will be used when necessary to meet county and state weed control requirements. 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, ensure effective control of the weed species, and avoid 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.

5.0 USEFUL NOXIOUS WEED REFERENCES

The following sources are provided as additional reference materials that can be used during the implementation of this plan. The control of noxious weeds is an ever changing field and new techniques and chemicals may be developed in the future that could be used in conjunction with this plan.

- Weed ID Tool: http://weedid.wisc.edu/ca/weedid.php
- Arizona Weed Fact Sheets: http://www.eddmaps.org/tools/statereport.cfm?id=us_az
- Coconino County Weed Lists: http://www.eddmaps.org/tools/countyplants.cfm?id=us_az_04005
- Invasive Species Information: http://www.invasive.org/
- Arizona Weed Guide: http://www.uapress.arizona.edu/onlinebks/weeds/species.htm

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APPENDIX A

Pre-construction Survey Noxious and Invasive Weed Data

Table A-1. Pre-construction Survey Noxious and Invasive Weed Data

Weed 1	Weed 2	Weed 3	Weed 4	Weed 5	Infestation Type	R=Radius of Infestation in Meters	Easting UTM	Northing UTM
Small Patches/Individual Plants								
Russian thistle					Light	R=4M	602762	1612217
Field bindweed					Medium	R=4M	606341	1611849
Field bindweed					Medium	R=4M	606517	1611838
Horehound	Russian thistle				Light	R=2M	607298	1612551
Horehound	Redstem storks-bill				Light	R=3M	610341	1614015
Horehound					Light	R=1M	609525	1612676
Horehound					Light	R=4M	609021	1621400
Horehound					Light	R=6M	609036	1621676
Horehound					Light	R=5M	609648	1624414
Redstem storks-bill					Light	R=5M	587941	1628781
Horehound	Redstem storks-bill				Light	R=5M	588106	1628716
Horehound					Medium	R=4M	588742	1628222
Redstem storks-bill					Medium	R=3M	591489	1629110
Redstem storks-bill					Heavy	R=15M	591711	1629475
Redstem storks-bill					Heavy	R=15M	591692	1629551
Redstem storks-bill					Medium	R=5M	591846	1630478
Redstem storks-bill					Light	R=10M	586169	1632541
Common mullein					Light	R=3M	578123	1609944
Common mullein					Light	R=1M	578787	1609794
Common mullein					Light	R=1M	578800	1609770
Common mullein	Cheatgrass				Light	R=1M	579121	1609680
Horehound					Medium	R=2M	579962	1609530
Horehound					Light	R=3M	581528	1609280
Common mullein					Light	R=1M	581577	1609252
Common mullein					Light	R=.5M	581684	1609143
Horehound					Light	R=.1M	582186	1609108
Horehound					Medium	R=1.5M	581836	1608976
Horehound					Medium	R=1M	581822	1608995

Table A-1. Pre-construction Survey Noxious and Invasive Weed Data (Continued)

Weed 1	Weed 2	Weed 3	Weed 4	Weed 5	Infestation Type	R=Radius of Infestation in Meters	Easting UTM	Northing UTM
Horehound					Light	R=3M	581788	1608989
Common mullein	Horehound				Light	R=2M	581622	1608967
Horehound					Light	R=1M	581418	1608908
Horehound	Cheatgrass				Medium	R=3M	581253	1608889
Horehound					Light	R=12M	580085	1608673
Horehound	Cheatgrass				Light	R=2M	579527	1608650
Common mullein	Cheatgrass	Redstem storks-bill			Light	R=3M	579490	1608642
Russian thistle					Light	R=1.5M	579470	1608624
Horehound	Redstem storks-bill				Light	R=4M	579447	1608639
Redstem storks-bill	Cheatgrass				Medium	R=5M	579383	1608643
Horehound					Light	R=.5M	579188	1608633
Horehound					Light	R=2M	579134	1608632
Horehound					Light	R=4M	579103	1608569
Redstem storks-bill	Cheatgrass	Horehound			Medium	R=6M	578872	1608525
Redstem storks-bill	Horehound	Cheatgrass			Medium	R=5M	578779	1608540
Horehound	Cheatgrass				Light	R=3M	578280	1608562
Horehound					Light	R=2M	578191	1608562
Redstem storks-bill	Cheatgrass				Light	R=2M	577871	1608605
Horehound					Medium	R=2M	577727	1608655
Redstem storks-bill					Light	R=1.5M	577299	1608869
Horehound					Light	R=1M	576363	1610297
Horehound					Light	R=2M	576338	1610371
Common mullein					Light	R=.5M	577314	1610092
Horehound					Light	R=1M	576888	1610358
Horehound					Light	R=.5M	576279	1611129
Horehound					Light	R=2.5M	576127	1610920
Horehound					Light	R=1M	575937	1610933
Horehound					Light	R=1M	575886	1610946
Horehound					Light	R=.5M	576002	1611172

Table A-1. Pre-construction Survey Noxious and Invasive Weed Data (Continued)

Weed 1	Weed 2	Weed 3	Weed 4	Weed 5	Infestation Type	R=Radius of Infestation in Meters	Easting UTM	Northing UTM
Horehound					Light	R=4M	576048	1611061
Horehound					Light	R=1.5M	575998	1611031
Horehound					Light	R=9M	575912	1611034
Horehound					Light	R=2M	576094	1611273
Horehound					Light	R=8M	576067	1611334
Horehound					Light	R=2M	575743	1611984
Horehound					Light	R=5M	575717	1612010
Horehound					Light	R=8M	575917	1613018
Horehound					Light	R=12M	576496	1612789
Horehound					Light	R=11M	576571	1612904
Horehound					Light	R=2M	576495	1613039
Horehound					Light	R=.5M	576335	1612982
Horehound					Light	R=2M	576450	1612903
Horehound	Common mullein				Light	R=4M	576548	1612986
Horehound					Light	R=3M	576515	1613005
Horehound	Cheatgrass				Light	R=6M	576329	1613495
Horehound					Light	R=9M	576332	1613576
Horehound	Cheatgrass				Light	R=6M	576296	1613744
Horehound					Light	R=2M	576244	1613887
Horehound					Light	R=5M	576024	1614444
Horehound	Cheatgrass				Light	R=6M	596696	1594978
Horehound	Cheatgrass				Light	R=8M	596470	1595554
Horehound					Light	R=4M	596499	1595738
Horehound	Cheatgrass				Light	R=10M	596320	1595690
Horehound					Light	R=13M	596214	1595811
Horehound	Cheatgrass				Light	R=8M	596202	1596018
Horehound	Redstem storks-bill	Cheatgrass			Light	R=14M	596017	1596348
Horehound	Cheatgrass	Common mullein			Medium	R=10M	596012	1596504
Horehound					Light	R=10M	596037	1596805

Table A-1. Pre-construction Survey Noxious and Invasive Weed Data (Continued)

Weed 1	Weed 2	Weed 3	Weed 4	Weed 5	Infestation Type	R=Radius of Infestation in Meters	Easting UTM	Northing UTM
Horehound					Light	R=12M	596125	1596817
Horehound					Light	R=8M	596150	1596999
Horehound					Light	R=7M	596000	1597864
Redstem storks-bill	Horehound				Light	R=5M	595980	1598013
Horehound					Light	R=6M	595877	1598143
Horehound	Redstem storks-bill				Medium	R=5M	595361	1598918
Common mullein					Light	R=4M	595155	1598801
Redstem storks-bill					Medium	R=3M	595084	1600003
Redstem storks-bill	Common mullein				Light	R=6M	594755	1599902
Horehound	Cheatgrass				Light	R=6M	594879	1600204
Horehound					Light	R=7M	594858	1600257
Redstem storks-bill					Light	R=5M	594642	1600433
Horehound	Cheatgrass	Redstem storks-bill			Light	R=10M	594136	1601793
Common mullein					Light	R=8M	594133	1601960
Russian thistle					Light	R=3M	606732	1604227
Horehound						R=3M	585479	1588028
Common mullein						R=10M	584971	1588513
Horehound	Common mullein					R=8M	584891	1588546
Common mullein	Horehound					R=15M	584775	1588757
Common mullein	Horehound					R=15M	583951	1589269
Common mullein	Horehound					R=10M	583464	1589325
Common mullein	Horehound					R=10M	583334	1589309
Common mullein						R=5M	583125	1589195
Horehound	Common mullein					R=3M	583013	1589109
Horehound						R=3M	582553	1588699
Horehound						R=4M	582376	1588582
Horehound	Common mullein					R=5M	582161	1588466
Horehound						R=5M	582214	1587250
Common mullein	Horehound					R=10M	583349	1588629

Table A-1. Pre-construction Survey Noxious and Invasive Weed Data (Continued)

Weed 1	Weed 2	Weed 3	Weed 4	Weed 5	Infestation Type	R=Radius of Infestation in Meters	Easting UTM	Northing UTM
Common mullein	Horehound					R=4M	583462	1588796
Common mullein	Horehound					R=5M	583538	1588904
Common mullein	Horehound					R=3M	583701	1589066
Horehound						R=4M	581681	1588650
Horehound						R=3M	581989	1588906
Horehound						R=3M	581093	1589703
Horehound						R=4M	580967	1589703
Horehound						R=4M	580167	1589139
Horehound						R=3M	580090	1589791
Common mullein						R=2M	579960	1589875
Horehound						R=5M	579592	1590319
Russian thistle						R=10M	578943	1591851
Horehound						R=3M	578880	1590350
Horehound						R=8M	579001	1590155
Horehound						R=10M	579291	1589993
Horehound						R=15M	579535	1590016
Field bindweed						R=3M	578842	1590323
Horehound						R=3M	578515	1590149
Horehound						R=4M	577826	1590154
Horehound						R=4M	577438	1590162
Horehound						R=3M	576808	1590553
Horehound						R=5M	576654	1590681
Horehound						R=3M	576207	1591133
Horehound						R=3M	575600	1591219
Horehound						R=3M	577215	1591797
Horehound						R=2M	578563	1593387
Common mullein						R=3M	579244	1597152
Russian thistle	Horehound				Light	R=5M	609910	1606106
Horehound	Russian thistle				Light	R=2M	611032	1606134

Table A-1. Pre-construction Survey Noxious and Invasive Weed Data (Continued)

Weed 1	Weed 2	Weed 3	Weed 4	Weed 5	Infestation Type	R=Radius of Infestation in Meters	Easting UTM	Northing UTM
Common mullein					Medium	R=4M	611621	1605811
Horehound					Light		612045	1605589
Common mullein					Light	R=6M	613361	1604230
Horehound					Medium	R=4M	613529	1603912
Horehound					Light	R=3M	617272	1598373
Field bindweed					Heavy	R=5M	606592	1611827
Field bindweed					Heavy	R=5M	607119	1611766
Redstem storks-bill					Heavy	R=12M	594353	1606744
Redstem storks-bill					Heavy	R=15M	594107	1607571
Redstem storks-bill					Medium	R=15M	593854	1602917
Redstem storks-bill					Medium	R=10M	593330	1609656
Redstem storks-bill					Medium	R=15M	594144	1607662
Redstem storks-bill					Medium	R=5M	594008	1607817
Horehound	Redstem storks-bill	Russian thistle			Medium	R=20M	594074	1607816
Horehound	Redstem storks-bill	Common Mullein			Light	R=5M	595753	1607449
Horehound	Redstem storks-bill				Light	R=5M	593347	1609892
Horehound	Redstem storks-bill				Light	R=8M	593990	1607886
Horehound					Heavy	R=20M	593334	1609791
Horehound					Medium	R=6M	576209	1622294
Horehound					Medium	R=10M	576224	1617659
Horehound					Medium	R=15M	576005	1624918
Horehound					Medium	R=5M	576079	1616785
Horehound	Redstem storks-bill				Medium	R=10M	593513	1608528
Russian thistle					Medium	R=30M	576069	1624482
Russian thistle					Medium	R=35M	576058	1624621
Russian thistle	Horehound	Field bindweed	Cheatgrass		Heavy	R=10M	577634	1621999
Horehound					Medium	R=5M	585824	1607285
Horehound	Russian thistle				Light	R=2.5M	586791	1607068
Field bindweed	Horehound				Light	R=10M	583783	1607979

Table A-1. Pre-construction Survey Noxious and Invasive Weed Data (Continued)

Weed 1	Weed 2	Weed 3	Weed 4	Weed 5	Infestation Type	R=Radius of Infestation in Meters	Easting UTM	Northing UTM
Field bindweed					Medium	R=2.5M	583818	1608182
Common mullien					Medium	R=15M	590189	1611454
Field bindweed					Medium	R=15M	590185	1611536
Scotch thistle						R=2M	602391	1611721
Horehound					Medium		595856	1611546
Russian thistle						R=50M	608796	1626063
Redstem storks-bill					Medium	R=20M	597528	1629715
Field bindweed	Cheatgrass				Medium	CONARG7MWIDE.BROTEC HEAVY	593650	1630999
Horehound	Russian thistle				Light	R=5M	588629	1632540
Russian thistle					Light	R=5M	579626	1624703
Horehound	Russian thistle				Light	R=2M	577757	1624557
Horehound					Light	R=7M	577303	1624666
Russian thistle					Light	R=15M	577272	1624681
Horehound	Russian thistle				Medium	R=20M	577168	1624716
Horehound					Light	R=10M	576949	1625036
Horehound					Medium	R=1M	577113	1625721
Horehound	Russian thistle				Medium	R=15M	577377	1626016
Horehound					Light	R=8M	580308	1627080
Horehound	Russian thistle				Medium	R=25M	580371	1627211
Redstem storks-bill					Light	R=15M	577922	1628431
Redstem storks-bill					Medium	R=25M	580074	1629339
Russian thistle					Light	R=10M	582782	1629112
Horehound					Light	R=3M	593432	1604097
Russian thistle	Horehound				Light	R=8M	590838	1605295
Russian thistle					Light	R=3M	590648	1606973
Common mullein					Light	R=5M	592663	1607057
Common mullein	Horehound				Light	R=5M	607015	1604421
Horehound					Light	R=7M	606866	1604071
Horehound					Light	R=6M	606842	1604268

Table A-1. Pre-construction Survey Noxious and Invasive Weed Data (Continued)

Weed 1	Weed 2	Weed 3	Weed 4	Weed 5	Infestation Type	R=Radius of Infestation in Meters	Easting UTM	Northing UTM
Horehound	Russian thistle				Medium	R=8M	606806	1604527
Horehound					Medium	R=4M	606816	1604255
Cheatgrass	Russian thistle	Horehound			Heavy	RT=M HH=M R=25M	580648	1599805
Horehound	Cheatgrass				Medium	BT=M R=10M	580707	1599948
Horehound	Cheatgrass				Heavy	R=25M BT=M	581864	1602392
Horehound	Cheatgrass				Medium	R=30M BT=M	582033	1602530
Horehound	Cheatgrass				Medium	R=20 BT=H	582215	1602607
Horehound	Cheatgrass	Common mullein				R=10M BT=M_VT=L	582446	1602811
UNK SHRUB CHRMOL							583434	1603810
Horehound					Heavy	R=2M	583409	1605340
Redstem storks-bill					Medium	R=5M	587621	1605318
Horehound	Field bindweed	Common mullein			Medium	R=20M CA=L VT=L	590298	1603232
Field bindweed	Horehound	Cheatgrass			Medium	R=25M MV=M BT=M	590734	1602933
Field bindweed					Medium	R=5M	590772	1602879
Field bindweed					Medium	R=15M	590820	1602779
Field bindweed					Medium	R=5M	590872	1602652
Field bindweed					Medium	R=10M	590900	1602587
Field bindweed					Medium	R=20M W=DRAINAGE	592318	1601702
Field bindweed					Medium	R=20M	592399	1601702
Redstem storks-bill					Medium	R=3M	592482	1601744
Field bindweed					Light	R=3M	592615	1602252
Common mullein					Medium	R=5M	588024	1606080
Horehound					Medium	R=7M	587558	1606585
Horehound					Light	R=3M	587559	1606667
Common mullein					Light	R=2M	587423	1606692
Common mullein					Light	R=3M	587332	1606691
Field bindweed					Heavy	R=10M	606316	1607867
Common mullein	Horehound				Light	R=2M	611149	1605307
Horehound					Medium	R=3M	610462	1605123

Table A-1. Pre-construction Survey Noxious and Invasive Weed Data (Continued)

Weed 1	Weed 2	Weed 3	Weed 4	Weed 5	Infestation Type	R=Radius of Infestation in Meters	Easting UTM	Northing UTM
Horehound					Medium	R=10M	610186	1604921
Horehound					Light	R=2M	609853	1604669
Russian thistle	Horehound				Medium	R=5M MV=L	609918	1604575
Horehound					Medium	R=2M	611133	1604612
Horehound	Common mullein				Medium	R=2M	611182	1604611
Horehound					Heavy	R=2M	611297	1604804
Horehound	Common mullein				Medium	R=3M	611371	1604831
Horehound	Common mullein				Heavy	R=2M_VT=L	611463	1604913
Horehound	Common mullein				Medium	R=5M_VT=L	611473	1604958
Common mullein					Medium	R=5M	611295	1604899
Common mullein					Medium	R=10M	611117	1604836
Horehound					Light	R=2M	610706	1605572
Horehound					Light	R=1M	618341	1596619
Common mullein					Light	R=5M	619108	1595535
Russian thistle	Cheatgrass				Medium	R=30M	622768	1590069
Field bindweed					Medium	R=5M	622763	1589863
Horehound					Heavy	R=5M	584265	1612884
Horehound					Heavy	R=5M	584008	1612001
Horehound					Medium	R=2M	584018	1611891
Horehound					Medium	R=2M	583989	1611862
Horehound					Light	R=1M	583970	1611649
Horehound					Light	R=2M	583947	1611628
Horehound					Medium	R=3M	583959	1611616
Large Patches (Note: UTMs were recorded as the center of the patch)								
Russian thistle	Redstem storks-bill				Light	W=3M	587627	1633402
Russian thistle					Light	W=2M	602887	1612212
Russian thistle					Medium	W=2M	603804	1612123
Russian thistle					Medium	W=2M	605066	1611988
Redstem storks-bill					Heavy	W=3M	608258	1613886

Table A-1. Pre-construction Survey Noxious and Invasive Weed Data (Continued)

Weed 1	Weed 2	Weed 3	Weed 4	Weed 5	Infestation Type	R=Radius of Infestation in Meters	Easting UTM	Northing UTM
Common mullein					Light	W=3M	578318	1609867
Horehound	Cheatgrass				Light	W=14M	579914	1608650
Horehound					Light	W=4M	578970	1608527
Horehound					Light	W=3M	576192	1611144
Horehound	Common mullein				Medium	W=8M	584320	1589019
Horehound	Scotch cottonthistle				Medium	W=2M	614905	1601939
Field bindweed					Medium	W=3M	583604	1610642
Russian thistle					Heavy	W=3M	577980	1623302
Redstem storks-bill					Light		577936	1609922
Horehound	Field bindweed	Russian thistle			Light		580683	1608823
Common mullein	Horehound				Medium		584696	1588579
Horehound					Heavy		582125	1587287
Russian thistle	Horehound				Heavy		584258	1608030
Russian thistle	Horehound				Heavy		584376	1608358
Field bindweed	Russian thistle	horehound			Heavy		584688	1607638
Common mullein					Light	W=10M	590246	1611555
Common mullein	Horehound	Redstem storks-bill	Cheatgrass		Light	W=10M	590750	1611783
Field bindweed					Light	W=10M	591966	1612170
Field bindweed	Redstem storks-bill	Russian thistle	Horehound		Medium	W=10M	593031	1612334
Field bindweed	Russian thistle	Redstem storks-bill	Common mullein	Cheatgrass	Heavy	Espee Rd	NA	NA
Field bindweed	Russian thistle	Redstem storks-bill	Common mullein	Cheatgrass	Heavy	Espee Rd	NA	NA
Field bindweed	Russian thistle	Redstem storks-bill	Common mullein	Cheatgrass	Heavy	Espee Rd	NA	NA
Field bindweed	Russian thistle	Redstem storks-bill	Common mullein	Cheatgrass	Heavy	Espee Rd	NA	NA
Scotch thistle					Light		602737	1611624
Field bindweed	Russian thistle	Horehound	Common mullein	Cheatgrass		Espee Rd	589701	1621325
Field bindweed	Russian thistle	Horehound	Common mullein	Cheatgrass		Espee Rd	589640	1621320
Field bindweed	Redstem storks-bill				Heavy	W=100+M	608955	1607009
Horehound					Medium	W=5M	592578	1602042
Horehound	Cheatgrass				Medium	W=CORR	581067	1600543

Table A-1. Pre-construction Survey Noxious and Invasive Weed Data (Continued)

Weed 1	Weed 2	Weed 3	Weed 4	Weed 5	Infestation Type	R=Radius of Infestation in Meters	Easting UTM	Northing UTM
Field bindweed					Medium		580751	1600068
Redstem storks-bill	Horehound				Light	W=5M	593195	1604475
Redstem storks-bill					Medium	W=10M	582059	1629549

APPENDIX B

Noxious and Invasive Weed Fact Sheets

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 cottonthistle. Glyphosate products can be used to treat individual plants or small patches.

Photo:

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

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Plant Guide

CHEATGRASS

Bromus tectorum L.

Plant Symbol = BRTE

Contributed By: USDA, NRCS, National Plant Data Center; Idaho NRCS State Office; and University of California, Department of Botany; partial funding from the USGS and the US National Biological Information Infrastructure

Hitchcock (1950)

Caution: This plant is highly invasive.

Alternate Names
Downy brome, downy bromegrass, downy chess, early chess, slender chess, drooping chess, junegrass, and bronco-grass

Uses
Erosion Control: due to being a winter annual species with a shallow root system, cheatgrass is considered a poor erosion control plant particularly during periods of extended drought.

Invasive to Noxious Traits: Cheatgrass or downy brome is native to the Mediterranean region. In Europe, its original habitat was the decaying straw of thatched roofs. *'Tectum'* is Latin for roof, hence the name *Bromus tectorum*, 'brome of the roofs'.

Introduced into the United States in packing materials, ship ballast and likely as a contaminant of crop seed, cheatgrass was first found in the United States near Denver, Colorado, in the late 1800s (Whitson et al. 1991). In the late 1800's and early 1900's, it spread explosively in the ready-made seed-beds prepared by the trampling livestock hooves of overstocked rangelands. Disturbance associated with homesteading and cultivation of winter wheat also accelerated its spread and establishment. By the 1930's, cheatgrass was becoming the dominant grass over vast areas of the Pacific Northwest and the Intermountain West regions and the "worst" western range weed.

Cheatgrass has developed into a severe weed in several agricultural systems throughout North America, particularly western pastureland, rangeland, and winter wheat fields. It is now estimated to infest more than 41 million hectares (101 million acres) in western states (Mack 1981).

Winter wheat growers in the western United States proclaim it as their worst weed problem. In the Palouse winter wheat country of the Pacific Northwest, at high density, it reduces wheat yields by an average of 27% (FICMNEW, 1997). It can reduce seed yield of winter rye as much as 33%. In winter wheat and alfalfa fields, it is especially troublesome, because of its ability to reproduce prior to crop and hay harvesting (Peepers 1984). It is an aggressive invader of sagebrush, pinyon-juniper, mountain brush and other shrub communities, where it often completely out-competes native grasses and forbs. Approximately five million hectares of overgrazed rangeland in Idaho and Utah are covered by almost pure stands of cheatgrass (FICMNEW 1997). Serious problems with downy brome have been reported in the New England nursery trade and in orchards (Morrow & Stahlman 1984).

Stands of cheatgrass on western rangeland are highly flammable in late spring through early fall after maturation, which usually occurs long before native species mature and enter summer and autumn dormancy. Consequently, its presence, in altering the timing and occurrence of range and forest fires, negatively impacts other species.

Livestock: Although cheatgrass provides good quality forage early in the season, the plants mature quickly; initially turning reddish before completely curing to a tan- buff color. Forage yields fluctuate widely with changes in annual precipitation. The best forage quality is in late winter to mid spring and it must be grazed early in the growing season. Moreover, under drought situations the presence of cheatgrass causes rapid depletion of early season soil moisture, thus serving to out-compete, retard or prevent the establishment of perennial grasses (Welsh 1981).

Mature plants are unpalatable, the characteristic drooping seed heads becoming brittle as the plant dries, shattering upon disturbance and disseminating the sharp-tipped seeds with their barbed awns. These sharp-tipped seeds work their way into the eyes, nostrils, mouths, and intestines of grazing animals. Put succinctly by Aldo Leopold (1949), he writes "to appreciate the predicament of a cow trying to eat mature cheat, try walking through it in low shoes. All field workers in cheat country wear high boots." Leopold was perhaps one of the first authors to bring to the general public an awareness of the impact of cheatgrass in the west. In his essay "Cheat Takes Over," he addresses the ecological implications of its establishment with clarity and humor. His list of negative impacts and noxious characteristics are:

- replacement of rich and useful native bunchgrasses and wheatgrasses with the inferior cheat;
- prickly awns that, when mature, cause cheat-sores in the mouths of cows and sheep;
- extreme flammability of cheat-covered lands that results in burn-back of winter forage such as sagebrush, bitterbrush, and perennial grasses, and destruction of winter cover for wildlife;
- degradation of hay following invasion of alfalfa fields; and
- blockading of newly-hatched ducklings from making the vital trek from upland nest to lowland water.

Vectors: Overgrazing and misuse of western rangelands has resulted in trampling of native bunchgrasses and destruction of the soil surface and sometimes cryptogam layer, resulting in an increase in evaporation of soil moisture and reduction of bunchgrass population. Such disturbance favors the invasion of cheatgrass, whose seedlings become established during fall through late winter before the principal germination and growth period of native taxa. Homesteading and cultivation of winter wheat, beginning with the railroad boom of the 1880s, disturbed the land even further, and accelerated the introduction and establishment of cheatgrass.

Cultivation of land for winter wheat prepares a seedbed. The lack of the use of selective herbicides for the control of cheatgrass has aided its increase and spread.

The barbed awns of the florets penetrate or adhere readily to fur or clothing. When vehicles are driven across cheatgrass- infested land, seeds become lodged in clothing, tire treads, in cracks and crevices, and in mud of tires and bumpers, to be dislodged perhaps hundreds of miles distant. Since its introduction, cheatgrass has been spread far and wide by livestock, by trains and other vehicles, and by wildlife and livestock. Seeds, maturing before harvest of alfalfa and winter wheat, contaminate hay and grain.

Wildlife: Deer and elk make some use of cheatgrass in late winter to early spring while it is green and prior to other grasses and forbs beginning growth. It seems to be very important food, cover and nesting habitat for Hungarian partridge and chukar. Canada geese graze cheatgrass heavily in fall, winter and early spring.

Status

Consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status, such as, state noxious status.

Description

General: Grass Family (Poaceae). Cheatgrass is an annual or winter annual, softly downy to short-hairy throughout, and generally 10- 60cm (4- 24 in) tall.

Stems are solitary or in a few-stemmed tuft. Ligules are short (usually 1- 2 mm long), membranous, and fringed at the top; auricles are lacking. Leaf blades are up to 20 cm (8 in) long, flat, relatively narrow, usually 2- 5 mm wide (1/8- 3/16 in), and generally long-ciliate near the base.

The roots are fibrous and usually quite shallow; the plants do not root at the nodes. The inflorescence is a soft and drooping, much-branched, open panicle, usually becoming a dull red- purple color as it matures to a tan- buff color when fully cured. Spikelets are about 1.5- 2.0 cm (0.6- 0.8 in) long with 3- 6 florets. Florets are 12- 19 mm (1/2- 3/4 in) long, tapering to sharp points. The glumes are shorter than the florets, the first 1-veined and the second 3-veined. Lemmas are sharply tipped, glabrous to densely hairy, more-or-less rounded on the back, and with a

nearly straight awn that is 7- 18 mm (3/8- 5/8 in) long. Flowering occurs from April to mid June depending on climate and location.

Reproduction is by seed. Germination occurs in fall through winter to early spring, depending on the climate and rainfall (Hickman 1993; Gleason & Cronquist 1991; Cronquist et al. 1977; Muenscher 1955; Uva et al. 1997).

Hitchcock (1950)

Adaptation
Cheatgrass grows in rainfall areas receiving 6- 22 inches or more. It does particularly well under conditions where rainfall occurs in fall, winter and early spring. During periods of multiple year drought, it may almost disappear from the plant community only to return in very lush stands as moisture conditions improve.

Cheatgrass prefers well drained soils of any soil texture. It is not well adapted to saline or sodic soil conditions or soils that are too wet.

Cheatgrass can be found at almost any elevation, but it does particularly well at elevations ranging from 500- 6,000 feet.

Distribution
Cheatgrass is one of the most widespread introduced annual grasses in the North America, occurring in all 50 states as well as in most of the Canadian provinces and also in parts of Mexico. It is most common where annual rainfall ranges from 15-55 cm (6- 22 in) and autumn rainfall ranges from 5-12 cm (2- 6 in) (Peepers 1984). It is a weed of roadsides, cropland, hayland, pastureland, rangeland and waste places, usually occurring on dry, sometimes weakly alkaline, clayey to loamy to sandy or gravelly soils. Cheatgrass is especially common in the western states including the Columbia Basin, Snake River Basin and the Great Basin (Morrow & Stahlman 1984). Uncommon or sporadic in the southeastern part of the United States, it is abundant over large areas of sagebrush plant communities, where whole landscapes are lush green, turning red- purplish by the developing inflorescences, then a tan- straw- buff color as the plants mature and cure.

For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

Establishment
This species is not recommended for seeding.

Control
Contact your local extension specialist or county weed specialist for assistance on recommendations for cheatgrass control in your area. Tillage and chemicals are the most common control methods. When using chemicals, it is important to always read and follow label and safety instructions. Trade names and control measures that appear in this document are only to provide specific information. USDA, NRCS does not guarantee or warranty the products and control methods named, and other products may be equally effective.

Environmental and Mechanical: Environmental practices, which minimize the further spread of cheatgrass, are suggested by knowledge of the circumstances, which have accompanied its spread. Vehicles, clothing, camp gear, and pets should be cleaned of adhering seed after driving, camping, and walking in cheatgrass-infested areas. Excessive roadside and rangeland disturbance should be avoided. In cultivated fields, mowing cheatgrass before seeds are formed and clean cultivation assist in control. Infested meadows and pastures can be harrowed while seedlings are small (Muenscher 1955). In cropland and hayland, the best control is often achieved by fallowing or planting continuous spring crops for two or more years (Kennedy et al. 1989).

Biological: Soil bacteria which cause crown rot may be a potential biological control for cheatgrass in the arid environment of western North America (Grey et al. 1995). The crown rot causing soil bacteria has been found to produce a toxin that is specific for cheatgrass and related species. Studies have shown that these bacteria can be used to suppress the growth of cheatgrass, thus resulting in substantial increases in winter wheat yields (Kennedy et al. 1989).

Applications of a strain (D7) of *Rhizobacterium* have been shown to selectively suppress cheatgrass in winter wheat test plots by means of a phytotoxin produced by the bacteria (Tranel et al. 1993), apparently by inhibition of root elongation.

Chemical: Non-selective herbicides are presently the primary chemical available for control of cheatgrass. Since non-selective herbicides can kill all vegetation they contact, not just the problem weed, care must be taken that they do not contact desirable plants.

The chemical fluazifop has been shown to prevent seed formation in cheatgrass, most successfully when applied early in the reproductive phase (Richardson et al. 1987. Metribuzin or Metribuzin plus terbutryn, fall-applied, have succeeded in reducing cheatgrass infestations and increasing wheat yields. The combination results in better control. Sulfonylurea herbicides have been shown to increase winter wheat yields when used for cheatgrass control.

Other herbicides that have been recommended for cheatgrass management include glyphosate, bromacil, imidazolinone and tebuthiuron.

Formulations containing glyphosate are marketed as JURY, RATTLER, ROUNDUP, and RODEO. Those containing bromacil are sold as HYVAR X and HYVAR X-L. Those containing imidazolinone are sold as Plateau. Tebuthiuron is sold as SPIKE 80W.

Glyphosate controls cheatgrass by inhibition of biosynthesis of amino acids. It is applied to above ground parts, since the active ingredient is adsorbed and made inactive by soil particles. Following absorption, glyphosate is translocated to underground structures and should thus be applied during active growth. Growth is inhibited soon after application, and foliar chlorosis and necrosis are seen within 10-20 days. Contact with formulations of glyphosate should be avoided. **Ingestion requires emergency medical attention**.

Bromacil inhibits photosynthesis. It is readily absorbed through the root system and is then translocated to foliage. It is applied as a spray just before or during the period of active growth, preferably when rain can be expected for soil activation. Application near desirable plants or grazing of cattle in treated areas should be avoided. After the herbicide has been carried into the root zone by rain, leaf chlorosis and defoliation occur within a week. Contact with bromacil may irritate eyes, nose, throat, and skin. In case of contact, flush eyes copiously with water and wash skin with soap and water. **Get medical attention if irritation persists**.

Tebuthiuron is a pre- and post-emergence herbicide used for total control of vegetation. A small amount of the herbicide in contact with roots of desirable plants may kill them. It produces browning of vegetation within one week, which suggests that it acts through photosynthesis inhibition. It is absorbed principally through the roots, and is readily translocated. For best results it should be applied before spring growth begins. At least one inch of rainfall is needed to activate the herbicide and place it in the seed germination zone, so it should be applied before the predominant portion of annual rainfall occurs. It may not be fully effective on clay soils or those high in organic matter. Tebuthiuron should not contact skin, clothing, or eyes (causes eye irritation). If it gets on skin or in eyes, wash with plenty of water; if swallowed, or if breathing difficulty develops from inhalation, get emergency medical attention.

Imidazolinone, sold as Plateau is a pre- and post-emergence herbicide used for partial to total control of vegetation. Plateau herbicide may be used for control of brome grass species and tall fescue. It can be used for the release of most other wheatgrasses, native grasses, wildflowers and certain legumes. It is readily absorbed through leaves, stems, and roots and is translocated rapidly throughout the plant, with accumulation in the meristematic regions. Treated plants stop growing soon after spray application. Adequate soil moisture is important for optimum herbicide activity. When adequate soil moisture is present, it will provide residual control of susceptible germinating weeds. Activity on established weeds will depend on the weed species and rooting depth. Post emergence application is the method of choice in most situations, particularly for perennial species. It may be applied in the dormant or growing season for weed control. Tolerance of desirable grass species to Plateau herbicide may be reduced when grasses are stressed due to insect damage, disease, environmental conditions, shade, poorly drained soils or other causes. It should not be applied to newly seeded or sprigged grass stands, unless stated in label.

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For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site<http://plants.usda.gov> or the Plant Materials Program Web site <http://Plant-Materials.nrcs.usda.gov>

Bromus tectorum L. (Cheat grass)

Chris Evans, The University of Georgia, Bugwood.org

Family: Poaceae (Grass Family)

Synonym(s): ***Anisantha tectorum***

Duration: Annual

Habit: Grass/Grasslike

Listed by:
Invasive Plant Atlas of the US: 1
Federal Noxious Weed: 0
TDA Noxious Weed: 0
TPWD Prohibited Exotic Species: 0

Description: B. tectorum is a winter annual. The seedlings are bright green and have hairy leaves. Stems are erect and slender and may also be slightly hairy. The stem tips, where the seeds are located, droop slightly. The grass has an overall fine, soft appearance and typically grows 50-60 cm tall. As it dries out it begins to turn purplish in colour. B. tectorum is a straw-like colour when completely dry, which is when it is most flammable.

History:

Biology & Spread: B. tectorum is self-pollinating. Seeds are dispersed by wind and animals.

Ecological Threat: As B. tectorum is such a dry plant, it increases the frequency of fires in an area. This causes declines in natives that are accustomed to less frequent fires while B. tectorum flourishes. The more frequent fires cause a loss of topsoil and nutrients, which alters the make up of the soil and therefore the ecosystem. On the other hand, B. tectorum may stabilize the soil from wind and water erosion (Carpenter et. al, 1999). In Russia the impacts of B. tectorum are less serious, even in regions with similar precipitation to the Great Basin of the United States. While it will rapidly and completely dominate disturbed sites in Russia, these will often revert to more diverse, stable communities within three to five years of the invasion. It has been suggested that this is due to the more diverse natural communities present in these affected regions of Russia, and the greater proportion of summer rainfall that benefits perennials rather than winter annuals such as B. tectorum (Clark, 2001).North American B. tectorum invasions cost wheat farmers in the western United States and Canada US$350-375 million in control and loss yields each year. Although used by some farmers as feed, it can cause serious damage to livestock's mouth, intestines, nostrils, and eyes. In North America it competes with native shrubs and perennial grasses and totally alters the ecosystem.

US Habitat: B. tectorum is predominately found in disturbed sagebrush grassland ecosystems but is also found in undisturbed shrub-steppe and intermountain ranges. It spreads into areas that are overgrazed, cultivated, frequently burned or otherwise disturbed. B. tectorum prefers full sunlight and does not grow well under the forest canopy.

Distribution

US Nativity: Introduced to U.S.

Native Origin: B. tectorum is native to southern Europe and southwestern Asia.

US States: AK, AL, AR, AZ, CA, CO, CT, DE, FL, GA, HI, IA, ID, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NM, NV, NY, OH, OK, OR, PA, RI, SC

Resembles/Alternatives:

Management: Preventative measures: It is important to avoid disturbance caused by overgrazing, cultivation and frequent fires as they encourage invasion.

Physical: Where infestation is light, burning is not recommended, however, hand pulling can be effective in these areas. Care must be taken to remove most of the root, or it will grow back. Treatment should be followed by re-seeding of perennials, or else B. tectorum and other weeds will re-establish in the newly disturbed area. Follow-up treatment is required.

Biological: In North America, grasses, such as Crested Wheatgrass, have been planted to compete with B. tectorum. This has been successful in some cases.

Integrated management: Mowing or cutting is not recommended. Burning and herbicide application are effective control measures, but to ensure selective control, they should be performed in early spring when non-target species are dormant. However B. tectorum fires can burn very hot and move very quickly so care should be taken (Beck pers. comm., in Carpenter et. al, 1999).

USE PESTICIDES WISELY: ALWAYS READ THE ENTIRE PESTICIDE LABEL CAREFULLY, FOLLOW ALL MIXING AND APPLICATION INSTRUCTIONS AND WEAR ALL RECOMMENDED PERSONAL PROTECTIVE GEAR AND CLOTHING. CONTACT YOUR STATE DEPARTMENT OF AGRICULTURE FOR ANY ADDITIONAL PESTICIDE USE REQUIREMENTS, RESTRICTIONS OR RECOMMENDATIONS. MENTION OF PESTICIDE PRODUCTS ON THIS WEB SITE DOES NOT CONSTITUTE ENDORSEMENT OF ANY MATERIAL.

Listing Source

- ☐ Texas Department ofAgriculture Noxious Plant List
- ☐ Texas Parks and Wildlife Department Prohibited Exotic Species
- ☑ Invaders Program
- ☐ Federal Noxious Weed
- ☑ Union of Concerned Scientists
- ☑ United States Forest Service Southern Research Station

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Data Source

Global Invasive Species Database (http://www.issg.org/database)

Last Updated: 2007-11-08 by LBJWFC

Crop, Range, Pasture

Cheatgrass (Bromus tectorum)

Monica Pokorny

Steve Dewey, USU, Bugwood.org

Mature nodding cheatgrass panicle with awned spikelets.

L.J. Mehrhoff, U of CT, Bugwood.org

Cheatgrass infestation.

Identification and Life Cycle. Cheatgrass, also known as downy brome, is an introduced annual or winter annual grass (Poaceae). Seedlings are bright green with hairy leaf blades and sheaths. Mature plants are generally 4-30 inches tall with a finely divided, fibrous root system that may reach 12 inches deep. Stems are erect, slender, glabrous, or slightly hairy. Leaves are light green and hairy with fused sheaths except near the node at the bottom of each sheath. The lower sheaths are conspicuously hairy, while the upper sheaths are sometimes smooth. Cheatgrass changes color from green to purple to brown as the plant matures and eventually dries. The nodding, open panicles with moderately awned spikelets are very distinctive.

Habitats. Cheatgrass grows in both disturbed and undisturbed grasslands, shrublands and dry forests. It can tolerate a wide range of precipitation and temperature variations. Cheatgrass grows on almost any soil type but has been reported to prefer coarse-textured soils and does not flourish on extremely heavy or dry soils. It is common in recently burned rangeland, winter crops, disturbed areas, abandoned fields, eroded areas, and heavy-grazed grasslands.

Impacts. Cheatgrass can be troublesome in winter wheat and other crops. Awns many injure livestock and animals' eyes, throat and mouths if consumed in late spring or summer, leading to reduced feed intake and weight gain. Cheatgrass can form dense stands, reducing desired forage species. Cheatgrass is adapted to and promotes frequent uniform fires. This fire cycle significantly reduces the ability of perennial grasses and shrubs to re-establish, and furthers the dominance of cheatgrass. Areas dominated by cheatgrass have increased surface soil erosion and loss of soil nutrients.

Biology and Ecology. Cheatgrass is an annual that can germinate in autumn or spring when soil moisture is adequate. Autumn-germinated plants will establish a root system that allows the plant to take early advantage of spring moisture. The seed heads appear in mid-spring, followed by flowering within a week, and seeds mature in mid to late June. Cheatgrass can produce up to 400 lbs seeds/ac. Seeds have a high germination rate and a low retention in the soil. Seeds are dispersed short distances by wind, and long distances by attaching to fur or clothing. Dry conditions can cause environmentally induced dormancy, which may last several years.

Management Approaches. Integrated management will require a combination of chemical control, cultural control, seeding perennial grasses, and proper land management.

Biological Control. none

Mechanical and Cultural Control: Controlled livestock grazing can help regulate cheatgrass populations, but grazing prescriptions depend on the mixture of plants in the plant community and timing of grazing. Repeated mowing every 3 weeks during spring and summer can be effective at managing seed production. Many cut plants will however continue to produce seed. Repeated fire treatments can be used if plants are burned after they have dried but before the seeds

have dropped. Repeated pulling cheatgrass plants in small infestations before seed set can effectively eliminate current seed production, but may not eliminate the infestation. Pulling should remove as much of the root as possible. Live plants can be tilled/disked in the spring and fall before the heads turn purple. Tilling should be repeated when new plants appear. Seeds can be tilled/disked in the late spring to bury the seeds and prevent germination. Tilling should be followed by revegetation. Prevent new infestations by minimizing disturbance and seed dispersal and maintaining vigorous perennial plant communities. Revegetate disturbed areas to perennial grasses to provide competition.

Chemical Control: There are several types of herbicides that can be used alone or combined to provide effective control.

Example of herbicides that can be used to manage cheatgrass. Consult herbicide labels for additional rate, application and safety information. Additional herbicide information can be found at http://ces.uwyo.edu/WeedManagementHandbook.asp

Herbicide Trade Name *chemical name*	**Product per Acre**	**Comments**
Croplands		
Assure *quizalofop*	5 - 12 oz/ac	In canola, apply to emerged weedy grasses within height ranges specified on label. For best results, apply when grasses are in the 3-leaf stage.
Frontier *dimethenamid*	14 - 21 oz/ac	In grass seed apply in the fall prior to emergence of targeted weeds, or in a sequential use program with other herbicides that control emerged weeds. Grass seed crop must have been established for at least 1 year or had at least one seed crop harvested before application.
Gramoxone***R*** *paraquat*	Corn/sorghum: 0.7- 4 pt/ac Peas/lentils: 1.3 - 2.7 pt/ac Sugarbeats:1.25 -3 pt/ac	In corn, peas, lentils, sugarbeats or sorghum, apply before, during, or after planting but before crop emergence and after weeds have emerged. May apply as a postemergence directed spray when crop is at least 10 inches tall.
Kerb *pronamide*	1 - 4 lb/ac	Apply in the fall to new fall- or spring-planted forage legume seedlings after they have reached at least the trifoliate leaf stage, or, to established forage legumes in the late fall or early winter after soil temperatures fall below 55º F, but before freeze-up.
Maverick *sulfosulfuron*	0.66 oz/ac in a single application	In small grains apply either preemergence or after wheat emerges but prior to jointing. Can be applied in fall or spring, but fall applications are most effective.
Nortron *ethofumesate*	2.25 - 7.5 pt/ac	In sugarbeats apply preplant incorporated or preemergence.
Poast *sethoxydim*	1.5 - 2.5 pt/ac	In canola, apply to actively growing grasses at the appropriate stage of growth indicated on the label.
Princep *simazine*	2.2 - 4.4 lb/ac	In corn or sorghum, apply before, during, or after final seedbed preparation, but before weeds and crop emerge.
Prism, Select, Arrow *clethodim*	13 - 34 oz/ac Prism or 6 -16 oz/ac Select or Arrow	May be applied to seedling or established alfalfa. Apply postemergence to weeds that are actively growing and at the appropriate growth stage listed on label.
Raptor *imazamox*	4 oz/ac	In peas and lentils apply postemergence when weeds are actively growing and before they exceed the maximum recommended size stated on label. Apply when peas have at least 3 pairs of leaves, but before bloom.
Roundup *glyphosate*	12 fl oz to 5 qt/ac	Apply to actively growing weeds before planting, or any time prior to emergence of crop.
Scythe *Pelargonic acid + related fatty acids*	3- 10% per 100 gallons total spray solution	In peas, lentils, potatoes, or grass seed, apply to small emerged weeds prior to crop emergence or after harvest.
Select	6 - 16 oz/ac	In potatoes and sugarbeats apply postemergence to actively

clethodim		growing grasses.
Sencor *metribuzin*	0.33- 1.33 lb/ac, or 0.5-2.0 pt/ac; Small grains: 1.5 – 16 oz/ac	Apply in fall or spring when alfalfa or grass seed is dormant. Apply preemergence or postemergence in potatoes. In small grains apply postemergence to healthy, actively growing wheat at the 2-leaf to 4-tiller stage. Application must be made prior to the jointing stage, or crop injury may result.
Sinbar *terbacil*	0.5 -1.5 lb/ac	Apply in fall after alfalfa becomes dormant or in the spring before growth. Apply before or after weeds emerge, but before they are 2 inches tall.
Treflan *trifluralin*	1 - 2 pt/ac, or 20 lb/ac	Apply to established alfalfa during dormancy or semi-dormancy in the fall or spring before weeds emerge, or apply liquid formulations during the growing season immediately after cutting. In peas and lentils, apply preplant incorporated in the spring. In potatoes apply after planting, before emergence, immediately after drag-off, or after potato plants have fully emerged. In safflower preplant incorporated fall or spring. Apply to sugarbeets when they are 2 to 6 inches tall and well rooted so the plants can withstand incorporation.
Triflurex *trifluralin*	0.75 to 2 pt/ac	In corn or sorghum, apply post-emergence following cultivation and/or use of another herbicide to remove existing weeds. Crop must be well established.
Velpar *hexazinone*	1 - 3 qt/ac	Apply in the fall after alfalfa becomes dormant or in the spring before alfalfa growth begins.
Pasture, Rangeland, and Non-crop areas		
2,4-D		
Aatrex ***R*** *atrazine*	1-2 pt/ac 4L; 0.63-1.25 lb/ac 80WP; 0.55-1.1 lb/ 90 DG	Apply in fall after perennial grasses are dormant but before cheatgrass has emerged. Moisture is required to activate the atrazine, which is effective as a preemergent treatment. Do not apply to perennial grasses that are not dormant.
Gramoxone***R*** *paraquat*	26 oz/ac	Apply when cheatgrass has initiated seedhead formation but before seed set. This treatment timing allows for control of both fall and spring germinating.
Journey *imazapic + glyphosate*	10.7 - 32 oz/ac	Apply in fall preemergence or early postemeregence.
Plateau *imazapic*	2-12 oz/ac	Cheatgrass control is best with applications in the late summer to early fall before it has emerged. Apply with MSO at 1 qt/ac if cheat grass has emerged.
Roundup *glyphosate*	12 – 16 oz/ac	Annual weeds are best controlled when they are small, actively growing, and when cheatgrass has initiated seedhead formation but before seed set. Cheatgrass can be selectively controlled with the lower rates in range and pasture if the proper conditions are met.

R*Restricted Use Product.*

Categories: Weed, Crop, Range, Pasture, Downy brome

Date: 11/28/2007

Redstem filaree

Colorado Dept. of Agriculture
Conservation Services Division
700 Kipling Street
Suite 4000
Lakewood, CO 80215
303-239-4100

Redstem filaree Identification and Management

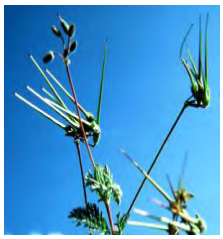
The key to effective control of Redstem filaree is preventing establishment of the plant and seed production. There are many options for control of Redstem filaree depending on site ecology. Both chemical and mechanical control options are effective. Details on the back of this sheet can help to create a management plan compatible with your site ecology.

Redstem filaree is designated as a "List B" species in the Colorado Noxious Weed Act. It is required to be either eradicated, contained, or suppressed depending on the local infestations. For more information visit www.colorado.gov/ag/csd and click on the Noxious Weed Management Program. Or call the State Weed Coordinator at the Colorado Department of Agriculture, Conservation Services Division, 303-239-4100.

Identification and Impacts

Redstem filaree (*Erodium cicutarium*) is a winter annual or biennial forb that has a spreading or erect profile and is native to the Mediterranean or Asia. Part of the Geranium family, Redstem filaree grows generally from a rosette stage, and can grow from the 3 inches to 2 feet tall. The stems are hairy and red in color. The leaves are opposite and finely divided with toothed or lobed margins. They are pubescent, grow on short stems and have a reddish tint. The root system is a shallow taproot with fiberous secondary roots. The five petaled flowers are a purplish-pink in color and are in clusters of 2 or more. Each flower will produce five long lobed fruits. Each fruit will have an awn like tail which will dry and split with maturity. Redstem filaree primarily reproduces by seed and generally germinates in early spring.

Habitats for Redstem filaree include: dry pasturelands, landscapes, turfgrass and it prefers sandy soils. It can easily outcompete desirable vegetation once established. Redstem filaree is drought tolerant and can withstand a heavy stocking rate. The plant is grazed by many different animals especially sheep.



Key ID Points

1. The hairy red colored stems.
2. The opposite leaf pattern in the rosette stage.
3. The long beak like fruit and seed.

Photos © (Clockwise from lower left): Theodore Webster, USDA, Bugwood.org; (Unknown) Oregon State University; Howard F. Schwartz, Colorado State University, Bugwood.org; Richard Old, XID Services Inc., Bugwood.org; (Unknown) Oregon State University

Erodium cicutarium

Updated on: 04/08

Management Recommendations

Redstem filaree

CULTURAL
Prevent the establishment of Redstem filaree, in rangeland or pastureland by planting native grasses and forbs. Contact your local Natural Resources Conservation Service for seed mix recommendations that may help. Bareground is prime habitat for weed invasions.

BIOLOGICAL
Currently there is not any biocontrol available for Redstem filaree. Biocontrol takes many years of research and development. For more information, contact the Colorado Department of Agriculture's Insectary in Palisade, Colorado at 970 464 7916.

MECHANICAL
Hand pulling or digging when soil is moist, making sure to get the roots to prevent resprouting is effective. Removing flowers before the plant sets seed will also be effective. Be sure to bag specimens carefully so as not to spread seeds.

Integrated Weed Management:

Locate and remove plants immediately before plants set seed to prevent the spread of Redstem filaree. Since the plant reproduces solely by seed, an integrated management effort must include the elimination of seed production and depletion of seed bank. Combing control methods of herbicide and mechanical can be effective.

HERBICIDES

NOTE: The following are recommendations for herbicides that can be applied to range and pasturelands. *Rates are approximate and based on equipment with an output of 30 gallons per acre.* **Always read, understand, and follow the label directions. The herbicide label is the LAW!**

HERBICIDE	RATE	APPLICATION TIMING

Above photos © (Top): Richard Old, XID Services Inc., Bugwood.org; (Middle) Whitney Cranshaw, Colorado State University, Bugwood.org; (Bottom) Kelly Uhing, Colorado Department of Agriculture

Colorado State University

COLORADO DEPARTMENT OF AGRICULTURE

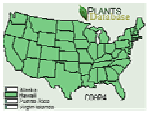
Field Bindweed *Convolvulus arvensis* L.

Common Names: field bindweed, wild morning glory, European bindweed, creeping jenny, creeping Charlie, small flowered morning glory, perennial morning glory, field morning glory, devil's guts, orchard morning-glory, possession vine, corn bind

Native Origin: Field bindweed is native to Europe, North Africa, and temperate Asia.

Description: Field bindweed is a perennial vine (0.4 – 2 inches in height) arising from deep, persistent, spreading roots. It has slender, trailing to somewhat twining, branched stems, 8 to 79 inches long, sometimes forming tangled mats. Simple leaves are variable, 0.4 to 4 inches long and 0.1 to 2.4 inches wide. Peduncles arise from leaf axils and bear 1 to 3 white or pink flowers from June to August. Fruits that appear June to September contain 1 to 4 dark brown or black sub ovate seeds. Taproots with a large numbers of annual lateral roots (2 to 10 feet long) develop throughout its length, and penetrate the soil in all directions. It spreads by rhizomes and seeds.

Habitat: It is found in a wide range of habitats: orchards, vineyards, roadsides, stream banks, lake shores, ditches and croplands. This species prefers strong sunlight and moderate-to-low moisture. It does not grow in wet soils.



Distribution: It is a serious weed problem throughout the continental United States

Ecological Impacts: Field bindweed intertwines and topples native species. It competes with other species for sunlight, moisture and nutrients. It poses threats to restoration efforts and riparian corridors by choking out grasses and forbs. It can decrease habitat biodiversity. It is one of the most serious weeds of agricultural fields in temperate regions of the world.

Toxicity: Mildly toxic to grazing animals

Control and Management: Field bindweed is difficult to eradicate because the seeds remain viable in soil for up to 20 years. One plant can produce up to 500 seeds. The deep, extensive root system stores carbohydrates and proteins and allows it to sprout repeatedly from fragments and rhizomes following removal of aboveground growth.

- **Manual**- Discing, tilling or hand pulling
- **Chemical**- Apply herbicide 2,4-D or glyphosate (Roundup); applications that trans-locate 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

Natural Enemies: Eight fungi and ten arthropods have been found on members of the genus *Convlvulus.*

References: www.fs.fed.us/database/feis/plants/forb/conarv/all.html,
www.plantatlas.usf.edu/images.asp?plantID=1755,
http://plants.usda.gov/cgi_bin/topics.cgi?earl=noxious.cgi
Invasive Plants of Asia Origin Established in the US and their Natural Enemies p. 58-59
WSSA-1,000 Weeds of North America: An Identification Guide
ELEMENT STEWARDSHIP ABSTRACT- http://tncweeds.ucdavis.edu/esadocs/documnts/convarv.rtf
Federal Noxious Weed Disseminules in the US -
www.lucidcentral.org/keys/FNW/FNW%20seeds/html/fact%20sheets/Convolvulus%20arvensis.htm

Produced by the USDA Forest Service, Forest Health Staff, Newtown Square, PA. WOW 02-08-06
Invasive Plants website: http://www.na.fs.fed.us/fhp/invasive_plants

Field Bindweed (Morning glory) Fact Sheet

Convolvulus arvensis Morningglory Family

Chris Evans, River to River CWMA, Bugwood.org Center and right photos by Steve Dewey, Utah State University, Bugwood.org

Distinguishing Features:

❶ **Flowers:** Trumpet-shaped flowers, light pink to white.
❷ **Seeds / Roots:** Reproduces vegetatively from roots, rhizomes, stem fragments, and by seeds that can lie dormant in the soil for up to 50 years.
❸ **Leaves:** Smooth, arrowhead-shaped leaves.
❹ **Flowering Time:** June - October.
❺ **Other:** A deep-rooted perennial vine with twining stems that can reach 6 ft in length.

Impacts:

- Once established, nearly impossible to fully eradicate.
- Out-competes native plant species by forming dense infestations.
- Field bindweed can reduce crop yields by up to 60%.
- Threatens restoration efforts by out-competing new plantings.

USDA PLANTS Database, USDA NRCS PLANTS Database, Bugwood.org

Control:

- Remove seedlings before they become perennial plants and produce seeds. Don't dispose in backyard compost piles; Bindweed can resprout from cuttings.
- Avoid digging or tilling the soil around mature field bindweed roots; Roots or rhizome fragments left behind may resprout.
- For small infestations repeated hand pulling works eventually, but is highly labor intensive.
- For small infestations herbicides can be painted or brushed on leaves to avoid drift onto desirable plants. Products containing glyphosate are effective when applied in the summer and fall before the leaves die back.
- For large infestations smothering plants with mulch, black plastic or plastic-fiber mats (geotextiles) is another option, but the covering must be kept in place for several years. Success may be somewhat limited as field bindweed can persist without light, sending its underground roots beyond the edge of the covering to start a new infestation.
- For best results, control methods should be used throughout several growing seasons; success in controlling this weed requires the **prevention** of seeds, **competition** from more desirable vegetation and vigilance in **removing new growth**.

SALT LAKE COUNTY

Salt Lake County Weed Control Program
www.weeds.slco.org
801-562-6466
weeds@slco.org

Field Bindweed (*Convolvulus arvensis*)

Classification

Field bindweed is a member of the morning glory (Convolvulaceae) family. It is known by the synonyms *Convolvulus ambigens, Convolvulus incanus,* and *Strophocaulos arvensis*. Common names include perennial morning glory, creeping jenny, bellbine, sheep-bine, and corn-bind. Field bindweed is a Class B priority weed in the Park.

Description, Identification, Distribution

Field bindweed is an herbaceous perennial vine that grows from persistent vertical and horizontal rhizomes. The rhizomes are often spirally twisted and can grow more than 6 feet into the ground. Stems are 1 to 3 feet long, prostrate, spreading, or twining, often forming tangled mats. Leaves are alternate; petioles are ¼ to
1 inch long; blades are ½ to 3 inches long, ½ to 2½ inches wide, smooth and not hairy; margins are entire; apices are rounded. Flowers are solitary, with sometimes 2 to 3 per node. The corolla is ¾ to 1¼ inch long,
¾ to 1 inch wide, funnelform, white to pink, sometimes purplish near the margins, with 5 anthers. The fruit is a capsule; the seeds are ovoid to obovoid and dark brown. Field bindweed flowers from May to October.

A native of Mediterranean Europe, bindweed has been introduced throughout most temperate and dry subtropical climates, including northern Africa, Australia, Eurasia, India, New Zealand, Hawaii, Chile, and North America. The earliest reported record in California is from San Francisco. Collections cited by Jepson (1939) suggest that it had become widespread in California prior to 1900. It has since colonized in all
50 states. In its native range, bindweed occurs in cultivated and fallow fields, along roadsides and railroad rights-of-way, and in disturbed open sites; it occupies similar habitats where naturalized.

Occurrence in the Park

Field bindweed is found on disturbed sites within the Park.

Biology

Field bindweed is self-incompatible and thus requires insect-pollination for seed set. In Europe, the principal pollinators are small bees. Dormant seeds retain high viability under field conditions, surviving at least
20 years. Seeds can be dispersed by birds, but primary dispersal is through irrigation of cultivated fields and through vehicle movement.

Although initially dispersed by seeds to new sites, it also can reproduce successfully and vigorously by underground rhizomes. Deep-set rhizomes also may persist for several years as a function of efficient use of carbohydrate reserves. Fragmentation of rhizomes is one of the primary mechanisms by which it disperses and persists in cultivated fields.

Potential Concerns

Field bindweed is one of the most persistent and difficult-to-control weeds in ornamentals, orchard and vine crops, and field crops.

Action Thresholds

To be determined by the NPS.

Inspection and Monitoring

No information at this time.

Non-chemical Management

Several phytophagous insects (i.e., Noctuid moths, whiteflies) and gall-forming mites (e.g., Aceria, Epitrimerus, Aculus) are reported to be destructive to bindweed. Chessman et al. (1997) found that moth larvae fed on leaves and stems of several bindweed "biotypes," but that development to pre-pupal maturity was delayed relative to larvae feeding on other "biotypes." Introduction and establishment of gall-forming mites (*Aceria malherbae*), which reduces productivity in field bindweed, was initially successful in Texas, but mite populations did not persist.

Several fungal pathogens have been reported to infect bindweed, including *Alternaria, Fusarium*, *Phoma proboscis*, and *Phomus convolvulus*. *Phomus convolvulus* appears to be the most successful fungal biocontrol, but it sporulates optimally only under conditions of high humidity. *Phoma proboscis* was found to be resistant to herbicide treatment and may act synergistically in the control of bindweed growth. Like *Phomus convolvulus*, however, it develops best under conditions of high humidity.

Chemical Management

Several kinds of herbicides (e.g., arsenicals, chlorates, dicamba, flouroxypyr, 2,4-D, glyphosates, imazapyr, metasulfuron) have been used primarily in cultivated fields, with varying results. Pandey and Singh (1994) reported that bindweed could not be controlled with sulphonyl urea herbicides, at least in wheat fields. Field conditions, including amount and time of cultivation and soil moisture, appear to be critical factors determining success of herbicides.

Use of surfactants (e.g., sodium carbonate) and high soil nutrient (e.g., nitrates, phosphates) levels have been reported to reduce the effectiveness of certain herbicides. One or more different herbicides appear to be effective when combined with appropriate tillage conditions.

Glyphosates appear to be among the more effective herbicides in cultivated fields. Yerkes and Weller (1996) reported differing response to glyphosate, suggesting variation in susceptibility or resistance. Westwood et al. (1997) reported various levels of susceptibility to glyphosates, which were related partly to differences in adsorption and translocation. Mixtures of glyphosates with other herbicides appear to be synergistic and may be more effective.

Evaluating Treatments

No information at this time.

Chemical Alternatives

The use of dark polyethylene film to increase soil temperature has been shown to be more effective than herbicides for small infestations. Under some conditions, defoliation has reduced productivity and reduced infestation levels. Combinations of both herbicide treatments and mechanical removal methods also have been shown to be effective. Re-establishment by means of root or rhizome fragments may be reduced by techniques that either minimize tilling or expose such fragments to desiccation and sun.

Sources of Advice, Technical Information, and Supplies

None at this time.

Personal References

None at this time.

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Marrubium vulgare L. (Horehound)


Lytle, Melody, NPIN

Family: Lamiaceae (Mint Family)

Synonym(s):

Duration: Perennial

Habit: Herb

Listed by:
Invasive Plant Atlas of the US: 1
Federal Noxious Weed: 0
TDA Noxious Weed: 0
TPWD Prohibited Exotic Species: 0

Description: Horehound has square stems (often woody near the base) densely covered with white hairs with leaves opposite each other. Leaves are hairy above, very hairy to woolly underneath, rounded with a crinkled surface and sharply aromatic when crushed. It has small white flowers in dense clusters above the nodes (where the leaves join the stem) around the upper sections of the stems. Clusters of flowers dry to form brown burrs with small hooked spines. Each burr contains up to 4 small (1-2 mm long) spear-shaped seeds.

History: Introduced as a plant for gardens.

Biology & Spread: Horehound spreads by seed. It is an opportunistic germinator with most seeds germinating in response to autumn rainfall, but germination also occurs throughout winter and spring whenever sufficient water is available. In low rainfall areas, however, there are rarely follow-up rains that allow for recruitment of seedlings. Most seedlings that germinate in spring and summer do not survive the first summer. Horehound, as with most members of the Lamiaceae family, is primarily bee pollinated but there have been no studies, however, to indicate what the seeding potential of horehound would be without bees.

Ecological Threat: The spread of horehound in pasture land poses a problem for successful management.

US Habitat: Open fields, lawns, disturbed areas

Distribution

US Nativity: Introduced to U.S.

Native Origin: Asia, south. Europe, north. Africa, Canary Is., Azores (Bailey, L.H. and E.Z. Bailey, Hortus Third: A Concise Dictionary of Plants Cultivated in the United States and Canada, MacMillan Publishing Co., Inc., New York , (1977).); NatureServe Explorer

US States: AK, AL, AR, AZ, CA, CO, CT, GA, HI, IA, ID, IL, IN, KS, KY, MA, MD, ME, MI, MN, MO, MS, MT, NC, NE, NJ, NM, NV, NY, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VA, VT, WA, WI, WV, WY

Resembles/Alternatives:

Management:
Prevention: It is important to keep uninfested areas clear of horehound. Identify and treat existing or potential sources of this plant before it invades. Once an infestation is established, prevention of spread into surrounding areas should be a priority. The area may be quarantined to stop movement of seeds and burrs on vehicles and equipment (both

management and recreational). Ensure stock are quarantined or clean of burrs prior to entry onto land.

Hand-pulling/grubbing: Manual removal is labor-intensive and needs to be repeated as new plants establish from seedlings. Very small patches are suitable for eradication by this technique, or it could be used as a containment measure to prevent spread from a larger infestation. Care is needed to ensure that hand pulling does not spread seeds to uninfested areas.

Slashing: If repeated at least annually slashing may restrict seed production, limit spread of established plants. Slashing is unlikely to achieve rapid reduction of horehound infestations unless combined with other techniques and seed may be spread to uninfested areas on machinery

Cultivation: Where feasible, deep cultivation will destroy existingplants especially if repeated in summer so that plants dry off. Reseeding pasture species will reduce horehound seedling establishment but controlled grazing and/or herbicide application will probably also be needed. Cultivation is not compatible with biological control agents unless carried out in a number of stages or adjacent to an uncultivated infestation so that some agents can survive in uncultivated areas and recolonize later.

Herbicide: The following active constituents or combination of active constituents are effective in different situations. Ensure that the herbicides are registered for your particular State/Territory: 2,4-D dimethylamine salt, 2,4-D isopropylamine salt, 2,4-D ethyl ester, triclopyr butoxyethyl ester, bromacil, bromacil + trichloracetic acid, bromacil + diuron, dicamba dimethylamine salt, dicamba dimethylamine salt + MCPA dimethylamine salt, diflufenican and MCPA 2-ethyl hexyl ester and metribuzin.
Spot-spraying: Best effects are achieved in autumn when horehound is growing strongly. Small areas along creeks, tracks, fencelines or near rabbit warrens can be treated easily; it is more difficult to deal with widely scattered plants. Follow-up is needed to control seedlings and this technique is not ompatible with biological control agents. Not all of the herbicides listed above are registered for spot spraying.
Boom-spraying, aerial spray or large-scale handgun application: Vehicle access is required for ground application. Spraying is likely to be considered too damaging to indigenous vegetation unless it is already very degraded.

Burning: Burning is an effective means of killing larger plants but the large numbers of seedlings produced require follow-up treatment. The horehound seed bank is greatly reduced after fire due to large numbers of seeds being killed and the large numbers germinating immediately afterward. Nevertheless, it seems unlikely that the seed bank could be decreased to the point where horehound seedlings would not rapidly reappear in suitable gaps, so fire should always be combined with other techniques. Regeneration of indigenous species may be aided by fire if the circumstances are right.

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Listing Source

- [ ] Texas Department ofAgriculture Noxious Plant List
- [ ] Texas Parks and Wildlife Department Prohibited Exotic Species
- [x] Invaders Program
- [ ] Federal Noxious Weed
- [x] Union of Concerned Scientists
- [x] United States Forest Service Southern Research Station

Text References

Weiss J., N. Ainsworth, and I. Faithfull. 2000. best practice management guide: Horehound, Marrubium vulgare. Accessed 5 December 2008: http://www.weedscrc.org.au/documents/horehound.pdf.

Data Source

Salsola tragus L. (Prickly Russian thistle)

Steve Dewey, Utah State University, Bugwood.org

Family: Chenopodiaceae (Goosefoot Family)

Synonym(s): ***Salsola australis, Salsola iberica, Salsola kali, Salsola pestifer, Salsola ruthenica***

Duration: Annual

Habit: Herb

Listed by:
Invasive Plant Atlas of the US: 1
Federal Noxious Weed: 0
TDA Noxious Weed: 0
TPWD Prohibited Exotic Species: 0

Description: Noxious bushy summer annuals, with rigid branches and reduced, stiff, prickly upper stem leaves (bracts) at maturity.

History: Introduced from Eurasia.

Biology & Spread: Most seed germinates the spring following maturation. Seed can germinate when night temperatures are below freezing and daytime temperatures reach 2? C. Optimal temperatures for germination are between 7 and 35? C (45 and 95? F). Germination requires little moisture (0.3 inches of rainfall) and occurs within in a few hours. Successful germination requires loose soils. Seedlings that germinate on firm soil seldom survive because radicles are unable to penetrate the soil. Seed in the field typically remains viable for only 1 year, some up to 2 years, rarely to 3. Plants about 0.5 m tall can produce about 1500-2000 seeds, and large plants can produce up to 100,000. Seed disperses when plants break off at ground level and tumble with the wind. Seedlings attain optimal emergence from litter or soil depths to 1 cm, but can emerge from soil depths to 6 cm.

Ecological Threat: Plants are an alternate host for the beet leafhopper (Circulifer tenellus) that can carry the virus causing curly-top of sugarbeets, tomatoes, melons, and many other crop and native plants. Immature plants can provide extra forage for livestock on arid rangelands. However, under certain conditions, such as heavy nitrogen fertilizer application, nitrates or oxalates can accumulate to levels poisonous to sheep.

US Habitat: Typically infests sandy soils on disturbed sites, waste places, roadsides, cultivated and abandoned fields, disturbed natural and semi-natural plant communities.

Distribution

US Nativity: Introduced to U.S.

Native Origin: Africa, temp.& trop. Asia, Europe (Germplasm Resources Information Network)

US States: AL, AR, AZ, CA, CO, CT, DE, GA, HI, IA, ID, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NM, NV, NY, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VA, VT, WA, WI, WV, WY

Resembles/Alternatives: Glasswort [Salsola soda L.] is a slender erect to rounded, glabrous summer annual, to 0.5 m tall. Unlike the Russianthistles, Glasswort remains fleshy at maturity, has calyces 3.5-5 mm long, with inner sepals (facing stem) tubercled and outer sepals with wings less than 1.5 mm long. It is an introduced weed of mudflats and saltmarshes in the San Francisco Bay region. Although flowers and fruits resemble those of Russian and barbwire Russianthistle, Mediterranean saltwort [Salsola vermiculata L.][SASVE][CDFA list: A] is easily distinguished by its

Russian Thistle

Salsola kali

USDA APHIS PPQ Archives, USDA APHIS PPQ, www.forestryimages.org

OTHER COMMON NAMES: prickly Russian thistle, saltwort, tumbleweed, windwitch, prickly glasswort

DESCRIPTION
Russian thistle is an annual tap-rooted forb that grows one to three-feet tall. Seedlings look very similar to pine tree seedlings. The plant stands erect and is spiny and profusely branched. The stems of young plants have red or purple stripes. The green leaves are alternate, thread-like, stalkless, cylindrical or awl-shaped with pointed tips. Flowers are small and greenish, and lack petals. Papery, spine-tipped bracts are at the base of each flower. It typically blooms from July through October.

WHAT TO LOOK FOR
- Many-branched spiny shrubs that look like a "tumbleweed"
- Stems with red stripes
- Plants bristly (from spiny bracts) at maturity
- Leaves spine-tipped

WHEN TO FIND RUSSIAN THISTLE
Russian thistle germinates in spring (March - April), blooms from July through October, and breaks off to form "tumbleweeds" at maturity. It can flower and produce seed until the temperature drops below -3.9°C (25°F).

WHERE TO FIND RUSSIAN THISTLE
It commonly grows in cultivated fields, pastures, waste areas, irrigated areas, river bottoms, rangeland, disturbed areas, forest edges, and along roadsides, trails, streams and lakes. It also favors inland and coastal dunes and sandy beaches.

WHAT TO DO
Russian thistle can be hand pulled so long as you are sure of its identification. Take care not to spread seeds.

Native to Russia, Russian thistle was brought to the United States in 1873 in contaminated flax seed. It is prevalent in the semi-arid range of the western states due to its tolerance of drought and long-distance method of dispersal. In Oregon, it is found throughout the eastern half of the state.

Russian thistle reproduces by seed, which are widely dispersed by the "tumbleweeds" that form when plants mature and break off at ground level. As a result, "trails" of seedlings are often produced across fields.

Considered very invasive, Russian thistle can dominate areas that experience drought conditions or have been cleared of competing vegetation. It competes with native species, blocks stream channels and roadways, and can become a fire hazard.

The establishment of Russian thistle can be prevented by planting desirable competing plants in open fields or disturbed areas. Effective control methods include cutting, mowing or tilling, certain herbicides, and two approved biocontrol agents.

REFERENCES
Russian thistle. (2006). Retrieved March 23, 2007, from USDA Forest Service Web site: http://www.na.fs.fed.us/fhp/invasive_plants/weeds/russian-thistle.pdf

Morisawa, TunyaLee. Weed Notes: *Salsola kali*. The Nature Conservancy. 1999. http://tncweeds.ucdavis.edu/moredocs/salkal01.pdf

Seedling. John D. Byrd, Mississippi State University, www.forestryimages.org

Flower. USDA APHIS PPQ Archives, USDA APHIS PPQ, www.forestryimages.org

This fact sheet was produced by The Nature Conservancy in Oregon's Weed Watcher – Weed Buster Program.

shrubby perennial habit and oblong to ovate leaves with rounded tips. It is an uncommon weed of disturbed rocky slopes and flats, often on clay soils, in the Temblor Range (se San Luis Obispo and possibly cw Kern cos.). To 1000 m (3300 ft). Introduced from Syria in 1969 as an experimental range plant. Immature halogeton [Halogeton glomeratus (M. Bieb.) C. Meyer] is distinguished from immature Russianthistles by having fleshy cylindrical leaves broadest near the tips and tufts of long white hairs in the leaf axils.

Management: Prevention: These thistles are part of a complex genus in the Chenopodiaceae family. They are strongly competitive in semiarid areas and are heavily favored by disturbance. They persist in dryland cropping systems, overgrazed rangeland, roadsides, and waste areas. The exact time of introduction into California for Salsola tragus and Salsola paulsenii is uncertain, but may have been near the turn of the century. Salsola collina is not currently present in California, but appears to be increasing its range across the Great Plains.

Mechanical: Many mechanical strategies are effective in controlling these thistles. Mowing is effective on very young plants. However, older plants will recover by axial branching below the cutting level. Plants should never be mowed after seed set has occurred, as this will facilitate seed dispersal to new areas. Tillage will control both seedling and larger plants. However, tillage increases disturbance, which favors additional germination of seeds. Seed viability appears to be 1-3 years for Russian thistle and is unknown for barbwire or spineless Russian thistle. Therefore, an intensive tillage program that completely prevents seed production for 2-3 years may eliminate these thistles. However, recurrent seed depositions from tumbleweeds blowing in from adjacent areas is highly probable.

Hand pulling of large plants is extremely difficult and may be injurious due to the spiny nature of Russian and barbwire thistle. Always wear gloves if attempting to hand pull these species.

Biological: There are two insects that have been approved and released for control of Russian thistle: a leaf mining moth (Coleophora klimeschiella) and a stem boring moth (Coloephora parthenica). Both are available for release in California. Beyond its known establishment in central California, there is little information on the effectiveness of Coleophora klimeschiella. Coloephora parthenica has not been effective in reducing Russian thistle populations. There are a number of possible factors for this, including predation by rodents, spiders, and parasitoids; poor host plant synchronization due to herbivore independent mortality; and a general lack of effectiveness in reducing seed production. Recent taxonomic reconsideration of Salsola tragus and its possible biotypes or subspecies may bring further clarity to the effectiveness of this biocontrol agent.

Chemical: These thistles primarily occur in dryland agricultural production systems, roadsides, rangelands, and waste areas. This presents the need for several different herbicide strategies. Generally, seedling Russian thistle is not difficult to control with the proper herbicides. However, as plants get older, moisture stress is often likely and herbicide efficacy is greatly reduced. For roadsides, preemergent herbicides applied in the fall can provide season long control. Table 1 provides effective herbicides for roadside Russian thistle control. Post-emergent applications should be made in the seedling stage for effective control. Postemergent applications generally do not provide long term control due to repeated flushes of seed germination following herbicide application. Consult the label for application rates and restrictions.

Russian thistle has documented resistance to chlorsulfuron in Idaho, Oregon, and Washington. In California, a biotype with resistance to both chlorsulfuron and sulfometuron has been found. Avoid developing resistance by using a combination of management strategies and rotating between herbicide modes of action.

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Text References

Encycloweedia, California Department of Food and Agriculture

Data Source

Last Updated: 2007-11-08 by LBJWFC

Onopordum acanthium L. (Scotch thistle)

Steve Dewey, Utah State University, Bugwood.org

Family: Asteraceae (Aster Family)

Synonym(s):

Duration: Biennial

Habit: Herb

Listed by:
Invasive Plant Atlas of the US: 1
Federal Noxious Weed: 0
TDA Noxious Weed: 0
TPWD Prohibited Exotic Species: 0

Description: Branched, robust biennial (or sometimes annual) that often grows 2.5 m or more in height and 2 m in width. Main stems may be up to 10 cm wide at the base. Stems have vertical rows of prominent, spiny, ribbon-like leaf material or "wings" that extend to the base of the flower heads. Leaves, which are armed with sharp, yellow spines, are up to 60 cm long and 30 cm wide. Upper and lower leaf surfaces are covered with a thick mat of cotton-like or woolly hairs, which give the foliage a gray-green appearance. The globe-shaped flower heads are borne in groups of 2 or 3 on branch tips. Flower heads are up to 5 cm in diameter, with long, stiff, needle-like bracts at the base. Flowers range from dark pink to lavender. Seeds are smooth, slender, and plumed.

History:

Biology & Spread: Onopordum acanthium is a herb of the sunflower family (Asteraceae) that is native to Europe and Asia. It has been introduced to temperate climates elsewhere, including much of North America and Australia. In North America, O. acanthium is a weed problem on western rangeland and produces significant economic losses for ranchers.

Ecological Threat: Listed as a noxious weed or otherwise problem plant in 14 US states.

US Habitat: In its native Europe, O. acanthium is well established in continental areas with summer-dry climates. In the western U.S., O. acanthium infests wet meadows and pastures, as well as more arid big sagebrush (Artemesia tridentata Nutt.) sites. Onopordum acanthium is often associated with waste places, as well as rivers, streams, canals, or other waterways. It can also be abundant in dry pastures, fields, and rangeland. In particular, the plant thrives in light, well drained, and sandy or stony soils. Temperature and moisture, rather than soil nutrient concentrations determine the ecological performance of Onopordum species.

Distribution

US Nativity: Introduced to U.S.

Native Origin: Europe and Asia

US States: AZ, CA, CO, CT, DC, FL, ID, IL, IN, KS, KY, MA, MI, MN, MO, MT, NE, NJ, NM, NV, NY, OH, OR, PA, RI, TX, UT, VA, VT, WA, WI, WV, WY

Resembles/Alternatives: Canada thistle [Cirsium arvense (L.) Scop.][CIRAR], bull thistle [Cirsium vulgare (Savi) Ten] [CIRVU], and Nodding thistle [Carduus nutans (L.)][CANU4] may be confused with Scotch thistle.

Canada thistle is perennial, with creeping roots and small unisexual flower heads unlike Carduus thistles. Plants are

either male or female (dioecious). In addition, Canada thistle has smooth stems and plumose pappus bristles.

Bull thistle is a coarse biennial with plumose pappus bristles and upper leaf surfaces covered with stiff bristly hairs that are rough to touch.

Nodding thistle has leaves that are dark green, coarsely lobed, with a smooth waxy surface and a yellowish to white spine at the tip. Flower heads will droop to a 90-degree angle from the stem when mature.

Management: Physical: Small areas can be eradicated by digging. Plants must be cut off below the soil, leaving no leaves attached. Mowing has limited effectiveness for controlling O. acanthium. It usually only prevents seed production if done either immediately prior to flowering or when plants are just starting to flower. When mowing is conducted too early, it may only delay flowering. However, when plants are cut too late in the flowering process, viable seed may still develop in the capitula following cutting. Because there can be a wide variety in the maturity of plants, a single mowing is unlikely to provide satisfactory control. Onopordum acanthium invasions may be prevented by manipulating the cropping environment (cultural control methods). For example, establishing and maintaining dense, vigorous, competitive pasture can effectively prevent O. acanthium establishment. Healthy pasture is particularly important in the autumn, when most O. acanthium seeds germinate.

Chemical: For herbicide control, Picloram, dicamba, 2,4-D, dicamba + 2,4,-D, and metsulfuron are effective for controlling O. acanthium. Application rates vary depending on stand density and environmental conditions. Herbicides should be applied in the spring before O. acanthium bolts, or in the fall to rosettes.

Biological: Thistle invasion in unlikely to occur in ungrazed pasture. Goats will graze O. acanthium, reducing plant numbers and preventing seed production. No biological controls are currently available in the United States. Australia has released several biocontrol insects. Four control agents have been used in the biocontrol of O. acanthium a seed-feeding weevil Larinus latus was first released on 200 sites during 1993. It was found that the agents had eaten through 83% of the seed on released sites. A second control agent Lixus cardui, slower to spread than the first one was released a year later, this affected the growth of the plant. There are plans to release four more agents; thistle rosette destroying weevil Trichosirocalus sp. and a moth, Eublemma amoena, and two flies, Botanophila spinosa and Urophora terebrans which attack rosettes and seed respectivly. These control agents however, have failed host specificity tests in the U.S. Additional insects are being evaluated for release in the U.S.

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Text References

USDA, NRCS. 2006. The PLANTS Database (http://plants.usda.gov, 7 November 2006). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. (http://plants.usda.gov/java/profile?symbol=ONAC)

Global Invasive Species Database, 2005. Onopordum acanthium. Available from: http://www.issg.org/database/species/ecology.asp?si=295&fr=1&sts=(Accessed November 7, 2006)

Data Source

USDA, NRCS. 2006. The PLANTS Database (http://plants.usda.gov, 7 November 2006). National Plant

Data Center, Baton Rouge, LA 70874-4490 USA.

Global Invasive Species Database (http://www.issg.org/database)

Last Updated: 2007-11-08 by Joe Marcus

Scotch thistle

Colorado Dept. of Agriculture,
Conservation Services Division
700 Kipling Street
Suite 4000
Lakewood, CO 80215
303-239-4100

Key ID Points

1. Flower heads cluster 2 5 and are purple to dark red in color.
2. Leaves are alternate, stalk less and hairy underneath.

Updated on: 08/08

Scotch thistle Identification and Management

Identification and Impacts

Scotch thistle *(Onopordum acanthium or O. tauricum)* is a non-native biennial forb that reproduces solely by seed. A biennial is a plant that completes its lifecycle within two years. During the first year of growth, Scotch thistle appears as a rosette in spring or fall. Rosettes can be 1 to 2 feet in diameter. During the second year in mid to late spring the stem bolts, flowers, sets seed, and the plant dies. A prolific seed producer, Scotch thistle can produce up to 14,000 seeds per plant.

Scotch thistle can grow up to 12 feet tall. Stems are numerous, branched, and have broad, spiny wings. The leaves of species *acanthium* are large, grayish-green, spiny, and covered with fine dense hair giving the leaf a woolly appearance. The leaves of the species *tauricum* are similar in size, but are not hairy, smooth and bright green. On both species, the leaves have a distinct mid-rib. The flowers are violet to reddish in color, numerous (70-100/plant), and are surrounded by spine-tipped bracts. The plants flower from mid-June to September.

Due to the robust, spiny nature of Scotch thistle, this plant can act as a living barbed wire fence, making areas impassible for wildlife, livestock, and people. Scotch thistle invades rangeland, overgrazed pastures, roadsides, and irrigation ditches. It also prefers high-moist soil areas adjacent to creeks and rivers.

The key to effective control of Scotch thistle is maintaining healthy pastures and rangeland, guarding against disturbance or overuse, and as with most biennials limit seed production. To reduce seed production, plants with buds or flowers should be collected and immediately disposed of or destroyed. Chemical control is most effective when plants are in rosette stage, spring or early fall. Mechanical controls can be used to eliminate small patches or plants in a later growth stage. Details on the back of this sheet can help to create a management plan compatible with your site ecology.

Scotch thistle is designated as a "List B" species in the Colorado Noxious Weed Act. It is required to be either eradicated, contained, or suppressed depending on the local infestations. For more information visit www.colorado.gov/ag/csd and click on the Noxious Weed Management Program. Or call the State Weed Coordinator at the Colorado Department of Agriculture, Conservation Services Division, 303-239-4100.

Photos © Map above: Crystal Andrews, Colorado Department of Agriculture; All other photos: Kelly Uhing, Colorado Department of Agriculture.

Onopordum acanthium or O. tauricum

Management Recommendations

Scotch thistle

CULTURAL
Establishment of selected grasses can be an effective cultural control of Scotch thistle. Contact your local Natural Resources Conservation Service for seed mix recommendations. Maintain healthy pastures and prevent bare spots caused by overgrazing. Bareground is prime habitat for weed invasions.

BIOLOGICAL
Urophora stylata, a fly predator, is used to help control this thistle. The female fly lays eggs in the seed head of the thistle. The maggot then consumes the seed in the flower. This species has overwintered in Colorado but the limited numbers will not allow for general redistribution. For more information, contact the Palisade Insectary of the Colorado Department of Agriculture at 970 464 7916.

MECHANICAL
Any mechanical or physical method that severs the root below the soil surface will kill Scotch thistle. Mowing or chopping is most effective when Scotch thistle plants are at full bloom. Be sure to properly dispose of the flowering cut plants since seeds can mature and become viable after the plant has been cut down.

Integrated Weed Management:

Scotch thistle is best controlled in the rosette stage. For small infestations, Scotch thistle can be controlled by severing its taproot 1-2 inches below the ground. Control can be enhanced by a follow-up application of herbicides to the surviving rosettes. It is imperative to prevent seed production. Do not allow Scotch thistle flowers to appear.

HERBICIDES

NOTE: The following are recommendations for herbicides that can be applied to range and pasturelands. Rates are approximate and based on equipment with an output of 30 gal/acre. Please read label for exact rates. Always read, understand, and follow the label directions. The herbicide label is the LAW!

HERBICIDE	RATE	APPLICATION TIMING
Picloram (Tordon 22K - *Restricted Use*)	1 pint/acre + 0.25-0.5% v/v non-ionic surfactant	Apply spring or fall in the rosette stage.
Aminopyralid (Milestone)	7 fl. oz./acre + 0.25-0.5% v/v non-ionic surfactant	Apply spring or fall in the rosette stage.
Metsulfuron (Cimarron X-tra)	2 oz. product/acre 0.25-0.5% v/v non-ionic surfactant	Apply rosette to early bolt stages of growth. (Spring)

Colorado State University

COLORADO DEPARTMENT OF AGRICULTURE

Scotch thistle

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700 Kipling Street
Suite 4000
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Updated on: 08/08

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The key to effective control of Scotch thistle is maintaining healthy pastures and rangeland, guarding against disturbance or overuse, and as with most biennials limit seed production. To reduce seed production, plants with buds or flowers should be collected and immediately disposed of or destroyed. Chemical control is most effective when plants are in rosette stage, spring or early fall. Mechanical controls can be used to eliminate small patches or plants in a later growth stage. Details on the back of this sheet can help to create a management plan compatible with your site ecology.

Scotch thistle is designated as a "List B" species in the Colorado Noxious Weed Act. It is required to be either eradicated, contained, or suppressed depending on the local infestations. For more information visit www.colorado.gov/ag/csd and click on the Noxious Weed Management Program. Or call the State Weed Coordinator at the Colorado Department of Agriculture, Conservation Services Division, 303-239-4100.

Photos © Map above: Crystal Andrews, Colorado Department of Agriculture; All other photos: Kelly Uhing, Colorado Department of Agriculture.

Onopordum acanthium or O. tauricum

Management Recommendations

Scotch thistle

CULTURAL
Establishment of selected grasses can be an effective cultural control of Scotch thistle. Contact your local Natural Resources Conservation Service for seed mix recommendations. Maintain healthy pastures and prevent bare spots caused by overgrazing. Bareground is prime habitat for weed invasions.

BIOLOGICAL
Urophora stylata, a fly predator, is used to help control this thistle. The female fly lays eggs in the seed head of the thistle. The maggot then consumes the seed in the flower. This species has overwintered in Colorado but the limited numbers will not allow for general redistribution. For more information, contact the Palisade Insectary of the Colorado Department of Agriculture at 970 464 7916.

MECHANICAL
Any mechanical or physical method that severs the root below the soil surface will kill Scotch thistle. Mowing or chopping is most effective when Scotch thistle plants are at full bloom. Be sure to properly dispose of the flowering cut plants since seeds can mature and become viable after the plant has been cut down.

Integrated Weed Management:

Scotch thistle is best controlled in the rosette stage. For small infestations, Scotch thistle can be controlled by severing its taproot 1-2 inches below the ground. Control can be enhanced by a follow-up application of herbicides to the surviving rosettes. It is imperative to prevent seed production. Do not allow Scotch thistle flowers to appear.

HERBICIDES

NOTE: The following are recommendations for herbicides that can be applied to range and pasturelands. Rates are approximate and based on equipment with an output of 30 gal/acre. Please read label for exact rates. Always read, understand, and follow the label directions. The herbicide label is the LAW!

HERBICIDE	RATE	APPLICATION TIMING
Picloram (Tordon 22K - *Restricted Use*)	1 pint/acre + 0.25-0.5% v/v non-ionic surfactant	Apply spring or fall in the rosette stage.
Aminopyralid (Milestone)	7 fl. oz./acre + 0.25-0.5% v/v non-ionic surfactant	Apply spring or fall in the rosette stage.
Metsulfuron (Cimarron X-tra)	2 oz. product/acre 0.25-0.5% v/v non-ionic surfactant	Apply rosette to early bolt stages of growth. (Spring)

Colorado State University

COLORADO DEPARTMENT OF AGRICULTURE

NOXIOUS WEED FACT SHEET

Scotch Thistle *(Onopordum acanthium)*

Description: Scotch Thistle is an extremely large biennial or winter annual thistle, commonly growing 8-10 feet tall, depending on the amount of available moisture. It is usually well branched with a large amount of soft white hair on the stalks, upper and lower leaf surfaces. Leaf margins and midribs, as well as flower buds, are covered with very sharp, yellow-tipped spines. The stems of Scotch Thistle are "winged", having a soft, thin tissue attached like a ribbon along the sides of the stalks. Purple flowers are born either singly or in clusters of 2 to 5 and bloom from June to September. A prolific seed producer, each plant can produce 8,400 to 40,000 seeds.

Impacts: Scotch Thistle forms large infestations that can crowd out more desirable forage species, prevent livestock from accessing water, and has the potential to invade extensive acres of pasture land. Individual plants are so large that they shade out surrounding vegetation, using the water and nutrients that would have gone to more desirable species. When a Scotch Thistle plant dies, it leaves abundant litter that can smother surrounding plants. While Scotch Thistle is drought tolerant, it thrives with high soil moisture, causing it to be a threat to most areas of Thurston County.

Control Options: Thurston County's Integrated Pest Management emphasizes cultural, biological, and manual control methods to keep pests and vegetation problems low enough to prevent damage. The goal of Thurston County's pesticide use policy is to minimize the use of pesticides by utilizing and providing information about the most effective control options that are available and practical.

► **Cultural / Habitat**

Scotch Thistle is a native of Europe and Asia. It was introduced into the United States in the late 19th century as an ornamental, and is still occasionally grown as a garden curiosity due to its large size, interesting foliage and flowers. However, seeds commonly escape, creating a nuisance weed even in gardens and landscaping. Do not plant intentionally, and if you recognize this plant as an accidental introduction, remove it and monitor the area for more plants over the next several seasons.

Scotch Thistle seed is capable of remaining dormant in the soil for many years. A water-soluble germination inhibitor in the seed coat must be leached away to allow the seed to germinate, one reason why Scotch Thistle is so prominent in moist soils, ditches and drainage areas. Revegetating areas with desirable plants where control work has been done can help reduce the amount of Scotch Thistle in subsequent years and also prevent other weeds from taking advantage of the disturbed soil.

► **Manual / 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 usually not effective as it simply delays the blooming process. 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.

► **Biological**

While bio-control agents are used on Scotch Thistle with variable success in other areas of the country, none are particularly suited to Western Washington. Also, because bio-control agents are dependent on large, undisturbed infestations of host plants, it is not an appropriate control method in Thurston County where the only populations of Scotch Thistle are new introductions.

► Chemical

Spot spraying with ***glyphosate*** (example: Roundup Pro®, Glyfos®, etc.) is effective in controlling Scotch Thistle. Glyphosate products can be used to treat individual plants or small patches. Currently, products containing the active ingredient glyphosate are the only herbicides for the control of Scotch Thistle considered "low in hazard" by Thurston County's pesticide review process for the potential for chemical mobility and persistence.

Thurston County has observed that most ready-to-use, pre-mixed products do not contain sufficient active ingredients to be as effective as concentrated products that are then mixed with water to create a specific finished concentration. The following instructions are for products containing 41% glyphosate which will be mixed down to a specified dilution rate. Be sure to read your label carefully, and make adjustments to rates accordingly.

Foliar applications of glyphosate (ROUNDUP PRO™):

- Spot applications with glyphosate products are effective. Spot application means the herbicide is applied only to the plants and not on the surrounding plants or soil. Spray each plant thoroughly on the stems and leaves enough to be wet but not dripping.
- Glyphosate is non-selective, and will injure any plants that it comes in contact with, including grass.
- Keep people and pets off treated areas until spray solution has dried.
- Remove livestock before application; wait 14 days after spot application before grazing livestock or harvesting.
- Do not enter or allow worker entry into treated areas during the restricted entry interval of 12 hours. Keep people and pets off treated areas until spray solution has dried.

Foliar applications of *aminopyralid* (Milestone®)

For selective control of Scotch Thistle in agricultural settings (pastures, hayfields, etc.): an herbicide containing the active ingredient aminopyralid (example: Milestone™, Milestone VM™, etc.) may be a preferred choice. Aminopyralid products will not harm grass and can be used around livestock (provided all label precautions are followed). ***Do not use plant material or hay from treated areas for mulch. Likewise, do not use manure from animals that have grazed or eaten hay from treated areas.*** Aminopyralid is currently sold in agricultural herbicides that are to be used only in areas listed on the label, and are available in farm supply stores. Aminopyralid is considered moderate in hazard by Thurston County's review process for the potential for chemical mobility and persistence.

Timing: Applications should be made in the spring, when plants are actively growing, up to when the flowering stem elongates. Plants sprayed after buds develop are harder to kill and have a high likelihood of producing viable seeds, despite damage to the plant. Applications of aminopyralid are also effective in the fall before a killing frost.

Herbicide & Method	Product Rates	Mix
RoundUp Pro™ Spot/Foliar	2%	To 1 gallon of water add 2.66 oz. RoundUp Pro™, apply to foliage at or beyond bud stage.
Milestone™ Spot/Foliar	1 tsp per 1000 ft²	**To treat a 1,000 sq. ft. area:** Using a 2 to 4 gallon backpack or tank sprayer, add half of the water needed to cover all plants with one teaspoon Milestone™, agitate, then add water to reach desired amount (0.5 - 2.5 gallons total volume, depending on quantity and size of plants). Lightly spray all thistle plants in 1,000 sq. ft. area, then continue lightly spraying the thistle until the tank is empty and all plants have been thoroughly covered. The addition of a non-ionic surfactant (at least 80% active ingredient) is recommended to enhance herbicide activity.

READ AND FOLLOW ALL LABEL DIRECTIONS AND RESTRICTIONS. Obey all label precautions and safety measures. Always use personal protective equipment that includes coveralls, waterproof gloves, shoes plus socks, and protective eyewear. Use of brand names does not connote endorsement and is for reference only; other formulations of the same herbicides may be available under other names. Information provided is current as of the date of the fact sheet. Pesticide product registration is renewed annually and product names and formulations may vary from year to year

References:

Problem Thistles of Oregon, OR Dept. of Agriculture, EC Bulletin 1288
Written Findings of the Washington State Noxious Weed Control Board;
Gilkey's Weeds Of The PNW;
Bio-Control Of Weeds In The West Utah State University Extension, Plant Ecology: Scotch Thistle
Managing Scotch Thistle, University of Nevada, Reno, Extension Fact Sheet FS-02-57

THURSTON COUNTY
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SINCE 1852

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Revised March, 2011

COMMON MULLEIN
Verbascum thapsus

Life History/Identification:

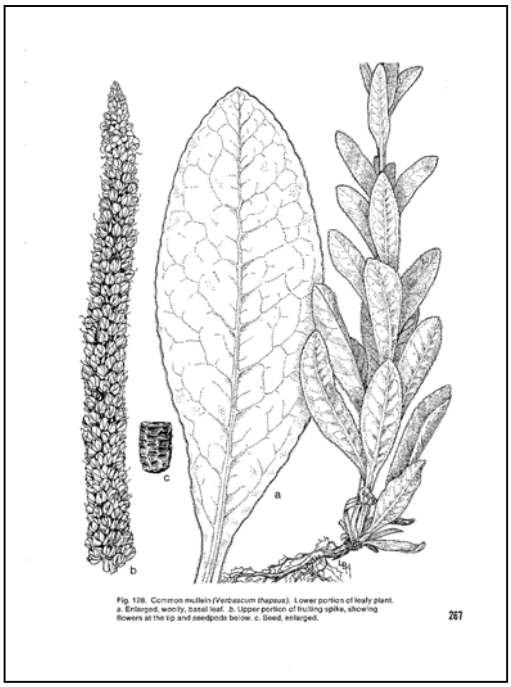


Fig. 128. Common mullein (Verbascum thapsus). I. Lower portion of leafy plant. a. Enlarged, woolly, basal leaf. b. Upper portion of fruiting spike, showing flowers at the tip and seedpods below. c. Seed, enlarged.

Common mullein is native to Europe and Asia, and has established itself throughout the United States. Of the 250 species of *Verbascum*, eight have been introduced into North America, of which, *Verbascum thapsus* is the most widespread. First year mullein plants are low-growing rosettes that have bluish, gray-green leaves and a felt-like texture. As the plant ages, the hairs on the leaves are mechanically worn away, but not completely. Leaves range from 4-12 inches in length and 1-5 inches in width in the rosette stage. Mature flowering plants are produced the second year, and can grow from five to ten feet in height, including the conspicuous flowering stalk. Leaves alternate along the flowering stalk and are much larger towards the base of the plant. Mullein typically begins to flower in late June and peaks in early August. The flowers are yellow and have five petals. The flowers are also autogamous, meaning that they can self-pollinate if pollination by short or long-tongued bees does not occur. The weed will bear fruit only once and then will die. Mullein seeds are tiny, pitted, and rough with wavy edges and deep grooves, and they usually do not fall far from the parent plant. An adult mullein can produce as many as 100,000-180,000 seeds. Since vegetative reproduction does not occur in mullein, the weed depends on its seeds to produce offspring. The seeds remain viable for an extremely long time, having a life expectancy that ranges from 35 years to more than 100 years, but they will remain dormant if they are buried too deeply in the soil. If a viable seed is brought to the surface of the soil through a disturbance of some kind, it will be able to germinate the following year. Moisture and light are required for the germination of mullein, and competition with other plants decreases the amount of seeds that successfully germinate. Once established, however, mullein grows more vigorously than many native herbs and shrubs, and its growth can overtake a site in fairly short order.

Flagstaff Localities:

Mullein is considered a noxious weed by the Arizona Interagency Noxious Weed Coordinating Committee, although it is commonly not considered a serious threat due to the fact that local populations are not able to persist in an area unless it is continuously disturbed and individuals which flower and die are replaced. In the vicinity of Flagstaff, mullein can be found along roadsides, in neglected pastures, within natural meadows and forest openings, and in industrial areas. Common mullein prefers, but is not limited to, dry sandy soils.

Economic Impact:

It was Aristotle who first recorded common mullein as a piscicide, or fish poison, and the plant has been commonly used as such since antiquity. In the mid-1700's, the plant was introduced in Virginia as a piscicide, and from there it quickly spread throughout the United States. Records show that it was first described in Michigan in 1839 and by 1876 it was found on the Pacific coast. Mullein was also introduced into the United States for its impressive medicinal properties. It has long been used as a remedy for bronchitis and as a cough suppressant. An antispasmodic, mullein can also relieve stomach cramps and help control diarrhea. Traditional uses for mullein also include protection for scraped tissues, and as relief for minor abrasions. A methanol extract from the plant has been

effective in the control of mosquito larvae. On a lighter note, somewhere down the line common mullein has earned the nickname, "Nature's toilet paper," although that term requires a bit of faith and desperation from the user. Despite its medicinal properties and usefulness, however, it must be remembered that common mullein is an invasive non-native weed that competes with native flora. Unless current infestations are kept in check, the plant does have the potential to create unhealthy dynamics in an ecosystem by inhibiting natural processes and stifling native plant spread. In rangelands, mullein is unpalatable to cattle and sheep, and its presence in overgrazed or poor pastures represents a further degradation of the pasture.

Control:

The most desirable approach is that of an integrated pest management plan. This involves the optimum use of all control strategies to control non-native weeds. The manual removal of mullein plants before flowering, the establishment of dense vegetative cover, and minimizing the availability of disturbed, bare soil have been shown to be useful and adequate control methods for mullein.

Cultural Control:

The prevention of further infestations of common mullein is the most effective and least expensive method of control. The use of competitive native species is an important control for mullein, but it is most effective when used in conjunction with another control method.

Mechanical Control:

Mullein plants are easily hand pulled on loose soils due to relatively shallow taproots. This is an extremely effective method of reducing populations and seed productivity, especially if the weed is pulled before the seeds are formed. If blooms or seed capsules are present, reproductive structures should be removed, bagged, and properly disposed of in a sanitary landfill. Care should be taken to minimize soil disturbance since loose soil will facilitate mullein seed germination. Mullein may be trimmed back by mowers, and repeated mowing will prevent the flower stalk from bolting. However, mowing will increase the size of the basal rosette, and if mowing is discontinued, a much larger plant, often with additional branching, will proceed to bolt and produce higher quantities of flowers and seeds.

Chemical Control *(Noted here are chemical control methods that have been used in other areas. Always check with weed specialists or chemical suppliers before treatment to ensure correct dosage and application. Mention of these products does not imply endorsement by the Northern Arizona Weed Council or The Nature Conservancy.)*:

For situations where hand pulling of plants is not practical or safe, herbicidal control is an effective option. Apply a 2% solution of Roundup™ (chemical name: glyphosate) or Garlon™ (chemical name: triclopyr) and water plus a non-ionic surfactant, using a tank or backpack sprayer to thoroughly cover the leaves of mullein. Do not apply so heavily that the herbicide drips off the leaf surface. Use caution, as Roundup™ is a non-selective herbicide that can kill desirable plants. Garlon™ is selective to broadleaf plants and is a better choice if native or other desirable grasses are present. Applications can be made during the early spring when most other non-target vegetation is dormant.

Biological Control *(No exotic species should be introduced into an ecosystem without extensive research into the long-term effects. Mention of the species below does not imply appropriateness for use in Northern Arizona.)*:

There are currently no approved biological control agents used on common mullein. However, there are two insects that have possible control implications for mullein, a weevil and a moth. These insects feed on the seed capsules of the weed and, in the case of the weevil, can destroy up to 50% of the seeds. Pathogens that have been shown to cause disease in mullein are also destructive to economically important plants such as vegetables and cotton.

Note: No single control method, or any one-year treatment plan, will ever achieve effective control of an area contaminated with common mullein. The fast growth and high seed production of this plant require long-term cooperative integrated management programs and planning to prevent, contain, and reduce mullein infestations.

Moser, L; D. Crisp. San Francisco Peaks Weed Management Area fact sheet on Verbascum thapsus. Coconino National Forest.

FACT SHEET: COMMON MULLEIN

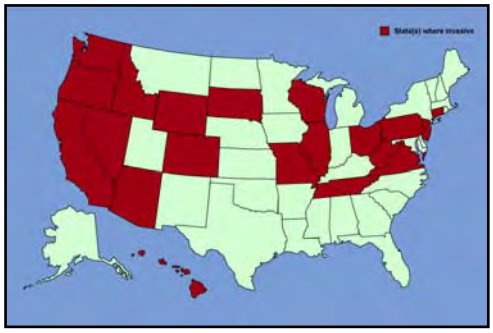
Common Mullein

Verbascum thapsus L.
Figwort family (Scrophulariaceae)

NATIVE RANGE
Europe and Asia

DESCRIPTION
Common mullein, also known as wooly mullein, is an erect herb. First year mullein plants are low-growing rosettes of bluish gray-green, feltlike leaves that range from 4-12 inches in length and 1-5 inches in width. Mature flowering plants are produced the second year, and grow to 5 to 10 feet in height, including the conspicuous flowering stalk. The five-petaled yellow flowers are arranged in a leafy spike and bloom a few at a time from June-August. Leaves alternate along the flowering stalks and are much larger toward the base of the plant. The tiny seeds are pitted and rough with wavy ridges and deep grooves and can germinate after lying dormant in the soil for several decades.

ECOLOGICAL THREAT
Common mullein threatens natural meadows and forest openings, where it adapts easily to a wide variety of site conditions. Once established, it grows more vigorously than many native herbs and shrubs, and its growth can overtake a site in fairly short order. Common mullein is a prolific seeder and its seeds last a very long time in the soil. An established population of common mullein can be extremely difficult to eradicate.



DISTRIBUTION IN THE UNITED STATES
Common mullein was first introduced into the U.S. in the mid-1700's, where it was used as a piscicide, or fish poison, in Virginia. It quickly spread throughout the U.S. and is well established throughout the eastern states. Records show that it was first described in Michigan in 1839 and on the Pacific coast in 1876, probably due to multiple introductions as a medicinal herb.

HABITAT IN THE UNITED STATES
Common mullein can be found where mean annual precipitation is greater than 3-6 inches and the growing season lasts for a minimum of 140 days. Intolerant of shade, mullein will grow in almost any open area including natural meadows and forest openings as well as neglected pastures, road cuts, industrial areas. Common mullein prefers, but is not limited to, dry sandy soils.

BACKGROUND
Common mullein is a monocarpic perennial (i.e., takes two or more years to flower and die). Brought over from Europe by settlers, it was used as a medicinal herb, as a remedy for coughs and diarrhea and a respiratory stimulant for the lungs when smoked. A methanol extract from common mullein has been used as an insecticide for mosquito larvae.

BIOLOGY & SPREAD
During the first summer after germination mullein produces a tap root and a rosette of leaves. During this vegetative stage, the rosette increases in size during the growing season until low temperatures arrest growth sometime during the autumn and winter. Beginning the next spring, second year plants bolt into maturity, flower, produce seed during the summer, and then die, completing the plant's normal life cycle. Flowers mature from the base to the tip of the stalk. The length of the flowering period is a function of stalk height; longer stalks can continue to flower into early October. It is

estimated that a single plant can produce 100,000-180,000 seeds which may remain viable for more than 100 years. The seeds are dispersed mechanically near the parent plant during the autumn and winter. Seeds at or near the surface are more likely to germinate.

MANAGEMENT OPTIONS

Although common mullein can be very difficult to eradicate, there are a variety of management methods available, depending on the particular situation. Because mullein seedling emergence is dependent on the presence of bare ground, sowing sites with early successional native grasses or other plants may decrease seed germination and the chance of successful emergence of mullein seedlings.

Manual and Mechanical

Mullein plants are easily hand pulled on loose soils due to relatively shallow tap roots. This is an extremely effective method of reducing populations and seed productivity, especially if plant is pulled before seed set. If blooms or seed capsules are present, reproductive structures should be removed, bagged, and properly disposed of in a sanitary landfill. Care should be taken, however, to minimize soil disturbance since loose soil will facilitate mullein seed germination.

Biological

There are two insects that have possible biological control implications for mullein. A European curculionid weevil (*Gymnaetron tetrum*), determined by the U.S. Department of Agriculture to be specific to mullein, has been introduced to North America. The weevil larvae matures in the seed capsules and can destroy up to 50% of the seeds. Another agent, the mullein moth (*Cucullia verbasci*) has been tested in the U.S. and is considered to be a relatively safe control agent because of its consistent feeding and development on mullein species. Although tests showed limited feeding on other native species, the larvae did not survive significantly longer than those individuals tested in the absence of food.

Release of biological controls into natural environments is always experimental and should be entered into only after full and careful consideration of potential non-target species impacts. Once released into nature, biological control agents are difficult if not impossible to control.

Chemical

For situations where hand-pulling of plants is not practical or safe, for example, on very steep slopes where hand pulling is dangerous or would cause significant soil disturbance, herbicidal control is an effective option. Apply a 2% solution of glyphosate (e.g., Roundup®) or triclopyr (Garlon®) and water plus a non-ionic surfactant, using a tank or backpack sprayer to thoroughly cover all leaves. Do not apply so heavily that the herbicide drips off the leaf surface. Use caution as glyphosate is a non-selective herbicide that may kill desirable plants even if partially contacted by spray. Triclopyr is selective to broadleaf plants and is a better choice if native or other desirable grasses are present. For some sites, applications can be made during the early spring when most other non-target vegetation is dormant. Refer to the pesticide manufacturers' label for specific information and restrictions regarding herbicide use.

USE PESTICIDES WISELY: Always read the entire pesticide label carefully, follow all mixing and application instructions and wear all recommended personal protective gear and clothing. Contact your state department of agriculture for any additional pesticide use requirements, restrictions or recommendations.

NOTICE: mention of pesticide products on this page does not constitute endorsement of any material.

CONTACTS

For more information on the management of Common Mullein, please contact:

- Kris Johnson, Great Smoky Mountains National Park, Gatlinburg, TN

SUGGESTED ALTERNATIVE PLANTS
Although not a popular ornamental, there are many excellent native plant alternatives for mullein that thrive in full sun and sandy soils. In the eastern U.S., common milkweed (*Asclepias syriaca*), butterflyweed (*Asclepias tuberosa*), joe-pye weed (*Eupatorium dubium*), black-eyed Susan (*Rudbeckia fulgida*), and Ironweed (*Vernonia noveboracensis*), are just a few of the many selections. You may wish to contact your local native plant society for further suggestions.

OTHER LINKS
- http://www.invasive.org/search/action.cfm?q=Verbascum%20thapsus
- http://www.hear.org/starr/hiplants/images/thumbnails/html/verbascum_thapsus.htm

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APPENDIX C

Anticipated Disturbance Type by Project Component

Table C.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 (×5)	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 power 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 with 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*	−23.7	−0.06%	−1.8	0.00%	N/A
Total	**647.9**	**1.63%**	**225.4**	**0.60%**	**N/A**

N/A = not applicable.
* 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 D

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. According to the *Coconino County Public Works Department Seeding Standards* (Coconino County 2008:4), "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 D.1.

Table D.1. Compost Standards

Category	Requirement
Cation exchange capacity	Greater than 60 meq/100 g
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 100 mb 02/kg compost dry solids - hour

Note: Table adapted from the Coconino County Public Works Department Seeding Standards (Coconino County 2008).

Fertilizer:

In order to aid the establishment of the native seeds planted in the project area and to avoid the proliferation of non-native species, the following fertilizer specifications are recommended by Granite Seed Company: sustain slow release fertilizer at an application rate of 1,000 lb/acre.

Mulch:

In accordance with recommendations by Granite Seed Company, the following information should be used as guidance if applying the seed mix through hydroseeding methods: Hydraulic mulch is typically applied at 2,000 lb/acre with M-binder tackifier at 150 lb/acre.

Appendix D

WESTERN AREA POWER ADMINISTRATION STANDARD CONSTRUCTION PROJECT PRACTICES AND MITIGATION

Table D.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 D.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 E

FIRE PROTECTION AND EMERGENCY RESPONSE PLAN

FIRE PROTECTION AND EMERGENCY RESPONSE PLAN

PERRIN RANCH WIND ENERGY PROJECT
COCONINO COUNTY, ARIZONA

Prepared for
Perrin Ranch Wind, LLC
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Figures

1.0 INTRODUCTION

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 39, 833 acres of private and state-owned land at Perrin Ranch (the project area) in Coconino County, Arizona. The proposed Perrin Ranch Wind Energy Center (hereafter called the project) would be a wind generation facility located on 39,833 acres of State Trust land, managed by the Arizona State Land Department (ASLD), and private land owned by one landowner. The proposed project would be located approximately 13 miles north of the town of Williams, Arizona, on the west side of and adjacent to State Route (SR) 64 (Figure 1.1).

This Fire Protection and Emergency Response Plan (plan) primarily deals with the actions that would need to be taken in the event that a fire-related incident or an emergency incident occurred during construction and operation of the project; however, it does not cover the issues and details of a formal Health and Safety Plan. This plan has been prepared with the assumption that 1) all contractors and subcontractors working on the site during constructon and operation, like Perrin Ranch Wind, have their own Health and Safety Plan, and 2) their staff are trained and experienced in the daily implementation of that plan and the procedures and recommendations that it provides. Contractors and subcontractors would be made aware of and be provided with a copy of this plan (particularly the aspects of wildland fire), which would supplement their own Health and Safety Plan. As part of Perrin Ranch Wind's due diligence, when appointing its own construction subcontractors, such Health and Safety Plans, along with the subcontractor's Safety Records, would be reviewed.

This document will form part of the site safety induction for all site personnel. An overall map of the site showing where emergency response equipment will be stored for the duration of construction will be developed after meetings and input from emergency providers and contractors. This map wil be submitted to emergency responders prior to site preparation. This map will also show the location(s) of gated/locked entrances.

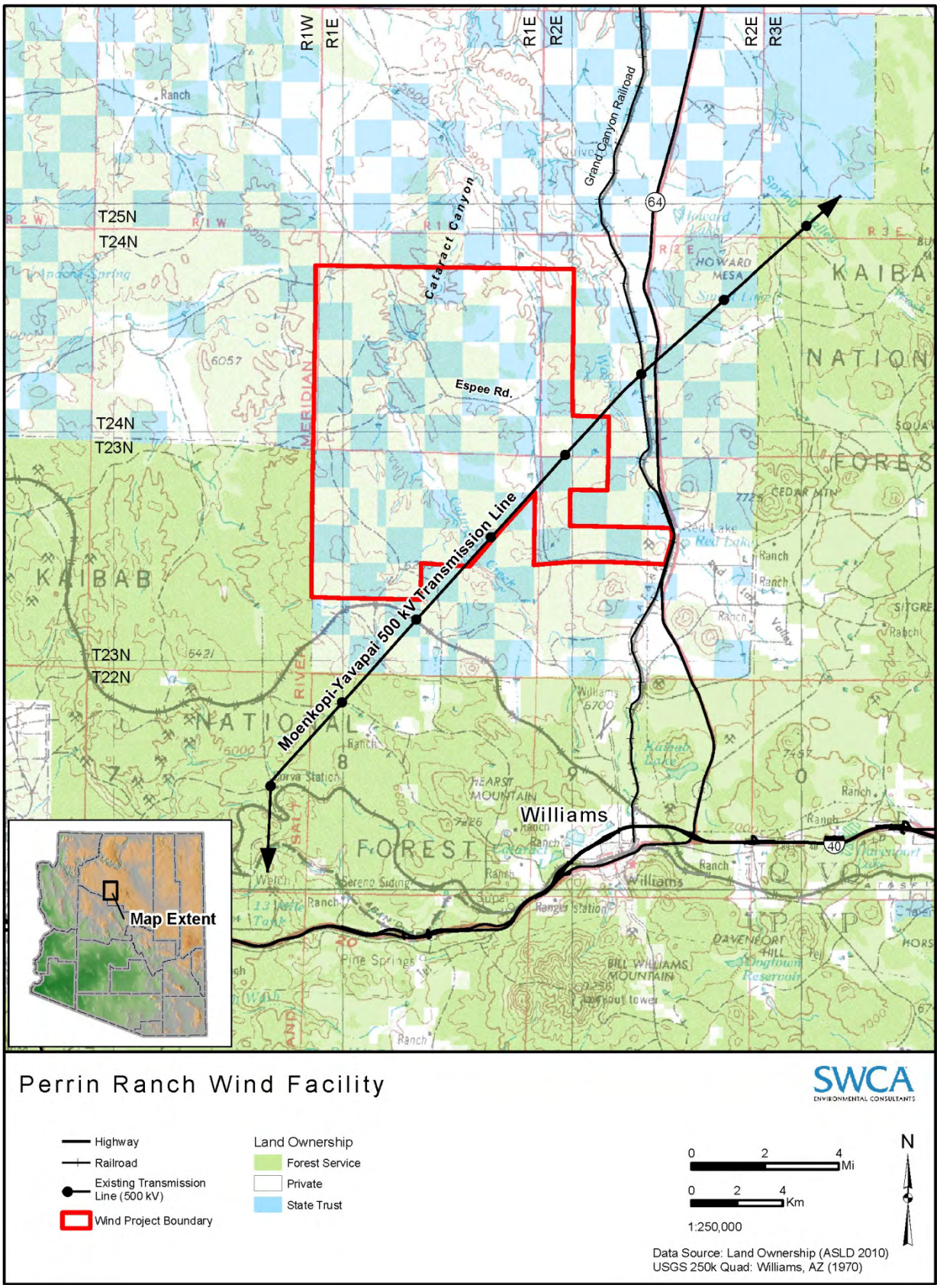

Figure 1.1. General location of the project area.

2.0 PROJECT DESCRIPTION

The proposed project is located at Perrin Ranch, approximately 13 miles north of the town of Williams, Arizona. Perrin Ranch Wind would construct, operate, and maintain a wind energy facility on private and state trust owned land at Perrin Ranch.

The maximum output[1] 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 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-kilovolt (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.

Figure 1.1 shows the overall site layout and site location.

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

3.0 EMERGENCY INFORMATION

3.1 Notification Procedure

All emergency situations should be immediately reported.

The following seven-step Emergency Notification Procedure should be used:

1. **Notify 911 immediately**
    a. Give the site name, address, and directions to the operator.
2. **Describe the type of emergency situation**
    a. Typically, the categories include the following:
        i. Medical emergency
        ii. Fire
            1. Structural or equipment fire
            2. Wildfire
        iii. Construction emergency
            1. Equipment failure – specify
            2. Hazardous spillage – specify
            3. Turbine structural failure – specify
            4. Power failure
        iv. Extreme weather conditions
            1. Thunderstorm/electrical storm
            2. Extreme high winds
            3. Severe hail
            4. Snow/ice storm
        v. Transport incident
            1. Passenger vehicle
            2. Heavy hauler
            3. Heavy plant
            4. Aircraft impact
        vi. Extreme site conditions
            1. Flood
            2. Earthquake
        vii. Act of sabotage/vandalism
            1. Act of terrorism
            2. Bomb threat

b. When describing the personnel involved, indicate the number of people affected and the following initial assessment:

   i. Fatality

   ii. Major illness (e.g., heart attack, not breathing, unconscious, etc.)

   iii. Major injury (e.g., broken bone, loss of limb, severe cuts/bleeding, etc.)

   iv. Minor injury (e.g., twisted ankle, foreign body in eyes, minor cuts, etc.)

   v. Bite/sting (e.g., snake, insect, etc.)

   vi. Weather effect (e.g., effects of heat, sun, cold, wind chill, lightning strike, etc.)

   vii. Incident type (e.g., fall, crush, vehicle crash, fire, electric shock, etc.)

3. Provide the location

Give the operator the location of the emergency by referring to the nearest turbine, structure, or road junction. Also, let the operator know whether casualties are in the open, trapped in a vehicle or site equipment, or at height within the turbine.

4. Notify supervisor

Contact the nearest site supervisor, and then contact your own supervisor. For non-urgent medical attention, the supervisor should arrange for site transport to take the injured to the hospital and should notify the hospital that they are on their way. The nearest hospitals with an emergency room are 1) Flagstaff Medical Center, located about 35 miles from the project area on North Beaver Street in Flagstaff, Coconino County; and 2) North Country Health Care Hospital, about 50 miles north of the project area on North Fourth Street in Grand Canyon National Park, Coconino County.

5. Notify Perrin Ranch Wind

The supervisor(s) will contact a Perrin Ranch Wind supervisor (a full list will be provided and posted in a highly visible area of the O&M facility), who will assist at the location of the emergency. Jointly, the supervisors will arrange for a trained first aider to attend the scene of the emergency, if required. The names of all first aiders will be made available to all of the site supervisors. First aiders should be identified by badges on their hard hats.

6. Coordinate with emergency services

The supervisor will send an employee to the nearest site access point to meet the emergency services and will escort them to the location of the emergency. The gate guard also should be informed to assist in directing the emergency services to the scene of the incident.

If Air Evacuation services are required, personnel will direct the emergency responders to a designated helicopter landing area. This area will be identified prior to construction, and a map and coordinates will be included in the final plan.

7. Accompany any injured personnel to the hospital

The supervisor will continue to assist with the situation on site, and one of the supervisors will accompany any injured personnel to the hospital. The supervisor will stay until the examination (including drug and alcohol test) is complete, so that a full report that includes the extent of the injuries can be made. The employer can later require the injured to make an appointment to see a designated company doctor if confirmation of the nature or extent of the injuries, treatment, or disability is required.

3.2 Site Evacuation Procedure

1. Personnel empowered to order evacuation/shutdown of the site are as follows:

    a. Supervisors of individual contractors, who may instruct their own people to evacuate
    b. Perrin Ranch Wind supervisors, who may instruct all personnel to evacuate

2. A designated evacuation route and meeting site will be identified in the final plan and posted in plain view within the O&M facility and at various other locations. When instructed, personnel will evacuate the site via the nearest access to the designated route and will assemble at the designated site.

3. The Perrin Ranch Wind site manager (or designated person) will arrange a head count of all personnel following an emergency evacuation. This will be done as follows: supervisors from each contractor will carry out their own head count and will advise Perrin Ranch Wind of the result. Supervisors from each contractor will be responsible for maintaining an accurate record of which personnel are on-site each day, in order to be able to identify which personnel are missing in the case of an emergency evacuation. Further, a sign-in/sign-out procedure will be implemented at the main entrance.

3.3 Natural Disasters or Acts of Terrorism Without Warning

Natural disasters like earthquake and flash flooding may occur without warning. In such cases, it is important that the site be evacuated with all possible haste. All site personnel should move away from the location of the event and get to a safe location. It is essential that personnel remain calm and do not panic. Once personnel are in a safe location, the Emergency Notification Procedure (as described in Section 3.1) should be enacted.

Acts of terrorism, by their nature, frequently come without warning and should be treated in the same manner as natural disasters.

A radio will be located on-site and will provide a good source of information/communication. Site personnel should tune into a news station until such time as the all-clear is announced and they can either safely return to the site or to their homes.

3.4 Fire Prevention Procedures

Area jurisdictions currently have wildland fire emergency procedures in place. The procedures generally include management actions to protect values (homes, businesses, watersheds) and to diminish the risks and consequences of severe wildfires. Perrin Ranch Wind will employ a strategy of appropriate management response to all wildland fires, in cooperation with local fire departments. Selected

management strategies will consider public and firefighter safety as the first priority. Tactics will consider values at risk as well as the effects on lands adjacent to the project area.

Landowners around the project area, local fire departments, and the Coconino County Sheriff's Office would all 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.

Areas within the permanent footprint of the project (base of wind turbine towers, O&M facility, associated switchyards, etc.) must be declared a non-smoking area. In order to ensure compliance with the ban on smoking, employees and external companies, if applicable, must be instructed accordingly, and sanctions shall be imposed in case of violation of the ban. "No Smoking" signs will be installed at all project facilities.

3.4.1 Applicable Area Fire Plans

Greater Williams Area Community Wildfire Protection Plan (CWPP), March 2005. This CWPP includes the lands to the south and east of the Perrin Ranch Wind project area.

Flagstaff and Surrounding Communities in the Coconino and Kaibab National Forests CWPP, January 2005. This CWPP includes the Flagstaff region.

Grand Canyon National Park Fire Management Plan (FMP), July 2005. This FMP includes Grand Canyon National Park, approximately 50 miles north of the project area.

Kaibab National Forest FMP, January 2011. This FMP provides information for fire preparedness, wildfire response and protection, and wildfire prevention for the national forest lands adjacent to the southwest corner of the project area.

Coconino National Forest Plan, as amended, June 2005. This forest plan includes management actions for fire protection and use for the national forest lands located approximately 15 miles east of the project area.

3.4.2 Fuel 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.

Wind farms can also be potentially impacted by wildfire entering the site. This is less of an issue than for normal power generation sites, as power transmission is located within the towers and underground to the transformers.

Vegetation in the project area ranges from grasslands to pine-woodlands. Fire activity for different vegetation types normally will increase in response to seasonally declining moisture and humidity levels, combined with winds. Table 1 describes the total acreage of vegetation types in the project area and their respective fire risk.

Table 1. Fuel hazards of the Perrin Ranch Wind Project

Vegetation Type	Total Acreage	Fuel Hazard
Colorado Plateau Pinyon-Juniper Woodland	30,527	High
Intermountain Basins Semidesert Shrub Steppe	4,462	Moderate
Intermountain Basins Juniper Savanna	2,091	Moderate
Intermountain Basins Semidesert Grassland	1,388	Low
Intermountain Basins Big Sagebrush Shrubland	1,001	Moderate
Rocky Mountain Ponderosa Pine Woodland	172	Extreme
Intermountain Basins Mixed Salt Desertscrub	128	Moderate

3.4.3 Wildland Fire Suppression

The vegetation types within the project area and their associated fuel complexes vary widely. The range of fire behavior will be responsive to the three factors that influence the spread of wildfire: fuel, weather, and topography. Only fuel can be managed by humans to reduce the intensity and spread of wildfire.

Perrin Ranch Wind will ensure preparedness by doing the following:

- Maintaining a prevention program;
- Maintaining fully qualified and trained personnel;
- Maintaining a cache of supplies, materials, and equipment sufficient to meet normal fire-year requirements;
- Preparing and updating this plan based on preparedness levels derived from other relevant fire plans; and
- Maintaining agreements to coordinate area fire departments and agencies.

The overall objective of Perrin Ranch Wind's Fire Protection and Emergency Response Plan is to minimize the occurrence of unwanted human-caused and naturally occurring fires.

3.5 Severe Weather Conditions

Severe weather conditions, particularly gusting high wind speeds and electrical storms, have a pronounced effect on the construction of wind turbines. Records of prevailing weather conditions will be kept on a daily basis, and weather forecast updates will be reviewed and assessed periodically throughout the day. These measures will be used to ensure the safe continuity of work such that weather-sensitive activities are only undertaken when existing or imminent weather conditions allow for safe execution of those activities. All concerned parties at the project site should be proactive in monitoring local atmospheric conditions and should maintain awareness regarding any changes that could indicate deteriorating weather conditions.

The turbine manufacturers have recommendations in the turbine installation manuals that specify maximum wind speeds that are allowed for the following:

- Erecting tower sections, nacelles, and rotor assemblies;
- Working at height inside a turbine;

- Working at height external to the turbine; and
- Working on a suspended platform.

In addition, heavy lifting cranes have specific limitations with respect to positioning, rigging, and lifting components that will change with the dimensions of the component, the location, ground conditions, weather conditions, and wind speeds. The turbine manufacturer's recommendations and the crane limitations need to be considered for each stage of construction to balance the risk inherent in each operation. Turbine specific details and manuals will be maintained on-site.

Tall metal structures like wind turbines and heavy lifting cranes are prone to attracting atmospheric electrical activity until suitable grounding is in place. In the event of local electrical storms or thunderstorms, site personnel should evacuate all turbine locations and seek safety in the cabs of their vehicles, maintaining a distance of at least 80 feet from turbine locations until the storm has passed or abated.

3.6 PLAN HOLDERS

The Fire Protection and Emergency Response Plan will be held in the Perrin Ranch Wind construction supervisor's work trailer and by each of the contractors. In addition, copies of the final plan, site layout map, and site location map will be sent to local emergency services providers. A poster that summarizes pertinent information detailed in the final plan will be prominently displayed in the O&M facility during operation of the project.

4.0 EMERGENCY WITHIN A TURBINE

In the event that an incident occurs at height within a turbine, emergency services should be made aware of the need for specialized recovery equipment and techniques to enable injured personnel to be removed to safety. The wind turbine manufacturer will have available, on-site, such equipment and trained personnel to support and assist emergency services to accomplish such a recovery.

Emergency response equipment will be stored in the O&M facility and shall be transported to the appropriate turbine in the case of an emergency.

5.0 IN CASE OF SPILLAGE

A separate construction spill prevention, control, and countermeasures (SPCC) plan will be developed to address any spill of hazardous or potentially hazardous materials on-site. Please refer to that plan for more detailed instructions regarding spill prevention and response.

Location of Material Safety Data Sheets for Hazardous Materials

Each contractor is required to maintain listings of all materials they are using that may be flammable or hazardous to health and must provide a copy, updated as needed, to Perrin Ranch Wind. These files should be prominently posted in a clearly visible location in each contractor's trailer or office and in the Perrin Ranch Wind O&M facility.

6.0 AIRCRAFT IMPACT

Turbines would have the lighting 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 following FAA approval. The system would be designed to keep the towers dark before activating lights on the towers when a plane is detected in the area.

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 have 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.

The lighting system on project structures will be fully operational as soon as each electrical circuit is energized. To minimize the risk of collision by low-flying aircraft during the construction phase, fully erected turbines that have not been energized will be marked with a suitable self-powered obstruction light until the circuit is energized.

In the unlikely event that such a collision occurs, the plan will be brought into effect to mobilize the appropriate emergency services.

7.0 ACTS OF SABOTAGE, TERRORISM, AND BOMB THREATS

With the advent of potentially increased levels of terrorist activity in the United States, it is now essential that all companies consider the implications of a terrorist attack in the workplace on the health and safety of their staff. The primary concerns are threats of bombing attacks and the potential for chemical or biological attack. The Coconino County Sheriff's Office and Arizona Department of Homeland Security have joint law enforcement authority over the site and are responsible for assuming control of response actions.

In the event that an act of terrorism comes without warning, or in the case that an incident is subsequently found to be caused by vandalism or sabotage, the plan will be brought into effect to mobilize the appropriate emergency services.

7.1 Bomb Threat Procedure

In the event that a bomb threat call is received, the main objective is to record every word of the threat message accurately and obtain as much information as possible from the caller. To this end, the following questions should be asked:

- When will the bomb go off?
- Where is the bomb?
- What type of bomb is it?
- What does it look like?
- When was it put there?
- Why are you doing this?
- Who are you?

While talking to this person, try to determine the following:

- The gender of the caller
- The style of speech
- The accent and mannerisms of the caller
- Listen for background noises that could be helpful to an investigator

After receiving the call, the recipient will then do the following:

- Contact the site manager or the nearest site supervisor
- Dial 911 and inform the Coconino County Office or the Sheriff

Site management should do the following:

- Make sure the Coconino County Office or the Sheriff has been informed
- Ensure immediate evacuation of the supposed location of the bomb and the surrounding areas
- Prepare to implement the Evacuation Procedure

- Prepare relevant documentation to assist in assessing the situation with police and authorities, including information such as the number of people at each site location, site maps, plans of related buildings and equipment, etc.
- Coordinate with and provide support to the Coconino County Sheriff and Arizona Department of Homeland Security as requested

Whether the threat is received in writing or in person, the same procedure should be followed as far as possible.

A procedural checklist will be developed in the final plan; this checklist shall be maintained and readily available and will incorporate the above elements.

7.2 Chemical or Biological Threat

It is difficult to prepare a contingency plan that takes into consideration all of the potential consequences of a chemical or biological attack. However, should a warning or threat be issued, the same procedure should be applied as is described in Section 7.1 for a bomb threat. In the case of a chemical or biological attack, it is even more imperative for personnel to leave the area than when there is a bomb threat. Individuals should keep their bodies covered as much as possible to avoid any skin contact with the threatened substance and should cover their noses and mouths to avoid inhalation.

All site personnel should be vigilant in their examination of suspicious or unsolicited deliveries because of the potential use of a letter or parcel to spread a noxious medium. If there are any doubts about the content of a letter or parcel, or if the sender's address and the postmark do not match, the item should be treated as suspect, and authorities should be contacted to examine the piece under controlled conditions.

Site management cannot safeguard against all potential malicious actions of others; therefore, all site personnel should maintain a heightened state of awareness to protect themselves, their families, and their colleagues at work.

DO NOT APPROACH, TOUCH, OR ATTEMPT TO REMOVE
ANY SUSPICIOUS OBJECT OR DEVICE.

8.0 TRAINING

Perrin Ranch Wind will develop specific training protocol to be provided to all on-site personnel.Training protocol will be developed in consultation with the chief line officer of each agency and/or public service department.

9.0 POST-INCIDENT REVIEW OF RESPONSE PROCEDURE

Perrin Ranch Wind will develop a schedule for regular site safety meetings. During meetings that follow an emergency response incident, the site team will review how successfully the plan was implemented. Following this review, actions will be taken to correct any deficiencies, either by improved communication of the plan or by modifications to the plan.

Summary of Emergency Services for the Perrin Ranch Wind Energy Project Coconino County, Arizona

Nearest 24/7 hospital with emergency room capability that can be reached within 20–30 minutes	
Hospitals	Dial 911
Flagstaff Medical Center 1200 North Beaver Street Flagstaff, AZ 86001 (928) 779-3366	
North Country Health Care Hospital 2920 North Fourth Street Grand Canyon, AZ 86023 (928) 638-2598	
Will Respond to any Emergency Call (Fire/Basic Life Support)	Dial 911
Red Lake Fire Department (Non-transporting, Basic Life Support) 7807 North 8 Mile Boulevard Williams, AZ 86046 (928) 635-1550	
Junipine Volunteer Fire Department (Non-transporting, Basic Life Support) 7415 N Ponderosa Ave Williams, AZ 86046 (928) 635-1010	
Sherwood Forest Volunteer Fire Department (Non-transporting, Basic Life Support) 450 South Little John Road Williams, AZ 86046 (928) 635-9837	
Parks/Bellemont Fire District (Non-transporting, Basic Life Support) 101 Spring Valley Road Parks, AZ 86018 (928) 635-5311	
Fire Departments	Dial 911
Summit Fire Department (Ambulance, Paramedics) 8509 North Koch Field Road Flagstaff, AZ 86004 (928) 526-9537	
Flagstaff Fire Department (Ambulance, Paramedics) 211 West Aspen Avenue Flagstaff, AZ 86001 (928) 779-7688	
Police Departments	Dial 911
Coconino County Sheriff's Office 911 East Sawmill Road Flagstaff, AZ 86001 (928) 774-4523	
Williams Police Department 501 West Route 66 Avenue Williams, AZ 86046 (928) 635-4461 ()	
Company Doctor	
TBD	

Summary of Emergency Services for the Perrin Ranch Wind Energy Project Coconino County, Arizona (Continued)

Spill Reports – National Response Center	Dial 1-800-424-8802
Spill Reports – Arizona Department of Environmental Quality	Dial (602) 771-4303
Poison Center	Dial 1-800-222-1222
Emergency Services Can Be Contacted by Dialing 911	TBD
Perrin Ranch Wind Energy Center Project Manager	TBD
Perrin Ranch Wind Energy Center Superintendent	TBD
Perrin Ranch Wind Energy Center Safety Coordinator	TBD
Perrin Ranch Wind Energy Center Jobsite Trailer/Office	TBD
Perrin Ranch Wind Energy Center Personnel	TBD

Contact details of site supervisors, first aiders, and other personnel are listed on a separate sheet that will be issued with this plan and updated as the project progresses.

Useful Internet Links

Centers for Disease Control and Prevention (CDC)	http://www.cdc.gov/
Department of Homeland Security	http://www.dhs.gov/dhspublic/
Environmental Protection Agency (EPA)	http://www.epa.gov/
Federal Bureau of Investigation (FBI)	http://www.fbi.gov/
Federal Emergency Management Agency (FEMA)	http://www.fema.gov/
National Response Center to Report Toxic Chemicals and Oil Spills	http://www.nrc.uscg.mil/nrchp.html
Arizona Department of Health Services	http://www.azdhs.gov/
Industrial Commission of Arizona, Department of Labor, Division of Occupational Safety and Health (ADOSH)	http://www.ica.state.az.us/ADOSH/ADOSH_main.aspx
Occupational Safety and Health Administration (OSHA)	http://www.osha.gov/
Poisons Control Center	http://www.aapcc.org/ http://uuhsc.utah.edu/healthinfo/adult/nontrauma/overview.htm
United States Postal Service	http://www.usps.com/

Appendix F

CUMULATIVE ACTIONS

CUMULATIVE IMPACTS

Council on Environmental Quality regulations 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 (RFA) 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 effects analysis is to ensure that decision-makers consider the full range of consequences of the Proposed Action, alternatives to the Proposed Action, and the No-Action Alternative. Assessing the cumulative effects 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. In any NEPA analysis, it is preferable to quantify the assessment of effects (changes) on each affected resource. This is true for direct, indirect, and cumulative effects. Where possible, the analysis is quantified. Where quantification is not available, a meaningful and qualified judgment of cumulative effects is included to inform the public and the decision-maker.

Western and the consultant developed a list of the relevant cumulative actions that may have applicable effects on resource values and uses of the project area.

Table F.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

Table F.1. Cumulative Actions (Continued)

Project	Project Description	Location	Resources Affected
Past and Present (5 years to present)			
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
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

Table F.1. Cumulative Actions (Continued)

Project	Project Description	Location	Resources Affected
Past and Present (5 years to present)			
Coconino National Forest, continued			
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
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

Table F.1. Cumulative Actions (Continued)

Project	Project Description	Location	Resources Affected
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
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

Table F.1. Cumulative Actions (Continued)

Project	Project Description	Location	Resources Affected
Reasonably Foreseeable (1–20 years)			
ADOT Projects, continued			
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
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

Table F.1. Cumulative Actions (Continued)

Project	Project Description	Location	Resources Affected
Reasonably Foreseeable (1–20 years)			
Coconino National Forest, continued			
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
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

Table F.1. Cumulative Actions (Continued)

Project	Project Description	Location	Resources Affected
Reasonably Foreseeable (1–20 years)			
Coconino National Forest, continued			
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
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

Table F.1. Cumulative Actions (Continued)

Project	Project Description	Location	Resources Affected
Reasonably Foreseeable (1–20 years)			
Coconino National Forest, continued			
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
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 G

SUMMARY OF CULTURAL RESOURCES IN THE PROJECT AREA OF POTENTIAL EFFECTS

Table G-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 G-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 H

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

June 2011

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

Prepared for

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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.

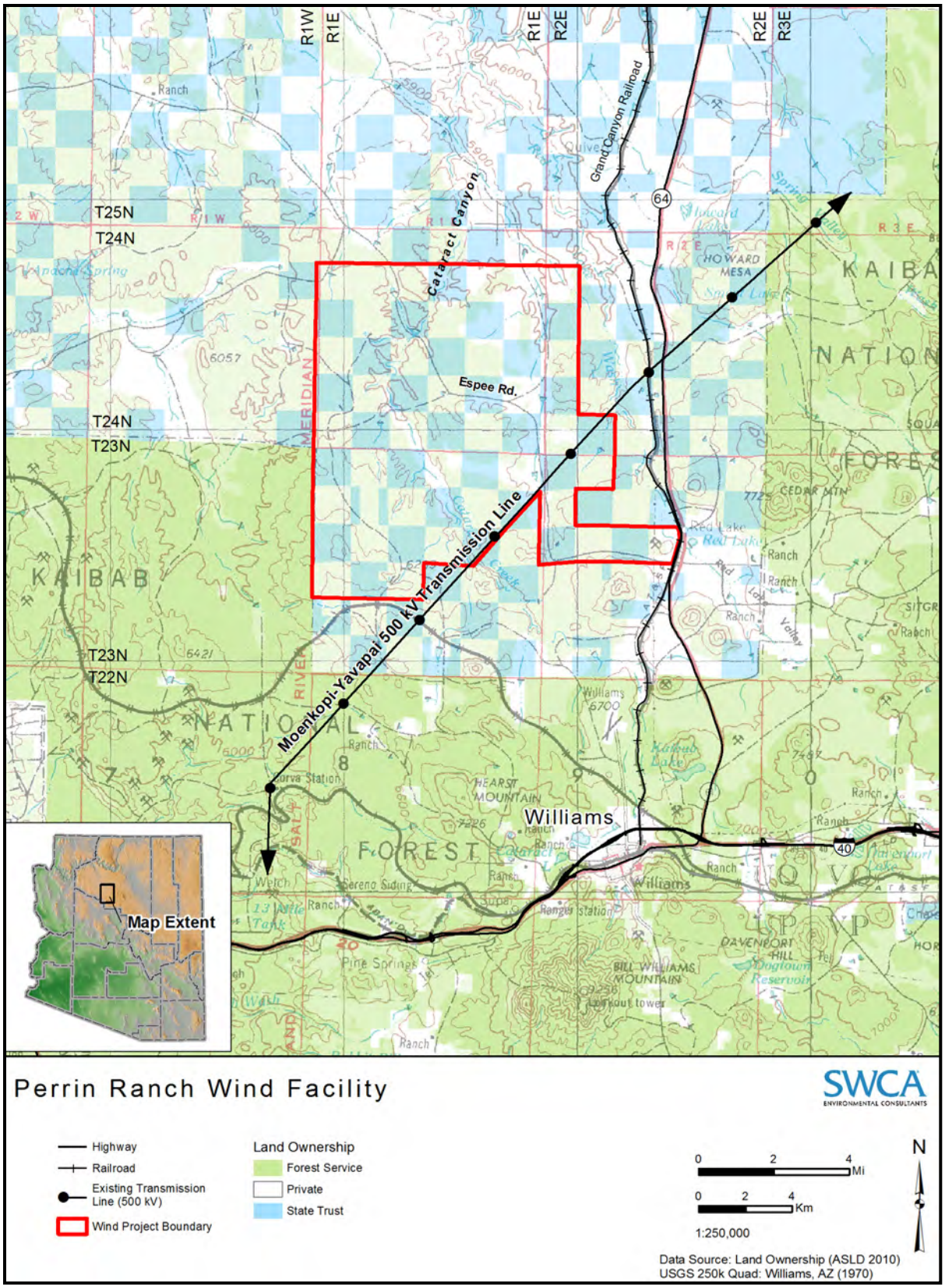

Figure 1. Project location.

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 Common name	Species Scientific name	Protection Status USFWS	Protection Status AZSWAP	Potential for Occurrence in the Project Area
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 Common name	Species Scientific name	Protection Status USFWS	Protection Status AZSWAP	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.
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 Common name	Species Scientific name	Protection Status USFWS	Protection Status AZSWAP	Potential for Occurrence in the Project Area
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 Common name	Species Scientific name	Protection Status USFWS	Protection Status AZSWAP	Potential for Occurrence in the Project Area
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 Common name	Species Scientific name	Protection Status USFWS	Protection Status AZSWAP	Potential for Occurrence in 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.
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 Common name	Species Scientific name	Protection Status USFWS	Protection Status AZSWAP	Potential for Occurrence in the Project 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 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 Common name	Species Scientific name	Protection Status USFWS	Protection Status AZSWAP	Potential for Occurrence in the Project Area
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 Common name	Species Scientific name	Protection Status USFWS	Protection Status AZSWAP	Potential for Occurrence in 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 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:

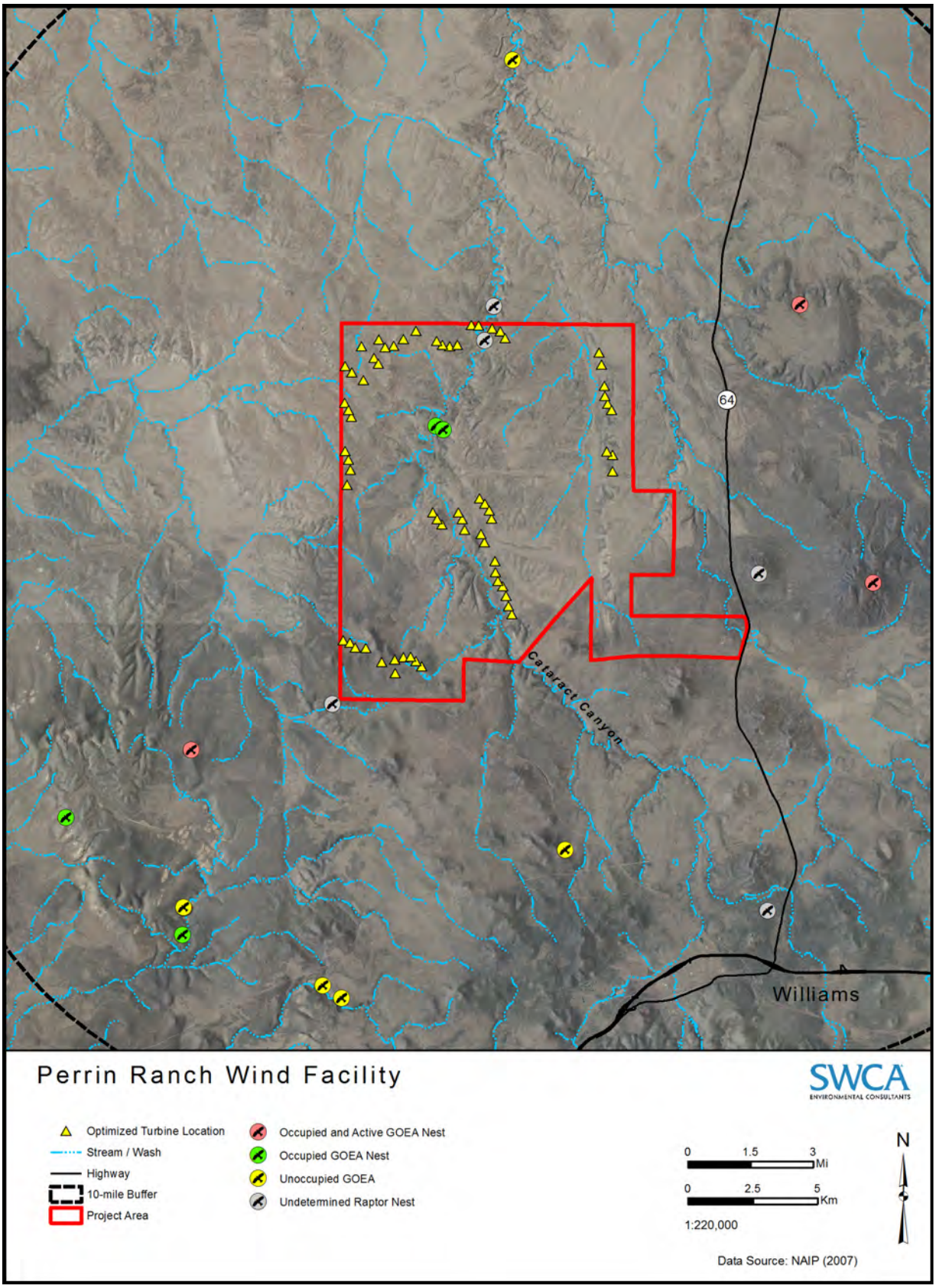

Figure 2. Eagle nests recorded in the study area (10-mile buffer).

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 18 species in the project area to date, 14 of which are special-status (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 Mexican free-tailed bat and the hoary bat. While a limited number of studies have been done within the range of the Mexican free-tailed bats, it may be assumed that this species is susceptible to mortality based upon their flight characteristics. Mexican free-tailed bats are likely to be at greatest risk of collision during the fall migratory period (Pandion 2011). 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), a time when its numbers are lower than other bat species in the project area.

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 AGFD and USFWS approved 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 program will be prepared by a qualified biologist. 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 and provided 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.

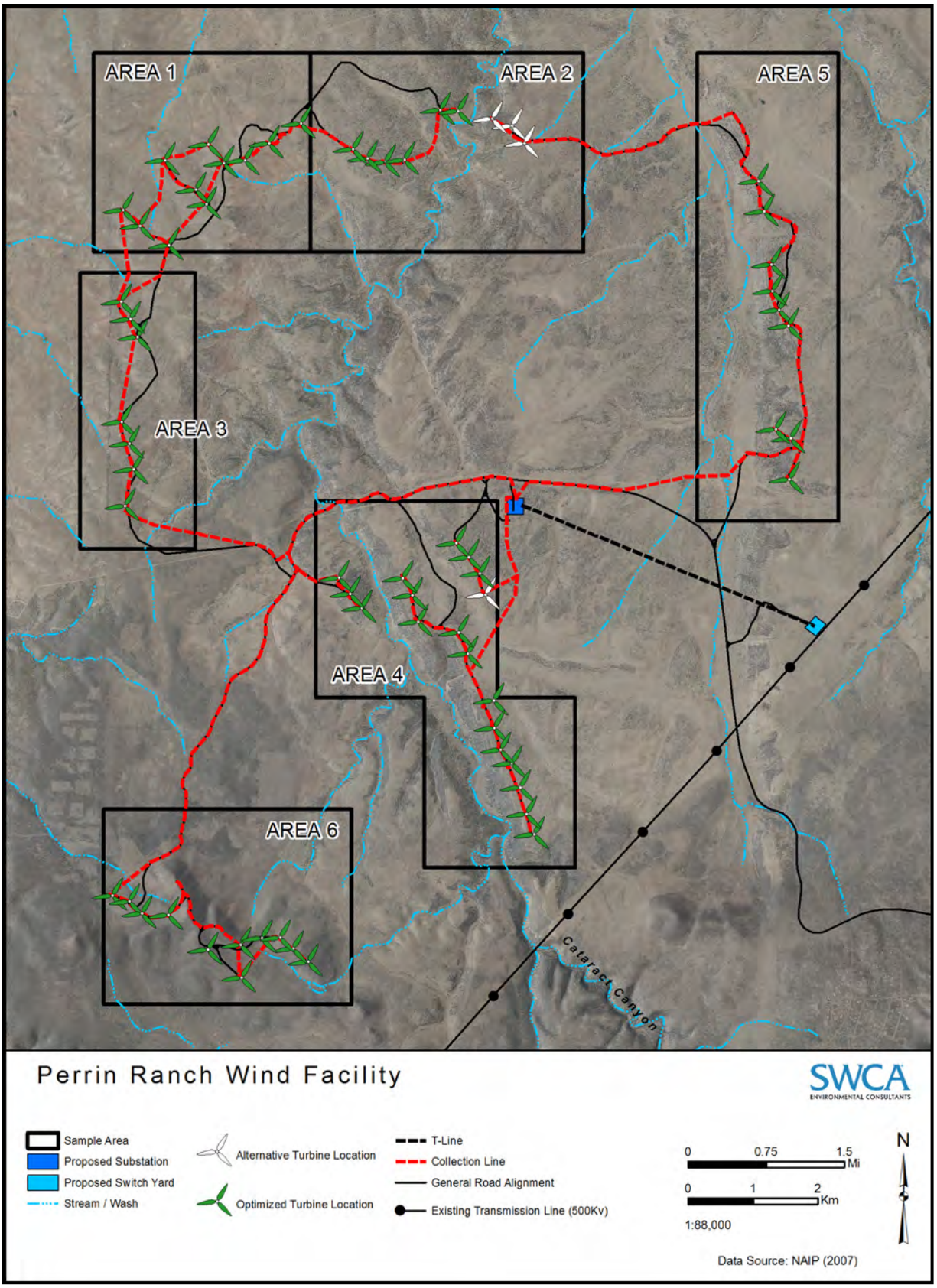

Figure 3. Mortality sample areas for the Perrin Ranch Wind Facility.

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	Threshold Value 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 (WBWG 2011).	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	Threshold Value 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.

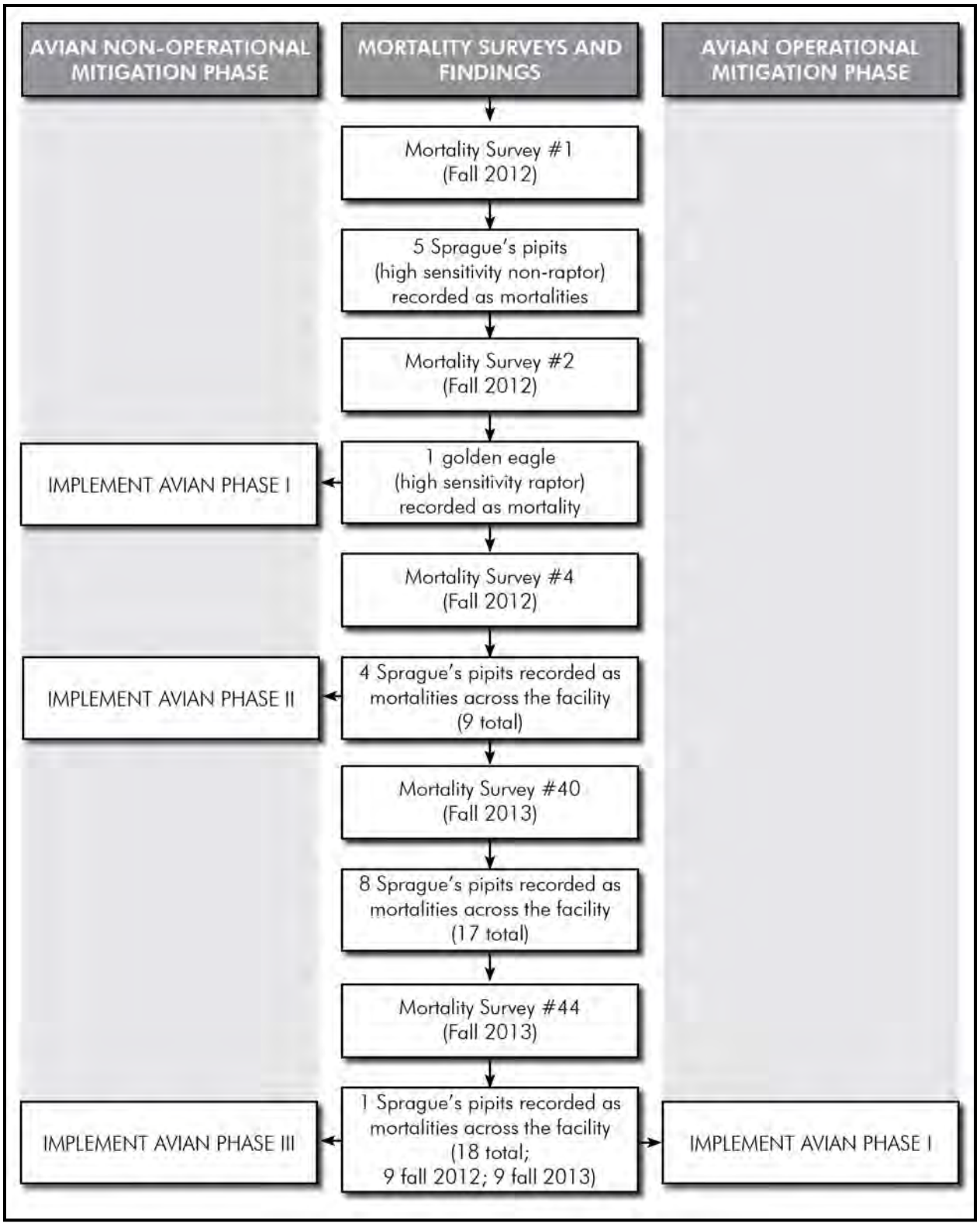

Figure 4. Mitigation process example flowchart.

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).

*Contributed to the Bald and Golden Eagle fund for eagle mortalities

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 or the Bald and Golden Eagle Fund described in Section 3.2.4 depending on species. 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 or the Bald and Golden Eagle Fund described in Section 3.2.4 depending on species.

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 or the Bald and Golden Eagle Fund described in Section 3.2.4 depending on species.

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 or the Bald and Golden Eagle Fund described in Section 3.2.4 depending on species.

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.

Radio-controlled Bownet – 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.

Radio-controlled Power-Snare – 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.

Eagle Dho-gaza – 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.

Net-Launchers – 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 I

PERRIN TRIBAL GOVERNMENT CONTACTS

Table I-1. Perrin Ranch Wind Energy Interconnection Project Tribal Government Contacts M Bilsbarrow 6/27/2011

Date/Time (MST)	Contact Type	Tribal Government	Name	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; Edmund Tilousi, or Roland Manakaja**
4/14/11 13:30	called	Havasupai	Edmund Tilousi	No answer; no opportunity to leave voice mail
4/14/11 13:50	emailed	Havasupai	Edmund Tilousi	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	No answer; no opportunity to leave voice mail
4/14/11 15:30	called	Havasupai	Edmund Tilousi	No answer; no opportunity to leave voice mail
4/15/11 10:20	called	Havasupai	Edmund Tilousi	No answer; no opportunity to leave voice mail
4/15/11 10:30	called	Havasupai	general contact	Receptionist said that the Tribe's cultural resources contact is Travis Hambrieek (sp?).
4/15/11 10:35	called	Havasupai	Travis Hamidreek	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.
4/15/11 14:30	called	Havasupai	Travis Hamidreek	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?

Table I-1. Perrin Ranch Wind Energy Interconnection Project Tribal Government Contacts M Bilsbarrow 6/27/2011 (Continued)

Date/Time (MST)	Contact Type	Tribal Government	Name	Result
Havasupai, continued				
4/18/11 10:00	Call received	Havasupai	Ron Manakaja	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	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 Grizet (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.
5/5/11 13:30	Field visit	Havasupai	Travis Hamidreek Roland Manakaja	We meet with Hualapai government representatives during lunch. Afterwards, Hualapai left and we visited Sites AZ H:12:56(ASM) and AZ H:12:77(ASM) located near the interconnected substation. They were pleased that the sites would be avoided by the project. They are interested in developing wind energy on their reservation. They requested a follow up meeting tentatively set for May 25, 26, or 27 at Peach Springs on the Hualapai Reservation. Western, NextEra, the landowner, and SWCA were invited to give presentations, and the following topics were requested: project overview, visual impacts, and isolated occurrences identified during the cultural survey.
Hopi Tribe				**Terry Morgart**
2/8/11	Letter received	Hopi	Leigh Kuwanwisiwma	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	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?

Table I-1. Perrin Ranch Wind Energy Interconnection Project Tribal Government Contacts M Bilsbarrow 6/27/2011 (Continued)

Date/Time (MST)	Contact Type	Tribal Government	Name	Result
Hopi Tribe, continued				
4/15/11 11:00	Called received	Hopi	Terry Morgart	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]
5/9/11	mailed	Hopi	Terry Morgart	At Western's direction, the consultant mailed the draft EA to Hopi per 2/8/11 letter.
Hualapai Nation				**Loretta Jackson Kelly**
4/14/11 14:40	called	Hualapai	Loretta Jackson Kelly	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	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? Ron Manakaja, calling on behalf of Travis Hamibreeck, 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 nite in flagstaff. So we could meet in the AM on the 5th. Thanks.
4/26/11 13:00	Called	Hualapai	Loretta Jackson Kelly	Left message with secretary.

Table I-1. Perrin Ranch Wind Energy Interconnection Project Tribal Government Contacts M Bilsbarrow 6/27/2011 (Continued)

Date/Time (MST)	Contact Type	Tribal Government	Name	Result
Hualapai Nation, continued				
4/26/11 13:25	Email sent	Hualapai	Loretta Jackson Kelly	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?
5/5/11 9:30	Field Visit	Hualapai	Loretta Jackson Kelly; Dawn Hubbs	We visited Site AZ H:12:56(ASM) located near the interconnection substation and Site H:12:72(ASM) which contains obsidian artifacts. LJ express a concern that too many of the cultural resources were recorded as isolated artifact occurrences. LJ expressed concerns about visual impacts, and specifically requested Red Butte as a Key Observation Point. They requested a follow up meeting tentatively set for May 25, 26, or 27 at Peach Springs on the Hualapai Reservation. Western, NextEra, the landowner, and SWCA were invited to give presentations, and the following topics were requested: project overview, visual impacts, and isolated occurrences identified during the cultural survey
5/10/11 14:00	Called	Hualapai	Loretta Jackson Kelly	Left message with secretary. Can we meet on 5/26? What time? How long?
5/10/11 10:30	Called	Hualapai	Loretta Jackson Kelly	Secretary said that LJ was in a meeting and would I like to leave a message. I said I left a message yesterday and would send an email.
5/10/11 10:50	Email sent	Hualapai	Loretta Jackson Kelly	Western would like to schedule the follow up meeting for the Perrin Ranch Wind Energy Project for Thursday May 26 at Peach Springs. Are your staff available on this date? What time works best? How long should we plan to meet for?
5/12/11 11:30	Email received	Hualapai	Dawn Hubbs	For Perrin Ranch presentations, how about 9:00 am on the 26th here at Cultural? Let us know about your agenda.

Table I-1. Perrin Ranch Wind Energy Interconnection Project Tribal Government Contacts M Bilsbarrow 6/27/2011 (Continued)

Date/Time (MST)	Contact Type	Tribal Government	Name	Result
Hualapai Nation, continued				
5/12/11 14:05	Email sent	Hualapai	Dawn Hubbs Loretta Jackson Kelly	The meeting time, date, and place (9 am on Thursday 5/26 at the Hualapai Cultural office in Peach Springs) works for us. Did your office confirm this with the Havasupai representatives, or do we need to follow up? I'm going to ask Suzanne Griset to follow up with the draft agenda and logistical details, because I'm out of the office on Friday 5/13 and Monday 5/16. I look forward to seeing you on 5/26.
5/12/11 16:30	Email received	Hualapai	Loretta Jackson Kelly	Have SWCA contact Havasupai pls-very busy here as well.
5/26/11	Meeting	Hualapai	Loretta Jackson Kelly	Western, NextEra, SWCA and the ranch owner met with Hualapai Nation government representatives at the tribe's cultural center in Peach Springs, AZ. Havasupai representatives were invited, but did not attend. The following topics were discussed: Western's action and related decision points, project description, visual analysis, cultural resources, and biological resources. Hualapai requested that the tribe have right of first refusal for bird feathers from any birds harmed by the project. Western responded that protected bird feathers are subject to federal law administered by FWS; the project proponent and ranch owner would not object to an agreement between FWS and Hualapai regarding their distribution. Based on the visual analysis, the project's turbines would be visible from the top of Red Butte, but at 25-34 miles away, they would be difficult to discern their form or color against the background. Western and Hualapai agreed to have a tribal government representative monitor construction, Hualapai government would be contacted directly in the event of a discovery, and Hualapai government representatives would participate in any treatment of a discovery. Hualapai plans to provide Western with comments on the draft EA, probably after 6/6/11. Western agreed to consider the Hualapai Nation's comments in the time available prior to making decision, currently scheduled for 6/30/11.
6/3/11 11:30	Email sent	Hualapai	Dawn Hubbs Loretta Jackson Kelly	On June 1, 2011, Western changed the NEPA schedule for the Perrin Ranch Wind Energy Interconnection Project, which may allow us to incorporate your government's comments more easily. Western extended the public comment period to Thursday June 23, 2011 from Monday June 6, 2011. We still would like to sign a decision document as close to June 30, as possible, but realistically it could be closer to July 15, 2011; this part of the schedule is still in flux. As I said in the May 26, 2011 meeting, Western will consider your government's comments when we receive them and respond at best we can given where we are at in the schedule. From Western's perceptive, the best time to receive your government's comments would be on or before June 23, 2011. I look forward to receiving your government's input.

Table I-1. Perrin Ranch Wind Energy Interconnection Project Tribal Government Contacts M Bilsbarrow 6/27/2011 (Continued)

Date/Time (MST)	Contact Type	Tribal Government	Name	Result
Hualapai Nation, continued				
6/10/11 13:00	Email sent	Hualapai	Loretta Jackson Kelly	Following up on a discussion item at the 5/26/11 meeting, NextEra asked the U.S. Fish and Wildlife Service Region 2 Migratory Bird Office about collecting bird feathers from bird strikes associated with the operation of the Perrin Ranch Wind Energy Project. FWS's response is presented below. "Feather distribution to Native American tribal members is only allowed under a federal permit that authorizes the activity. Currently, only the National Eagle Repository and a handful of Native American aviaries are authorized to distribute eagle feathers and two national non-eagle repositories are authorized to distribute carcasses/parts of non-eagle MBTA species. Any federally recognized tribal members are encouraged to contact the repositories to request feathers." One of the repositories is Liberty Wildlife Rehabilitation Foundation, located in Scottsdale. Wind energy companies who want to conduct salvage activities need to apply for a special collecting permit that may allow for salvage within a larger, approved research project. The Region 2 Migratory Bird office recommends contacting them with questions about the Perrin Ranch site and activities. Until the company has a valid permit that includes Arizona, no activities that could violate the Migratory Bird Treaty Act should take place. This link has further information: http://www.fws.gov/migratorybirds/mbpermits.html <http://www.fws.gov/migratorybirds/mbpermits.html> Contact information for Region 2 permits (AZ, NM, OK, TX): U.S. Fish and Wildlife Service Migratory Bird Permit Office P.O. Box 709 Albuquerque, NM 87103 Tel. (505) 248-7882 Fax (505) 248-7885 Email permitsR2MB@fws.gov <mailto:permitsR2MB@fws.gov>
6/23/11 17:00	Email sent	Hualapai	Loretta Jackson Kelly	Western looks forward to receiving and addressing your government's comments on the Perrin Ranch Wind Energy Interconnection Project. Western plans to produce a final Environmental Assessment on Tuesday 6/28/11 and sign a decision document during the week of July 5, 2011. From Western's point of view, the best time to receive your government's comment is by Monday 6/27/2011. Past this date, Western will address comments to the extent that we can given our project schedule.
6/27/11 3:30	Called	Hualapai	Loretta Jackson Kelly	Left message on answering machine. Western looks forward to receiving and addressing your government's comments on the Perrin Ranch Wind Energy Interconnection Project. Western plans to produce a final Environmental Assessment on 6/28/11 or 6/29/11and sign a decision document during the week of July 5, 2011. Western will address comments to the extent that we can given our project schedule.

Table I-1. Perrin Ranch Wind Energy Interconnection Project Tribal Government Contacts M Bilsbarrow 6/27/2011 (Continued)

Date/Time (MST)	Contact Type	Tribal Government	Name	Result
Navajo Nation				**Alan Downer**
4/14/11 15:00	called	Navajo Nation	Alan Downer	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**
4/14/11 14:00	called	Yavapai-Apache	Chris Coder	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	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	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**
4/14/11 14:15	Called	Yavapai Prescott	Greg Glassco	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.
4/18/11 11:40	Email sent	Yavapai Prescott	Greg Glassco	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	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	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 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.

Table I-1. Perrin Ranch Wind Energy Interconnection Project Tribal Government Contacts M Bilsbarrow 6/27/2011 (Continued)

Date/Time (MST)	Contact Type	Tribal Government	Name	Result
Yavapai Prescott, continued				
4/26/11 16:00	Email received	Yavapai Prescott	Greg Glassco	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.
5/10/2011 17:20	Email sent	Yavapai Prescott	Greg Glassco	Western held a government-to-government meeting with representatives from the Hualapai and Havasupai Tribes at the project area on Thursday 5/5/11. NextEra, the landowner, and SWCA representatives were also present. I'm providing this summary per your request on 4/26/11. In the morning, we meet with Hualapai representatives Loretta Jackson and Dawn Hubbs. We visited Site AZ H:12:56 (ASM), which is located near the interconnection substation, and an existing transmission line access road crosses it. The site protection markings (metal t-posts, rope and flagging) were present. Although we do not plan to use the road during construction, it is possible that a rubber-tired vehicle might drive on the access road, which is used by APS and the ranch. The landowner said that the transmission line right-of-way, which includes the site, was chained to remove juniper and pinyon, prior to construction in 1972. We also visited AZ H:12:72(ASM), because they wanted to see a site with obsidian artifacts. Loretta expressed concern that there were too many resources were recorded as IO in the survey results (n=337). However, she did not identify any specific IOs as being problematic however. At lunch, Havasupai representatives, Travis Hamidreek and Roland Manakaja joined us. Both Hualapai and Havasupai requested that a burial agreement with ASM be obtained for this project; it did not matter that all sites were being avoided by project-related ground-disturbing activities. The landowner mentioned that a mummified human burial was discovered in 1972 during the construction of a footing for a transmission line tower near Red Lake Wash, two miles northeast of the proposed interconnection substation. (The discovery may have been reported as part of Calvin Jennings dissertation at UofA). After lunch, Hualapai representatives had to leave because of prior commitments. In the afternoon, we visited Site AZ H:12:56 (ASM) and nearby AZ H:12:77(ASM) with the Havasupai representatives. They were pleased that the sites would be avoided by the project. They are interested in developing wind energy on their reservation. Both Hualapai and Havasupai government representatives requested a follow up meeting tentatively set for May 25, 26, or 27 at Peach Springs on the Hualapai Reservation. Western, NextEra, the landowner, and SWCA were invited to give presentations, and the following topics were requested: project overview, visual impacts, and isolated occurrences identified during the cultural survey. Loretta specifically wanted to see be a photo-simulation of the project from Red Butte, which is 31 miles north of the project area. Western plans to follow up regarding the proposed meeting for the end of May.